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Human Health Risk Assessment Former ChemOil Refinery 2020 Walnut Avenue Signal Hill, California 90755

May 31, 2018

Prepared for:

Signal Hill XC, LLC. 3010 Old Ranch Parkway, Suite 470 Seal Beach, California 90740

Prepared by:

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via email

Mr. Steven Christie Signal Hill XC, LLC. 3010 Old Ranch Parkway, Suite 470 Seal Beach, California 90740

RE: Human Health Risk Assessment Former ChemOil Refinery, 2020 Walnut Avenue, Signal Hill, California 90755

Dear Mr. Christie:

The 8.2-acre former ChemOil refinery is divided by Walnut Avenue into a 5.7-acre western parcel and a 2.5-acre eastern parcel. The refinery operated on the western parcel, offices, warehouse truck repair/garage and maintenance shop was located on the eastern parcel. Potential impacts to human health due to exposure to constituents in the soil matrix, soil vapor and groundwater underlying the parcels therefore were assessed separately.

The objectives of this baseline human health risk assessment are: (1) to evaluate potential health risks to human receptors posed by concentrations of constituents detected at least one time in the soil matrix and soil vapor and shallow groundwater underlying the 8.2-acre site, and (2) to satisfy the City of Signal Hill's requirement under the California Environmental Quality Act.

A methane assessment of the 8.2-acre site was performed in March and April 2018 in accordance with the City of Signal Hill's Oil and Gas Code §16.24.080, the City's Project Development Guide (June 20, 2017) and Methane Assessment Minimum Requirements Standard. Methane was consistently detected in the field and by the laboratory.

Methane mitigation subslab of proposed buildings is required pursuant to the City's Project Development Guide (June 20, 2017) and Methane Mitigation Minimum Requirements Standard. The methane mitigation system on the western parcel shall consist of a subslab impervious membrane placed inbetween geotextile or geocloth to protect it from sand above and the 4" thick gravel blanket below. Perforated horizontal vent pipes should be placed in the 4" thick gravel blanket and tied into vertical vent risers (typically cast iron) placed inbetween the interior and exterior walls, less than 100-feet apart, extending a minimum of 3-feet above the roof line and should not terminate less than 100-feet from any opening.

The methane mitigation system on the eastern parcel shall consist of a subslab impervious membrane placed inbetween geotextile or geocloth to protect it from sand above and the 2" thick gravel blanket below. Perforated horizontal vent pipes should be placed in the 2" thick gravel blanket and tied into vertical vent risers (typically cast iron) placed inbetween the interior and exterior walls, less than 100-feet apart, extending a minimum of 3-feet above the roof line and should not terminate less than 100-feet from any opening.

Methane mitigation underneath paved areas greater than 5,000 square feet within 15-feet of the proposed buildings shall consist of a minimum 12-inch square vents with 34 inch rock placed on the exposed soil at a minimum depth of 1-foot, protected by traffic rated grates.

Although designed to capture and vent methane to the atmosphere, other volatile organic compounds (VOCs) in the subsurface (in the soil matrix, soil vapor and shallow groundwater) also will be captured and vented by this system.

This human health risk assessment assessed the potential risk and hazard attributable to exposure to 15 carcinogenic constituents and 62 noncarcinogenic constituents, including lead, detected in soil, soil vapor and groundwater underlying the western parcel, and to 6 carcinogenic constituents and 26 noncarcinogenic constituents detected in soil and soil vapor underlying the eastern parcel. Although the site is zoned industrial and the intended future use is commercial the hypothetical residential exposure scenario was assessed in addition to the commercial worker and construction worker scenarios pursuant to DTSC guidance (2015).

Western Parcel – Planned remediation includes a soil vapor extraction system, air sparging to prevent offsite migration of contamination and passive skimming of shallow groundwater to remove light non-aqueous phase liquid (LNAPL). The planned remediation system will be constructed concurrently with grading for development of the western parcel.

DTSC's LeadSpread 8.0 Model results indicate that lead does not pose an unacceptable hazard to adults and children in a residential exposure scenario.

The hypothetical residential and commercial worker scenario indicates hazard levels exceed target thresholds via the ingestion and dermal contact pathways. The hypothetical residential and commercial worker scenarios indicate risk and hazard levels exceed target thresholds via the inhalation exposure pathway where VOCs in the vapor phase are the attributable constituents.

The construction worker scenario indicates a hazard level that exceeds the target threshold via ingestion and dermal contact pathways.

Eastern Parcel – The hypothetical residential scenario indicates hazard levels exceed target thresholds via the ingestion and dermal contact pathways. The hypothetical residential scenarios indicate risk levels exceed target thresholds via the inhalation exposure pathway where VOCs in the vapor phase are the attributable constituents.

The commercial and construction worker scenarios indicate a hazard level that exceeds the target threshold via ingestion and dermal contact pathways.

Conclusions and Recommendations – Engineered remedial systems on the western parcel, i.e., the soil vapor extraction system, air sparging and passive skimming should reduce the potential health impacts to the commercial worker.

Institutional controls, i.e., the required methane mitigation system to be installed subslab of all proposed buildings and paved areas greater than 5,000 square feet, and paving of surface soils for parking effectively mitigates the risks and hazards to negligible conditions ensuring the site is safe for the future intended use as a commercial property.

Mitigation measures during grading activities such as monitoring under the Air Quality Management District (AQMD) Rule 1166 permit/compliance plan and the application of Simple Green mixed with water applied as a dust suppressant may result in decreased concentrations of TPH-g and TPH-d in soils that protect the construction worker.

Should you have any questions or desire additional information, please do not hesitate to contact me at 310.403.1921.

Sincerely,

X Susan Mearns

Susan L. Mearns, Ph.D.

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EXECUTIVE SUMMARY

The 8.2-acre former ChemOil refinery is divided by Walnut Avenue into a 5.7-acre western parcel and a 2.5-acre eastern parcel. The refinery operated on the western parcel, offices, warehouse truck repair/garage and maintenance shop was located on the eastern parcel. Potential impacts to human health due to exposure to constituents in the soil matrix, soil vapor and groundwater underlying the parcels therefore were assessed separately.

The objectives of this baseline human health risk assessment are: (1) to evaluate potential health risks to human receptors posed by concentrations of constituents detected at least one time in the soil matrix and soil vapor and shallow groundwater underlying the 8.2-acre site, and (2) to satisfy the City of Signal Hill's requirement under the California Environmental Quality Act.

This baseline human health risk assessment (HHRA) followed the guidance in the Department of Toxic Substances Control (DTSC) *Preliminary Endangerment Assessment* (PEA) guidance manual (DTSC 2015), U.S. Environmental Protection Agency *Risk Assessment Guidance for Superfund volume 1, Human Health Evaluation Manual* (RAGs) (USEPA 2004), the U.S. Environmental Protection Agency *Risk Assessment Guidance for Superfund volume 1, Human Health Evaluation Manual* (Part F, Supplemental Guidance for Inhalation Risk Assessment) (USEPA 2009), the DTSC *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (DTSC, October 2011), the Massachusetts Department of Environmental Protection (MADEP) *Characterizing Risks posed by Petroleum Contaminated Sites* manual (MADEP October 31, 2002), the DTSC LeadSpread 8.0 Model, the DTSC modified Johnson & Ettinger soil gas screen, USEPA version 2.0 model (April 2003) modified by DTSC Office of Human and Ecological Risk (HERO) December 2014, and the DTSC modified Johnson & Ettinger groundwater screen, USEPA version 3.0 model (April 2003) modified by DTSC HERO December 2014.

The site is currently zoned for medium industrial use and the planned development is for commercial use. There are no current plans to place residential units onsite, however the HHRA included the residential land use scenario in estimating risks and hazards due to exposure to constituents in the soil matrix and soil vapor and shallow groundwater underlying the site as a hypothetical scenario pursuant to DTSC guidance (DTSC 2015, 2016).

The planned redevelopment is to construct five commercial buildings on the western parcel, four on the eastern parcel and surface level parking on both parcels.

A methane assessment of the 8.2-acre site was performed in March and April 2018 in accordance with the City of Signal Hill's Oil and Gas Code §16.24.080, the City's Project Development Guide (June 20, 2017) and Methane Assessment Minimum Requirements Standard. Methane was consistently detected in the field and by the laboratory.

Methane mitigation subslab of proposed buildings is required pursuant to the City's Project Development Guide (June 20, 2017) and Methane Mitigation Minimum Requirements Standard. The methane mitigation system on the western parcel shall consist of a subslab impervious membrane placed inbetween geotextile or geocloth to protect it from sand above and the 4" thick gravel blanket below. Perforated horizontal vent pipes should be placed in the 4" thick gravel blanket and tied into vertical vent risers (typically cast iron) placed inbetween the interior and exterior walls, less than 100-feet apart, extending a minimum of 3-feet above the roof line and should not terminate less than 100-feet from any opening.

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The methane mitigation system on the eastern parcel shall consist of a subslab impervious membrane placed inbetween geotextile or geocloth to protect it from sand above and the 2" thick gravel blanket below. Perforated horizontal vent pipes should be placed in the 2" thick gravel blanket and tied into vertical vent risers (typically cast iron) placed inbetween the interior and exterior walls, less than 100-feet apart, extending a minimum of 3-feet above the roof line and should not terminate less than 100-feet from any opening.

Methane mitigation underneath paved areas greater than 5,000 square feet within 15-feet of the proposed buildings shall consist of a minimum 12-inch square vents with 3/4 inch rock placed on the exposed soil at a minimum depth of 1-foot, protected by traffic rated grates.

Although designed to capture and vent methane to the atmosphere, other volatile organic compounds (VOCs) in the subsurface (in the soil matrix, soil vapor and shallow groundwater) also will be captured and vented by this system.

Western Parcel – Planned remediation includes a soil vapor extraction system, air sparging to prevent offsite migration of contamination and passive skimming of shallow groundwater to remove light non-aqueous phase liquid (LNAPL). The planned remediation system will be constructed concurrently with grading for development of the western parcel.

The maximum detected concentration or the upper confidence level, whichever was lower pursuant to the ProUCL guidance (USEPA 2004), of the constituent detected in the top 15-feet (ft) of the soil matrix was used as the exposure point concentration for residential, commercial and construction worker scenarios for the 5.7-acre western parcel. The maximum detected concentrations of the volatiles in soil vapor collected at 5-ft below ground surface (bgs) and in shallow groundwater were used as the exposure point concentrations for the residential and commercial worker scenarios. Those chemicals of concern that had both reference doses or reference concentrations and slope factors or unit risk factors available, were assessed as both noncarcinogenic and carcinogenic compounds.

DTSC's LeadSpread 8.0 Model estimates the hazard due to exposure to lead in air and onsite soils/dust for adults and children within a residential scenario. Typically lead concentrations in air are not measured onsite. Therefore the model extrapolates these concentrations from the measured concentrations of lead in onsite soils. The percentile blood lead concentration is estimated by the model to provide an estimate of the percentage of a population of children and adults that would be expected to have blood lead levels that exceed the threshold value for a residential exposure scenario.

DTSC's LeadSpread 8.0 Model results indicates that the 95UCL of lead does not pose an unacceptable hazard to children or adults in a residential exposure scenario on the western parcel.

The estimated risk of each carcinogenic constituent detected in soil, soil vapor and groundwater were summed to provide a summed risk. The results of the HHRA indicate the summed risk of the carcinogenic volatiles in soil vapor and groundwater did exceed the target threshold $1x10^{-6}$ for the residential scenario. The estimated risks due to exposure to benzene, 1,4-dichlorobenzene, ethylbenzene, naphthalene and tetrachloroethylene via the inhalation pathway contributed the risks.

The results of the HHRA indicate the summed risk of the carcinogenic constituents in soil and soil vapor did exceed the target threshold $1x10^{-5}$ for the commercial worker scenario. The estimated risk due to

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exposure to benzene and ethylbenzene inn soil vapor and shallow groundwater via the inhalation pathway contributed the risk.

The results of the HHRA indicate that the estimated summed hazard index (HI) of the noncarcinogenic constituents in soil, soil vapor and shallow groundwater did exceed the target hazard threshold for the residential exposure scenario. The estimated hazards of total petroleum hydrocarbons-gasoline range (TPH-g) and TPH-diesel range (TPH-d) in the soil matrix and benzene, ethylbenzene, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, m,p-xylenes, o-xylene and in soil vapor via the ingestion, dermal contact and inhalation exposure routes contributed the greatest hazard to the residential scenario.

The estimated HI of the noncarcinogenic constituents in soil, soil vapor and shallow groundwater did exceed the target hazard threshold for the commercial worker exposure scenario. The estimated hazard of TPH-g and TPH-d in the soil matrix and benzene, toluene, 1,2,4-trimethylbenzene, m,p-xylenes and o-xylene in soil vapor via the inhalation exposure route contributed the greatest hazard to the commercial worker scenario.

The estimated HI of the noncarcinogenic constituents in soil did exceed the target hazard threshold for the construction worker exposure scenario. The estimated hazard of TPH-g and TPH-d in the soil matrix contributed the greatest hazard to the construction worker.

Eastern Parcel - The maximum detected concentrations of constituents detected in the soil matrix were used as the exposure point concentrations for the residential, commercial and construction worker scenarios for the 2.5-acre eastern parcel. The maximum detected concentrations of the volatiles in soil vapor collected at 5-ft bgs and in shallow groundwater were used as the exposure point concentrations for the residential and commercial worker scenarios. Those chemicals of concern that had both reference doses or reference concentrations and slope factors or unit risk factors available, were assessed as both noncarcinogenic and carcinogenic compounds.

The estimated risk of each carcinogenic constituent detected in soil, soil vapor and groundwater were summed to provide a summed risk. The results of the HHRA indicate the summed risk of the carcinogenic volatiles in soil vapor and groundwater did exceed the target threshold $1x10^{-6}$ for the residential scenario. The estimated risks due to exposure to benzene in soil vapor and bis(2-chloroethyl)ether in groundwater via the inhalation pathway contributed the risks.

The results of the HHRA indicate the summed risk of the carcinogenic constituents in soil and soil vapor did not the target threshold $1x10^{-5}$ for the commercial worker scenario.

The results of the HHRA indicate that the estimated summed hazard index (HI) of the noncarcinogenic constituents in soil, soil vapor and shallow groundwater did exceed the target hazard threshold for the residential exposure scenario. The estimated hazards of TPH-g, TPH-d and thallium in the soil matrix via the ingestion and dermal contact contributed the greatest hazard to the residential scenario.

The estimated HI of the noncarcinogenic constituents in soil, soil vapor and shallow groundwater did exceed the target hazard threshold for the commercial worker exposure scenario. The estimated hazard of TPH-g and TPH-d in the soil matrix via the ingestion and dermal contact contributed the greatest hazard to the commercial worker scenario.

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The estimated HI of the noncarcinogenic constituents in soil did exceed the target hazard threshold for the construction worker exposure scenario. The estimated hazard of TPH-g and TPH-d in the soil matrix via ingestion and dermal contact contributed the greatest hazard to the construction worker.

Conclusions and Recommendations - Institutional controls, i.e., the required methane mitigation system to be installed subslab of the proposed buildings and paved areas greater than 5,000 square feet, and paving of surface soils for parking effectively mitigates the risks and hazards to negligible conditions ensuring the site is safe for the future intended use as a commercial/industrial property.

Mitigation measures during grading activities such as monitoring under the Air Quality Management District (AQMD) Rule 1166 permit/compliance plan and the application of Simple Green mixed with water applied as a dust suppressant may result in decreased concentrations of TPH-g and TPH-d in soils that protect the construction worker.

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1.0 INTRODUCTION

This report presents the results of a human health risk assessment for the 5.7-acre western parcel (GeoTracker T10000010213, RB Case #1391) and the 2.5-acre eastern parcel (GeoTracker SL2047W2348, RB Case #0453A), collectively the former ChemOil refinery site located at 2020 Walnut Avenue in Signal Hill, California (the site) (Figure 1).

The 8.2-acre former ChemOil refinery is divided by Walnut Avenue into a 5.7-acre western parcel and a 2.5-acre eastern parcel (Figure 2). The western parcel is divided along an east-west axis by 21st Street. The proposed development entails the vacation of 21st Street by the City of Signal Hill City Council for development as surface level parking. Although various historic assessments and investigations have further divided the western parcel for the purposes of site characterization this human health risk assessment did not subdivide the western parcel as the fuel hydrocarbons in the soil matrix, impacted soil vapor underlying the site, methane, light non-aqueous phase liquid (LNAPL) and hydrocarbon impacted shallow groundwater extend throughout the western parcel (Figures 3-10). As the historic use of the western and eastern parcels was different (Figure 11) with the refinery operating on the western parcel potential impacts to human health due to exposure to constituents in the soil matrix, soil vapor and groundwater underlying the parcels were assessed separately.

The purpose of this human health risk assessment is to evaluate the potential adverse health impacts due to exposure to concentrations of constituents detected in the soil matrix, soil vapor and shallow groundwater underlying the site. If a constituent was detected one time in soil sampled, and/or one time in soil vapor, and/or one time in the shallow groundwater it was retained and quantitatively assessed in this human health risk assessment. This human health risk assessment assessed the potential risk and hazard attributable to exposure to 15 carcinogenic constituents and 62 noncarcinogenic constituents, including lead, detected in soil, soil vapor and groundwater underlying the western parcel, and to 6 carcinogenic constituents and 26 noncarcinogenic constituents detected in soil and soil vapor underlying the eastern parcel.

This HHRA followed the guidance in the Department of Toxic Substances Control (DTSC) *Preliminary Endangerment Assessment* (PEA) guidance manual (DTSC 2015), U.S. Environmental Protection Agency *Risk Assessment Guidance for Superfund volume 1, Human Health Evaluation Manual* (RAGs) (USEPA 2004), the U.S. Environmental Protection Agency *Risk Assessment Guidance for Superfund volume 1, Human Health Evaluation Manual* (Part F, Supplemental Guidance for Inhalation Risk Assessment) (USEPA 2009), the DTSC *Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (DTSC, October 2011), the Massachusetts Department of Environmental Protection (MADEP) *Characterizing Risks posed by Petroleum Contaminated Sites* manual (MADEP October 31, 2002), the DTSC LeadSpread 8.0 Model, the DTSC modified Johnson & Ettinger soil gas screen, USEPA version 2.0 model (April 2003) modified by DTSC Office of Human and Ecological Risk (HERO) December 2014, and the DTSC modified Johnson & Ettinger groundwater screen, USEPA version 3.0 model (April 2003) modified by DTSC HERO December 2014.

As the USEPA and the State of California Office of Environmental Health Hazard Assessment (OEHHA) have not published toxicity values, i.e., Reference Doses (RfDs), for total petroleum hydrocarbons (TPH) the guidance in the Massachusetts Department of Environmental Protection approach to characterizing risks posed by petroleum contaminated sites were used to obtain surrogate RfDs for TPH-g and TPH-d (MADEP 2002). The potential adverse health impacts due to exposure to TPH-g and TPH-d in onsite soils were then assessed by following the appropriate ingestion and dermal contact equations (DTSC 2015).

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2.0 SITE BACKGROUND

Background

The 8.2-acre vacant undeveloped property was used as a dairy farm prior to 1922. MacMillan Ring-Free Oil Company owned and operated a refinery onsite from 1922–1988. ChemOil purchased the refinery in August 1988 and operated it until February 14, 1994, when the refinery was shut down with occasional operation of its waste water system (Testa Environmental Corporation [TEC] 2009). Operation of the waste water system was discontinued and all above ground structures were dismantled in 1997. Reportedly the below ground structures and appurtenances including sumps, footings, foundations, and pipelines also were removed in 1997 (The Source Group [TSG] 2017).

MacMillan Ring-Free Oil Company had most of the processing area of the refinery located south of 21st Street on the western parcel. The refinery had an oil and grease area, scale house, truck scales, warehouses, crude unloading rack and truck loading rack on the western parcel. Aboveground storage tanks for the storage of crude oil, diesel, fuel oil, naptha, water, wastewater and blending stock also were located on the western parcel.

The California Regional Water Quality Control Board (CRWQCB) issued an order in 1984, Order No. 85-17, that required operating refineries to conduct a subsurface site assessment including the characterization and delineation of groundwater pollution underlying these facilities. MacMillan Ring-Free Oil Company complied with Order No. 85-17 in 1985 by installing groundwater monitoring wells in a shallow semi-perched groundwater zone approximately 40-feet below ground surface (bgs) and collecting soil samples from the borings used to install the monitoring wells.

Monitoring of groundwater underlying the former refinery has been performed periodically since 1985, with a hiatus from July 1999 to October 2001. Eight groundwater monitoring wells and three former light non-aqueous phase liquid (LNAPL) recovery wells were originally installed on this property. The refinery was dismantled in 1997 to 1998 after which one monitoring well and two recovery wells were no longer operational. There were nine wells, six monitoring wells and three former recovery wells on the western parcel; two additional monitoring wells were on the eastern parcel.

Three plumes of LNAPL were discovered underlying the property during the initial site assessments in 1985 to 1989. Two of these plumes were located in the area formerly occupied by the aboveground storage tanks on the western parcel. The first plume was located in the central and eastern portions of the western parcel and was comprised of a combination of naphtha, kerosene and gas-oil. The other plume was on the western corner of this parcel and was comprised of naphtha, kerosene and gas-oil (Figures 5-7 and 9).

A LNAPL recovery program was initiated in the first plume in March 1987 and in the second plume in December 1988. The estimated volume of total fluids removed from the recovery system was 253,902 barrels of which approximately 27.9 barrels were LNAPL. The LNAPL recovery system was terminated in February 1994. Residual LNAPL was encountered at a thickness of 2.25 feet in 2002 at the location of the first plume. Approximately nine gallons of LNAPL has been bailed from the recovery well in place at the first plume from 1994 to 2002.

Soil samples were collected in 1986, 1987 and 1998 by Environmental Engineering, Inc. (EEI) and TEC from soils on the western parcel from depths of 2-feet bgs to 35-feet bgs. Not all investigations placed borings to 35-feet bgs. Eight soil samples were obtained from depths of 6 to 7.5-feet bgs and 20 to 21.5-feet bgs and submitted for analysis of oil and grease, phenols, total organic carbon, total organic halogens,

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selected volatile organic compounds, pH and certain metals. Twelve additional soil samples from a depth of 2-feet bgs and 26 soil samples from a depth of 10-feet bgs were submitted for the same analyses. EEI reported that diesel and gasoline impacted soils occurred beneath the majority of the central and southern portions of the western parcel.

EEI reported that total petroleum hydrocarbons in the gasoline range (TPH-g) were reported in concentrations as great as 4,000 milligrams per kilogram (mg/kg). TPH in the diesel range (TPH-d) was reported in concentrations as great as 61,000 mg/kg. Undifferentiated hydrocarbons were reported in concentrations as great as 12,000 mg/kg, and total recoverable petroleum hydrocarbons (TrPH) were reported in concentrations as great as 49,000 mg/kg.

TEC place three soil borings to depths of 25-feet bgs, 30-feet bgs and 35-feet bgs in the western parcel in 1998. Eighteen soil samples were collected by TEC and submitted for analysis of TPH-g, TPH-d, TrPH, benzene, toluene, ethylbenzene and total xylenes (BTEX), and methyl tertiary butyl ether (MTBE). TPH-g was reported in concentrations as great as 1,130 mg/kg; TPH-d was reported in concentrations as great as 11,200 mg/kg; TrPH was reported in concentrations as great as 20,800 mg/kg; the greatest detected concentrations of benzene, toluene, ethylbenzene and total xylenes were reported as 1,560 mg/kg, 14,000 mg/kg, 60,800 mg/kg and 105,000 mg/kg, respectively; and MTBE was not detected.

TEC concluded that hydrocarbon concentrations in subsurface soil under the western parcel increased with depth and the greatest concentrations were detected in close proximity to the groundwater, especially within the central portion of this parcel.

In summary, the former ChemOil refinery property has been investigated and remediated since 1985 to 2008 under the oversight of the LARWQCB. The bulk of the historic refinery operations occurred on the western parcel, south of 21st Street. Aboveground storage tanks were historically located on the southern one-half of the western parcel and apparently contributed to the bulk of subsurface soils and groundwater contamination underlying the property. Benign operations such as warehouses, a truck scale, a scale house, a crude unloading rack and truck loading rack were located on the northern portion of the western parcel. LNAPL has been recovered from the groundwater underlying the former ChemOil property; biannual groundwater monitoring occurred from 1988 to 1998; and quarterly groundwater monitoring occurred from 2001 to 2008. Subsurface soils have been identified on the western parcel with concentrations of TPH-g, TPH-d, TrPH and BTEX.

Previous Environmental Investigations

The Los Angeles Regional Water Quality Control Board (LARWQCB) issued an enforcement letter under §13267 of the California Water Code to Signal Hill Holding Corporation on November 19, 2008 requiring a Phase I report and Phase II workplan.

TEC conducted additional investigations in 2009 and 2011, on behalf of Signal Hill Holding Corporation, the property owner, including a soil vapor survey around the site perimeter and groundwater monitoring. Depth to groundwater was reported to range from 10.80-feet to 41.50-feet bgs and flow was reported to the south-southeast. Dissolved gasoline range organics were reported in 10 of the 16 monitoring wells sampled at concentrations ranging from non-detect to 19 milligrams per liter (mg/L). Dissolved diesel range organics were reported in 12 of the 16 monitoring wells at concentrations ranging from 1.1mg/L to 11mg/L. Benzene, toluene, ethylbenzene and total xylenes (BTEX), methyl tert-butyl ether (MTBE) and tert-butanol were reportedly detected in groundwater as were eight additional volatile organic compounds (VOCs). Slight to strong hydrocarbon odors were noted in all monitoring wells during sampling. TEC

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concluded dissolved hydrocarbons exist beneath the site and have migrated hydraulically offsite towards the west, south and southwest. TEC also concluded significant portions of the soil column beneath the Western Parcel are impacted by residual hydrocarbons from beneath existing grade to the water table, particularly in the southern portion of the western parcel and the northwestern corner of the eastern parcel. Tables from these reports are included as Appendix A and the data were used in the human health risk assessments.

Exponent (2009) prepared an initial soil vapor intrusion evaluation and an updated evaluation in a letter dated May 5, 2010 (Exponent 2010). Both evaluations concluded the potential soil vapor intrusion is not likely to be of concern for current off-site residents living south or southwest of the site, pending collection of additional soil vapor and groundwater samples. The California Environmental Protection Agency (Cal-EPA) Office of Human Health and Environmental Assessment (OEHHA) reviewed the May 5, 2010, evaluation and generally concurred with this conclusion, also pending collection of additional samples and resolution of several comments (Appendix B).

ToxStrategies prepared a *Second Update to Vapor Intrusion Evaluation for Southern Boundary, Former ChemOil Refinery, Signal Hill, California* in 2012 (Appendix C). ToxStrategies concluded "potential soil vapor intrusion should not be of concern for current or future residents living south or southwest of the property." (ToxStrategies October 8, 2012)

Trihydro Corporation prepared a Phase I Environmental Site Assessment in May 2016 on behalf of RE|Solutions, LLC. Trihydro stated that soil sampling occurred onsite in 1986, 1999, 2006 and 2009, and indicates significant portions of the soil column beneath the Western Parcel are impacted by residual hydrocarbons extending from ground surface to the water table. Trihydro concluded that soil impacts have not been addressed.

The Source Group ([TSG] now Apex Companies, LLC [Apex]) produced a Site Investigation and Site Conceptual Model report on March 29, 2017 on behalf of Signal Hill Enterprises, LLC and RE|Solutions, LLC. The site was owned by Signal Hill Enterprises, LLC in March 2017. RE|Solutions, LLC entered into a California Land Reuse Revitalization Agreement (CLRRA) with the Los Angeles Regional Water Quality Control Board (LARWQCB) on March 4, 2017. Signal Hill Enterprises, LLC and RE|Solutions, LLC were negotiating to transfer property ownership for redevelopment. TSG concluded constituents typical of petroleum refining facilities, including total petroleum hydrocarbons (TPH), VOCs, including BTEX and benzene derivatives are present in soil within a significant portion of the western parcel and isolated to the northern portion of the eastern parcel. TSG also concluded constituents detected in soil vapor underlying the site are elevated and remediation or mitigation of soil and soil vapor will be required prior to redevelopment.

TGR Geotechnical, Inc. prepared a Preliminary Geotechnical Investigation Report in May 2017 on behalf of Xebec Realty Partners, LLC. TGR found undocumented fill between 1-feet to 5-feet thick consisted of sandy silt with scattered gravel was not suitable for support of the proposed buildings (Figures 12-14). TGR stated oversize material (cobble to boulder size), possibly concrete, may be encountered during grading. TGR recommended all uncertified fill with the building footprints and extending 5-feet laterally should be removed and replaced with engineered fill. TGR concludes "It is our understanding that a portion of the onsite soils have environmental contamination that would require export and proper disposal of excavated soils."

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The Source Group (TSG) prepared a Response Plan and Remedial Technology Evaluation in July 2017, pursuant to the CLRRA. The LARWQCB reviewed and approved the Response Plan on September 15, 2017. The Response Plan proposes the following remedial strategies: (1) removal of the LNAPL, (2) air sparging to create a barrier to off-site migration, (3) a soil vapor extraction (SVE) system, and (4) engineering and institutional controls (Figure 18). Implementation of these remedial strategies was proposed as a phased approach. Phase I includes pilot studies of the SVE system and passive skimming of the LNAPL, additional monitoring of groundwater and installation of the air sparge wells. Phase II includes remediation proposed to be constructed and installed concurrently with grading and construction.

Apex Companies, LLC prepared a Soil Reuse Plan in April 2018 that provides details for treating and reusing onsite soils impacted with hydrocarbons. The soil reuse plan is to redeposit contaminated soil onsite in areas that require fill and to treat this contaminated soil with the SVE system. Apex proposes monitoring for VOCs during soil excavation activities using the Air Quality Management District (AQMD) Rule 1166 permit and compliance plan. Both Apex and the LARWQCB estimate the SVE system will operate between 2 to 5 years after completion.

Apex Companies, LLC prepared a Methane Soil Vapor Assessment Report in May 2018 in conformance with the City of Signal Hill's Oil and Gas Code and Project Development Guidelines. The methane soil gas assessment concluded that a modified active methane mitigation system subslab of buildings proposed on the Western Parcel, a passive methane mitigation system subslab of buildings proposed on the Eastern Parcel and methane mitigation of paved areas greater than 5,000 square feet within 15-feet of the proposed buildings was required.

Proposed Development

The proposed development for the eastern parcel is four commercial/industrial buildings and surface level paved parking (Figure 2). The western parcel will be similarly developed after 21st Street is vacated with five commercial/industrial buildings and surface level paved parking. The developer plans to sell the commercial space, similar to condominiums, as "office condominiums". It is anticipated there will be approximately 25 buyers of the office condominiums and a separate entity that retains ownership of the physical structures. An industrial-owners association (IOA) will be formed for maintenance of the common areas and SVE system.

Intent of Human Health Risk Assessment

The City of Signal Hill requires environmental assessments, investigations, remedial strategies and a baseline human health risk assessment in order to assess the feasibility of a project under California Environmental Quality Act (CEQA) guidelines. This baseline human health risk assessment satisfies the City's requirement.

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3.0 SUMMARY OF FIELD ACTIVITIES

As mentioned previously data collected by various consultants during their assessment and investigation activities that met data quality objectives was used in the human health risk assessment. Previous assessments and investigations focused on soil vapor and shallow groundwater primarily underlying the western parcel. A lack of inorganic data in the soil matrix, off-site inorganic data in the soil matrix and soil vapor specific to the proposed development were identified as data gaps. Apex Companies, LLC (Apex) collected soil matrix samples to address the inorganic data gaps and performed a soil vapor survey specific to the proposed development concurrently with the required methane assessment in March and April 2018.

Apex collected soil matrix samples from the western and eastern parcels for analysis of total threshold limit concentration (TTLC) metals including hexavalent chromium and mercury in addition to off-site soil matrix samples for the same analyses in March and April 2018 (Figure 15). This data is included in Tables 1 and 2 and was used in the human health risk assessment. Laboratory analytical results are included as Appendix D.

Soil matrix data from 1988, 1999, 2006, 2009, 2016 and 2017 submitted for analysis of total petroleum hydrocarbons from the western parcel is summarized in Table 3. Volatile organic compounds and polycyclic aromatic hydrocarbons (PAHs) in the soil matrix from 2006 and 2017 from the western parcel are summarized in Tables 4 and 5, respectively. Inorganics, TPH-g, TPH-d, VOCs and PAHs in the soil matrix were quantitatively assessed in the human health risk assessment.

The soil vapor data (Figure 16) is presented in Tables 6 and 7 for both the western and eastern parcels. Table 8 provides the soil physical characteristics data used in the Johnson & Ettinger model.

Additional data for the eastern parcel is included in Appendix A.

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4.0 CONCEPTUAL SITE MODEL

A conceptual site model was developed to identify the potential complete exposure pathways by which constituents detected in soil could impact human health (Figure 17).

The conceptual site model identifies potential sources, environmental release mechanisms, potential migration pathways, potential exposure pathways, potential exposure routes and potential human receptors onsite.

The conceptual site model identified the following potential complete exposure pathways:

- Future onsite commercial worker
 - ingestion/dermal contact with surface soil
 - inhalation of dust from soil in outdoor air
 - inhalation of VOCs from soil vapor that have migrated to indoor air
 - inhalation of VOCs from groundwater that have migrated to indoor air
- Future construction worker
 - ingestion/dermal contact with surface and subsurface soil
 - inhalation of dust from soil in outdoor air
- Future onsite resident a hypothetical scenario as the property is zoned industrial
 - ingestion/dermal contact with surface and subsurface soil
 - inhalation of dust from soil in outdoor air
 - inhalation of VOCs from soil vapor that have migrated to indoor air
 - inhalation of VOCs from groundwater that have migrated to indoor air

Consumption of fruit or vegetables grown in soil is not considered to be a complete potential exposure pathway under future site conditions as the 8.2-acre industrial zoned site will be developed as a commercial/industrial property.

Potential direct exposures (ingestion and dermal contact) to groundwater are not complete pathways as drinking water is provided by a remote municipal water supply, so there is little chance of incidental exposure. Discharge of groundwater to surface water also is not considered to be a complete migration pathway since there are no surface water bodies that are recharged by artesian flow or groundwater seepage in the vicinity of the site.

The potential for chemicals in soil to leach to underlying groundwater used as a drinking water source is considered very low as several aquitards or aquicludes exist below the maximum depth of impacted soils and groundwater used as a drinking water source.

There is very limited ecological habitat at and near the site. Wetlands were not observed onsite or at adjacent sites. There are no natural or undisturbed areas onsite. Based on the lack of viable ecological habitat at and near the site, there are no complete ecological pathways onsite.

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5.0 IDENTIFYING CHEMICALS OF CONCERN

All constituents detected at least one time in the soil matrix, in soil vapor and groundwater underlying the site were quantitatively assessed using the appropriate exposure pathway in this risk assessment.

Pursuant to the following guidance documents, Selecting Inorganic Constituents as Chemicals of Concern for Risk Assessments at Hazardous Waste Sites and Permitted Facilities (DTSC 1997), Background Metals at Los Angeles Unified School Sites – Arsenic (DTSC 2005) and Arsenic Strategies, Determination of Arsenic Remediation, Development of Arsenic Cleanup Goals (DTSC 2009) the following statistical tests: (a) Wilcoxon-Mann-Whitney, (b) Gehan, (c) Tarone-Ware, (d) Multiple Box Plots, (e) Multiple Histograms and (f) Q-Q Plots, were used to determine whether detected concentrations of metals in the soil matrix onsite were within background concentrations. The results of these statistical analyses are included as Appendices E (western parcel) and F (eastern parcel).

These two sample hypotheses tests with non-detects are based on the null hypothesis. The Null hypothesis tests whether the mean and median of the concentrations of each metal detected in onsite soils are less than or equal to the mean and median concentrations of the concentrations of the same metal detected in offsite or background soil samples.

The alternative hypothesis tested was whether the mean and median of the concentrations of detected metals in soils onsite are greater than the mean and median concentrations of the concentrations of the same metals in offsite or background soil samples.

The graphs (1) Multiple Box Plots, (2) Multiple Histograms and (3) Q-Q Plots with non-detects visually indicate whether the detected concentrations of metals in onsite soils are within the population of background metals.

Western Parcel

The conclusion based on these quantitative statistical tests was barium, mercury and lead were not within the background population. Therefore these three metals were quantitatively assessed in the human health risk assessment via the ingestion, dermal contact and inhalation routes of exposure.

Constituents of concern quantitatively assessed include: (a) soil matrix – TPH-g, TPH-d, the VOCs: benzene, sec-butylbenzene, tert-butylbenzene, ethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, m,p-xylenes, o-xylene, the PAHs: acenaphthene, anthracene, benz(a)anthracene, chrysene, fluoranthene, fluorene, naphthalene, pyrene, inorganics: barium, mercury and lead; (b) soil vapor – acetone, benzene, sec-butylbenzene, carbon disulfide, cyclohexane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, ethylbenzene, n-hexane, isopropylbenzene, naphthalene, n-propylbenzene, tetrachloroethylene, toluene, 1,2,4-trimethylbenzene, sec-butylbenzene, m,p-xylenes and o-xylene; (c) VOCs in groundwater - acetone, benzene, n-butylbenzene, sec-butylbenzene, tert-butylbenzene, 1,2-dichloroethane, cis-1,2-dichloroethene, ethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, tetrachloroethylene, toluene, 1,2,4-trimethylbenzene, isopropylbenzene, naphthalene, n-propylbenzene, tetrachloroethylene, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 2-butanone, m,p-xylenes and o-xylene; (d) PAHs in groundwater – acenaphthene and fluorene.

Eastern Parcel

The conclusion based on these quantitative statistical tests was antimony, hexavalent chromium, molybdenum and thallium were not within the background population. Therefore these four metals were

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quantitatively assessed in the human health risk assessment via the ingestion, dermal contact and inhalation routes of exposure.

Constituents of concern quantitatively assessed include: (a) soil matrix – TPH-g, TPH-d, the VOCs: n-butylbenzene, sec-butylbenzene, tert-butylbenzene, ethylbenzene, isopropylbenzene, naphthalene, toluene, o-xylene, the PAHs: acenaphthene, chrysene, fluoranthene, fluorene, naphthalene, pyrene, inorganics: antimony, hexavalent chromium, molybdenum and thallium; (b) soil vapor – acetone, chloroform, chloromethane, cyclohexane, ethylbenzene, n-hexane and toluene; (c) VOCs in groundwater - sec-butylbenzene, isopropylbenzene, naphthalene, n-propylbenzene and o-xylene.

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6.0 TOXICITY ASSESSMENT

Toxicity values are combined with exposure factors to estimate noncancer adverse health effects and cancer risks. Toxicity values include reference doses (RfDs), reference concentrations (RfCs), unit risk factors (URFs) and slope factors (SFs) that are used to evaluate noncancer adverse health effects and cancer risks. USEPA (1989) has developed the following hierarchical toxicity identification protocol:

- Integrated Risk Information System (IRIS, USEPA 1999)
- Health Effects Assessment Summary Tables (HEAST, USEPA 1997)
- National Center for Environmental Assessment (NCEA)

The State of California Office of Environmental Health Hazard Assessment (OEHHA) and the State of California Department of Toxic Substances Control (DTSC) Office of Human and Ecological Risk (HERO) have developed URFs SFs, RfCs and RfDs. Pursuant to regulatory agency guidance OEHHA's and HERO's values are preferentially used instead of USEPA's when available, as OEHHA's and HERO's values are generally more conservative than USEPA's (DTSC 2015, USEPA 2004).

If a constituent had both a risk factor and a reference concentration it was assessed as a carcinogen and as a noncarcinogen. The unit risk factors and reference concentrations were obtained from DTSC HERO (DTSC 2016), ATSDR, IRIS, OEHHA, PPRTV as listed in USEPA's Regional Screening Levels (November 2017) and DTSC's Screening Levels for residential soils (January 2018).

The exposure point concentrations, the slope factors and reference doses for the constituents detected in the soil matrix and quantitatively assessed are presented in Table 11 for the western parcel and Table 24 for the eastern parcel.

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7.0 EXPOSURE ASSESSMENT

The exposure assessment provides a scientifically defensible basis for the identification of potentially exposed human receptors and the most likely ways they might be exposed to chemicals of concern at the site. As defined by USEPA (1989), the following four components are necessary for chemical exposure to occur:

- A chemical source and a mechanism of chemical release to the environment
- An environmental transport medium (e.g., soil) for the released chemical
- A point of contact between the contaminated medium and the receptor (i.e., the exposure point)
- An exposure route (e.g., ingesting chemically-impacted soil) at the exposure point

All four of these elements must be present for an exposure pathway to be considered complete and for chemical exposure to occur (USEPA 1989).

This HHRA evaluated the potential for receptors to be exposed to the maximum detected concentrations or the upper confidence level (UCL) for the western parcel, whichever value was less, pursuant to the ProUCL User's Guide (USEPA 2004) of the constituents detected in the top 15-ft of soil. The ProUCL model output for constituents detected in the soil matrix is included as Appendix G and for VOCs detected in soil vapor is included as Appendix H for the western parcel.

The maximum concentrations of the VOCs detected in soil vapor at 5-ft underlying the site and in groundwater were used as the exposure point concentrations in the Johnson & Ettinger vapor intrusion models.

7.1 Average and Reasonable Maximum Exposures

Typically two types of exposure scenarios are evaluated in a risk assessment; an average exposure scenario, and a reasonable maximum exposure (RME) scenario. The average exposure scenario represents a more typical exposure, believed to be most likely to occur, while the reasonable maximum exposure scenario represents a plausible worst case situation - one that is not very likely to occur. USEPA guidance (1989) recommends evaluating a reasonable maximum exposure scenario. The reasonable maximum exposure scenario estimates the exposure a receptor might receive using highly conservative intake assumptions (e.g., 90th or 95th percentile for most intake assumptions) and the upper confidence limit (UCL) on the mean of the chemical concentrations. It is assumed that by evaluating a reasonable maximum exposure scenario potential health risks to extremely sensitive individuals within a particular receptor population will be adequately addressed. As an added measure of conservatism, only a reasonable maximum exposure scenario was evaluated in this HHRA.

The DTSC PEA and USEPA guidance contain formulae that incorporate default values which were selected to be health protective. Some of these default values, such as, the exposure frequency, exposure time and exposure duration, were modified when evaluating the commercial worker and construction worker scenarios (DTSC 2015, USEPA 2004).

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8.0 RISK CHARACTERIZATION

The risk characterization process incorporates data from the exposure and toxicity assessments. The exposure assessment information necessary to estimate risks and hazards includes the estimated chemical intakes, exposure modeling assumptions, and the exposure pathways assumed to contribute to the majority of exposure for each receptor over a given time period (USEPA 1989a). The exposure parameters for assessing the constituents detected in the soil matrix are included as Table 13.

The method by which chemicals with carcinogenic and/or noncarcinogenic effects are evaluated to determine whether they pose a risk or an adverse impact to human health is discussed below, relative to the exposure pathways by which the receptors may be exposed to the exposure point concentrations of the chemicals of concern.

8.1 Ingestion and Dermal Contact Pathways

To provide an evaluation of chronic risk along the ingestion and dermal contact pathways the following equations for risk and hazard were used consistent with PEA guidance (DTSC 2015).

$$Risk_{soil} = SF_o \ x \ C_s \ x \ \underline{IR_{s, adult} \ x \ EF \ x \ ED_{adult} \ x \ 10^{-6} \ kg/mg} \\ = BW_{adult} \ x \ AT \ x \ EF$$

$$+ SF_o \ x \ C_s \ x \ \underline{SA_{adult} \ x \ AF \ x \ ABS \ x \ EF \ x \ ED_{adult} \ x \ 10^{-6} \ kg/mg} \\ = BW_{child} \ x \ AT \ x \ EF$$

$$+ SF_o \ x \ C_s \ x \ \underline{IR_{s, child} \ x \ EF \ x \ ED_{child} \ x \ 10^{-6} \ kg/mg} \\ = BW_{child} \ x \ AT \ x \ EF$$

$$+ SF_o \ x \ C_s \ x \ \underline{SA_{child} \ x \ AF \ x \ ABS \ x \ EF \ x \ ED_{child} \ x \ 10^{-6} \ kg/mg} \\ = BW_{child} \ x \ AT \ x \ EF$$

$$\begin{aligned} \text{Hazard}_{soil} = & (1/RfD_o) \; x \; C_s \; x \; \underline{IR_{s,child}} \; x \; EF \; x \; ED_{child} \; x \; 10^{-6} \; kg/mg \\ & BW_{child} \; x \; AT \end{aligned}$$

$$+ (1/RfD_o) \; x \; C_s \; x \; \underline{SA_{child}} \; x \; AF \; x \; ABS \; x \; EF_{child} \; x \; ED_{child} \; x \; 10^{-6} \; kg/mg \\ & BW_{child} \; x \; AT \end{aligned}$$

$$+ (1/RfD_o) \; x \; C_s \; x \; \underline{IR_{s,adult}} \; x \; EF \; x \; ED_{adult} \; x \; 10^{-6} \; kg/mg \\ & BW_{adult} \; x \; AT \end{aligned}$$

$$+ (1/RfD_o) \; x \; C_s \; x \; \underline{SA_{adult}} \; x \; AF \; x \; ABS \; x \; EF_{adult} \; x \; ED_{adult} \; x \; 10^{-6} \; kg/mg \\ & BW_{adult} \; x \; AT \end{aligned}$$

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Where:

 $SF_o = \text{cancer slope factor (mg/kg-day)}^{-1}$

 C_s = concentration in soil (mg/kg)

 RfD_o = oral reference dose (mg/kg-day)

ABS = absorption fraction (dimensionless)

ED = exposure duration (years)

EF = exposure frequency (days/year)

BW = body weight (kg)

IRs = incidental soil ingestion rate (mg/day)

SA = skin surface area (cm²/event)

AF = soil to skin adherence factor (mg/cm²)

AT = averaging time (days)

Chemical specific values for the absorption fractions (ABS) parameter were obtained from USEPA and DTSC (USEPA November 2017; DTSC 2018). Toxicity and exposure point concentrations are found in Tables 11 and 24. Exposure parameters for assessing constituents detected in the soil matrix are presented in Table 12. The maximum concentration or the upper confidence level, whichever was less, of the constituents detected in the top 15-ft of soils were evaluated in this risk assessment for the residential, commercial worker and construction worker scenarios.

The exposure factors presented in Tables 11, 12 and 24 provide a conservative estimate of chronic risk and hazard to human health due to exposure to the chemicals of concern detected in the soil matrix via the ingestion and dermal contact routes of exposure. The calculated estimates of risk and hazard due to exposure to constituents detected in the soil matrix are provided in Tables 13-16 (western parcel) and 25-28 (eastern parcel).

8.2 Inhalation Pathway Soil Matrix

To provide an evaluation of chronic risk along the inhalation pathway the following equations (DTSC 2015, USEPA 2009) for estimating risk and hazard due to exposure to constituents of concern detected in the soil matrix were used consistent with PEA guidance (DTSC 2015, USEPA 2009).

Semi-volatile organic compounds and metals in soil are evaluated in outdoor air using particulate emission factors (PEFs) to obtain concentrations of chemicals in dust. PEFs are used to develop an estimate of the concentration of a chemical in dust based on its concentration in soil. It assumes that the dust from the site is caused by the wind and not created by mechanical means (e.g. construction activities, tilling, automobile traffic, etc.) (DTSC 2015).

A default PEF of 1.36E+09 (m³/kg) is used for the residential and commercial worker scenarios, and a PEF of 1.00E+06 is used for the construction worker scenario (DTSC 2015, USEPA 2009). It assumes an infinite source of chemicals, a vegetative cover of 50%, and a mean annual wind speed of 4.69 m/s. This is equivalent to a dust concentration of 0.76 g/m³ at the receptor. The default dispersion term (Q/C) of 90.80 (g/m²-s per kg/m³) is based on a site of 0.5 acres and dispersion modeling runs of 29 sites across the United States. The default Q/C provides a conservative estimate of the long-term exposure to dust (DTSC 2015).

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$$C_a = (C_s/PEF) \times 1000 \mu g/mg$$

Where:

 C_a = concentration in air, mg/m³ C_s = concentration in soil, mg/kg PEF = particulate emission factor

$$\begin{array}{ccc} Risk_{air} & = & & IUR \; x \; C_a \; x \; \underline{ET \; x \; EF \; x \; ED} \\ & & & AT \end{array}$$

$$Hazard_{air} = (1/RfC \times 1000 \mu g/mg) \times C_a \times ET \times EF \times ED$$

$$AT$$

Where:

IUR = inhalation unit risk factor $(\mu g/m^3)^{-1}$ RfC = reference concentration (mg/m^3)

 C_a = contaminant concentration in air (mg/m³)

ET = exposure time (hours/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)

AT = averaging time (hours)

The risk and hazard for the air pathway are based on either the exposure to volatile emissions for VOCs or the exposure to fugitive dust emissions for non-VOCs. The Office of Scientific Affairs defines a VOC as a chemical with a vapor pressure of 0.001 mm mercury or higher and a Henry's Law Constant of 1 x 10⁻⁵ or higher. Exposure to a chemical via the air pathway can be adequately performed using either volatilization or fugitive dust scenarios; it is not necessary to do both (DTSC 2015).

For this risk assessment exposure to non-VOCs detected in the soil matrix via the inhalation pathway was performed using the fugitive dust scenario.

8.3 The DTSC modified Johnson and Ettinger Model - Soil gas screen, version 2.0 (April 2003; modified by DTSC HERO December 2014)

The exposure point concentrations (the maximum detected concentrations) of VOCs detected at least one time in soil vapor was assessed by the DTSC modified Johnson & Ettinger Model soil gas screen, version 2.0 (April 2003; modified by DTSC HERO December 2014).

The Johnson and Ettinger Model has the following conservative assumptions: (1) steady state conditions exist, (2) an infinite source of contamination exists, (3) the subsurface is homogenous, (4) air mixing within the building is uniform, (5) preferential pathways do not exist, (6) biodegradation of vapors does not occur, (7) contaminants are homogenously distributed, (8) contaminant vapors enter the building primarily through cracks in the foundation and walls, (9) buildings are constructed on slabs or with basements, (10) ventilation rates and pressure differences are assumed to remain constant and (11) the receptors are exposed to these constituents for 350 days per year for 30 years (residential scenario).

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The Johnson & Ettinger Model was used to calculate incremental risks and hazards by the following equations imbedded within the model:

 $Risk = \underbrace{URF \ x \ EF \ x \ ED \ x \ C_{building}}_{AT_c \ x \ 365 \ days/year}$

Where: URF = unit risk factor $\mu g/m^3$; comparable to a SF

EF = exposure frequency = 350 days/year ED = exposure duration = 30 years

C_{building} = vapor concentration in the building, milligrams per cubic meter (mg/m³) per

µg/kg soil; calculated by the model

 AT_c = averaging time for carcinogens; default value = 70

 $Hazard\ Quotient = \underbrace{EF\ x\ ED\ x\ 1/RfC\ x\ C_{building}}_{AT_{nc}\ x\ 365\ days/year}$

Where: RfC = Reference Concentration mg/m^3 ; comparable to a RfD

EF = exposure frequency = 350 days/year ED = exposure duration = 30 years

C_{building} = vapor concentration in the building, milligrams per cubic meter (mg/m³) per

µg/kg soil; calculated by the model

 AT_{nc} = averaging time for noncarcinogens; default value = 25

Site specific variables input into the model include the following:

- The soil type based on grain size (Table 9) is sand for the western parcel.
- The vadose zone soil dry bulk density, soil total porosity and water-filled porosity are 1.64g/cm³, 0.392 and 0.197cm³/cm³ for the western parcel based on the average of the values in Table 8.
- The soil type based on grain size (Table 22) is sand for the eastern parcel.
- The vadose zone soil dry bulk density, soil total porosity and water-filled porosity are 1.72g/cm³, 0.358 and 0.122cm³/cm³ for the eastern parcel based on the average of the values in Table 23.

The results of the Johnson & Ettinger model are presented in Tables 13-16 for the western parcel and in Tables 25-28 for the eastern parcel and Appendices I-L.

8.4 The DTSC modified Johnson and Ettinger Model - Groundwater screen, version 3.0 (April 2003; modified by DTSC HERO December 2014)

The maximum detected concentrations of VOCs detected in the shallow groundwater was assessed by the DTSC modified Johnson & Ettinger Model groundwater screen, version 3.0 (April 2003; modified by DTSC HERO December 2014) for the residential and commercial scenarios.

The Johnson and Ettinger Model has the following conservative assumptions: (1) steady state conditions exist, (2) an infinite source of contamination exists, (3) the subsurface is homogenous, (4) air mixing within the building is uniform, (5) preferential pathways do not exist, (6) biodegradation of vapors does not occur, (7) contaminants are homogenously distributed, (8) contaminant vapors enter the building primarily through cracks in the foundation and walls, (9) buildings are constructed on slabs or with basements, (10) ventilation rates and pressure differences are assumed to remain constant and (11) the receptors are

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exposed to these constituents for 350 days per year for 30 years (residential scenario) or 250 days per year for 25 years (commercial scenario).

The Johnson & Ettinger Model was used to calculate incremental risks and hazards by the following equations imbedded within the model:

 $Risk = \underbrace{URF \ x \ EF \ x \ ED \ x \ C_{building}}_{AT_c \ x \ 365 \ days/year}$

Where: URF = unit risk factor μ g/m³; comparable to a SF

EF = exposure frequency = 350 days/year

ED = exposure duration = 30 years

C_{building} = vapor concentration in the building, milligrams per cubic meter (mg/m³) per

µg/kg soil; calculated by the model

 AT_c = averaging time for carcinogens; default value = 70

Hazard Quotient = $EF \times ED \times 1/RfC \times C_{building}$ $AT_{nc} \times 365 \text{ days/year}$

Where: RfC = Reference Concentration mg/m^3 ; comparable to a RfD

EF = exposure frequency = 350 days/year

ED = exposure duration = 30 years

C_{building} = vapor concentration in the building, milligrams per cubic meter (mg/m³) per

µg/kg soil; calculated by the model

 AT_{nc} = averaging time for noncarcinogens; default value = 25

Site specific variables input into the model include the following:

Groundwater is detected 41.33-ft bgs, the depth of groundwater was changed to 1259.84 centimeters (cm).

The results of the Johnson & Ettinger model are presented in Tables 13-16 for the western parcel and in Tables 25-28 for the eastern parcel and Appendices I-L.

8.5 DTSC's LeadSpread 8.0 Model

DTSC's LeadSpread 8.0 Model estimates the hazard due to exposure to lead in air and onsite soils/dust for adults and children within a residential exposure scenario. Typically, lead concentrations in air are not measured onsite. Therefore the model extrapolates these concentrations from the measured concentrations of lead in onsite soils.

DTSC's LeadSpread 8.0 Model results indicate that lead does not pose an unacceptable hazard to adults or children exposed to the 95UCL concentration of lead in site soils, 70.78mg/kg, used in the model as the exposure point concentration. These results are provided in Table 17.

8.6 Noncancer Adverse Health Effects

Noncarcinogenic effects or hazards are typically evaluated by comparing an exposure level over a specified time period (e.g., a lifetime or 25 years), with a reference dose based on a similar time period. Hazard

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quotient values less than 1 indicate that potential exposures to noncarcinogenic COCs are not expected to result in toxicity (USEPA 1989). Summing the hazard quotient values to derive a hazard index (HI) provides an estimation of the total potential hazard due to a simultaneous exposure to all the noncarcinogenic COCs. However, summing hazard quotient values is not necessary when the chemicals of concern target different organs within the body (USEPA 1989, DTSC 2015). Although the noncarcinogenic chemicals of concern quantitatively assessed in this risk assessment target different organs within the body, the estimated hazard quotients were summed to derive a HI.

8.7 Lifetime Excess Cancer Risk

Slope factors are used to estimate the potential risk associated with exposure to individual COCs. The slope factor is multiplied by the chronic daily intake averaged over 70 years to estimate lifetime excess cancer risk. "Excess" or "incremental" cancer risk represents the probability of an individual developing cancer over a lifetime as a result of chemical exposure, over and above the baseline or "background" cancer risk in the general population. Cancer risks and noncancer health hazards estimated in the HHRA are regarded as estimated or theoretical results developed on the basis of the toxicity factors, chemical fate and transport, exposure assumption, and other inputs previously described. Cancer risks do not represent actual cancer cases in actual people. Rather, risks are calculated on the basis of an entirely hypothetical set of conditions. This assumed "exposure scenario" is developed to protect human health, and is based on standard USEPA and Cal-EPA methods and assumptions.

USEPA characterizes theoretical excess lifetime cancer risks below one in one million (10⁻⁶) as not of concern and has stated that risks between 10⁻⁶ and one in 10,000 (10⁻⁴) are "safe and protective of public health" (Federal Register 56(20):3535, 1991). Remedial action is not generally required by USEPA for sites with a theoretical lifetime excess risk of less than 10⁻⁴; whereas the State of California uses a risk-management approach (DTSC 2011).

The more stringent target risk of 10^{-6} is typically applied to residential receptors. To provide perspective, a total theoretical lifetime excess cancer risk of one in $100,000 (10^{-5})$ is frequently accepted by Cal-EPA for worker receptors at California sites, and the target risk for chemicals evaluated under State Proposition 65 regulations is 10^{-5} (22CCR 12703).

8.8 Multipathway Cancer Risk

Based on regulatory guidelines, it is appropriate to combine risk estimates across exposure pathways for a given receptor. At the same time, exposure to multiple carcinogenic COCs is also typically considered to be additive. For exposures to multiple pathways and chemicals, the following equation was used to estimate total theoretical lifetime excess carcinogenic risks:

Where:

Total Risk = Excess cancer risk from exposure to n chemicals via m pathways

m = Number of exposure pathways

n = Number of chemicals

CR_{i,p} = Potential cancer risk from exposure to chemical i via pathway p

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This equation was used to estimate the total potential cancer risks due to exposure to the carcinogenic COCs via the ingestion, dermal contact and inhalation routes of exposure. The estimated risks, total risk, estimated hazards and hazard index are presented in Tables 13-16 (western parcel) and 25-28 (eastern parcel).

8.9 Estimation of Risks and Hazards – Western Parcel

Residential Scenario - Hypothetical scenario as property is zoned industrial

Estimated Risk Soil Ingestion and Dermal Contact - The estimated risk due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes 1.04×10^{-6} is greater than the target threshold 1×10^{-6} .

Estimated Risk Soil & Soil Vapor Inhalation - The estimated risk due to exposure to constituents detected in the soil matrix via the inhalation exposure route and due to exposure to VOCs in the vapor phase is 1.10×10^{-2} greater than the target threshold 1×10^{-6} and is attributable to benzene, 1,4-dichlorobenzene, ethylbenzene, naphthalene, tetrachloroethylene in soil vapor and benzene, ethylbenzene and naphthalene in groundwater.

Hazard Quotients Soil Ingestion and Dermal Contact - The sum of the estimated hazard quotients due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes is 27, greater than 1, the target hazard value and is attributable to TPH-g and TPH-d.

Hazard Quotients Soil & Soil Vapor Inhalation - The sum of the estimated hazard quotients due to exposure to constituents detected in the soil matrix via the inhalation exposure route and to VOCs in the vapor phase is 400, greater less than 1, the target hazard value and is attributable to benzene, ethylbenzene, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, m,p-xylenes and o-xylene in soil vapor and benzene in groundwater.

Summed Risk - The total risk, summed across all exposure pathways for all carcinogenic chemicals of concern in the soil matrix and soil vapor, is 1.10×10^{-2} , greater than the target risk.

Hazard Index – The total hazard, summed across all exposure pathways for all noncarcinogenic chemicals of concern in the soil matrix and soil vapor is 427, greater than the target hazard value. These estimated risk and hazards values are presented in Tables 13 and 16.

Construction Worker Scenario – Soil Matrix

Estimated Risk Ingestion and Dermal Contact - The estimated risk due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes 6.01×10^{-8} less than the target threshold 1×10^{-5} .

Estimated Risk Inhalation - The estimated risk due to exposure to constituents detected in the soil matrix via the inhalation exposure route is 1.57×10^{-12} less than the target threshold 1×10^{-5} .

Hazard Quotients Ingestion and Dermal Contact - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes is 14, greater than 1, the target hazard value and is attributable to TPH-g and TPH-d.

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Hazard Quotients Inhalation - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the inhalation exposure route is 8×10^{-5} , which is less than 1, the target hazard value. *Summed Risk* - The total risk, summed across all exposure pathways for all carcinogenic chemicals of concern in the soil matrix, is 6.01×10^{-8} , less than the target threshold 1×10^{-5} .

Hazard Index – The total hazard, summed across all exposure pathways for all noncarcinogenic chemicals of concern in the soil matrix is 14, greater than the target hazard value. These estimated risk and hazards values are presented in Tables 14 and 16.

Commercial Worker Scenario

Estimated Risk Soil Ingestion and Dermal Contact - The estimated risk due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes 4.08×10^{-7} less than the target threshold 1×10^{-5} .

Estimated Risk Soil & Soil Vapor Inhalation - The estimated risk due to exposure to constituents detected in the soil matrix via the inhalation exposure route and to VOCs in the vapor phase is 1.30×10^{-3} greater than the target threshold 1×10^{-5} and is attributable to benzene and ethylbenzene in soil vapor and benzene in groundwater.

Hazard Quotients Soil Ingestion and Dermal Contact - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes is 3, which is greater than 1, the target hazard value and is attributable to TPH-g and TPH-d.

Hazard Quotients Soil & Soil Vapor Inhalation - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the inhalation exposure route and to VOCs the vapor phase is 49, greater than 1, the target hazard value and is attributable to benzene, toluene, 1,2,4-trimethylbenzene, m,p-xylenes and o-xylene in soil vapor and benzene in groundwater.

Summed Risk - The total risk, summed across all exposure pathways for all carcinogenic chemicals of concern in the soil matrix and soil vapor, is 1.30×10^{-3} , greater than the target threshold 1×10^{-5} .

Hazard Index – The total hazard, summed across all exposure pathways for all noncarcinogenic chemicals of concern in the soil matrix and soil vapor is 51, greater than the target hazard value. These estimated risk and hazards values are presented in Tables 15 and 16.

8.10 Estimation of Risks and Hazards – Eastern Parcel

Residential Scenario – Hypothetical scenario as property is zoned industrial

Estimated Risk Soil Ingestion and Dermal Contact - The estimated risk due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes 5.27×10^{-8} is less than the target threshold 1×10^{-6} .

Estimated Risk Soil & Soil Vapor Inhalation - The estimated risk due to exposure to constituents detected in the soil matrix via the inhalation exposure route and due to exposure to VOCs in the vapor phase is 1.81×10^{-5} greater than the target threshold 1×10^{-6} and is attributable to ethylbenzene in soil vapor and bis(2-chloroethyl)ether in groundwater.

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Hazard Quotients Soil Ingestion and Dermal Contact - The sum of the estimated hazard quotients due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes is 85, greater than 1, the target hazard value and is attributable to TPH-g, TPH-d and thallium.

Hazard Quotients Soil & Soil Vapor Inhalation - The sum of the estimated hazard quotients due to exposure to constituents detected in the soil matrix via the inhalation exposure route and to VOCs in the vapor phase is 0.12, less than 1, the target hazard value.

Summed Risk - The total risk, summed across all exposure pathways for all carcinogenic chemicals of concern in the soil matrix and soil vapor, is 6.62×10^{-6} , greater than the target risk.

Hazard Index – The total hazard, summed across all exposure pathways for all noncarcinogenic chemicals of concern in the soil matrix and soil vapor is 85, greater than the target hazard value. These estimated risk and hazards values are presented in Tables 25 and 28.

Construction Worker Scenario - Soil Matrix

Estimated Risk Ingestion and Dermal Contact - The estimated risk due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes 1.61×10^{-9} less than the target threshold 1×10^{-5} .

Estimated Risk Inhalation - The estimated risk due to exposure to constituents detected in the soil matrix via the inhalation exposure route is 2.14×10^{-11} less than the target threshold 1×10^{-5} .

Hazard Quotients Ingestion and Dermal Contact - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes is 45, greater than 1, the target hazard value and is attributable to TPH-g and TPH-d.

Hazard Quotients Inhalation - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the inhalation exposure route is 1.41×10^{-6} , which is less than 1, the target hazard value.

Summed Risk - The total risk, summed across all exposure pathways for all carcinogenic chemicals of concern in the soil matrix, is 1.63×10^{-9} , less than the target threshold 1×10^{-5} .

Hazard Index – The total hazard, summed across all exposure pathways for all noncarcinogenic chemicals of concern in the soil matrix is 43, greater than the target hazard value. These estimated risk and hazards values are presented in Tables 26 and 28.

Commercial Worker Scenario

Estimated Risk Soil Ingestion and Dermal Contact - The estimated risk due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes 1.21×10^{-8} less than the target threshold 1×10^{-5} .

Estimated Risk Soil & Soil Vapor Inhalation - The estimated risk due to exposure to constituents detected in the soil matrix via the inhalation exposure route and to VOCs in the vapor phase is 7.64×10^{-7} less than the target threshold 1×10^{-5} .

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Hazard Quotients Soil Ingestion and Dermal Contact - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the ingestion and dermal contact exposure routes is 9, which is greater than 1, the target hazard value and is attributable to TPH-g and TPH-d.

Hazard Quotients Soil & Soil Vapor Inhalation - The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the inhalation exposure route and to VOCs the vapor phase is 0.01, less than 1, the target hazard value.

Summed Risk - The total risk, summed across all exposure pathways for all carcinogenic chemicals of concern in the soil matrix and soil vapor, is 7.76×10^{-7} , less than the target threshold 1×10^{-5} .

Hazard Index – The total hazard, summed across all exposure pathways for all noncarcinogenic chemicals of concern in the soil matrix and soil vapor is 9, greater than the target hazard value. These estimated risk and hazards values are presented in Tables 27 and 28.

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9.0 UNCERTAINTY ANALYSIS

The uncertainty analysis characterizes the propagated uncertainty in health risk assessments. These uncertainties are driven by variability in:

- The chemical data selection and assumptions used in the models with which concentrations at receptor locations were estimated.
- The variability of receptor intake parameters.
- The accuracy of toxicity values used to characterize exposure, hazards and cancer risks.

Additionally, uncertainties are introduced in the risk assessment when exposures to several substances across multiple pathways are summed.

Quantifying uncertainty is an essential element of the risk assessment process. According to USEPA's Guidance on Risk Characterization for Risk Managers and Risk Assessors, point estimates of risk "do not fully convey the range of information considered and used in developing the assessment" (USEPA 1992). The following components of the risk assessment process can introduce uncertainties:

- Data Collection and Evaluation
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

9.1 Data Collection and Evaluation

The techniques used for data sampling and analysis and the methods used for identifying chemicals for evaluation in this risk assessment, may result in a number of uncertainties. These uncertainties are itemized below in the form of assumptions.

- It was assumed that the nature and extent of chemical impacts on and near the site have been adequately characterized. If this assumption is not valid, then potential health impacts may be over- or underestimated.
- Systematic or random errors in the chemical analyses may yield erroneous data. These types of
 errors may result in a slight over- or underestimation of risk.

9.2 Exposure Assessment

A number of uncertainties are associated with the exposure assessment, including estimation of exposure point concentrations and assumptions used to estimate chemical intakes. Key uncertainties associated with these components of the HHRA are summarized below.

9.2.1 Exposure Pathways

The exposure pathways evaluated in this HHRA are expected to represent the primary pathways of exposure, based on the results of the chemical analyses, and the expected fate and transport of these chemicals in the environment. Minor or secondary pathways may also exist, but often cannot be identified or evaluated using the available data. The contribution of secondary pathways to the overall risk from the

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site is not likely to be significant. In addition, intake assumptions are reflective of trends (usually for the most sensitive individual within an entire population), and as such are subject to intrinsic variability. In both cases, their presence introduces a level of uncertainty to this risk assessment process.

9.3 Toxicity Assessment

Toxicity information for many chemicals is often limited. Consequently, there are varying degrees of uncertainty with the calculated toxicity values. Sources of uncertainty associated with toxicity values include:

- Using dose-response information from effects observed at high doses to predict the adverse
 health effects that may occur following exposure to the low levels expected from human
 contact with the agent in the environment.
- Using dose-response information from short-term exposures to predict the effects of long-term exposures.
- Using dose-response information from animal studies to predict effects in humans.
- Using dose-response information from homogeneous animal populations or human populations
 to predict the effects likely to be observed in the general population consisting of individuals
 with a wide range of sensitivities.

To compensate for these uncertainties, USEPA typically applies a margin of safety when promulgating human toxicity values. Therefore, use of USEPA toxicity values likely results in an overestimation of potential hazard and risk.

9.4 Risk Characterization

The reasonable maximum exposure scenario risk characterization represents an over-estimation of risk. Site-specific information regarding depth below ground at which the constituents of concern were detected was not used in the equations. The reasonable maximum exposure scenario estimated the risk to the receptors based on the maximum detected concentrations or the UCLs for the constituents quantitatively assessed in this risk assessment.

9.5 Summary of Risk Assessment Uncertainties

The analysis of the uncertainties associated with this risk assessment indicates that the estimated risks and hazards derived from the equations in the PEA Manual (DTSC 2015), the RAGs Manual (USEPA 2009), the LeadSpread Model (DTSC) and the J&E Models for the reasonable maximum exposure scenario represent an over-estimation of risk. Although as outlined in the sections above, many factors can contribute to the over- or underestimation of risk, in general, a mixture of conservative and upper-bound input values were identified to estimate potential exposures. Compounding conservative and upper-bound input values in the risk assessment process are intended to lead to reasonable, maximum, health-conservative estimates. The actual impacts to human health are most likely less than those estimated in this HHRA for the evaluated receptors and pathways.

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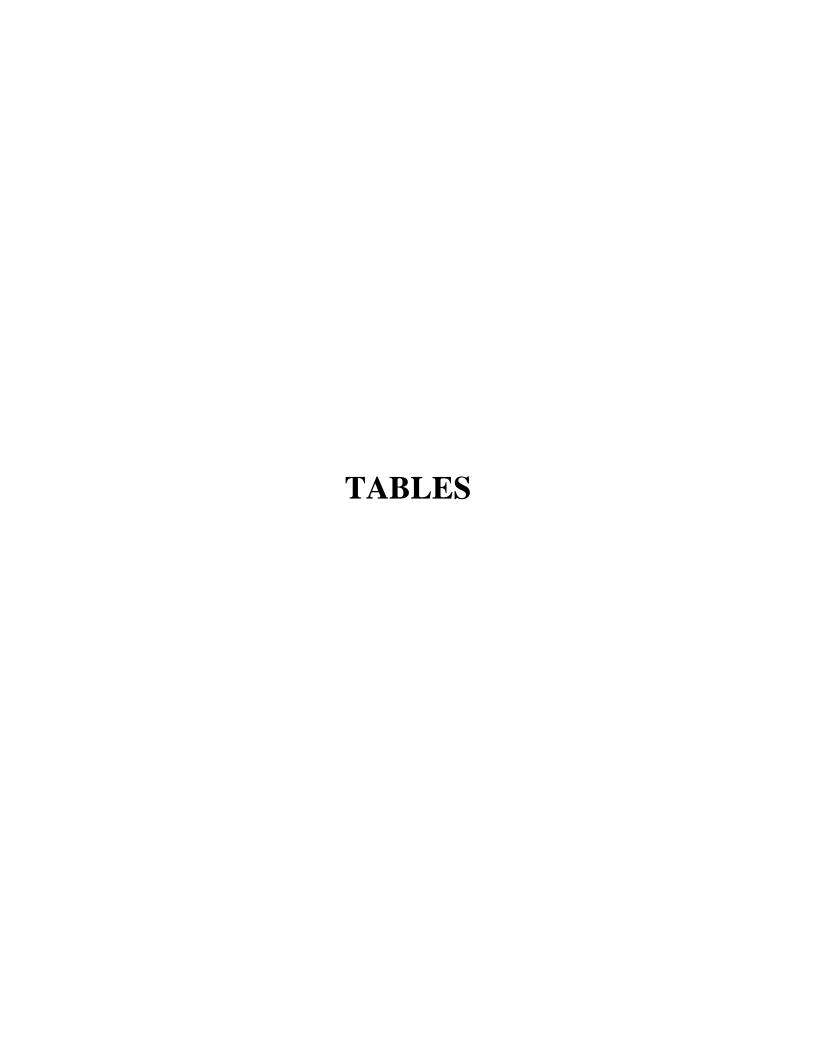


Table 1
Metal Analytical Results in Soil - Western Parcel

Sample Location	Sample Depth (feet bgs)	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	copper mg/kg	Fead mg/kg	molybdenum	Nickel mg/kg	mg/kg	Silver mg/kg	mg/kg	mg/kg	Ziuc mg/kg	(mg/kg)	© Hexavalent (Sy) Chromium
									NO	ORTHWEST	PARCEL									
TP-1	1	4/17/2018	<10	5.2	120	<1.0	<1.0	21	8.1	7.9	9.5	<5.0	15	<0.50	<1.0	<5.0	38	72	0.045	<0.040
	5	4/17/2018	<10	12	190	<1.0	<1.0	37	14	18	9.4	<5.0	27	<0.50	<1.0	<5.0	69	50	0.052	<0.040
DUP 2	5	4/17/2018	<10	11	170	<1.0	<1.0	34	13	18	7.8	<5.0	25	<0.50	<1.0	<5.0	65	46	0.062	<0.040
	10	4/17/2018	<10	7.4	200	<1.0	<1.0	23	9.4	14	6.0	<5.0	19	<0.50	<1.0	<5.0	40	36	0.041	<0.040
TP-2	1	3/15/2018	<10	4.3	110	<1.0	<1.0	19	7.3	6.9	19	<5.0	14	<0.50	<1.0	<5.0	32	54	0.082	<0.040
	5	3/15/2018	<10	8.9	140	<1.0	<1.0	26	11	12	6.6	<5.0	21	<0.50	<1.0	<5.0	49	35	0.058	<0.040
	10	4/17/2018	<10	8.0	230	<1.0	<1.0	25	9.1	15	9.7	<5.0	19	<0.50	<1.0	<5.0	40	38	0.15	<0.040
DUP 1	10	4/17/2018	<10	6.9	210	<1.0	<1.0	24	8.2	13	8.8	<5.0	18	<0.50	<1.0	<5.0	35	35	0.13	<0.040
TP-4	1	4/17/2018	<10	5.4	150	<1.0	<1.0	22	8.6	26	70	<5.0	18	<0.50	<1.0	<5.0	39	150	11	<0.040
	5	4/17/2018	<10	8.0	200	<1.0	<1.0	26	10	11	6.3	<5.0	20	<0.50	<1.0	<5.0	49	38	0.062	<0.040
	10	4/17/2018	<10	6.9	120	<1.0	<1.0	19	8.8	8.7	7.8	<5.0	16	<0.50	<1.0	<5.0	41	40	0.054	<0.040
TP-5	1	3/14/2018	<10	7.3	160	<1.0	<1.0	23	9.9	16	25	<5.0	19	<0.50	<1.0	<5.0	42	73	0.10	<0.040
	5	3/14/2018	<10	9.3	160	<1.0	<1.0	23	9.4	12	7.6	<5.0	18	<0.50	<1.0	<5.0	41	41	0.027	<0.040
	10	4/16/2018	<10	10	210	<1.0	<1.0	22	8.9	17	5.6	<5.0	17	<0.50	<1.0	<5.0	38	33	0.082	<0.040
TP-6	1	3/15/2018	<10	4.6	130	<1.0	<1.0	20	7.2	18	140	<5.0	18	<0.50	<1.0	<5.0	33	140	1.5	<0.040
	5	3/15/2018	<10	7.9	160	<1.0	<1.0	27	8.9	19	8.5	<5.0	17	<0.50	<1.0	<5.0	52	31	0.032	<0.040
	10	4/17/2018	<10	8.2	240	<1.0	<1.0	26	10	18	18	<5.0	21	<0.50	<1.0	<5.0	42	44	0.084	<0.040
TP-7	1	4/16/2018	<10	7.3	150	<1.0	<1.0	27	11	5.4	7.6	<5.0	20	<0.50	<1.0	<5.0	53	48	0.049	<0.040
,	5	4/16/2018	<10	9.3	140	<1.0	<1.0	29	11	9.3	6.4	<5.0	21	<0.50	<1.0	<5.0	56	37	0.039	<0.040
	10	4/16/2018	<10	8.4	160	<1.0	<1.0	23	9.5	8.4	6.0	<5.0	19	<0.50	<1.0	<5.0	42	35	0.066	<0.040
TP-8	1	3/14/2018	<10	4.6	140	<1.0	<1.0	22	8.1	12	82	<5.0	17	<0.50	<1.0	<5.0	35	93	0.59	0.057
11-0	5	3/14/2018	<10	9.5	130	<1.0	<1.0	34	14	12	10	<5.0	23	<0.50	<1.0	<5.0	58	48	0.061	<0.040
	10	4/16/2018	<10	11	110	<1.0	<1.0	28	12	12	7.1	<5.0	22	<0.50	<1.0	<5.0	55	39	0.052	<0.040
TP-11	4			<u>. </u>				! I	<u>!</u>	<u>!</u>			<u>. </u>	<u>!</u>			! I			
17-11	5	4/16/2018 4/16/2018	<10 <10	6.3 9.9	130 150	<1.0 <1.0	<1.0 <1.0	30	9.5 12	7.6 14	5.3 7.0	<5.0 <5.0	16 22	<0.50 <0.50	<1.0 <1.0	<5.0 <5.0	43 61	38 41	0.028 0.038	<0.040 <0.040
	10	4/16/2018	<10	7.0	180	<1.0	<1.0	18	7.4	7.0	4.7	<5.0	14	<0.50	<1.0	<5.0	33	30	0.052	<0.040
TD 40	10				1			1		ı			1				ı	1		
TP-12	1	4/16/2018	<10	7.9	170	<1.0	<1.0	17	4.9	7.4	410	<5.0	17	<0.50	<1.0	<5.0	40	27	0.12	<0.040
	5 10	4/16/2018 4/16/2018	<10 <10	8.2 4.5	140 150	<1.0 <1.0	<1.0 <1.0	32 16	12	12 6.2	6.3 3.7	<5.0 <5.0	13	<0.50 <0.50	<1.0 <1.0	<5.0 <5.0	82 29	48 25	0.065 0.024	<0.040 <0.040
	10			<u> </u>	l			ı	6.6	ı			1							
TP-13	1 -	3/14/2018	<10	5.9	150	<1.0	<1.0	28	8.0	19	140	<5.0	23	<0.50	<1.0	<5.0	38	100	0.54	<0.040
	5	3/14/2018	<10	6.3	160	<1.0	<1.0	25	9.8	11	21	<5.0	19	<0.50	<1.0	<5.0	48	47	0.15	<0.040
	10	4/16/2018	<10	5.2	170	<1.0	<1.0	18	8.2	4.9	5.0	<5.0	16	<0.50	<1.0	<5.0	35	27	0.029	<0.040
TP-14	1	4/16/2018	<10	4.9	120	<1.0	<1.0	20	8.4	5.8	6.0	<5.0	15	<0.50	<1.0	<5.0	38	35	0.030	<0.040
	5	4/16/2018	<10	7.9	140	<1.0	<1.0	25	10	10	7.8	<5.0	20	<0.50	<1.0	<5.0	48	35	0.036	<0.040
	10	4/16/2018	<10	4.0	120	<1.0	<1.0	14	7.1	4.3	3.7	<5.0	13	<0.50	<1.0	<5.0	31	28	0.030	<0.040

Table 1
Metal Analytical Results in Soil - Western Parcel

Sample Location	Sample Depth	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	Mercury	Hexavalent Chromium
	(feet bgs)		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	(mg/kg)	(mg/kg)
AN-24	1	4/10/2018	<10	4.7	120	<1.0	<1.0	19	8.1	8.3	4.9	<5.0	14	<0.50	<1.0	<5.0	36	29	<0.020	<0.040
	5	4/10/2018	<10	5.6	160	<1.0	<1.0	24	10	10	6.3	<5.0	18	<0.50	<1.0	<5.0	49	39	0.025	<0.040
	10	4/10/2018	<10	6.5	130	<1.0	<1.0	24	8.9	9.8	5.8	<5.0	16	<0.50	<1.0	<5.0	40	50	0.062	<0.040
AN-26	1	4/10/2018	<10	7.6	170	<1.0	<1.0	26	10	16	12	<5.0	21	<0.50	<1.0	<5.0	51	47	0.052	<0.040
	5	4/10/2018	<10	14	160	<1.0	<1.0	23	10	13	5.4	<5.0	18	<0.50	<1.0	<5.0	45	32	0.051	<0.040
	10	4/10/2018	<10	18	310	<1.0	<1.0	20	8.6	14	6.1	<5.0	17	<0.50	<1.0	<5.0	39	27	0.061	<0.040
										OUTHWEST	PARCEL				•	1				
TP-15	1	4/18/2018	<10	5.2	120	<1.0	<1.0	22	7.6	16	34	<5.0	21	<0.50	<1.0	<5.0	39	110	0.078	<0.040
	5	4/18/2018	<10	6.0	240	<1.0	<1.0	27	11	6.1	6.3	<5.0	19	<0.50	<1.0	<5.0	54	39	0.047	<0.040
	10	4/18/2018	<10	5.9	130	<1.0	<1.0	25	9.8	6.6	6.2	<5.0	19	<0.50	<1.0	<5.0	48	36	0.060	<0.040
TP-16	1	3/15/2018	<10	8.7	170	<1.0	<1.0	35	9.1	44	46	<5.0	20	<0.50	<1.0	<5.0	43	85	0.50	<0.040
	5	3/15/2018	<10	4.0	110	<1.0	<1.0	20	8.7	7.1	11	<5.0	15	<0.50	<1.0	<5.0	43	34	0.050	<0.040
	10	4/17/2018	<10	4.4	140	<1.0	<1.0	27	11	8.5	9.9	<5.0	22	<0.50	<1.0	<5.0	53	39	0.13	<0.040
DUP 4	10	4/17/2018	<10	4.2	130	<1.0	<1.0	26	11	8.4	10	<5.0	22	<0.50	<1.0	<5.0	52	39	0.036	<0.040
TP-17	1	4/17/2018	<10	9.2	180	<1.0	<1.0	38	10	38	110	<5.0	31	<0.50	<1.0	<5.0	55	130	0.088	<0.040
1	5	4/17/2018	<10	2.8	110	<1.0	<1.0	21	8.8	8.3	11	<5.0	16	<0.50	<1.0	<5.0	42	42	0.038	<0.040
	10	4/17/2018	<10	5.6	120	<1.0	<1.0	24	9.8	6.1	5.9	<5.0	18	<0.50	<1.0	<5.0	52	36	0.12	<0.040
TP-18	1	4/17/2018	<10	5.1	130	<1.0	<1.0	28	8.2	26	70	<5.0	26	<0.50	<1.0	<5.0	46	130	0.57	<0.040
	5	4/17/2018	<10	3.1	120	<1.0	<1.0	20	7.9	3.8	4.9	<5.0	14	<0.50	<1.0	<5.0	39	35	0.024	<0.040
DUP 3	5	4/17/2018	<10	3.6	120	<1.0	<1.0	19	7.7	4.0	6.0	<5.0	14	<0.50	<1.0	<5.0	37	36	<0.020	<0.040
	10	4/17/2018	<10	7.7	150	<1.0	<1.0	27	12	8.9	7.4	<5.0	22	<0.50	<1.0	<5.0	56	38	0.61	<0.040
TP-19	1	3/15/2018	<10	6.3	110	<1.0	<1.0	17	7.4	7.3	11	<5.0	13	<0.50	<1.0	<5.0	38	34	0.039	<0.040
11 - 19	5	3/15/2018	<10	1.6	87	<1.0	<1.0	15	5.6	5.4	3.5	<5.0	9.3	<0.50	<1.0	<5.0 <5.0	30	24	<0.020	<0.040
1	10	4/18/2018	<10	7.7	130	<1.0	<1.0	29	12	13	8.5	<5.0	22	<0.50	<1.0	<5.0	57	45	0.13	<0.040
TD 00	4				1				1	1				1			<u> </u>			
TP-20	1	3/16/2018	<10	4.8	130	<1.0	<1.0	38	7.7	34	84	<5.0	18	<0.50	<1.0	<5.0	31	120	1.7	0.16
1	5 10	3/16/2018 4/18/2018	<10 <10	3.4 8.7	110 120	<1.0 <1.0	<1.0 <1.0	30	8.4 12	<3.0 14	8.1 9.5	<5.0 <5.0	15 22	<0.50 <0.50	<1.0 <1.0	<5.0 <5.0	39 59	37 46	0.080 0.17	<0.040 <0.040
	10						l						<u> </u>				<u> </u>			
AS-14	1	4/10/2018	<10	5.8	200	<1.0	<1.0	29	11	100	570	<5.0	66	<0.50	<1.0	<5.0	94	290	25	<0.040
	5	4/10/2018	<10	5.0	150	<1.0	<1.0	23	10	6.9	34	<5.0	19	<0.50	<1.0	<5.0	52	47	0.42	<0.040
	10	4/10/2018	<10	5.8	140	<1.0	<1.0	26	11	9.5	5.5	<5.0	21	<0.50	<1.0	<5.0	50	43	0.034	<0.040
AN-02	6.5	1/4/2017									34.0									
AN-03	5.5	1/5/2017									4.4									
AN-05	5	1/5/2017									6.8									<u> </u>
AN-13	9	1/9/2017									5.1									<u> </u>
SB2	5	5/15/2006									4.2J									
SB2	16	5/15/2006									4.9J									
SB4	5	5/16/2006									22.1									

Table 1 Metal Analytical Results in Soil - Western Parcel

Sample Location	Sample Depth (feet bgs)	Sample Date	mg/kg	mg/kg	mg/kg	g/g Beryllium	mg/kg	mg/kg	mg/kg	g/kg	rg/kg	Molybdenum ^{kg} /kg	Mickel	Selenium mg/kg	Silver mg/kg	mg/kg	mg/kg	Zinc mg/kg	(mg/kg)	by Hexavalent (shromium
SB4	15	5/16/2006									4.0J									
MW-20	7	1/10/2017									4.9									
MW-20	11	1/10/2017									<0.20									
MW-20	19	1/10/2017									<0.10									
SB3	4	5/15/2006									0.5									
SB3	20	5/15/2006									10.7									

Notes:

CAM 17 Metals measured by USEPA Method 6000/7000.

Mercury measured by USEPA Method 7470A/7471A.

Hexavalent chromium measured by USEPA Method 7199.

Bold values were reported above the laboratory reporting limits (RL).

bgs = below ground surface.

mg/kg = milligram per kilogram.

ND<10 = not detected at or above the laboratory RL of 10 mg/kg.

-- = not analyzed.

All 2001 data collected by TEC (TEC, 2001).

References:

Testa Environmental Coroporation (TEC), 2001. Report of Additional Subsurface Assessment, Former Chemoil Refinery - Eastern Parcel, Signal Hill, California. December 14.

Table 2 Summary of Soil Analytical Data - Offsite Metals Former ChemOil Refinery

Signal Hill, California

Sample Location	Sample Depth (feet bgs)	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg Berrylium	mg/kg	mg/kg	mg/kg	Cobber	read mg/kg	Molybdenum mg/kg	Nickel	Selenium mg/kg	mg/kg	mg/kg	mg/kg	Ziuc mg/kg	Mercury (m ³)	Hexavalent abada Chromium
MW-21	1	2/12/2018	ND<10	2.1	83	ND<1.0	ND<1.0	15	5.9	8.7	3.8	ND<5.0	8.8	ND<0.50	ND<1.0	ND<5.0	32	26	ND<0.020	ND<0.040
	2	2/12/2018	ND<10	4.6	150	ND<1.0	ND<1.0	24	11	9.8	6.4	ND<5.0	17	ND<0.50	ND<1.0	ND<5.0	53	35	ND<0.020	ND<0.040
	5	2/12/2018	ND<10	5.4	200	ND<1.0	ND<1.0	22	9.3	13	6.4	ND<5.0	15	ND<0.50	ND<1.0	ND<5.0	48	37	ND<0.020	ND<0.040
	10	2/12/2018	ND<10	6.7	230	ND<1.0	ND<1.0	23	13	13	6.4	ND<5.0	19	ND<0.50	ND<1.0	ND<5.0	50	42	0.036	ND<0.040
MW-22	1	2/6/2018	ND<10	4.4	110	ND<1.0	ND<1.0	20	8.7	11	16	ND<5.0	13	ND<0.50	ND<1.0	ND<5.0	37	48	0.074	ND<0.040
	2	2/6/2018	ND<10	3.4	91	ND<1.0	ND<1.0	18	6.8	6.5	5.9	ND<5.0	11	ND<0.50	ND<1.0	ND<5.0	34	34	0.024	ND<0.040
	5	2/6/2018	ND<10	11	110	ND<1.0	ND<1.0	30	12	16	6.6	ND<5.0	23	ND<0.50	ND<1.0	ND<5.0	61	43	0.054	ND<0.040
	10	2/6/2018	ND<10	7.2	100	ND<1.0	ND<1.0	28	11	7.6	5.7	ND<5.0	20	ND<0.50	ND<1.0	ND<5.0	53	45	0.044	ND<0.040

Notes:

CAM 17 Metals measured by USEPA Method 6000/7000.

Mercury measured by USEPA Method 7470A/7471A.

Hexavalent chromium measured by USEPA Method 7199.

Bold values were reported above the laboratory reporting limit (RL).

bgs = below ground surface.

mg/kg = milligram per kilogram.

ND<10 = analyte not detected at or above the laboratory RL of 10 mg/kg.

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Table 3 - Total Petroleum Hydrocarbons Analytical Results in Soil Western Parcel

											wester	n Parce	:1										
Sample ID	Consultant	Date Sampled	TRPH	TPH-g	TPH-d	ТРН-о	нс	C6-C8	C8-C10	C10-C12	C12-C14	C14-C16	C16-C18	C18-C20	C20-C22	C22-C24	C24-C26	C26-C28	C28-C32	C32-C34	C34-C36	C36-C40	C40-C44
RSLr Aromatic				82	110	2500		82	82	82	110	110	110	110	110	110	2500	2500	2500	2500	2500	2500	2500
RSLr Aliphatic				520	96	230,000		520	520	520	96	96	96	96	96	96	230,000	230,000	230,000	230,000	230,000	230,000	230,000
RSLi Aromatic				420	600	33,000		420	420	420	600	600	600	600	600	600	33,000	33,000	33,000	33,000	33,000	33,000	33,000
RSLi Aliphatic				2200	440	3,500,000		2200	2200	2200	440	440	440	440	440	440	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
DTSC SLr Aliphatic						8,400											8,400	8,400	8,400	8,400	8,400	8,400	8,400
S-5-2	EEI	1988	38000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-5-10	EEI	1988	NA	ND	ND	NA	12000	NA	NA	NA	NA	NA	NA	NA									
S-6-2	EEI	1988	21000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-6-10	EEI	1988	NA	690	1900	NA	ND	NA	NA	NA	NA	NA	NA	NA									
S-7-10	EEI	1988	NA	68	ND	NA	ND	NA	NA	NA	NA	NA	NA	NA									
S-9-10	EEI	1988	NA	ND	6100	NA	<100	NA	NA	NA	NA	NA	NA	NA									
S-10-10	EEI	1988	NA	ND	2100	NA	ND	NA	NA	NA	NA	NA	NA	NA									
S-11-2	EEI	1988	12000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-10	EEI	1988	NA	4000	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA									
S-12-10	EEI	1988	NA NA	780	300	NA NA	ND	NA NA	NA	NA	NA	NA	NA	NA NA	NA	NA	NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA
S-13-10	EEI	1988	NA	ND	ND	NA	12000	NA	NA	NA	NA	NA	NA	NA									
S-14-2	EEI	1988	49000	NA NA	NA	NA NA	NA	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA
S-14-10	EEI	1988	NA	ND	ND	NA NA	4300	NA	NA	NA	NA	NA NA	NA	NA NA	NA	NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
S-15-10	EEI	1988	NA NA	ND	ND	NA NA	320	NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA									
S-16-10	EEI	1988	NA NA	ND	100	NA NA	ND	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA
S-17-10	EEI	1988	NA NA	ND	ND	ND ND	290	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA
S-17-10 S-19-2	EEI	1988	16000	NA NA	NA NA	NA NA			NA NA		NA NA	NA NA	NA NA	-	NA NA				NA NA	NA NA	NA NA	NA NA	NA NA
				NA ND			NA 220	NA NA		NA NA		-		NA NA		NA	NA NA	NA NA					
S-19-10	EEI	1988	NA 45000		1000	NA NA	220	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA	NA	NA NA	NA NA	NA	NA NA	NA NA
S-20-2	EEI	1988	45000	NA	NA 1200	NA NA	NA 420	NA	NA	NA NA	NA NA	NA	NA	NA									
S-20-10	EEI	1988	NA	ND	1200	NA NA	420	NA	NA	NA NA	NA NA	NA	NA	NA									
S-21-2	EEI	1988	NA	ND 500	ND	NA NA	<100	NA	NA	NA NA	NA NA	NA	NA	NA									
S-21-10	EEI	1988	NA 20000	500	460	NA NA	<100	NA	NA	NA NA	NA NA	NA	NA	NA									
S-22-2	EEI	1988	28000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-22-10	EEI	1988	NA	ND	ND	NA NA	2600	NA	NA	NA	NA NA	NA	NA	NA									
S-23-2	EEI	1988	15000	NA	NA 220	NA NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA NA	NA NA	NA	NA	NA
S-23-10	EEI	1988	NA	ND	320	NA	ND	NA	NA	NA	NA	NA	NA	NA									
S-24-2	EEI	1988	48000	NA	NA 20	NA NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA NA	NA NA	NA	NA	NA
S-24-10	EEI	1988	NA 10000	ND NA	29 NA	NA NA	ND NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA							
S-25-2	EEI	1988	19000	NA ND	NA	NA NA	NA 520	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA							
S-25-10	EEI	1988	NA 48000	ND NA	ND NA	NA NA	520	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA									
S-26-2	EEI	1988	48000	NA ND	NA 1000	NA NA	NA ND	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA							
S-26-10	EEI	1988	NA 40000	ND NA	1900	NA NA	ND NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA							
S-28-2	EEI	1988	40000	NA ND	NA	NA NA	NA	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA	NA NA	NA
S-28-10	EEI	1988	NA 961	ND NA	ND	NA NA	3400	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA									
MW-8-1.5	EEI	1988	861	NA 65	NA 1170	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA							
B-1-5	TEC	1999	1590	65	1170	NA NA	NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA
B-1-10	TEC	1999	705	23 ND	652	NA NA	NA	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA
B-1-15	TEC	1999	270	ND 400	229	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA							
B-1-20	TEC	1999	8580	498	5750	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
B-1-25	TEC	1999	11900	735	10700	NA NA	NA	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA
B-1-30	TEC	1999	20800	289	11200	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
B-1-35	TEC	1999	15100	735	9250	NA NA	NA	NA NA	NA	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA	NA	NA NA	NA NA	NA	NA NA	NA NA
B-2-5	TEC	1999	14100	334	8300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 3 - Total Petroleum Hydrocarbons Analytical Results in Soil Western Parcel

											wester	n Parce	:1										
Sample ID	Consultant	Date Sampled	TRPH	ТРН-g	TPH-d	ТРН-о	нс	C6-C8	C8-C10	C10-C12	C12-C14	C14-C16	C16-C18	C18-C20	C20-C22	C22-C24	C24-C26	C26-C28	C28-C32	C32-C34	C34-C36	C36-C40	C40-C44
RSLr Aromatic				82	110	2500		82	82	82	110	110	110	110	110	110	2500	2500	2500	2500	2500	2500	2500
RSLr Aliphatic				520	96	230,000		520	520	520	96	96	96	96	96	96	230,000	230,000	230,000	230,000	230,000	230,000	230,000
RSLi Aromatic				420	600	33,000		420	420	420	600	600	600	600	600	600	33,000	33,000	33,000	33,000	33,000	33,000	33,000
RSLi Aliphatic				2200	440	3,500,000		2200	2200	2200	440	440	440	440	440	440	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
DTSC SLr Aliphatic						8,400											8,400	8,400	8,400	8,400	8,400	8,400	8,400
B-2-10	TEC	1999	ND	24	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-2-15	TEC	1999	11	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-2-20	TEC	1999	12	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-2-25	TEC	1999	13900	1510	5924	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-2-30	TEC	1999	7140	1130	4400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-3-5	TEC	1999	4940	175	4700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-3-10	TEC	1999	7740	209	5290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-3-15	TEC	1999	99	ND	94	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-3-20	TEC	1999	9480	306	9150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-3-25	TEC	1999	11300	445	10400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-4	Tetra Tech	5/16/2006	NA	3112	14726	1053	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-10	Tetra Tech	5/16/2006	NA	440	3731	231	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-15	Tetra Tech	5/16/2006	NA	2410	4567	185	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-20	Tetra Tech	5/16/2006	NA	1958	3614	147	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-25	Tetra Tech	5/16/2006	NA	2243	6048	268	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-30	Tetra Tech	5/16/2006	NA	1562	561	17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-35	Tetra Tech	5/16/2006	NA	1296	1910	71	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-2-5	Tetra Tech	5/16/2006	NA	2592	6314	7337	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-2-10	Tetra Tech	5/16/2006	NA	<4.5	<25	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-2-15	Tetra Tech	5/16/2006	NA	<4.5	<25	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-2-20	Tetra Tech	5/16/2006	NA	<4.5	<25	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-2-25	Tetra Tech	5/16/2006	NA	3.2	<25	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-2-30	Tetra Tech	5/16/2006	NA	2.7	<25	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-2-35	Tetra Tech	5/16/2006	NA	3252	2931	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-5	Tetra Tech	5/16/2006	NA	11782	1052	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-10	Tetra Tech	5/16/2006	NA	3134	401	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-15	Tetra Tech		NA	6737	457	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-20	Tetra Tech		NA	5814	462	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-25	Tetra Tech		NA	1752	638	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-30	Tetra Tech		NA	3799	363	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-35	Tetra Tech		NA	11840	4942	<238	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-40	Tetra Tech		NA	5769	594	<48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-1	TEC	2009	NA	1.9	1100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-5	TEC	2009	NA	1300	3000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-10	TEC	2009	NA	3800	23000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-15	TEC	2009	NA	2600	8700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-20	TEC	2009	NA	2000	3500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-25	TEC	2009	NA	1500	3300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-30	TEC	2009	NA	3400	14000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-35	TEC	2009	NA	1100	18000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-40	TEC	2009	NA	3200	7000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-11-45	TEC	2009	NA	8800	4100	NA NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-12-5	TEC	2009	NA	<1	6400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 3 - Total Petroleum Hydrocarbons Analytical Results in Soil Western Parcel

									ı		wester	rn Parce	1	ı									
Sample ID	Consultant	Date Sampled	TRPH	TPH-g	TPH-d	TPH-o	нс	C6-C8	C8-C10	C10-C12	C12-C14	C14-C16	C16-C18	C18-C20	C20-C22	C22-C24	C24-C26	C26-C28	C28-C32	C32-C34	C34-C36	C36-C40	C40-C44
RSLr Aromatic				82	110	2500		82	82	82	110	110	110	110	110	110	2500	2500	2500	2500	2500	2500	2500
RSLr Aliphatic				520	96	230,000		520	520	520	96	96	96	96	96	96	230,000	230,000	230,000	230,000	230,000	230,000	230,000
RSLi Aromatic				420	600	33,000		420	420	420	600	600	600	600	600	600	33,000	33,000	33,000	33,000	33,000	33,000	33,000
RSLi Aliphatic				2200	440	3,500,000		2200	2200	2200	440	440	440	440	440	440	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
DTSC SLr Aliphatic						8,400		2200		2200					1.0		8,400	8,400	8,400	8,400	8,400	8,400	8,400
S-12-10	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-12-15	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-12-20	TEC	2009	NA	130	260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-12-25	TEC	2009	NA	580	650	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-12-30	TEC	2009	NA	960	360	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-12-35	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-13-1	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-13-5	TEC	2009	NA	<1	450	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-13-10	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-13-15	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-13-20	TEC	2009	NA	130	370	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-13-25	TEC	2009	NA	390	2200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-13-30	TEC	2009	NA	250	1400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-14-5	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-14-10	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-14-15	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-14-20	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-14-25	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-15-5	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-15-10	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-15-15	TEC	2009	NA	100	440	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-15-20	TEC	2009	NA	180	1200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-15-25	TEC	2009	NA	150	780	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-16-5	TEC	2009	NA	<1	110	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-16-10	TEC	2009	NA	<1	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-16-15	TEC	2009	NA	250	1400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-16-20	TEC	2009	NA	1.5	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-16-25	TEC	2009	NA	67	37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-3-4	TSG	5/15/2016	NA	2939	5094	1375	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB3-10	TSG	5/15/2016	NA	1124	335	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB3-15	TSG	5/15/2016	NA	7026	3014	206	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB3-20	TSG	5/15/2016	NA	2261	11577	793	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB3-25	TSG	5/15/2016	NA	3483	3561	250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AN-01-10	TSG	1/4/2017	NA	<0.5	<5	<8	NA	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
AN-01-20	TSG	1/4/2017	NA	<0.5	2.1	<8	NA	<1	<1	2	1.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
AN-02-6.5	TSG	1/4/2017	NA	370	6780	26250	NA	< 50	<50	430	1600	2000	1300	880	1800	2900	4200	5000	8700	2100	1600	1800	1400
AN-02-10	TSG	1/4/2017	NA	1.5	2.8	<8	NA	<1	<1	<1	1.7	1.9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
AN-02-30	TSG	1/4/2017	NA	380	315	10	NA	6	70	140	170	120	64	36	10	6.7	3.4	1.3	1.7	<1	<1	<1	<1
AN-03-5.5	TSG	1/5/2017	NA	19000	405	<400	NA	260	3100	2700	810	<50	< 50	< 50	< 50	< 50	< 50	<50	< 50	<50	< 50	< 50	<50
AN-03-10	TSG	1/5/2017	NA	6800	183	<80	NA	46	650	750	320	23	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
AN-03-20.5	TSG	1/5/2017	NA	250	27	<8	NA	2.6	84	140	51	1.4	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
AN-05-5	TSG	1/5/2017	NA	3800	9050	892	NA	380	930	1700	1700	3000	2600	1400	1200	780	200	140	140	22	11	<10	<10
AN-05-10	TSG	1/5/2017	NA	510	198	25	NA	4.9	33	92	92	59	49	23	21	13	6	6.4	5.7	<1	<1	<1	<1

Table 3 - Total Petroleum Hydrocarbons Analytical Results in Soil
Western Parcel

											vv este	rn Parce	71										
Sample ID	Consultant	Date Sampled	TRPH	ТРН-д	TPH-d	ТРН-о	НС	C6-C8	C8-C10	C10-C12	C12-C14	C14-C16	C16-C18	C18-C20	C20-C22	C22-C24	C24-C26	C26-C28	C28-C32	C32-C34	C34-C36	C36-C40	C40-C44
RSLr Aromatic				82	110	2500		82	82	82	110	110	110	110	110	110	2500	2500	2500	2500	2500	2500	2500
RSLr Aliphatic				520	96	230,000		520	520	520	96	96	96	96	96	96	230,000	230,000	230,000	230,000	230,000	230,000	230,000
RSLi Aromatic				420	600	33,000		420	420	420	600	600	600	600	600	600	33,000	33,000	33,000	33,000	33,000	33,000	33,000
RSLi Aliphatic				2200	440	3,500,000		2200	2200	2200	440	440	440	440	440	440	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
DTSC SLr Aliphatic						8,400											8,400	8,400	8,400	8,400	8,400	8,400	8,400
AN-5-10 DUP	TSG	1/5/2017	NA	620																			
AN-05-20	TSG	1/5/2017	NA	2700	67	8	NA	<1	10	31	43	25	9.3	6.3	4.9	2.8	2.6	1.6	2.8	<1	<1	<1	<1
AN-13-5.5	TSG	1/9/2017	NA	8.1	3540	157	NA	23	150	890	2400	1200	790	640	210	120	72	13	12	<10	<10	<10	<10
AN-13-9	TSG	1/9/2017	NA	250	11490	503	NA	680	810	3100	4900	3800	2600	1800	840	430	220	44	24	<10	<10	<10	<10
AN-13-15	TSG	1/9/2017	NA	1500	4850	212	NA	310	610	1600	2300	1700	970	700	330	160	93	21	18	<10	<10	<10	<10
AN-13-20	TSG	1/9/2017	NA	470	1252	42	NA	28	170	390	550	440	250	190	97	40	22	<10	<10	<10	<10	<10	<10
AN-20-8	TSG	1/18/2017	NA	5500																			
AN-20-10	TSG	1/18/2017	NA	1200																			
AN-20-15	TSG	1/18/2017	NA	920																			
AN-20-20	TSG	1/18/2017	NA	940																			
MW-20-7	TSG	1/10/2017	NA	11	134	111	NA	<1	17	24	30	35	32	30	22	17	16	15	31	13	6.6	16	5.1
MW-7-11	TSG	1/10/2017	NA	260	1025	1089	NA	<5	130	230	310	250	230	230	160	160	130	140	320	130	68	140	81
MW-7-19	TSG	1/10/2017	NA	600	5040	370	NA	<1	390	1200	2000	1600	1200	840	400	180	120	51	71	16	12	10	<10
AN-20-8	TSG	1/18/2017	NA	1290	46	36	NA	100	760	430	92	<10	<10	<10	<10	<10	<10	<10	16	10	<10	10	<10
AN-20-10	TSG	1/18/2017	NA	332	3.7	<8	NA	24	230	78	7.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
AN-20-15	TSG	1/18/2017	NA	691	12	<80	NA	31	450	210	24	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
AN-20-20	TSG	1/18/2017	NA	476	7	<80	NA	16	320	140	14	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Notes:

TRPH = total recoverable petroleum hydrocarbons

TPH-g = Total Petroleum Hydrocarbons-gasoline range C4-C12

TPH-d = Total Petroleum Hydrocarbons-diesel range C10-C24

TPH-o = Total Petroleum Hydrocarbons-oil range C22-C36

HC = undifferentiated hydrocarbons

NA = not analyzed

ND = not detected

EEI = Environmental Engineering Inc.

TEC = Testa Environmental Corporation

TSG = The Source Group, merged with Apex in 2018

mg/kg = milligram per kilogram

<1 = concentration is less than the Reporting Limit (1), i.e., not detected (ND)

SB-1-5 = Soil Boring1, 5-feet below ground surface (bgs). The last digit in the Sampling ID is the depth bgs.

RSLr = USEPA Regional Screening Level for residential soils, RSLi for industrial soils (November 2017)

DTSC SLr = CalEPA DTSC Screening Level for residential soils (January 2018)

BOLD = Detected concentration exceeds the RSLi aromatic threshold

Table 4 - Volatile Organic Compounds Analytical Results in Soil - Western Parcel

							une com		•						1		
Sample ID RSLr	Consultant	Date Sampled	Benzene	n-Butylbenzene	sec-Butylbenzene	tert-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Methyl-tertbutylether	Naphthalene	n-Propylbenzene	Toluene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	m,p-Xylenes	o-Xylene
RSLi					7800		5.8		NA	47	3.8		4900	58		550	
DTSC-SLr			5.1	58,000	120,000	120,000	25	9900	NA	210	17	24,000	47,000	240	12,000	2400	2800
DTSC-SLi			0.33	1200	2200	2200	NA	NA	NA	NA	NA	NA	1100	NA	210	NA	NA
	TOG	1/4/2015	1.4	64,000	12,000	12,000	NA 0.0020	NA 0.0050	NA 0.0050	NA 0.0050	NA 0.0010	NA 0.0050	5400	NA 0.0050	170	NA 0.0020	NA O 0020
AN-01-10	TSG	1/4/2017	<0.0020	<0.0050	<0.0050	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0010	<0.0050	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020
AN-01-20	TSG	1/4/2017	<0.0020	<0.0050	<0.0050	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.0010	<0.0050	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020
AN-02-6.5	TSG	1/4/2017	0.089	0.0011	<0.010	<0.010	0.12	0.02	0.011	<0.010	0.05	0.021	0.0052	0.07	0.014	0.022	0.015
AN-02-10	TSG	1/4/2017	<0.0020	<0.0050	<0.0050	<0.0050	<0.0020	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<0.0020	<0.0050	<0.0050	<0.0020	<0.0020
AN-02-30	TSG	1/4/2017	<0.0040	0.14	0.2	0.016	0.0045	0.24	<0.010	<0.010	1.6	0.53	<0.0040	< 0.010	<0.010	<0.0040	<0.0040
AN-03-5.5	TSG	1/5/2017	1.7	8.8	10	<2.0	28	13	16	<2.0	19	19	<0.80	170	250	210	36
AN-03-10	TSG	1/5/2017	<2.0	<5.0	7.1	<5.0	8.7	<5.0	<5.0	<5.0	<10	15	<2.0	12	7.9	3.7	<2.0
AN-03-20.5	TSG	1/5/2017	<0.20	< 0.50	0.73	<0.50	<0.20	<0.50	0.75	<0.50	1.6	<0.50	<0.20	<0.50	<0.50	<0.20	<0.20
AN-05-5	TSG	1/5/2017	1.6	6.7	3.7	<0.50	7.8	3.1	4.3	<0.50	13	6.2	<0.20	32	8.7	12	1.4
AN-05-10	TSG	1/5/2017	<0.20	0.77	<0.50	<0.50	0.93	<0.50	<0.50	<0.50	1.7	0.79	<0.20	2.6	0.77	0.56	<0.20
AN-5-10 DUP	TSG	1/5/2017	<0.20	0.85	< 0.50	<0.50	0.79	<0.50	<0.50	<0.50	1.9	0.65	<0.20	2.7	0.74	0.52	<0.20
AN-05-20	TSG	1/5/2017	0.27	2.5	1.7	<0.50	6.5	2.1	1.5	<0.010	6.4	3.8	<0.20	8.9	2.2	2	<0.20
AN-13-5.5	TSG	1/9/2017	<0.0040	0.048	0.034	<0.010	<0.0040	0.012	<0.010	<0.010	0.11	0.033	<0.0040	<0.010	<0.010	<0.0040	<0.0040
AN-13-9	TSG	1/9/2017	0.17	0.29	0.2	<0.010	0.96	0.38	<0.010	<0.50	2.9	0.4	<0.0040	<0.010	<0.010	<0.0040	0.008
AN-13-15	TSG	1/9/2017	0.42	4	2.7	<0.5	7.9	4.3	<0.50	<0.50	16	5.4	<0.20	<0.50	<0.50	<0.20	<0.20
AN-13-20	TSG	1/9/2017	<0.20	0.4	0.9	<0.5	2	12	<0.50	<1.0	5.2	1.8	<0.20	< 0.50	<0.50	< 0.20	<0.20
AN-20-8	TSG	1/18/2017	8.4	9.4	5.5	<1.0	27	12	8.5	<0.50	9.9	15	<0.0066	54	16	70	36
AN-20-10	TSG	1/18/2017	1.2	2.6	1.9	<0.50	6.6 3.9	3	2.6	<0.50	2.2	4.3	<0.005	13	4.6	15	5
AN-20-15	TSG	1/18/2017	0.26 <0.20	2.3	1.5	<0.50 <0.50	1.9	1.9 0.79	2.2	<0.50 <0.50	1.6	3	<0.0039	10 2.4	3.5	7.4	1.3 0.43
AN-20-20 SB1-4	TSG	1/18/2017 5/16/2006	0.0486	<0.025	1.1	0.104	1.9	0.79	1.6 ND	<0.50 ND	1.2 16.8	1.9	<0.0044	2.4	2 0.0261J	2.7 0.2	0.43
SB1-4 SB1-10	TSG	5/16/2006	0.0486	<0.025	0.012	<0.005	0.182	0.528	ND ND	ND ND	0.124	0.037	0.263 0.003J	0.012	0.0261J 0.0050J	0.2 0.0067J	0.218 0.0048J
SB1-10	TSG	5/16/2006	0.076	<0.003	2.07	0.121	2.5	2.45	ND ND	ND ND	9.96	3.39	0.467	7.71	1.7	0.00673	0.00483
SB1-13	TSG	5/16/2006	0.121	<0.030	1.27	0.121	1.27	1.65	ND	ND ND	6.04	2.26	0.407	4.38	0.957	0.518	0.229
SB1-25	TSG	5/16/2006	0.142	<0.030	1.33	0.073	2.53	1.84	ND ND	ND ND	6.19	2.43	0.297	3.85	0.937	0.518	0.130
SB1-23 SB1-30	TSG	5/16/2006	0.202	<0.023	1.05	0.079	1.78	1.55	ND ND	ND ND	5.14	2.43	0.308	3.53	0.8	0.513	0.149
SB1-35	TSG	5/16/2006	0.236	<0.020	1.03	0.066 0.0692J	1.78	1.98	ND ND	ND ND	4.06	2.3	0.23	1.25	0.773	0.313	0.134 0.0915J
SB1-55	TSG	5/15/2006	11.3	<0.035	0.533	0.06923	9.97	1.48	ND ND	ND ND	0.431	1.26	0.300	1.02	0.211	0.279	0.09133
SB2-10	TSG	5/15/2006	0.173	<0.025	<0.005	< 0.005	0.024	< 0.005	ND ND	ND ND	<0.005	< 0.005	0.472 0.002J	< 0.005	<0.005	<0.002	<0.002
SB2-10 SB2-15			0.173 0.0084J	<0.005	<0.005	<0.005	0.024 0.0079J	<0.005	ND ND	ND ND	<0.005	<0.005	<0.0023	<0.005	<0.005	<0.002	<0.002
302-13	TSG	5/15/2006	0.00 04 J	<0.003	<0.003	<0.003	0.00/91	<0.003	ND	ND	<0.003	<0.003	<0.002	<0.003	<0.003	<0.002	<0.002

 Table 4 - Volatile Organic Compounds Analytical Results in Soil - Western Parcel

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Sample ID	Consultant	Date Sampled	Benzene	n-Butylbenzene	sec-Butylbenzene	tert-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Methyl-tertbutylether	Naphthalene	n-Propylbenzene	Toluene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	m,p-Xylenes	o-Xylene
RSLr			1.2	3900	7800	7800	5.8	1900	NA	47	3.8	3800	4900	58	780	550	650
RSL <i>i</i>			5.1	58,000	120,000	120,000	25	9900	NA	210	17	24,000	47,000	240	12,000	2400	2800
DTSC-SLr			0.33	1200	2200	2200	NA	NA	NA	NA	NA	NA	1100	NA	210	NA	NA
DTSC-SLi			1.4	64,000	12,000	12,000	NA	NA	NA	NA	NA	NA	5400	NA	170	NA	NA
SB2-20	TSG	5/15/2006	0.0063J	< 0.005	< 0.005	< 0.005	0.0047J	< 0.005	ND	ND	0.011	< 0.005	< 0.002	< 0.005	< 0.005	< 0.002	< 0.002
SB2-25	TSG	5/15/2006	0.0049J	< 0.005	< 0.005	< 0.005	0.0063J	< 0.005	ND	ND	0.0081J	< 0.005	< 0.002	< 0.005	< 0.005	< 0.002	< 0.002
SB2-30	TSG	5/15/2006	0.018	0.013	0.017	< 0.005	0.111	0.039	ND	ND	0.079	0.054	0.0033J	0.018	< 0.005	0.003J	< 0.002
SB2-35	TSG	5/15/2006	3.28	< 0.020	2.11	0.162	13.3	3.3	ND	ND	10.8	4.92	0.307	10.3	2.97	0.945	0.24
SB3-5	TSG	5/15/2006	ND	3	6.23	0.606	8.99	7.8	ND	ND	19	12.5	0.257	0.05	ND	0.051J	0.051
SB3-10	TSG	5/15/2006	0.373	ND	0.792	0.102	3.23	1.2	ND	ND	4.2	1.7	3.9	10.9	4.53	20.4	5.76
SB3-15	TSG	5/15/2006	0.086	ND	8.2	0.926	15.6	9.77	ND	ND	50.7	15.2	0.966	96.5	12.5	23.7	7.6
SB3-20	TSG	5/15/2006	0.0462J	ND	5.97	0.587	ND	7.16	ND	ND	30.6	10.1	0.449	60	1.22	9	1.45
SB3-25	TSG	5/15/2006	ND	ND	5.06	0.477	0.268	6.93	ND	ND	23.1	10.6	0.284	45.1	0.49	9.2	0.103
SB4-5	TSG	5/16/2006	5.9	< 0.005	10.7	0.59	17.7	10.9	ND	ND	21.9	18	0.488	60	0.151	7.29	0.157
SB4-10	TSG	5/16/2006	3.47	< 0.005	5.14	0.304	13.9	5.14	ND	ND	6.4	8.35	0.855	29.6	9.7	35.2	6.23
SB4-15	TSG	5/16/2006	0.979	< 0.020	2.05	0.15	5.57	2.16	ND	ND	4.77	3.64	1.47	18.1	6.34	23	7.18
SB4-20	TSG	5/16/2006	7.27	< 0.065	11.1	0.631	19.6	10.7	ND	ND	24.3	17.9	1.93	61	9.08	19.6	3.08
SB4-25	TSG	5/16/2006	0.092	< 0.045	1.54	0.113	2.27	1.31	ND	ND	4.88	2.17	0.711	13.8	4.64	11.2	3.65
SB4-30	TSG	5/16/2006	10.8	< 0.005	5.2	0.322	18.8	5.11	ND	ND	19.9	10.3	0.478	44.5	13.6	40	3.35
SB4-35	TSG	5/16/2006	4.08	< 0.025	7.97	0.558	20.9	8.27	ND	ND	36.8	14.5	3.39	79.4	27.2	90.3	26.6
SB4-40	TSG	5/16/2006	1.2	< 0.050	3.97	0.289	8.28	3.76	ND	ND	11.2	6.02	1.86	34.8	12.3	38.3	12.1
MW-20-7	TSG	1/10/2017	< 0.0040	0.017	0.037	< 0.010	0.019	0.043	< 0.010	< 0.010	0.052	0.062	< 0.0040	< 0.010	< 0.010	< 0.0040	< 0.0040
MW-20-11	TSG	1/10/2017	< 0.20	< 0.50	0.66	< 0.50	< 0.20	< 0.50	< 0.50	< 0.50	<1.0	1.1	< 0.20	< 0.50	< 0.50	< 0.20	< 0.20
MW-20-19	TSG	1/10/2017	< 0.20	1.7	2.3	< 0.50	< 0.20	2.1	< 0.50	< 0.50	12	3.5	< 0.20	< 0.50	< 0.50	< 0.20	< 0.20

Notes:

NA = Not Analyzed or Not Available

ND = Not Detected

EEI = Environmental Engineering Inc.

TEC = Testa Environmental Corporation

TSG = The Source Group, merged with Apex in 2018

mg/kg = milligram per kilogram

<1 = concentration is less than the Reporting Limit (1), i.e., not detected (ND)

SB-1-5 = Soil Boring1, 5-feet below ground surface (bgs). The last digit in the Sampling ID is the depth bgs.

RSLr = USEPA Regional Screening Level for residential soils, RSLi for industrial soils (November 2017)

Table 4 - Volatile Organic Compounds Analytical Results in Soil - Western Parcel

Sample ID	Consultant	Date Sampled	Benzene	n-Butylbenzene	sec-Butylbenzene	tert-Butylbenzene	Ethylbenzene	Isopropylbenzene	4-Isopropyltoluene	Methyl-tertbutylether	Naphthalene	n-Propylbenzene	Toluene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	m,p-Xylenes	o-Xylene
RSLr			1.2	3900	7800	7800	5.8	1900	NA	47	3.8	3800	4900	58	780	550	650
RSLi			5.1	58,000	120,000	120,000	25	9900	NA	210	17	24,000	47,000	240	12,000	2400	2800
DTSC-SLr			0.33	1200	2200	2200	NA	NA	NA	NA	NA	NA	1100	NA	210	NA	NA

DTSC SLr = CalEPA DTSC Screening Level for residential soils, SLi for industrial soils (January 2018)

 $\mathbf{BOLD} = \mathbf{Detected}$ concentration exceeds the RSLi screening level

Only detected concentrations of VOCs are presented in this table; all other VOCS were ND

Table 5 - Polycyclic Aromatic Hydrocarbons Analytical Results in Soil - Western Parcel

						ne						
			မ	ane .		Benz(a)anthracene					a)	
			Acenaphthene	Acenaphthylene	e e	thr		Fluoranthene		ene	Phenanthrene	
			pht	pht]	Anthracene	1)an	ene	mth	ne	Naphthalene	nth	ø.
		Date	ena	ena	thr	nz(8	Chrysene	1013	Fluorene	pht	ena	Pyrene
Sample ID	Consultant	Sampled	Ac			Be		F				Py
RSLr			3600	NA	18000	1.1	110	2400	2400	3.8	NA	1800
RSLi			45000	NA	230000	21	2100	30000	30000	17	NA	23000
DTSC-SLr			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DTSC-SLi			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AN-01-10	TSG	1/4/2017	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
AN-01-20	TSG	1/4/2017	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
AN-02-6.5	TSG	1/4/2017	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0	<5.0	<5.0	<5.0
AN-02-10	TSG	1/4/2017	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
AN-02-30	TSG	1/4/2017	0.043	0.022	< 0.010	< 0.010	< 0.010	< 0.010	0.09	0.067	0.084	< 0.010
AN-03-5.5	TSG	1/5/2017	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	24	< 0.20	< 0.20
AN-03-10	TSG	1/5/2017	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3	< 0.10	< 0.10
AN-03-20.5	TSG	1/5/2017	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.43	< 0.050	< 0.050
AN-05-5	TSG	1/5/2017	< 0.50	< 0.50	2	< 0.50	< 0.50	0.57	3.7	11	9.2	1.2
AN-05-10	TSG	1/5/2017	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.76	0.2	< 0.10
AN-05-20	TSG	1/5/2017	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	4	0.69	< 0.10
AN-13-5.5	TSG	1/9/2017	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.33	0.62	0.34	< 0.50
AN-13-9	TSG	1/9/2017	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.2	14	2	< 0.50
AN-13-15	TSG	1/9/2017	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.4	15	1.2	< 0.50
AN-13-20	TSG	1/9/2017	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.65	3.2	0.55	<0.50
AN-20-8	TSG	1/18/2017	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	7.3	<0.10	<0.10
AN-20-10	TSG	1/18/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.59	<0.010	<0.010
AN-20-15	TSG	1/18/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.96	<0.010	<0.010
AN-20-20	TSG	1/18/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.86	<0.010	<0.010
SB1-4	TSG	5/16/2006	0.794	ND NA	0.114	ND NA	ND NA	0.097	3.68	17.3	26.5	1.24
SB1-10	TSG	5/16/2006	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
SB1-15	TSG	5/16/2006	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
SB1-20	TSG	5/16/2006	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
SB1-25	TSG	5/16/2006	NA 0.022	NA ND	NA ND	NA ND	NA ND	NA ND	NA 0.104	NA 0.226	NA 0.424	NA ND
SB1-30	TSG	5/16/2006	0.033	ND NA	ND NA	ND NA	ND NA	ND NA	0.104	0.226	0.424	ND NA
SB1-35	TSG	5/16/2006	NA 0.122	NA ND	NA 0.16	NA ND	NA 1.092	NA 0.062	NA 1.24	NA ND	NA 4.05	NA 0.712
SB2-5	TSG	5/15/2006	0.122	ND NA	0.16	ND NA	1.083	0.063	1.34	ND NA	4.05	0.712
SB2-10	TSG	5/15/2006	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
SB2-16	TSG	5/15/2006	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA	NA NA
SB2-20	TSG	5/15/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5 - Polycyclic Aromatic Hydrocarbons Analytical Results in Soil - Western Parcel

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Sample ID	Consultant	Date Sampled	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Chrysene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
RSLr			3600	NA	18000	1.1	110	2400	2400	3.8	NA	1800
RSLi			45000	NA	230000	21	2100	30000	30000	17	NA	23000
DTSC-SLr			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DTSC-SLi			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB2-25	TSG	5/15/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB2-30	TSG	5/15/2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SB2-35	TSG	5/15/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB3-5	TSG	5/15/2006	0.409	ND	ND	1.01	0.688	0.048	0.87	11.1	7.63	7.63
SB3-10	TSG	5/15/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB3-15	TSG	5/15/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB3-20	TSG	5/15/2006	0.564	ND	0.9	ND	0.832	0.089	4.35	52.9	30.9	30.9
SB3-25	TSG	5/15/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB4-5	TSG	5/16/2006	0.159	ND	ND	ND	ND	< 0.010	0.068	3.3	1.04	ND
SB4-10	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	< 0.3	< 0.3	NA
SB4-15	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	< 0.3	< 0.3	NA
SB4-20	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	< 0.3	< 0.3	NA
SB4-25	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	< 0.3	< 0.3	NA
SB4-30	TSG	5/16/2006	0.045	ND	ND	ND	ND	ND	0.018J	3.13	0.059	ND
SB4-35	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	< 0.3	< 0.3	NA
SB4-40	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	< 0.3	< 0.3	NA
MW-20-7	TSG	1/10/2017	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
MW-20-11	TSG	1/10/2017	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.24	< 0.20	< 0.20
MW-20-19	TSG	1/10/2017	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	8.3	0.8	< 0.10

Notes:

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ND = Not Detected

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TEC = Testa Environmental Corporation

TSG = The Source Group, merged with Apex in 2018

mg/kg = milligram per kilogram

<1 = concentration is less than the Reporting Limit (1), i.e., not detected (ND)

SB-1-5 = Soil Boring1, 5-feet below ground surface (bgs). The last digit in the Sampling ID is the depth bgs.

RSLr = USEPA Regional Screening Level for residential soils, RSLi for industrial soils (November 2017)

DTSC SLr = CalEPA DTSC Screening Level for residential soils, SLi for industrial soils (January 2018)

 Table 5 - Polycyclic Aromatic Hydrocarbons Analytical Results in Soil - Western Parcel

Sample ID	Consultant	Date Sampled	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Chrysene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
RSLr			3600	NA	18000	1.1	110	2400	2400	3.8	NA	1800
RSL <i>i</i>			45000	NA	230000	21	2100	30000	30000	17	NA	23000
DTSC-SLr			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DTSC-SLi			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

BOLD = Detected concentration exceeds the RSLi screening level

Only detected concentrations of PAHs are presented in this table; all other PAHS were ND

Table 6 Summary of Soil Vapor Monitoring Point Analytical Data - VOCs Former ChemOil Refinery Signal Hill, California

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Sample Location	Sample Depth (feet bgs)	Sample Date	(hg/w ₃)	(hã/w ₃)	hβh (gangengengengengengengengengengengengengen	m,p-Xylenes (mg/m³)	o-Xylenes (µg/m³)	(μg/m³)	ர் இ sec-Butylbenzene ்	bh (section Disulfide	(mg/m³)	m/gμ) (ε	(په Cyclohexane	(mg/m³)	hō/m³, 1,3-DCB	(h8/m³)	Ethanol	bh James (Ethyltoluene James (Sethyltoluene	Heptane (Fig. Mg/m ³)	n-Hexane	(mg/m³)	ش/s Isopropylbenzene (پ	h இ 4- Isopropyltoluene ்	m/δπ) (ε	(µg/m³)	hg/m n-Propylbenzene	(mg/m³)	(hg/m ³)	(hg/m³)	(ha/w ₃)
			Ī			ī	ī				ī				NORTHWEST F	PARCEL									T		ī	T	T	
TP-1	5	4/13/18	ND<10	ND<10	ND<10	ND<10	ND<10	11	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-2	5	4/13/18	ND<10	ND<10	ND<10	ND<10	ND<10	27	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	12	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-3	_		ND<10	ND<10	ND<10	ND<10	ND<10	89	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	14	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
(DUP)	5	4/13/18	ND<10	ND<10	ND<10	ND<10	ND<10	23	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	12	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-4		4/13/18	ND<500	ND<500	2,000	4,800	1,600	ND<500	ND<500	ND<500	ND<500	ND<500	9,700	ND<500	ND<500	ND<500	ND<500	ND<500	3,200	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	550	ND<500
	5	4/25/18	ND<15,000	21,000	100,000	260,000	93,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	330,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	18,000	130,000	ND<15,000	ND<15,000	29,000	ND<15,000	ND<15,000	ND<15,000	27,000	ND<15,000	ND<15,000	53,000	21,000
TP-5	5		ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)		ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)	ND<500 (3)
		4/13/18	12,000	19,000	, ,	. ,	` ,	, ,	, ,	. ,	ND<500	ND<500		ND<500	ND<500	ND<500	ND<500	19,000			. ,	` '	9,800	, ,	ND<500	5,700	ND<500	ND<500		` '
TP-6	5		·	·	11,000	230,000	130,000	ND<500	4,300	5,900			180,000 E					•	83,000	12,000	ND<500	7,700	<u> </u>	1,300	1				19,000	39,000
TP-7	5	4/13/18	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	520	ND<500	ND<500	8,600	ND<500	ND<500	ND<500	ND<500	ND<500	990	1,500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	660	ND<500	ND<500	ND<500
TP-8	5	4/13/18	620,000	5,100,000	2,200,000	8,300,000	2,600,000	ND<220,000	ND<220,000	ND<220,000	ND<220,000	ND<220,000	3,600,000	ND<220,000	ND<220,000	ND<220,000	ND<220,000	290,000	1,200,000	1,200,000		ND<220,000	ND<220,000	ND<220,000	ND<220,000	240,000	ND<220,000	ND<220,000	530,000	310,000
TP-9	5	4/13/18	2,000,000	13,000,000 E	3,000,000	11,000,000	3,200,000	ND<300,000	ND<300,000	ND<300,000	ND<300,000	ND<300,000	2,800,000	ND<300,000	ND<300,000	ND<300,000	ND<300,000	350,000	3,900,000	1,500,000	ND<300,000	ND<300,000	ND<300,000	ND<300,000	ND<300,000	300,000	ND<300,000	15,000,000 E	580,000	370,000
TP-10	5	4/13/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-11	5	4/12/18	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	ND<500	2,600	ND<500	ND<500
TP-12	5	4/12/18	ND<3,000	ND<3,000	19,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	230,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	7,900	ND<3,000	7,300	ND<3,000	ND<3,000	ND<3,000	7,400	ND<3,000	ND<3,000	3,900	ND<3,000
TP-13	5	4/12/18	ND<3,000	ND<3,000	7,200	3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	ND<3,000	7,000	ND<3,000	ND<3,000	ND<3,000	7,300	ND<3,000	ND<3,000	7,000	ND<3,000
TP-14			ND<10	ND<10	13	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	130	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
(DUP)	5	4/12/18	ND<10	ND<10	14	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	150	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
VP-1	5	12/28/17	97,000	ND<50,000	ND<50,000	ND<50,000	ND<50.000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	2,000,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	170,000	290,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000		ND<50,000
		12/28/17	180,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	2,000,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	280,000	450,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	ND<50,000	,	,
VP-2	<u> </u>		,	,	,	,		,	,	<u>'</u>	, , , , , , , , , , , , , , , , , , ,	·	, ,	,	,	,	,	,	,	,		,	,	,	1	,	,	<u> </u>	,	,
AN-06	5			ND<22,611.04	28,255.15	ND<52,107.98	,	,		ND<18,684.66	,			-	ND<36,073.62			-	·	·		·	ND<65,874.85	·		,	,	,	,	
		4/25/18	230,000	ND<15,000	28,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	1,500,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	330,000	460,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000	ND<15,000
AN-07	5	1/17/17	ND<6.39	ND<7.54	ND<8.68	ND<17.37	ND<8.68	ND<19.00	ND<21.96	ND<6.23	ND<9.77	ND<4.13	ND<6.88	ND<12.02	ND<12.02	ND<12.02	ND<3.77	ND<9.83	ND<8.20	ND<7.05	ND<9.83	ND<19.66	ND<21.96	ND<10.48	ND<13.57	ND<19.66	ND<3.44	ND<9.34	ND<9.83	ND<9.83
		4/25/18	ND<10	ND<10	ND<10	ND<10	ND<10	22	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
AN-08		1/17/17	ND<6.39	ND<7.54	ND<8.68	ND<17.37	ND<8.68	ND<19.00	ND<21.96	ND<6.23	ND<29.30	ND<4.13	ND<6.88	ND<12.02	ND<12.02	ND<12.02	ND<3.77	ND<9.83	ND<8.20	ND<7.05	ND<9.83	ND<19.66	ND<21.96	ND<10.48	ND<13.57	ND<19.66	ND<3.44	ND<9.34	ND<9.83	ND<9.83
(DUP)	5	1/17/17	ND<6.39	ND<7.54	ND<8.68	ND<17.37	ND<8.68	ND<19.00	ND<21.96	ND<6.23	ND<29.30	ND<4.13	ND<6.88	ND<12.02	ND<12.02	ND<12.02	ND<3.77	ND<9.83	ND<8.20	ND<7.05	ND<9.83	ND<19.66	ND<21.96	ND<10.48	ND<13.57	ND<19.66	ND<3.44	ND<9.34	ND<9.83	ND<9.83
		4/13/18	ND<10	ND<10	ND<10	ND<10	ND<10	64	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	12	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
,															SOUTHWEST P	PARCEL			•				'							
TP-15	5	4/12/18	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	250	ND<40	ND<40	ND<40	ND<40	2,300	1,100	1,000	ND<40	ND<40	ND<40	ND<40	ND<40	88	ND<40	ND<40	ND<40	ND<40	78	420	ND<40	ND<40
TP-16	5	4/12/18	ND<200	ND<200	1,400	ND<200	ND<200	ND<200	570	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	1,300	ND<200	ND<200	1,100	1,100	ND<200	ND<200	ND<200	ND<200
TP-17		4/12/18	ND<200	ND<200	1,800	ND<200	300	ND<200	560	330	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	930	ND<200	ND<200	2,000	1,000	350	ND<200	ND<200	ND<200
	5		ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	ND<750	1,000	ND<750	ND<750	ND<750
TD 40																			-				 				· ·			
TP-18			ND<1,000		ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000		ND<1,000		ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	ND<1,000	2,900	ND<1,000	ND<1,000
	5	4/25/18		ND<30,000	ND<30,000	30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	950,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000		ND<30,000		ND<30,000	ND<30,000	ND<30,000	ND<30,000		ND<30,000	ND<30,000		ND<30,000
(DUP)		4/25/18	65,000	ND<30,000	ND<30,000	44,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	1,200,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	170,000	32,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000	ND<30,000
TP-19	5	4/12/18	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	120	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	ND<40	100	ND<40	ND<40	ND<40	75	ND<40	350	ND<40	ND<40
TP-20	5	4/12/18	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	3,400	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	ND<2,500	13,000	ND<2,500	ND<2,500	ND<2,500	12,000	ND<2,500	ND<2,500	3,500	ND<2,500
VP-3	5	12/28/17	ND<5,000	ND<5,000	7,900	ND<5,000	ND<5,000	ND<5,000	6,400	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	18,000	ND<5,000	ND<5,000	ND<5,000	18,000	ND<5,000	ND<5,000	8,500	ND<5,000
VP-4		12/28/17	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	ND<5,000	11,000	ND<5,000	ND<5,000
	5	4/12/18	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	450	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	ND<200	1,200	ND<200	ND<200	260	970	ND<200	10,000	ND<200	ND<200
AN-04	5	1/17/17	194,876	<45,222.09	208,432	955,313	191,063						2,478,331					103,239	819,714	458,217				<62905.52					167,149	93,399
			<u> </u>		<u> </u>	<u>'</u>	<u> </u>]		<u> </u>	<u> </u>	1	<u> </u>	1		<u> </u>	<u>[</u>	<u> </u>	<u> </u>	<u>.</u>	1	<u> </u>	1	<u> </u>	<u> </u>	1	<u> </u>	<u> </u>	<u> </u>	<u>. </u>

Apex Companies LLC

Summary of Soil Vapor Monitoring Point Analytical Data - VOCs Former ChemOil Refinery Signal Hill, California

Sample Location	Sample Depth (feet bgs)	Sample Date	(µg/m³)	(µg/m³)	balanzene (°Ethylbenzene	m,p-Xylenes	o-Xylenes	(μg/m³)	h گ عر چ (چ	لة الإ الإ الإ	(hg/w ₃)	6π) ω/chloromethane (ε	ش' Cyclohexane (پیدر)	(ha/ba/) 1,2-DCB	(ha/bh) (په 1,3-DCB	(hg/m³)	(Ethanol	oh) W,B 4-Ethyltoluene (.e.	(µg/m³)	n-Hexane	mg/m) (sopropanol	h ^d /sopropylbenzene پر	h த' ்.	Maphthalene (ε _ε m/6π)	(µg/m³)	ش) په n-Propylbenzene	^(bd) پاکستان پاکستان	(hg/w ₃)	hg/m 1,2,4-ТМВ	^(hd) 1,3,5-ТМВ
SB1	5	5/30/06	<820	<820	2,100	<1,640	<800																						4,300	<1230
SB1	15	5/30/06	24,000	<800	26,900	10,800	<800																						4,380	<1230
SB2	5	5/30/06	242,000	<820	15,200	<1,640	<820																						<1230	<1230
SB2	20	5/30/06	230,000	<800	108,000	<1,640	<800																						<1230	<1230
SB4	5	5/30/06	10,100	<800	6,810	9,040	<800																						10,300	5,490
SB4	17	5/18/06	802,000	70,800	159,000	221,000	<800																						7,770	5,830
SB3	15	5/18/06	3,400	<800	31,900	<1600	41,400																						2,490	1,720
SB3	15	5/18/06	2,500	<800	22,300	<1600	<800																						3,460	3,370
SB3	15	5/18/06	2,940	<820	48,400	<1600	<800																						3,500	3,070
SB3	5	5/30/06	12,100	<820	25,600	<1640	<800																						<1230	<1230
SB3	15	5/30/06	7,140	<800	60,600	<1600	<800																						<1200	<1200

Bold values are detected at concentrations at or above the laboratory reporting limit.

Shaded values indicate the helium leak threshold exceeded 5% (as shown on Table 5), which is indicative of a potential ambient air leakage during sample collection. Therefore, the VOC data is not considered valid and data from an alternative date should be used if available.

VOCs = Volatile organic compounds.

VOCs measured by USEPA Method TO-15. Only detected compounds are presented in the table above.

bgs = Below ground surface. TPHd = Total petroleum hydrocarbon as diesel.

TPHg = Total petroleum hydrocarbon as gasoline.

μg/m³ = Microgram per cubic meter.

ND<100 = Analyte not detected at or above the laboratory reporting limit of 100 μ g/m³.

DUP = Duplicate sample.

(3) = The sample required dilution due to the presence of high moisture content.

E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument.

NA = Not analyzed.

PCE = Tetrachloroethane. DCB = Dichlorobenzene.

TMP = Trimethylpentane.

TMB = Trimethylbenzene.

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Table 7 Summary of Soil Vapor Monitoring Point Analytical Results - Helium Former ChemOil Refinery

ormer ChemOil Refiner Signal Hill, California

Sample Location	Sample Depth feet bgs	Date Sampled	Helium in Sample (%)	Average Helium Under Shroud (%)	Leak Ratio ¹ (%)
	100t bgc	NORTHWE	ST PARCEL	(70)	(70)
TP-1	5	4/13/18	ND<0.20	22	
TP-2	5	4/13/18	ND<0.20	25	
TP-3 (DUP)	5	4/13/18	ND<0.20 ND<0.20	- 24 -	
TP-4	5 -	4/13/18 4/25/18	7.8 ND<0.20	23 25	33.43%
TP-5	5	4/13/18	ND<0.20	23	
TP-6	5	4/13/18	ND<0.20	26	
TP-7	5	4/13/18	ND<0.20	22	
TP-8	5	4/13/18	ND<0.20	27	
TP-9	5	4/13/18	2.1	23	9.26%
TP-10	5	4/13/18	ND<0.20	24	
TP-11	5	4/12/18	ND<0.20	23	
TP-12	5	4/12/18	ND<0.20	26	
TP-13	5	4/12/18	0.50	30	1.67%
TP-14 (DUP)	5	4/12/18	2.6 2.9	- 25	10.54% 11.76%
AN-06	5	1/17/17	ND<0.20	21	
		4/25/18	ND<0.20	31	
AN-07	5	1/17/17 4/25/18	ND<0.20 2.0	21 27	 7.41%
AN-08 (DUP)	5	1/17/17 1/17/17 4/13/18	ND<0.20 ND<0.20 0.69	21 21 25	 2.76%
VP-1	5	12/28/17	ND<0.20	23	
VP-2	5	12/28/17	ND<0.20	23	
	1		ST PARCEL		
TP-15	5	4/12/18	ND<0.20	22	
TP-16	5	4/12/18	1.5	22	6.82%
TP-17	5	4/12/18 4/25/18	3.2 3.2	23 22	13.91% 14.55%
TP-18 (DUP)	5	4/12/18 4/25/18 4/25/18	16 ND<0.20 ND<0.20	23 24	68.57%

Table 7 Summary of Soil Vapor Monitoring Point Analytical Results - Helium

Former ChemOil Refinery Signal Hill, California

Sample Location	Sample Depth feet bgs	Date Sampled	Helium in Sample (%)	Average Helium Under Shroud (%)	Leak Ratio ¹ (%)
TP-19	5	4/12/18	ND<0.20	24	
TP-20	5	4/12/18	ND<0.20	24	
TP-21	4.5	4/25/18	0.40	26	1.52%
VP-3	5	12/28/17	ND<0.20	23	
VP-4	5	12/28/17	ND<0.20	24	
	5	4/12/18	ND<0.20	24	

Notes:

Bold values are detected at concentrations above the laboratory reporting limit.

Shaded values exceed a leak threshold of 5% and indicate a potential ambient air leakage during sample collection.

Helium measured by ASTM D1946M.

bgs = Below ground surface.

% = Percent.

ND<0.20 = Analyte not detected at or above the laboratory reporting limit of 0.20%.

DUP = Duplicate sample.

-- = Not calculated, helium not detected in sample.

¹ Estimated leak ratio (%) = [Concentration of Helium in Sample (%)] / [Concentration of Helium in Shroud (%)] X100.

Table 8 Summary of Soil Physical Property Data - Western Parcel

Former ChemOil Refinery Signal Hill, California

Commis	Dete	Sample	Moisture	Content	Den	sity		Porosity						
Sample Location	Date Sampled	Depth	Wioisture	Content	Dry Bulk	Grain	Total ⁽¹⁾	Air-filled ⁽²⁾	Water-filled					
	-	feet bgs	% weight	cm ³ /cm ³	g/cm ³	g/cm ³	cm ³ /cm ³	cm ³ /cm ³	cm ³ /cm ³					
	NORTHWEST PARCEL													
TP-3	3/14/2018	5.3-5.45	13.0	0.227	1.74	2.67	0.349	0.122	0.227					
AN-22	5/18/2017	4.75-5.25	11.8	0.172	1.46	2.73	0.465	0.293	0.172					
SOUTHWEST PARCEL														
TP-19	3/15/2018	5.3-5.45	11.3	0.192	1.71	2.67	0.361	0.169	0.192					

Notes:

Moisture content measured by ASTM D2216 and API RP40.

Density and porosity by API RP40.

bgs = below ground surface.

cm³/cm³ = Cubic centimer by cubic centimeter.

% = percent.

⁽¹⁾ Total porosity = all interconnected pore channels.

⁽²⁾ Air-filled = pore channels not occupied by pore fluids.

Table 9 Summary of Particle Size Data - Western Parcel

Former ChemOil Refinery Signal Hill, California

Sample	Date	Sample	Mean Grain	Median	Parti	cle Size Dist	tribution (% v	weight)	Silt &					
Location	Sampled	Depth	Size	Grain Size	Gravel		Sand Size		Clay					
		feet bgs	Description ⁽¹⁾	mm	Gravei	Coarse	Medium	Fine						
	NORTHWEST PARCEL													
TP-3	3/14/2018	5.1-5.2	Fine Sand	0.149	0.94	1.71	22.88	47.41	27.06					
AN-22	5/18/2017	4.75-5.25	Silt	0.024	0.00	0.00	0.66	24.25	75.10					
	SOUTHWEST PARCEL													
TP-19	3/15/2018	5.1-5.2	Fine Sand	0.127	0.00	0.00	7.71	54.96	37.33					

Notes:

bgs = below ground surface.

mm = millimeter.

% = percent.

⁽¹⁾ Based on mean from Trask.

Table 10 Summary of Organic Carbon Data - Western Parcel

Former ChemOil Refinery Signal Hill, California

Sample Location	Date Sampled	Sample Depth	Total Organic Carbon	Fraction Organic Carbon								
		feet bgs	mg/kg	g/g								
NORTHWEST PARCEL												
TP-3	3/14/2018	5.0 - 5.1	12,136	1.21E-02								
AN-22	5/18/2017	4.75-5.25	2,760	2.76E-03								
SOUTHWEST PARCEL												
TP-19	3/15/2018	5.0 - 5.1	5,743	5.74E-03								

Notes:

bgs = below ground surface. mg/kg = milligram per kilogram g/g = gram per gram

Table 11 Exposure Point Concentrations, Slope Factors and Reference Doses - Western Parcel

SOIL MATRIX ANALYTE	MAX mg/kg	95UCL mg/kg	SFo	IUR	RfDo	RfCi
TPH-g	19000	2185			4.00E-03	3.00E+01
TPH-d	23000	3647			4.00E-03	3.00E+00
benzene	11.3	3.873	1.00E-01	2.90E-05	4.00E-03	3.00E+00
n-butylbenzene	9.4	1.902			5.00E-02	2.00E+02
sec-butylbenzene	11.1	3.433			1.00E-01	4.00E+02
tert-butylbenzene	0.926	0.234			1.00E-01	4.00E+02
ethylbenzene	28	8.008	1.10E-02	2.50E-06	1.00E-01	1.00E+03
isopropylbenzene	13	3.907			1.00E-01	4.00E+02
4-isopropyltoluene	16	4.586				
naphthalene	50.7	11.97		3.40E-05	2.00E-02	3.00E+00
n-propylbenzene	19	6.387			1.00E-01	1.00E+03
toluene	3.9	0.952			8.00E-02	5.00E+00
1,2,4-trimethylbenzene	170	28.8				7.00E+00
1,3,5-trimethylbenzene	250	31.93			1.00E-02	4.00E+01
m,p-xylenes	210	27.55			2.00E-01	1.00E+02
o-xylenes	36	10.78			2.00E-01	1.00E+02
Acenaphthene	0.794	0.16			6.00E-02	2.40E+02
Anthracene	2	0.317			3.00E-01	1.20E+03
Benz(a)anthracene	1.01	NA	1.00E-01	6.00E-05		
Chrysene	1.083	0.241	1.00E-03	6.00E-07		
Fluoranthene	0.57	0.067			4.00E-02	
Fluorene	4.35	1.173			4.00E-02	1.60E+02
Naphthalene	52.9	11.07		3.40E-05	2.00E-02	3.00E-03
Phenanthrene	30.9	7.306				
Pyrene	30.9	3.879			3.00E-02	1.20E+02
arsenic	18	7.455	9.50E+00	3.30E-03	3.60E-06	1.50E-02
barium	310	159.4			2.00E-01	5.00E-04
cobalt	14	9.831		9.00E-03	3.00E-04	6.00E-06
chromium	38	25.63			1.50E+00	
hexavalent chromium	0.16	0.0537	5.00E-01	8.40E-02	3.00E-03	1.00E-04
copper	100	15.22			4.00E-02	
mercury	25	2.559			1.60E-04	3.00E-02
nickel	66	20.87	9.10E-01	2.60E-04	1.10E-02	1.40E-05
lead	570	70.78	LeadSpread	LeadSpread	LeadSpread	LeadSpread
vanadium	94	48.28			5.00E-03	1.00E-01
zinc	290	77.31			3.00E-01	
SOIL VAPOR ANALYTE	MAX μg/m ³	95UCL µg/m3				
acetone	89	34.70		J&E model		J&E model
benzene	2,000,000	240,031		J&E model		J&E model
sec-butylbenzene	6,400	1,373		J&E model		J&E model
carbon disulfide	5,900	664.30		J&E model		J&E model
cyclohexane	3,600,000	774,972		J&E model		J&E model
1,2-dichlorobenzene	2,300	NA		J&E model		J&E model
1,3-dichlorobenzene	1,100	NA		J&E model		J&E model
1,4-dichlorobenzene	1,000	NA		J&E model		J&E model
ethanol	10.6	NA				
ethylbenzene	3,000,000	585,506		J&E model		J&E model
4-ethyltoluene	350,000	41,907				
heptane	3,900,000	602,472				

Table 11 Exposure Point Concentrations, Slope Factors and Reference Doses - Western Parcel

SOIL VAPOR ANALYTE	MAX μg/m ³	95UCL μg/m3		
n-hexane	1,500,000	221,784	J&E model	J&E model
isopropanol	14	10.67		
isopropylbenzene	29,000	4,860	J&E model	J&E model
4-isopropyltoluene	9,800	NA		
naphthalene	1,300	NA	J&E model	J&E model
n-propylbenzene	300,000	58,856	J&E model	J&E model
propylene	1,000	194.9		
tetrachloroethylene	2,000	341.9	J&E model	J&E model
toluene	13,000,000	878,878	J&E model	J&E model
2,2,4-trimethylpentane	11,000	1,915		
1,2,4-trimethylbenzene	580,000	98,631	J&E model	J&E model
1,3,5-trimethylbenzene	370,000	53,164	J&E model	J&E model
m,p-xylenes	11,000,000	2,181,897	J&E model	J&E model
o-xylene	3,200,000	467,756	J&E model	J&E model
GROUNDWATER ANALYTE	MAX μg/L	95UCL μg/L		
acetone	160	NA	J&E model	J&E model
benzene	6,300	NA	J&E model	J&E model
tert-butylalcohol	140	NA		
n-butylbenzene	370	NA	J&E model	J&E model
sec-butylbenzene	420	NA	J&E model	J&E model
tert-butylbenzene	48	NA	J&E model	J&E model
1,2-dichloroethane	38	NA	J&E model	J&E model
cis-1,2-dichloroethene	150	NA	J&E model	J&E model
ethylbenzene	1,200	NA	J&E model	J&E model
isopropylbenzene	710	NA	J&E model	J&E model
4-isopropyltoluene	16	NA		
naphthalene	1,600	NA	J&E model	J&E model
n-propylbenzene	850	NA	J&E model	J&E model
tetrachloroethylene	8	NA	J&E model	J&E model
toluene	13	NA	J&E model	J&E model
1,2,4-trimethylbenzene	680	NA	J&E model	J&E model
1,3,5-trimethylbenzene	220	NA	J&E model	J&E model
2-butanone	18	NA	J&E model	J&E model
m,p-xylenes	1,400	NA	J&E model	J&E model
o-xylene	24	NA	J&E model	J&E model
acenaphthlene	17	NA	J&E model	J&E model
acenaphthylene	3.2	NA		
fluorene	28	NA	J&E model	J&E model
phenanthrene	170	NA		

Notes:

95UCL calculated using ProUCL version 5.1.02

EPCs are highlighted

SFo = Slope Factor, oral route of exposure (mg/kg-day)⁻¹

IUR = inhalation unit risk factor, inhalation route of exposure (µg/m3)⁻¹

RfDo = Reference Dose, oral route of exposure (mg/kg-day)

RfCi = Reference Concentration, inhalation route of exposure ($\mu g/m^3$)

OEHHA (12-8-2016), DTSC SL tables (January 2018), USEPA RSL tables (November 2017)

HHRA Note 3 January 2018

Nickel refinery dust values

Table 12 - Exposure Parameters

		R	leceptor Populati	ons		_	
Exposure Parameter	Notation	Commercial Worker	Construction Worker	Residential User Adult	r Child	Units	Reference
General Parameters							
Body Weight	BW	80	80	80	15	kg	DTSC
Exposure Duration	ED	25	1	20	6	years	DTSC
Exposure Frequency	EF	250	250	350	350	days/year	DTSC
Exposure Time	ET	8	8	24	24	hours/day	DTSC
Soil Ingestion Pathway							
Soil Ingestion Rate	IR	100	330	100	200	mg/day	DTSC
Averaging Time carcinogens 70dx365d/yr	Atc	25550	25550	25550	25550	days	DTSC
Averaging Time noncarcinogens EDx365d/yr	Atnc	9125	365	7300	2190	days	DTSC
Dermal Contact with Soil							
Skin Surface Area	SA	6,032	6,032	6,032	2,900	cm ² /event	ОЕННА
Soil-to-Skin Adherence factor	AF	0.2	0.8	0.07	0.2	mg/cm ²	ОЕННА
Fraction of Chemical Dermally Absorbed	ABS	chem specific	chem specific	ch sp	ch sp	unitless	DTSC
Averaging Time carcinogens 70dx365d/yr	Atc	25550	25550	25550	25550	days	DTSC
Averaging Time noncarcinogens EDx365d/yr	Atnc	9125	365	7300	2190	days	DTSC
Inhalation of Outdoor Air							
Particulate Emission Factor	PEF	1.36E+09	1.00E+06	1.36E+09	1.36E+09	m ³ /kg	DTSC
Exposure Time (site visit duration)	ET	6	12	6	6	hours/day	USEPA
Averaging Time carcinogens 70dx365d/yrx24hr/d	Atc	613200	613200	613200	613200	hours	DTSC
Averaging Time noncarcinogens EDx365d/yrx24h/d	Atnc	219000	8760	175200	52560	hours	DTSC

Notes:

 $ABS = 0.1 \ for \ VOCs, \ 0.13 \ for \ naphthalene, \ 0.01 \ for \ most \ metals \ (DTSC \ 2015; \ USEPA \ RSL \ May \ 2016)$

Table 13
Estimated Risks and Hazards - Residential Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			9.94E+00	5.135E-08
TPH-d			1.66E+01	8.571E-07
benzene	6.69E-07		1.76E-02	
n-butylbenzene			6.92E-04	
sec-butylbenzene			6.25E-04	
tert-butylbenzene			4.26E-05	
ethylbenzene	1.52E-07		1.46E-03	
isopropylbenzene			7.11E-04	
naphthalene			1.09E-02	
n-propylbenzene			1.16E-03	
toluene			2.08E-04	
1,2,4-trimethylbenzene				
1,3,5-trimethylbenzene			5.81E-02	
m,p-xylenes			2.51E-03	
o-xylenes			9.81E-04	
Acenaphthene			5.20E-05	4.70E-13
Anthracene			1.93E-05	1.86E-13
Benz(a)anthracene	2.15E-07	3.88E-12		
Chrysene	5.14E-10	9.26E-15		
Fluoranthene			5.40E-05	
Fluorene			5.95E-04	5.17E-12
Naphthalene		2.42E-11	1.12E-02	2.60E-06
Pyrene			2.60E-03	2.28E-11
barium			1.15E-02	2.25E-04
mercury			2.30E-01	6.393E-08
soil vapor (MAX EPC)				
acetone				1.50E-06
benzene		9.20E-03		2.80E+02
sec-butylbenzene				4.30E-03
carbon disulfide				4.10E-03
cyclohexane				2.30E-01
1,2-dichlorobenzene				3.30E-03
1,3-dichlorobenzene				3.00E-03
1,4-dichlorobenzene		1.20E-06		3.50E-04
ethylbenzene		9.50E-04		1.00E+00
n-hexane				7.70E-01
isopropylbenzene				2.20E-02
naphthalene		5.10E-06		1.30E-01
n-propylbenzene				9.10E-02
tetrachloroethylene		1.10E-06		1.50E-02
toluene				1.60E+01
1,2,4-trimethylbenzene				2.50E+01
1,3,5-trimethylbenzene				3.20E+00
m,p-xylenes				3.70E+01
o-xylene				1.10E+01
groundwater				
acetone				4.90E-07
benzene		7.90E-04		2.40E+01

Table 13
Estimated Risks and Hazards - Residential Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
n-butylbenzene				4.10E-02
sec-butylbenzene				1.30E-02
tert-butylbenzene				2.00E-03
1,2-dichloroethane		8.70E-07		1.30E-02
cis-1,2-dichloroethene				1.80E-01
ethylbenzene		1.40E-05		1.50E-02
isopropylbenzene				2.80E-02
naphthalene		1.30E-05		3.30E-01
n-propylbenzene				1.20E-02
tetrachloroethylene		3.70E-07		4.80E-03
toluene				5.20E-04
1,2,4-trimethylbenzene				8.40E-01
1,3,5-trimethylbenzene				7.70E-02
2-butanone				4.70E-07
m,p-xylenes				1.60E-01
o-xylene				2.00E-03
acenaphthlene				1.80E-05
fluorene				2.00E-05
Sum Risk = 1.10E-02	1.037E-06	1.10E-02		
Sum Hazard = 427			26.89101	4.00E+02

Table 13a Estimated Risks and Hazards - Residential Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			9.94E+00	5.135E-08
TPH-d			1.66E+01	8.571E-07
benzene	6.69E-07		1.76E-02	
n-butylbenzene			6.92E-04	
sec-butylbenzene			6.25E-04	
tert-butylbenzene			4.26E-05	
ethylbenzene	1.52E-07		1.46E-03	
isopropylbenzene			7.11E-04	
naphthalene			1.09E-02	
n-propylbenzene			1.16E-03	
toluene			2.08E-04	
1,2,4-trimethylbenzene				
1,3,5-trimethylbenzene			5.81E-02	
m,p-xylenes			2.51E-03	
o-xylenes			9.81E-04	
Acenaphthene			5.20E-05	4.70E-13
Anthracene			1.93E-05	1.86E-13
Benz(a)anthracene	2.15E-07	3.88E-12		
Chrysene	5.14E-10	9.26E-15		
Fluoranthene			5.40E-05	
Fluorene			5.95E-04	5.17E-12
Naphthalene		2.42E-11	1.12E-02	2.60E-06
Pyrene			2.60E-03	2.28E-11
barium			1.15E-02	2.25E-04
mercury			2.30E-01	6.393E-08
soil vapor (95UCL EPC)				
acetone				5.80E-07
benzene		1.10E-03		3.40E+01
sec-butylbenzene				9.30E-04
carbon disulfide				4.70E-04
cyclohexane				5.00E-02
1,2-dichlorobenzene				3.30E-03
1,3-dichlorobenzene				3.00E-03
1,4-dichlorobenzene		1.20E-06		3.50E-04
ethylbenzene		1.90E-04		2.00E-01
n-hexane				1.00E-02
isopropylbenzene				3.70E-03
naphthalene		5.10E-06		1.30E-01
n-propylbenzene				1.80E-02
tetrachloroethylene		2.00E-07		2.50E-03
toluene				1.10E+00
1,2,4-trimethylbenzene				4.30E+00
1,3,5-trimethylbenzene				4.60E-01
m,p-xylenes				7.40E+00
o-xylene				1.60E+00
groundwater				
acetone				4.90E-07
benzene		7.90E-04		2.40E+01

Table 13a Estimated Risks and Hazards - Residential Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
n-butylbenzene				4.10E-02
sec-butylbenzene				1.30E-02
tert-butylbenzene				2.00E-03
1,2-dichloroethane		8.70E-07		1.30E-02
cis-1,2-dichloroethene				1.80E-01
ethylbenzene		1.40E-05		1.50E-02
isopropylbenzene				2.80E-02
naphthalene		1.30E-05		3.30E-01
n-propylbenzene				1.20E-02
tetrachloroethylene		3.70E-07		4.80E-03
toluene				5.20E-04
1,2,4-trimethylbenzene				8.40E-01
1,3,5-trimethylbenzene				7.70E-02
2-butanone				4.70E-07
m,p-xylenes				1.60E-01
o-xylene				2.00E-03
Acenaphthene				1.80E-05
fluorene				2.00E-05
Sum Risk = 2.11E-03	1.037E-06	2.11E-03		
Sum Hazard = 102			26.89101	7.50E+01

Table 14
Estimated Risks and Hazards - Construction Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			5.32E+00	1.834E-08
TPH-d			8.88E+00	3.061E-07
benzene	3.83E-08		9.43E-03	
n-butylbenzene			3.70E-04	
sec-butylbenzene			3.34E-04	
tert-butylbenzene			2.28E-05	
ethylbenzene	8.72E-09		7.80E-04	
isopropylbenzene			3.81E-04	
naphthalene			5.83E-03	
n-propylbenzene			6.22E-04	
toluene			1.11E-04	
1,2,4-trimethylbenzene				
1,3,5-trimethylbenzene			3.11E-02	
m,p-xylenes			1.34E-03	
o-xylenes			5.25E-04	
Acenaphthene			3.23E-05	1.679E-13
Anthracene			1.20E-05	6.652E-14
Benz(a)anthracene	1.30E-08	2.18E-13		
Chrysene	3.11E-11	5.20E-16		
Fluoranthene			2.12E-05	
Fluorene			3.70E-04	1.85E-12
Naphthalene		1.35E-12	6.99E-03	2.79E-07
Pyrene			1.62E-03	5.88E-09
barium			3.61E-03	8.03E-05
mercury			7.25E-02	2.283E-08
Sum Risk = 6.01E-08	6.012E-08	1.57E-12		
Sum Hazard = 14			14.33545	8.09E-05

Table 15
Estimated Risks and Hazards - Commercial Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			1.03E+00	9.17E-09
TPH-d			1.72E+00	1.531E-07
benzene	2.614E-07		1.83E-03	
n-butylbenzene			7.19E-05	
sec-butylbenzene			6.48E-05	
tert-butylbenzene			4.42E-06	
ethylbenzene	5.95E-08		1.51E-04	
isopropylbenzene			7.38E-05	
naphthalene			1.13E-03	
n-propylbenzene			1.21E-04	
toluene			2.16E-05	
1,2,4-trimethylbenzene				
1,3,5-trimethylbenzene			6.03E-03	
m,p-xylenes			2.60E-04	
o-xylenes			1.02E-04	
Acenaphthene			6.16E-06	8.39E-14
Anthracene			2.29E-06	3.33E-14
Benz(a)anthracene	8.68E-08	2.83E-12		
Chrysene	2.07E-10	6.76E-15		
Fluoranthene			4.03E-06	
Fluorene			7.05E-05	9.23E-13
Naphthalene		1.76E-11	1.33E-03	1.39E-07
Pyrene			3.08E-04	9.07E-04
barium			7.64E-04	4.01E-05
mercury			1.53E-02	1.14E-08
soil vapor (MAX EPC)				
acetone				1.80E-07
benzene		1.10E-03		3.40E+01
sec-butylbenzene				5.20E-04
carbon disulfide				4.90E-04
cyclohexane				2.80E-02
1,2-dichlorobenzene				3.90E-04
1,3-dichlorobenzene				3.50E-04
1,4-dichlorobenzene		1.30E-07		4.20E-05
ethylbenzene		1.10E-04		1.20E-01
n-hexane				9.20E-02
isopropylbenzene				2.60E-03
naphthalene		5.80E-07		1.60E-02
n-propylbenzene				1.10E-02
tetrachloroethylene		1.30E-07		1.80E-03
toluene				2.00E+00
1,2,4-trimethylbenzene				3.00E+00
1,3,5-trimethylbenzene				3.80E-01
m,p-xylenes				4.50E+00
o-xylene				1.30E+00
groundwater				
acetone				5.90E-08
benzene		9.00E-05		2.90E+00

Table 15
Estimated Risks and Hazards - Commercial Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
n-butylbenzene				4.90E-03
sec-butylbenzene				1.60E-03
tert-butylbenzene				2.30E-04
1,2-dichloroethane		1.00E-07		1.50E-03
cis-1,2-dichloroethene				2.20E-02
ethylbenzene		1.60E-06		1.80E-03
isopropylbenzene				3.40E-03
naphthalene		1.40E-06		3.90E-02
n-propylbenzene				1.50E-03
tetrachloroethylene		4.20E-08		5.70E-04
toluene				6.20E-05
1,2,4-trimethylbenzene				1.00E-01
1,3,5-trimethylbenzene				9.10E-03
2-butanone				5.60E-08
m,p-xylenes				1.90E-02
o-xylene				2.40E-04
acenaphthlene				2.10E-06
fluorene				2.40E-06
Sum Risk = 1.30E-03	4.079E-07	1.30E-03		
Sum Hazard = 51			2.78	4.86E+01

Table 15a Estimated Risks and Hazards - Commercial Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			1.03E+00	9.17E-09
TPH-d			1.72E+00	1.531E-07
benzene	2.614E-07		1.83E-03	
n-butylbenzene			7.19E-05	
sec-butylbenzene			6.48E-05	
tert-butylbenzene			4.42E-06	
ethylbenzene	5.95E-08		1.51E-04	
isopropylbenzene			7.38E-05	
naphthalene			1.13E-03	
n-propylbenzene			1.21E-04	
toluene			2.16E-05	
1,2,4-trimethylbenzene				
1,3,5-trimethylbenzene			6.03E-03	
m,p-xylenes			2.60E-04	
o-xylenes			1.02E-04	
Acenaphthene			6.16E-06	8.39E-14
Anthracene			2.29E-06	3.33E-14
Benz(a)anthracene	8.68E-08	2.83E-12		
Chrysene	2.07E-10	6.76E-15		
Fluoranthene			4.03E-06	
Fluorene			7.05E-05	9.23E-13
Naphthalene		1.76E-11	1.33E-03	1.39E-07
Pyrene			3.08E-04	9.07E-04
barium			7.64E-04	4.01E-05
mercury			1.53E-02	1.14E-08
soil vapor (95UCL EPC)				
acetone				6.90E-08
benzene		1.30E-04		4.10E+00
sec-butylbenzene				1.10E-04
carbon disulfide				5.50E-05
cyclohexane				6.00E-03
1,2-dichlorobenzene				3.30E-03
1,3-dichlorobenzene				3.00E-03
1,4-dichlorobenzene		1.20E-06		3.50E-04
ethylbenzene		2.10E-05		2.40E-02
n-hexane				1.40E-02
isopropylbenzene				4.40E-04
naphthalene		5.10E-06		1.30E-01
n-propylbenzene				2.10E-03
tetrachloroethylene		2.20E-08		3.00E-04
toluene				1.30E-01
1,2,4-trimethylbenzene				5.10E-01
1,3,5-trimethylbenzene				5.50E-02
m,p-xylenes				8.80E-01
o-xylene				1.90E-01
groundwater				
acetone				5.90E-08
benzene		9.00E-05		2.90E+00

Table 15a Estimated Risks and Hazards - Commercial Western Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
n-butylbenzene				4.90E-03
sec-butylbenzene				1.60E-03
tert-butylbenzene				2.30E-04
1,2-dichloroethane		1.00E-07		1.50E-03
cis-1,2-dichloroethene				2.20E-02
ethylbenzene		1.60E-06		1.80E-03
isopropylbenzene				3.40E-03
naphthalene		1.40E-06		3.90E-02
n-propylbenzene				1.50E-03
tetrachloroethylene		4.20E-08		5.70E-04
toluene				6.20E-05
1,2,4-trimethylbenzene				1.00E-01
1,3,5-trimethylbenzene				9.10E-03
2-butanone				5.60E-08
m,p-xylenes				1.90E-02
o-xylene				2.40E-04
acenaphthlene				2.10E-06
fluorene				2.40E-06
Sum Risk = 9.76E-04	4.079E-07	2.50E-04		
Sum Hazard = 34.58			2.78	9.15E+00

Table 16 - Summary of Risks and Hazards - Western Parcel

	Receptor Populations				
	Commercial Worker Construction Worker Residential				
Hazard Index	51	14	427		
∑ Risk	1.30E-03	6.01E-08	1.10E-02		

Notes:

Hazard Index Residential & Commercial = J&E model results + estimated hazards due to inhalation, ingestion and dermal contact of constituents in soil Σ Risk Residential & Commercial = J&E model results + estimated risks due to inhalation, ingestion and dermal contact of constituents in soil

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8

INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	70.8
Respirable Dust (ug/m³)	1.5

OUTPUT													
Percentile Estimate of Blood Pb (ug/dl)													
50th 90th 95th 98th 99th													
BLOOD Pb, CHILD	0.5	0.9	1.1	1.3	1.5	77							
BLOOD Pb, PICA CHILD	1.0	1.8	2.2	2.6	3.0	39							

EXPOSURE PAR	AMETERS	
	units	children
Days per week	days/wk	7
Geometric Standard Deviation		1.6
Blood lead level of concern (ug/dl)		1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	200
Dermal uptake constant	(ug/dl)/(ug/day	0.0001
Soil ingestion	mg/day	100
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	6.8
Inhalation constant	(ug/dl)/(ug/day	0.192

	PATHWAYS														
CHILDREN		typica	with pica												
	Pathwa	ay cont	ribution	Pathwa	ay cont	ribution									
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent									
Soil Contact	5.8E-5	0.00	1%		0.00	0%									
Soil Ingestion	7.0E-3	0.50	99%	1.4E-2	1.00	100%									
Inhalation	2.0E-6	0.00	0%		0.00	0%									

MODIFIED VERSION OF USEPA ADULT LEAD MODEL

CALCULATIONS OF BLOOD LEAD CONCENTRATIONS (PbBs) AND PRELMIINARY REMEDIATION GOAL (PRG)

EDIT RED CELL

Variable	Description of Variable	Units	
PbS	Soil lead concentration	ug/g or ppm	70.78
R _{fetal/maternal}	Fetal/maternal PbB ratio		0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD _i	Geometric standard deviation PbB		1.8
PbB ₀	Baseline PbB	ug/dL	0.0
IR _S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
AF _{S, D}	Absorption fraction (same for soil and dust)		0.12
EF _{S, D}	Exposure frequency (same for soil and dust)	days/yr	250
AT _{S, D}	Averaging time (same for soil and dust)	days/yr	365
PbB _{adult}	PbB of adult worker, geometric mean	ug/dL	0.1
PbB _{fetal, 0.90}	90th percentile PbB among fetuses of adult workers	ug/dL	0.2
PbB _t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	1.0
$P(PbB_{fetal} > PbB_{t})$	Probability that fetal PbB > PbB, assuming lognormal distributio	%	0.0%

PRG90 318

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Click here for ABBREVIATED INSTRUCTIONS FOR LEADSPREAD 8

INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	570.0
Respirable Dust (ug/m³)	1.5

OUTPUT												
Percentile Estimate of Blood Pb (ug/dl)												
50th 90th 95th 98th 99th												
BLOOD Pb, CHILD	4.0	7.4	8.7	10.6	12.1	77						
BLOOD Pb, PICA CHILD	8.1	14.7	17.4	21.2	24.1	39						

EXPOSURE PAR	AMETERS	
	units	children
Days per week	days/wk	7
Geometric Standard Deviation		1.6
Blood lead level of concern (ug/dl)		1
Skin area, residential	cm ²	2900
Soil adherence	ug/cm ²	200
Dermal uptake constant	(ug/dl)/(ug/day	0.0001
Soil ingestion	mg/day	100
Soil ingestion, pica	mg/day	200
Ingestion constant	(ug/dl)/(ug/day	0.16
Bioavailability	unitless	0.44
Breathing rate	m ³ /day	6.8
Inhalation constant	(ug/dl)/(ug/day	0.192

	PATHWAYS														
CHILDREN		typica		with pica											
	Pathwa	ay cont	ribution	Pathwa	ay cont	ribution									
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent									
Soil Contact	5.8E-5	0.03	1%		0.03	0%									
Soil Ingestion	7.0E-3	4.01	99%	1.4E-2	8.03	100%									
Inhalation	2.0E-6	0.00	0%		0.00	0%									

MODIFIED VERSION OF USEPA ADULT LEAD MODEL

CALCULATIONS OF BLOOD LEAD CONCENTRATIONS (PbBs) AND PRELMIINARY REMEDIATION GOAL (PRG)

EDIT RED CELL

Variable	Description of Variable	Units	
PbS	Soil lead concentration	ug/g or ppm	570
R _{fetal/maternal}	Fetal/maternal PbB ratio		0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD _i	Geometric standard deviation PbB		1.8
PbB ₀	Baseline PbB	ug/dL	0.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.050
AF _{S, D}	Absorption fraction (same for soil and dust)		0.12
EF _{S, D}	Exposure frequency (same for soil and dust)	days/yr	250
AT _{S, D}	Averaging time (same for soil and dust)	days/yr	365
PbB _{adult}	PbB of adult worker, geometric mean	ug/dL	0.9
PbB _{fetal, 0.90}	90th percentile PbB among fetuses of adult workers	ug/dL	1.8
PbB _t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	1.0
$P(PbB_{fetal} > PbB_{t})$	Probability that fetal PbB > PbB _t , assuming lognormal distributio	%	38.6%

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Table 18 Summary of Soil Analytical Data - Onsite Metals - Eastern Parcel Former ChemOil Refinery

Former ChemOil Refinery Signal Hill, California

Sample Location	Sample Depth	Sample Date	. Antimony	, Arsenic	, Barium	. Beryllium	, Cadmium	. Chromium	, Cobalt	Copper	, Lead	, Molybdenum	, Nickel	. Selenium	Silver	, Thallium	, Vanadium	Zinc	Mercury	Hexavalent Chromium
	(feet bgs)		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg EAST PAR	mg/kg CFI	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	(mg/kg)	(mg/kg)
B-1	1	2001	0.50	4.5	50	ND<0.15	ND<0.15	10	4.0	8.0	2.0	ND<0.25	5.0	ND<0.25	ND<0.15	0.42	17	23	ND<0.10	
1	5	2001	0.50	13	92	ND<0.15	ND<0.15	20	11	21	4.0	0.36	17	ND<0.25	ND<0.15	0.50	46	46	ND<0.10	
	10	2001	0.50	12	86	ND<0.15	ND<0.15	20	10	19	ND<0.25	ND<0.25	17	ND<0.25	ND<0.15	0.50	38	41	3.0	
B-2	1	2001	1.0	9.5	120	ND<0.15	ND<0.15	40	7.0	48	100	0.50	64	ND<0.25	ND<0.15	0.50	120	200		
	5	2001	0.50	10	450	ND<0.15	ND<0.15	18	10	15	3.0	ND<0.25	18	ND<0.25	ND<0.15	1.0	31	38	0.11	
	10	2001	0.50	8.0	56	ND<0.15	ND<0.15	8.5	4.5	9.0	1.5	ND<0.25	7.5	ND<0.25	ND<0.15	0.33	20	27	ND<0.10	
B-3	1	2001	0.39	5.0	58	ND<0.15	ND<0.15	9.5	4.5	8.0	1.5	0.33	6.0	ND<0.25	ND<0.15	0.50	18	22	ND<0.10	
1	5	2001	0.50	12	100	ND<0.15	ND<0.15	19	10	16	3.0	0.41	14	ND<0.25	ND<0.15	1.0	41	41	ND<0.10	
	10	2001	1.0	16	150	ND<0.15	ND<0.15	25	12	26	4.5	0.50	20	ND<0.25	ND<0.15	1.5	48	48	ND<0.10	
B-4	1	2001	0.50	10	76	ND<0.15	ND<0.15	18	8.0	16	3.0	0.36	12	ND<0.25	ND<0.15	1.0	36	41	ND<0.10	
1	5	2001	0.50	18	90	ND<0.15	ND<0.15	28	13	31	4.5	0.50	22	ND<0.25	ND<0.15	2.0	53	56	ND<0.10	
	10	2001	ND<0.25	4.5	44	ND<0.15	ND<0.15	8.0	4.0	7.5	1.0	0.26	6.5	ND<0.25	ND<0.15	ND<0.25	16	23	ND<0.10	
B-5	1	2001	0.50	4.5	54	ND<0.15	ND<0.15	10	4.5	7.0	2.0	0.42	6.0	ND<0.25	ND<0.15	1.0	17	24	ND<0.10	
	5	2001	0.50	9.0	73	ND<0.15	ND<0.15	15	8.0	12	2.5	0.50	12	ND<0.25	ND<0.15	1.0	30	38	ND<0.10	
	10	2001	0.50	18	140	ND<0.15	ND<0.15	32	13	31	5.5	0.50	23	ND<0.25	ND<0.15	1.5	52	57	0.12	
B-6	1	2001	0.36	4.0	30	ND<0.15	ND<0.15	7.5	3.5	3.0	0.50	0.35	5.5	ND<0.25	ND<0.15	0.50	15	22	ND<0.10	
	5	2001	0.50	10	68	ND<0.15	ND<0.15	16	8.0	14	3.0	0.42	12	ND<0.25	ND<0.15	1.0	32	45	ND<0.10	
	10	2001	0.50	17	310	ND<0.15	ND<0.15	25	12	26	5.0	0.50	20	ND<0.25	ND<0.15	1.0	48	48	ND<0.10	
B-7	1	2001	0.45	5.0	56	ND<0.15	ND<0.15	9.0	4.5	7.5	3.0	0.35	5.5	ND<0.25	ND<0.15	0.50	16	23	ND<0.10	
	5	2001	0.50	9.0	88	ND<0.15	ND<0.15	16	6.5	12	3.0	0.49	10	ND<0.25	ND<0.15	0.50	27	38	ND<0.10	
	10	2001	1.0	18	98	ND<0.15	ND<0.15	26	14	31	6.0	0.50	22	ND<0.25	ND<0.15	1.5	52	54	ND<0.10	
B-8	1	2001	0.50	4.5	47	ND<0.15	ND<0.15	9.5	4.5	6.5	1.5	0.49	4.5	ND<0.25	ND<0.15	0.50	17	22	ND<0.10	
	5	2001	0.50	12	73	ND<0.15	ND<0.15	22	10	17	3.5	0.42	15	ND<0.25	ND<0.15	1.5	40	50	ND<0.10	
	10	2001	1.0	16	76	ND<0.15	ND<0.15	25	12	28	4.5	0.50	20	ND<0.25	ND<0.15	1.5	48	50	ND<0.10	
B-9	1	2001	0.50	7.0	72	ND<0.15	ND<0.15	12	6.0	12	5.5	0.47	8.0	ND<0.25	ND<0.15	0.50	22	39	ND<0.10	
	5	2001	1.0	9.0	84	ND<0.15	ND<0.15	16	7.5	12	3.0	0.46	11	ND<0.25	ND<0.15	0.50	29	40	ND<0.10	
	10	2001	0.50	7.0	140	ND<0.15	ND<0.15	10	7.0	12	3.0	0.37	10	ND<0.25	ND<0.15	1.0	19	26	ND<0.10	
TP-30	1	4/18/2018	<10	3.6	88	<1.0	<1.0	16	6.5	5.9	14	<5.0	11	<0.50	<1.0	<5.0	31	68	0.033	<0.040
	5	4/18/2018	<10	2.6	80	<1.0	<1.0	15	6.2	<3.0	4.2	<5.0	10	<0.50	<1.0	<5.0	30	33	<0.020	<0.040
	10	4/18/2018	<10	3.8	93	<1.0	<1.0	17	7.8	5.9	5.8	<5.0	12	<0.50	<1.0	<5.0	35	40	0.043	<0.040
TP-34	1	4/10/2018	<10	3.3	110	<1.0	<1.0	18	6.2	6.9	37	<5.0	13	<0.50	<1.0	<5.0	30	56	0.047	<0.040
	5	4/10/2018	<10	3.0	73	<1.0	<1.0	18	5.7	<3.0	3.9	<5.0	12	<0.50	<1.0	<5.0	28	24	<0.020	<0.040
	10	4/10/2018	<10	8.3	110	<1.0	<1.0	27	11	15	6.0	<5.0	19	<0.50	<1.0	<5.0	53	33	0.076	0.048
TP-35	1	4/10/2018	<10	2.3	71	<1.0	<1.0	11	4.5	6.8	11	<5.0	7.1	<0.50	<1.0	<5.0	22	44	0.048	0.061
	5	4/10/2018	<10	2.6	85	<1.0	<1.0	16	6.9	<3.0	6.0	<5.0	12	<0.50	<1.0	<5.0	33	38	<0.020	0.067

Table 18 Summary of Soil Analytical Data - Onsite Metals - Eastern Parcel

Former ChemOil Refinery Signal Hill, California

Sample Location	Sample Depth (feet bgs)	Sample Date	m g/kg Antimony	g/kg by/senic	mg/kg	a /s/Beryllium	g/kg	mg/kg	g/kg	Copper mg/kg	mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	mg/kg	mg/kg	wg/kg	Sinc mg/kg	(mg/kg)	ba Say/bay/chromium (f
	10	4/10/2018	<10	8.1	120	<1.0	<1.0	27	11	17	6.6	<5.0	21	<0.50	<1.0	<5.0	55	34	0.055	<0.040
TP-36	1	4/18/2018	<10	1.9	60	<1.0	<1.0	12	4.6	<3.0	5.8	<5.0	7.2	<0.50	<1.0	<5.0	23	29	0.090	<0.040
	5	4/18/2018	<10	3.1	92	<1.0	<1.0	21	7.3	11	4.9	<5.0	14	<0.50	<1.0	<5.0	37	36	0.028	<0.040
	10	4/18/2018	<10	7.5	100	<1.0	<1.0	30	12	10	6.2	<5.0	20	<0.50	<1.0	<5.0	57	43	0.098	0.050
AE-04	1	4/10/2018	<10	5.9	170	<1.0	<1.0	22	10	22	12	<5.0	17	<0.50	<1.0	<5.0	47	61	0.076	<0.040
	5	4/10/2018	<10	3.1	98	<1.0	<1.0	17	6.3	<3.0	4.3	<5.0	12	<0.50	<1.0	<5.0	32	28	0.024	<0.040
	10	4/10/2018	<10	7.6	160	<1.0	<1.0	29	11	9.5	6.5	<5.0	20	<0.50	<1.0	<5.0	57	29	0.076	<0.040

Notes:

CAM 17 Metals measured by USEPA Method 6000/7000.

Mercury measured by USEPA Method 7470A/7471A.

Hexavalent chromium measured by USEPA Method 7199.

Bold values were reported above the laboratory reporting limits (RL).

bgs = below ground surface.

mg/kg = milligram per kilogram.

ND<10 = not detected at or above the laboratory RL of 10 mg/kg.

-- = not analyzed.

All 2001 data collected by TEC (TEC, 2001).

References:

Testa Environmental Coroporation (TEC), 2001. Report of Additional Subsurface Assessment, Former Chemoil Refinery - Eastern Parcel, Signal Hill, California. December 14.

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									ne De				Summary	of Soil Vapor Mo	nitoring Point Ar	alytical Data - \	OCs - Eastern I	arcel				ne	lene			Ð				
Sample	Sample	Sample				ω ·			nze	nlfid		lane	Φ		Former ChemOi Signal Hill, Ca			au Su			_	nze	Itolu	Φ		ızen				
Location	Depth	Date	Φ		nzei	ene	es es		ylbe	Disc	or m	neth	exan		m	m	_	olue	0	e	ano	ylbe	opy	alen		/lber	ne ne	٩b	B	l l
			ızen	nen	ylbe	×	ylen	tone	-But	bon	orof	oror) you	DCE	DCE	DCE	anol	th yit	tane	exar	orop	orop	sopr	htth		ropy	pyle	4-TN	T-4	5-TN
			Ber	Ī	Eth	E q,	× o	Асе	sec	Car	<u> </u>	CP.	Ç	4,2	-6,1	4,	Ēţ	4- Ā	Hep	- -	los	losi	4- Is	Nap	P.C.	<u>а</u> -п	Pro	2,2,	1,2,	1,3,
	(feet bgs)		(µg/m³)	(µg/m ³)	(µg/m³)	(µg/m³)	(µg/m ³)	(µg/m³)	(μg/m ³)	(µg/m ³)	(µg/m³)	(µg/m ³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m³)	(µg/m ³)	(µg/m ³)	(µg/m³)	(µg/m ³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m ³)	(µg/m³)	(µg/m ³)
TP-21	4.5	4/25/18	ND<10	88	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-22	5	4/25/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	29	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	14	ND<10
TP-23	4.5	4/25/18	ND<10	ND<10	ND<10	ND<10	ND<10	21	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	13	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-24	5	4/25/18	ND<10	ND<10	ND<10	ND<10	ND<10	12	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-25	5	4/24/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	43	33	ND<10	ND<10	ND<10	ND<10	ND<10	20	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-26	5	4/24/18	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	280,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	180,000	83,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000	ND<60,000
TP-27	5	4/24/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-28	5	4/24/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-29	5	4/24/18	ND<10	ND<10	ND<10	ND<10	ND<10	40	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	17	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-30	5	4/24/18	ND<10	ND<10	ND<10	ND<10	ND<10	15	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-31	5	4/24/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	13	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-32	5	4/25/18	ND<10	10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-33	5	4/25/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-34	5	4/24/18	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	20	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-35			ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
TP-35 (DUP)	5	4/24/18		ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
E1	15	6/2/06		<796	10,800	<1592	<796																						<1194	<1194
			<u> </u>		<u> </u>		<u> </u>	<u> </u>		<u> </u>																				

Bold values are detected at concentrations at or above the laboratory reporting limit.

Shaded values indicate the helium leak threshold exceeded 5% (as shown on Table 5), which is indicative of a potential ambient air leakage during sample collection. Therefore, the VOC data is not considered valid and data from an alternative date should be used if available.

VOCs = Volatile organic compounds.

VOCs measured by USEPA Method TO-15. Only detected compounds are presented in the table above.

bgs = Below ground surface.

TPHd = Total petroleum hydrocarbon as diesel.

TPHg = Total petroleum hydrocarbon as gasoline.

 μ g/m³ = Microgram per cubic meter.

ND<100 = Analyte not detected at or above the laboratory reporting limit of 100 μ g/m³. DUP = Duplicate sample.

(3) = The sample required dilution due to the presence of high moisture content. E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument.

NA = Not analyzed. PCE = Tetrachloroethane.

DCB = Dichlorobenzene.

TMP = Trimethylpentane.

TMB = Trimethylbenzene.

Table 20 Summary of Soil Vapor Monitoring Point Analytical Results - Helium - Eastern Parcel

Former ChemOil Refinery Signal Hill, California

Sample Location	Sample Depth	Date Sampled	Helium in Sample	Average Helium Under Shroud	Leak Ratio ¹
	feet bgs	EAST	(%) PARCEL	(%)	(%)
TP-22	5	4/25/18	ND<0.20	28	
TP-23	4.5	4/25/18	ND<0.20	25	
TP-24	5	4/25/18	ND<0.20	24	
TP-25	5	4/24/18	ND<0.20	25	
TP-26	5	4/24/18	ND<0.20	25	
TP-27	5	4/24/18	ND<0.20	29	
TP-28	5	4/24/18	ND<0.20	26	
TP-29	5	4/24/18	ND<0.20	22	
TP-30	5	4/24/18	ND<0.20	22	
TP-31	5	4/24/18	ND<0.20	23	
TP-32	5	4/25/18	ND<0.20	29	
TP-33	5	4/25/18	ND<0.20	24	
TP-34	5	4/24/18	ND<0.20	23	
TP-35 (DUP)	5	4/24/18 4/24/18	ND<0.20 ND<0.20	- 25	

Notes:

Bold values are detected at concentrations above the laboratory reporting limit.

Shaded values exceed a leak threshold of 5% and indicate a potential ambient air leakage during sample collection.

Helium measured by ASTM D1946M.

bgs = Below ground surface.

% = Percent.

ND<0.20 = Analyte not detected at or above the laboratory reporting limit of 0.20%.

DUP = Duplicate sample.

-- = Not calculated, helium not detected in sample.

¹ Estimated leak ratio (%) = [Concentration of Helium in Sample (%)] / [Concentration of Helium in Shroud (%)] X100.

Table 21 Summary of Soil Physical Property Data - Eastern Parcel

Former ChemOil Refinery Signal Hill, California

Sample	Date	Sample	Moisture Content		Den	sity	Porosity			
Sample Location	Sampled	Depth			Dry Bulk	Grain	Total ⁽¹⁾	Air-filled ⁽²⁾	Water-filled	
	-	feet bgs	% weight	cm ³ /cm ³	g/cm ³	g/cm ³	cm ³ /cm ³	cm ³ /cm ³	cm ³ /cm ³	
					EAST PARCE	L				
TP-25	3/13/2018	5.0	7.2	0.128	1.78	2.69	0.336	0.209	0.127	
TP-27	3/13/2018	5.6	7.4	0.127	1.71	2.70	0.365	0.238	0.127	
TP-29	3/13/2018	5.2	6.7	0.113	1.68	2.68	0.373	0.260	0.113	

Notes:

Moisture content measured by ASTM D2216 and API RP40.

Density and porosity by API RP40.

bgs = below ground surface.

cm³/cm³ = Cubic centimer by cubic centimeter.

% = percent.

⁽¹⁾ Total porosity = all interconnected pore channels.

⁽²⁾ Air-filled = pore channels not occupied by pore fluids.

Table 22 Summary of Particle Size Data - Eastern Parcel

Former ChemOil Refinery Signal Hill, California

Sample	Date	Sample	Mean Grain	Median	Parti	weight)	Silt &		
Location	Sampled	Depth	Size Description ⁽¹⁾	Grain Size	Gravel		Clay		
		feet bgs	t bgs		Gravei	Coarse	Medium	Fine	
				EAST PARCE	L				
TP-25	3/13/2018	5.20	Fine Sand	0.129	0.79	0.20	11.34	53.79	33.87
TP-27	3/13/2018	5.65	Fine Sand	0.135	0.21	0.47	14.59	52.15	32.57
TP-29	3/13/2018	5.10	Fine Sand	0.143	4.68	1.06	12.65	52.51	29.11

Notes:

bgs = below ground surface.

mm = millimeter.

% = percent.

⁽¹⁾ Based on mean from Trask.

Table 23 Summary of Organic Carbon Data Eastern Parcel

Former ChemOil Refinery Signal Hill, California

Sample Location	Date Sampled	Sample Depth feet bgs	Total Organic Carbon mg/kg	Fraction Organic Carbon g/g
		EAST PAI	RCEL	
TP-25	3/13/2018	5.3	1,181	1.18E-03
TP-27	3/13/2018	5.5	107	1.07E-04
TP-29	3/13/2018	5.0	3,565	3.56E-03

Notes:

bgs = below ground surface. mg/kg = milligram per kilogram g/g = gram per gram

Table 24 Exposure Point Concentrations, Slope Factors and Reference Doses - Eastern Parcel

SOIL MATRIX ANALYTE	MAX mg/kg	95UCL mg/kg	SFo	IUR	RfDo	RfCi
TPH-g	4,999	NA			4.00E-03	3.00E+01
TPH-d	13,030	NA			4.00E-03	3.00E+00
n-butylbenzene	1.19	NA			5.00E-02	2.00E+02
sec-butylbenzene	4.76	NA			1.00E-01	4.00E+02
tert-butylbenzene	0.281	NA			1.00E-01	4.00E+02
ethylbenzene	0.0594	NA	1.10E-02	2.50E-06	1.00E-01	1.00E+03
isopropylbenzene	4.02	NA			1.00E-01	4.00E+02
naphthalene	9.08	NA		3.40E-05	2.00E-02	3.00E+00
toluene	0.136	NA			8.00E-02	5.00E+00
o-xylene	0.0458	NA			2.00E-01	1.00E+02
Acenaphthene	0.221	NA			6.00E-02	2.40E+02
Chrysene	1.59	NA	1.00E-03	6.00E-07		
Fluoranthene	0.036	NA			4.00E-02	
Fluorene	0.387	NA			4.00E-02	1.60E+02
Naphthalene	1.19	NA		3.40E-05	2.00E-02	3.00E-03
Phenanthrene	1.95	NA				
Pyrene	1.95	NA			3.00E-02	1.20E+02
antimony	1	0.625			4.00E-04	
arsenic	18	9.554	9.50E+00	3.30E-03	3.60E-06	1.50E-02
barium	450	120.8			2.00E-01	5.00E-04
cobalt	14	8.781		9.00E-03	3.00E-04	6.00E-06
chromium	40	20.32			1.50E+00	
hexavalent chromium	0.067	0.0488	5.00E-01	8.40E-02	3.00E-03	1.00E-04
copper	48	16.92			4.00E-02	
mercury	3	0.447			1.60E-04	3.00E-02
molybdenum	0.5	0.433			5.00E-03	
nickel	64	16.64	9.10E-01	2.60E-04	1.10E-02	1.40E-05
lead	100	18.05				
thallium	2	1.262			1.00E-05	
vanadium	120	40.98			5.00E-03	1.00E-01
zinc	200	48.04			3.00E-01	
SOIL VAPOR ANALYTE	MAX μg/m ³	95UCL µg/m3				
acetone	40	NA		J&E model		J&E model
chloroform	20	NA		J&E model		J&E model
chloromethane	43	NA		J&E model		J&E model
cyclohexane	280,000	NA		J&E model		J&E model
ethanol	17.0	NA				
ethylbenzene	10,800	NA		J&E model		J&E model
heptane	180,000	NA				
n-hexane	83,000	NA		J&E model		J&E model
toluene	88	NA		J&E model		J&E model
GROUNDWATER ANALYTE	MAX μg/L	95UCL μg/L				
bis(2-chloroethyl)ether	1,500	NA		J&E model		J&E model
tert-butyl alcohol	220	NA				
sec-butylbenzene	2	NA		J&E model		J&E model
isopropylbenzene	13	NA		J&E model		J&E model
naphthalene	65	NA		J&E model		J&E model
n-propylbenzene	13	NA		J&E model		J&E model
o-xylene	3	NA		J&E model		J&E model

Table 24 Exposure Point Concentrations, Slope Factors and Reference Doses - Eastern Parcel

SOIL VAPOR ANALYTE MAX µg/m³ 95UCL µg/m3

Notes:

95UCL calculated using ProUCL version 5.1.02

EPCs are highlighted

SFo = Slope Factor, oral route of exposure (mg/kg-day)⁻¹

IUR = inhalation unit risk factor, inhalation route of exposure (μg/m3)⁻¹

RfDo = Reference Dose, oral route of exposure (mg/kg-day)

RfCi = Reference Concentration, inhalation route of exposure ($\mu g/m^3$)

OEHHA (12-8-2016), DTSC SL tables (January 2018), USEPA RSL tables (November 2017)

HHRA Note 3 January 2018

Nickel refinery dust values

Table 25
Estimated Risks and Hazards - Residential Eastern Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			2.27E+01	1.175E-07
TPH-d			5.93E+01	3.062E-06
n-butylbenzene			4.33E-04	4.195E-12
sec-butylbenzene			8.66E-04	8.39E-12
tert-butylbenzene			5.11E-05	4.953E-13
ethylbenzene	1.13E-09		1.08E-05	
isopropylbenzene			7.32E-04	7.09E-12
naphthalene			8.26E-03	2.132E-09
toluene			2.97E-05	
o-xylenes			4.17E-06	3.23E-08
Acenaphthene			7.18E-05	6.49E-13
Chrysene	3.39E-09	6.25E-14		
Fluoranthene			1.83E-05	
Fluorene			1.96E-04	1.71E-12
Naphthalene		2.02E-11	1.21E-03	2.80E-07
Pyrene			1.31E-03	1.15E-11
antimony			3.60E-02	
hexavalent chromium	4.82E-08	3.68E-10	3.12E-04	4.72E-07
molybdenum			1.44E-03	
thallium			2.88E+00	
soil vapor (MAX EPC)				
acetone				1.10E-06
chloroform		1.20E-07		1.40E-04
chloromethane				4.60E-04
cyclohexane				3.40E-02
ethylbenzene		6.50E-06		7.00E-03
n-hexane				8.10E-02
toluene				2.10E-04
groundwater				
bis(2-chloroethyl) ether		1.10E-05		
sec-butylbenzene				5.30E-05
isopropylbenzene (cumene)				5.30E-04
naphthalene		5.10E-07		1.30E-02
n-propylbenzene				1.90E-04
o-xylene				2.50E-04
Sum Risk = 1.82E-05	5.27E-08	1.81E-05		
Sum Hazard = 85			84.96	1.37E-01

Table 26
Estimated Risks and Hazards - Construction Eastern Parcel

ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			1.22E+01	4.196E-08
TPH-d			3.17E+01	1.094E-06
n-butylbenzene			2.32E-04	1.498E-12
sec-butylbenzene			4.64E-04	2.997E-12
tert-butylbenzene			2.74E-05	1.769E-13
ethylbenzene	6.47E-11		5.78E-06	
isopropylbenzene			3.92E-04	2.53E-12
naphthalene			4.42E-03	7.614E-10
toluene			1.59E-05	
o-xylenes			2.23E-06	1.15E-13
Acenaphthene			4.47E-05	2.32E-13
Chrysene	2.05E-10	3.43E-15		
Fluoranthene			1.14E-05	
Fluorene			1.22E-04	6.09E-13
Naphthalene		1.11E-12	7.52E-04	9.99E-08
Pyrene			8.13E-04	4.09E-12
antimony			1.13E-02	
hexavalent chromium	1.34E-09	2.02E-11	8.82E-05	1.69E-07
molybdenum			4.53E-04	
thallium		_	9.07E-01	
Sum Risk = 1.63E-09	1.61E-09	2.14E-11		
Sum Hazard = 43			44.82	1.41E-06

Table 27
Estimated Risks and Hazards - Commercial Eastern Parcel

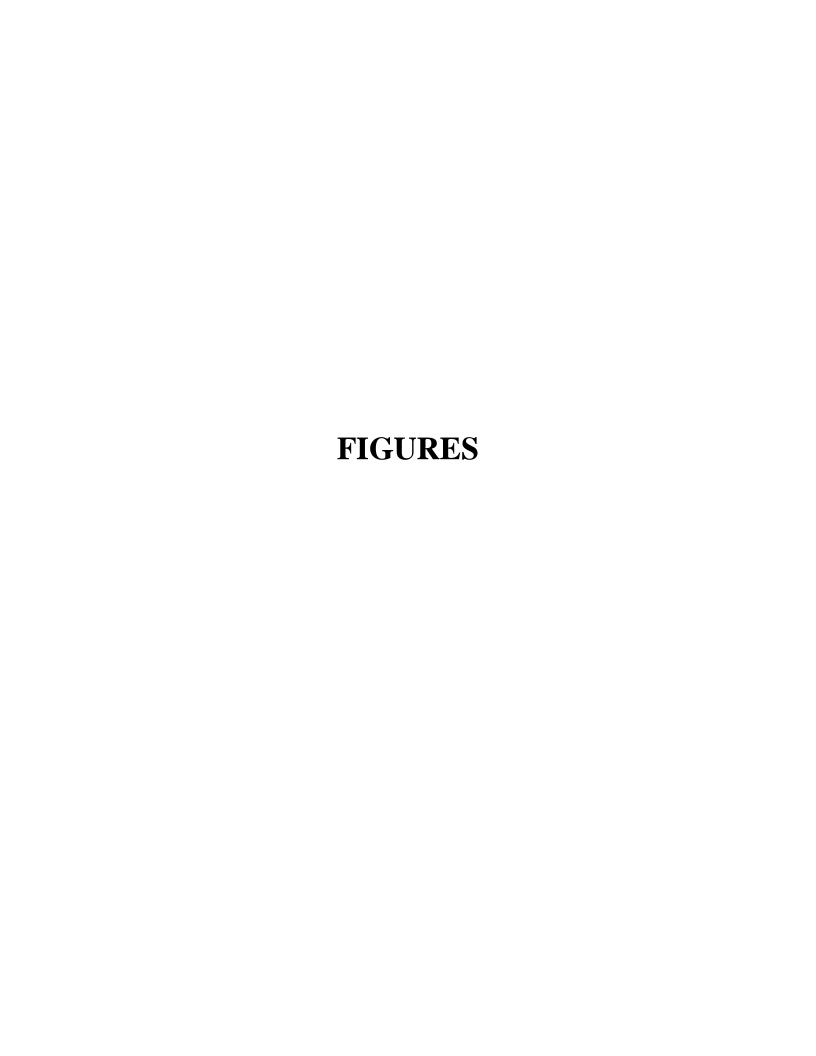
ANALYTE	RISKo	RISKi	HAZARDo	HAZARDi
soil				
TPH-g			2.36E+00	2.10E-08
TPH-d			6.15E+00	5.47E-07
n-butylbenzene			4.50E-05	7.49E-13
sec-butylbenzene			8.99E-05	1.50E-12
tert-butylbenzene			5.31E-06	8.84E-14
ethylbenzene	4.41E-10		1.12E-06	
isopropylbenzene			7.59E-05	1.27E-12
naphthalene			8.58E-04	3.81E-10
toluene			3.08E-06	
o-xylenes			4.33E-07	5.77E-09
Acenaphthene			8.50E-06	1.16E-13
Chrysene	1.37E-09	4.46E-14		
Fluoranthene			2.16E-06	
Fluorene			2.33E-05	3.05E-13
Naphthalene		1.44E-11	1.43E-04	4.99E-08
Pyrene			1.55E-04	2.05E-12
antimony			2.40E-03	
hexavalent chromium	1.03E-08	2.63E-10	1.91E-05	8.44E-08
molybdenum			9.59E-05	
thallium			1.92E-01	
soil vapor (MAX EPC)				
acetone				1.40E-07
chloroform		1.40E-08		1.70E-05
chloromethane				5.50E-05
cyclohexane				4.00E-03
ethylbenzene		7.50E-07		8.40E-04
n-hexane				9.60E-03
toluene				0.00
groundwater				
bis(2-chloroethyl) ether			1.30E-06	
sec-butylbenzene				6.30E-06
isopropylbenzene (cumene)				6.30E-05
naphthalene			5.80E-08	1.60E-03
n-propylbenzene				1.40E-03
o-xylene				3.00E-05
Sum Risk = 7.76E-07	1.21E-08	7.64E-07		
Sum Hazard = 9			8.71	1.76E-02

Table 28 - Summary of Risks and Hazards - Eastern Parcel

		Receptor Populations				
	Commercial Worker Construction Worker Reside					
Hazard Index	9	43	85			
∑ Risk	7.76E-07 1.63E-09 1.82E-05					

Notes:

Hazard Index Residential & Commercial = J&E model results + estimated hazards due to inhalation, ingestion and dermal contact of constituents in soil Σ Risk Residential & Commercial = J&E model results + estimated risks due to inhalation, ingestion and dermal contact of constituents in soil







299 WEST HILLCREST DR. SUITE 220 THOUSAND OAKS, CA 91360

FORMER CHEMOIL REFINERY 2020 WALNUT AVENUE SIGNAL HILL, CA

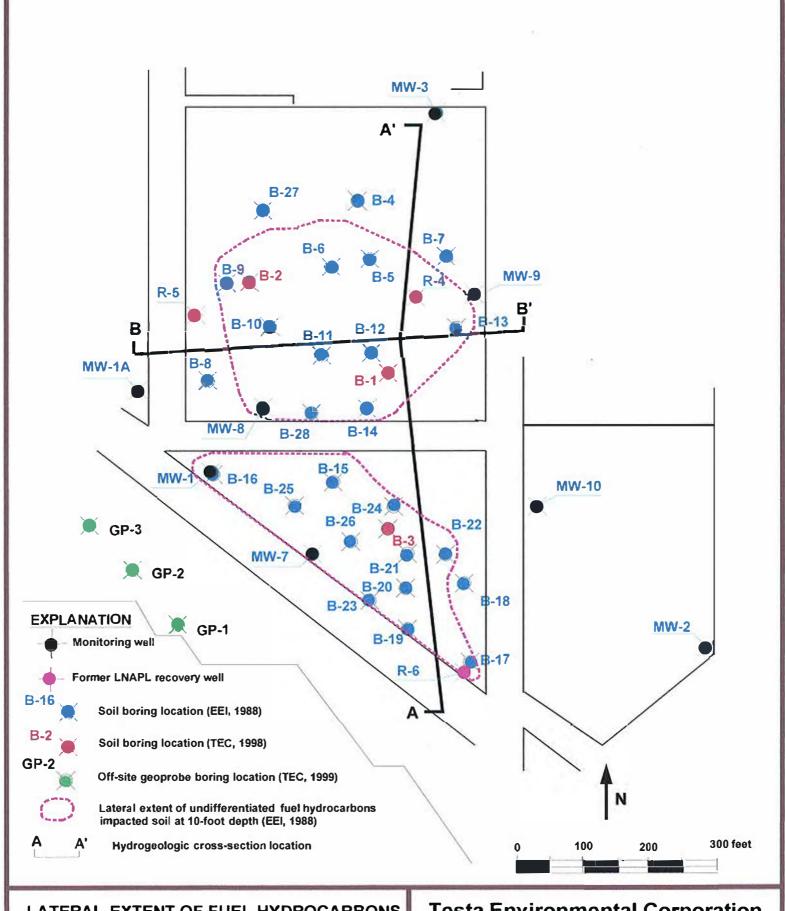
PROJECT NO. DATE 093-CHEMOIL-001 05/30/17

DR.BY: ZA APP. BY: KD

SITE LOCATION MAP



0 2500 5000 HORIZONTAL SCALE IN FEET FIGURE 1

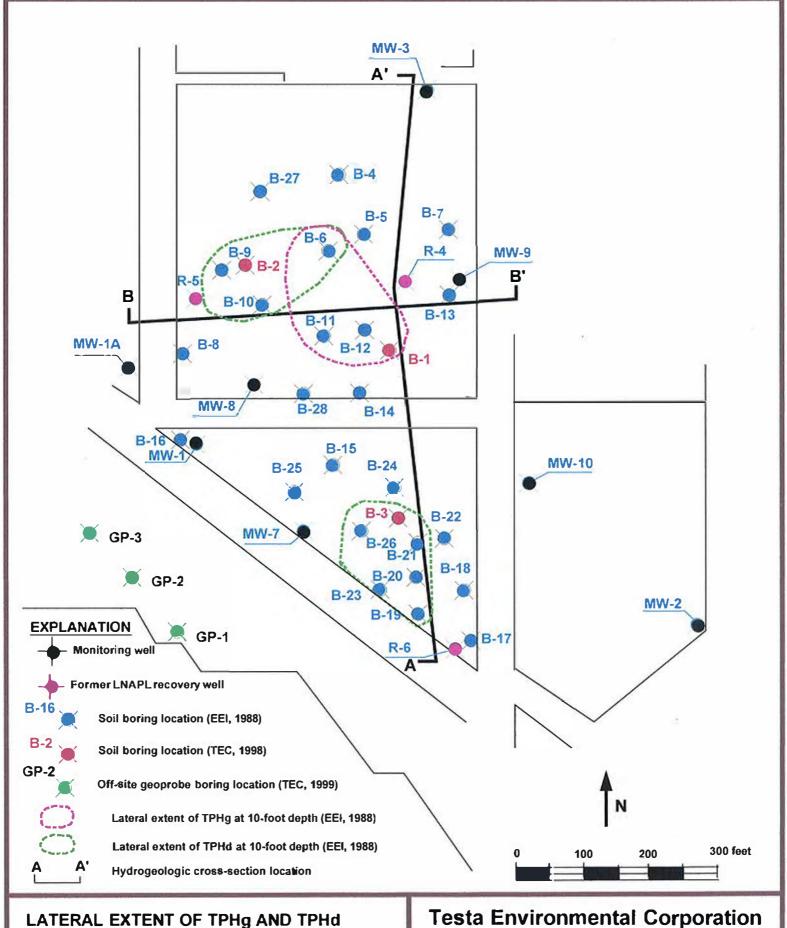


LATERAL EXTENT OF FUEL HYDROCARBONS IMPACTED SOIL AT 10-FOOT DEPTH **WESTERN PARCEL FORMER CHEMOIL REFINERY** SIGNAL HILL, CALIFORNIA

Testa Environmental Corporation

Earlh Sciences & Environmental Specialists

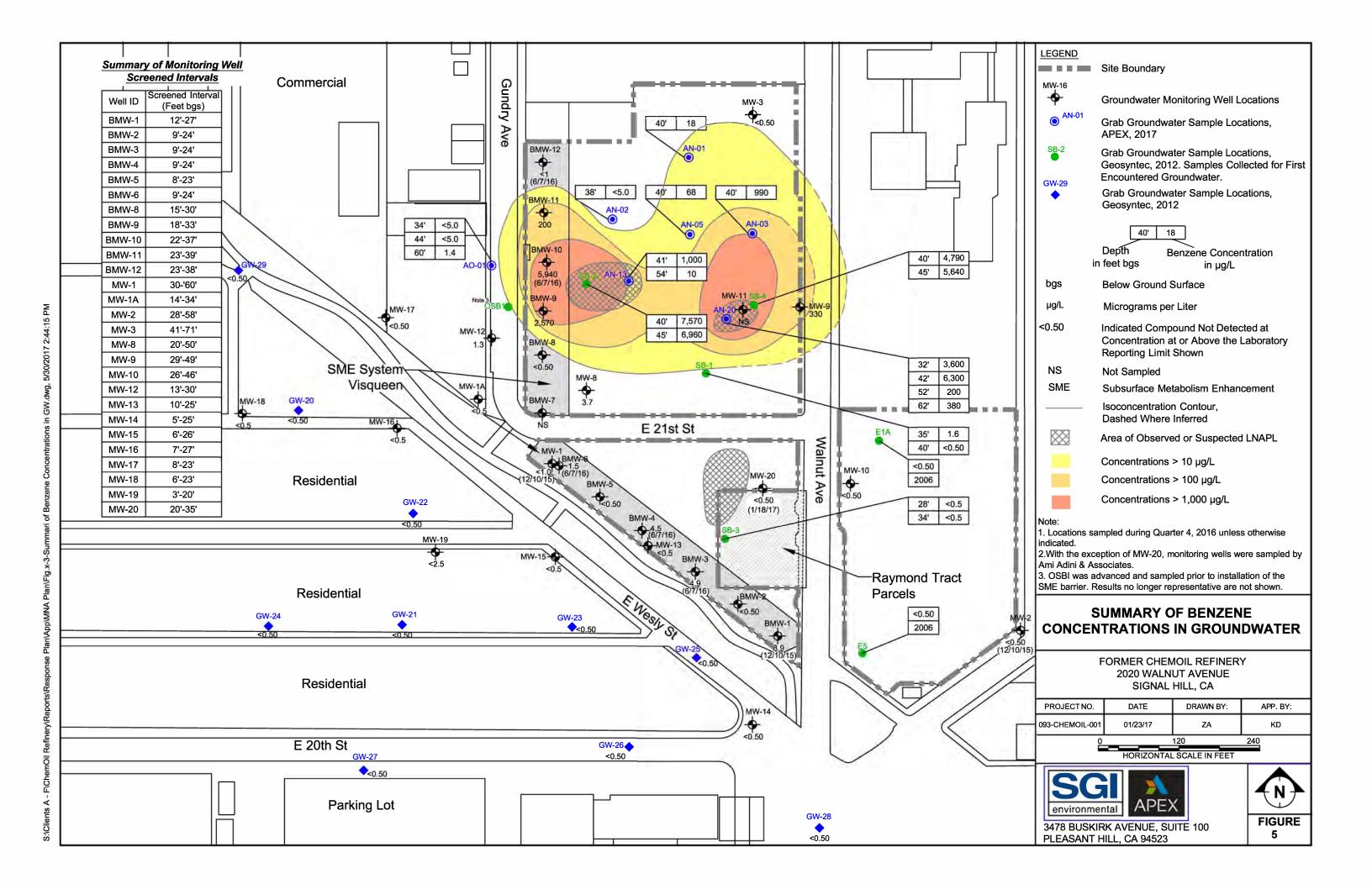
FILE: .74 94-11-1008 3 DRAWN BY. June 2011



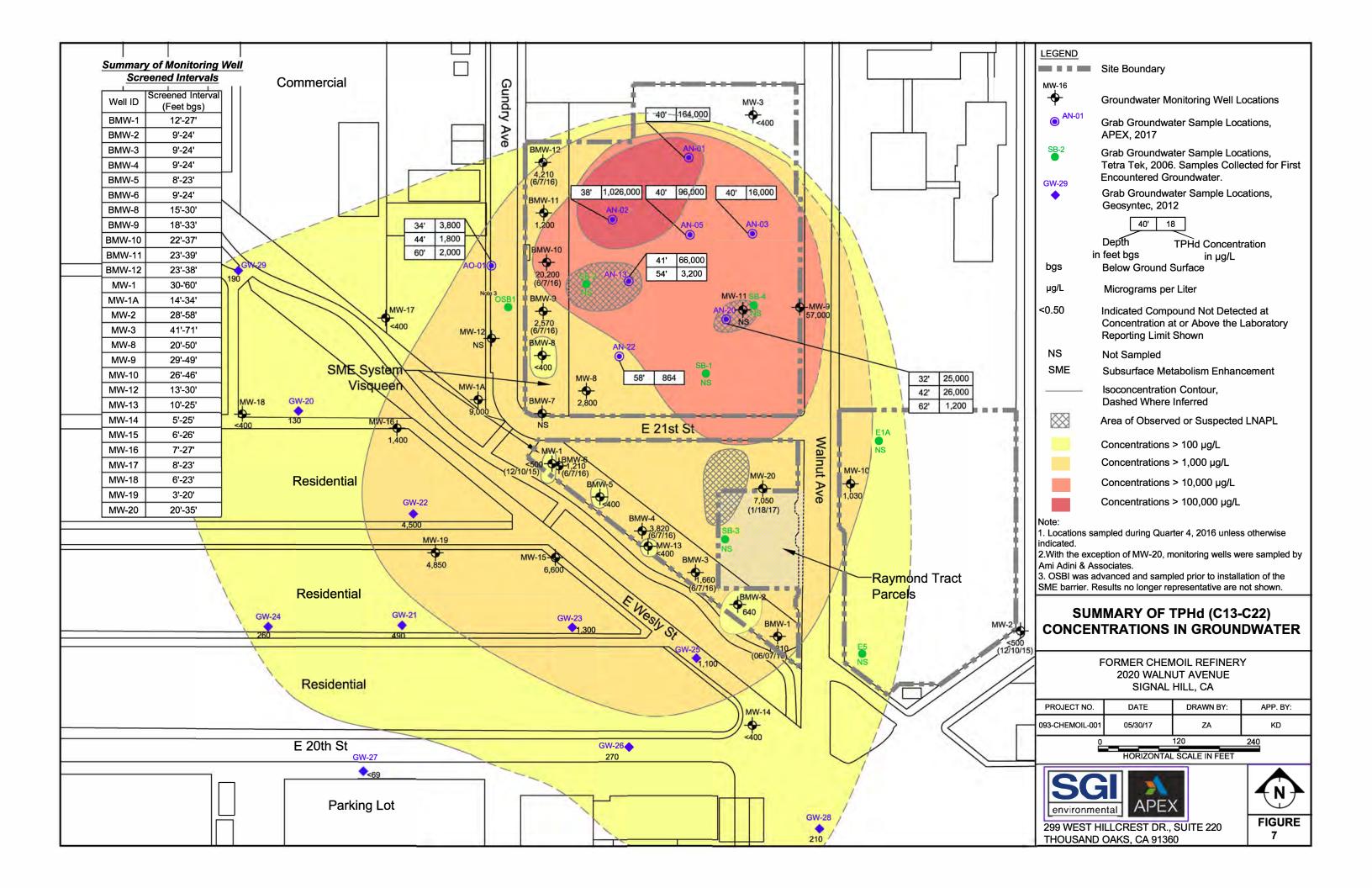
LATERAL EXTENT OF TPHg AND TPHd IMPACTED SOIL AT 10-FOOT DEPTH WESTERN PARCEL FORMER CHEMOIL REFINERY SIGNAL HILL, CALIFORNIA

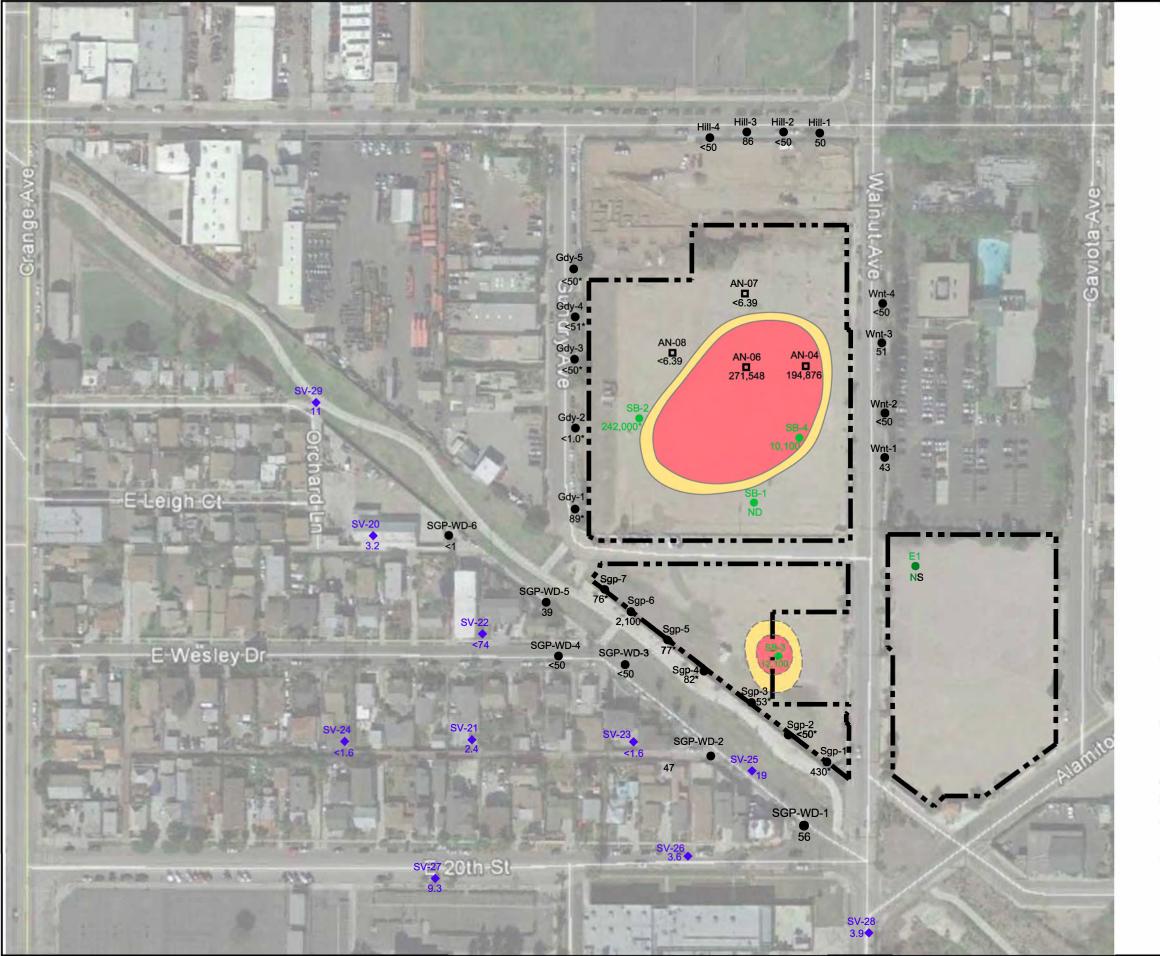
Earth Sciences & Environmental Specialists

PROJECT NO: 94-11-1008 FR.E: ,74 FIGURE NO: DATE: June 2011 DRAWN BY: SMT 4



TPHg (C4-C12) in GW.dwg, 6/1/2017 11:37:26 AM





LEGEND

■ ■ ■ Site Boundary

Soil Vapor Sampling Locations, (TEC, 2009/2010)

Soil Vapor Sample Locations, (APEX, 2017)

Soil Vapor Sample Locations, (Tetratech, 2006)

SV-20

Soil Gas Sampling Locations, (Geosyntec, 2012)

Indicated Compound Not Detected at Concentration at or Above the Laboratory Reporting Limit Shown

Data Not Used in Contouring due to Proximity of SME System Which Began Operation After Collection of Samples

Below Ground Surface bgs

Not Detected ND

Not Sampled NS

> Isoconcentration Contour, **Dashed Where Inferred**

Concentrations > 909 µg/m³

Concentrations > 10,000 µg/m³

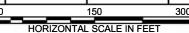
Micrograms per Cubic Meter

- Concentration of benzene in micrograms per cubic meter (μg/m³)
 909 μg/m³ = Site-specific soil vapor screening level for commercial/industrial land use.

SUMMARY OF BENZENE CONCENTRATIONS IN SOIL VAPOR AT 5 FEET BGS

FORMER CHEMOIL REFINERY 2020 WALNUT AVENUE SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-ChemOil-001	01/31/17	ZA	KD



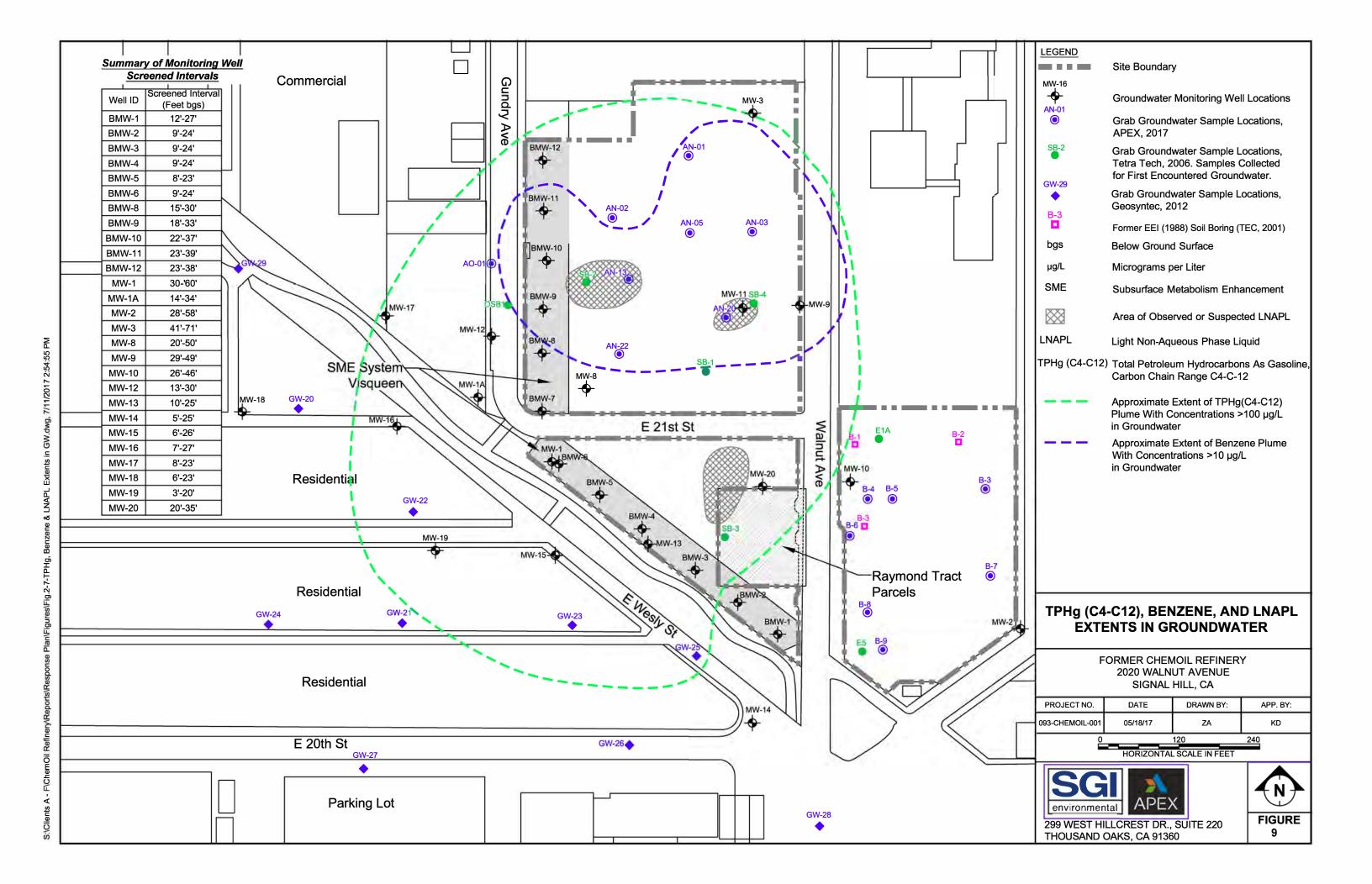


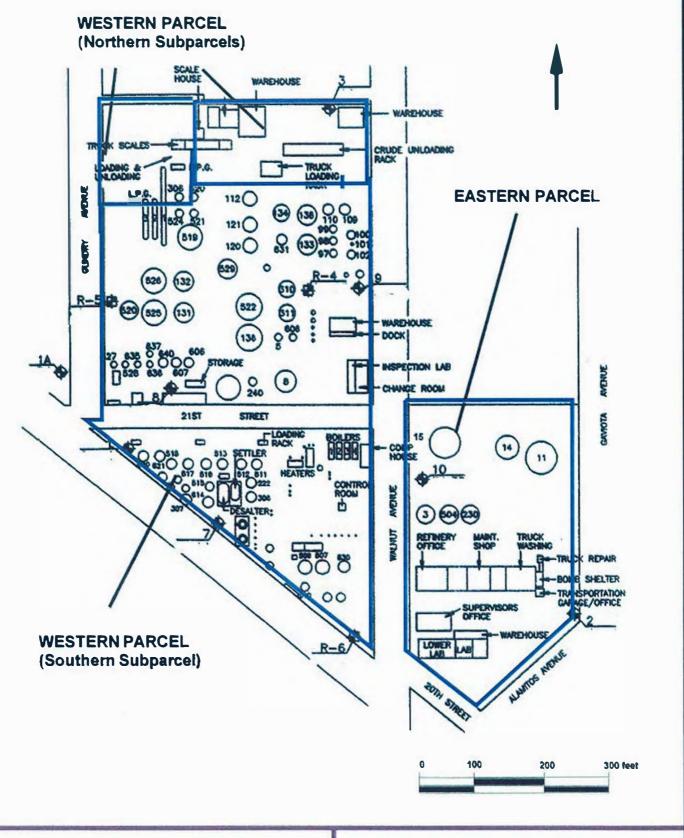


299 WEST HILLCREST DR., SUITE 220 THOUSAND OAKS, CA 91360



FIGURE



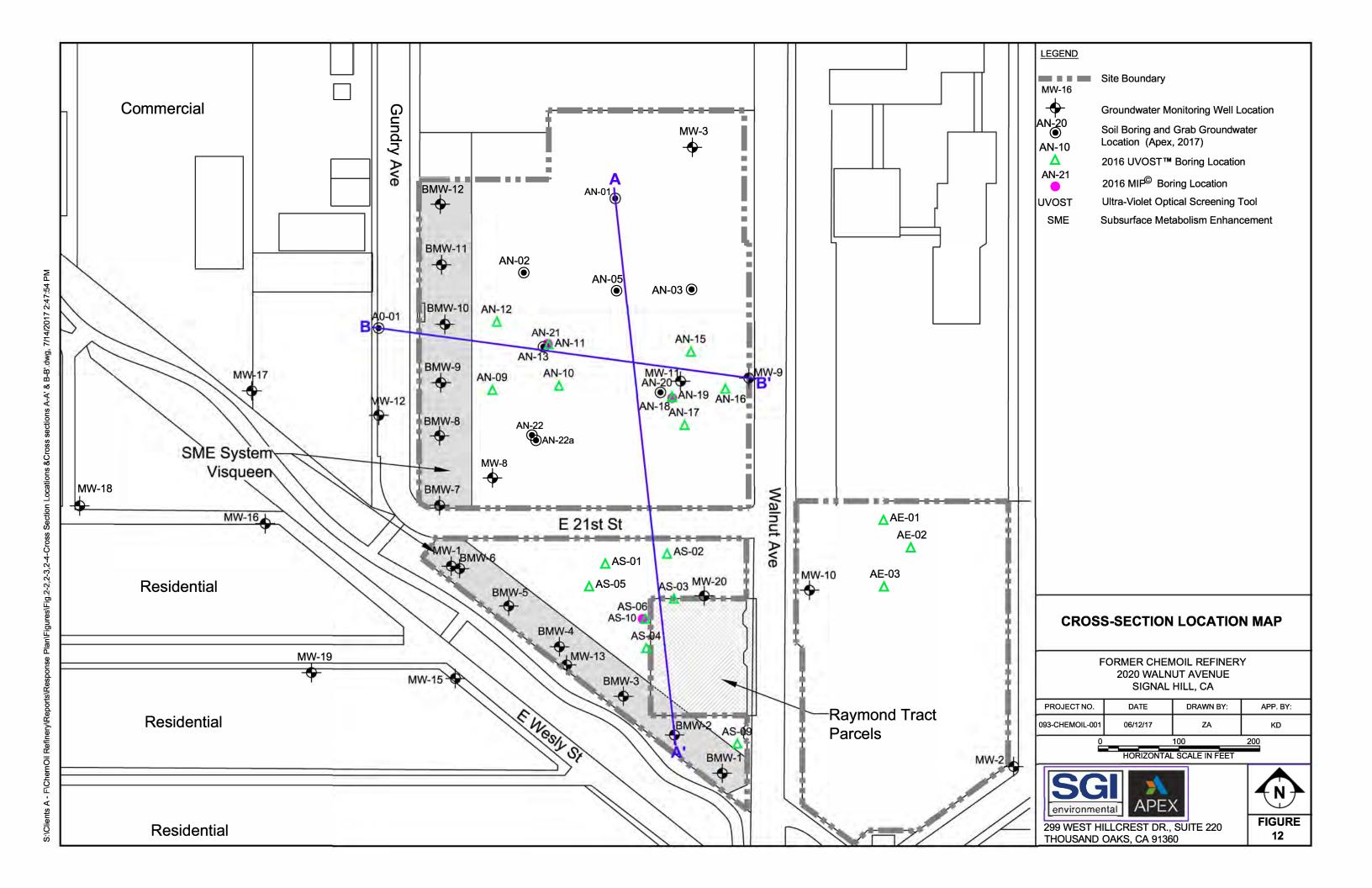


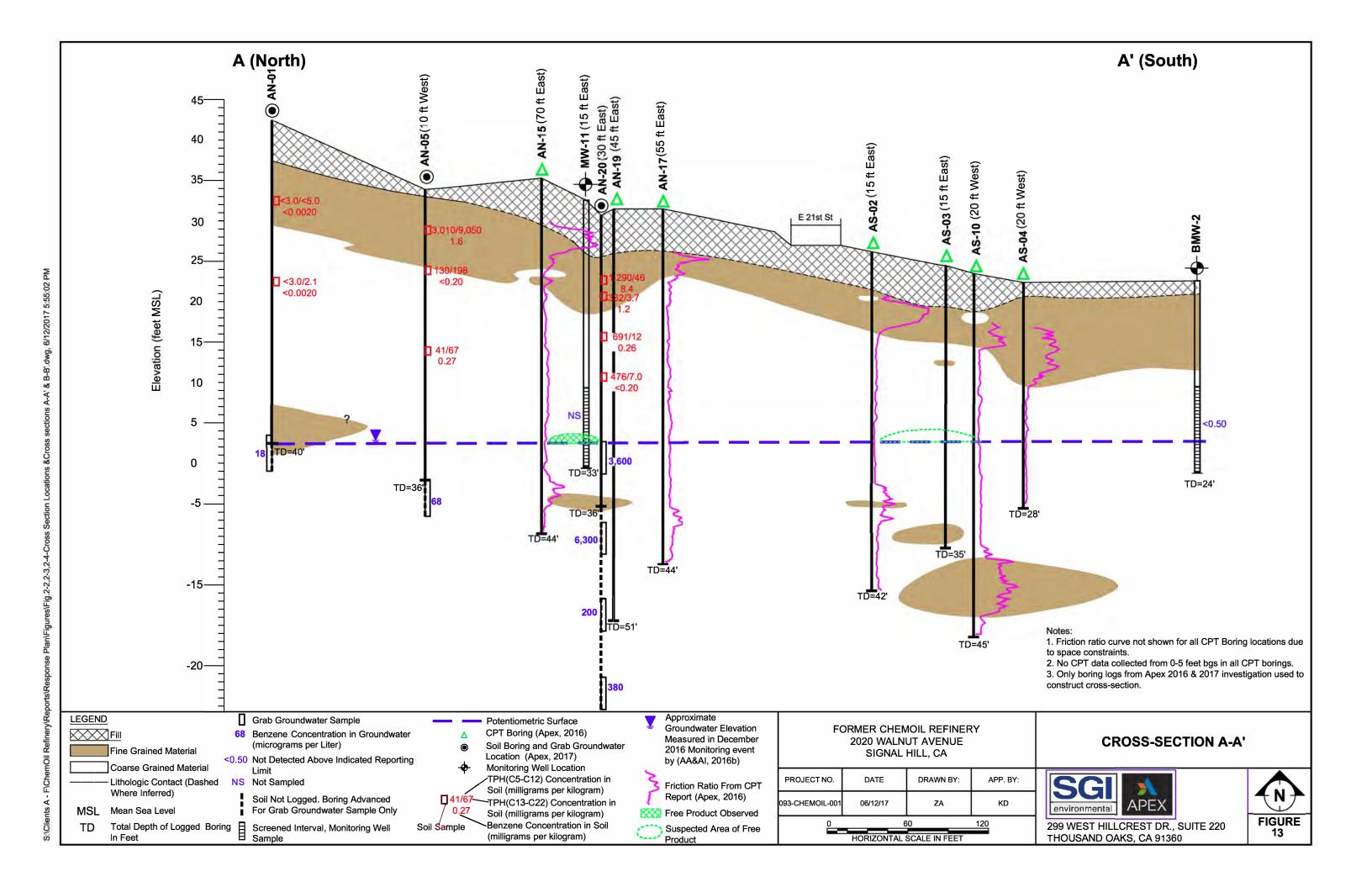
SITE LAYOUT MAP FORMER CHEMOIL REFINERY SITE SIGNAL HILL, CALIFORNIA

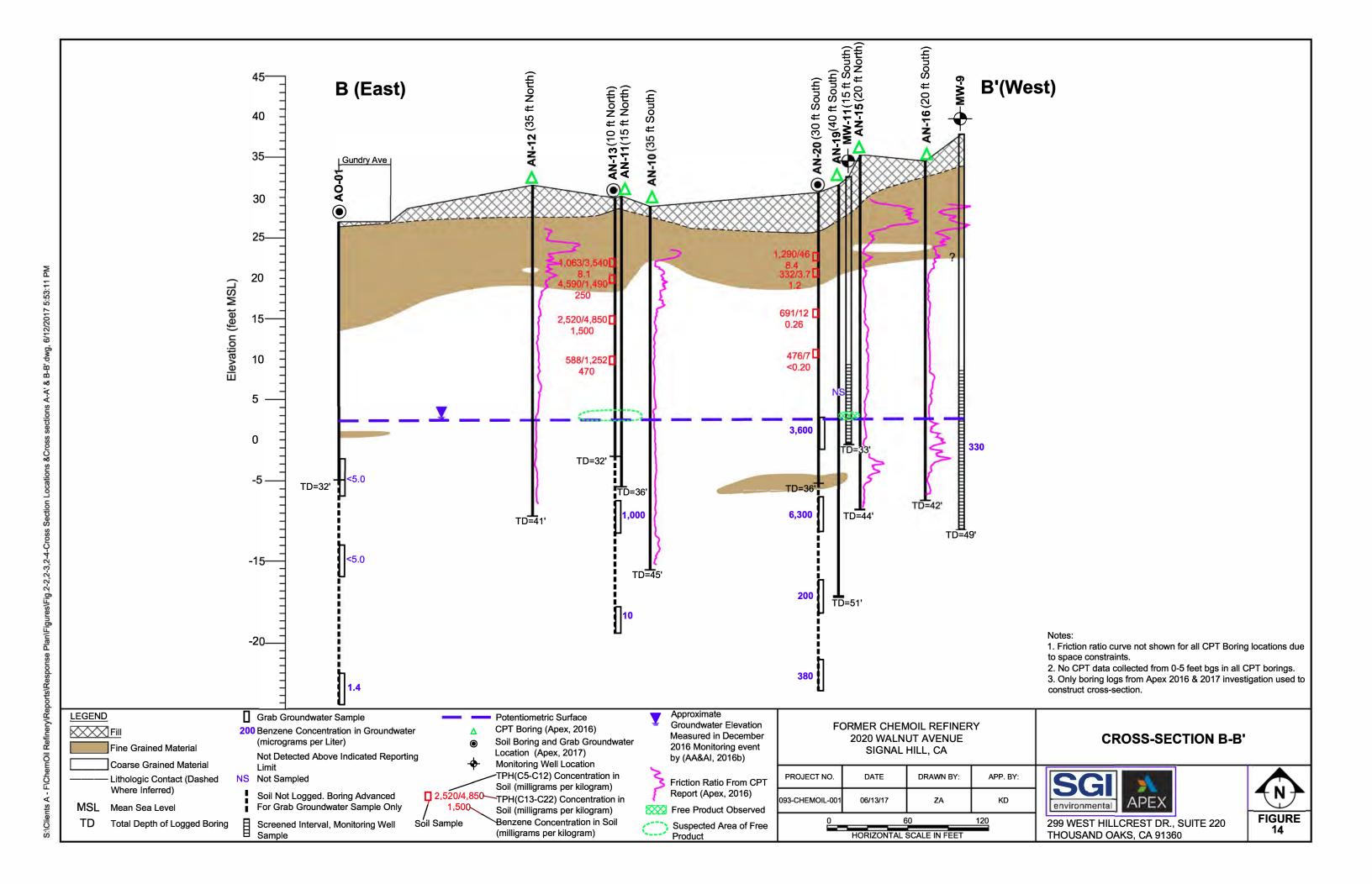
Testa Environmental Corporation

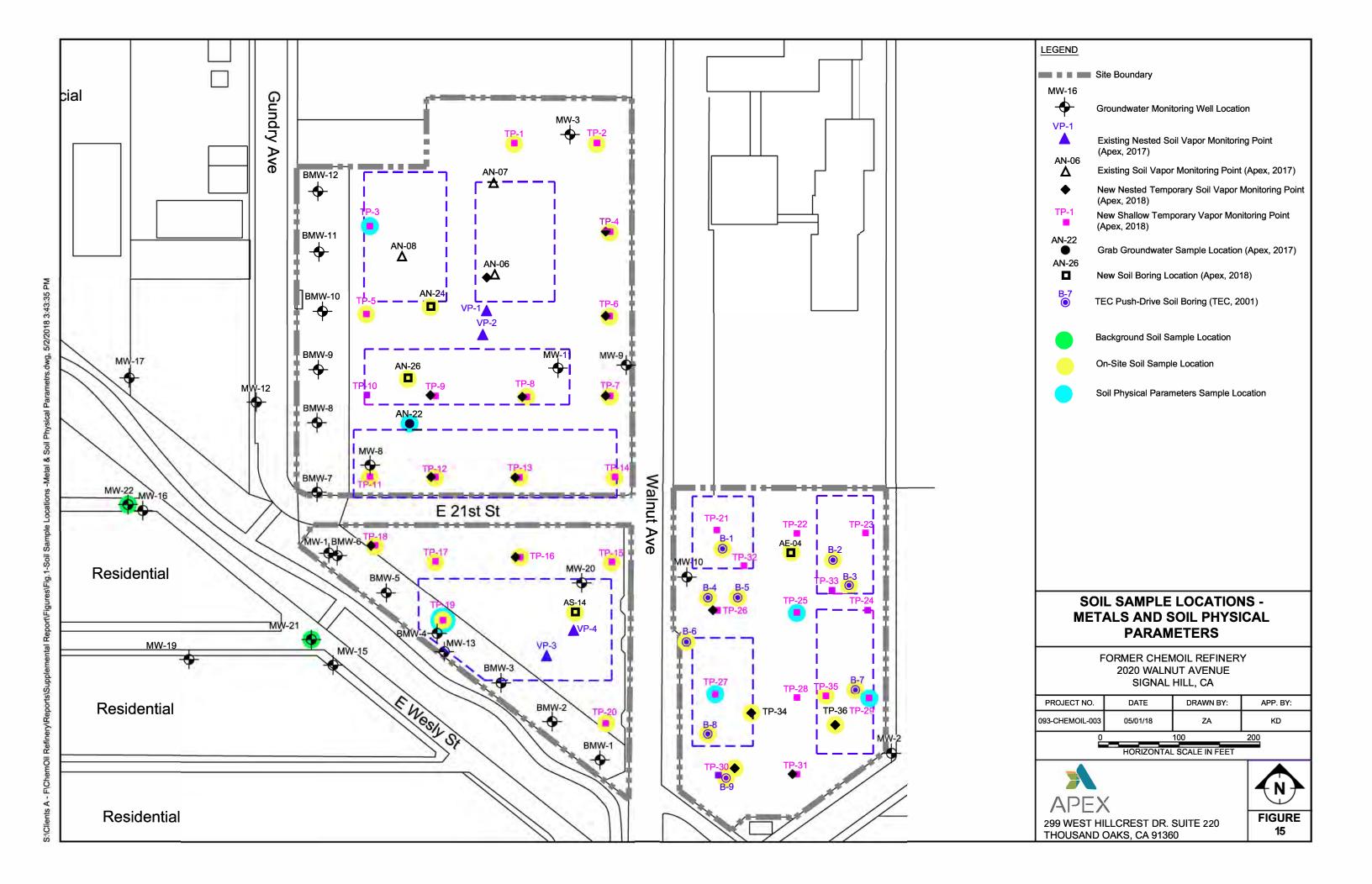
Earth Sciences & Environmental Specialists

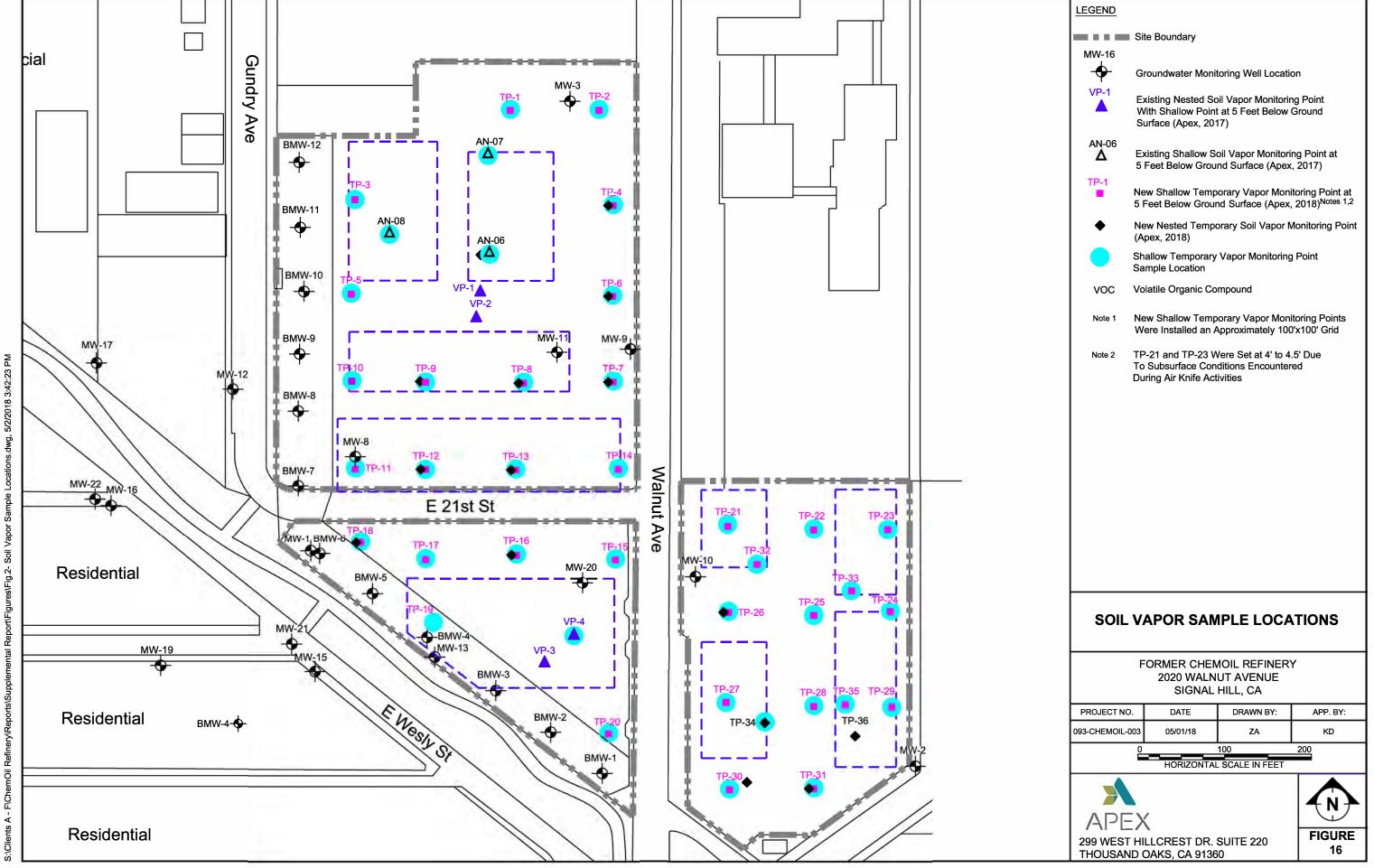
	FILE .64 2	FICUAE
January 2009	DPAMMY (81:	11

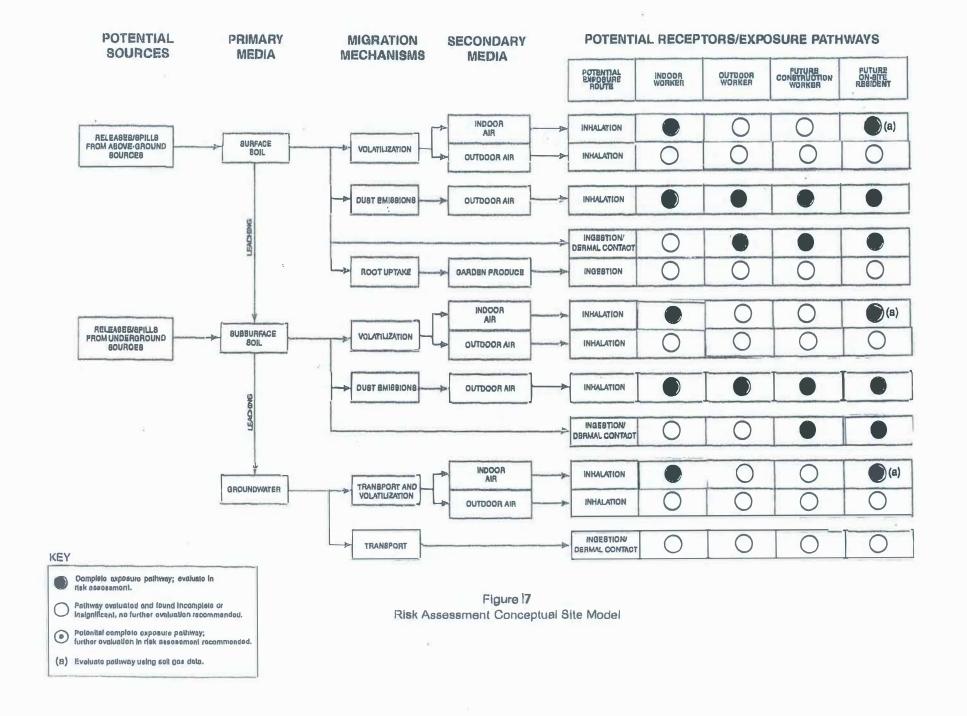


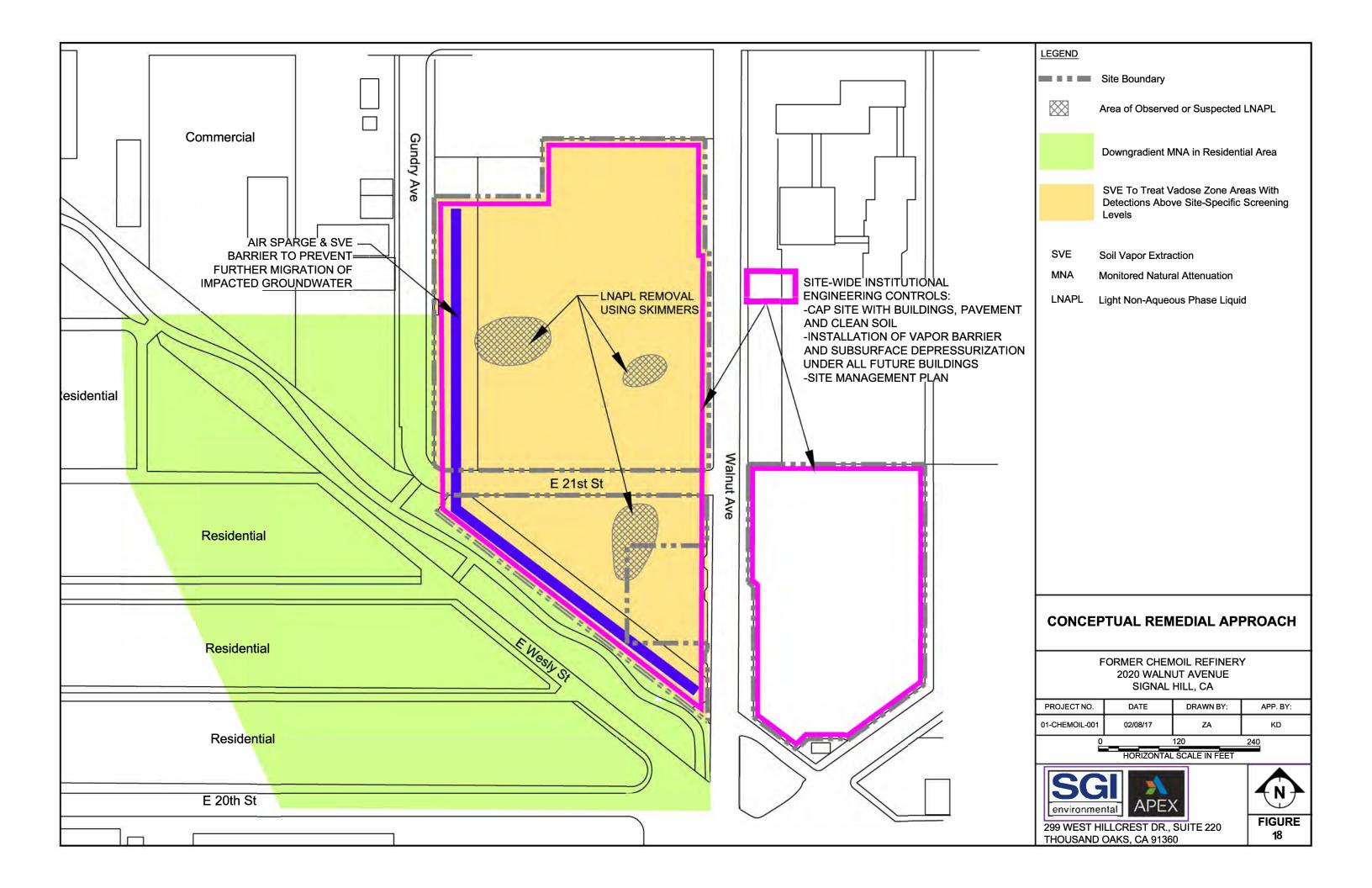












APPENDIX A Historic Data Eastern Parcel

Table A-4 Summary of Analytical Results for Total Petroleum Hydrocarbons (TPH) in Soil, East Parcel Former ChemOil Refinery Signal Hill, California

							1							II C EDA	Mathad 0	ME TOU								ı	Total TDU	
			Sample	Sample	TPHg	TPHd	CUE CUS	C08 C10	C10 C12	C12 C14	C14 C16	C16 C18	C18 C20	C20-C22	Method 80		C26 C28	C38 C33	C32 C34	C34 C38	C38 C40	C40-C44	Total	C5-C12	Total TPH ¹ C13-C22	C23-C44
Sample ID	Consultant	Data Qualifiers	Date	Depth			C00-C08	C00-C10	C10-C12	C12-C14	C14-C16	C 10-C 10	0 10-020	C20-C22	G22-G24	C24-C26	C20-C20	C20-C32	C32-C34	C34-C36	C36-C40	C40-C44	Iotai	(Note 2)	(Note 3)	(Note 4)
			Date	feet bgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				icci bgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			ge: 0 to 10		ilig/ikg	mg/kg	mg/kg	mg/kg	mg/kg	i iig/itg	mg/kg	mg/kg	mg/kg	ilig/kg	mg/kg	mg/ng	ing/ng
R-1	EEI	(a) (b) (c)	1988	2						<u>_</u>				T							T		T	I I		
B-1	EEI	(a) (b) (c) (d)	1988	10		ND<10	 _						-			-										
B-2	EEI	(a) (b) (c) (d)	1988	2												-										
B-2	EEI	(a) (b) (c)	1988	10		11,000 *																				
B-3	EEI	(a) (b) (c)	1988	2	2.000																					
B-3	EEI	(a) (b) (c)	1988	10		1,100										_										
B-3	EEI	(a) (b) (c)	1988	10		410 *																				
110-95-1	TSG	(a) (b) (c) (d) (e)	1999	1	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	13	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	13	ND<1	ND<1	6.5
110-95-5	TSG	(a) (b) (c) (d) (e)	1999	5	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	8.8	ND<1	ND<1	ND<1	2.6	ND<1	11	ND<1	ND<1	11.4
110-95-10	TSG	(a) (b) (c) (d) (e)	1999	10	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
125-310-1	TSG	(a) (b) (c) (d) (e)	1999	1	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	11	14	27	24	24	25	7.4	11	ND<1	ND<1	143	ND<1	25	104.9
125-310-5	TSG	(a) (b) (c) (d) (e)	1999	5	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	15	ND<1	ND<1	1.9	ND<1	ND<1	ND<1	ND<1	17	ND<1	ND<1	9.4
125-310-10	TSG	(a) (b) (c) (d) (e)	1999	10	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
180-75-1	TSG	(a) (b) (c) (d) (e)	1999	1	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
180-75-5	TSG	(a) (b) (c) (d) (e)	1999	5	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
180-75-10	TSG	(a) (b) (c) (d) (e)	1999	10	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
200-310-1	TSG	(a) (b) (c) (d) (e)	1999	1	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	15	ND<1	ND<1	1.9	ND<1	ND<1	ND<1	ND<1	17	ND<1	ND<1	9.4
200-310-5	TSG	(a) (b) (c) (d) (e)	1999	5	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
200-310-10	TSG	(a) (b) (c) (d) (e)	1999	10	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
204-95-1	TSG	(a) (b) (c) (d) (e)	1999	1	ND<1		ND<20	ND<20	ND<20	ND<20	ND<20	ND<20	ND<20	42	91	180	240	450	270	220	430	200	2,123	ND<20	42	2,036
204-95-5	TSG	(a) (b) (c) (d) (e)	1999	5	ND<1		ND<20	ND<20	ND<1	ND<20	ND<20	ND<20	ND<1	ND<1	ND<1	ND<1	14	ND<1	ND<1	ND<1	3.0	4.8	22	ND<20	ND<1	21.8
204-95-10	TSG	(a) (b) (c) (d) (e)	1999	10	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	28	ND<1	ND<1	ND<1	4.0	2.1	34	ND<1	ND<1	34.1
30-195-1	TSG	(a) (b) (c) (d) (e) (g)	1999	10	24		ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
30-195-5	TSG	(a) (b) (c) (d) (e) (g)	1999	5	30		ND<10	6.3	3.0	ND<10	ND<10	3.5	3.9	1.8	1.2	ND<1	7.1	ND<10	1.1	ND<10	ND<10	ND<10	28	9.3	9.2	8.8
30-195-10	TSG	(a) (b) (c) (d) (e) (g)	1999	10	8.8		ND<1	6.1	1.3	ND<1	ND<1	5.3	6.9	2.8	2.9	1.7	2.1	ND<1	ND<1	ND<1	ND<1	ND<1	29	7.4	15.0	5.3
70-70-1	TSG	(a) (b) (c) (d) (e) (g)	1999	10	10		ND<20	ND<20	ND<20	ND<20	510	820	650	320	220	260	590	960	550	470	700	240	6,290	ND<20	2,300	3,880
70-70-1	TSG	(a) (b) (c) (d) (e)	1999	5	7.2		ND<20	ND<20	ND<20	50	310	270	170	59	76	53	56	110	85	52	74	22	1,387	ND<20 ND<10	834	490
70-70-3	TSG		1999	10	370		ND<10	230	310	580	2,300	2,300	1.300	350	290	470	570	890	470	400	550	170	11.180	830	6,540	3,665
75-195-1	TSG	(a) (b) (c) (d) (e)	1999	10	ND<1		ND<10	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	10	ND<1	ND<1	7	ND<1	ND<1	ND<1	ND<1	17	ND<1	ND<1	12
75-195-1 75-195-5	TSG	(a) (b) (c) (d) (e)	1999	5	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	10	ND<1	7.7	ND<1	ND<1	ND<1	2.0	1.1	21	ND<1	ND<1	15.8
75-195-5 75-195-10	TSG	(a) (b) (c) (d) (e)	1999	10	ND<1		ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1
B-6-1	TEC	(a) (b) (c) (d) (e)	2001	10		45		IND~I	IND~I								ND~1									
		(a) (b) (c)							-							-	-									
B-6-10	TEC	(a) (b) (c)	2001	10		10			-			-	-			-										
B-8-1	TEC	(a) (b) (c)	2001	1		46			-							-									-	
B-9-1	TEC Took	(a) (b) (c)	2001	1 5		220	-		-						-	-							-	 ND<4.5	ND-25	 ND<49
E1B E1C	Tetra Tech		06/01/06	5	-		+ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5 94	ND<25 201	ND<48
E1C E3A	Tetra Tech		06/01/06	5 10	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	94 ND<4.5		92 ND<48
E3A	Tetra Tech		06/01/06 06/01/06	5				-				 	+			-	-				†	+	+	ND<4.5 ND<4.5	ND<25	
E5	Tetra Tech			10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		ND<25	ND<48
EO	Tetra Tech		06/01/06	10	-	-		-	-	- Donth	- Danger	- Prostor the	- an 10 foot l	-	-	-		-	-	-	-	-	-	ND<4.5	ND<25	ND<48
70 70 15	ITCC I	(a) (b) (a) (d) (a)	1999	15	370		66	000	2.200	3.300	2.900		an 10 feet b		1.200	010	720	740	120	350	88	70	18.612	4006	0.540	2 606
70-70-15	TSG	(a) (b) (c) (d) (e)		15			ND<5	980	,	- /	,-,	2,400	1,700	860	,	910					93	78	- , -	4896	9,510	3,606
70-70-20 70-70-25	TSG	(a) (b) (c) (d) (e)	1999 1999	20 25	760 ND<1		ND<5	1,800 1.2	3,300 4.7	8,100 11	4,300 10	3,400 9.1	2,700	1,400	1,800 16	1,100 11	1,300 12	960	210 3.7	480 5.4	2.5	120 ND<1	31,063 118	9150	15,850 47.6	5,163 51.2
	TSG	(a) (b) (c) (d) (e)				 ND<10				1				1				8.6			1		1	11.4		51.2
B-2-40	TEC	(a) (b) (c) (d)	2001	40 #\/\\\\		ND<10			-							-							-			-
B-9-15	TEC	(a) (b) (c)	2001	#VALUE!		27	-		-							-					-		-			
B-9-20	TEC	(a) (b) (c)	2001	20		17	-		-														-	 ND<4.5	ND-25	ND < 40
E1B	Tetra Tech		06/01/06	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48
E1B	Tetra Tech		06/01/06	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.72	7.59 J	5.04 J
E1C	Tetra Tech		06/01/06	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,829	2,540	2,162
E1C	Tetra Tech		06/01/06	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4,999	13,030	8,238
E0	Tetra Tech		06/01/06	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48
EO	Tetra Tech		06/01/06	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48

Table A-4

Summary of Analytical Results for Total Petroleum Hydrocarbons (TPH) in Soil, East Parcel

Former ChemOil Refinery Signal Hill, California

Notes:

mg/kg = milligrams per kilogram.

bgs = below ground surface.

U.S. EPA = United States Environmental Protection Agency.

TPH = Total Petroleum Hydrocarbons.

TPHg = total petroleum hydrocarbons as gasoline.

TPHd = total petroleum hydrocarbons as diesel.

ND = not detected.

ND< = less than the laboratory reporting limit in data from Tetra Tech, 2006 samples or analytical detection limit in data from Testa, 2001.

* = Carbon range C8-C30

Consultant listed is the consultant that collected the data. Data from EEI, TSG, and TEC are recorded from TEC, 2001 report.

EEI = Engineering Enterprises, Inc.

TSG = The Source Group, Inc.

TEC = Testa Environmental Corporation

- -- = sample not analyzed for compound.
- = Data not presented herein. Refer to Tetra Tech, 2006.
- 1 For use in the risk assessment, laboratory analytical results for carbon data within the specific TPH carbon ranges were summed to represent a total TPH value for each carbon range.
- ²TPH (C5-C12) was calculated based on summing detected results from C6-C8, C8-C10, and C10-C12.
- ³ TPH (C13-C22) was calculated based on summing detected results of one half C12-C14 and the results between C14 and C22.
- ⁴ TPH (C23-C44) was calculated based on summing the results of one half C22-C24 and the results between C24 and C44.

Data qualifiers from TEC, 2001:

- (a) Sample date is unknown. The date listed is the date reported.
- (b) Table 5-3 in TEC, 2001 does not indicate the whether this is soil or groundwater data. The table is inferred to be soil data based on the report text.
- (c) Table 5-3 in TEC, 2001 does not indicate what units these data are presented in. Units are inferred from the report text.
- (d) <1 was not defined in this table. All <1 symbols were assumed to indicate "not detected above the analytical detection limit".
- (e) The sum totals of TPH presented in TEC, 2001 did not sum up and were recalculated for this report.
- (f) The carbon ranges for TPHg and TPHd were not defined except where indicated.
- (g) TSG boring 130-195 is not shown on any figure in TEC, 2001. It is assumed to be boring 130-95 on all figures in TEC, 2001.

References:

TEC. 2001. Report on Additional Subsurface Assessment, Former Chemoil Refinery - Eastern Parcel, Signal Hill, California. December 14.

Tetra Tech. 2006. Environmental Due Diligence Site Assessment Results, Former Chemoil Refinery Property, Signal Hill, California. August 8.

Table A-5 Summary of Analytical Results for Volatile Organic Compounds (VOCs) in Soil, East Parcel Former ChemOil Refiney

Signal Hill, California

Sample D Consultant Data Sample Date Date					1				U.S. EPA	Method 8260	B - VOCs			
B-1	Sample ID	Consultant	I I		Depth	_			-	_			·	. Total Xylenes
B-1 EEI (a) (b) (c) 1988 2					feet bgs					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B-1		EE!	() () ()	4000			eptn Range:	U to 10 feet b		1	1		1	
B-2 EEI (a) (b) (c) 1988 2														
B-2 EEI (a) (b) (c) (c) 1988 10														
B-3 EEI (a) (b) (c) (c) 1988 2														
B-3 EEI (a) (b) (c) 1988 10														
B-3 EEI														
110-95-1 TSG (a) (b) (c) 1999 1 ND-0.005 ND-0.005 ND-0.005 110-95-5 TSG (a) (b) (c) 1999 10 ND-0.005 ND-0.005 ND-0.005 110-95-10 TSG (a) (b) (c) 1999 10 ND-0.005 ND-0.005 ND-0.005 110-95-10 TSG (a) (b) (c) 1999 10 ND-0.005 ND-0.005 ND-0.005 125-310-5 TSG (a) (b) (c) 1999 5 ND-0.005 ND-0.005 ND-0.005 125-310-5 TSG (a) (b) (c) 1999 10 ND-0.005 ND-0.005 ND-0.005 125-310-10 TSG (a) (b) (c) 1999 10 ND-0.005 ND-0.005 ND-0.005 125-310-10 TSG (a) (b) (c) 1999 1 ND-0.005 ND-0.005 ND-0.005 180-75-5 TSG (a) (b) (c) 1999 5 ND-0.005 ND-0.005 ND-0.005 ND-0.005 180-75-5 TSG (a) (b) (c) 1999 1 ND-0.005														
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125-310-10 TSG														ND<0.01
180-75-1 TSG														ND<0.01
180-75-5 TSG (a) (b) (c) 1999 5 ND<0.005														ND<0.01
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200-310-1 TSG														ND<0.01
200-310-5 TSG (a) (b) (c) 1999 5 ND-0.005 ND<0.005 ND<0.														ND<0.01
200-310-10 TSG (a) (b) (c) 1999 10 NP<0.005														ND<0.01
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204-95-5 TSG														ND<0.01
204-95-10 TSG (a) (b) (c) 1999 10 ND<0.005 ND<0														ND<0.01
30-195-1 TSG (a) (b) (c) (e) 1999 1 ND<0.005 0.017 ND<0.005 30-195-5 TSG (a) (b) (c) (e) 1999 5 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) (e) 1999 1 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 1 ND<0.005 0.024 ND<0.005 70-70-5 TSG (a) (b) (c) 1999 5 ND<0.005 0.013 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 5 ND<0.005 0.013 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 1 ND<0.005 0.013 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 1 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 1 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 1 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 1 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 5 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 5 ND<0.005 ND<0.005 ND<0.005 8-6-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-8-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-8-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 ND<0.005 8-8-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 ND<0.005 8-9-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<		TSG	(a) (b) (c)	1999		ND<0.005				ND<0.005			ND<0.005	ND<0.01
30-195-5 TSG (a) (b) (c) (e) 1999 5 ND<0.005 0.52 0.0068 30-195-10 TSG (a) (b) (c) (e) 1999 10 ND<0.005 ND<0.005 ND<0.005 70-70-1 TSG (a) (b) (c) 1999 5 ND<0.005 0.024 ND<0.005 70-70-5 TSG (a) (b) (c) 1999 5 ND<0.005 0.013 ND<0.005 70-70-10 TSG (a) (b) (c) 1999 10 0.057 0.82 0.25 75-195-1 TSG (a) (b) (c) 1999 1 ND<0.005 ND<0.005 ND<0.005 75-195-5 TSG (a) (b) (c) 1999 5 ND<0.005 ND<0.005 ND<0.005 75-195-10 TSG (a) (b) (c) 1999 10 ND<0.005 ND<0.005 ND<0.005 75-195-10 TSG (a) (b) (c) 1999 10 ND<0.005 ND<0.005 ND<0.005 8-6-10 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-8-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-9-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-9-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-9-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-9-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-9-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 8-9-1 TEC (a) (b) (c) 2001 1 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 N			(a) (b) (c)		10									ND<0.01
30-195-10 TSG (a) (b) (c) (e) 1999 10 ND<0.005 ND<0.005 (a) (b) (c) 1999 1 ND<0.005 ND<0.005 (a) (b) (c) 1999 1 ND<0.005 ND<0.005 (a) (b) (c) 1999 1 ND<0.005 (a) (b) (c) 1999 1 ND<0.005 (a) (b) (c) 1999 10 ND<0.005 (a) (b) (c) 2001 11 ND<0.005 (a) (a)	0-195-1	TSG	(a) (b) (c) (e)	1999		ND<0.005				0.017			ND<0.005	0.014
70-70-1 TSG (a) (b) (c) 1999 1 ND<0.005 0.024 ND<0.005 ND<0.00	0-195-5	TSG	(a) (b) (c) (e)	1999	5	ND<0.005				0.52			0.0068	0.13
To-70-5	0-195-10	TSG	(a) (b) (c) (e)	1999	10	ND<0.005				ND<0.005			ND<0.005	ND<0.01
TSG	0-70-1	TSG	(a) (b) (c)	1999	1	ND<0.005				0.024			ND<0.005	0.045
TSG	0-70-5	TSG	(a) (b) (c)	1999	5	ND<0.005				0.013			ND<0.005	0.058
75-195-5 TSG (a) (b) (c) 1999 5 ND<0.005 ND<0.00	0-70-10	TSG	(a) (b) (c)	1999	10	0.057				0.82			0.29	3.4
75-195-10 TSG (a) (b) (c) 1999 10 ND<0.005 ND<0.	5-195-1	TSG	(a) (b) (c)	1999	1	ND<0.005				ND<0.005			ND<0.005	ND<0.01
75-195-10 TSG (a) (b) (c) 1999 10 ND<0.005 ND<0.	5-195-5	TSG	(a) (b) (c)	1999	5	ND<0.005				ND<0.005			ND<0.005	ND<0.01
B-6-1 TEC (a) (b) (c) 2001 1 ND<0.005		TSG				ND<0.005				ND<0.005			ND<0.005	ND<0.01
B-6-10 TEC (a) (b) (c) 2001 10 ND<0.005 ND<0.00					1	ND<0.005								ND<0.01
B-8-1 TEC (a) (b) (c) 2001 1 ND<0.005 -		TEC	\cdots	2001	10									ND<0.01
B-9-1 TEC (a) (b) (c) 2001 1 ND<0.005														ND<0.01
Depth Range: Greater than 10 feet bgs					1									ND<0.01
E1B Tetra Tech 06/01/06 5 ND<0.002 ND<0.005 ND<0.005 ND<0.002 ND<0.002 ND<0.005 ND<0.005 ND<0.002 ND<0.002 ND<0.005 ND<0.						Depth	Range: Grea	iter than 10 fe	et bgs					
E1C Tetra Tech 06/01/06 5 ND<0.002 ND<0.005 ND<0.005 ND<0.005 0.0088 J ND<0.005 0.0050 J ND<0.002 E3A Tetra Tech 06/01/06 10 ND<0.002	1B	Tetra Tech		06/01/06	5					ND<0.002	ND<0.005	ND<0.005	ND<0.002	ND<0.002
E3A Tetra Tech 06/01/06 10 ND<0.002 ND<0.005 ND<0				06/01/06		ND<0.002					ND<0.005			ND<0.002
E5 Tetra Tech 06/01/06 5 ND<0.002 ND<0.005 ND<0.0														ND<0.002
E5 Tetra Tech 06/01/06 10 ND<0.002 ND<0.005 ND<0.005 ND<0.005 ND<0.002 ND<0.005 ND														ND<0.002
70-70-15 TSG (a) (b) (c) 1999 15 ND<0.005 0.33 0.33 70-70-20 TSG (a) (b) (c) 1999 20 ND<0.005 0.25 0.80 70-70-25 TSG (a) (b) (c) 1999 25 ND<0.005														ND<0.002
70-70-20 TSG (a) (b) (c) 1999 20 ND<0.005 0.25 0.80 70-70-25 TSG (a) (b) (c) 1999 25 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005 ND<0.005			(a) (b) (c)											4.2
70-70-25 TSG (a) (b) (c) 1999 25 ND<0.005 ND<0.005 B-2-40 TEC (a) (b) (c) (d) 2001 40 ND<0.005 5.1 10 ND<0.005 ND<0.005														8.1
B-2-40 TEC (a) (b) (c) (d) 2001 40 ND<0.005 5.1 10 ND<0.005 ND<0.005														ND<0.01
														7.2
		TEC	(a) (b) (c) (d)	2001	15	ND<0.005	J. 1 			ND<0.005			ND<0.005	ND<0.01
B-9-20 TEC (a) (b) (c) 2001 20 ND<0.005 ND<0.005 ND<0.005														ND<0.01

Table A-5

Summary of Analytical Results for Volatile Organic Compounds (VOCs) in Soil, East Parcel

Former ChemOil Refiney Signal Hill, California

								U.S. EPA	Method 8260	B - VOCs			
Sample ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	Benzene	n-Butylbenzene	sec-Butylbenzene	tert-Butylbenzene	Ethylbenzene	Isopropylbenzene	Naphthalene	Toluene	Total Xylenes
				feet bgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
E1B	Tetra Tech		06/01/06	15	ND<0.002	ND<0.005	ND<0.005	ND<0.005	ND<0.002	ND<0.005	ND<0.005	ND<0.002	ND<0.002
E1B	Tetra Tech		06/01/06	25	ND<0.002	ND<0.005	ND<0.005	ND<0.005	ND<0.002	ND<0.005	ND<0.005	ND<0.002	ND<0.002
E1C	Tetra Tech		06/01/06	15	ND<0.012	1.100	3.100	0.175	ND<0.012	2.600	4.320	0.114	ND<0.012
E1C	Tetra Tech		06/01/06	25	ND<0.012	1.190	4.760	0.281	0.0594 J	4.020	9.080	0.136	0.0458 J
E5	Tetra Tech		06/01/06	15	ND<0.002	ND<0.005	ND<0.005	ND<0.005	ND<0.002	ND<0.005	ND<0.005	ND<0.002	ND<0.002
E5	Tetra Tech		06/01/06	20	ND<0.002	ND<0.005	ND<0.005	ND<0.005	ND<0.002	ND<0.005	ND<0.005	ND<0.002	ND<0.002

Notes:

mg/kg = milligram per kilogram.

bgs = below ground surface.

U.S. EPA = United States Environmental Protection Agency.

VOCs = volatile organic compounds.

ND = not detected.

ND< = less than the laboratory reporting limit in data from Tetra Tech, 2006 samples or analytical detection limit in data from TEC, 2001.

Consultant listed is the consultant that collected the data. Data from EEI, TSG, and TEC are recorded from TEC, 2001 report.

EEI = Engineering Enterprises, Inc.

TSG = The Source Group, Inc.

TEC = Testa Environmental Corporation

-- = sample not analyzed for compound.

J = analyte was detected; however, analyte concentration is an estimated value between the method detection limit and the practical quantitation limit.

Data qualifiers from TEC, 2001:

- (a) Sample date is unknown. The date listed is the date reported.
- (b) The analytical method for benzene, toluene, ethylbenzene and xylenes (BTEX) is unknown for all samples reported in TEC, 2001. Table 5-1 lists the method for as U.S. EPA Method 8020; however, the report text states the method is U.S. EPA Method 8260B. It is assumed the analytical method used is U.S. EPA Method 8260B.
- (c) The analytical method for n-Butylbenzene and sec-butylbenzene are unknown. The report text indicates the analytical method for VOCs is U.S. EPA Method 8260 for all samples collected by TEC, 2001, so it is assumed that this is the actual analytical method used to analyze VOCs.
- (d) Two concentrations are listed for xylenes in sample B-2-40. The higher concentration was assumed to be correct and is listed in this table.
- (e) TSG boring 130-195 is not shown on any figure in TEC, 2001. It is assumed to be boring 130-95 on all figures in TEC, 2001.

References:

TEC. 2001. Report on Additional Subsurface Assessment, Former Chemoil Refinery - Eastern Parcel, Signal Hill, California. December 14.

Tetra Tech. 2006. Environmental Due Diligence Site Assessment Results, Former Chemoil Refinery Property, Signal Hill, California. August 8.

Table A-6 Summary of Analytical Results for Polycyclic Aromatic Hydrocarbons (PAHs) in Soil, East Parcel

Former ChemOil Refinery Signal Hill, California

									U.S. E	PA Meth	od 8270C	- PAHs						
Boring	Sample Date	Sample Depth	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene
		feet bgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
E1B	6/1/2006	5																
E1B	6/1/2006	15																
E1B	6/1/2006	25																
E1C	6/1/2006	5																
E1C	6/1/2006	15	0.221	ND	ND	ND	ND	ND	ND	ND	1.59	ND	0.036	0.387	ND	1.19	1.95	1.95
E1C	6/1/2006	25		-				-		-								
E3A	6/1/2006	10		1			-	-	-	-			-		-			
E5	6/1/2006	5		-			-	-		-			-					
E5	6/1/2006	10		1			-	-	-	-			-		-			
E5	6/1/2006	15		-			-	-	-	-								-
E5	6/1/2006	20		ı			-	-	-	-			-				-	

Notes:

mg/kg = milligram per kilogram.

ft bgs = feet below ground surface.

PAHs = Polycyclic aromatic hydrocarbons.

U.S. EPA = United States Environmental Protection Agency.

ND = Not detected at laboratory reporting limit. See Tetra Tech, 2006 for laboratory reporting limit.

-- = Not analyzed.

References:

Tetra Tech. 2006. Environmental Due Diligence Site Assessment Results, Former Chemoil Refinery Property, Signal Hill, California. August 8.

Table A-7 Summary of Analytical Results for Metals in Soil, East Parcel

Former ChemOil Refinery Signal Hill, California

		1							nai Hill, Ca		U	I.S. EPA	Method 60	10B - Met	als						
Sample ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	. Molybdenum	Nickel	Selenium	Silver	Thallium	- Vanadium	Zinc
				feet bgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg Range: 0 to	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B-1-1	TEC	(a) (b) (c) (d)	2001	1	0.50	4.5	50		ND<0.15	10	4.0	8.0	2.0	ND<0.10	ND<0.25	5.0	ND<0.25	ND<0.15	0.42	17	23
B-1-5	TEC	(a) (b) (c) (d)	2001	5	0.50	13	92		ND<0.15	20	11	21	4.0	ND<0.10	0.36	17		ND<0.15	0.50	46	46
B-1-10	TEC	(a) (b) (c) (d)	2001	10	0.50	12	86		ND<0.15	20	10	19	ND<0.25	3.0	ND<0.25	17		ND<0.15	0.50	38	41
B-2-1	TEC	(a) (b) (c) (d)	2001	1	1.0	9.5	120		ND<0.15	40	7.0	48	100		0.50	64		ND<0.15	0.50	120	200
B-2-5	TEC	(a) (b) (c) (d)	2001	5	0.50	10	450	ND<0.15	ND<0.15	18	10	15	3.0	0.11	ND<0.25	18	ND<0.25	ND<0.15	1.0	31	38
B-2-10	TEC	(a) (b) (c) (d)	2001	10	0.50	8.0	56		ND<0.15	8.5	4.5	9.0	1.5	ND<0.10	ND<0.25	7.5		ND<0.15	0.33	20	27
B-3-1	TEC	(a) (b) (c) (d)	2001	1	0.39	5.0	58		ND<0.15	9.5	4.5	8.0	1.5	ND<0.10	0.33	6.0		ND<0.15	0.50	18	22
B-3-5	TEC	(a) (b) (c) (d)	2001	5	0.50	12	100		ND<0.15	19	10	16	3.0	ND<0.10	0.41	14		ND<0.15	1.0	41	41
B-3-10	TEC	(a) (b) (c) (d)	2001	10	1.0	16	150		ND<0.15	25	12	26	4.5	ND<0.10	0.50	20		ND<0.15	1.5	48	48
B-4-1	TEC	(a) (b) (c) (d)	2001	1 -	0.50	10	76		ND<0.15	18	8.0	16	3.0	ND<0.10	0.36	12		ND<0.15	1.0	36	41
B-4-5	TEC	(a) (b) (c) (d)	2001	5	0.50	18	90		ND<0.15	28	13	31	4.5	ND<0.10	0.50	22		ND<0.15	2.0	53	56
B-4-10 B-5-1	TEC TEC	(a) (b) (c) (d)	2001 2001	10	ND<0.25	4.5	44		ND<0.15	8.0	4.0	7.5		ND<0.10 ND<0.10	0.26	6.5		ND<0.15 ND<0.15		16 17	23
B-5-5	TEC	(a) (b) (c) (d) (a) (b) (c) (d)	2001	5	0.50 0.50	4.5 9.0	54 73		ND<0.15	10 15	4.5 8.0	7.0 12	2.5	ND<0.10	0.42 0.50	6.0 12		ND<0.15 ND<0.15	1.0 1.0	30	24 38
B-5-10	TEC	(a) (b) (c) (d)	2001	10	0.50	18	140		ND<0.15	32	13	31	5.5	0.12	0.50	23		ND<0.15	1.5	52	57
B-6-1	TEC	(a) (b) (c) (d)	2001	1	0.36	4.0	30	ND<0.15		7.5	3.5	3.0	0.50	ND<0.10	0.35	5.5		ND<0.15	0.50	15	22
B-6-5	TEC	(a) (b) (c) (d)	2001	5	0.50	10	68		ND<0.15	16	8.0	14	3.0	ND<0.10	0.42	12		ND<0.15	1.0	32	45
B-6-10	TEC	(a) (b) (c) (d)	2001	10	0.50	17	310		ND<0.15	25	12	26	5.0	ND<0.10	0.50	20		ND<0.15	1.0	48	48
B-7-1	TEC	(a) (b) (c) (d)	2001	1	0.45	5.0	56		ND<0.15	9.0	4.5	7.5	3.0	ND<0.10	0.35	5.5		ND<0.15	0.50	16	23
B-7-5	TEC	(a) (b) (c) (d)	2001	5	0.50	9.0	88		ND<0.15	16	6.5	12	3.0	ND<0.10	0.49	10		ND<0.15	0.50	27	38
B-7-10	TEC	(a) (b) (c) (d)	2001	10	1.0	18	98	ND<0.15	ND<0.15	26	14	31	6.0	ND<0.10	0.50	22		ND<0.15	1.5	52	54
B-8-1	TEC	(a) (b) (c) (d)	2001	1	0.50	4.5	47		ND<0.15	9.5	4.5	6.5	1.5	ND<0.10	0.49	4.5		ND<0.15	0.50	17	22
B-8-5	TEC	(a) (b) (c) (d)	2001	5	0.50	12	73		ND<0.15	22	10	17	3.5	ND<0.10	0.42	15		ND<0.15	1.5	40	50
B-8-10	TEC	(a) (b) (c) (d)	2001	10	1.0	16	76		ND<0.15	25	12	28	4.5	ND<0.10	0.50	20		ND<0.15	1.5	48	50
B-9-1	TEC	(a) (b) (c) (d)	2001	1	0.50	7.0	72		ND<0.15	12	6.0	12	5.5	ND<0.10	0.47	8.0		ND<0.15	0.50	22	39
B-9-5	TEC	(a) (b) (c) (d)	2001	5	1.0	9.0	84		ND<0.15	16	7.5	12	3.0	ND<0.10	0.46	11		ND<0.15	0.50	29	40
B-9-10	TEC	(a) (b) (c) (d)	2001	10	0.50	7.0	140		ND<0.15	10	7.0	12	3.0	ND<0.10	0.37	10	ND<0.25	ND<0.15	1.0	19	26
B-1-15	TEC	(a) (b) (a) (d)	2001	1 15	0.44	E 0	54		e: Greater ND<0.15		eet bgs 3.6	6.0	1.0	ND<0.40	ND<0.25	5.0	I NID < 0.25	ND<0.15	ND<0.25	1 42	18
		(a) (b) (c) (d)		15	0.41 ND<0.25	5.0				5.5		6.0			ND<0.25 ND<0.25		+			1	10
B-1-20 B-1-25	TEC TEC	(a) (b) (c) (d) (a) (b) (c) (d)	2001 2001	20 25	ND<0.25	3.0 5.0	15 22		ND<0.15 ND<0.15		1.5 3.5	1.5 3.0		ND<0.10	0.50	2.5 4.5	ND<0.25	ND<0.15 5.0	0.50	9.5 15	18
B-1-30	TEC	(a) (b) (c) (d)	2001	30	ND<0.25	5.0	24		ND<0.15		3.0	3.5		ND<0.10	0.37	4.5		ND<0.15	0.48	16	18
B-1-35	TEC	(a) (b) (c) (d)	2001	35	0.42	10	26		ND<0.15		3.5	6.5		ND<0.10	0.50	5.0		ND<0.15	0.45	20	22
B-2-15	TEC	(a) (b) (c) (d)	2001	15	0.50	9.5	63		ND<0.15	16	8.0	12		ND<0.10	0.50	12	ND<0.25		1.0	32	36
B-2-20	TEC	(a) (b) (c) (d)	2001	20	0.38	6.0	50		ND<0.15	10	6.0	10		ND<0.10	0.44	8.0		ND<0.15	0.50	24	29
B-2-25	TEC	(a) (b) (c) (d)	2001	25	ND<0.25	2.5	24		ND<0.15	6.5	3.0	5.5		ND<0.10	0.29	4.5		ND<0.15	0.25	12	16
B-2-30	TEC	(a) (b) (c) (d)	2001	30	0.47	8.0	35	ND<0.15	ND<0.15	9.0	4.5	4.5		ND<0.10	0.30	5.5	ND<0.25	ND<0.15	0.50	18	25
B-2-35	TEC	(a) (b) (c) (d)	2001	35	0.32	5.5	28		ND<0.15	8.0	4.5	4.0		ND<0.10	0.34	5.0		ND<0.15	0.45	18	26
B-2-40	TEC	(a) (b) (c) (d)	2001	40	0.50	5.5	32		ND<0.15	9.0	5.5	5.0		ND<0.10	0.31	6.0		ND<0.15	0.50	20	30
B-3-15	TEC	(a) (b) (c) (d)	2001	15	0.39	3.5	38		ND<0.15	6.5	3.5	6.0	1.0	ND<0.10	0.27	5.5		ND<0.15	0.36	14	16
B-3-20	TEC	(a) (b) (c) (d)	2001	20	0.43	5.5	50		ND<0.15	10	5.5	10	1.5	ND<0.10	ND<0.25	8.0		ND<0.15	0.50	22	26
B-3-25	TEC	(a) (b) (c) (d)	2001	25	0.26	5.0	29		ND<0.15	9.5	4.5	3.5	1.0	ND<0.10	0.50	6.0		ND<0.15	0.50	16	25
B-3-33	TEC	(a) (b) (c) (d)	2001	33	0.42	8.0	34		ND<0.15	8.0	5.0	5.0	0.50	ND<0.10	ND<0.25	5.5		ND<0.15	0.50	19	28
B-4-15	TEC	(a) (b) (c) (d)	2001	15	0.42	4.5	43		ND<0.15	9.0	4.5	7.0	3.0	ND<0.10	0.46	5.0		ND<0.15	0.50	18	21
B-4-20 B-4-25	TEC TEC	(a) (b) (c) (d)	2001 2001	20 25	0.34	3.5 4.0	33 36		ND<0.15 ND<0.15	6.0 7.0	2.5 3.5	5.5 3.0		ND<0.10 ND<0.10	0.29 ND<0.25	4.0 5.0		ND<0.15 ND<0.15		13 14	14
B-5-15	TEC	(a) (b) (c) (d) (a) (b) (c) (d)	2001	15	0.38 0.45	6.0	82		ND<0.15	10	6.0	3.0 11	2.0 1.5	ND<0.10		8.5		ND<0.15 ND<0.15	0.50 0.50	21	20 29
B-5-13	TEC	(a) (b) (c) (d)	2001	20	ND<0.25	3.0	20		ND<0.15	5.0	2.0	4.0		ND<0.10	0.30			ND<0.15	0.30	10	12
D 0-20	1120	(a) (b) (c) (d)	2001	20	טאין טאין	5.0	20	טו.טי שוון	טו.טי טוון	5.0	۷.٠	7.0	1.0	טו.טי טוון	0.00	5.5	110 10.20	טי טיון.ט	0.20	10	14

Table A-7 Summary of Analytical Results for Metals in Soil, East Parcel

Former ChemOil Refinery Signal Hill, California

											U	J.S. EPA I	Method 60	10B - Meta	als						
Sample ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
				feet bgs	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B-5-25	TEC	(a) (b) (c) (d)	2001	25	0.40	4.0	29	ND<0.15	ND<0.15	6.5	3.5	3.0	0.50	ND<0.10	0.38	4.5	ND<0.25	ND<0.15	0.41	14	20
B-6-15	TEC	(a) (b) (c) (d)	2001	15	0.31	6.0	40	ND<0.15	ND<0.15	8.5	5.0	12	8.0	ND<0.10	0.26	8.0	ND<0.25	ND<0.15	0.49	18	28
B-6-20	TEC	(a) (b) (c) (d)	2001	20	0.25	5.0	27	ND<0.15	ND<0.15	5.5	3.0	5.0	1.0	ND<0.10	ND<0.25	3.5	ND<0.25	ND<0.15	0.34	12	14
B-6-25	TEC	(a) (b) (c) (d)	2001	25	ND<0.25	3.0	23	ND<0.15	ND<0.15	7.0	2.0	3.5	1.5	ND<0.10	0.25	2.5	ND<0.25	ND<0.15	ND<0.25	9.5	12
B-7-15	TEC	(a) (b) (c) (d)	2001	15	0.46	7.5	61	ND<0.15	ND<0.15	11	6.5	15	2.5	0.12	0.40	10	ND<0.25	ND<0.15	0.50	24	32
B-7-20	TEC	(a) (b) (c) (d)	2001	20	0.50	6.5	62	ND<0.15	ND<0.15	12	6.5	13	3.0	ND<0.10	0.26	9.5	ND<0.25	ND<0.15	0.50	24	31
B-7-25	TEC	(a) (b) (c) (d)	2001	25	0.36	4.5	34	ND<0.15	ND<0.15	8.0	4.0	3.0	1.0	ND<0.10	0.30	55	ND<0.25	ND<0.15	0.47	15	20
B-8-15	TEC	(a) (b) (c) (d)	2001	15	0.50	7.5	62	ND<0.15	ND<0.15	12	7.5	14	2.0	ND<0.10	ND<0.25	11	ND<0.25	ND<0.15	1.0	26	37
B-8-20	TEC	(a) (b) (c) (d)	2001	20	0.50	4.5	29	ND<0.15	ND<0.15	5.0	2.5	4.0	1.0	ND<0.10	ND<0.25	3.5	ND<0.25	ND<0.15	ND<0.25	12	13
B-8-25	TEC	(a) (b) (c) (d)	2001	25	1.0	12	100	ND<0.15	ND<0.15	25	14	24	5.0	ND<0.10	0.37	20	ND<0.25	ND<0.15	1.5	32	62
B-9-15	TEC	(a) (b) (c) (d)	2001	15	0.50	7.0	66	ND<0.15	ND<0.15	10	6.0	10	2.0	ND<0.10	0.38	8.5	ND<0.25	ND<0.15	0.50	22	26
B-9-20	TEC	(a) (b) (c) (d)	2001	20	0.50	4.5	26	ND<0.15	ND<0.15	5.5	2.5	5.0	1.5	0.12	ND<0.25	3.5	ND<0.25	ND<0.15	0.31	12	14

Notes:

mg/kg = milligram per kilogram.

bgs = below ground surface.

U.S. EPA = United States Environmental Protection Agency.

ND = not detected.

ND< = less than analytical detection limit listed.

TEC = Testa Environmental Corporation

-- = sample not analyzed for compound.

Data qualifiers from TEC, 2001:

- (a) Sample date is unknown. The date listed is the date reported.
- (b) Table 5-2 in TEC, 2001 does not indicate the whether this is soil or groundwater data. The units listed on the table indicate this is groundwater data (milligrams per liter), but the report text indicates this table is soil data. The table is inferred to be soil data based on the report text and the units are assumed to be milligrams per kilogram.
- (c) The consultant is inferred from the report text and figures.
- (d) No analytical method is listed on Table 5-2 in TEC, 2001. The report text lists the analytical method for soil as U.S. EPA Method 6010B; therefore, it is assumed this is the correct listed method.

References:

TEC. 2001. Report on Additional Subsurface Assessment, Former Chemoil Refinery - Eastern Parcel, Signal Hill, California. December 14.

Table A-8
Summary of Soil Vapor Analytical Results - Volatile Organic Compounds, Northwest, Southwest and East Parcels
Former ChemOil Refinery

Signal Hill, California

						1	e.igi.i	ai mili, Calliornia	1	1		63		1		
Boring	Sample Date	Depth feet bgs	±g/m Benzene	تارکر چ Cyclohexane	Ethylbenzene	E 3/ 8 8. 4-Ethyltoluene ²	Heptane	n-Hexane	드 공을 Se Methyl tert-Butyl Ether	¤, By Se Naphthalene	Toluene	E 3, 1,2,4-Trimethylbenzene	ਨੂੰ 3 3 1,3,5-Trimethylbenzene	m,p-Xylenes	a/B o-Xylene	Xylenes مراهم
	fic, Risk-Based Sci Soil Vapor Comme		909	60,703,429	12,565	3,089,871	7,513,217	7,513,217	113,307	1,006	3,089,871	85,410	429,320	1,122,976	1,116,790	1,116,790
	Con rapor Commo	11041/11144041141	L	l			NORT	HWEST PARCEL	•							
AN-04	1/17/2017	5	194,875.66	2,478,331.29	208,431.90	103,239.26	819,713.70	458,216.77	<43,263.80	<62,905.52	<45,222.09	167,149.28	93,399.18	955,312.88	191,062.58	1,146,375.46
AN-06	1/17/2017	5	271,548.06	2,099,697.34	28,255.15	<29,496.93	393,462.58	634,453.99	<21,631.90	<31,452.76	<22,611.04	<29,496.93	<29,494.48	<52,107.98	<26,053.99	<78,161.97
AN-07	1/17/2017	5	<6.39	<6.88	<8.68	<9.83	<8.20	<7.05	<7.21	<10.48	<7.54	<9.83	<9.83	<17.37	<8.68	<26.05
	1/17/2017	5	<6.39	<6.88	<8.68	<9.83	<8.20	<7.05	<7.21	<10.48	<7.54	<9.83	<9.83	<17.37	<8.68	<26.05
AN-08	1/17/2017	5 (DUP)	<6.39	<6.88	<8.68	<9.83	<8.20	<7.05	<7.21	<10.48	<7.54	<9.83	<9.83	<17.37	<8.68	<26.05
SB1	5/30/2006	5	<820		2,100				<820		<820	4,300	<1,230	<1,640	<800	<2,460
281	5/30/2006	15	24,000		26,900				<800		<800	4,380	<1,200	10,800	<800	10,800
SB2	5/30/2006	5	242,000		15,200				<820		<820	<1,230	<1,230	<1,640	<820	<2,460
362	5/30/2006	19.5	230,000		108,000				<800		<800	<1,200	<1,200	<1,600	<800	<2,400
SB4	5/30/2006	5	10,100		6,810				1,680		<800	10,300	5,490	9,040	<800	9,040
ODT	5/30/2006	16.5	802,000		159,000				<800		70,800	7,770	5,830	221,000	41,100	262,100
							SOUT	HWEST PARCEL								
	5/18/2006	15	3,400		31,900				<800		<800	2,490	1,720	<1,600	<800	<2,400
SB3	5/18/2006 5/18/2006	15	2,500		22,300 48,400				<800 <800		<800 <820	3,460 3,500	3,370 3.070	<1,600 <1,600	<800 <800	<2,400 <2,400
১০১	5/30/2006	15 5	2,940 12,100		48,400 25,600				<800 <820		<820 <820	3,500 <1,230	3,070 <1,230	<1,600	<800 <800	<2,400
	5/30/2006	15	7.140		60,600				<800		<800	<1.200	<1.200	<1.600	<800	<2,400
	5,55,2550		.,					AST PARCEL				.,=00	.,200	.,000		
E1	6/2/2006	15	<796		10,800				<796		<796	<1,194	<1,194	<1,592	<796	<2,388
<u> </u>	•	•	•	•	•							•		•		

Notes:

VOCs measured by EPA Method TO-15.

μg/m³ = microgram per cubic meter.

DTSC SL= Department of Toxic Substances Control Screening Level (DTSC, 2016).

USEPA RSL= U.S. Environmental Protection Agency Regional Screening Level (USEPA, 2016).

<X.XX = Not detected at or above the indicated laboratory reporting limit.</p>

NV = No published value.

ND = Not detected at laboratory reporting limit. See Tetra Tech, 2006 for laboratory reporting limit.

- = Not analyzed.

DUP = Duplicate sample.

Bold values were reported above laboratory detection limits.

Shaded and bold value exceeds Table 4-2: Summary of Soil Vapor Screening Levels - Site-Specific, Risk-Based Screening Levels - Commercial/Industrial Scenario (Apex-SGI, 2017).

The Source Group, Inc., a division of Apex Companies, LLC (Apex-SGI). 2017. Response Plan and Remedial Technology Evaluation, Former Chemoil Refinery, Signal Hill, California. June.

Tetra Tech. 2006. Environmental Due Diligence Site Assessment Results, Former Chemoil Refinery Property, Signal Hill, California. August 8.

¹ Final Screening Level, Soil Vapor Commercial/Industrial is from Table 4-2: Summary of Soil Vapor Screening Levels, Site-Specific, Risk-Based Screening Levels - Commercial/Industrial Scenario (Apex-SGI, 2017) References:

Table A-12

Summary of Analytical Results for Volatile Organic Compounds (VOCs) in Groundwater, East Parcel

Former ChemOil Refinery Signal Hill, California

			U.S. Method	EPA 1 8015B	U.S. EPA Method 8020B							U.S EPA N	lethod 826	0B - VOCs						
Sample ID	Consultant	Sample Date	бНЬТ mg/L	РНД mg/L	효 을 Bis (2-chloroethyl) ether	ے ک اے کا	க் rert-Butyl Alcohol	ਜੂ n-Butylbenzene	த் sec-Butylbenzene	ட் cis-1,2-Dichloroethene	க் Fthylbenzene	ട്ട് Isopropylbenzene	ਨੂੰ 4-Isopropyltoluene	ත් ඛුර් T	മ് n-Propylbenzene	д Toluene	മ് 1,2,4-Trimethylbenzene	ਛੂ 1,3,5-Trimethylbenzene	m,p-Xylene	o-Xylene تا
MW-2	AA&AI	12/9/2012	ND<0.05	0.48	ND<10	ND<0.5	ND<10	ND<0.50	ND<0.50	ND<1	ND<0.5	ND<0.50	ND<0.50	ND<1	ND<0.50	ND<0.5	ND<1	ND<1	ND<1.0	ND<0.50
MW-2	AA&AI	12/27/2013	ND<0.05	ND<0.5	ND<10	ND<0.5	ND<10	ND<1	ND<1	ND<1	ND<1	ND<1		ND<3	ND<1	ND<0.5	ND<1	ND<1		
MW-2	AA&AI	12/7/2014	ND<0.05	ND<0.5	ND<10	ND<0.5	ND<10	ND<1	ND<1	ND<1	ND<1	ND<1		ND<3	ND<1	ND<0.5	ND<1	ND<1		
MW-2	AA&AI	12/10/2015	ND<0.05	ND<0.5	ND<10	ND<0.5	ND<10	ND<1	ND<1	ND<1	ND<1	ND<1		ND<3	ND<1	ND<0.5	ND<1	ND<1		
	AA&AI	12/9/2012	0.080	2.5	ND<10	ND<0.5	220	ND<0.50	ND<0.50	ND<1	ND<0.5	0.71	ND<0.50	1.3	0.51	ND<0.5	ND<1	ND<1	ND<1.0	0.65
MW-10	AA&AI	12/27/2013	ND<0.05	ND<0.5	ND<10	ND<0.5	130	ND<1	ND<1	ND<1	ND<1	ND<1		ND<3	ND<1	ND<0.5	ND<1	ND<1		
MW-10	AA&AI		ND<0.050	ND<0.5	ND<10	ND<0.5	ND<10	ND<1	ND<1	ND<1	ND<1	ND<1		ND<3	ND<1	ND<0.5	ND<1	ND<1	-	
MW-10	AA&AI		ND<0.050	0.911	ND<10	ND<0.5	ND<10	ND<1	ND<1	ND<1	ND<1	ND<1	 ND 40 50	ND<3	ND<1	ND<0.5	ND<1	ND<1	 ND 44.0	 ND 40 50
	AA&AI	12/15/2016	0.079 ND<0.20	1.03	ND<9.5 1.500	ND<0.50 ND<5.0	15	ND<1.0	ND<1.0		ND<0.50	0.65	ND<0.50	1.5 ND<5.0	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	ND<0.50
B-1 B-2	TEC TEC	2001 2001	ND<0.20		ND<110	ND<5.0		ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	ND<5.0 ND<5.0	2.1 ND<5.0
B-2 B-3	TEC	2001	ND<0.20		ND<110 ND<110	ND<5.0	<u></u>	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
B-3 B-4	TEC	2001	ND<0.20		100	ND<5.0		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	3.0
B-5	TEC	2001	ND<0.20		ND<110	ND<5.0		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
B-6	TEC	2001	ND<0.20		ND<110	ND<5.0		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
B-7	TEC	2001	ND<0.20		ND<11	ND<5.0		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
B-8	TEC	2001	ND<0.20		ND<11	ND<5.0		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
B-9	TEC	2001	ND<0.20		ND<11	ND<5.0		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
E1A	Tetra Tech	6/1/2006				ND<0.5		ND<0.5	1.6	ND<0.5	ND<0.5	8.7		11.6	9.6	ND<0.5	ND<0.5	ND<0.5	ND<1.0	ND<0.5
E1A	Tetra Tech	6/1/2006				ND<0.5		ND<0.5	1.7	ND<0.5	ND<0.5	13.3		64.7	13.2	ND<0.5	ND<0.5	ND<0.5	ND<1.0	ND<0.5
E5	Tetra Tech	6/1/2006				ND<0.5		ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<1.0	ND<0.5

Notes:

mg/L = milligram per liter.

 μ g/L = microgram per liter.

U.S. EPA = United States Environmental Protection Agency.

TPHg = total petroleum hydrocarbons as gasoline.

TPHd - total petroleum hydrocarbons as diesel.

VOCs = volatile organic compounds.

ND = not detected.

ND< = less than the laboratory reporting limit in data from Tetra Tech, 2006 samples or analytical detection limit in data from TEC, 2001.

AA&AI = Ami Amini & Adini, Inc.

TEC = Testa Environmental Corporation.

Data qualifiers from TEC, 2001:

- B-1 through B-9 are reported in TEC, 2001.
- (a) Sample date is unknown. The date listed is the date reported.
- (b) The consultant is unknown. Data collected for borings B-1 through B-9 are assumed to be collected by TEC, 2001, as it is stated in the report

text 9 borings were installed as part of their investigation with the same naming convention.

(c) The sample depth is unknown.

References:

AA&AI. 2017. Groundwater Monitoring Report – Fourth Quarter 2016, Former Chemoil Refinery, 2020 Walnut Avenue, Signal Hill, California. January 15.

AA&AI. 2016. Groundwater Monitoring Report – Fourth Quarter 2015, Former Chemoil Refinery, 2020 Walnut Avenue, Signal Hill, California. January 15.

AA&AI. 2015. Groundwater Monitoring Report – Fourth Quarter 2014, Former Chemoil Refinery, 2020 Walnut Avenue, Signal Hill, California. January 15.

AA&AI. 2014. Groundwater Monitoring Report – Fourth Quarter 2013, Former Chemoil Refinery, 2020 Walnut Avenue, Signal Hill, California. January 15. TEC. 2013. Report on Groundwater Quality Monitoring Program January 2013, Former Chemoil Refinery, Slic No. 453A, Signal Hill, California. January 15.

TEC. 2001. Report on Additional Subsurface Assessment, Former Chemoil Refinery - Eastern Parcel, Signal Hill, California. December 14.

Tetra Tech. 2006. Environmental Due Diligence Site Assessment Results, Former Chemoil Refinery Property, Signal Hill, California. August 8.

APPENDIX B OEHHA January 21, 2011

ABL

Office of Environmental Health Hazard Assessment

Linda S. Adams Acting Secretary for

Environmental Protection

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Edmund G. Brown Jr. Governor

MEMORANDUM

TO:

Ms. Ann Lin, PE

Site Cleanup Program IV

California Regional Water Quality Control Board Los Angeles Region

320 West 4th Street, Suite 200

Los Angeles, CA 90013

FROM:

Hristo Hristov, M.D., Ph.D., M.Env.Sc.

Integrated Risk Assessment Branch

Office of Environmental Health Hazard Assessment

DATE:

January 21, 2011

SUBJECT: Review of "Updated Soil Vapor Intrusion Evaluation for Southern Payment Former Champil Refinery Signal Hill Colifornia"

Boundary, Former Chemoil Refinery, Signal Hill, California"

SWRCB # R4-10-34

OEHHA # 880247-01

Document Reviewed

Per your request, I reviewed the "Updated Soil Vapor Intrusion Evaluation for Southern Boundary, Former Chemoil Refinery, Signal Hill, California", prepared by Exponent, and dated May 5, 2010.

(Italicized text is quoted from the request or from the documents provided for review.)

Scope of the Review

I reviewed the document for scientific and regulatory issues related to the assessment of human health risk due to indoor inhalation of vapors migrating from subsurface into residences located south of the former Chemoil Refinery site.

Limitations

OEHHA was not involved in the Former Chemoil Refinery on- and off-site characterization. I assumed that the provided soil gas data accurately represent the contamination under the houses located beyond the southern site boundary.

California Environmental Protection Agency

Mr. Ann Linn January 21, 2011 Page 2

This health risk assessment is limited to the indoor inhalation of vapors pathway.

My review was limited to the content of the report. The report (p.1) states "however, health risks associated with potential vapor intrusion into indoor air will be re-evaluated following completion of additional soil vapor and groundwater sampling scheduled for the first half of 2010." No such additional data were provided to me at the time of preparing this memorandum.

General Comments

- 1. Background Section provides information of the site use history and the land use of its surroundings. No other information is provided on the off-site area of interest at this study, except that it is located south of the site. Section Data Included in Evaluation states that "six sampling locations are located closer to the offsite residents than the previous locations south of the property." More detailed information about the houses being potentially impacted, and about the presence of natural or man-made preferential migration pathways would help determine the representativeness of the selected sampling locations, and decrease the potential for underestimation of the calculated risk and hazard results. Please note that according to section 5.4 of the "Report on Off Site Soil Gas Survey...April 15, 2010", "higher soil vapor concentrations at 5 ft bgs are indicative of a localized shallow soil source coincident with an unlined culvert that paralleled the southern boundary." I assumed that the collected samples were representative of the contamination under the impacted houses for the purpose of completing this review in a timely manner. The Los Angeles Regional Water Quality Control Board (LA RWQCB) should clarify the issue with the parties involved in this offsite contamination delineation.
- 2. This health risk assessment is based on:
 - 1. Soil gas data collected from 5 and 10 ft bgs at five locations, and from 5 ft bgs at one additional location.
 - 2. Groundwater data collected at five monitoring wells during the last four monitoring events.

The data are presented in a table format. No original laboratory reports were found in the documents available for review. I assumed that the data are consistent with the laboratory reports and representative of the groundwater contamination under the residences of interest. LA RWQCB may want to verify the presented data to the laboratory reports for consistency.

3. Chemicals of Potential Concern. Exponent screened out C₄-C₁₂ range total petroleum hydrocarbons (TPHs), 4-isopropyltoluene, and tert-butanol due to limited toxicity

information. In my modeling I used isopropylbenzene as a surrogate for 4-isopropyltoluene.

Subsurface to Indoor Air Migration, Cancer Risk and Non-cancer Hazard Modeling

- 4. Exponent modified the advanced US EPA soil gas and groundwater spreadsheets based on the Johnson and Ettinger (J&E) model. I updated the two original US EPA, 2004 spreadsheets with California EPA-specific toxicity information before performing modeling for the contaminants of interest.
- 5. According to p. 4, Exponent performed the modeling using default input assumptions, except for the soil gas and groundwater sampling depth, and the soil type. No information on the soil type and layer thickness ("based on the recommendation from Stephen Testa, P. A-1") was presented in the reviewed reports. Please note that the soil type model parameters are among the most sensitive ones in the model. Exponent should have provided a table and discussion of the selected soil parameters supported by boring logs and/or laboratory reports as a minimum. In their absence, I assumed that the soil parameters' values used as model inputs were representative of the soil under the buildings of interest. I used the same input parameter values as Exponent. LA RWQCB should verify the soil type and layer thickness and may require site-specific soil data to eliminate potential underestimation of the indoor air concentrations, risk and hazard results.

OEHHA's Modeling Results

Estimated Health Impact Due to Indoor Air Inhalation Resulting from Migration of Soil-Gas and Groundwater Contaminants

Exposure Medium	Maximum Soil-Gas Concentrations at	Maximum Soil-Gas Concentrations at	Maximum Groundwater
Health Impact	5 ft bgs	10 ft bgs	Concentrations
Excess Cancer Risk	4E-06 (1E-06)	2E-06 (5E-07)	5E-06
Non-cancer Hazard Index	9E-02 (1E-02)	7E-02* (1E-02)	2E-01*

Notes:

() Based on minimum detection limit.

Modeling results differing from the reported ones.

Exponent modeled chemicals present in groundwater but not detected in soil gas at half of their maximum and minimum soil gas detection limits. The recommended risk assessment approach under residential scenario considers the maximum detected concentration as exposure point concentration (EPC) to protect the most exposed individual(s). Therefore, half of the maximum detection limit should be considered as

Mr. Ann Linn January 21, 2011 Page 4

primary EPCs when estimating the risk and hazard. Half of the minimum detection limit may be used in the analysis of the uncertainty of the estimated risk and hazard.

My risk and hazard results replicated Exponent's results except for the soil gas hazard index at 10 ft bgs (7E-02 vs. Exponent's 6E-02 based on incorrect half of detection limits for 1,2,4-trimethylbenzene and m,p-xylenes), and the hazard index estimated from maximum groundwater concentrations (2E-01 vs. Exponent 's 8E-01 based on cumene). These small differences do not change the significance of the estimated hazard index which is less than unity, above which would raise a concern. Using isopropylbenzene (cumene) as a surrogate for 4-isopropyltoluene resulted in insignificant hazard quotient when estimated from soil-gas at 5 ft bgs and 10 ft bgs, and from groundwater. The C₄-C₁₂ range total petroleum hydrocarbons (TPHs), and tert-butanol excluded from the risk assessment due to lack of toxicity criteria are expected to result in some non-cancer hazard underestimation. This underestimation may be considered in a qualitative way while discussing your risk management decision(s).

The analysis of the estimated cancer risk should be performed recognizing that the acceptability of any risk level above 1E-06 (under residential scenario) is a risk management decision. I agree with the points made by Exponent regarding the level of risk estimated from soil gas versus the risk estimated from groundwater at the sampled locations. However, I have to point out that some contaminants were identified in the groundwater and soil gas (and may be assumed to originate from the groundwater coming from the site), while others were only identified in soil gas or groundwater. While the chemicals identified in groundwater only may not be migrating to the sampling depths, the chemicals in soil-gas only may be migrating through preferential pathway(s) or may be due to a different source(s). To elaborate on this, I compared the contaminants identified in soil gas and groundwater near the residences beyond the southern site boundary shown in Table 3 of the report to the contaminants identified at the southern site boundary shown in Table 7-2a of the "Report on Off Site Soil Gas Survey, Former Chemoil Refinery..., dated April 15, 2010". Acetone, 2-butanone, chlorobenzene, 4-methyl-2-pentanone, and 1,1,1-trichloroethane were not detected in groundwater or in the soil gas at the southern site boundary but were detected in the soil gas at the residences. Additional sampling may be needed to determine the source(s) of contamination and all impacted residences located beyond the southern site boundary.

Conclusions

I concur with Exponent that the indoor air contaminant concentrations estimated from soil gas and groundwater are not likely to be of concern. However, this conclusion is based on the assumptions regarding the groundwater data, soil properties, and layer thickness described above. Also, the conclusion is limited to the data set used in the risk and hazard estimation. That dataset may not be representative of all impacted

Mr. Ann Linn January 21, 2011 Page 5

houses, and /or may not account for preferential pathway(s) and different on- or off-site sources of contamination.

Additional sampling may be needed to identify the source(s) of contamination, and all impacted residences located beyond the southern site boundary.

Please do not hesitate to contact me at (916) 322-8364 or by e-mail at hhristov@oehha.ca.gov, if you have any questions related to this review.

Reviewed by:

David Siegel, Ph.D., DABT

Section Chief

Integrated Risk Assessment Branch

References

US EPA, 2004 Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings v.3.1, Waste and Cleanup Risk Assessment, US Environmental Protection Agency, February 2004

http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm

APPENDIX C

ToxStrategies October 8, 2012



Innovative solutions Sound science

October 8, 2012

Mr. Louis Johnston Managing Director Signal Hill Holding Company 1900 South Norfolk Street, Suite 350 San Mateo, CA 94404

SUBJECT: Second Update to Vapor Intrusion Evaluation for Southern Boundary Former Chemoil Refinery, Signal Hill, California

Dear Mr. Johnston:

This letter report presents the results of a second update to an evaluation of potential health risks to offsite residents living south or southwest of the former Chemoil Refinery, located in Signal Hill, California (see Figure 1 in Attachment A), associated with potential intrusion of volatile chemicals in soil vapor and groundwater into indoor air. Results of an initial soil vapor intrusion evaluation were reported in a letter dated November 23, 2009 (Exponent 2009), and results of an updated evaluation were reported in a letter dated May 5, 2010 (Exponent 2010). Both evaluations concluded that potential soil vapor intrusion is not likely to be of concern for current off-site residents living south or southwest of the property, pending collection of additional soil vapor and groundwater samples. The Office of Human Health and Environmental Assessment (OEHHA) of the California Environmental Protection Agency (Cal-EPA) reviewed the May 5, 2010, evaluation and generally concurred with this conclusion, also pending collection of additional samples and resolution of several comments (Cal-EPA 2010).³ A comprehensive soil vapor and groundwater investigation was conducted earlier this year, and the results from that investigation have been incorporated into this second updated evaluation. As discussed further below, the results of this updated evaluation indicate that potential soil vapor intrusion should not be of concern for current or future residents living south or southwest of the property.

Exponent. 2009. Letter to Mr. Stephen Testa, Testa Environmental Corporation, from Mr. Gregory P. Brorby, re: Initial soil vapor intrusion evaluation, former Chemoil refinery, Signal Hill, California. November 23.

² Exponent. 2010. Letter to Mr. Stephen Testa, Testa Environmental Corporation, from Mr. Gregory P. Brorby, re: Updated soil vapor intrusion evaluation for southern boundary, former Chemoil refinery, Signal Hill, California. May 5.

³ Cal-EPA. 2011. Memorandum to Ms. Ann Lin, California Regional Water Quality Control Board Los Angeles Region, from Dr. Hristo Hristov, re: Review of "Updated soil vapor intrusion evaluation for southern boundary, former Chemoil refinery, Signal Hill, California." California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. January 21.

Background

Based on information provided in the "Report of Phase III Additional Site Characterization," which was conducted by Testa Environmental Corporation (TEC) on behalf of the current property owner, Signal Hill Holding Company (TEC 2011), ⁴ the site was used as a dairy farm prior to 1922, and was operated as a refinery from 1922 until early 1994. From 1994 to 1997, there was limited operation of the wastewater treatment facility, after which all aboveground structures were dismantled. The site is currently vacant (TEC 2011).

The site is divided into the Western Parcel, which is situated immediately west of Walnut Avenue, and the Eastern Parcel, which is situated east of Walnut Avenue (TEC, 2011; see Figure 1 in Attachment A). Groundwater flow beneath the site is generally toward the south and southeast (TEC 2011). With regard to current offsite land use, commercial/industrial developments are located to the north, east, and west of the site, an elementary school is also located north of the site, beyond the commercial/industrial area, and a residential development is located south and southwest of the site. A visual survey of the residential area indicates that some homes are built "slab on grade" whereas others are built over a crawl space.⁵

This second updated evaluation is confined to receptors in the residential development south and southwest of the site, because additional soil vapor and groundwater samples have been obtained within this area since the May 2010 letter report (Exponent 2010). The purpose of this updated evaluation is to assess the potential for vapor intrusion into indoor air associated with the presence of volatile chemicals dissolved in groundwater potentially migrating from the site toward this residential area.

Data Included in Evaluation

Soil vapor samples were collected at six locations south and southwest of the Western Parcel (SGP-WD-01 through SGP-WD-06) by TEC in March 2010 (see Figure 2 in Attachment A) (TEC 2011). Soil vapor samples were collected from 5 and 10 ft below ground surface (bgs) at each location—except for SGP-WD-1, where a 10-ft sample was not collected due to the shallow water table. Samples were analyzed for volatile organic compounds (VOCs) by EPA Method 8260B. In addition, duplicate soil vapor samples were collected from two locations (SGP-WD-2 from 5 ft bgs and SGP-WD-4 from10 ft bgs) and analyzed by EPA Method TO-15 (TEC 2011). These soil vapor data were the basis for the May 2010 evaluation and are presented in Table 1. Soil vapor samples were collected at ten additional locations south, southwest, and west of the Western Parcel (GW/SV-20 through GW/SV-29) by Geosyntec Consultants (Geosyntec) in May and June 2012 (see Figure 2 in Attachment A) to provide more widespread coverage of the residential area (Geosyntec 2012). Soil vapor samples were collected from 5 and 10 ft

⁴ TEC. 2011. Report on phase III additional site characterization, former Chemoil Refinery, SLIC No. 453A, Signal Hill, California. Testa Environmental Corporation. June 30.

⁵ Personal communication, Tom Graf, GrafCon, September 11, 2012.

⁶ Geosyntec. 2012. Additional off-site environmental investigation report, former Chemoil refinery, Signal Hill, California. Geosyntec Consultants. July 11.

bgs at each location, and analyzed for VOCs by EPA Method TO-15 (Geosyntec 2012). These soil vapor data are also presented in Table 1.

Because the 2012 sampling locations were not intended to replace the data collected in 2010, data from both investigations are included in this second updated evaluation. Data from 5 ft and 10 ft bgs were evaluated separately. In total, the data from these 16 locations are considered sufficiently representative of soil vapor conditions that potentially exist beneath residences south and southwest of the Western Parcel.

It should be noted that soil vapor samples collected by TEC in 2010 were also analyzed for total petroleum hydrocarbons (TPH) quantified as gasoline (TPHg; defined as C4-C12 hydrocarbons) by the California Leaking Underground Fuel Tank (LUFT) manual method (gas chromatography/mass spectrometry) (TEC 2011). Such measurements represent mixtures of chemicals that, because of their highly variable composition, do not have descriptive health criteria. Therefore, the toxicity of these mixtures is best described by the aggregate toxicity of key individual chemicals in the mixture, as quantified by EPA Method 8260B or TO-15. However, it is worthwhile to note that relatively high concentrations of C4–C12 hydrocarbons were detected in samples collected from SGP-WD-3 from 5 ft and 10 ft bgs and from SGP-WD-4 from 10 ft bgs. The presence of high concentrations of C4–C12 hydrocarbons in these samples may indicate an offsite source, especially because these samples were taken at locations that are separated from the site by an unlined drainage culvert, which would prevent lateral migration of soil vapor. Further, these high concentrations mean that the samples had to be diluted prior to analysis, resulting in elevated detection limits (by an order of magnitude) for these samples. A few soil vapor samples collected by Geosyntec in 2012 also had to be diluted, thus resulting in elevated detection limits in these samples (Geosyntec 2012).

At present, groundwater samples are collected from a total of 16 groundwater monitoring wells (MW-1, MW-1A, MW-3, and MW-8 through MW-19) (see Figure 2 in Attachment A) and are analyzed for VOCs by EPA Method 8260B, and semivolatile organic compounds (SVOCs) by EPA Method 8270C (TEC 2012).⁷ Of these groundwater monitoring wells, MW-1 and MW-13 through MW-19 are closest to the southern property boundary and/or located south, southwest, or west of the Western Parcel. For the purposes of this evaluation, data from these monitoring wells from the previous four quarters (third and fourth quarters 2011 and first and second quarters 2012) were included.⁸ These data are presented in Table 2. In addition, Geosyntec collected grab groundwater samples from 10 additional locations south, southwest, and west of the Western Parcel (GW/SV-20 through GW/SV-29) in May and June 2012 (see Figure 2 of Attachment A) (Geosyntec 2012). These samples were analyzed for VOCs by EPA Method 8260B, and the results are also presented in Table 2.

⁷ TEC. 2012. Report on quarterly groundwater quality monitoring program June 2012, Former Chemoil refinery, SLIC No. 453A, Signal Hill, California. Testa Environmental Corporation. July 15.

⁸ Groundwater data from the third and fourth quarters of 2011 and the first quarter of 2012 were downloaded from Geotracker; data from the second quarter of 2012 were taken from the quarterly groundwater monitoring report (TEC 2012).

Chemicals of Potential Concern

All chemicals detected in soil vapor and groundwater were selected as chemicals of potential concern (COPCs), except as noted below. In addition, if a chemical was not detected in soil vapor, but was detected in groundwater south, southwest, or west of the Western Parcel, then that chemical was also identified as a COPC in soil vapor. For example, n-butylbenzene was not detected in any soil vapor sample, but was detected at very low concentrations in groundwater collected from monitoring well MW-16. Therefore, n-butylbenzene was conservatively identified as a COPC in soil vapor.

Two chemicals detected in soil vapor were not identified as COPCs, i.e., ethanol and 4-ethyltoluene. Ethanol was detected in three soil vapor samples at a maximum concentration of 60 micrograms per cubic meter ($\mu g/m^3$) and 4-ethyltoluene was detected in a single soil vapor sample at a concentration of 4.2 $\mu g/m^3$. Toxicity criteria have not been developed for these chemicals by regulatory agencies; however, the detection of ethanol and 4-ethyltoluene in a small number of soil vapor samples at low concentrations is not expected to pose a potential risk from vapor intrusion.

Exposure Point Concentrations

For detected chemicals in soil vapor or groundwater, the maximum detected concentration was used as the exposure-point concentration (EPC), regardless of whether the maximum concentrations were detected in the same sample. For chemicals that were not detected in soil vapor at one or both sampling depths, one-half the limit of detection was used as the EPC. It should be noted, however, that the detection limits reported by the laboratory varied for several reasons. First, samples were analyzed by different methods, collected at different time periods and submitted to different analytical laboratories. Additionally, a few samples had to be diluted prior to analysis, thus resulting in elevated detection limits in those samples, in some cases by an order of magnitude or more. Therefore, depending on data from groundwater or other soil vapor samples, the detection limit upon which the EPC was based was selected according to one of three methods as described below.

• Method 1: Naphthalene is an example of a chemical that was not detected in any soil vapor sample, but has been detected in groundwater samples from several monitoring wells over the past four quarters. The detection limits for naphthalene in soil vapor range from <26 to <32 micrograms per cubic meter (μg/m³) in undiluted samples and from <53 to <2600 μg/m³ in diluted samples. For purposes of this assessment, one-half the maximum detection limit from undiluted samples (<32 μg/m³) was used as the EPC because soil vapor samples collected from locations in the vicinity of monitoring wells near the site boundaries in which naphthalene has been detected in contemporaneous groundwater samples (e.g., MW-13 and SGP-4 and SGP-5; MW-12 and GDY-2; MW-1A and GDY-1)⁹ were

⁹ Soil vapor sampling locations SGP-4, SGP-5, GDY-1, and GDY-2 are located onsite and are, therefore, not included in Table 1 of this report. These data were summarized in the initial vapor intrusion evaluation (Exponent 2009) and are reproduced in Attachment C of this second updated evaluation report.

not diluted. The same approach was applied to n-butylbenzene, tert-butylbenzene, n-propylbenzene, 1,1,2,2-tetrachloroethane, and 1,1,2-trichloroethane.

- Method 2: Bromodichlormethane is an example of a chemical that was detected in only soil vapor samples collected at a single depth, in this case, two samples from 5 ft bgs. Because the maximum detected concentration was in an undiluted sample, one-half the maximum detection limit from undiluted samples collected at the other sampling depth (10 ft bgs) was used as the EPC for this depth. This approach was also applied to chloromethane, dibromochloromethane, methyl t-butyl ether, 4-methyl-2-pentanone, 1,2,4-trimethylbenzene, 1,3,5-trimethyl benzene, vinyl chloride, and m,p-xylenes.
- Method 3: Sec-butylbenzene is another example of a chemical that was detected in only soil vapor samples collected at a single depth (i.e., two samples from 10 ft bgs); however, because the maximum detected concentration was in a diluted sample, one-half the maximum detection limit from diluted samples collected at the other depth (5 ft bgs) was used as the EPC for this depth. The same approach was applied to tert-butyl alcohol (TBA) and isopropylbenzene.

The soil vapor EPCs are presented in Table 3.

Risk Calculations

Evaluating potential exposure to COPCs in soil vapor or groundwater via inhalation of vapors in indoor air requires estimating vapor emissions and resulting indoor air concentrations. The Johnson and Ettinger model (J&E Model; Johnson and Ettinger 1991)¹⁰ was used as prescribed by Cal-EPA guidance for evaluating vapor intrusion (Cal-EPA 2011a).¹¹ This model, which provides an estimated attenuation factor that relates vapor concentration in the indoor space to the vapor concentration in the subsurface, has been parameterized by the U.S. Environmental Protection Agency (EPA) (EPA 2004)¹² and was modified to reflect Cal-EPA-specific toxicity criteria, as appropriate (Cal-EPA 2011b).¹³ The toxicity criteria for the COPCs are presented in Table 4. It should be noted that one COPC, i.e., tert-butyl alcohol (TBA), was not included in the EPA or Cal-EPA J&E model spreadsheets. For purposes of this assessment, the chemical physical constants for TBA were taken from the New Jersey Department of Environmental Protection (NJDEP) J&E model spreadsheets (NJDEP 2006),¹⁴ and the toxicity criterion

Cal-EPA. 2011a. Guidance for the evaluation of subsurface vapor intrusion to indoor air (Vapor intrusion guidance). Final. California Environmental Protection Agency, Department of Toxic Substances Control, Sacramento, CA. October.

Cal-EPA. 20011b. Screening model spreadsheets. California Environmental Protection Agency, Department of Toxic Substances Control. http://www.dtsc.ca.gov/AssessingRisk/JE Models.cfm.

Johnson, P.C., and R.A. Ettinger. 1991. Heuristic model for predicting the intrusion rate of contaminant vapors in buildings. Environ. Sci. Technol. 25:1445–1452.

U.S. EPA. 2004. User's guide for evaluating subsurface vapor intrusion into buildings. U.S.
 Environmental Protection Agency, Office of Emergency and Remedial Response, Toxics Integration
 Branch, Washington, DC. Revised February 22.

NJDEP. 2006. New Jersey Johnson & Ettinger spreadsheets. New Jersey Department of Environmental Protection. http://www.state.nj.us/dep/srp/guidance/vaporintrusion/njje.htm.

for sec-butyl alcohol was used as a surrogate based on guidance from the Nevada Division of Environmental Protection (NDEP 2012). Default model input assumptions were used for the majority of the model parameters; however, site-specific information was used for some parameters (e.g., soil vapor and groundwater sampling depth and soil type). Model output sheets and additional information regarding site-specific parameter assumptions are included in Attachment B.

As previously noted, houses in the residential area south and southwest of the Western Parcel were observed to be built slab-on-grade or over crawl spaces. Although the J&E model is not designed to evaluate vapor intrusion into houses with crawl spaces (U.S. EPA 2004), per Cal-EPA guidance (Gallagher 2012), is site-specific attenuation factors predicted by the J&E Model for slab-on-grade homes can be applied to homes built over a crawl space.

Results

Potential noncancer risks are expressed in terms of a hazard index, and potential cancer risks are expressed in terms of a theoretical lifetime excess cancer risk. A hazard index less than 1 is generally considered acceptable by regulatory agencies. Theoretical lifetime excess cancer risks are generally compared to an acceptable risk range of 1×10^{-6} to 1×10^{-4} ; cancer risk estimates of less than 1×10^{-6} are considered to be so low as to warrant no further investigation or analysis. As stated previously, several chemicals that were not detected in the soil vapor samples were identified as COPCs in soil vapor because they were detected in groundwater. For these chemicals, a value of one-half the limit of detection was used as the EPC; otherwise, maximum detected concentrations in soil vapor or groundwater were used, regardless of whether the maximum concentrations were detected in the same sample.

The estimated noncancer hazard indexes associated with exposure to COPCs in indoor air due to chemicals in soil vapor and groundwater south, southwest, and west of the Western Parcel, assuming a residential exposure scenario, are summarized in Table 5. The total hazard index due to vapors in indoor air based on soil vapor data is 0.02 for samples collected from 5 or 10 ft bgs. The total hazard index due to exposure to vapors in indoor air based on groundwater data is 0.5. These values are below 1, indicating that potential exposure to COPCs in indoor air by residents located south or southwest of the Western Parcel poses a negligible noncancer health risk under the conditions evaluated.

The estimated excess cancer risks associated with exposure to COPCs in indoor air due to chemicals in soil vapor and groundwater south, southwest, and west of the Western Parcel, assuming a residential exposure scenario, are also summarized in Table 5. The

NDEP. 2012. User's guide and background technical document for the Nevada Division of Environmental Protection (NDEP) basic comparison levels for human health for the BMI complex and common areas. Nevada Division of Environmental Protection. Revision 8. May.

Gallagher, D. 2012. Electronic mail message to Mr. Robert Cheung, Geosyntec Consults, Inc. California Environmental Protection Agency, Department of Toxic Substances Control, Sacramento, CA. September 24.

total excess cancer risk due to vapors in indoor air based on soil vapor data is 2×10^{-6} for samples collected at 5 or 10 ft bgs. The total excess cancer risk due to vapors in indoor air based on groundwater data is 6×10^{-6} . These values are at the low end of the generally acceptable risk range. With regard to the results based on soil vapor, one of the primary contributors to the total estimated excess cancer risk is 1,1,2,2-tetrachloroethane. This chemical was not detected in any soil vapor sample collected south, southwest, or west of the Western Parcel and was detected at a very low concentration (2.2 micrograms per liter [µg/L]) in only one groundwater sample collected from within this area over the past four quarters (monitoring well MW-16 in February 2012), and was not detected in the sample collected from this location during the most recent quarterly groundwater monitoring event in June 2012. Furthermore, the estimated cancer risk for this chemical based on the maximum detected groundwater concentration is substantially lower than that based on one-half the limit of detection in soil vapor, indicating that a value of onehalf the limit of detection overstates the concentration of 1,1,2,2-trichloroethane in soil vapor, if it is present at all. If 1,1,2,2-tetrachloroethane is removed from the soil vapor calculations, the estimated excess cancer risk is 1×10^{-6} based on samples collected from 5 or 10 ft bgs, which is equal to the lower end of the risk range.

With regard to the results based on groundwater data, the largest contributors to the estimated excess cancer risk are benzene and naphthalene. Importantly, benzene was detected in only one sample collected from monitoring well MW-13 in September 2011. This monitoring well is actually located on the Western Parcel, along the southern boundary (see Figure 2). Benzene has not been detected in samples collected from this monitoring well since that time, nor has it been detected in any of the groundwater samples collected south, southwest, or west of the Western Parcel during the past four quarters or in the grab groundwater samples collected in May or June of 2012. Furthermore, naphthalene was not detected in any soil vapor sample, and the excess cancer risk estimates for both of these chemicals based on soil vapor data are substantially lower (and below 1×10^{-6}) than those based on groundwater data.

The difference between the estimated cancer risk based on soil vapor data and that based on groundwater data is likely due to a number of factors, including (1) benzene and naphthalene are aromatic hydrocarbons that may be biodegrading in the vadose zone, and (2) there is greater uncertainty in the groundwater model relative to the soil vapor model, because the soil vapor concentration must be estimated from groundwater concentrations in the groundwater model, whereas measured soil vapor concentrations are used in the soil vapor model. During the most recent site investigation, Geosyntec analyzed soil vapor samples for fixed gases, including oxygen, carbon dioxide, and methane. Based on the distribution of these gases in relation to petroleum hydrocarbons in soil vapor, Geosyntec concluded that there is evidence of both aerobic and anaerobic biodegradation in the vadose zone (Geosyntec 2012). As such, the estimated excess cancer risks based on the maximum COPC concentrations in groundwater likely overstate the potential health risks to residents south or southwest of the Western Parcel under the conditions evaluated.

Supplemental Evaluation of Vapor Intrusion Pursuant to SWRCB Low- Threat Closure Policy

On May 1, 2012, the State Water Resources Control Board (SWRCB) adopted a Low-Threat Underground Storage Tank (UST) Case Closure Policy (the Policy), ¹⁷ which became effective on August 17, 2012. One of the components of the Policy is the evaluation of vapor intrusion of petroleum hydrocarbons into indoor air. The Policy identifies four potential exposure scenarios depending on site characteristics and identifies media-specific criteria that, if met, demonstrate that the site should be considered a low-threat for the vapor intrusion-to-indoor air pathway. Two of the four scenarios are applicable to this evaluation:

- Scenario 3 Dissolved Phase Benzene Concentrations in Groundwater, and
- Scenario 4 Direct Measurements of Soil Gas Concentrations.

Data necessary to evaluate these scenarios include benzene concentrations in groundwater and benzene, ethylbenzene, and naphthalene concentrations in soil vapor, which were described previously. In addition, data for TPH concentrations (sum of TPHg and TPH as diesel) in the upper 5 ft of soil and oxygen concentrations in soil vapor at 5 ft bgs are used to establish the presence of a "bioattenuation zone." The Policy defines a bioattenuation zone as "an area of soil with conditions that support biodegradation of petroleum hydrocarbon vapors" (SWRCB 2012a). Geosyntec collected these latter data as part of their recent investigation (Geosyntec 2012). As noted in their report, TPH concentrations were below 100 milligrams per kilogram (mg/kg) in soil samples collected from 1, 3, and 4.5 ft bgs, except in three 1-ft samples impacted by surficial spills unrelated to historical operations at the former Chemoil Refinery, and oxygen concentrations were greater than or equal to 4% in soil vapor samples collected from 5 ft bgs (Geosyntec 2012). These conditions have been shown to attenuate soil vapor concentrations between a soil vapor source at 5 ft bgs and the building foundation by at least a factor of 1000 (SWRCB 2012b). ¹⁸

For both scenarios, site data meet the media-specific criteria established in the Policy assuming TPH in the upper 5 ft of soil is <100 mg/kg and oxygen in soil gas at 5 ft is \geq 4%. Specifically, the maximum benzene concentration in groundwater of 17 µg/L is well below the 1000 µg/L criterion specified in Scenario 3. In addition, the maximum detected concentrations of benzene (71 µg/m³) and ethylbenzene (1000 µg/m³) in soil vapor are more than three orders of magnitude below the criteria specified in Scenario 4 (85,000 and 1,100,000 µg/m³, respectively). Naphthalene was not detected in any soil vapor samples; however, even the maximum detection limit in a diluted sample (2,600 µg/m³) is well below the criterion specified in Scenario 4 (93,000 µg/m³). Based on this evaluation, the residential area south and southwest of the former Chemoil Refinery

SWRCB. 2012a. State Water Resources Control Board Resolution No. 2012-0016, Approve a substitute environmental document and adopt a proposed water quality control policy for low-threat underground storage tank case closure. May 1.

SWRCB. 2012b. Technical justification for vapor intrusion media-specific criteria. State Water Resources Control Board. March 21.

would be considered a low-threat for the vapor intrusion-to-indoor air pathway under the Policy.

Uncertainty Analysis

Uncertainty is inherent in many aspects of the risk assessment process. As described above, assumptions were generally selected in a manner that purposely biases the process toward health protection. For example, chemicals detected in groundwater, but not detected in soil vapor, were nevertheless identified as COPCs in soil vapor. In addition, the maximum detected concentration in soil vapor or groundwater was used as the EPC, regardless of whether the maximum concentration was detected in the same sample. Furthermore, EPCs based on recently collected data were assumed to be representative of concentrations to which offsite residents would be exposed for 30 years despite the evidence of biodegradation in the vadose zone. In combination, these assumptions likely overestimate the potential health risks associated with vapor intrusion, likely to a significant degree. One assumption with the potential to underestimate potential health risks was the use of detection limits from undiluted samples as the basis for the EPCs for some non-detected chemicals in soil vapor despite higher detection limits in a few diluted samples. However, the potential underestimation associated with this approach is low relative to the aforementioned assumptions that overestimate potential health risks.

Summary and Conclusions

This letter report presents the results of an updated evaluation of potential health risks to offsite residents living south or southwest of the former Chemoil Refinery site. This updated evaluation includes soil vapor and groundwater data recently collected across the residential area (Geosyntec 2012), as well as previous soil vapor samples collected near the southern boundary of the Western Parcel by TEC in 2010 and groundwater samples collected during the previous four quarter from monitoring wells along the southern boundary and south, southwest, and west of the Western Parcel by TEC in 2011 and 2012. In total, these data are considered representative of soil vapor and groundwater conditions within this residential area. It is important to note that this evaluation is based on maximum detected concentrations, which are assumed to be representative of concentrations to which offsite residents would be exposed for 30 years. This latter assumption is particularly conservative, because aromatic hydrocarbons are known to biodegrade over time, and data collected by Geosyntec suggest that biodegradation is occurring in the vadose zone.

Indoor air concentrations resulting from potential intrusion of volatile chemicals in soil vapor or groundwater were estimated using the J&E Model. Estimated noncancer hazard indexes, assuming a residential scenario, were below levels generally considered acceptable by regulatory agencies under the conditions evaluated. The estimated excess cancer risks are in the lower end of the risk range based on maximum COPC concentrations and one-half the limits of detection in soil vapor, or based on maximum COPC concentrations in groundwater. One of the largest contributors to the estimated excess cancer risk based on soil vapor data is 1,1,2,2-tetrachloroethane; however, this chemical was not detected in any soil vapor sample and was included as a COPC only because it was detected at a very low concentration in a single groundwater sample. If

this chemical is eliminated from the evaluation, the estimated excess cancer risk based on soil vapor data is equal to the lower end of the risk range under the conditions evaluated. The estimated risks based on groundwater data are driven by naphthalene and benzene. Naphthalene was not detected in the soil vapor samples, and benzene, which was detected in only one sample collected from monitoring well MW-13 on the former Chemoil Refinery property, has not been subsequently detected in groundwater south, southwest, or west of the Western Parcel during the past four quarters, or in grab groundwater samples collected during the most recent off-site investigation. Estimated health risks based on groundwater data are likely more uncertain than those based on soil vapor data because of additional assumptions required in the model and potential biodegradation of the COPCs in the vadose zone. In summary, potential soil vapor intrusion is not likely to be of concern for current offsite residents south or southwest of the former Chemoil Refinery property under the conditions evaluated.

Please feel free to contact me at (510) 455-4769 (office), (707) 319-1741 (cell), or e-mail me at gbrorby@toxstrategies.com.

Sincerely,

Gregory P. Brorby, DABT Senior Managing Scientist

Attachments (3)

cc: Tom Graf, GrafCon

Ravi Arulanantham, Geosytec Consultants Robert Cheung, Geosyntec Consultants

Tables

Table 1. Analytical data for chemicals detected in soil vapor (uα/m³) using EPA Method TO-15 (unless otherwise noted)

									1					
	Sample				Bromo-		tert-Butyl							
	Depth	Sample			dichloro-		alcohol	n-Butyl-	sec-Butvl-	tert-Butyl-	Carbon	Chloro-		Chloro-
Sample Location	(ft bgs)	Date	Acetone	Benzene	methane	2-Butanone	(TBA)	benzene	benzene	benzene	Disulfide	benzene	Chloroform	methane
SGP-WD-1-5-1V*	5	3/29/10	<5000	<36	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-1-5-3V*	5	3/29/10	<5000	56	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-1-5-7V*	5	3/29/10	<5000	39	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-2-5*	5	3/29/10	<5000	47	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-2-5-Dup*	5	3/29/10	<5000	47	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-2-5	5	3/29/10	270	47	<38	52	NA	NA	NA	NA	<70	180	<27	<12
SGP-WD-2-10*	10	3/29/10	<5000	<36	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-3-5*	5	3/29/10	<50000	<360	<500	<5000	<5000	<500	<500	<500	<5000	<500	<500	<1000
SGP-WD-3-10*	10	3/29/10	<50000	<360	<500	<5000	<5000	<500	1500	<500	<5000	<500	<500	<1000
SGP-WD-4-5*	5	3/29/10	<5000	<36	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-4-10*	10	3/29/10	<50000	<360	<500	<5000	<5000	<500	510	<500	<5000	<500	<500	<1000
SGP-WD-4-10	10	3/29/10	<700	<230	<490	<650	NA	NA	NA	NA	<920	2500	<360	<150
SGP-WD-5-5*	5	3/29/10	<5000	39	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-5-10*	10	3/29/10	<5000	<36	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-6-5*	5	3/29/10	<5000	71	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
SGP-WD-6-10*	10	3/29/10	<5000	53	<50	<500	<500	<50	<50	<50	<500	<50	<50	<100
GW/SV-20-5	5	5/30/12	54	3.2	3.6	10	<6.1	NA	NA	NA	<6.2	<2.3	200	<1
GW/SV-20-10	10	5/30/12	6.9	<1.6	<3.4	4.9	<6.1	NA	NA	NA	<6.2	<2.3	220	<1
GW/SV-21-5	5	6/13/12	45	2.4	<3.4	8.7	<6.1	NA	NA	NA	<6.2	<2.3	6.3	<1.3
GW/SV-21-10	10	6/13/12	100	<3.3	<6.8	25	<12	NA	NA	NA	<13	<4.7	<5.0	<2.7
GW/SV-22-5	5	5/30/12	<220	<74	<150	<200	<280	NA	NA	NA	<290	<110	<110	<48
GW/SV-22-10	10	5/30/12	1,400	<160	<340	<440	1500	NA	NA	NA	<620	<230	<240	<100
GW/SV-22-10/Dup	10	5/30/12	1,800	<160	<340	<440	<610	NA	NA	NA	<620	<230	310	<100
GW/SV-23-5	5	6/13/12	38	<1.6	<3.4	9.1	<6.1	NA	NA	NA	<6.2	<2.3	<2.4	<1.3
GW/SV-23-10	10	6/13/12	100	34	<3.4	40	<6.1	NA	NA	NA	71	<2.3	<2.4	<1.3
GW/SV-23-10/Dup	10	6/13/12	95	11	<11	29	<19	NA	NA	NA	51	<7.3	<7.8	<4.2
GW/SV-24-5	5	6/13/12	13	<1.6	<3.4	<4.4	<6.1	NA	NA	NA	<6.2	<2.3	<2.4	<1.3
GW/SV-24-10	10	6/13/12	22	4.1	<3.4	9.3	<6.1	NA	NA	NA	<6.2	<2.3	17	<1.3
GW/SV-25-5	5	5/30/12	16	19	<3.4	18	<6.1	NA	NA	NA	<6.2	<2.3	3.5	<1
GW/SV-25-10	10	5/30/12	<4.8	1.9	<3.4	8.1	<6.1	NA	NA	NA	<6.2	<2.3	<2.4	<1
GW/SV-26-5	5	5/31/12	17	3.6	<3.4	<4.4	<6.1	NA	NA	NA	<6.2	<2.3	<2.4	<1
GW/SV-26-10	10	5/31/12	14	<1.6	<3.4	<4.4	<6.1	NA	NA	NA	<6.2	<2.3	<2.4	<1
GW/SV-27-5	5	5/31/12	45	9.3	<3.4	13	<6.1	NA	NA	NA	<6.2	<2.3	5.2	<1
GW/SV-27-10	10	5/31/12	21	2.8	<3.4	10	<6.1	NA	NA	NA	<6.2	<2.3	22	<1
GW/SV-28-5	5	5/31/12	25	3.9	7.5	6.9	<6.1	NA	NA	NA	<6.2	<2.3	12	<1
GW/SV-28-10	10	5/31/12	29	2.3	<3.4	8.3	<6.1	NA	NA	NA	<6.2	<2.3	11	<1
GW/SV-29-5	5	5/31/12	220	11	5.2	64	<6.1	NA	NA	NA	13	<2.3	14	1.2
GW/SV-29-10	10	5/31/12	15	<1.6	<3.4	6.2	<6.1	NA	NA	NA	<6.2	<2.3	<2.4	<1
Notes:														

Notes:

* = Analyzed by EPA Method 8260B

Abbreviations:

μg/m³ = micrograms per cubic meter

Dup = Duplicate sample

< indicates that the compound was not detected at or above the laboratory reporting limit shown.

Table 1. Cont.

Sample Location	Sample Depth (ft bgs)	Sample Date	Dibromo- chloro- methane	Dichloro- difluoro- methane	cis-1,2- Dichlor- ethane	Ethanol	Ethyl- benzene	4-Ethyl- toluene	Isopropyl- benzene	4-Methyl- 2-Pentanone	Methyl tert- butyl ether (MTBE)	Naphthalene		1,1,2,2- Tetrachloro- ethane
SGP-WD-1-5-1V*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-1-5-3V*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-1-5-7V*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-2-5*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-2-5-Dup*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-2-5	5	3/29/10	<48	<28	<22	NA	81	<28	NA	77	<81	NA	NA	<77
SGP-WD-2-10*	10	3/29/10	<50	<50	<50	NA	<50	NA	62	<500	150	<32	<50	<100
SGP-WD-3-5*	5	3/29/10	<500	<500	<500	NA	<500	NA	<500	<5000	<500	<320	<500	<1000
SGP-WD-3-10*	10	3/29/10	<500	<500	<500	NA	<500	NA	4900	<5000	<500	<320	<500	<1000
SGP-WD-4-5*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-4-10*	10	3/29/10	<500	<500	<500	NA	<500	NA	<500	<5000	<500	<320	<500	<1000
SGP-WD-4-10	10	3/29/10	<630	<360	<290	NA	<320	<360	NA	<900	<1100	NA	NA	<1000
SGP-WD-5-5*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-5-10*	10	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-6-5*	5	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
SGP-WD-6-10*	10	3/29/10	<50	<50	<50	NA	<50	NA	<50	<500	<50	<32	<50	<100
GW/SV-20-5	5	5/30/12	<4.3	2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-20-10	10	5/30/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-21-5	5	6/13/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-21-10	10	6/13/12	<8.7	<5.0	<4	60	<4.4	<5.0	NA	<13	<15	<53	NA	<14
GW/SV-22-5	5	5/30/12	<200	<110	<92	<440	<100	<110	NA	<280	<330	<1200	NA	<320
GW/SV-22-10	10	5/30/12	<430	<250	<200	<940	1000	<250	NA	<610	<720	<2600	NA	<690
GW/SV-22-10/Dup	10	5/30/12	<430	<250	<200	<940	970	<250	NA	<610	<720	<2600	NA	<690
GW/SV-23-5	5	6/13/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-23-10	10	6/13/12	<4.3	<2.5	<2	<9.4	3.8	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-23-10/Dup	10	6/13/12	<14	<7.9	<6.3	<30	<6.9	<7.8	NA	<20	<23	<83	NA	<22
GW/SV-24-5	5	6/13/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-24-10	10	6/13/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-25-5	5	5/30/12	<4.3	<2.5	<2	<9.4	11	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-25-10	10	5/30/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	9	<26	NA	<6.9
GW/SV-26-5	5	5/31/12	<4.3	<2.5	4.2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-26-10	10	5/31/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-27-5	5	5/31/12	<4.3	2.6	<2	<9.4	3.3	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-27-10	10	5/31/12	<4.3	<2.5	3.3	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-28-5	5	5/31/12	<4.3	<2.5	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-28-10	10	5/31/12	<4.3	<2.5	<2	12	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9
GW/SV-29-5	5	5/31/12	4.8	3.3	<2	13	2.8	4.2	NA	8.4	<7.2	<26	NA	<6.9
GW/SV-29-10	10	5/31/12	<4.3	2.9	<2	<9.4	<2.2	<2.5	NA	<6.1	<7.2	<26	NA	<6.9

Notes:

* = Analyzed by EPA Method 8260B

Abbreviations:

μg/m³ = micrograms per cubic meter

Dup = Duplicate sample
< indicates that the compound was not detected at or above the laboratory reporting limit shown.

Table 1. Cont.

Sample Location	Sample Depth (ft bgs)	Sample Date	Tetrachloro- ethene	Toluene	1,1,1- Trichloro- ethane	1,1,2- Trichloro- ethane	Trichloro- fluoro- methane	1,2,4- Trimethyl- benzene	1,3,5- Trimethyl- benzene	Vinyl- Chloride	m,p-Xylene	o-Xylene
SGP-WD-1-5-1V*	5	3/29/10	<50	77	<50	<50	<50	<50	<50	<13	<100	<50
SGP-WD-1-5-3V*	5	3/29/10	<50	160	100	<50	<50	<50	<50	<13	<100	<50
SGP-WD-1-5-7V*	5	3/29/10	<50	140	<50	<50	<50	<50	<50	<13	<100	<50
SGP-WD-2-5*	5	3/29/10	<50	160	350	<50	<50	<50	<50	<13	130	<50
SGP-WD-2-5-Dup*	5	3/29/10	<50	160	340	<50	<50	<50	<50	<13	120	<50
SGP-WD-2-5	5	3/29/10	<38	170	250	<31	<63	<83	<28	<14	120	43
SGP-WD-2-10*	10	3/29/10	<50	71	50	<50	<50	<50	<50	<13	<100	<50
SGP-WD-3-5*	5	3/29/10	<500	<500	<500	<500	<500	<500	<500	<130	<1000	<500
SGP-WD-3-10*	10	3/29/10	<500	<500	<500	<500	<500	<500	<500	<130	<1000	<500
SGP-WD-4-5*	5	3/29/10	<50	66	270	<50	<50	<50	<50	<13	<100	<50
SGP-WD-4-10*	10	3/29/10	<500	530	<500	<500	<500	<500	<500	<130	<1000	<500
SGP-WD-4-10	10	3/29/10	<500	<280	<400	<400	<830	<1100	<360	<190	<1300	<320
SGP-WD-5-5*	5	3/29/10	<50	130	380	<50	<50	<50	<50	<13	<100	<50
SGP-WD-5-10*	10	3/29/10	<50	<50	<50	<50	<50	<50	<50	<13	<100	<50
SGP-WD-6-5*	5	3/29/10	<50	200	420	<50	<50	<50	<50	<13	100	<50
SGP-WD-6-10*	10	3/29/10	<50	130	170	<50	<50	<50	<50	<13	<100	<50
GW/SV-20-5	5	5/30/12	9.3	2.7	<2.7	<2.7	68	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-20-10	10	5/30/12	7.3	<1.9	<2.7	<2.7	69	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-21-5	5	6/13/12	<3.4	<1.9	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-21-10	10	6/13/12	<5.5	<3.8	<5.6	<5.6	<5.5	<15	<5.0	<2.6	<18	<4.4
GW/SV-22-5	5	5/30/12	<160	<87	<130	<130	<260	<340	<110	<59	<400	<100
GW/SV-22-10	10	5/30/12	<340	510	<270	<270	<560	<740	<250	<130	<870	240
GW/SV-22-10/Dup	10	5/30/12	<340	320	<270	<270	<560	<740	<250	<130	<870	240
GW/SV-23-5	5	6/13/12	<3.4	2.9	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-23-10	10	6/13/12	7.4	14	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-23-10/Dup	10	6/13/12	<11	11	<8.7	<8.7	<18	<23	<7.8	<4.1	<28	<6.9
GW/SV-24-5	5	6/13/12	<3.4	2.4	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-24-10	10	6/13/12	9.9	<1.9	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-25-5	5	5/30/12	<3.4	20	<2.7	<2.7	<5.6	8	2.8	<1.3	30	14
GW/SV-25-10	10	5/30/12	<3.4	<1.9	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-26-5	5	5/31/12	25	3.3	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-26-10	10	5/31/12	28	<1.9	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-27-5	5	5/31/12	67	16	3.6	<2.7	<5.6	<7.4	<2.5	<1.3	12	4.6
GW/SV-27-10	10	5/31/12	84	2	<2.7	<2.7	<5.6	<7.4	<2.5	2.9	<8.7	<2.2
GW/SV-28-5	5	5/31/12	<3.4	5.2	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	2.9
GW/SV-28-10	10	5/31/12	<3.4	<1.9	<2.7	<2.7	<5.6	<7.4	<2.5	<1.3	<8.7	<2.2
GW/SV-29-5	5	5/31/12	6.8	11	7	<2.7	13	30	8.6	<1.3	9.4	4.2
GW/SV-29-10	10	5/31/12	150	<1.9	<2.7	<2.7	15	<7.4	<2.5	<1.3	<8.7	<2.2

Abbreviations:

μg/m³ = micrograms per cubic meter

Notes:

* = Analyzed by EPA Method 8260B

Dup = Duplicate sample
< indicates that the compound was not detected at or above the laboratory reporting limit shown.

Table 2. Analytical data for chemicals detected in groundwater (µg/L) using EPA Method 8260B (unless otherwise noted)

Sample Location	Date Collected	Benzene	tert-Butyl- alcohol (TBA)	n-Butyl- benzene	sec-Butyl- benzene	tert-Butyl- benzene	Carbon Disulfide	Chloro- benzene	Chloro- form	Ethyl- benzene	Isopropyl- benzene	Methyl tert- butyl ether (MTBE)	2-Methyl- naphthalene (8270)
MW-1	9/13/11	<5	250	<5	<5	<5	N/A	<5	<5	<5	22	<5	<100
MW-1	12/13/11	<5	<100	<5	<5	<5	<5	<5	<5	<5	6.7	<5	<100
MW-1	2/24/12	<0.5	18	<0.5	<0.5	<0.5	3.1	<0.5	<0.5	<0.5	2.8	<0.5	<10
MW-1	6/8/12	<0.5	37	<0.5	0.55	<0.5	<2	<0.5	<0.5	<0.5	9	<0.5	<10
MW-13	9/13/11	17	<100	<5	8	<5	N/A	<5	<5	3.6	47	16	<100
MW-13	12/13/11	<5	<100	<5	8.1	<5	<5	<5	<5	<5	36	22	110
MW-13	2/24/12	<1.0	50	<1.0	5.8	1.6	<4	<1.0	<1.0	<1	30	17	37
MW-13	6/8/12	<0.5	30	<0.5	8.5	1.7	<2	<0.5	<0.5	<0.5	41	21	<25
MW-14	9/13/11	<5	<100	<5	<5	<5	N/A	<5	<5	<5	<5	<5	<10
MW-14	12/12/11	<5	<100	<5	<5	<5	<5	<5	<5	<5	<5	<5	<10
MW-14	2/23/12	<0.5	14	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<10
MW-14	6/7/12	<0.5	<10	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<10
MW-15	9/13/11	<5	<100	<5	8.5	<5	N/A	<5	<5	<5	48	<5	<10
MW-15	12/12/11	<5	<100	< 5	9.1	<5	<5	<5	<5	<5	45	<5	70
MW-15	2/23/12	<0.5	16	<0.5	8	1.6	<2	<0.5	<0.5	<0.5	43	<0.5	58
MW-15	6/7/12	<0.5	<10	<0.5	8	1.6	<2	<0.5	<0.5	<0.5	47	<0.5	39
MW-16	9/13/11	<5	<100	<5	29	3.2	N/A	<5	<5	<5	110	26	24
MW-16	2/24/12	<2	<40	<2	28	2.9	<8	<2	<2	<2	110	60	41
MW-16	6/8/12	<0.5	<10	1.4	30	3.3	<2	<0.5	<0.5	<0.5	110	74	43
MW-17	9/12/11	<5	<100	<5	<5	<5	N/A	<5	<5	<5	<5	82	<10
MW-17	12/13/11	<5	<100	<5	<5	<5	<5	<5	<5	<5	<5	140	<100
MW-17	2/23/12	<0.5	<10	<0.5	<0.5	<0.5	<2	2	<0.5	<0.5	<0.5	170	<10
MW-17	6/7/12	<0.5	<10	<0.5	<0.5	<0.5	<2	1.8	<0.5	<0.5	<0.5	180	<10
MW-18	9/13/11	<5	<100	<5	<5	<5	N/A	<5	<5	<5	<5	<5	<10
MW-18	12/12/11	<5	<100	<5	<5 <5	<5	<5	<5 <5	<5	<5	<5	<5	<10
MW-18	2/23/12	<0.5	<100	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<10
MW-18	6/7/12	<0.5	<10	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<10
MW-19	9/13/11	<5	110	<5	12	<5	N/A	<5	<5	<5	73	<5	<100
MW-19	12/12/11	<5	<100	<5	15	<5 <5	<5	<5 <5	<5	<5 <5	65	<5 <5	81
MW-19	2/23/12	<0.5	28	<1.0	11	1.7	<4	<1.0	<1.0	<1	73	<1.0	64
MW-19	6/8/12	<0.5 <0.5	38	<0.5	9.8	1.5	<1	<0.5	<0.5	1.4	52	<0.5	<25
GW/SV-20	6/1/12	<0.5	<10	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	NA
GW/SV-21	6/4/12	<0.5	<10	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	NA NA
GW/SV-21	6/1/12	<0.5	38	<1.0	4.1	<1.0	<10	<1.0	<1.0	<1.0	17	<1.0	NA NA
GW/SV-22 GW/SV-23	6/4/12	<0.5	17	<1.0	2.5	<1.0	<10	<1.0	<1.0	<1.0	4.5	10	NA NA
GW/SV-23	6/4/12	<0.5	<10	<1.0	<1.0	<1.0	<10	<1.0	1.0	<1.0	4.5 <1.0	<1.0	NA NA
GW/SV-24 GW/SV-25	5/31/12	<0.5	14	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	1.2	NA NA
GW/SV-25-Dup	5/31/12	<0.5	17	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	1.7	NA NA
GW/SV-25-Dup GW/SV-26	5/31/12	<0.5 <0.5	<10	<1.0 <1.0	<1.0	<1.0 <1.0	<10	<1.0 <1.0	<1.0 <1.0	<1.0	<1.0	<1.7	NA NA
	6/1/12		<10	<1.0 <1.0	<1.0	<1.0 <1.0	<10 <10	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0	<1.0	NA NA
GW/SV-27 GW/SV-28	5/30/12	<0.5 <0.5	<10	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<10 <10	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0	NA NA
GW/SV-28 GW/SV-29	6/1/12	<0.5 <0.5	<10	<1.0 <1.0	<1.0	<1.0	<10	<1.0 <1.0	<1.0 <1.0	<1.0	<1.0	<1.0	NA NA
Abbreviations:	0/1/12	< 0.5	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	I INA

Abbreviations:

μg/L = micrograms per liter

Dup = Duplicate sample

NA = Not analyzed

< indicates that the compound was not detected at or above the laboratory reporting limit shown.

Table 2. Cont.

Sample	Date	Naph- thalene	n-Propyl-	1,1,2,2- Tetrachloro-	1,1,2- Trichloro-	1,2,4- Trimethyl-	. V. I
Location MW-1	9/13/11	(8260/8270) 14/<100	benzene 8.6	ethane <5	ethane <5	benzene <5	o-Xylene <5
MW-1		<5/<100 <5/<100		<5 <5	<5 <5	<5 <5	<5 <5
MW-1	12/13/11 2/24/12	<0.5/<100	<5 1.1	<0.5	<0.5	<0.5	<0.5
MW-1	6/8/12	3.5/<10	3.6	<0.5 <0.5	<0.5 <0.5	<0.5 <0.5	<0.5 <0.5
MW-13	9/13/11	220/<100	37	<5	<0.5 <5	<0.5 <5	<0.5 <5
MW-13	12/13/11	180/100	28	<5 <5	<5 <5	<5 <5	<5 <5
MW-13	2/24/12	150/100	22	<1.0	<1.0	<1.0	<1.0
MW-13	6/8/12	210/<25	31	<0.5	<0.5	<0.5	<0.5
MW-14	9/13/11	<5/<10	<5	<5	<5	<5	<5
MW-14	12/12/11	<5/<10 <5/<10	<5	<5 <5	<5	<5	<5
MW-14	2/23/12	<0.5/<10	<0.5	<0.5	<0.5	<0.5	<0.5
MW-14	6/7/12	<0.5/<10	<0.5	<0.5	<0.5	<0.5	<0.5
MW-15	9/13/11	11/<10	11	<5	<5	<5	<5
MW-15	12/12/11	<5/<50	10	<5	<5	<5	<5
MW-15	2/23/12	<0.5/<10	9.2	<0.5	<0.5	<0.5	<0.5
MW-15	6/7/12	<0.5/<10	9.7	<0.5	<0.5	<0.5	<0.5
MW-16	9/13/11	28/8.2	71	<5	<5	<5	<5
MW-16	2/24/12	72/22	76	2.2	5.4	<2	<2
MW-16	6/8/12	65/26	73	<0.5	<0.5	<0.5	0.55
MW-17	9/12/11	<5/<10	<5	<5	<5	<5	<5
MW-17	12/13/11	6.6/<100	<5	<5	<5	<5	<5
MW-17	2/23/12	0.77/<10	<0.5	<0.5	<0.5	<0.5	<0.5
MW-17	6/7/12	<0.5/<10	<0.5	<0.5	<0.5	<0.55	<0.5
MW-18	9/13/11	<5/<10	<5	<5	<5	<5	<5
MW-18	12/12/11	<5/<10	<5	<5	<5	<5	<5
MW-18	2/23/12	<0.5/<10	<0.5	<0.5	<0.5	<0.5	<0.5
MW-18	6/7/12	<0.5/<10	<0.5	<0.5	<0.5	<0.5	<0.5
MW-19	9/13/11	200/<100	14	<5	<5	<5	<5
MW-19	12/12/11	330/130	11	<5	<5	<5	<5
MW-19	2/23/12	240/110	8.3	<1.0	<1.0	<1.0	<1.0
MW-19	6/8/12	210/<25	6.5	<0.5	<0.5	2.8	<0.5
GW/SV-20	6/1/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-21	6/4/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-22	6/1/12	<10	2.9	<1.0	<1.0	<1.0	<1.0
GW/SV-23	6/4/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-24	6/4/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-25	5/31/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-25-Dup	5/31/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-26	5/31/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-27	6/1/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-28	5/30/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0
GW/SV-29	6/1/12	<10	<1.0	<1.0	<1.0	<1.0	<1.0

Abbreviations:

μg/L = micrograms per liter

Dup = Duplicate sample

NA = Not analyzed

< indicates that the compound was not detected at or above the laboratory reporting limit shown.

Table 3. Exposure-point concentrations for chemicals of potential concern

	Maximum Detected Cor	centration South, Southwes	st, or West of Western Parcel
	Soil Vapo		
Chemical	5 ft	10 ft	— Groundwater (μg/L)
Acetone	270	1800	N/A
Benzene	71	53	17
Bromodichloromethane	7.5	25*	N/A
2-Butanone	64	40	N/A
ert-Butyl alcohol	2500*	1500	250
n-Butylbenzene	25*	25*	1.4
sec-Butylbenzene	250*	1500	30
ert-Butylbenzene	25*	25*	3.3
Carbon disulfide	13	71	3.1
Chlorobenzene	180	2500	2
Chloroform	200	310	1
Chloromethane	1.2	50*	N/A
Dibromochloromethane	4.8	25*	N/A
Dichlorodifluoromethane	3.3	2.9	N/A
cis-1,2-Dichloroethene	4.2	3.3	N/A
Ethylbenzene	81	1000	3.6
sopropylbenzene	250*	4900	110
2-Methylnaphthalene	N/A	N/A	110
I-Methyl-2-Pentanone	77	250*	N/A
Methyl tert-butyl ether	41*	150	180
Naphthalene	16*	16*	330
n-Propylbenzene	25*	25*	76
1,1,2,2-Tetrachloroethane	50*	50*	2.2
Tetrachloroethene	67	150	N/A
Toluene	200	530	N/A
1,1,1-Trichloroethane	420	170	N/A
1,1,2-Trichloroethane	25*	25*	5.4
Trichlorofluoromethane	68	69	N/A
,2,4-Trimethylbenzene	30	42*	2.8
,3,5-Trimethylbenzene	8.6	25*	N/A
/inyl Chloride	7*	2.9	N/A
n,p-Xylenes	130	50*	N/A
o-Xylene	43	240	0.55

Notes:

μg/m³ = micrograms per cubic meter μg/L = micrograms per liter

N/A = Not applicable

* = Detected in groundwater or the corresponding soil gas sample at another depth; half the detection limit used (see text) Abbreviations:

Table 4. Summary of toxicity criteria for chemicals of potential concern

	Inhalation IUR		Inhalation RfC	
Chemical	$(\mu g/m^3)^{-1}$		(mg/m³)	
Acetone	N/A		3.10E+01	d
Benzene	2.90E-05	0	3.00E-02	i
Bromodichloromethane	3.70E-05	0	7.00E-02	d
2-Butanone	N/A		5.00E+00	i
tert-Butyl alcohol	N/A		3.00E+01	S
n-Butylbenzene	N/A		1.40E-01	d
sec-Butylbenzene	N/A		1.40E-01	d
tert-Butylbenzene	N/A		1.40E-01	d
Carbon disulfide	N/A		7.00E-01	i
Chlorobenzene	N/A		1.00E+00	0
Chloroform	5.30E-06	0	3.00E-01	0
Chloromethane	1.80E-06	d	9.00E-02	i
Dibromochloromethane	2.70E-05	0	7.00E-02	d
Dichlorodifluoromethane	N/A		2.00E-01	d
cis-1,2-Dichloroethene	N/A		3.50E-02	d
Ethylbenzene	2.50E-06	0	1.00E+00	i
Isopropylbenzene	N/A		4.00E-01	i
2-Methylnaphthalene	N/A		1.40E-02	d
4-Methyl-2-Pentanone	N/A		3.00E+00	i
Methyl tert-butyl ether	2.60E-07	0	3.00E+00	i
Naphthalene	3.40E-05	0	3.00E-03	i
n-Propylbenzene	N/A		1.40E-01	d
1,1,2,2-Tetrachloroethane	5.80E-05	0	1.40E-02	d
Tetrachloroethene	5.90E-06	0	3.50E-02	d
Toluene	N/A		3.00E-01	0
1,1,1-Trichloroethane	N/A		5.00E+00	i
1,1,2-Trichloroethane	1.60E-05	0	1.40E-02	d
Trichlorofluoromeethane	N/A		7.00E-01	d
1,2,4-Trimethylbenzene	N/A		7.00E-03	d
1,3,5-Trimethylbenzene	N/A		6.00E-03	d
Vinyl chloride	7.80E-05	0	1.00E-01	i
p-Xylene (surrogate for m/p-xylene)	N/A		1.00E-01	i
o-Xylene	N/A		1.00E-01	i

Note: d - DTSC J&E Spreadsheets (2011)

- U.S. Environmental Protection Agency EPA

i - EPA Integrated Risk Information System (IRIS) database

- inhalation unit risk IUR N/A - not applicable

NDEP - Nevade Division of Environmental Protection

o - OEHHA Toxicity Criteria Database OEHHA - Office of Environmental Health Hazard Assessment

RfC - reference concentration

- surrogate [sec-butyl alcohol (NDEP, 2012)]

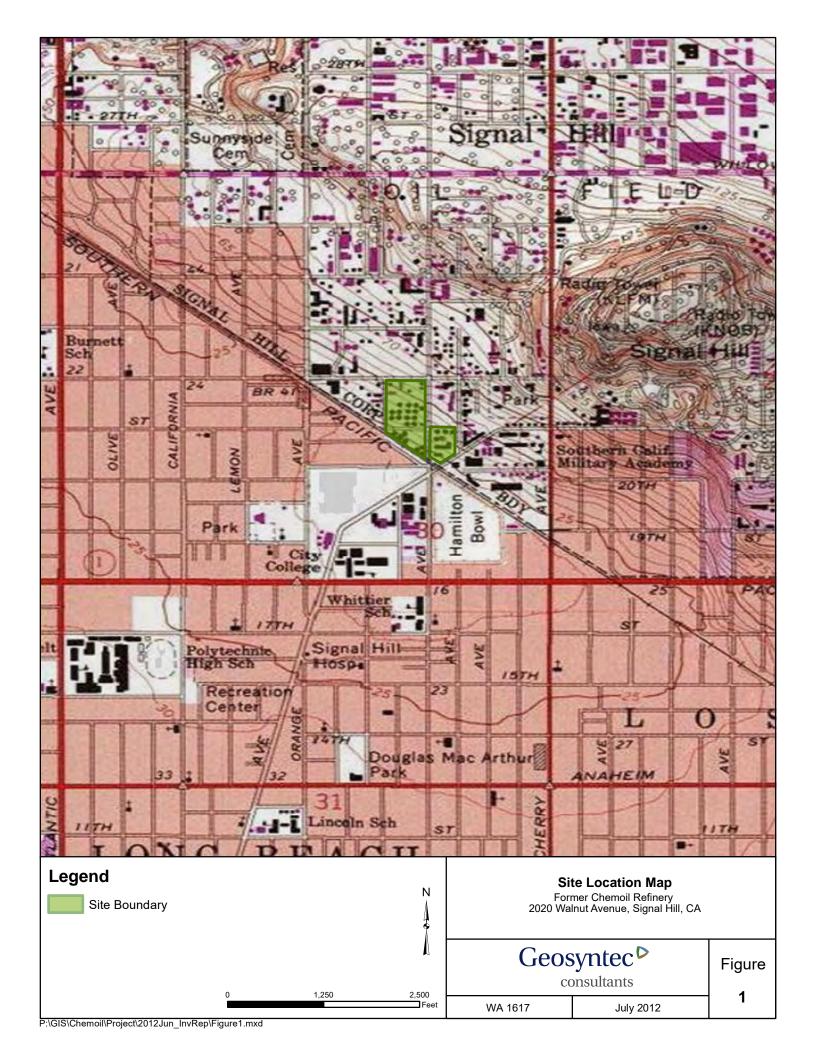
Table 5. Results for resident using data south of southern property boundary

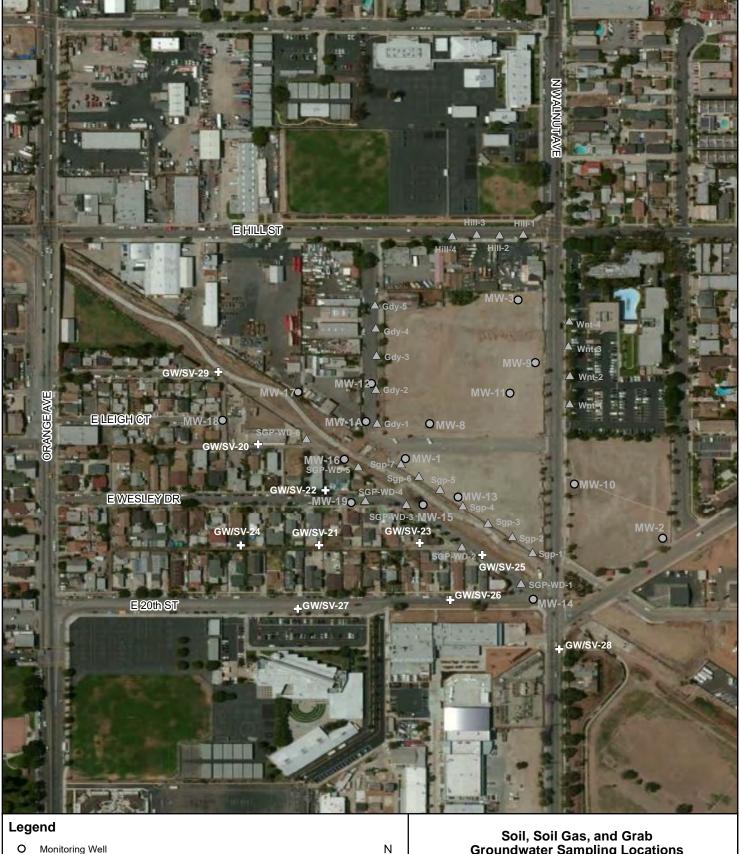
	Exposure to Indoor Air Using Maximum Soil Vapor Concentrations at 5 ft		Maximum	Exposure to Indoor Air Using Maximum Soil Vapor Concentrations at 10 ft		Exposure to Indoor Air Using Maxiumum Groundwater Concentrations	
Chaminal	Estimated Excess Cancer	Non-Cancer Hazard	Estimated Excess Cancer		Estimated Excess Cancer	Estimated Non-Cancer	
Chemical	Risk N/A	Quotient	Risk	Hazard Quotient	Risk	Hazard Quotient	
Acetone		8.0E-06	N/A	3.2E-05	N/A	N/A	
Benzene	6.4E-07	1.7E-03	2.7E-07	7.2E-04	2.1E-06	5.7E-03	
Bromodichloromethane	3.7E-08	8.9E-06	6.2E-08	3.1E-06	N/A	N/A	
2-Butanone	N/A	8.9E-06	N/A	3.1E-06	N/A	N/A	
tert-Butyl alcohol	N/A	7.1E-05	N/A	2.5E-05	N/A	9.5E-07	
n-Butylbenzene	N/A	9.4E-05	N/A	5.0E-05	N/A	1.3E-04	
sec-Butylbenzene	N/A	9.4E-04	N/A	3.0E-03	N/A	1.9E-04	
tert-Butylbenzene	N/A	9.4E-05	N/A	5.0E-05	N/A	3.1E-04	
Carbon disulfide	N/A	1.5E-05	N/A	4.8E-05	N/A	2.9E-04	
Chlorobenzene	N/A	1.1E-04	N/A	8.8E-04	N/A	1.1E-05	
Chloroform	3.7E-07	5.4E-04	3.3E-07	4.8E-04	1.8E-08	2.7E-05	
Chloromethane	8.5E-10	1.2E-05	2.1E-08	3.0E-04	N/A	N/A	
Dibrormochloromethane	1.2E-08	1.5E-05	3.1E-08	3.8E-05	N/A	N/A	
Dichlorodifluoromethane	N/A	9.8E-06	N/A	4.7E-06	N/A	N/A	
cis-1,2-Dichloroethane	N/A	7.7E-05	N/A	3.3E-05	N/A	N/A	
Ethylbenzene	5.6E-08	5.3E-05	3.8E-07	3.6E-04	4.3E-08	4.1E-05	
Isopropylbenzene	N/A	3.6E-04	N/A	3.9E-03	N/A	3.5E-01	
2-Methylnaphthalene	N/A	N/A	N/A	N/A	N/A	5.9E-03	
4-Methyl-2-Pentanone	N/A	1.7E-05	N/A	3.0E-05	N/A	N/A	
Methyl tert-butyl ether	3.7E-09	1.1E-05	7.8E-09	2.3E-05	3.6E-08	1.1E-04	
Naphthalene	1.3E-07	2.9E-03	6.8E-08	1.6E-03	3.9E-06	9.0E-02	
n-Propylbenzene	N/A	9.8E-05	N/A	5.3E-05	NA	6.4E-03	
1,1,2,2-Tetrachloroethane	7.8E-07	2.2E-03	4.3E-07	1.2E-03	4.3E-08	1.2E-04	
Tetrachloroethene	1.1E-07	1.2E-03	1.3E-07	1.5E-03	N/A	N/A	
Toluene	N/A	4.8E-04	N/A	7.2E-04	N/A	N/A	
1,1,1-Trichloroethane	N/A	5.6E-05	N/A	1.3E-05	N/A	N/A	
1,1,2-Trichloroethane	1.1E-07	1.2E-03	6.4E-08	6.6E-04	6.5E-08	6.7E-04	
Trichlorofluoromethane	N/A	7.0E-05	N/A	4.0E-05	N/A	N/A	
1,2,4-Trimethylbenzene	N/A	2.4E-03	N/A	1.8E-03	N/A	2.8E-03	
1,3,5-Trimethylbenzene	N/A	8.0E-04	N/A	1.2E-03	N/A	N/A	
Vinyl chloride	1.9E-07	5.8E-05	4.6E-08	1.4E-05	N/A	N/A	
m,p-Xylenes	N/A	8.6E-04	N/A	1.8E-04	N/A	N/A	
o-Xylene	N/A	3.1E-04	N/A	9.7E-04	N/A	4.8E-05	
TOŤAL	2E-06	2E-02	2E-06	2E-02	6E-06	5E-01	

Note: N/A - Not Applicable

Attachment A

Figures from Geosyntec (2012)





- Monitoring Well
- Soil Gas Probe (TEC, 2009 and 2010)
- ₽ Soil, Soil Gas, and Grab Goundwater Sampling Locations (Geosyntec, 2012)

NOTE:

Approximate locations of monitoring well and soil gas probes from Testa Environmental Corporation's (TEC) June 2011 Report on Phase II and Phase III Additional Site Characterization

> 600 Feet

Groundwater Sampling Locations

Former Chemoil Refinery 2020 Walnut Avenue, Signal Hill, CA

Geosyntec ^D

Figure

consultants

WA 1617 July 2012 2

Attachment B

Johnson & Ettinger Modeling Output

Johnson & Ettinger Modeling Sheets

This attachment includes the model output sheets from the Johnson and Ettinger model (Johnson and Ettinger 1991), which was used to estimate infiltration of chemicals in soil vapor into indoor air. This model has been has been parameterized by U.S. EPA (2004) and was modified to reflect Cal-EPA-specific toxicity criteria, as appropriate (Cal-EPA 2011a and b). Default model input parameters recommended by U.S. EPA were used, except as follows.

- The soil vapor sampling depth was set to 152 cm (5 ft) or 305 cm (10 ft) depending on the depth indicated in the analytical report.
- The depth to groundwater was set to 360 cm (11.8 ft), which is based on the average depth to groundwater in monitoring wells located in the residential area south and southwest of the Western Parcel (MW-14, MW-15, MW-16, MW-18, and MW-19) for the last four quarterly monitoring events (third and fourth quarter 2011 and first and second quarter 2011; TEC 2011 and TEC 2012a-c). These data are summarized in Table B-1. As shown in the table, there is relatively little fluctuation in groundwater depth in these monitoring wells over the four quarters.
- Based on information provided by Stephen Testa of Testa Environmental Corporation (TEC: Testa, 2009), a single soil stratum extends from ground surface to approximately 13 ft below ground surface (bgs), which is below the depth to groundwater south and southwest of the Western Parcel. The soil type in this stratum ("Soil stratum A SCS soil type" and "SCS soil type directly above water table" in the J&E Model spreadsheets) is typical of a "silt loam." Input soil parameters for dry bulk density, total soil porosity, and water-filled soil porosity were based on default values for silt loam provided in the J&E Model spreadsheet.
- The average soil temperature was assumed to be 19°C, based on Figure 8 of U.S. EPA's (2003) guidance.
- The crack-to-total area ratio (η) was set at 0.005 (rather than calculated) to be consisted with Cal-EPA guidance (Cal-EPA 2011a).

The choice of soil type and use of default soil input parameters, which can have a substantial effect on the predicted indoor air concentrations, is supported by the results of soil property analyses included in the comprehensive soil vapor and groundwater investigation conducted by Geosyntec Consultants (Geosyntec) in 2012 (Geosyntec 2012). Specifically, Geosyntec collected soil samples from locations GW/SV-22 and GW/SV-29 at 3.5 to 4 ft and 7 to 8 ft bgs. These samples were analyzed for grain size distribution using ASTM Method D422/D4464M, dry bulk density and total porosity using API RP 40, and moisture content using API RP 40/ASTM D2216. The results of these analyses are summarized in Table B-2; the original laboratory reports are provided in Appendix E of the Geosyntec (2012) report.

Soil Type

Based on the particle size analysis, the weight percent of sand, silt, and clay was plotted on the U.S. Soil Conservation Service Classification Chart provided in the J&E Model User's Guide (U.S. EPA 2004). The result is shown in Figure B-1. According to this classification, two samples are "loam," one sample is "silt loam," and one sample is on the border between "loam" and "silt loam." The mean of the four results falls slightly within the boundary of "silt loam." In total, these results support the choice of silt loam as the soil type for soil stratum A.

Dry Bulk Density, Total Soil Porosity, and Water-filled Soil Porosity

The default values for dry bulk density, total soil porosity, and water-filled soil porosity for silt loam in the J&E Model spreadsheets are 1.49 grams per cubic centimeter (g/cm3), 0.439 (43.9%), and 0.18 (18.0%), respectively. These values are reasonably similar to the mean values for the four samples tested, i.e., 1.68 g/cm3, 37.7%, and 20.9%, respectively. Of these parameters, the water-filled soil porosity has the greatest effect on the predicted indoor air concentration; therefore, the fact that the measured values are generally slightly higher than the default value means that use of the default value is conservative (i.e., results in higher predicted indoor air concentrations). Overall, these results are also supportive of the choice of silt loam as the soil type.

References

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TEC. 2011. Report on Quarterly Groundwater Quality Monitoring Program, October 2011, former Chemoil Refinery, SLIC No. 453A, Signal Hill, California. Testa Environmental Corporation. October 15.

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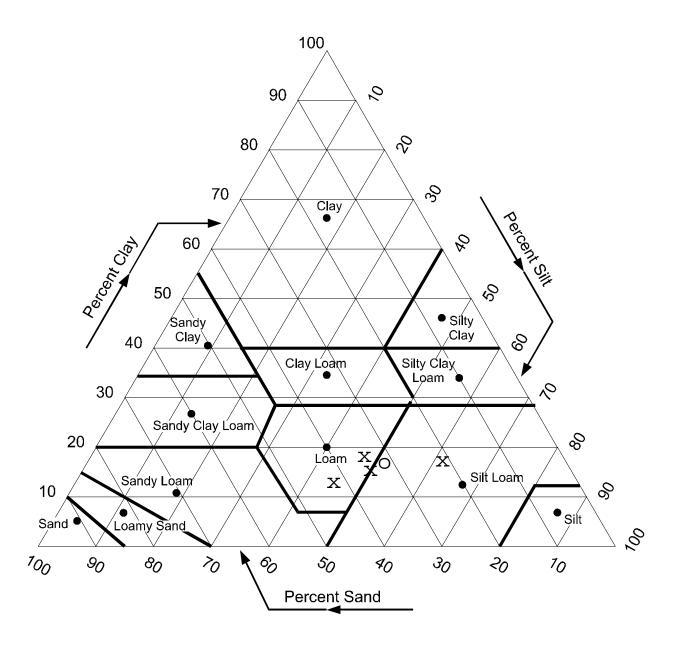
Water-filled porosity was calculated from measurements of dry bulk density and moisture contect as described by the State of Alaska Department of Environmental Conservation (http://dec.alaska.gov/applications/spar/webcalc/definitions.htm).

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TEC. 2012c. Report on Quarterly Groundwater Quality Monitoring Program, July 2012, former Chemoil Refinery, SLIC No. 453A, Signal Hill, California. Testa Environmental Corporation. July 15.

Testa, S. 2009. E-mail letter from Stephen Testa of Testa Environmental Corporation to Greg Brorby of Exponent. Re: Additional questions. November 1.

U.S. EPA. 2004. User's guide for evaluating subsurface vapor intrusion into buildings. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Toxics Integration Branch, Washington, DC. Revised February 22.



x = individual sample

o = mean of 4 samples

Figure B-1 Soil Type Classifcation

Table B-1. Summary of Depth to Groundwater Data for Wells South and Southwest of the Western Parcel (ft)

Monitoring Well	Sep-11	Dec-11	Feb-12	12-Jun
MW-14	11.3	11.6	11.5	11.5
MW-15	11.4	11.6	11.6	11.6
MW-16	12.5	No data	12.8	12.6
MW-18	12.3	12.4	12.4	12.4
MW-19	11.1	11.2	11.3	11.3
Mean	11.7	11.7	11.9	11.9
Overall Mean (ft)		:		11.8
Overall Mean (cm)				360

Table B-2. Soil physical properties

Sample Location	Sample Depth (ft bgs)	Particle Size Distribution (wt. percent) ASTM D422/D4464M Sand Silt Clay			Moisture Content (% weight) API RP 40/ASTM D2216	Dry Bulk Density (g/cm³) API RP40	Water-Filled Porosity (calculated)	Total Porosity (% bulk vol.) API RP 40
GW/SV-22-3'-4'	3.5-4.0	33.11	48.17	18.71	9.7	1.56	15.1	42.2
GW/SV-29-3'-4'	3.5-4.0	40.98	45.06	13.96	13.2	1.64	21.6	39.0
GW/SV-22-7'-8'	7-8	32.67	50.34	17.00	12.5	1.77	22.1	34.6
GW/SV-29-7'-8'	7-8	20.73 61.33 17.94		14.3	1.74	24.9	35.0	
Mean		31.87	51.23	16.90	12.4	1.68	20.9	37.7

Notes:

Water-filled porosity = Moisture content x Dry bulk density (http://dec.alaska.gov/applications/spar/webcalc/definitions.htm). Abbreviations:

g/cm³ = grams per cubic centimeter

Resident using 5 ft. soil vapor data south, southwest, and west of the Western Parcel SG-ADV Version 3.1; 02/04

Program modified to accommodate multiple chemicals

Reset to Defaults

	Soil	Gas Concentratio	n Data		
ENTER	ENTER		ENTER		7
	Soil		Soil		
Chemical CAS No.	gas conc.,	OR	gas		
(numbers only,	Conc.,	UK	conc., C _q		
no dashes)	(µg/m³)		(ppmv)	Chemical	
no dasnes)	(pg/III)		(ppinv)	Chemical	
67641	2.70E+02			Acetone	
71432	7.10E+01			Benzene	
75274	7.50E+00			Bromodichloromethane	
78933	6.40E+01			Methylethylketone (2-butanone)	
75650	2.50E+03			tert-Butyl alcohol	
104518	2.50E+01			n-Butylbenzene	
135988	2.50E+02			sec-Butylbenzene	7
98066	2.50E+01			tert-Butylbenzene	
75150	1.30E+01			Carbon disulfide	
108907	1.80E+02			Chlorobenzene	
67663	2.00E+02			Chloroform	
74873	1.20E+00			Methyl chloride (chloromethane)	
124481	4.80E+00			Chlorodibromomethane	Note: Same as Dibromochloromethane
75718	3.30E+00			Dichlorodifluoromethane	
156592	4.20E+00			cis-1,2-Dichloroethylene	
100414	8.10E+01			Ethylbenzene	7
98828	2.50E+02			Cumene	Note: Same as isopropylbenzene
108101	7.70E+01			Methylisobutylketone (4-methyl-2-pentanone)	- · · · · · · · · · · · · · · · · · · ·
1634044	4.10E+01			MTBE	7
91203	1.60E+01			Naphthalene	
103651	2.50E+01			n-Propylbenzene	
79345	5.00E+01			1,1,2,2-Tetrachloroethane	
127184	6.70E+01			Tetrachloroethylene	
108883	2.00E+02			Toluene	
71556	4.20E+02			1,1,1-Trichloroethane	
79005	2.50E+01			1,1,2-Trichloroethane	
75694	6.80E+01			Trichlorofluoromethane	1
95636	3.00E+01			1,2,4-Trimethylbenzene	1
108678	8.60E+00			1,3,5-Trimethylbenzene	1
75014	7.00E+00			Vinyl chloride (chloroethene)	1
106423	1.30E+02			p-Xylene	Note: results reported as "m,p-xylenes"; p-xylene has the most conservative physical co
95476	4.30E+01			o-Xylene	

MORE ↓

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER		ENTER
Depth			Totals mus	st add up to value of l	s (cell F24)	Soil		
below grade	Soil gas			Thickness	Thickness	stratum A		User-defined
to bottom	sampling	Average	Thickness	of soil	of soil	SCS		stratum A
of enclosed	depth	soil	of soil	stratum B,	stratum C,	soil type		soil vapor
space floor,	below grade,	temperature,	stratum A,	(Enter value or 0)	(Enter value or 0)	(used to estimate	OR	permeability,
L _F	L _s	Ts	h _A	h _B	hc	soil vapor		k _v
(cm)	(cm)	(°C)	(cm)	(cm)	(cm)	permeability)		(cm ²)
1.5	152	10	152	0	0	CII		



	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
	Stratum A	Stratum A	Stratum A	Stratum A	Stratum B	Stratum B	Stratum B	Stratum B	Stratum C	Stratum C	Stratum C	Stratum C
	SCS	soil dry	soil total	soil water-filled	SCS	soil dry	soil total	soil water-filled	SCS	soil dry	soil total	soil water-filled
	soil type	bulk density,	porosity,	porosity,	soil type	bulk density,	porosity,	porosity,	soil type	bulk density,	porosity,	porosity,
- 1	Lookup Soil	ρ_b^A	n ^A	θ_w^A	Lookup Soil	ρ_b^B	n ^B	θ_w^B	Lookup Soil	P _b ^C	n ^c	θ_w^c
_	Parameters	(g/cm ³)	(unitless)	(cm ³ /cm ³)	Parameters	(g/cm ³)	(unitless)	(cm ³ /cm ³)	Parameters	(g/cm ³)	(unitless)	(cm ³ /cm ³)
-												
	SIL	1.49	0.439	0.18								



ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Enclosed		Enclosed	Enclosed				Average vapor
space	Soil-bldg.	space	space	Enclosed	Floor-wall	Indoor	flow rate into bldg.
floor	pressure	floor	floor	space	seam crack	air exchange	OR
thickness,	differential,	length,	width,	height,	width,	rate,	Leave blank to calculate
L _{crack}	ΔP	L _B	W _B	H _B	w	ER	Q _{soll}
(cm)	(g/cm-s ²)	(cm)	(cm)	(cm)	(cm)	(1/h)	(L/m)
							· · · · · · · · · · · · · · · · · · ·
15	40	1000	1000	244	0.1	0.5	5

ENTER	ENTER	ENTER	ENTER
Averaging time for carcinogens,	Averaging time for noncarcinogens,	Exposure duration.	Exposure frequency,
AT _c	AT _{NC}	FD.	FF
(yrs)	(yrs)	(yrs)	(days/yr)
70	30	30	350

CHEMICAL PROPERTIES SHEET

Resident using 5 ft. soil vapor data south, southwest, and west of the Western Parcel

Resident using 5 rt. son vapor t	ata south, southwe	st, and west o	Henry's	Henry's	Enthalpy of					
			law constant	law constant	vaporization at	Normal			Unit	
	Diffusivity	Diffusivity	at reference	reference	the normal	boiling	Critical	Molecular	risk	Reference
	in air,	in water,	temperature,	temperature,	boiling point,	point,	temperature,	weight,	factor,	conc.,
	D _a	D _w	прегисите,	T _R	ΔH _{v,b}	T _B	T _C	MW	URF	RfC
	-		П 37 г.	**	**	_	-			
<u>-</u>	(cm ² /s)	(cm ² /s)	(atm-m ³ /mol)	(°C)	(cal/mol)	(°K)	(°K)	(g/mol)	$(\mu g/m^3)^{-1}$	(mg/m ³)
Acetone	1.24E-01	1.14E-05	3.87E-05	25	6,955	329.20	508.10	58.08	0.0E+00	3.1E+01
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	78.11	2.9E-05	3.0E-02
Bromodichloromethane	2.98E-02	1.06E-05	1.60E-03	25	7,800	363.15	585.85	163.83	3.7E-05	7.0E-02
Methylethylketone (2-butanor	8.08E-02	9.80E-06	5.58E-05	25	7,481	352.50	536.78	72.11	0.0E+00	5.0E+00
tert-Butyl alcohol	9.85E-02	1.14E-05	9.05E-06	25	9,338	355.41	508.00	74.12	0.0E+00	3.0E+01
n-Butylbenzene	5.70E-02	8.12E-06	1.31E-02	25	9,290	456.46	660.50	134.22	0.0E+00	1.4E-01
sec-Butylbenzene	5.70E-02	8.12E-06	1.39E-02	25	88,730	446.50	679.00	134.22	0.0E+00	1.4E-01
tert-Butylbenzene	5.65E-02	8.02E-06	1.19E-02	25	8,980	442.10	1220.00	134.22	0.0E+00	1.4E-01
Carbon disulfide	1.04E-01	1.00E-05	3.02E-02	25	6,391	319.00	552.00	76.13	0.0E+00	7.0E-01
Chlorobenzene	7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	112.56	0.0E+00	1.0E+00
Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	119.38	5.3E-06	3.0E-01
Methyl chloride (chloromethan	1.26E-01	6.50E-06	8.80E-03	25	5,115	249.00	416.25	50.49	1.8E-06	9.0E-02
Chlorodibromomethane	1.96E-02	1.05E-05	7.81E-04	25	5,900	416.14	678.20	208.28	2.7E-05	7.0E-02
Dichlorodifluoromethane	6.65E-02	9.92E-06	3.42E-01	25	9,421	243.20	384.95	120.92	0.0E+00	2.0E-01
cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	96.94	0.0E+00	3.5E-02
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	106.17	2.5E-06	1.0E+00
Cumene	6.50E-02	7.10E-06	1.16E+00	25	10,335	425.56	631.10	120.19	0.0E+00	4.0E-01
Methylisobutylketone (4-meth	7.50E-02	7.80E-06	1.38E-04	25	8,243	389.50	571.00	100.16	0.0E+00	3.0E+00
MTBE	1.02E-01	1.05E-05	6.23E-04	25	6,678	328.30	497.10	88.15	2.6E-07	3.0E+00
Naphthalene	5.90E-02	7.50E-06	4.82E-04	25	10,373	491.14	748.40	128.18	3.4E-05	3.0E-03
n-Propylbenzene	6.01E-02	7.83E-06	1.07E-02	25	9,123	432.20	630.00	120.19	0.0E+00	1.4E-01
1,1,2,2-Tetrachloroethane	7.10E-02	7.90E-06	3.44E-04	25	8,996	419.60	661.15	167.85	5.8E-05	1.4E-02
Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	165.83	5.9E-06	3.5E-02
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	92.14	0.0E+00	3.0E-01
1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	133.40	0.0E+00	5.0E+00
1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.11E-04	25	8,322	386.15	602.00	133.41	1.6E-05	1.4E-02
Trichlorofluoromethane	8.70E-02	9.70E-06	9.68E-02	25	5,999	296.70	471.00	137.36	0.0E+00	7.0E-01
1,2,4-Trimethylbenzene	6.06E-02	7.92E-06	6.14E-03	25	9,369	442.30	649.17	120.20	0.0E+00	7.0E-03
1,3,5-Trimethylbenzene	6.02E-02	8.67E-06	5.87E-03	25	9,321	437.89	637.25	120.20	0.0E+00	6.0E-03
Vinyl chloride (chloroethene)	1.06E-01	1.23E-05	2.69E-02	25	5,250	259.25	432.00	62.50	7.8E-05	1.0E-01
p-Xylene	7.69E-02	8.44E-06	7.64E-03	25	8,525	411.52	616.20	106.17	0.0E+00	1.0E-01
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	106.17	0.0E+00	1.0E-01

INTERMEDIATE CALCULATIONS SHEET

Resident using 5 ft. soil vapor data south, southwest, and west of the Western Parcel

			Stratum A	Stratum B	Stratum C	Stratum A	Stratum A	Stratum A	Stratum A	Floor-		
	_	Source-	soil	soil	soil	effective	soil	soil	soil	wall		Bldg.
	Exposure	building	air-filled	air-filled	air-filled	total fluid	intrinsic	relative air	effective vapo	seam	Soil	ventilation
	duration, τ	separation, L_T	porosity, θ _a ^A	porosity, θ _a ^B	porosity, θa ^C	saturation, S _{te}	permeability, k _i	permeability, k _{rg}	permeability, k _v	perimeter, X _{crack}	gas conc.	rate, Q _{building}
	(sec)	(cm)	(cm ³ /cm ³)	(cm ³ /cm ³)	(cm ³ /cm ³)	(cm ³ /cm ³)	(cm ²)	(cm ²)	(cm ²)	(cm)	(μg/m ³)	(cm ³ /s)
Acetone Benzene	9.46E+08 9.46E+08	137 137	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000 4,000	2.70E+02 7.10E+01	3.39E+04 3.39E+04
Bromodichloromethane	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	7.50E+00	3.39E+04
Methylethylketone (2-butar	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	6.40E+01	3.39E+04
tert-Butyl alcohol	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+03	3.39E+04
n-Butylbenzene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+01	3.39E+04
sec-Butylbenzene	9.46E+08	137	0.259	ERROR ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+02	3.39E+04
tert-Butylbenzene Carbon disulfide	9.46E+08 9.46E+08	137 137	0.259	ERROR	ERROR ERROR	0.307	2.86E-09 2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	2.50E+01 1.30E+01	3.39E+04 3.39E+04
Chlorobenzene	9.46E+08	137	0.259 0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.80E+02	3.39E+04
Chloroform	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.00E+02	3.39E+04
Methyl chloride (chlorometh	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.20E+00	3.39E+04
Chlorodibromomethane	9.46E+08	137	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09	4,000	4.80E+00 3.30E+00	3.39E+04
Dichlorodifluoromethane cis-1,2-Dichloroethylene	9.46E+08 9.46E+08	137 137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	4.20E+00	3.39E+04 3.39E+04
Ethylbenzene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	8.10E+01	3.39E+04
Cumene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+02	3.39E+04
Methylisobutylketone (4-me	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	7.70E+01	3.39E+04
MTBE	9.46E+08 9.46E+08	137 137	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000 4,000	4.10E+01 1.60E+01	3.39E+04 3.39E+04
Naphthalene n-Propylbenzene	9.46E+08 9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09 2.86E-09	0.798	2.28E-09 2.28E-09	4,000	1.60E+01 2.50E+01	3.39E+04 3.39E+04
1,1,2,2-Tetrachloroethane	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	5.00E+01	3.39E+04
Tetrachloroethylene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	6.70E+01	3.39E+04
Toluene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.00E+02	3.39E+04
1,1,1-Trichloroethane	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.20E+02	3.39E+04
1,1,2-Trichloroethane Trichlorofluoromethane	9.46E+08 9.46E+08	137 137	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000 4,000	2.50E+01 6.80E+01	3.39E+04 3.39E+04
1,2,4-Trimethylbenzene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	3.00E+01	3.39E+04
1,3,5-Trimethylbenzene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	8.60E+00	3.39E+04
Vinyl chloride (chloroethene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	7.00E+00	3.39E+04
p-Xylene o-Xylene	9.46E+08 9.46E+08	137 137	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000	1.30E+02 4.30E+01	3.39E+04 3.39E+04
	anclosed	Crack-	Crack	Enthalpy of	Henry's law	Henry's law	Vanor	Stratum _A	Stratum	Stratum	Total	
	enclosed space below	Crack- to-total area	Crack depth below	Enthalpy of vaporization at ave. soil	Henry's law constant at ave. soil	Henry's law constant at ave. soil	Vapor viscosity at ave. soil	A effective diffusion	B effective diffusion	C effective diffusion	overall effective diffusion	Diffusion path
	space	to-total	depth below grade,	vaporization at ave. soil temperature,	constant at	constant at	viscosity at ave. soil temperature,	A effective	B effective	C effective	overall effective	
	space below grade,	to-total area ratio,	depth below	vaporization at ave. soil	constant at ave. soil temperature,	constant at ave. soil temperature,	viscosity at ave. soil	A effective diffusion coefficient,	B effective diffusion coefficient,	C effective diffusion coefficient,	overall effective diffusion coefficient,	path length,
- Acctors	space below grade, A _B (cm ²)	to-total area ratio, η (unitless)	depth below grade, Z _{crack} (cm)	vaporization at ave. soil temperature, ΔH _{v,TS} (cal/mol)	constant at ave. soil temperature, H _{TS} (atm-m ³ /mol)	constant at ave. soil temperature, H' _{TS} (unitless)	viscosity at ave. soil temperature, µts (g/cm-s)	A effective diffusion coefficient, D ^{eff} _A (cm ² /s)	B effective diffusion coefficient, D ^{eff} _B (cm ² /s)	C effective diffusion coefficient, D ^{eff} _C (cm ² /s)	overall effective diffusion coefficient, D ^{eff} _T (cm ² /s)	path length, L _d (cm)
Acetone Renzene	space below grade, A _B (cm ²)	to-total area ratio, η (unitless)	depth below grade, Z _{crack} (cm)	vaporization at ave. soil temperature, $\Delta H_{V,TS}$ (cal/mol)	constant at ave. soil temperature, H _{TS} (atm-m ³ /mol)	constant at ave. soil temperature, H' _{TS} (unitless)	viscosity at ave. soil temperature, µts (g/cm-s)	A effective diffusion coefficient, Deff A (cm²/s)	B effective diffusion coefficient, Deff B (cm²/s)	C effective diffusion coefficient, Deff c (cm²/s)	overall effective diffusion coefficient, D ^{eff} _T (cm ² /s) 7.31E-03	path length, L _d (cm)
Acetone Benzene Benzene Bromodichloromethane	space below grade, A _B (cm ²)	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15	vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) 7,447 8,030 8,576	constant at ave. soil temperature, H _{TS} (atm-m ³ /mol)	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02	viscosity at ave. soil temperature, µ _{TS} (g/cm-s) 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03	B effective diffusion coefficient, Deff B (cm²/s) 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff _T (cm²/s) 7.31E-03 5.08E-03 1.72E-03	path length, L _d (cm)
Benzene Bromodichloromethane Methylethylketone (2-butar	space below grade, A _B (cm ²) 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15	vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) 7,447 8,030 8,576 8,307	constant at ave. soil temperature, HTS (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff _A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03	B effective diffusion coefficient, Deff B (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff_T (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03	path length, L _d (cm) 137 137 137 137
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol	space below grade, A _B (cm ²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15	vaporization at ave. soil temperature,	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff _T (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03	path length, L _d (cm) 137 137 137 137 137
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene	space below grade, A _B (cm ²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-03 4.19E-03 4.18E-05 6.24E-06 8.74E-03	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Defr _T (cm ² /s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03	path length, L _d (cm) 137 137 137 137 137 137 137 137
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol	space below grade, A _B (cm ²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature,	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 2.60E-04 3.65E-01 1.41E-02	viscosity at ave. soil temperature, µTS (g/cm-s) 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 3.26E-03	B effective diffusion coefficient, Deff g (cm²/s) (0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) (cm²/s) (7.31E-03 1.72E-03 1.72E-03 3.29E-03 3.30E-03 3.26E-03	path length, L _d (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene tert-Butylbenzene Carbon disulfide	space below grade, A ₈ (cm²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00	viscosity at ave. soil temperature, μ _{TS} (g/cm-s) 1.78E-04	A effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.30E-03 3.26E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00 0.	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deffr (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.30E-03 3.26E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene	space below grade, A _B (cm²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02	constant at awe. soil temperature, H'TS (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 4.2EE-03 4.2EE-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) (7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 6.00E-03 4.22E-03 4.22E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform	space below grade, A _B (cm²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83SE-03	constant at ave. soil temperature, H'15 (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 1.18E-01	viscosity at ave. soil temperature, μ _{TS} (g/cm-s) 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromethylbenzene)	space below grade, A _B (cm²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 117,734 117,157 9,468 6,612 9,712 7,461 4,640	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03	constant at awe. soil temperature, H'TS (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 4.2EE-03 4.2EE-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) (7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 6.00E-03 4.22E-03 4.22E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform	space below grade, A _B (cm²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03 7.49E-03 6.19E-04 2.58E-01	constant at ave. soil temperature, H ⁺ rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.10E-01 1.10E-01 3.12E-01	viscosity at ave, soil temperature, µrs (g/cm-s) 1.78E-04	A effective diffusion coefficient, perf , (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 7.27E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.29E-03 3.26E-03 3.26E-03 3.26E-03 3.26E-03 3.26E-03 3.26E-03 3.38E-03 3.38E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromet/ Chlorodifluoromethane Dichlorodifluoromethane	space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 2.40E-02 2.64E-03 2.83E-03 2.40E-02 2.64E-03 3.38E-04 3.58E-03 3.16E-03 3.16E-03 3.16E-03 3.16E-03 3.16E-03 3.16E-03	constant at ave. soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.00E+00 1.10E-01 1.18E-01 2.58E-02 1.08E+01 1.30E-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.78E-0	A effective diffusion coefficient, per / (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.30E-03 3.20E-03 6.00E-03 4.22E-03 6.00E-03 7.27E-03 1.14E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00 0.00E+0	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 1.72E-03 4.76E-03 3.30E-03 3.30E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 7.27E-03 1.14E-03 3.84E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromet Chlorodifromomethane Dichlorodifluoromethane dis-1,2-Dichloroethylene Ethylbenzene	space below grade, A ₈ (cm ²) 1.00E+06 1.00E+0	to-total area ratio, 1 (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 7.49E-03 5.55E-01 3.12E-03	constant at ave. soil temperature, HT _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.10E-01 1.10E-01 1.18E-01 2.58E-02 1.08E+01 1.30E-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.	A effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.30E-03 3.30E-03 6.00E-03 4.22E-03 1.14E-03 3.84E-03 4.25E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.30E-03 3.26E-03 4.22E-03 4.22E-03 4.22E-03 4.22E-03 4.22E-03 4.22E-03 4.22E-03 4.23E-03 4.25E-03 4.25E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometi Chlorodibromomethane Dichlorodifluoromethane Gis-1,2-Dichloroethylene Ethylbenzene Cumene	space below grade, A ₈ (cm ²) 1.00E+06 1.00E+0	to-total area ratio, ratio, ratio, rq (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 117,734 117,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03 7.49E-03 6.19E-04 2.58E-01 3.12E-03 5.55E-03 7.50E-01	constant at ave. soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.18E-01 1.10E-01 1.18E-01 2.58E-02 2.58E-02 2.31E-01 3.31E-01 3.31E-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.78E-0	A effective diffusion coefficient, perf , (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 1.14E-03 3.84E-03 3.38E-03 3.38E-03 3.38E-03 3.38E-03 3.38E-03 3.38E-03 3.38E-03 4.38E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00 0.00E+0	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 3.30E-03 6.00E-03 4.22E-03 6.00E-03 4.22E-03 4.38E-03 3.384E-03 4.33E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromet Chlorodifromomethane Dichlorodifluoromethane dis-1,2-Dichloroethylene Ethylbenzene	space below grade, A ₈ (cm ²) 1.00E+06 1.00E+0	to-total area ratio, ratio, ratio, ratio, ratio, ratio, ratio, some constitution of the state of	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,7741	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.83E-03 2.83E-03 6.19E-04 2.58E-01 3.12E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04	constant at ave. soil temperature, HTs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.10E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 3.3E-01 2.38E-02 1.08E+01 4.305-01 4.305-01 4.305-01 4.305-01 4.305-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.	A effective diffusion coefficient, perf , (cm²/s) 7.31E-03 5.08E-03 4.76E-03 3.29E-03 3.20E-03 4.22E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.36E-03 4.36E-03 5.92E-03 5.92E-03 5.92E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.20E-03 4.22E-03 4.22E-03 4.22E-03 4.22E-03 4.33E-03 3.35E-03 4.35E-03 4.35E-03 4.35E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometi Chlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Ethylbenzene Methyl soboutylketone (4-me MTBE MTBE	space below grade, A ₈ (cm ²) 1.00E+06 1.00E+0	to-total area ratio, 19 (unitless) 5.00E-03 5.00	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at tave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 11,518 9,741 7,179 12,820	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 7.49E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04	constant at ave. soil temperature, H'TS (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.10E-01 1.10E-01 1.10E-01 1.18E-01 3.12E-01 2.58E-02 1.08E+01 4.10E-03 2.31E-01 2.31E-01 2.31E-01 2.31E-01 2.31E-01	viscosity at ave. soil temperature, µrs (g/cm-s) (g/cm-s) (1.78E-04 1.78E-04 1.78E	A effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.20E-03 6.00E-03 7.27E-03 1.14E-03 3.84E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00 0.00E+0	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.20E-03 6.00E-03 7.27E-03 1.14E-03 3.84E-03 4.23E-03 4.25E-03 4.35E-03 4.35E-03 3.75E-03 4.36E-03 5.92E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylettylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene tert-Butylbenzene tert-Butylbenzene (Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometh Chlorodibromomethane cis-1,2-Dichloroethylene Ethylbenzene Cumene Methylisobutylketone (4-me MTBE Naphthalene n-Propylbenzene	space below grade, A8 (cm²)	to-total area ratio, 1 (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 117,34 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 6.19E-04 2.58E-01 3.12E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04	constant at ave. soil temperature, HT _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.38E-01 1.38E-01 2.38E-02 1.38E-01 3.13E+01 3.13E+01 3.13E+01 3.13E-01 3.13E-01 3.13E-01 3.13E-01 3.13E-01 3.13E-01 3.13E-01 3.13E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, porf (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 6.00E-03 3.26E-03 6.00E-03 1.14E-03 3.84E-03 4.25E-03 4.33E-03 3.75E-03 4.33E-03 3.75E-03 3.42E-03 3.42E-03 3.42E-03 4.23E-03 3.42E-03 4.33E-03 3.42E-03 4.23E-03 3.42E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.29E-03 3.26E-03 6.00E-03 6.00E-03 1.14E-03 3.84E-03 4.25E-03 4.35E-03 4.35E-03 3.75E-03 3.42E-03 4.38E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometi Chlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Methyl sibotylketone (4-m MTBE Maphthalene n-Propylbenzene 1,1,2)-Citracholoroethylane n-Propylbenzene 1,1,2,2-Tetracholoroethane	Space below grade, A ₈ (cm ²) 1.00E+06 1.00E+0	to-total area ratio, 1 (unitless) (unitless) 5.00E-03 5.0	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at tave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 4,640 10,052 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.88E-01 3.12E-03 5.55E-03 7.49E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 7.21E-03	constant at awe, soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.15E-01 1.30E-01 2.31E-01 2.31E-01 2.31E-01 2.31E-01 3.13E-01 4.10E-03 3.03E-02 3.01E-01	viscosity at ave, soil temperature,	A effective diffusion coefficient, per / (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.20E-03 6.04E-03 6.00E-03 6.00E-03 1.14E-03 3.84E-03 3.85E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.35E-03 4.35E-03 4.37E-03 3.47E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00 0.00E+0	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 1.72E-03 4.76E-03 3.30E-03 3.30E-03 3.30E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.36E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylettylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene tert-Butylbenzene tert-Butylbenzene (Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometh Chlorodibromomethane cis-1,2-Dichloroethylene Ethylbenzene Cumene Methylisobutylketone (4-me MTBE Naphthalene n-Propylbenzene	space below grade, A ₈ (cm ²) 1.00E+06 1.00E+0	to-total area ratio, 1 (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03 7.49E-03 3.12E-03 7.50E-01 3.12E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04 1.32E-03 2.40E-04 1.32E-03 2.40E-04 1.32E-02 2.40E-04 1.32E-02 2.40E-04 1.32E-03 2.40E-04 1.32E-02 2.40E-04 1.40E-04 1.4	constant at ave. soil temperature, HT _{TS} (unitless) 1.75E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 2.58E-02 1.38E-01 1.31E-01 3.312E-01 1.38E-01 3.312E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.75E-03 6.44E-03 3.29E-03 3.20E-03 4.22E-03 6.00E-03 4.22E-03 6.00E-03 4.22E-03 3.84E-03 4.25E-03 4.35E-03 4.36E-03 4.35E-03 4.36E-03 4.36E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 1.72E-03 4.76E-03 6.44E-03 3.09E-03 3.20E-03 4.22E-03 6.00E-03 4.22E-03 4.25E-03 4.25E-03 4.35E-03 4.36E-03 4.36E-03 4.36E-03 4.36E-03 4.36E-03 4.36E-03 4.16E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylektylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromett Chloroformomethane Dichlorodifluoromethane cis-1,2-Dichloroethylene Ethylbenzene Cumene Methyl solutionethylene Cumene MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Tetrachloroethylene Tetrachloroethylene Toluene 1,1,1,1-Trichloroethane	Space below grade, A ₈ (cm ²) 1.00E+06 1.00E+0	to-total area ratio, 19 (unitless) 5.00E-03 5.00	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at tave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 4,640 10,052 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.88E-01 3.12E-03 5.55E-03 7.49E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 7.21E-03	constant at ave. soil temperature, HTs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.38E+01 1.38E+01 1.38E+01 1.38E+01 1.38E+01 1.39E-02 3.01E-01 3.13E+01	viscosity at ave. soil temperature,	A effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 5.08E-03 4.76E-03 6.44E-03 3.29E-03 3.20E-03 4.22E-03 6.00E-03 4.22E-03 6.00E-03 4.22E-03 3.42E-03 4.31E-03 4.31E-03 4.31E-03 4.31E-03 4.31E-03 4.31E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.75E-03 6.44E-03 3.29E-03 3.20E-03 4.22E-03 4.22E-03 4.36E-03 4.35E-03 4.35E-03 4.35E-03 4.31E-03 4.31E-03 4.31E-03 4.31E-03 4.31E-03 4.31E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylalcohol n-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometh Chlorodibromomethane Dichlorodifloromethane Dichlorodifloromethane Cis-1,2-Dichloroethylene Ethylbenzene Cumene Methylisobutylketone (4-me MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethylene Toluene Toluene 1,1,1-Trichloroethane 1,1,1,2-Trichloroethane	space below grade, A8 (cm²)	to-total area ratio, 1 (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 117,34 117,34 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462 9,056 7,787 9,474	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.48E-03 3.12E-03 3.12E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04 1.31E-02 4.84E-03 1.31E-02	constant at ave. soil temperature, Hrs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.10E-01 1.10E-01 1.10E-01 1.30E-01 1.30E-01 1.30E-01 2.31E-01 3.13E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, perf , (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 3.29E-03 6.00E-03 4.22E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.36E-03 4.37E-03 4.11E-03 4.11E-03 4.11E-03 4.11E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, perify (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.29E-03 3.29E-03 3.29E-03 4.22E-03 6.00E-03 4.22E-03 4.25E-03 4.35E-03 4.25E-03 4.35E-03 4.31E-03 4.11E-03 4.11E-03 4.11E-03 4.50E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylettylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometi Chlorodifluoromethane cis-1,2-Dichloroethylene Ethylbenzene Methyl sobutylketone (4-me MTBE Maphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,1,2-Trichloroethane 1,1,1,2-Trichloroethane 1,1,1,2-Trichloroethane 1,1,1,2-Trichloroethane 1,1,1,2-Trichloroethane 1,1,1,2-Trichloroethane 1,1,1,2-Trichloroethane 1,1,1,2-Trichloroethane	space below grade, A ₈ (cm²) - 1.00E+06 - 1	to-total area ratio, 19 (unitless) 5.00E-03 5.00	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at tave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,712 9,712 9,712 4,640 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462 9,056 7,787 9,474	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.43E-03 7.49E-03 7.59E-01 9.82E-05 4.86E-04 7.21E-03 2.40E-04 1.32E-02 6.56E-04 1.31E-02 6.56E-04 7.84E-03	constant at awe, soil temperature, HTs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.13E-01 2.38E-02 1.08E+01 2.31E-01 3.31E-01 3.31E-01 2.31E-01 3.31E-01 3.31E-01 2.31E-01 3.31E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, perial (cm²/s) 7.31E-03 5.08E-03 5.08E-03 4.76E-03 6.44E-03 3.29E-03 3.20E-03 6.00E-03 7.27E-03 1.14E-03 3.84E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 3.47E-03 3.47E-03 4.16E-03 4.16E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.20E-03 3.20E-03 3.20E-03 4.22E-03 4.22E-03 4.22E-03 4.22E-03 4.22E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.36E-03 5.02E-03 4.11E-03 5.02E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylektylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometholiorodifluoromethane Dichlorodifluoromethane Dichlorodifluoromethane Cis-1,2-Dichloroethylene Ethylbenzene Cumene Methyl sobutylketone (4-m MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,1,2-Trichloroethane 1,1,2-Trichloroethane 1,2,4-Trichloroethane 1,2,4-Trichloroethane 1,2,4-Trichloroethane 1,2,4-Trichloroethane	space below grade, A8 (cm² de l'acceptant de l'acce	to-total area ratio, 1 (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462 9,056 7,787 9,474 6,053	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 6.19E-04 3.12E-03 7.50E-01 3.12E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04 1.13E-02 4.84E-03 1.13I-02 6.56E-04 7.84E-02 4.11E-03	constant at awe, soil temperature, HT _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.38E-01 2.31E-01 3.312E-01 2.31E-01 3.312E-01 2.31E-01 3.312E-01 2.31E-01 3.312E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, porf (cm²/s) (7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 4.25E-03 6.00E-03 4.25E-03 6.00E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, perf (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 1.14E-03 4.25E-03 4.35E-03 4.35E-03 4.25E-03 5.02E-03 5.02E-03 5.02E-03 5.02E-03 5.02E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometi Chlorodifloromethane cis-1,2-Dichloroethylene Ethylbenzene Methylisobutylketone (4-m MTBE Maphthalene n-Propylbenzene 1,1,12-Tetrachloroethane 1,1,12-Trichloroethane	space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, 1 (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462 9,056 7,787 9,474 6,053 11,579	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 2.58E-01 2.40E-02 2.64E-03 2.38E-01 3.12E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 7.21E-03 2.40E-04 1.32E-02 4.84E-03 1.31E-02 6.56E-04 7.84E-02 4.11E-03	constant at awe, soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.00E+00 1.10E-01 1.10E-01 1.18E-01 3.12E-01 2.58E-02 1.08E+01 2.31E-01 3.13E+01 4.10E-03 2.03E-02 3.01E-01 2.74E-02 3.01E-01 2.72E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, per / (cm²/s) 7.31E-03 5.08E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.30E-03 3.29E-03 3.30E-03 6.00E-03 4.22E-03 6.00E-03 4.22E-03 6.00E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.50E-03 4.50E-03 4.50E-03 4.50E-03 3.50E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 5.08E-03 1.72E-03 4.76E-03 3.30E-03 3.29E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 4.22E-03 4.32E-03 4.35E-03 4.35E-03 4.35E-03 4.36E-03 5.92E-03 4.11E-03 4.16E-03 5.02E-03 4.51E-03 5.02E-03 4.51E-03 5.02E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13
Benzene Bromodichloromethane Methylettyliketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometholiorodifluoromethane Dichlorodifluoromethane Dichlorodifluoromethane Cis-1,2-Dichloroethylene Ethylbenzene Cumene Methyl sobutylketone (4-m MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,1-Trichloroethane Toluene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichlorofluoromethane 1,2,4-Trichloroethane Trichlorofluoromethane 1,2,4-Trichloroethane	space below grade, A8 (cm² de l'acceptant de l'acce	to-total area ratio, 19 (unitless) 5.00E-03 5.00	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462 9,056 7,787 9,474 6,053	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 6.19E-04 3.12E-03 7.50E-01 3.12E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04 1.13E-02 4.84E-03 1.13I-02 6.56E-04 7.84E-02 4.11E-03	constant at awe, soil temperature, HT _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.38E-01 2.31E-01 3.312E-01 2.31E-01 3.312E-01 2.31E-01 3.312E-01 2.31E-01 3.312E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, porf (cm²/s) (7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 4.25E-03 6.00E-03 4.25E-03 6.00E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, perf (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.26E-03 6.00E-03 3.26E-03 6.00E-03 1.14E-03 4.25E-03 4.35E-03 4.25E-03 5.02E-03 5.02E-03 5.02E-03 5.02E-03	path length, Ld (cm) 137 137 137 137 137 137 137 137 137 13

Resident using 5 ft. soil vapor data south, southwest, and west of the Western Parcel

							Exponent of	Infinite			
		_		Average	Crack		equivalent	source	Infinite		
	Convection	Source		vapor	effective		foundation	indoor	source	Unit	D (
	path	vapor	Crack	flow rate	diffusion	Area of	Peclet	attenuation	bldg.	risk	Reference
	length,	conc.,	radius,	into bldg.,	coefficient,	crack,	number,	coefficient,	conc.,	factor,	conc.,
	Lp	C _{source}	r _{crack}	Q _{soil}		A _{crack}	exp(Pe ^t)	α	C _{building}	URF	RfC
	(cm)	$(\mu g/m^3)$	(cm)	(cm ³ /s)	(cm ² /s)	(cm ²)	(unitless)	(unitless)	(μg/m³)	(μg/m³) ⁻¹	(mg/m³)
Acetone	15	2.70E+02	1.25	8.33E+01	7.31E-03	5.00E+03	6.96E+14	9.60E-04	2.59E-01	NA	3.1E+01
Benzene	15	7.10E+01	1.25	8.33E+01	5.08E-03	5.00E+03	2.34E+21	7.57E-04	5.38E-02	2.9E-05	3.0E-02
Bromodichloromethane	15	7.10E+01 7.50E+00	1.25	8.33E+01	1.72E-03	5.00E+03	9.61E+62	3.23E-04	2.42E-03	3.7E-05	7.0E-02
Methylethylketone (2-butar		6.40E+01	1.25	8.33E+01	4.76E-03	5.00E+03	6.40E+22	7.24E-04	4.63E-02	NA	5.0E+00
tert-Butvl alcohol	15	2.50E+03	1.25	8.33E+01	6.44E-03	5.00E+03	7.29E+16	8.87E-04	2.22E+00	NA NA	3.0E+00
n-Butylbenzene	15	2.50E+03 2.50E+01	1.25	8.33E+01	3.29E-03	5.00E+03	9.87E+32	5.50E-04	1.38E-02	NA NA	1.4E-01
	15	2.50E+01	1.25	8.33E+01	3.30E-03	5.00E+03	7.93E+32	5.51E-04	1.38E-01	NA NA	1.4E-01
sec-Butylbenzene	15	2.50E+02 2.50E+01	1.25	8.33E+01			1.93E+32	5.46E-04	1.38E-01	NA NA	1.4E-01
tert-Butylbenzene Carbon disulfide	15	1.30E+01	1.25	8.33E+01	3.26E-03 6.00E-03	5.00E+03 5.00E+03	1.22E+18	8.47E-04	1.10E-02	NA NA	7.0E-01
Chlorobenzene		1.80E+01	1.25				5.72E+25	6.63E-04		NA NA	7.0E-01 1.0E+00
	15 15			8.33E+01	4.22E-03	5.00E+03			1.19E-01		
Chloroform	15	2.00E+02 1.20E+00	1.25 1.25	8.33E+01 8.33E+01	6.00E-03	5.00E+03	1.21E+18	8.48E-04	1.70E-01	5.3E-06 1.8E-06	3.0E-01 9.0E-02
Methyl chloride (chloromet		4.80E+00	1.25		7.27E-03	5.00E+03	8.45E+14	9.57E-04 2.23E-04	1.15E-03 1.07E-03		
Chlorodibromomethane	15			8.33E+01	1.14E-03	5.00E+03	2.37E+95			2.7E-05	7.0E-02
Dichlorodifluoromethane	15	3.30E+00	1.25	8.33E+01	3.84E-03	5.00E+03	1.92E+28	6.19E-04	2.04E-03	NA	2.0E-01
cis-1,2-Dichloroethylene	15	4.20E+00	1.25	8.33E+01	4.25E-03	5.00E+03	3.52E+25	6.67E-04	2.80E-03	NA	3.5E-02
Ethylbenzene	15	8.10E+01	1.25	8.33E+01	4.33E-03	5.00E+03	1.19E+25	6.76E-04	5.48E-02	2.5E-06	1.0E+00
Cumene	15	2.50E+02	1.25	8.33E+01	3.75E-03	5.00E+03	8.65E+28	6.08E-04	1.52E-01	NA	4.0E-01
Methylisobutylketone (4-m		7.70E+01	1.25	8.33E+01	4.36E-03	5.00E+03	7.77E+24	6.80E-04	5.23E-02	NA	3.0E+00
MTBE	15	4.10E+01	1.25	8.33E+01	5.92E-03	5.00E+03	2.19E+18	8.40E-04	3.44E-02	2.6E-07	3.0E+00
Naphthalene	15	1.60E+01	1.25	8.33E+01	3.42E-03	5.00E+03	6.11E+31	5.66E-04	9.06E-03	3.4E-05	3.0E-03
n-Propylbenzene	15	2.50E+01	1.25	8.33E+01	3.47E-03	5.00E+03	1.96E+31	5.73E-04	1.43E-02	NA	1.4E-01
1,1,2,2-Tetrachloroethane	15	5.00E+01	1.25	8.33E+01	4.11E-03	5.00E+03	2.54E+26	6.51E-04	3.26E-02	5.8E-05	1.4E-02
Tetrachloroethylene	15	6.70E+01	1.25	8.33E+01	4.16E-03	5.00E+03	1.32E+26	6.56E-04	4.40E-02	5.9E-06	3.5E-02
Toluene	15	2.00E+02	1.25	8.33E+01	5.02E-03	5.00E+03	4.13E+21	7.51E-04	1.50E-01	NA	3.0E-01
1,1,1-Trichloroethane	15	4.20E+02	1.25	8.33E+01	4.50E-03	5.00E+03	1.30E+24	6.96E-04	2.92E-01	NA	5.0E+00
1,1,2-Trichloroethane	15	2.50E+01	1.25	8.33E+01	4.51E-03	5.00E+03	1.21E+24	6.96E-04	1.74E-02	1.6E-05	1.4E-02
Trichlorofluoromethane	15	6.80E+01	1.25	8.33E+01	5.02E-03	5.00E+03	4.16E+21	7.51E-04	5.11E-02	NA	7.0E-01
1,2,4-Trimethylbenzene	15	3.00E+01	1.25	8.33E+01	3.50E-03	5.00E+03	1.07E+31	5.77E-04	1.73E-02	NA	7.0E-03
1,3,5-Trimethylbenzene	15	8.60E+00	1.25	8.33E+01	3.48E-03	5.00E+03	1.72E+31	5.74E-04	4.94E-03	NA	6.0E-03
Vinyl chloride (chloroethene		7.00E+00	1.25	8.33E+01	6.12E-03	5.00E+03	5.54E+17	8.58E-04	6.01E-03	7.8E-05	1.0E-01
p-Xylene	15	1.30E+02	1.25	8.33E+01	4.44E-03	5.00E+03	2.85E+24	6.89E-04	8.95E-02	NA	1.0E-01
o-Xylene	15	4.30E+01	1.25	8.33E+01	5.02E-03	5.00E+03	4.12E+21	7.51E-04	3.23E-02	NA	1.0E-01

RESULTS SHEET

Resident using 5 ft. soil vapor data south, southwest, and west of the Western Parcel INCREMENTAL RISK CALCULATIONS:

Incremental	Hazard
risk from	quotient
vapor	from vapor
intrusion to	intrusion to
indoor air,	indoor air,
carcinogen	noncarcinogen
(unitless)	(unitless)

Acetone	l NA	8.0E-06
Benzene	6.4E-07	1.7E-03
	3.7E-08	8.9E-06
Bromodichloromethane		
Methylethylketone (2-butanone)	NA	8.9E-06
tert-Butyl alcohol	NA	7.1E-05
n-Butylbenzene	NA	9.4E-05
sec-Butylbenzene	NA	9.4E-04
tert-Butylbenzene	NA	9.4E-05
Carbon disulfide	NA	1.5E-05
Chlorobenzene	NA	1.1E-04
Chloroform	3.7E-07	5.4E-04
Methyl chloride (chloromethane)	8.5E-10	1.2E-05
Chlorodibromomethane	1.2E-08	1.5E-05
Dichlorodifluoromethane	NA	9.8E-06
cis-1,2-Dichloroethylene	NA	7.7E-05
Ethylbenzene	5.6E-08	5.3E-05
Cumene	NA	3.6E-04
Methylisobutylketone (4-methyl-2-pentanone)	NA	1.7E-05
MTBE	3.7E-09	1.1E-05
Naphthalene	1.3E-07	2.9E-03
n-Propylbenzene	NA	9.8E-05
1,1,2,2-Tetrachloroethane	7.8E-07	2.2E-03
Tetrachloroethylene	1.1E-07	1.2E-03
Toluene	NA	4.8E-04
1,1,1-Trichloroethane	NA	5.6E-05
1,1,2-Trichloroethane	1.1E-07	1.2E-03
Trichlorofluoromethane	NA	7.0E-05
1,2,4-Trimethylbenzene	NA	2.4E-03
1,3,5-Trimethylbenzene	NA	8.0E-04
Vinyl chloride (chloroethene)	1.9E-07	5.8E-05
p-Xylene	NA	8.6E-04
o-Xylene	NA NA	3.1E-04
[2E-06	2E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL	
DOWN	
TO "END"	

DATA ENTRY SHEET Resident using 10 ft. soil vapor data south, southwest, and west of the Western Parcel Program modified to accommodate multiple Version 3.1; 02/04 chemicals Soil Gas Concentration Data Defaults Chemical gas conc., gas conc., CAS No. OR numbers only C_g no dashes) (µg/m³) (ppmv) Chemical 67641 1.80F+03 Acetone 71432 5.30F±01 75274 2.50F+01 Bromodichloromethane 78933 4.00E+01 Methylethylketone (2-butanone) 75650 1.50E+03 tert-Butyl alcohol 104518 n-Butvlbenzene 135988 1.50E+03 sec-Butylbenzene 98066 2.50E+01 tert-Butvlbenzene 75150 7.10F+01 108907 2 50F±03 67663 3.10F+02 74873 5.00E+01 Methyl chloride (chloromethane) 124481 2.50E+01 Note: Same as Dibromochloromethane 75718 2.90E+00 Dichlorodifluoromethane 156592 3.30E+00 cis-1.2-Dichloroethylene 100414 1.00E+03 Ethylbenzene 98828 4.90F+03 Note: Same as isopropylbenzene 108101 2 50F±02 Methylisobutylketone (4-methyl-2-pentanone) 1634044 1.50E+02 91203 1.60E+01 Naphthalene 103651 2.50E+01 n-Propylbenzene 79345 1,1,2,2-Tetrachloroethane 127184 1.50E+02 Tetrachloroethylene 108883 5.30E+02 Toluene 1.70E+02 1,1,1-Trichloroethane 71556 79005 2 50F±01 1,1,2-Trichloroethane 6.90F+01 75694 95636 4.20E+01 1,2,4-Trimethylbenzene 108678 2.50E+01 1,3,5-Trimethylbenzene 75014 2.90E+00 Vinvl chloride (chloroethene) 106423 5.00E+01 p-Xylene Note: results reported as "m,p-xylenes"; p-xylene has the most conservative physical constants 95476 2.40E+02 o-Xvlene ENTER ENTER ENTER ENTER MORE Depth Totals must add up to value of Ls (cell F24) Soil gas User-defined below grade Thickness Thickness stratum A Average Thickness of soil of soil SCS stratum A of enclosed depth soil of soil stratum B. stratum C. soil type soil vapor space floor, below grade, temperature, stratum A, (Enter value or 0) (Enter value or 0) used to estimate OR permeability, Le T_S h۸ ho he soil vapor k. (cm) (°C) (cm) permeability) (cm²) 305 19 ENTER ENTER ENTER ENTER ENTER ENTER ENTER MORE ↓ Stratum A SCS Stratum A soil dry Stratum A soil total Stratum A soil water-filled Stratum B SCS Stratum B soil total Stratum B soil water-filled Stratum C SCS Stratum C soil total Stratum C soil water-filled Stratum B Stratum C soil dry soil dry soil type bulk density, porosity, porosity, soil type bulk density, porosity, porosity, soil type bulk density, porosity, porosity, θ_w^B θ_w^A $\rho_b^{\ B}$ O_bC θ...^C ρ_b^A Lookup Soil Parameters Lookup Soil Parameters Lookup Soil Parameters (g/cm³) (g/cm³) (unitless) (cm³/cm³) (unitless) (cm³/cm³) (g/cm3) (unitless) (cm³/cm³) 0.439 0.18 SII 1.49 ENTER ENTER ENTER ENTER ENTER ENTER ENTER ENTER Enclosed Enclosed Enclosed Average vapor flow rate into bldg. MORE Soil-bldg. Enclosed Floor-wall Indoor space space floor space space height, pressure seam crack air exchange OR differential, Leave blank to calculate thickness, length, rate, L_{crack} ΔΡ W_{B} ER Q_{soil} (cm) (g/cm-s²) (cm) (cm) (cm) (1/h) (L/m)

AT_C AT_{NC} ED EF
(yrs) (yrs) (yrs) (days/yr)

70 30 30 350

40

ENTER

Averaging

time for

noncarcinogens,

1000

Exposure

duration,

1000

Exposure

frequency,

244

END

15

Averaging

time for

carcinogens,

0.5

CHEMICAL PROPERTIES SHEET

Resident using 10 ft. soil vapor data south, southwest, and west of the Western Parcel

Resident using 10 rt. soil vapo	r data south, southw	est, and west			5					
			Henry's	Henry's	Enthalpy of					
			law constant	law constant	vaporization at	Normal			Unit	
	Diffusivity	Diffusivity	at reference	reference	the normal	boiling	Critical	Molecular	risk	Reference
	in air,	in water,	temperature,	temperature,	boiling point,	point,	temperature,	weight,	factor,	conc.,
	D_a	D_{w}	Н	T_R	$\Delta H_{v,b}$	T_B	T _C	MW	URF	RfC
	(cm ² /s)	(cm ² /s)	(atm-m ³ /mol)	(°C)	(cal/mol)	(°K)	(°K)	(g/mol)	(µg/m³) ⁻¹	(mg/m^3)
=					`			,,	., .	
Acetone	1.24E-01	1.14E-05	3.87E-05	25	6,955	329.20	508.10	58.08	0.0E+00	3.1E+01
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	78.11	2.9E-05	3.0E-02
Bromodichloromethane	2.98E-02	1.06E-05	1.60E-03	25	7,800	363.15	585.85	163.83	3.7E-05	7.0E-02
Methylethylketone (2-butanor	8.08E-02	9.80E-06	5.58E-05	25	7,481	352.50	536.78	72.11	0.0E+00	5.0E+00
tert-Butyl alcohol	9.85E-02	1.14E-05	9.05E-06	25	9,338	355.41	508.00	74.12	0.0E+00	3.0E+01
n-Butylbenzene	5.70E-02	8.12E-06	1.31E-02	25	9,290	456.46	660.50	134.22	0.0E+00	1.4E-01
sec-Butylbenzene	5.70E-02	8.12E-06	1.39E-02	25	88,730	446.50	679.00	134.22	0.0E+00	1.4E-01
tert-Butylbenzene	5.65E-02	8.02E-06	1.19E-02	25	8,980	442.10	1220.00	134.22	0.0E+00	1.4E-01
Carbon disulfide	1.04E-01	1.00E-05	3.02E-02	25	6,391	319.00	552.00	76.13	0.0E+00	7.0E-01
Chlorobenzene	7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	112.56	0.0E+00	1.0E+00
Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	119.38	5.3E-06	3.0E-01
Methyl chloride (chloromethan	1.26E-01	6.50E-06	8.80E-03	25	5,115	249.00	416.25	50.49	1.8E-06	9.0E-02
Chlorodibromomethane	1.96E-02	1.05E-05	7.81E-04	25	5,900	416.14	678.20	208.28	2.7E-05	7.0E-02
Dichlorodifluoromethane	6.65E-02	9.92E-06	3.42E-01	25	9,421	243.20	384.95	120.92	0.0E+00	2.0E-01
cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	96.94	0.0E+00	3.5E-02
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	106.17	2.5E-06	1.0E+00
Cumene	6.50E-02	7.10E-06	1.16E+00	25	10,335	425.56	631.10	120.19	0.0E+00	4.0E-01
Methylisobutylketone (4-meth	7.50E-02	7.80E-06	1.38E-04	25	8,243	389.50	571.00	100.16	0.0E+00	3.0E+00
MTBE	1.02E-01	1.05E-05	6.23E-04	25	6,678	328.30	497.10	88.15	2.6E-07	3.0E+00
Naphthalene	5.90E-02	7.50E-06	4.82E-04	25	10,373	491.14	748.40	128.18	3.4E-05	3.0E-03
n-Propylbenzene	6.01E-02	7.83E-06	1.07E-02	25	9,123	432.20	630.00	120.19	0.0E+00	1.4E-01
1,1,2,2-Tetrachloroethane	7.10E-02	7.90E-06	3.44E-04	25	8,996	419.60	661.15	167.85	5.8E-05	1.4E-02
Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	165.83	5.9E-06	3.5E-02
Toluene	8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	92.14	0.0E+00	3.0E-01
1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	133.40	0.0E+00	5.0E+00
1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.11E-04	25	8,322	386.15	602.00	133.41	1.6E-05	1.4E-02
Trichlorofluoromethane	8.70E-02	9.70E-06	9.68E-02	25	5,999	296.70	471.00	137.36	0.0E+00	7.0E-01
1,2,4-Trimethylbenzene	6.06E-02	7.92E-06	6.14E-03	25	9,369	442.30	649.17	120.20	0.0E+00	7.0E-03
1,3,5-Trimethylbenzene	6.02E-02	8.67E-06	5.87E-03	25	9,321	437.89	637.25	120.20	0.0E+00	6.0E-03
Vinyl chloride (chloroethene)	1.06E-01	1.23E-05	2.69E-02	25	5,250	259.25	432.00	62.50	7.8E-05	1.0E-01
p-Xylene	7.69E-02	8.44E-06	7.64E-03	25	8,525	411.52	616.20	106.17	0.0E+00	1.0E-01
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	106.17	0.0E+00	1.0E-01

Resident using 10 ft. soil vapor data south, southwest, and west of the Western Parcel

			Stratum A	Stratum B	Stratum C	Stratum A	Stratum A	Stratum A	Stratum A	Floor-		
	Exposure	Source- building	soil air-filled	soil air-filled	soil air-filled	effective total fluid	soil intrinsic	soil relative air	soil effective vapo	wall seam	Soil	Bldg. ventilation
	duration,	separation,	porosity,	porosity,	porosity,	saturation,	permeability,	permeability,	permeability,	perimeter,	gas	rate,
	τ	L _T	θ _a ^A	θ_a^B	θ_a^C	S _{te}	k _i	k _{rg}	k _v	X _{crack}	conc.	Qbuilding
•	(sec)	(cm)	(cm ³ /cm ³)	(cm ³ /cm ³)	(cm ³ /cm ³)	(cm ³ /cm ³)	(cm ²)	(cm ²)	(cm ²)	(cm)	(μg/m³)	(cm ³ /s)
Acetone	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.80E+03	3.39E+04
Benzene Bromodichloromethane	9.46E+08 9.46E+08	290 290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	5.30E+01 2.50E+01	3.39E+04 3.39E+04
Methylethylketone (2-butar	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.00E+01	3.39E+04
tert-Butyl alcohol	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.50E+03	3.39E+04
n-Butylbenzene sec-Butylbenzene	9.46E+08 9.46E+08	290 290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000 4,000	2.50E+01 1.50E+03	3.39E+04 3.39E+04
tert-Butylbenzene	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+01	3.39E+04
Carbon disulfide Chlorobenzene	9.46E+08	290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09	4,000	7.10E+01 2.50E+03	3.39E+04
Chloroform	9.46E+08 9.46E+08	290 290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	3.10E+02	3.39E+04 3.39E+04
Methyl chloride (chlorometh	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	5.00E+01	3.39E+04
Chlorodibromomethane Dichlorodifluoromethane	9.46E+08 9.46E+08	290 290	0.259	ERROR FRROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	2.50E+01 2.90F+00	3.39E+04 3.39E+04
cis-1,2-Dichloroethylene	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	3.30E+00	3.39E+04
Ethylbenzene	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.00E+03	3.39E+04
Cumene Methylisobutylketone (4-me	9.46E+08 9.46E+08	290 290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000 4,000	4.90E+03 2.50E+02	3.39E+04 3.39E+04
MTBE (4-116	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.50E+02	3.39E+04
Naphthalene n-Propylbenzene	9.46E+08	290 290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000	1.60E+01 2.50E+01	3.39E+04 3.39E+04
1,1,2,2-Tetrachloroethane	9.46E+08 9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09 2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	5.00E+01	3.39E+04 3.39E+04
Tetrachloroethylene	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.50E+02	3.39E+04
Toluene 1,1,1-Trichloroethane	9.46E+08 9.46E+08	290 290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307	2.86E-09 2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	5.30E+02 1.70E+02	3.39E+04 3.39E+04
1,1,2-Trichloroethane	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+01	3.39E+04
Trichlorofluoromethane	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	6.90E+01	3.39E+04
1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene	9.46E+08 9.46E+08	290 290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798 0.798	2.28E-09 2.28E-09	4,000 4,000	4.20E+01 2.50E+01	3.39E+04 3.39E+04
Vinyl chloride (chloroethene	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.90E+00	3.39E+04
p-Xylene o-Xylene	9.46E+08 9.46E+08	290 290	0.259 0.259	ERROR ERROR	ERROR ERROR	0.307 0.307	2.86E-09 2.86E-09	0.798	2.28E-09 2.28E-09	4,000 4,000	5.00E+01 2.40E+02	3.39E+04 3.39E+04
	Area of enclosed	Crack-	Crack	Enthalpy of	Henry's law	Henry's law	Vapor	Stratum A	Stratum B	Stratum C	Total overall	
	enclosed space below grade,	Crack- to-total area ratio,	Crack depth below grade,	Enthalpy of vaporization at ave. soil temperature,	Henry's law constant at ave. soil temperature,	Henry's law constant at ave. soil temperature,	Vapor viscosity at ave. soil temperature,	A effective diffusion coefficient,	B effective diffusion coefficient,	C effective diffusion coefficient,	overall effective diffusion coefficient,	Diffusion path length,
	enclosed space below grade, A _B	to-total area	depth below	vaporization at ave. soil	constant at ave. soil	constant at ave. soil	viscosity at ave. soil	A effective diffusion	B effective diffusion	C effective diffusion	overall effective diffusion	path
	enclosed space below grade, A _B (cm ²)	to-total area ratio, η (unitless)	depth below grade, Z _{crack} (cm)	vaporization at ave. soil temperature, ΔH _{v,TS} (cal/mol)	constant at ave. soil temperature, H _{TS} (atm-m ³ /mol)	constant at ave. soil temperature, H' _{TS} (unitless)	viscosity at ave. soil temperature, µ _{TS} (g/cm-s)	A effective diffusion coefficient, D ^{eff} _A (cm ² /s)	B effective diffusion coefficient, D ^{eff} _B (cm ² /s)	C effective diffusion coefficient, D ^{eff} c (cm ² /s)	overall effective diffusion coefficient, D ^{eff} _T (cm ² /s)	path length, L _d (cm)
Acetone Benzene	enclosed space below grade, A _B (cm ²)	to-total area ratio, η (unitless)	depth below grade, Z _{crack} (cm)	vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	constant at ave. soil temperature, H _{TS} (atm-m ³ /mol)	constant at ave. soil temperature, H' _{TS} (unitless)	viscosity at ave. soil temperature, µts (g/cm-s)	A effective diffusion coefficient, Deff (cm²/s)	B effective diffusion coefficient, Deff B (cm²/s)	C effective diffusion coefficient, Deff c (cm²/s)	overall effective diffusion coefficient, D ^{eff} _T (cm ² /s) 7.31E-03	path length, L _d (cm)
Benzene Bromodichloromethane	enclosed space below grade, A _B (cm ²) 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15	vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) 7,447 8,030 8,576	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02	viscosity at ave. soil temperature, μ_{TS} (g/cm-s) 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03	B effective diffusion coefficient, Deff B (cm²/s) 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff_T (cm²/s) 7.31E-03 5.08E-03 1.72E-03	path length, L _d (cm) 290 290 290
Benzene Bromodichloromethane Methylethylketone (2-butar	enclosed space below grade, A _B (cm ²) 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm)	vaporization at ave. soil temperature,	constant at ave. soil temperature, H _{TS} (atm-m ³ /mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03	viscosity at ave. soil temperature, µтs (g/cm-s) 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03	B effective diffusion coefficient, Deff B (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff_T (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03	path length, L _d (cm) 290 290 290 290 290
Benzene Bromodichloromethane	enclosed space below grade, A _B (cm ²) 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15	vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) 7,447 8,030 8,576	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02	viscosity at ave. soil temperature, μ_{TS} (g/cm-s) 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03	B effective diffusion coefficient, Deff B (cm²/s) 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff_T (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03	path length, L _d (cm) 290 290 290
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene	enclosed space below grade, AB (cm²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04	constant at ave. soil temperature, H'ns (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02	viscosity at ave. soil temperature, µTS (g/cm-s) 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Defr _A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03	B effective diffusion coefficient, Deff s (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene	enclosed space below grade, A ₈ (cm²) 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03	constant at ave. soil temperature, H' _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02	viscosity at ave. soil temperature, µTS (g/cm-s) 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 3.26E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	overall effective diffusion coefficient, Deff T (Cm²/s) 7.31E-03 (-7.45E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene	enclosed space below grade, A _B (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 1107,157 9,468 6,612 9,712	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03	constant at ave. soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.00E+00 1.10E-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 6.44E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 3.26E-03 4.26E-03 4.22E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform	enclosed space below grade, A _B (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v.75} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03	constant at ave. soil temperature, H'15 (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01	viscosity at ave. soil temperature, μ _{TS} (g/cm-s) 1.78E-04	A effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.0E-03 3.20E-03 6.00E-03 6.00E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0 0.00E+00 0 0 0 0 0 0	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.20E-03 3.20E-03 4.22E-03 4.22E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene	enclosed space below grade, A8 (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 117,734 107,157 9,468 6,612 9,712 7,461 4,640	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03	constant at ave. soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.18E-01 1.18E-01 3.12E-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04	A effective diffusion coefficient, Deff A (cm²/s) 7.31E-03 5.08E-03 1.72E-03 6.44E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 3.26E-03 4.26E-03 4.22E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromethane Dichlorodifluoromethane	enclosed space below grade, A _B (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 117,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 6.19E-04 2.58E-01	constant at ave. soil temperature, H* _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 3.12E-01 2.58E-02 1.08E+01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.78E	A effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.29E-03 3.20E-03 4.22E-03 4.22E-03 7.27E-03 1.14E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deffr, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.29E-03 3.20E-03 4.22E-03 4.22E-03 7.27E-03 1.14E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromet/ Chlorodifluoromethane Dichlorodifluoromethane	enclosed space below grade, A _B (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave, soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 2.40E-02 2.64E-03 2.83E-03 2.40E-02 2.64E-03 3.38E-04 3.58E-03 3.38E-04 3.38E-03 3.38E-04 3.38E-03 3.38E-04 3.38E-03	constant at ave. soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 1.41E-02 3.65E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.08E+01 1.30E-01	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04 1.78E-0	A effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.20E-03 6.04E-03 6.00E-03 4.22E-03 6.00E-03 7.27E-03 1.14E-03	B effective diffusion coefficient, Deff 5 (cm²/s) 0.00E+00 0.00E+	C effective diffusion to efficient Deff (cm²/s) 0.00E+00 0.00E	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.30E-03 3.30E-03 3.30E-03 4.22E-03 6.00E-03 7.27E-03 3.44E-03 3.44E-03 4.25E-03	path length, Ld (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometi Chlorodibromomethane Dichlorodifluoromethane cis-1,2-Dichloroethylene Ethylbenzene Cumene	enclosed space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 117,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03 7.49E-03 6.19E-04 2.58E-01 3.12E-03 5.55E-03 7.50E-01	constant at ave. soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.00E+00 1.10E-01 1.18E-01 2.58E-02 2.58E-02 2.31E-01 3.31E-01 3.31E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, per , (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 6.00E-03 4.22E-03 6.00E-03 1.14E-03 3.84E-03 3.38E-03 4.23E-03 4.33E-03 3.72FE-03 1.74E-03 3.75E-03 4.33E-03 4.33E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Driff c (cm²/s) 0.00E+00 0	overall effective diffusion coefficient, Deff', (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.30E-03 3.30E-03 4.20E-03 6.00E-03 4.22E-03 6.00E-03 1.14E-03 4.25E-03 4.35E-03 3.36E-03 3.36E-03 6.00E-03 3.36E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromett Chlorodiffuoromethane Dichlorodiffuoromethane Dichlorodiffuoromethane Ethylbenzene Cumene Methylisobutylketone (4-methylkene)	enclosed space below grade, As (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.283E-01 3.12E-03 5.55E-03 7.50E-01 9.82E-05	constant at ave. soil temperature, Hrs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 1.41E-02 3.57E-01 1.10E-01 1.10E-01 1.18E-01 3.12E-01 1.30E-01 1.30E-01 1.31E-01 3.31E-01 4.31E-01 4.31E-01	viscosity at ave. soil temperature, µrs (g/cm·s) 1.78E-04 1.78E-	A effective diffusion coefficient, perf / (cm²/s) 7.31E-03 5.08E-03 5.08E-03 4.76E-03 6.44E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 4.22E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03	B effective diffusion coefficient, Deff s (cm²/s) 0.00E+00	C effective diffusion to deficient. Deff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.30E-03 3.30E-03 4.22E-03 4.22E-03 1.14E-03 3.84E-03 4.25E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butyl alcohol sert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometi Chlorodifluoromethane Dichlorodifluoromethane cis-1,2-Dichloroethylene Ethylbenzene Cumene Methylisobutylketone (4-me	enclosed space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at tave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 117,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03 7.49E-03 6.19E-04 2.58E-01 3.12E-03 5.55E-03 7.50E-01 9.82E-05	constant at ave. soil temperature, H ⁺ rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.10E-01 1.10E-01 1.10E-01 1.30E-01 1.30E-01 1.30E-01 1.30E-01 2.31E-01 2.31E-01 3.13E+01 4.10E-03	viscosity at ave. soil temperature, µrs (g/cm-s) 1.78E-04	A effective diffusion coefficient, porf (cm²/s) (cm²/s) (7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.26E-03 4.22E-03 6.00E-03 1.14E-03 3.84E-03 4.25E-03 4.33E-03 3.75E-03 4.36E-03 5.92E-03 5.92E-03 5.92E-03	B effective diffusion coefficient, Deff s (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff_c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.20E-03 3.20E-03 6.044E-03 3.20E-03 6.00E-03 6.00E-03 4.22E-03 6.00E-03 1.14E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 5.95E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromett Chlorodifluoromethane cis-1,2-Dichloroethylene Ethylbenzene Cumene Methylisobutylketone (4-me MTBE Naphthalene n-Propylbenzene	enclosed space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless)	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 6.19E-04 3.12E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04	constant at ave. soil temperature, H* _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 3.12E-01 2.58E-02 1.08E+01 1.30E-01 3.33E+01 4.10E-03 2.03E-02 1.29E-02	viscosity at ave. soil temperature,	A effective diffusion coefficient, poff (cm²/s) (cm²/s) (7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.26E-03 4.22E-03 6.00E-03 1.14E-03 3.84E-03 4.38E-03 4.38E-03 3.75E-03 3.42E-03 3.42E-03 3.42E-03 3.42E-03 3.42E-03	B effective diffusion coefficient, Deff s (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff_c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.29E-03 3.26E-03 6.00E-03 1.14E-03 4.22E-03 6.00E-03 1.44E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03	path length, Ld (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chlorodinzene Chlorodinometrichlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Methyl sene Ethylbenzene Methyl sene Methylisobutylketone (4-m MTBE Maphthalene n-Propylbenzene	enclosed space below grade, Ag (cm²) 1.00E+06	to-total area ratio, 1 (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave, soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 4,640 10,052 12,518 9,741 7,179 12,820 11,251 11,251 11,251	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 2.40E-02 2.64E-03 2.40E-02 2.64E-03 7.49E-03 7.49E-03 5.55E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 7.21E-03	constant at awe, soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.40E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.30E-01 2.58E-02 1.08E+01 4.10E-03 2.03E-02 3.01E-01 4.10E-03	viscosity at ave, soil temperature, µrs (g/cm-s) 1.78E-04 1.78E-0	A effective diffusion coefficient, perf / (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.20E-03 3.20E-03 6.00E-03 4.22E-03 6.00E-03 7.27E-03 4.38E-03 4.38E-03 4.38E-03 4.38E-03 4.38E-03 4.36E-03 4.36E-03 4.37E-03	B effective diffusion coefficient, Deff 5 (cm²/s) 0.00E+00 0.00E+	C effective diffusion to efficient (confidence of the confidence o	overall effective diffusion coefficient, Deff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.30E-03 3.30E-03 3.30E-03 4.22E-03 6.00E-03 7.27E-03 4.38E-03 4.38E-03 4.35E-03 4.35E-03 4.35E-03 4.37E-03 4.37E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chlorodenzene ChlorodifluoromettChlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Methyl chloride (chloromete) Chlorodifluoromethane Dichlorodifluoromethane Dichlorodifluoromethane Cumene Methylisobutylketone (4-m MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Totluene	enclosed space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at tave, soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462 9,056	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 2.40E-02 2.64E-03 2.49E-03 2.49E-03 7.49E-03 7.49E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 7.21E-03 2.49E-04 1.32E-02 4.84E-04	constant at ave. soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.15E-01 1.30E-01 2.31E-01 2.31E-01 4.10E-03 3.13E+01 4.10E-03 3.01E-01 9.99E-03	viscosity at ave. soil temperature,	A effective diffusion coefficient, per / (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.29E-03 3.26E-03 6.00E-03 6.00E-03 4.22E-03 6.00E-03 3.84E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.36E-03 4.47E-03 3.47E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.0	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.30E-03 3.30E-03 3.30E-03 4.2E-03 1.14E-03 3.48E-03 4.25E-03 4.35E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.16E-03 3.47E-03 3.47E-03 3.47E-03 3.47E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chlorobenzene Chloroform Methyl chloride (chlorometh Chlorodifruoromethane Dichlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Cumene MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Truckloroethylene Trachoroethylene Tritchloroethylene Tritchloroethylene Tritchloroethylene	enclosed space below grade, As (cm²) 1.00E+06	to-total area ratio, 19 (unitless) 5.00E-03 5.00	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at tave. soil temperature, AH _{V,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,7741 7,179 12,820 11,251 10,450 9,462 9,056 7,787	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.28E-01 3.12E-03 3.55E-03 7.50E-01 3.12E-03 4.86E-04 3.09E-04 1.32E-02 4.84E-03 1.31E-02	constant at ave. soil temperature, Hrs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 1.41E-02 3.57E-01 1.40E-01 1.00E+00 1.10E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.38E-01 1.39E-02 1.08E+01 1.30E-01	viscosity at ave. soil temperature, µrs (g/cm·s) 1.78E-04 1.78	A effective diffusion coefficient, Deff (cm²/s) 7.31E-03 5.08E-03 5.08E-03 4.76E-03 6.44E-03 3.29E-03 3.20E-03 6.00E-03 4.22E-03 6.00E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00	C effective diffusion to deficient to be defined to be def	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.30E-03 3.30E-03 4.22E-03 4.22E-03 4.22E-03 4.33E-03 3.75E-03 4.33E-03 3.75E-03 4.31E-03 4.31E-03 4.31E-03 4.11E-03 4.11E-03 4.11E-03 4.10E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar terr-Butyl alcohol n-Butylbenzene sec-Butylbenzene terr-Butylbenzene Carbon disulfide Chlorobenzene Chlorodenzene Chlorodibromomethane Dichlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Methyl chloride (chlorometi Chlorodibromomethane Dichlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Cumene Methylisobutyliketone (4-m MTBE Naphthalene 1,1,2,2-Tetrachloroethylene Toluene 1,1,1-Trichloroethylene 1,1,1-Trichloroethane 1,1,1-Trichloroethane	enclosed space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 117,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 9,741 7,179 12,820 11,251 10,450 9,462 9,056 7,787 9,474	constant at ave. soil temperature, H _{Ts} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.19E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 2.83E-03 7.49E-03 6.19E-04 2.58E-01 3.12E-03 5.55E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04 1.32E-02 4.84E-03 1.31E-02 6.56E-04	constant at ave. soil temperature, H ⁺ rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.10E-01 1.10E-01 1.10E-01 1.312E-01 2.58E-02 1.08E+01 1.30E-01 3.13E+01 2.31E-01 3.13E+01 2.31E-01 3.13E+01 3.13E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, porf (cm²/s) 7.31E-03 5.08E-03 4.76E-03 3.29E-03 3.29E-03 6.00E-03 4.22E-03 4.25E-03 4.25E-03 4.25E-03 4.25E-03 4.11E-03 4.11E-03 4.11E-03 4.50E-03 4.50E-03 4.50E-03 4.51E-03 4.51E-03	B effective diffusion coefficient, Deffs (cm²/s) 0.00E+00	C effective diffusion coefficient, Drff c (cm²/s) 0.00E+00 0.	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.30E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 4.25E-03 4.35E-03 4.25E-03 4.14E-03 4.35E-03 4.16E-03 4.11E-03 4.11E-03 4.50E-03 4.50E-03	path length, L _d (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chloromett Chlorodifromomethane Dichlorodifluoromethane Dichlorodifluoromethane Cis-1,2-Dichloroethylene Ethylbenzene Cumene Methyl sobutylketone (4-m MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,1-Trichloroethane Toluene 1,1,1-Trichloroethane 1,1,2-Trichloroethane	enclosed space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 10,052 12,519 12,820 11,251 10,450 9,462 9,056 7,787 9,474 6,053 11,579	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 3.12E-03 3.12E-03 7.50E-01 3.12E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04 1.13E-02 4.84E-03 1.13IE-02 6.56E-04 7.84E-02 4.11E-03	constant at ave. soil temperature, H* _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.31E-01 3.13E+01 1.31E-01 3.13E+01 1.31E-01 3.13E+01 2.36E-02 1.29E-02 1.29E-02 1.29E-02 1.29E-02 1.27E-01 5.46E-01 2.77E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, port (cm²/s) (2.5 cm²/s) (3.1 cm²/s) (3.1 cm²/s) (3.2 c	B effective diffusion coefficient, Deff s (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 1.14E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.16E-03 5.02E-03 4.11E-03 5.02E-03 5.02E-03 5.02E-03	path length, Ld (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bromodichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chlorodinemethane Chlorodinomethane Dichlorodifluoromethane Dichlorodifluoromethane Ethylbenzene Methyl solboride (chloromethene Ethylbenzene Cumene Methylisobutylketone (4-me MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tetrachloroethane Tetrachloroethylene 1,1,1-Trichloroethane 1,1,2-Trichloroethane 1,1,2-Trichloroethane 1,1,2-Trichloroethane 1,1,2-Trichloroethane 1,1,2-Trichloroethane 1,1,2-Trimethylbenzene 1,3,5-Trimethylbenzene	enclosed space below grade, As (cm²) 1.00E+06	to-total area ratio, 1 (unitless) 5.00E-03	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave, soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 107,157 9,468 6,612 9,712 9,7461 4,640 6,726 8,118 7,643 10,052 12,518 9,2741 7,179 12,820 11,251 10,450 9,462 9,056 7,787 9,474 6,053 11,579	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 2.64E-03 2.40E-02 2.64E-03 7.49E-03 7.59E-01 9.82E-05 4.86E-04 7.21E-03 2.40E-02 4.84E-03 1.31E-02 6.56E-04 7.21E-03	constant at awe, soil temperature, H'rs (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.30E-01 2.58E-02 1.08E+01 4.10E-03 2.03E-02 3.01E-01 4.10E-03 3.13E+01 4.10E-03 3.12E-01 5.46E-01 5.46E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, per / (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 3.29E-03 3.20E-03 3.20E-03 6.00E-03 6.00E-03 6.00E-03 1.14E-03 3.84E-03 4.25E-03	B effective diffusion coefficient, Deff g (cm²/s) 0.00E+00	C effective diffusion coefficient, D*ff c (cm²/s) 0.00E+00	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 5.08E-03 1.72E-03 4.76E-03 6.44E-03 3.30E-03 3.30E-03 3.20E-03 6.00E-03 7.27E-03 4.22E-03 6.00E-03 7.27E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.11E-03 4.16E-03 4.50E-03 4.50E-03 4.50E-03 4.50E-03 4.50E-03 4.50E-03 4.50E-03 4.50E-03 4.50E-03	path length, Ld (cm) 290 290 290 290 290 290 290 290 290 29
Benzene Bernamen Bernamen Bernamen Bernameichloromethane Methylethylketone (2-butar tert-Butyl alcohol n-Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon disulfide Chlorobenzene Chloroform Methyl chloride (chlorometf Chlorodfituoromethane Dichlorodfituoromethane Cis-1,2-Dichloroethylene Ethylbenzene Cumene Methyl chloride (4-m MTBE Naphthalene n-Propylbenzene 1,1,2,2-Tettachloroethane Toluene 1,1,1,2-Trichloroethane 1,1,1-Trichloroethane Trichloroffuoromethane 1,1,2-Trichloroethane Tichloroffuoromethane 1,1,2,4-Timethylbenzene	enclosed space below grade, A ₈ (cm²) 1.00E+06	to-total area ratio, η (unitless) 5.00E-03 5.00E	depth below grade, Z _{crack} (cm) 15 15 15 15 15 15 15 15 15 15 15 15 15	vaporization at ave. soil temperature, AH _{v,TS} (cal/mol) 7,447 8,030 8,576 8,307 10,734 11,734 107,157 9,468 6,612 9,712 7,461 4,640 6,726 8,118 7,643 10,052 12,518 10,052 12,519 12,820 11,251 10,450 9,462 9,056 7,787 9,474 6,053 11,579	constant at ave. soil temperature, H _{TS} (atm-m³/mol) 2.99E-05 4.19E-03 1.19E-03 1.19E-03 4.18E-05 6.24E-06 8.74E-03 3.38E-04 8.55E-03 2.40E-02 2.64E-03 7.49E-03 3.12E-03 3.12E-03 7.50E-01 3.12E-03 7.50E-01 9.82E-05 4.86E-04 3.09E-04 1.13E-02 4.84E-03 1.13IE-02 6.56E-04 7.84E-02 4.11E-03	constant at ave. soil temperature, H* _{TS} (unitless) 1.25E-03 1.75E-01 4.95E-02 1.74E-03 2.60E-04 3.65E-01 1.41E-02 3.57E-01 1.00E+00 1.10E-01 1.18E-01 3.12E-01 1.31E-01 3.13E+01 1.31E-01 3.13E+01 1.31E-01 3.13E+01 2.36E-02 1.29E-02 1.29E-02 1.29E-02 1.29E-02 1.27E-01 5.46E-01 2.77E-01	viscosity at ave. soil temperature,	A effective diffusion coefficient, port (cm²/s) (2.5 cm²/s) (3.1 cm²/s) (3.1 cm²/s) (3.2 c	B effective diffusion coefficient, Deff s (cm²/s) 0.00E+00	C effective diffusion coefficient, Deff c (cm²/s) 0.00E+00 0.	overall effective diffusion coefficient, peff, (cm²/s) 7.31E-03 5.08E-03 1.72E-03 4.76E-03 4.76E-03 3.29E-03 3.29E-03 3.26E-03 6.00E-03 4.22E-03 6.00E-03 1.14E-03 4.25E-03 4.35E-03 4.35E-03 4.35E-03 4.35E-03 4.16E-03 5.02E-03 4.11E-03 5.02E-03 5.02E-03 5.02E-03	path length, Ld (cm) 290 290 290 290 290 290 290 290 290 29

INTERMEDIATE CALCULATIONS SHEET

Resident using 10 ft. soil vapor data south, southwest, and west of the Western Parcel

							Exponent of	Infinite			
		_		Average	Crack		equivalent	source	Infinite		
	Convection	Source	0 1	vapor	effective		foundation	indoor	source	Unit	D (
	path	vapor	Crack	flow rate	diffusion	Area of	Peclet	attenuation	bldg.	risk	Reference
	length,	conc.,	radius,	into bldg.,	coefficient, D ^{crack}	crack,	number,	coefficient,	conc.,	factor,	conc.,
	Lp	C _{source}	r _{crack}	Q _{soil}		A _{crack}	exp(Pe ^t)	α	C _{building}	URF	RfC
	(cm)	$(\mu g/m^3)$	(cm)	(cm ³ /s)	(cm ² /s)	(cm ²)	(unitless)	(unitless)	(μg/m³)	(μg/m³) ⁻¹	(mg/m ³)
Acetone	15	1.80E+03	1.25	8.33E+01	7.31E-03	5.00E+03	6.96E+14	5.71E-04	1.03E+00	NA	3.1E+01
Benzene	15	5.30E+01	1.25	8.33E+01	5.08E-03	5.00E+03	2.34E+21	4.27E-04	2.26E-02	2.9E-05	3.0E-02
Bromodichloromethane	15	2.50E+01	1.25	8.33E+01	1.72E-03	5.00E+03	9.61E+62	1.64E-04	4.09E-03	3.7E-05	7.0E-02
Methylethylketone (2-butar		4.00E+01	1.25	8.33E+01	4.76E-03	5.00E+03	6.40E+22	4.05E-04	1.62E-02	NA NA	5.0E+00
tert-Butyl alcohol	15	1.50E+03	1.25	8.33E+01	6.44E-03	5.00E+03	7.29E+16	5.17E-04	7.76E-01	NA NA	3.0E+01
n-Butylbenzene	15	2.50E+01	1.25	8.33E+01	3.29E-03	5.00E+03	9.87E+32	2.95E-04	7.37E-03	NA NA	1.4E-01
sec-Butylbenzene	15	1.50E+03	1.25	8.33E+01	3.30E-03	5.00E+03	7.93E+32	2.95E-04	4.43E-01	NA.	1.4E-01
tert-Butylbenzene	15	2.50E+01	1.25	8.33E+01	3.26E-03	5.00E+03	1.93E+33	2.92E-04	7.31E-03	NA NA	1.4E-01
Carbon disulfide	15	7.10E+01	1.25	8.33E+01	6.00E-03	5.00E+03	1.22E+18	4.89E-04	3.47E-02	NA.	7.0E-01
Chlorobenzene	15	2.50E+03	1.25	8.33E+01	4.22E-03	5.00E+03	5.72E+25	3.65E-04	9.13E-01	NA NA	1.0E+00
Chloroform	15	3.10E+02	1.25	8.33E+01	6.00E-03	5.00E+03	1.21E+18	4.89E-04	1.52E-01	5.3E-06	3.0E-01
Methyl chloride (chlorometh		5.00E+01	1.25	8.33E+01	7.27E-03	5.00E+03	8.45E+14	5.69E-04	2.84E-02	1.8E-06	9.0E-02
Chlorodibromomethane	15	2.50E+01	1.25	8.33E+01	1.14E-03	5.00E+03	2.37E+95	1.11E-04	2.77E-03	2.7E-05	7.0E-02
Dichlorodifluoromethane	15	2.90E+00	1.25	8.33E+01	3.84E-03	5.00E+03	1.92E+28	3.37E-04	9.77E-04	NA	2.0E-01
cis-1,2-Dichloroethylene	15	3.30E+00	1.25	8.33E+01	4.25E-03	5.00E+03	3.52E+25	3.68E-04	1.21E-03	NA	3.5E-02
Ethylbenzene	15	1.00E+03	1.25	8.33E+01	4.33E-03	5.00E+03	1.19E+25	3.74E-04	3.74E-01	2.5E-06	1.0E+00
Cumene	15	4.90E+03	1.25	8.33E+01	3.75E-03	5.00E+03	8.65E+28	3.30E-04	1.62E+00	NA	4.0E-01
Methylisobutylketone (4-me	15	2.50E+02	1.25	8.33E+01	4.36E-03	5.00E+03	7.77E+24	3.76E-04	9.40E-02	NA	3.0E+00
MTBE	15	1.50E+02	1.25	8.33E+01	5.92E-03	5.00E+03	2.19E+18	4.84E-04	7.26E-02	2.6E-07	3.0E+00
Naphthalene	15	1.60E+01	1.25	8.33E+01	3.42E-03	5.00E+03	6.11E+31	3.05E-04	4.87E-03	3.4E-05	3.0E-03
n-Propylbenzene	15	2.50E+01	1.25	8.33E+01	3.47E-03	5.00E+03	1.96E+31	3.09E-04	7.72E-03	NA	1.4E-01
1,1,2,2-Tetrachloroethane	15	5.00E+01	1.25	8.33E+01	4.11E-03	5.00E+03	2.54E+26	3.58E-04	1.79E-02	5.8E-05	1.4E-02
Tetrachloroethylene	15	1.50E+02	1.25	8.33E+01	4.16E-03	5.00E+03	1.32E+26	3.61E-04	5.41E-02	5.9E-06	3.5E-02
Toluene	15	5.30E+02	1.25	8.33E+01	5.02E-03	5.00E+03	4.13E+21	4.23E-04	2.24E-01	NA	3.0E-01
1,1,1-Trichloroethane	15	1.70E+02	1.25	8.33E+01	4.50E-03	5.00E+03	1.30E+24	3.86E-04	6.57E-02	NA	5.0E+00
1,1,2-Trichloroethane	15	2.50E+01	1.25	8.33E+01	4.51E-03	5.00E+03	1.21E+24	3.87E-04	9.66E-03	1.6E-05	1.4E-02
Trichlorofluoromethane	15	6.90E+01	1.25	8.33E+01	5.02E-03	5.00E+03	4.16E+21	4.23E-04	2.92E-02	NA	7.0E-01
1,2,4-Trimethylbenzene	15	4.20E+01	1.25	8.33E+01	3.50E-03	5.00E+03	1.07E+31	3.11E-04	1.31E-02	NA	7.0E-03
1,3,5-Trimethylbenzene	15	2.50E+01	1.25	8.33E+01	3.48E-03	5.00E+03	1.72E+31	3.09E-04	7.73E-03	NA	6.0E-03
Vinyl chloride (chloroethene		2.90E+00	1.25	8.33E+01	6.12E-03	5.00E+03	5.54E+17	4.97E-04	1.44E-03	7.8E-05	1.0E-01
p-Xylene	15	5.00E+01	1.25	8.33E+01	4.44E-03	5.00E+03	2.85E+24	3.82E-04	1.91E-02	NA	1.0E-01
o-Xylene	15	2.40E+02	1.25	8.33E+01	5.02E-03	5.00E+03	4.12E+21	4.23E-04	1.02E-01	NA	1.0E-01

RESULTS SHEET

Resident using 10 ft. soil vapor data south, southwest, and west of the Western Parcel INCREMENTAL RISK CALCULATIONS:

Incremental	Hazard
risk from	quotient
vapor	from vapor
intrusion to	intrusion to
indoor air,	indoor air,
carcinogen	noncarcinogen
(unitless)	(unitless)

Acetone	NA	3.2E-05
Benzene	2.7E-07	7.2E-04
Bromodichloromethane	6.2E-08	3.1E-06
Methylethylketone (2-butanone)	NA	3.1E-06
tert-Butyl alcohol	NA	2.5E-05
n-Butylbenzene	NA	5.0E-05
sec-Butylbenzene	NA	3.0E-03
tert-Butylbenzene	NA	5.0E-05
Carbon disulfide	NA	4.8E-05
Chlorobenzene	NA	8.8E-04
Chloroform	3.3E-07	4.8E-04
Methyl chloride (chloromethane)	2.1E-08	3.0E-04
Chlorodibromomethane	3.1E-08	3.8E-05
Dichlorodifluoromethane	NA	4.7E-06
cis-1,2-Dichloroethylene	NA	3.3E-05
Ethylbenzene	3.8E-07	3.6E-04
Cumene	NA	3.9E-03
Methylisobutylketone (4-methyl-2-pentanone)	NA	3.0E-05
MTBE	7.8E-09	2.3E-05
Naphthalene	6.8E-08	1.6E-03
n-Propylbenzene	NA	5.3E-05
1,1,2,2-Tetrachloroethane	4.3E-07	1.2E-03
Tetrachloroethylene	1.3E-07	1.5E-03
Toluene	NA	7.2E-04
1,1,1-Trichloroethane	NA	1.3E-05
1,1,2-Trichloroethane	6.4E-08	6.6E-04
Trichlorofluoromethane	NA	4.0E-05
1,2,4-Trimethylbenzene	NA	1.8E-03
1,3,5-Trimethylbenzene	NA	1.2E-03
Vinyl chloride (chloroethene)	4.6E-08	1.4E-05
p-Xylene	NA	1.8E-04
o-Xylene	NA	9.7E-04
	2E-06	2E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL
DOWN
TO "END"

Resident using groundwater data along and south, southwest, and west of the Western Parcel CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box) Program modified to accommodate multiple GW-ADV Version 3.1; 02/04 chemicals YES Reset to Defaults CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below) YES ENTER **ENTER** Initial #REF! Chemical groundwater CAS No. conc., (numbers only, C_{W} no dashes) (µg/L) Chemical 71432 1.70E+01 Benzene tert-Butyl alcohol 75650 2.50E+02 104518 1.40E+00 n-Butylbenzene 135988 3.00F+01 sec-Butylbenzene 98066 3.30E+00 tert-Butylbenzene 75150 3.10E+00 Carbon disulfide 108907 2.00E+00 67663 1.00E+00 100414 3.60E+00 Ethylbenzene 98828 1.10E+02 Note: same as isopropylbenzene 91576 1.10E+02 2-Methylnaphthalene 1634044 1.80E+02 MTBE 91203 3.30E+02 Naphthalene 103651 7.60E+01 79345 2.20E+00 ,2,2-Tetrachloroethane 79005 5.40E+00 1.1.2-Trichloroethane 2.80E+00 95636 1,2,4-Trimethylbenzene 95476 5.50E-01 o-Xvlene ENTER **ENTER** ENTER ENTER **ENTER** Totals must add up to value of LwT (cell G28) Soil Depth MORE below grade stratum A User-defined Average to bottom Depth Thickness of soil of soil Soil SCS stratum A groundwater of enclosed below grade of soil stratum B, stratum C, stratum SCS soil type soil vapor OR (Enter value or 0) (Enter value or 0) temperature, space floor. to water table stratum A. directly above soil type (used to estimate permeability L_F L_{WT} h_{A} water table, directly above soil vapor (°C) (cm) (cm) (cm) Enter A. B. or C) water table permeability) (cm²) 15 360 360 Ω SIL SII 19 ENTER ENTER **ENTER** ENTER FNTFR ENTER ENTER **ENTER** ENTER ENTER ENTER ENTER MORE Stratum A Stratum A Stratum A Stratum A Stratum B Stratum B Stratum B Stratum B Stratum C Stratum C Stratum C Stratum C SCS soil dry soil total soil water-filled SCS soil total soil water-filled SCS soil total soil water-filled soil dry soil dry bulk density, bulk density, porosity, soil type bulk density, porosity, porosity, soil type porosity, porosity, soil type porosity, ${\rho_b}^A$ θ_w^c $\rho_b^{\ B}$ ρ_b^C Lookup Soil Parameters Lookup Soil Parameters Lookup Soil Parameters (g/cm³) (unitless) (cm³/cm³) (g/cm³) (unitless) (cm³/cm³) (unitless) (cm³/cm³)SIL 1.49 0.439 0.18 **ENTER ENTER ENTER ENTER ENTER** ENTER **ENTER** MORE ↓ Enclosed Enclosed Enclosed Average vapor Soil-blda. Enclosed space space space Floor-wall Indoor flow rate into bldg. floor nressure floor floor space seam crack air exchange OR height, I eave blank to calculate thickness differential. length, width. width. rate, ΛР L_{crack} L_B W_B H_B FR Q_{soil} (cm) (1/h) (L/m) 1000 0.1 40 1000 244 0.5 1.5 MORE ↓ ENTER **ENTER ENTER ENTER** ENTER **ENTER** Averaging Averaging Target Target hazard time for time for Exposure Exposure risk for quotient for carcinogens, noncarcinogens, duration, frequency, carcinogens, noncarcinogens, ATc AT_{NC} ED EF TR THQ (unitless) (unitless) (vrs) (vrs) (vrs) (days/yr 1.0E-06 70 30 30 350 Used to calculate risk-based

groundwater concentration.

CHEMICAL PROPERTIES SHEET

Resident using groundwater data along and south, southwest, and west of the Western Parcel

Resident using groundwater data along	, and south, s	outilivest, and	Henry's	Henry's	inthalpy of			Organic	Pure		
			law constant	law constant	oorization	Normal		carbon	component	Unit	
	Diffusivity	Diffusivity	at reference	reference	:he norma	boiling	Critical	partition	water	risk	Reference
	in air,	in water,	temperature,	temperature,	oiling poir	point,	temperature,	coefficient,	solubility,	factor,	conc.,
	D_a	D_{w}	Н	T_R	$\Delta H_{v,b}$	T_B	T_C	K _{oc}	S	URF	RfC
	(cm ² /s)	(cm ² /s)	(atm-m ³ /mol)	(°C)	(cal/mol)	(°K)	(°K)	(cm ³ /g)	(mg/L)	$(\mu g/m^3)^{-1}$	(mg/m^3)
Benzene	8.80E-02	9.80E-06	5.54E-03	25	7,342	353.24	562.16	5.89E+01	1.79E+03	2.9E-05	3.0E-02
tert-Butyl alcohol	9.85E-02	1.14E-05	9.05E-06	25	9,338	355.41	508.00	2.20E+00	1.00E+06	0.0E+00	3.0E+01
n-Butylbenzene	5.70E-02	8.12E-06	1.31E-02	25	9,290	456.46	660.50	1.11E+03	2.00E+00	0.0E+00	1.4E-01
sec-Butylbenzene	5.70E-02	8.12E-06	1.39E-02	25	88,730	446.50	679.00	9.66E+02	3.94E+00	0.0E+00	1.4E-01
tert-Butylbenzene	5.65E-02	8.02E-06	1.19E-02	25	8,980	442.10	1220.00	7.71E+02	2.95E+01	0.0E+00	1.4E-01
Carbon disulfide	1.04E-01	1.00E-05	3.02E-02	25	6,391	319.00	552.00	4.57E+01	1.19E+03	0.0E+00	7.0E-01
Chlorobenzene	7.30E-02	8.70E-06	3.69E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	0.0E+00	1.0E+00
Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	5.3E-06	3.0E-01
Ethylbenzene	7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	2.5E-06	1.0E+00
Cumene	6.50E-02	7.10E-06	1.16E+00	25	10,335	425.56	631.10	4.89E+02	6.13E+01	0.0E+00	4.0E-01
2-Methylnaphthalene	5.22E-02	7.75E-06	5.17E-04	25	12,600	514.26	761.00	2.81E+03	2.46E+01	0.0E+00	1.4E-02
MTBE	1.02E-01	1.05E-05	6.23E-04	25	6,678	328.30	497.10	7.26E+00	5.10E+04	2.6E-07	3.0E+00
Naphthalene	5.90E-02	7.50E-06	4.82E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	3.4E-05	3.0E-03
n-Propylbenzene	6.01E-02	7.83E-06	1.07E-02	25	9,123	432.20	630.00	5.62E+02	6.00E+01	0.0E+00	1.4E-01
1,1,2,2-Tetrachloroethane	7.10E-02	7.90E-06	3.44E-04	25	8,996	419.60	661.15	9.33E+01	2.96E+03	5.8E-05	1.4E-02
1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.11E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	1.4E-02
1,2,4-Trimethylbenzene	6.06E-02	7.92E-06	6.14E-03	25	9,369	442.30	649.17	1.35E+03	5.70E+01	0.0E+00	7.0E-03
o-Xylene	8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	3.63E+02	1.78E+02	0.0E+00	1.0E-01

INTERMEDIATE CALCULATIONS SHEET

Resident using groundwater data along and south, southwest, and west of the Western Parcel

END

Exposure duration, τ (sec)	Source- building separation, L _T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm³/cm³)	Stratum B soil air-filled porosity, $\theta_a{}^B$ (cm³/cm³)	Stratum C soil air-filled porosity, $\theta_a^{\ C}$ (cm³/cm³)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k _i (cm ²)	Stratum A soil relative air permeability, k _{rg} (cm ²)	Stratum A soil effective vapor permeability, k _v (cm ²)	Thickness of capillary zone, L _{cz} (cm)	Total porosity in capillary zone, n _{cz} (cm³/cm³)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm ³ /cm ³)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm ³ /cm ³)	Floor- wall seam perimeter, X _{crack} (cm)	
0.405.00	0.45	0.250	EDDOD	I FROOD	0.207	2 005 00	0.700	2 225 22	CO 10	0.420	0.000	0.240	1 4000	İ
9.46E+08	345	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	68.18	0.439	0.090	0.349	4,000	
	Bldg. ventilation rate, Q _{building} (cm ³ /s)	Area of enclosed space below grade, A _B (cm ²)	Crack- to-total area ratio,	Crack depth below grade, Z _{crack}	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$	Henry's law constant at ave. groundwater temperature,	temperature, H' _{TS}	temperature, μ_{TS}	Stratum A effective diffusion coefficient, D ^{eff} A (cm ² /s)	Stratum B effective diffusion coefficient, D ^{eff} B (cm ² /s)	Stratum C effective diffusion coefficient, D ^{eff} C (cm ² /s)	Capillary zone effective diffusion coefficient, Deff_cz (cm²/s)	Total overall effective diffusion coefficient, Deff (cm²/s)	Diffusion path length,
	(CIII /5)	(CIII)	(unitless)	(cm)	(cal/mol)	(atm-m³/mol)	(unitless)	(g/cm-s)	(CIII /S)	(СП /5)	(СП /5)	(СП /5)	(СПГ/5)	(cm)
Benzene	3.39E+04	1.00E+06	5.00E-03	15	8,030	4.19E-03	1.75E-01	1.78E-04	5.08E-03	0.00E+00	0.00E+00	1.61E-04	7.21E-04	345
tert-Butyl alcohol	3.39E+04	1.00E+06	5.00E-03	15	10,734	6.24E-06	2.60E-04	1.78E-04	6.44E-03	0.00E+00	0.00E+00	6.98E-03	6.54E-03	345
n-Butylbenzene	3.39E+04	1.00E+06	5.00E-03	15	11,734	8.74E-03	3.65E-01	1.78E-04	3.29E-03	0.00E+00	0.00E+00	1.02E-04	4.58E-04	345
sec-Butylbenzene	3.39E+04	1.00E+06	5.00E-03	15	107,157	3.38E-04	1.41E-02	1.78E-04	3.30E-03	0.00E+00	0.00E+00	1.88E-04	7.73E-04	345
tert-Butylbenzene Carbon disulfide	3.39E+04 3.39E+04	1.00E+06 1.00E+06	5.00E-03 5.00E-03	15 15	9,468	8.55E-03 2.40E-02	3.57E-01 1.00E+00	1.78E-04 1.78E-04	3.26E-03 6.00E-03	0.00E+00 0.00E+00	0.00E+00 0.00E+00	1.01E-04 1.81E-04	4.55E-04 8.17E-04	345 345
Chlorobenzene	3.39E+04 3.39E+04	1.00E+06 1.00E+06	5.00E-03 5.00E-03	15	6,612 9,712	2.40E-02 2.64E-03	1.10E+00	1.78E-04	4.22E-03	0.00E+00	0.00E+00	1.38E-04	6.17E-04 6.18E-04	345
Chloroform	3.39E+04	1.00E+06	5.00E-03	15	7,461	2.83E-03	1.18E-01	1.78E-04	6.00E-03	0.00E+00	0.00E+00	1.93E-04	8.64E-04	345
Ethylbenzene	3.39E+04	1.00E+06	5.00E-03	15	10,052	5.55E-03	2.31E-01	1.78E-04	4.33E-03	0.00E+00	0.00E+00	1.35E-04	6.06E-04	345
Cumene	3.39E+04	1.00E+06	5.00E-03	15	12,518	7.50E-01	3.13E+01	1.78E-04	3.75E-03	0.00E+00	0.00E+00	1.12E-04	5.07E-04	345
2-Methylnaphthalene	3.39E+04	1.00E+06	5.00E-03	15	16,123	2.95E-04	1.23E-02	1.78E-04	3.02E-03	0.00E+00	0.00E+00	1.88E-04	7.59E-04	345
MTBE	3.39E+04	1.00E+06	5.00E-03	15	7,179	4.86E-04	2.03E-02	1.78E-04	5.92E-03	0.00E+00	0.00E+00	2.57E-04	1.11E-03	345
Naphthalene n-Propylbenzene	3.39E+04 3.39E+04	1.00E+06 1.00E+06	5.00E-03 5.00E-03	15 15	12,820 11,251	3.09E-04 7.21E-03	1.29E-02 3.01E-01	1.78E-04 1.78E-04	3.42E-03 3.47E-03	0.00E+00 0.00E+00	0.00E+00 0.00E+00	1.92E-04 1.08E-04	7.92E-04 4.85E-04	345 345
1,1,2,2-Tetrachloroethane	3.39E+04	1.00E+06	5.00E-03	15	10,450	2.40E-04	9.99E-03	1.78E-04	4.11E-03	0.00E+00	0.00E+00	2.46E-04	1.00E-03	345
1,1,2-Trichloroethane	3.39E+04	1.00E+06	5.00E-03	15	9,474	6.56E-04	2.74E-02	1.78E-04	4.51E-03	0.00E+00	0.00E+00	1.85E-04	8.02E-04	345
1,2,4-Trimethylbenzene	3.39E+04	1.00E+06	5.00E-03	15	11,579	4.11E-03	1.72E-01	1.78E-04	3.50E-03	0.00E+00	0.00E+00	1.12E-04	5.01E-04	345
o-Xylene	3.39E+04	1.00E+06	5.00E-03	15	10,302	3.62E-03	1.51E-01	1.78E-04	5.02E-03	0.00E+00	0.00E+00	1.61E-04	7.19E-04	345
	Convection path length, Lp (cm)	Source vapor conc., C _{source} (µg/m³)	Crack radius, r _{crack} (cm)	Average vapor flow rate into bldg., Q _{soil} (cm ³ /s)	Crack effective diffusion coefficient, D ^{crack} (cm ² /s)	Area of crack, A _{crack} (cm ²)	Exponent of equivalent foundation Peclet number, exp(Pe ^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., C _{building} (µg/m³)	Unit risk factor, URF (µg/m³) ⁻¹	Reference conc., RfC (mg/m³)	·		
Benzene	15	2.97E+03	1.25	8.33E+01	5.08E-03	5.00E+03	2.34E+21	6.02E-05	1.79E-01	2.9E-05	3.0E-02	Ì		
tert-Butyl alcohol	15	6.51E+01	1.25	8.33E+01	6.44E-03	5.00E+03	7.29E+16	4.56E-04	2.96E-02	NA	3.0E+01			
n-Butylbenzene	15	5.10E+02	1.25	8.33E+01	3.29E-03	5.00E+03	9.87E+32	3.86E-05	1.97E-02	NA	1.4E-01			
sec-Butylbenzene	15	4.22E+02	1.25	8.33E+01	3.30E-03	5.00E+03	7.93E+32	6.44E-05	2.72E-02	NA	1.4E-01			
tert-Butylbenzene	15	1.18E+03	1.25	8.33E+01	3.26E-03	5.00E+03	1.93E+33	3.83E-05	4.51E-02	NA	1.4E-01			
Carbon disulfide Chlorobenzene	15 15	3.11E+03 2.20E+02	1.25 1.25	8.33E+01 8.33E+01	6.00E-03 4.22E-03	5.00E+03 5.00E+03	1.22E+18 5.72E+25	6.80E-05 5.18E-05	2.11E-01 1.14E-02	NA NA	7.0E-01 1.0E+00			
Chloroform	15	1.18E+02	1.25	8.33E+01	6.00E-03	5.00E+03	1.21E+18	7.17E-05	8.45E-03	5.3E-06	3.0E-01			
Ethylbenzene	15	8.33E+02	1.25	8.33E+01	4.33E-03	5.00E+03	1.19E+25	5.07E-05	4.23E-02	2.5E-06	1.0E+00			
Cumene	15	3.44E+06	1.25	8.33E+01	3.75E-03	5.00E+03	8.65E+28	4.26E-05	1.47E+02	NA	4.0E-01			
2-Methylnaphthalene	15	1.36E+03	1.25	8.33E+01	3.02E-03	5.00E+03	8.01E+35	6.33E-05	8.58E-02	NA	1.4E-02			
MTBE	15	3.65E+03	1.25	8.33E+01	5.92E-03	5.00E+03	2.19E+18	9.12E-05	3.33E-01	2.6E-07	3.0E+00			
Naphthalene n-Propylhonzono	15 15	4.25E+03 2.29E+04	1.25 1.25	8.33E+01 8.33E+01	3.42E-03	5.00E+03	6.11E+31 1.96E+31	6.60E-05 4.08E-05	2.80E-01 9.33E-01	3.4E-05 NA	3.0E-03 1.4E-01			
n-Propylbenzene 1,1,2,2-Tetrachloroethane	15	2.29E+04 2.20E+01	1.25	8.33E+01	3.47E-03 4.11E-03	5.00E+03 5.00E+03	2.54E+26	8.27E-05	1.82E-03	5.8E-05	1.4E-01 1.4E-02			
1,1,2-Trichloroethane	15	1.48E+02	1.25	8.33E+01	4.51E-03	5.00E+03	1.21E+24	6.67E-05	9.85E-03	1.6E-05	1.4E-02			
1,2,4-Trimethylbenzene	15	4.80E+02	1.25	8.33E+01	3.50E-03	5.00E+03	1.07E+31	4.21E-05	2.02E-02	NA NA	7.0E-03	1		
o-Xylene	15	8.31E+01	1.25	8.33E+01	5.02E-03	5.00E+03	4.12E+21	6.00E-05	4.99E-03	NA	1.0E-01			

B-19

RESULTS SHEET

Resident using groundwater data along and south, southwest, and west of the Western Parcel RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

	Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)		Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Benzene	NA	NA	NA	1.79E+06	NA		2.1E-06	5.7E-03
tert-Butyl alcohol	NA	NA	NA	1.00E+09	NA		NA	9.5E-07
n-Butylbenzene	NA	NA	NA	2.00E+03	NA	1	NA	1.3E-04
sec-Butylbenzene	NA	NA	NA	3.94E+03	NA]	NA	1.9E-04
tert-Butylbenzene	NA	NA	NA	2.95E+04	NA		NA	3.1E-04
Carbon disulfide	NA	NA	NA	1.19E+06	NA		NA	2.9E-04
Chlorobenzene	NA	NA	NA	4.72E+05	NA		NA	1.1E-05
Chloroform	NA	NA	NA	7.92E+06	NA		1.8E-08	2.7E-05
Ethylbenzene	NA	NA	NA	1.69E+05	NA		4.3E-08	4.1E-05
Cumene	NA	NA	NA	6.13E+04	NA		NA	3.5E-01
2-Methylnaphthalene	NA	NA	NA	2.46E+04	NA		NA	5.9E-03
MTBE	NA	NA	NA	5.10E+07	NA		3.6E-08	1.1E-04
Naphthalene	NA	NA	NA	3.10E+04	NA		3.9E-06	9.0E-02
n-Propylbenzene	NA	NA	NA	6.00E+04	NA		NA	6.4E-03
1,1,2,2-Tetrachloroethane	NA	NA	NA	2.96E+06	NA		4.3E-08	1.2E-04
1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA		6.5E-08	6.7E-04
1,2,4-Trimethylbenzene	NA	NA	NA	5.70E+04	NA		NA	2.8E-03
o-Xylene	NA	NA	NA	1.78E+05	NA]	NA	4.8E-05
						TOTALS	6E-06	5E-01

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

SCROLL
DOWN
TO "END"

Attachment C

Soil Vapor Summary Table from Exponent (2009)

Table 1. Analytical data for chemicals detected in soil vapor (μ g/m³) using EPA Method 8260B (unless otherwise noted)

Chemcial	Sgp-1-5-1V	Sgp-1-5-3V	Sgp-1-5-7V	Sgp-1-15	Sgp-2-5	Sgp-2-15	Sgp-3-5	Sgp-3-15	Sgp-4-5	Sgp-4-15
Benzene	220	430	460	36	<36	<36	53	<36	82	<36
t-Butanol (TBA)	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
n-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
sec-Butylbenzene	<50	<50	<50	110	<50	<50	<50	1600	260	3100
Tert-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
cis-1,2-Dichloroethene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Ethylbenzene	180	780	960	190	<50	1500	<50	580	990	<50
Heptane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	<50	150	160	90	<50	580	<50	6900	1300	10000
4-isopropyltoluene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
MTBE	<50	<50	<50	<50	60	410	140	3400	<50	<50
Naphthalene	<32	<32	<32	<32	<32	<32	<32	<32	<32	<32
n-Propylbenzene	<50	80	80	60	<50	<50	<50	5900	640	5800
Propylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	120	290	330	100	<50	950	<50	<50	1000	<50
1,1,1-Trichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2,4-Trimethylbenzene	<50	220	190	220	<50	130	<50	<50	<50	<50
1,3,5-Trimethylbenzene	<50	50	<50	<50	<50	60	<50	<50	<50	<50
m,p-Xylenes	180	800	960	240	<100	4200	<100	<100	2600	<100
o-Xylenes	50	240	280	60	<50	1000	<50	<50	630	<50

Note: NA - Not Analyzed
* Analyzed Using EPA Method TO-15

Table 1. (cont.)

Chemcial	Sgp-4-15 DUP	Sgp-5-5	Sgp-5-15	Sgp-6-5	Sgp-6-15	Sgp-7-5	Sgp-7-15	Sgp7-15 DUP	Sgp-7-15*
Benzene	<36	77	<36	2100	<36	76	<36	<36	<479
t-Butanol (TBA)	<500	<500	<500	<500	<500	<500	<500	<500	NA
n-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	NA
sec-Butylbenzene	3000	140	2700	240	3400	170	3000	2800	NA
Tert-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	NA
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	895
1,1-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<607
1,2-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<607
cis-1,2-Dichloroethene	<50	<50	<50	<50	<50	<50	<50	<50	<595
Ethylbenzene	<50	220	<50	110	<50	<50	<50	<50	<651
Heptane	NA	NA	NA	NA	NA	NA	NA	NA	<615
Isopropylbenzene	9800	450	6500	910	17000	950	17000	16000	NA
4-isopropyltoluene	<50	<50	<50	<50	<50	<50	<50	<50	NA
MTBE	<50	<50	<50	<50	<50	<50	<50	<50	<541
Naphthalene	<32	<32	<32	<32	<32	<32	<32	<32	NA
n-Propylbenzene	<50	280	4200	740	12000	630	6200	5900	NA
Propylene	NA	NA	NA	NA	NA	NA	NA	NA	<516
Toluene	500	<50	<50	<50	<50	<50	<50	820	<565
1,1,1-Trichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<818
1,2,4-Trimethylbenzene	<50	150	<50	<50	<50	<50	<50	<50	<737
1,3,5-Trimethylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<737
m,p-Xylenes	<100	150	<100	130	<100	<100	<100	<100	<1303
o-Xylenes	<50	<50	<50	60	<50	60	<50	<50	<651

Note: NA - Not Analyzed
* Analyzed Using EPA Method TO-15

Table 1. (cont.)

Chemcial	Gdy-1-5	Gdy-1-15	Gdy-2-5	Gdy-2-15	Gdy-2-15 DUP	Gdy-3-5	Gdy-3-15	Gdy-4-5	Gdy-4-15	Gdy-5-5	Gdy-5-15
Benzene	89	<36	<36	<36	<36	<36	<36	51	<36	<36	<36
t-Butanol (TBA)	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
n-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
sec-Butylbenzene	<50	2300	<50	1800	1700	580	3000	<50	3900	<50	2100
Tert-Butylbenzene	<50	510	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
cis-1,2-Dichloroethene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Ethylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Heptane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	100	9200	<50	630	520	<50	1100	<50	1900	<50	<50
4-isopropyltoluene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
MTBE	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Naphthalene	<32	<32	<32	<32	<32	<32	<32	<32	<32	<32	<32
n-Propylbenzene	<50	570	<50	<50	<50	<50	670	<50	1200	<50	<50
Propylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	250	<50	<50	<50	<50	<50	<50	280	510	93	<50
1,1,1-Trichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2,4-Trimethylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,3,5-Trimethylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
m,p-Xylenes	120	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
o-Xylenes	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

Note: NA - Not Analyzed
* Analyzed Using EPA Method TO-15

Table 1. (cont.)

Chemcial	Wnt-1-5	Wnt-1-15	Wnt-1-15*	Wnt-2-5	Wnt-2-15	Wnt-3-5	Wnt-3-15	Wnt-4-5	Wnt-4-15
Benzene	43	<36	17.9	<36	<36	51	<36	<36	<36
t-Butanol (TBA)	<500	<500	NA	<500	<500	<500	<500	<500	<500
n-Butylbenzene	<50	<50	NA	<50	<50	<50	<50	<50	<50
sec-Butylbenzene	<50	<50	NA	1300	1800	<50	8900	<50	<50
Tert-Butylbenzene	<50	<50	NA	<50	<50	<50	630	<50	<50
Cyclohexane	NA	NA	234.1	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	<50	<50	13.4	<50	<50	<50	<50	<50	<50
1,2-Dichloroethane	<50	<50	17.8	<50	<50	<50	<50	<50	<50
cis-1,2-Dichloroethene	<50	<50	154.6	<50	<50	<50	<50	<50	<50
Ethylbenzene	61	<50	91.2	<50	1600	<50	620	260	<50
Heptane	NA	NA	139.4	NA	NA	NA	NA	NA	NA
Isopropylbenzene	<50	75	NA	23000	47000	280	81000	<50	<50
4-isopropyltoluene	<50	<50	NA	<50	<50	<50	<50	<50	<50
MTBE	<50	<50	<11	<50	<50	<50	<50	<50	<50
Naphthalene	<32	<32	NA	<32	<32	<32	<32	<32	<32
n-Propylbenzene	<50	<50	NA	2200	8700	<50	17000	<50	<50
Propylene	NA	NA	327.0	NA	NA	NA	NA	NA	NA
Toluene	150	88	1092.9	840	600	130	740	170	<50
1,1,1-Trichloroethane	<50	<50	180.0	<50	<50	<50	<50	<50	<50
1,2,4-Trimethylbenzene	<50	<50	<15	<50	<50	<50	<50	<50	<50
1,3,5-Trimethylbenzene	<50	<50	<15	<50	<50	<50	<50	<50	<50
m,p-Xylenes	190	130	477.6	<100	<100	<100	<100	780	<100
o-Xylenes	65	<50	112.9	<50	<50	<50	<50	180	<50

Note: NA - Not Analyzed
* Analyzed Using EPA Method TO-15

Table 1. (cont.)

Chemcial	Hill-1-5	Hill-1-15	Hill-2-5	Hill-2-15	Hill-2-15 DUP	Hill-3-5	Hill-3-15	Hill-4-5	Hill-4-15
Benzene	50	<36	<36	<36	<36	86	<36	<36	<36
t-Butanol (TBA)	<500	<500	<500	<500	<500	<500	<500	<500	<500
n-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50
sec-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50
Tert-Butylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50
Cyclohexane	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2-Dichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50
cis-1,2-Dichloroethene	<50	<50	<50	<50	<50	<50	<50	<50	<50
Ethylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50
Heptane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50
4-isopropyltoluene	<50	<50	<50	<50	<50	<50	<50	<50	<50
MTBE	<50	<50	<50	<50	<50	<50	<50	<50	<50
Naphthalene	<32	<32	<32	<32	<32	<32	<32	<32	<32
n-Propylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50
Propylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	180	<50	<50	68	69	250	130	<50	<50
1,1,1-Trichloroethane	<50	<50	<50	<50	<50	<50	<50	<50	<50
1,2,4-Trimethylbenzene	<50	<50	<50	110	99	<50	<50	<50	<50
1,3,5-Trimethylbenzene	<50	<50	<50	<50	<50	<50	<50	<50	<50
m,p-Xylenes	<100	<100	<100	<100	<100	120	<100	<100	<100
o-Xylenes	<50	<50	<50	<50	<50	<50	<50	<50	<50

Note: NA - Not Analyzed
* Analyzed Using EPA Method TO-15

APPENDIX D

March and April 2018 Laboratory Analytical Reports



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

February 26, 2018 Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100

Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596127 / 8B06013

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 02/06/18 16:17 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596127Project No:093-Chemoil-003Date Received: 02/06/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received			
7199 Hexavalent Chromium by IC -	Low Level							
MW-22a-1ft	8B06013-01	Soil	5	02/06/18 12:00	02/06/18 16:17			
MW-22a-2ft	8B06013-02	Soil	5	02/06/18 12:05	02/06/18 16:17			
MW-22a-5ft	8B06013-03	Soil	5	02/06/18 12:10	02/06/18 16:17			
MW-22a-10ft	8B06013-04	Soil	5	02/06/18 12:10	02/06/18 16:17			
CAM Metals Less Hg 6000/7000								
MW-22a-1ft	8B06013-01	Soil	5	02/06/18 12:00	02/06/18 16:17			
MW-22a-2ft	8B06013-02	Soil	5	02/06/18 12:05	02/06/18 16:17			
MW-22a-5ft	8B06013-03	Soil	5	02/06/18 12:10	02/06/18 16:17			
MW-22a-10ft	8B06013-04	Soil	5	02/06/18 12:10	02/06/18 16:17			
Mercury Total EPA 7470A/7471A								
MW-22a-1ft	8B06013-01	Soil	5	02/06/18 12:00	02/06/18 16:17			
MW-22a-2ft	8B06013-02	Soil	5	02/06/18 12:05	02/06/18 16:17			
MW-22a-5ft	8B06013-03	Soil	5	02/06/18 12:10	02/06/18 16:17			
MW-22a-10ft	8B06013-04	Soil	5	02/06/18 12:10	02/06/18 16:17			





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

AA Project No: A596127

Date Received: 02/06/18

Date Reported: 02/26/18

Method: Cations by Ion Chromatography

	,	0 1 7						
AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavale	ent Chromium by IC	- Low Level (EPA 7199)					
8B06013-01	MW-22a-1ft	02/06/18	02/09/18	02/09/18	1	< 0.040	mg/kg	0.04
8B06013-02	MW-22a-2ft	02/06/18	02/09/18	02/09/18	1	< 0.040	mg/kg	0.04
8B06013-03	MW-22a-5ft	02/06/18	02/09/18	02/09/18	1	< 0.040	mg/kg	0.04
8B06013-04	MW-22a-10ft	02/06/18	02/09/18	02/09/18	1	< 0.040	mg/kg	0.04





Client: The Source Group, Inc. (PH) AA Project No: A596127 093-Chemoil-003 **Project No:**

Date Received: 02/06/18 Project Name: Former Chemoil Refinery Date Reported: 02/26/18 Method: Total Metals CAM 17

Units: ma/ka

Wiethou.	Total Metals CAM 17			Oil	its. mg/kg
Date Sampled:	02/06/18	02/06/18	02/06/18	02/06/18	
Date Prepared:	02/08/18	02/08/18	02/08/18	02/08/18	
Date Analyzed:	02/09/18	02/09/18	02/09/18	02/09/18	
AA ID No:	8B06013-01	8B06013-02	8B06013-03	8B06013-04	
Client ID No:	MW-22a-1ft	MW-22a-2ft	MW-22a-5ft	MW-22a-10ft	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
CAM Metals Les	ss Hg 6000/7000 (EPA 6010E	<u>3/7000)</u>			
Antimony	<10	<10	<10	<10	10
Arsenic	4.4	3.4	11	7.2	0.50
Barium	110	91	110	100	10

Antimony	<10	<10	<10	<10	10
Arsenic	4.4	3.4	11	7.2	0.50
Barium	110	91	110	100	10
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	20	18	30	28	3.0
Cobalt	8.7	6.8	12	11	3.0
Copper	11	6.5	16	7.6	3.0
Lead	16	5.9	6.6	5.7	3.0
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
Nickel	13	11	23	20	3.0
Selenium	< 0.50	< 0.50	< 0.50	<0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	<5.0	<5.0	5.0
Vanadium	37	34	61	53	10
Zinc	48	34	43	45	3.0





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

AA Project No: A596127

Date Received: 02/06/18

Project No:093-Chemoil-003Date Received:02/06/18Project Name:Former Chemoil RefineryDate Reported:02/26/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 02/06/18 02/06/18 02/06/18 02/06/18 **Date Prepared:** 02/07/18 02/07/18 02/07/18 02/07/18 **Date Analyzed:** 02/07/18 02/07/18 02/07/18 02/07/18 AA ID No: 8B06013-01 8B06013-02 8B06013-03 8B06013-04 Client ID No: MW-22a-1ft MW-22a-2ft MW-22a-5ft MW-22a-10ft Soil Soil Soil Soil Matrix: **Dilution Factor:** 1 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.074 0.024 0.054 0.044** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596127Project No:093-Chemoil-003Date Received: 02/06/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography		ontrol								
Batch B8B0910 - NO PREP										
Blank (B8B0910-BLK1)				Prepare	ed & Analy	zed: 0	2/09/18			
Chromium (VI)	<0.040	0.040	mg/kg	•		<u> </u>				
LCS (B8B0910-BS1)			0 0	Prepare	ed & Analy	zed: 0	2/09/18			
Chromium (VI)	0.193	0.040	mg/kg	0.20		96.4	80-120			
LCS Dup (B8B0910-BSD1)			3 3	Prepare	ed & Analy	zed: 0	2/09/18			
Chromium (VI)	0.201	0.040	mg/kg	0.20		101	80-120	4.36	20	
Matrix Spike (B8B0910-MS1)	S	ource: 8B0		Prepare	ed & Analy	zed: 0	2/09/18			
Chromium (VI)	0.186	0.040	mg/kg	0.20	•		70-130			
Matrix Spike Dup (B8B0910-MS	D1) S	ource: 8B0	06013-04	Prepare	ed & Analy	zed: 0	2/09/18			
Chromium (VI)	0.230	0.040	mg/kg	0.20	<0.040		70-130	20.9	40	
Total Metals CAM 17 - Quality Co	ntrol		0 0							
Batch B8B0822 - EPA 3050B										
Blank (B8B0822-BLK1)				Prepare	ed: 02/08/	18 Ana	alyzed: 02	2/09/18		
Antimony	<10	10	mg/kg							
Arsenic	< 0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							
Cobalt	<3.0	3.0	mg/kg							
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	<5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0	mg/kg							
Thallium	<5.0	5.0	mg/kg							
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							
LCS (B8B0822-BS1)				Prepare	ed: 02/08/	18 Ana	alyzed: 02	2/09/18		
Antimony	54.8	10	mg/kg	50		110	80-120			

A



Client:The Source Group, Inc. (PH)AA Project No: A596127Project No:093-Chemoil-003Date Received: 02/06/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Analyto	F Result	Reporting Limit	Units		Source Result %REC	%REC	RPD	RPD Limit	Notes
Analyte		LIIIII	Ullits	Level	Result /6REC	LIIIIII	KFD	LIIIII	NOTES
Total Metals CAM 17 - Quality Con	itrol								
Batch B8B0822 - EPA 3050B									
LCS (B8B0822-BS1) Continued				Prepare	ed: 02/08/18 Ana	alyzed: 02	2/09/18		
Arsenic	53.5	0.50	mg/kg	50	107	80-120			
Barium	52.2	10	mg/kg	50	104	80-120			
Beryllium	58.1	1.0	mg/kg	50	116	80-120			
Cadmium	58.5	1.0	mg/kg	50	117	80-120			
Chromium	54.3	3.0	mg/kg	50	109	80-120			
Cobalt	56.2	3.0	mg/kg	50	112	80-120			
Copper	51.0	3.0	mg/kg	50	102	80-120			
Lead	54.9	3.0	mg/kg	50	110	80-120			
Molybdenum	56.0	5.0	mg/kg	50	112	80-120			
Nickel	56.4	3.0	mg/kg	50	113	80-120			
Selenium	54.5	0.50	mg/kg	50	109	80-120			
Silver	51.8	1.0	mg/kg	50	104	80-120			
Thallium	58.4	5.0	mg/kg	50	117	80-120			
Vanadium	54.4	10	mg/kg	50	109	80-120			
Zinc	59.6	3.0	mg/kg	50	119	80-120			
LCS Dup (B8B0822-BSD1)				•	ed: 02/08/18 Ana		2/09/18		
Antimony	53.1	10	mg/kg	50	106	80-120	3.19	20	
Arsenic	52.4	0.50	mg/kg	50	105	80-120	2.06	20	
Barium	50.6	10	mg/kg	50	101	80-120	3.25	20	
Beryllium	56.7	1.0	mg/kg	50	113	80-120	2.53	20	
Cadmium	56.6	1.0	mg/kg	50	113	80-120	3.18	20	
Chromium	52.8	3.0	mg/kg	50	106	80-120	2.71	20	
Cobalt	54.6	3.0	mg/kg	50	109	80-120	2.89	20	
Copper	49.4	3.0	mg/kg	50	98.8	80-120	3.21	20	
Lead	53.6	3.0	mg/kg	50	107	80-120	2.38	20	
Molybdenum	54.4	5.0	mg/kg	50	109	80-120	2.77	20	
Nickel	55.0	3.0	mg/kg	50	110	80-120	2.49	20	
Selenium	53.4	0.50	mg/kg	50	107	80-120	2.04	20	
Silver	50.2	1.0	mg/kg	50	100	80-120	3.08	20	
Thallium	57.6	5.0	mg/kg	50	115	80-120	1.41	20	
Vanadium	52.7	10	mg/kg	50	105	80-120	3.14	20	





Client:The Source Group, Inc. (PH)AA Project No: A596127Project No:093-Chemoil-003Date Received: 02/06/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Con	ntrol									
Batch B8B0822 - EPA 3050B										
LCS Dup (B8B0822-BSD1) Cont	inued			Prepare	ed: 02/08/	18 Ana	alyzed: 02	2/09/18		
Zinc	58.0	3.0	mg/kg	50		116	80-120	2.60	20	
Duplicate (B8B0822-DUP1)	5	Source: 8B0		Prepare	ed: 02/08/	18 Ana	alyzed: 02	2/09/18		
Antimony	<10	10	mg/kg	-	<10				40	
Arsenic	7.41	0.50	mg/kg		7.22			2.60	40	
Barium	107	10	mg/kg		101			6.35	40	
Beryllium	<1.0	1.0	mg/kg		<1.0				40	
Cadmium	<1.0	1.0	mg/kg		<1.0				40	
Chromium	30.7	3.0	mg/kg		27.8			10.0	40	
Cobalt	11.4	3.0	mg/kg		11.3			0.965	40	
Copper	10.6	3.0	mg/kg		7.58			33.0	40	
Lead	6.22	3.0	mg/kg		5.72			8.38	40	
Molybdenum	<5.0	5.0	mg/kg		< 5.0				40	
Nickel	21.5	3.0	mg/kg		20.0			7.66	40	
Selenium	<0.50	0.50	mg/kg		< 0.50				40	
Silver	<1.0	1.0	mg/kg		<1.0				40	
Thallium	<5.0	5.0	mg/kg		< 5.0				40	
Vanadium	59.0	10	mg/kg		53.4			9.95	40	
Zinc	47.8	3.0	mg/kg		45.1			5.71	40	
Matrix Spike (B8B0822-MS1)		Source: 8B0	7021-04	Prepare	ed: 02/08/	18 Ana	alyzed: 02	2/09/18		
Antimony	17.1	10	mg/kg	50		34.1	75-125			QM-07
Arsenic	43.9	0.50	mg/kg	50		81.6	75-125			
Barium	131	10	mg/kg	50	92.8	76.9	75-125			
Beryllium	41.2	1.0	mg/kg	50		82.5	75-125			
Cadmium	40.0	1.0	mg/kg	50		80.0	75-125			
Chromium	60.7	3.0	mg/kg	50		88.3	75-125			
Cobalt	45.3	3.0	mg/kg	50	5.89	78.9	75-125			
Copper	54.7	3.0	mg/kg	50		109	75-125			
Lead	45.2	3.0	mg/kg	50	3.39	83.6	75-125			
Molybdenum	43.6	5.0	mg/kg	50		87.1	75-125			
Nickel	51.7	3.0	mg/kg	50	13.4	76.5	75-125			
Selenium	40.0	0.50	mg/kg	50		80.0	75-125			

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Client:The Source Group, Inc. (PH)AA Project No: A596127Project No:093-Chemoil-003Date Received: 02/06/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Con										
Batch B8B0822 - EPA 3050B										
Matrix Spike (B8B0822-MS1) Cor	ntinued	Source: 8B0	7021-04	Prepare	ed: 02/08/	18 Ana	alyzed: 02	2/09/18		
Silver	48.4	1.0	mg/kg	50		96.8	75-125			
Thallium	31.3	5.0	mg/kg	50		62.5	60-140			
Vanadium	78.3	10	mg/kg	50	32.0	92.6	75-125			
Zinc	63.9	3.0	mg/kg	50	27.2	73.5	75-125			QM-07
Matrix Spike Dup (B8B0822-MSD	1)	Source: 8B0		Prepare	ed: 02/08/	18 Ana	alyzed: 02	2/09/18		
Antimony	18.8	10	mg/kg	50		37.5	75-125	9.49	40	QM-07
Arsenic	46.9	0.50	mg/kg	50	3.12	87.5	75-125	6.57	40	
Barium	135	10	mg/kg	50	92.8	83.9	75-125	2.63	40	
Beryllium	47.3	1.0	mg/kg	50		94.6	75-125	13.7	40	
Cadmium	40.0	1.0	mg/kg	50		80.0	75-125	0.00	40	
Chromium	65.0	3.0	mg/kg	50		96.8	75-125	6.75	40	
Cobalt	49.8	3.0	mg/kg	50	5.89	87.7	75-125	9.32	40	
Copper	56.9	3.0	mg/kg	50		114	75-125	3.93	40	
Lead	48.6	3.0	mg/kg	50	3.39		75-125	7.30	40	
Molybdenum	47.4	5.0	mg/kg	50		94.8	75-125	8.38	40	
Nickel	56.5	3.0	mg/kg	50	13.4	86.1	75-125	8.86	40	
Selenium	40.0	0.50	mg/kg	50		80.0	75-125	0.00	40	
Silver	49.4	1.0	mg/kg	50		98.7	75-125	1.98	40	
Thallium	35.9	5.0	mg/kg	50		71.8	60-140	13.7	40	
Vanadium	82.7	10	mg/kg	50	32.0		75-125	5.52	40	
Zinc	72.8	3.0	mg/kg	50	27.2	91.1	75-125	12.9	40	
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8B0720 - EPA 7471A Prep										
Blank (B8B0720-BLK1)				Prepare	ed & Analy	yzed: 0	2/07/18			
Mercury	<0.020	0.020	mg/kg	·						
LCS (B8B0720-BS1)			0 0	Prepare	ed & Analy	yzed: 0	2/07/18			
Mercury	0.490	0.020	mg/kg	0.50		98.1	80-120			
LCS Dup (B8B0720-BSD1)			3 3	Prepare	ed & Analy	yzed: 0	2/07/18			
Mercury	0.514	0.020	mg/kg	0.50		103	80-120	4.78	25	
Duplicate (B8B0720-DUP1)		Source: 8B0			ed & Anal	yzed: 0				
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Client:The Source Group, Inc. (PH)AA Project No: A596127Project No:093-Chemoil-003Date Received: 02/06/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

		Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8B0720 - EPA 7471A Prep										
Duplicate (B8B0720-DUP1) Cont	inued S	Source: 8B0	6013-04	Prepare	ed & Analy	yzed: 0	2/07/18			
Mercury	0.0490	0.020	mg/kg		0.0435			11.9	25	
Matrix Spike (B8B0720-MS1)	5	Source: 8B0	6012-02	Prepare	ed & Analy	yzed: 0	2/07/18			
Mercury	0.570	0.020	mg/kg	0.50	0.0330	107	75-125			
Matrix Spike Dup (B8B0720-MSD)1) S	Source: 8B0	6012-02	Prepare	ed & Analy	yzed: 0	2/07/18			
Mercury	0.562	0.020	mg/kg	0.50	0.0330	106	75-125	1.41	25	

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Client: The Source Group, Inc. (PH)

AA Project No: A596127 **Project No:** 093-Chemoil-003 Date Received: 02/06/18 Project Name: Former Chemoil Refinery Date Reported: 02/26/18

Special Notes

[1] = QM-07: The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was

accepted based on acceptable LCS recovery.



AMERICAN © MANA YTICS

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

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Sampler's Name:	Sampler's Signature:	P.O. No.:	Quote No.:	ANALYSIS REQUESTED (Test Name)			Please enter the TAT Turnaround Codes ** helow	2000												F F	Time	Time	
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Note: By relinquishing samples to Americán Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project.
Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

February 26, 2018

Kirsten Duey

The Source Group, Inc. (PH)

3478 Buskirk Ave., Suite 100 Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596128 / 8B13017

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 02/13/18 14:16 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

	,			= 0.00 1.000	
Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromium by IC	- Low Level				
MW-21-1ft	8B13017-01	Soil	5	02/12/18 09:00	02/13/18 14:16
MW-21-2ft	8B13017-02	Soil	5	02/12/18 09:05	02/13/18 14:16
MW-21-5ft	8B13017-03	Soil	5	02/12/18 09:10	02/13/18 14:16
MW-21-10ft	8B13017-04	Soil	5	02/12/18 09:15	02/13/18 14:16
CAM Metals Less Hg 6000/7000					
MW-21-1ft	8B13017-01	Soil	5	02/12/18 09:00	02/13/18 14:16
MW-21-2ft	8B13017-02	Soil	5	02/12/18 09:05	02/13/18 14:16
MW-21-5ft	8B13017-03	Soil	5	02/12/18 09:10	02/13/18 14:16
MW-21-10ft	8B13017-04	Soil	5	02/12/18 09:15	02/13/18 14:16
Mercury Total EPA 7470A/7471A					
MW-21-1ft	8B13017-01	Soil	5	02/12/18 09:00	02/13/18 14:16
MW-21-2ft	8B13017-02	Soil	5	02/12/18 09:05	02/13/18 14:16
MW-21-5ft	8B13017-03	Soil	5	02/12/18 09:10	02/13/18 14:16
MW-21-10ft	8B13017-04	Soil	5	02/12/18 09:15	02/13/18 14:16





Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Method: Cations by Ion Chromatography

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexaval	ent Chromium by IC	- Low Level (EPA 7199)					
8B13017-01	MW-21-1ft	02/12/18	02/20/18	02/20/18	1	<0.040	mg/kg	0.04
8B13017-02	MW-21-2ft	02/12/18	02/20/18	02/20/18	1	<0.040	mg/kg	0.04
8B13017-03	MW-21-5ft	02/12/18	02/20/18	02/20/18	1	<0.040	mg/kg	0.04
8B13017-04	MW-21-10ft	02/12/18	02/20/18	02/20/18	1	<0.040	mg/kg	0.04





Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

•	Total Metals CAM 17			Units:	
Date Sampled:	02/12/18	02/12/18	02/12/18	02/12/18	
Date Prepared:	02/15/18	02/15/18	02/15/18	02/15/18	
Date Analyzed:	02/16/18	02/16/18	02/16/18	02/16/18	
AA ID No:	8B13017-01	8B13017-02	8B13017-03	8B13017-04	
Client ID No:	MW-21-1ft	MW-21-2ft	MW-21-5ft	MW-21-10ft	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
CAM Metals Les	s Hg 6000/7000 (EPA 6010B/	7000)			
Antimony	<10	<10	<10	<10	10
Arsenic	2.1	4.6	5.4	6.7	0.50
Barium	83	150	200	230	10
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	15	24	22	23	3.0
Cobalt	5.9	11	9.3	13	3.0
Copper	8.7	9.8	13	13	3.0
Lead	3.8	6.4	6.4	6.4	3.0
Molyhdanum	√ 5.0	- 5 0	~5 O	∠ 5.0	5.0

=					
Copper	8.7	9.8	13	13	3.0
Lead	3.8	6.4	6.4	6.4	3.0
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
Nickel	8.8	17	15	19	3.0
Selenium	< 0.50	< 0.50	< 0.50	< 0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	< 5.0	<5.0	5.0
Vanadium	32	53	48	50	10
Zinc	26	35	37	42	3.0





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Date Received: 02/13/18

Project Name: Former Chemoil Refinery Date Reported: 02/26/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 02/12/18 02/12/18 02/12/18 02/12/18 **Date Prepared:** 02/15/18 02/15/18 02/15/18 02/15/18 **Date Analyzed:** 02/15/18 02/15/18 02/15/18 02/15/18 AA ID No: 8B13017-01 8B13017-02 8B13017-03 8B13017-04 **Client ID No:** MW-21-1ft MW-21-2ft MW-21-5ft MW-21-10ft Soil Soil Soil Soil Matrix: **Dilution Factor:** 1 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury <0.020 <0.020 **0.036** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography -										
Batch B8B2037 - NO PREP	- Lucinity									
Blank (B8B2037-BLK1)				Prenare	ed & Analy	/zed: 0	2/20/18			
Chromium (VI)	<0.040	0.040	mg/kg	Tropare	a a mai	/20u. 0	2/20/10			
LCS (B8B2037-BS1)	10.010	0.040	mg/kg	Prenare	ed & Analy	7564· N	2/20/18			
Chromium (VI)	0.184	0.040	mg/kg	0.20	a a Anaiy		80-120			
LCS Dup (B8B2037-BSD1)	0.104	0.040	mg/kg		ed & Analy					
Chromium (VI)	0.194	0.040	ma/ka	0.20	u & Allais	96.8		4.98	20	
` ,			mg/kg		امر ۸ مار			4.98	20	
Matrix Spike (B8B2037-MS1)	0.194	Source: 8B1 0.040		•	•		70-130			
Chromium (VI)			mg/kg	0.20						
Matrix Spike Dup (B8B2037-MSI		Source: 8B1		•				0.40	40	
Chromium (VI)	0.189	0.040	mg/kg	0.20	<0.040	94.5	70-130	2.40	40	
Total Metals CAM 17 - Quality Cor	ntrol									
Batch B8B1519 - EPA 3050B										
Blank (B8B1519-BLK1)				Prepare	ed & Analy	zed: 0	2/15/18			
Antimony	<10	10	mg/kg							
Arsenic	< 0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							
Cobalt	<3.0	3.0	mg/kg							
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	<5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0	mg/kg							
Thallium	<5.0	5.0	mg/kg							
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							
LCS (B8B1519-BS1)				•	ed & Analy					
Antimony	57.4	10	mg/kg	50		115	80-120			

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Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Analyte	l Result	Reporting Limit	Units		Source Result %REC	%REC	RPD	RPD Limit	Notes
		Liiiit	Office	LCVCI	Result /orteo	Lillits	IXI D	Liiiiii	110103
Total Metals CAM 17 - Quality Con	itroi								
Batch B8B1519 - EPA 3050B				_		0/45/40			
LCS (B8B1519-BS1) Continued					ed & Analyzed: 0				
Arsenic	52.2	0.50	mg/kg	50	104	80-120			
Barium	55.2	10	mg/kg	50	110	80-120			
Beryllium	55.1	1.0	mg/kg	50	110	80-120			
Cadmium	51.8	1.0	mg/kg	50	104	80-120			
Chromium	50.0	3.0	mg/kg	50	100	80-120			
Cobalt	52.7	3.0	mg/kg	50	105	80-120			
Copper	56.8	3.0	mg/kg	50	114	80-120			
Lead	54.2	3.0	mg/kg	50	108	80-120			
Molybdenum	53.0	5.0	mg/kg	50	106	80-120			
Nickel	50.8	3.0	mg/kg	50	102	80-120			
Selenium	55.3	0.50	mg/kg	50	111	80-120			
Silver	56.9	1.0	mg/kg	50	114	80-120			
Thallium	59.7	5.0	mg/kg	50	119	80-120			
Vanadium	53.4	10	mg/kg	50	107	80-120			
Zinc	51.8	3.0	mg/kg	50	104	80-120			
LCS Dup (B8B1519-BSD1)				•	ed & Analyzed: 0				
Antimony	53.4	10	mg/kg	50	107	80-120	7.37	20	
Arsenic	49.0	0.50	mg/kg	50	98.1	80-120	6.20	20	
Barium	51.4	10	mg/kg	50	103	80-120	7.32	20	
Beryllium	51.2	1.0	mg/kg	50	102	80-120	7.32	20	
Cadmium	49.0	1.0	mg/kg	50	98.1	80-120	5.53	20	
Chromium	46.1	3.0	mg/kg	50	92.3	80-120	8.03	20	
Cobalt	49.0	3.0	mg/kg	50	98.1	80-120	7.12	20	
Copper	52.8	3.0	mg/kg	50	106	80-120	7.29	20	
Lead	51.1	3.0	mg/kg	50	102	80-120	5.87	20	
Molybdenum	50.8	5.0	mg/kg	50	102	80-120	4.26	20	
Nickel	47.2	3.0	mg/kg	50	94.5	80-120	7.32	20	
Selenium	53.5	0.50	mg/kg	50	107	80-120	3.27	20	
Silver	53.4	1.0	mg/kg	50	107	80-120	6.46	20	
Thallium	60.0	5.0	mg/kg	50	120	80-120	0.535	20	
Vanadium	49.4	10	mg/kg	50	98.8	80-120	7.82	20	





Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Con	trol								_	
Batch B8B1519 - EPA 3050B										
LCS Dup (B8B1519-BSD1) Conti	nued			Prepare	d & Ana	lvzed: 0	2/15/18			
Zinc	49.6	3.0	mg/kg	50			80-120	4.32	20	
Duplicate (B8B1519-DUP1)	9	Source: 8B1		Prepare	ed: 02/15			2/16/18		
Antimony	<10	10	mg/kg	•					40	
Arsenic	7.27	0.50	mg/kg		9.02	<u> </u>		21.5	40	
Barium	41.5	10	mg/kg		49.0)		16.6	40	
Beryllium	<1.0	1.0	mg/kg		1.03	}			40	
Cadmium	<1.0	1.0	mg/kg						40	
Chromium	12.8	3.0	mg/kg		14.1			9.76	40	
Cobalt	6.87	3.0	mg/kg		8.20)		17.7	40	
Copper	3.46	3.0	mg/kg		9.51			93.3	40	QR-01
Lead	<3.0	3.0	mg/kg		3.01				40	
Molybdenum	<5.0	5.0	mg/kg						40	
Nickel	22.0	3.0	mg/kg		24.7	,		11.4	40	
Selenium	<0.50	0.50	mg/kg						40	
Silver	<1.0	1.0	mg/kg						40	
Thallium	<5.0	5.0	mg/kg						40	
Vanadium	80.7	10	mg/kg		107	•		27.9	40	
Zinc	<3.0	3.0	mg/kg						40	
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8B1524 - EPA 7471A Prep										
Blank (B8B1524-BLK1)				Prepare	d & Ana	lyzed: 0	2/15/18			
Mercury	<0.020	0.020	mg/kg	·						
LCS (B8B1524-BS1)			0 0	Prepare	d & Ana	lyzed: 0	2/15/18			
Mercury	0.456	0.020	mg/kg	0.50		91.2	80-120			
LCS Dup (B8B1524-BSD1)			0 0	Prepare	d & Ana	lyzed: 0	2/15/18			
Mercury	0.460	0.020	mg/kg	0.50		91.9	80-120	0.765	25	
Duplicate (B8B1524-DUP1)	5	Source: 8B1	3014-09	Prepare	ed & Ana	lyzed: 0	2/15/18			
Mercury	<0.020	0.020	mg/kg						25	
Matrix Spike (B8B1524-MS1)	5	Source: 8B1		Prepare	d & Ana	lyzed: 0	2/15/18			
Mercury	0.497	0.020	mg/kg	0.50		92.1	75-125			





Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

	Reporting		Spike Source	%REC		RPD	
Analyte	Result Limit	Units	Level Result %REC	Limits	RPD	Limit	Notes

Total Metals CAM 17 - Quality Control

Batch B8B1524 - EPA 7471A Prep

Matrix Spike Dup (B8B1524-MSD1) Source: 8B13017-04 Prepared & Analyzed: 02/15/18

Mercury 0.467 0.020 mg/kg 0.50 0.0365 86.1 75-125 6.22 25

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Client:The Source Group, Inc. (PH)AA Project No: A596128Project No:093-Chemoil-003Date Received: 02/13/18Project Name:Former Chemoil RefineryDate Reported: 02/26/18

Special Notes

[1] = QR-01 : Analyses are not controlled on RPD values from sample concentrations less than 10 times the

reporting limit. QC batch accepted based on LCS and/or LCSD QC results.

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AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

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Kernahan Sampler's Name: Project Name / No.: CTS Chemes I - OCS X 2845 204

Client: Apr Can and	Canics	Project Name / No.:	ie / No.:	543-Chemai	- nem	30-15	~ ~		Sampler's Name:		CONTRACTOR	
Bus	Kirstem Davey	Site A	Address:	3478	S.S. T. F.		400,500	$\lesssim_{\omega_0} + \ell_0 \otimes_{\omega_0} $ Sampler's Signature:	pler's Sign			
Phone: 625 - 651	-951-6376		City:	Deasont		derental Services	e e).q	P.O. No.:		
Fax:		State	State & Zip:	100 10	94 52				Quo	Quote No.:		
	TAT Turnaround Codes **						ANAL	ANAL YSIS REQUESTED (Test Name)	STED (Test	Name)		
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Client I.D.		Date	0	Sample	No.	10						
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Note: By relinquishing samples to American Analytics/client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 02, 2018

Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100 Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596137 / 8C16001

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 03/16/18 08:18 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

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Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromium by IC	- Low Level				
TP-8-1'	8C16001-01	Soil	5	03/14/18 13:11	03/16/18 08:18
TP-8-5'	8C16001-03	Soil	5	03/14/18 13:31	03/16/18 08:18
TP-5-1'	8C16001-04	Soil	5	03/14/18 08:50	03/16/18 08:18
TP-5-5'	8C16001-06	Soil	5	03/14/18 09:26	03/16/18 08:18
TP-13-1'	8C16001-07	Soil	5	03/14/18 12:55	03/16/18 08:18
TP-13-5'	8C16001-09	Soil	5	03/14/18 13:10	03/16/18 08:18
TP-2-1'	8C16001-10	Soil	5	03/15/18 08:00	03/16/18 08:18
TP-2-5'	8C16001-12	Soil	5	03/15/18 08:30	03/16/18 08:18
TP-6-1'	8C16001-13	Soil	5	03/15/18 10:00	03/16/18 08:18
TP-6-5'	8C16001-15	Soil	5	03/15/18 10:23	03/16/18 08:18
TP-19-1'	8C16001-16	Soil	5	03/15/18 13:00	03/16/18 08:18
TP-19-5'	8C16001-18	Soil	5	03/15/18 13:32	03/16/18 08:18
TP-16-1'	8C16001-19	Soil	5	03/15/18 14:03	03/16/18 08:18
TP-16-5'	8C16001-21	Soil	5	03/15/18 14:22	03/16/18 08:18
CAM Metals Less Hg 6000/7000					
TP-8-1'	8C16001-01	Soil	5	03/14/18 13:11	03/16/18 08:18
TP-8-5'	8C16001-03	Soil	5	03/14/18 13:31	03/16/18 08:18
TP-5-1'	8C16001-04	Soil	5	03/14/18 08:50	03/16/18 08:18

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Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

rioject Name. Tomber Chemon Ne	ли ю у			Date Reported. 04/02/10		
Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received	
TP-5-5'	8C16001-06	Soil	5	03/14/18 09:26	03/16/18 08:18	
TP-13-1'	8C16001-07	Soil	5	03/14/18 12:55	03/16/18 08:18	
TP-13-5'	8C16001-09	Soil	5	03/14/18 13:10	03/16/18 08:18	
TP-2-1'	8C16001-10	Soil	5	03/15/18 08:00	03/16/18 08:18	
TP-2-5'	8C16001-12	Soil	5	03/15/18 08:30	03/16/18 08:18	
TP-6-1'	8C16001-13	Soil	5	03/15/18 10:00	03/16/18 08:18	
TP-6-5'	8C16001-15	Soil	5	03/15/18 10:23	03/16/18 08:18	
TP-19-1'	8C16001-16	Soil	5	03/15/18 13:00	03/16/18 08:18	
TP-19-5'	8C16001-18	Soil	5	03/15/18 13:32	03/16/18 08:18	
TP-16-1'	8C16001-19	Soil	5	03/15/18 14:03	03/16/18 08:18	
TP-16-5'	8C16001-21	Soil	5	03/15/18 14:22	03/16/18 08:18	
Mercury Total EPA 7470A/7471A						
TP-8-1'	8C16001-01	Soil	5	03/14/18 13:11	03/16/18 08:18	
TP-8-5'	8C16001-03	Soil	5	03/14/18 13:31	03/16/18 08:18	
TP-5-1'	8C16001-04	Soil	5	03/14/18 08:50	03/16/18 08:18	
TP-5-5'	8C16001-06	Soil	5	03/14/18 09:26	03/16/18 08:18	
TP-13-1'	8C16001-07	Soil	5	03/14/18 12:55	03/16/18 08:18	
TP-13-5'	8C16001-09	Soil	5	03/14/18 13:10	03/16/18 08:18	
TP-2-1'	8C16001-10	Soil	5	03/15/18 08:00	03/16/18 08:18	
TP-2-5'	8C16001-12	Soil	5	03/15/18 08:30	03/16/18 08:18	





Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TP-6-1'	8C16001-13	Soil	5	03/15/18 10:00	03/16/18 08:18
TP-6-5'	8C16001-15	Soil	5	03/15/18 10:23	03/16/18 08:18
TP-19-1'	8C16001-16	Soil	5	03/15/18 13:00	03/16/18 08:18
TP-19-5'	8C16001-18	Soil	5	03/15/18 13:32	03/16/18 08:18
TP-16-1'	8C16001-19	Soil	5	03/15/18 14:03	03/16/18 08:18
TP-16-5'	8C16001-21	Soil	5	03/15/18 14:22	03/16/18 08:18





Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Method: Cations by Ion Chromatography

Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
nt Chromium by IC	- Low Level (I	EPA 7199)					
TP-8-1'	03/14/18	03/21/18	03/21/18	1	0.057	mg/kg	0.04
TP-8-5'	03/14/18	03/21/18	03/21/18	1	< 0.040	mg/kg	0.04
TP-5-1'	03/14/18	03/21/18	03/21/18	1	< 0.040	mg/kg	0.04
TP-5-5'	03/14/18	03/21/18	03/21/18	1	<0.040	mg/kg	0.04
TP-13-1'	03/14/18	03/21/18	03/21/18	1	< 0.040	mg/kg	0.04
TP-13-5'	03/14/18	03/21/18	03/21/18	1	< 0.040	mg/kg	0.04
TP-2-1'	03/15/18	03/21/18	03/21/18	1	< 0.040	mg/kg	0.04
TP-2-5'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04
TP-6-1'	03/15/18	03/22/18	03/22/18	1	< 0.040	mg/kg	0.04
TP-6-5'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04
TP-19-1'	03/15/18	03/28/18	03/28/18	1	< 0.040	mg/kg	0.04
TP-19-5'	03/15/18	03/22/18	03/22/18	1	< 0.040	mg/kg	0.04
TP-16-1'	03/15/18	03/22/18	03/22/18	1	< 0.040	mg/kg	0.04
TP-16-5'	03/15/18	03/22/18	03/22/18	1	< 0.040	mg/kg	0.04
	nt Chromium by IC TP-8-1' TP-8-5' TP-5-1' TP-5-5' TP-13-1' TP-13-5' TP-2-1' TP-2-5' TP-6-1' TP-6-5' TP-19-1' TP-19-5' TP-19-5'	TP-8-1' 03/14/18 TP-8-5' 03/14/18 TP-5-1' 03/14/18 TP-5-5' 03/14/18 TP-13-1' 03/14/18 TP-13-5' 03/14/18 TP-2-1' 03/15/18 TP-2-5' 03/15/18 TP-6-1' 03/15/18 TP-6-5' 03/15/18 TP-19-1' 03/15/18 TP-19-5' 03/15/18 TP-19-5' 03/15/18 TP-19-5' 03/15/18	TP-8-1' 03/14/18 03/21/18 TP-8-5' 03/14/18 03/21/18 TP-5-1' 03/14/18 03/21/18 TP-5-5' 03/14/18 03/21/18 TP-13-1' 03/14/18 03/21/18 TP-13-5' 03/14/18 03/21/18 TP-2-1' 03/15/18 03/21/18 TP-2-5' 03/15/18 03/22/18 TP-6-1' 03/15/18 03/22/18 TP-6-5' 03/15/18 03/22/18 TP-19-1' 03/15/18 03/22/18 TP-19-5' 03/15/18 03/22/18 TP-19-5' 03/15/18 03/22/18 TP-16-1' 03/15/18 03/22/18	TP-8-1' 03/14/18 03/21/18 03/21/18 TP-8-5' 03/14/18 03/21/18 03/21/18 TP-5-1' 03/14/18 03/21/18 03/21/18 TP-5-5' 03/14/18 03/21/18 03/21/18 TP-13-1' 03/14/18 03/21/18 03/21/18 TP-13-5' 03/14/18 03/21/18 03/21/18 TP-2-1' 03/15/18 03/21/18 03/21/18 TP-2-5' 03/15/18 03/22/18 03/22/18 TP-6-1' 03/15/18 03/22/18 03/22/18 TP-6-5' 03/15/18 03/22/18 03/22/18 TP-19-1' 03/15/18 03/22/18 03/22/18 TP-19-5' 03/15/18 03/22/18 03/22/18 TP-19-5' 03/15/18 03/22/18 03/22/18 TP-19-5' 03/15/18 03/22/18 03/22/18 TP-19-5' 03/15/18 03/22/18 03/22/18	TP-8-1' 03/14/18 03/21/18 03/21/18 1 TP-8-5' 03/14/18 03/21/18 03/21/18 1 TP-5-1' 03/14/18 03/21/18 03/21/18 1 TP-13-1' 03/14/18 03/21/18 03/21/18 1 TP-13-1' 03/14/18 03/21/18 03/21/18 1 TP-2-1' 03/15/18 03/21/18 03/21/18 1 TP-2-5' 03/15/18 03/21/18 03/21/18 1 TP-2-5' 03/15/18 03/22/18 03/22/18 1 TP-6-1' 03/15/18 03/22/18 03/22/18 1 TP-19-1' 03/15/18 03/22/18 03/22/18 1 TP-19-1' 03/15/18 03/22/18 03/22/18 1 TP-19-5' 03/15/18 03/22/18 03/22/18 1 TP-19-5' 03/15/18 03/22/18 03/22/18 1 TP-19-5' 03/15/18 03/22/18 03/22/18 1 TP-16-1' 03/15/18 03/22/18 03/22/18 1	TP-8-1' 03/14/18 03/21/18 03/21/18 1 0.057 TP-8-5' 03/14/18 03/21/18 03/21/18 1 0.040 TP-5-1' 03/14/18 03/21/18 03/21/18 1 0.040 TP-5-5' 03/14/18 03/21/18 03/21/18 1 0.040 TP-13-1' 03/14/18 03/21/18 03/21/18 1 0.040 TP-13-5' 03/14/18 03/21/18 03/21/18 1 0.040 TP-2-1' 03/15/18 03/21/18 03/21/18 1 0.040 TP-2-5' 03/15/18 03/22/18 03/22/18 1 0.040 TP-6-1' 03/15/18 03/22/18 03/22/18 1 0.040 TP-6-5' 03/15/18 03/22/18 03/22/18 1 0.040 TP-19-1' 03/15/18 03/28/18 03/28/18 1 0.040 TP-19-5' 03/15/18 03/28/18 03/28/18 1 0.040 TP-19-5' 03/15/18 03/22/18 03/22/18 1 0.0040 TP-19-5' 03/15/18 03/22/18 03/22/18 1 0.0040	TP-8-1' 03/14/18 03/21/18 03/21/18 1 0.057 mg/kg TP-8-5' 03/14/18 03/21/18 03/21/18 1 0.040 mg/kg TP-5-1' 03/14/18 03/21/18 03/21/18 1 0.040 mg/kg TP-5-5' 03/14/18 03/21/18 03/21/18 1 0.040 mg/kg TP-13-1' 03/14/18 03/21/18 03/21/18 1 0.040 mg/kg TP-13-5' 03/14/18 03/21/18 03/21/18 1 0.040 mg/kg TP-13-5' 03/14/18 03/21/18 03/21/18 1 0.040 mg/kg TP-2-1' 03/15/18 03/21/18 03/21/18 1 0.040 mg/kg TP-2-5' 03/15/18 03/22/18 03/22/18 1 0.040 mg/kg TP-6-1' 03/15/18 03/22/18 03/22/18 1 0.040 mg/kg TP-6-5' 03/15/18 03/22/18 03/22/18 1 0.040 mg/kg TP-19-1' 03/15/18 03/22/18 03/22/18 1 0.040 mg/kg TP-19-5' 03/15/18 03/22/18 03/22/18 1 0.040 mg/kg





Client: The Source Group, Inc. (PH) AA Project No: A596137 Date Received: 03/16/18 093-Chemoil-003 **Project No:** Project Name: Former Chemoil Refinery Date Reported: 04/02/18

Method:	Total Metals CA	M 17			Unit	s: mg/kg
Date Sampled:		03/14/18	03/14/18	03/14/18	03/14/18	
Date Prepared:		03/19/18	03/19/18	03/19/18	03/19/18	
Date Analyzed:		03/22/18	03/22/18	03/22/18	03/22/18	
AA ID No:		8C16001-01	8C16001-03	8C16001-04	8C16001-06	
Client ID No:		TP-8-1'	TP-8-5'	TP-5-1'	TP-5-5'	
Matrix:		Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	1	MRL
CAM Metals Le	ss Hg 6000/7000	(EPA 6010B/7	000)			
Antimony		<10	<10	<10	<10	10
Arsenic		4.6	9.5	7.3	9.3	0.50
Barium		140	130	160	160	10
Beryllium		<1.0	<1.0	<1.0	<1.0	1.0
Cadmium		<1.0	<1.0	<1.0	<1.0	1.0
Chromium		22	34	23	23	3.0

Barium	140	130	160	160	10
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	22	34	23	23	3.0
Cobalt	8.1	14	9.9	9.4	3.0
Copper	12	12	16	12	3.0
Lead	82	10	25	7.6	3.0
Molybdenum	< 5.0	< 5.0	< 5.0	<5.0	5.0
Nickel	17	23	19	18	3.0
Selenium	< 0.50	< 0.50	< 0.50	< 0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	< 5.0	< 5.0	<5.0	<5.0	5.0
Vanadium	35	58	42	41	10
Zinc	93	48	73	41	3.0





Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18

Project No:093-Chemoil-003Date Received:03/16/18Project Name:Former Chemoil RefineryDate Reported:04/02/18

Method: Total Metals CAM 17 Units: mg/kg

wethod:	Total Metals CAM 17				Units: mg/kg	
Date Sampled:	03/14/18	03/14/18	03/15/18	03/15/18		
Date Prepared:	03/19/18	03/19/18	03/19/18	03/19/18		
Date Analyzed:	03/22/18	03/22/18	03/22/18	03/22/18		
AA ID No:	8C16001-07	8C16001-09	8C16001-10	8C16001-12		
Client ID No:	TP-13-1'	TP-13-5'	TP-2-1'	TP-2-5'		
Matrix:	Soil	Soil	Soil	Soil		
Dilution Factor:	1	1	1	1		MRL
CAM Metals Les	ss Hg 6000/7000 (EPA 6010B/7	<u>7000)</u>				
Antimony	<10	<10	<10	<10		10
Arsenic	5.9	6.3	4.3	8.9		0.50
Barium	150	160	110	140		10
Bervllium	<1.0	<1.0	<1.0	<1.0		1.0

Arsenic	5.9	6.3	4.3	8.9	0.50
Barium	150	160	110	140	10
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	28	25	19	26	3.0
Cobalt	8.0	9.8	7.3	11	3.0
Copper	19	11	6.9	12	3.0
Lead	140	21	19	6.6	3.0
Molybdenum	< 5.0	<5.0	<5.0	<5.0	5.0
Nickel	23	19	14	21	3.0
Selenium	< 0.50	< 0.50	< 0.50	< 0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	< 5.0	<5.0	<5.0	<5.0	5.0
Vanadium	38	48	32	49	10
Zinc	100	47	54	35	3.0





The Source Group, Inc. (PH) Client: AA Project No: A596137 **Project No:** 093-Chemoil-003

Date Received: 03/16/18 **Project Name:** Former Chemoil Refinery Date Reported: 04/02/18 Method: **Total Metals CAM 17**

Units: mg/kg

Dilution Factor:	1	1	1	1	MRL
Matrix:	Soil	Soil	Soil	Soil	
Client ID No:	TP-6-1'	TP-6-5'	TP-19-1'	TP-19-5'	
AA ID No:	8C16001-13	8C16001-15	8C16001-16	8C16001-18	
Date Analyzed:	03/22/18	03/22/18	03/22/18	03/22/18	
Date Prepared:	03/19/18	03/19/18	03/19/18	03/19/18	
Date Sampled:	03/15/18	03/15/18	03/15/18	03/15/18	

CAM Metals Less Hg 6000/7000 (EPA 6010B/7000) Antimony <10 <10 <10 <10 10 Arsenic 4.6 7.9 6.3 1.6 0.50 **Barium** 130 160 110 87 10 Beryllium <1.0 <1.0 <1.0 <1.0 1.0 Cadmium <1.0 <1.0 <1.0 <1.0 1.0 Chromium 20 27 17 15 3.0 Cobalt 7.2 8.9 5.6 7.4 3.0 Copper 18 19 7.3 5.4 3.0 Lead 140 8.5 11 3.5 3.0 Molybdenum < 5.0 < 5.0 < 5.0 < 5.0 5.0 Nickel 17 18 13 9.3 3.0 Selenium < 0.50 < 0.50 < 0.50 < 0.50 0.50 Silver <1.0 <1.0 <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 < 5.0 < 5.0 5.0 Vanadium 33 52 38 30 10 Zinc 140 31 34 24 3.0





Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18Method:Total Metals CAM 17Units: mg/kg

Date Sampled: 03/15/18 03/15/18 **Date Prepared:** 03/19/18 03/19/18 **Date Analyzed:** 03/22/18 03/22/18 AA ID No: 8C16001-19 8C16001-21 Client ID No: TP-16-1' TP-16-5' Soil Soil Matrix:

Dilution Factor: 1 1 1 MRL

CAM Metals Less Hg 6000/7000 (EPA 6010B/7000) 10 <10 <10 Antimony Arsenic 4.0 0.50 8.7 **Barium** 170 110 10 <1.0 Beryllium <1.0 1.0 Cadmium <1.0 <1.0 1.0 Chromium 35 20 3.0 Cobalt 9.1 8.7 3.0 Copper 44 7.1 3.0 Lead 46 11 3.0 < 5.0 Molybdenum < 5.0 5.0 Nickel 15 20 3.0 Selenium < 0.50 < 0.50 0.50 Silver <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 5.0 Vanadium 43 43 10 Zinc 85 34 3.0





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Date Received: 03/16/18

Project Name: Former Chemoil Refinery

Method: Total Metals CAM 17

Date Reported: 04/02/18

Units: mg/kg

Date Sampled: 03/14/18 03/14/18 03/14/18 03/14/18 **Date Prepared:** 03/20/18 03/20/18 03/20/18 03/20/18 **Date Analyzed:** 03/20/18 03/20/18 03/20/18 03/20/18 AA ID No: 8C16001-01 8C16001-03 8C16001-04 8C16001-06 **Client ID No:** TP-8-1' TP-8-5' TP-5-1' TP-5-5' Soil Soil Soil Soil Matrix: **Dilution Factor:** 1 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.59 0.061 0.10 0.027** 0.020





Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Method: Total Metals CAM 17

AA Project No: A596137 Date Received: 03/16/18

Date Reported: 04/02/18

Units: mg/kg

03/14/18	03/14/18	03/15/18	03/15/18	
03/20/18	03/20/18	03/20/18	03/20/18	
03/20/18	03/20/18	03/20/18	03/20/18	
8C16001-07	8C16001-09	8C16001-10	8C16001-12	
TP-13-1'	TP-13-5'	TP-2-1'	TP-2-5'	
Soil	Soil	Soil	Soil	
1	1	1	1	MRL
	03/20/18 03/20/18 8C16001-07 TP-13-1'	03/20/18 03/20/18 03/20/18 03/20/18 8C16001-07 8C16001-09 TP-13-1' TP-13-5'	03/20/18 03/20/18 03/20/18 03/20/18 03/20/18 03/20/18 8C16001-07 8C16001-09 8C16001-10 TP-13-1' TP-13-5' TP-2-1'	03/20/18 03/20/18 03/20/18 03/20/18 03/20/18 03/20/18 03/20/18 03/20/18 8C16001-07 8C16001-09 8C16001-10 8C16001-12 TP-13-1' TP-13-5' TP-2-1' TP-2-5'

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.54 0.15 0.082 0.058** 0.020





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

AA Project No: A596137

Date Received: 03/16/18

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Date Received: 03/16/18

Date Reported: 04/02/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 03/15/18 03/15/18 03/15/18 03/15/18 **Date Prepared:** 03/20/18 03/20/18 03/20/18 03/20/18 **Date Analyzed:** 03/20/18 03/20/18 03/20/18 03/20/18 AA ID No: 8C16001-13 8C16001-15 8C16001-16 8C16001-18 TP-6-1' TP-6-5' TP-19-1' TP-19-5' **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 2 1 **MRL** 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **1.5 0.032 0.039 <**0.020 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18Method:Total Metals CAM 17Units: mg/kg

Date Sampled: 03/15/18 03/15/18 **Date Prepared:** 03/20/18 03/20/18 **Date Analyzed:** 03/20/18 03/20/18 AA ID No: 8C16001-19 8C16001-21 Client ID No: TP-16-1' TP-16-5' Soil Matrix: Soil

Dilution Factor: 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.50 0.050** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography						701120				
Batch B8C2123 - NO PREP	- Quanty C									
Blank (B8C2123-BLK1)				Dronard	ed & Anal	vzed: 0	3/21/18			
Chromium (VI)	<0.040	0.040	mg/kg	Гтерате	u & Allai	yzeu. u	3/21/10			
LCS (B8C2123-BS1)	\0.040	0.040	mg/kg	Dropara	ed & Anal	vzod: 0	2/21/10			
Chromium (VI)	0.189	0.040	ma/ka	0.20	u & Allai	•	80-120			
LCS Dup (B8C2123-BSD1)	0.109	0.040	mg/kg		ed & Anal					
Chromium (VI)	0.207	0.040	100 cs /1 c cs	0.20	u & Allai	103	80-120	0.00	20	
,			mg/kg		ما ۵ ۸ مما			8.89	20	
Matrix Spike (B8C2123-MS1)	2.70	0.040		•		121	70-130			
Chromium (VI)			mg/kg	0.20						
Matrix Spike Dup (B8C2123-MS		Source: 8C		-		•		0.00	40	
Chromium (VI)	2.70	0.040	mg/kg	0.20	2.46	121	70-130	0.00	40	
Batch B8C2206 - NO PREP				_			0/00/40			
Blank (B8C2206-BLK1)	0.040	0.040		Prepare	ed & Anal	yzed: 0	3/22/18			
Chromium (VI)	<0.040	0.040	mg/kg	_						
LCS (B8C2206-BS1)				•	ed & Anal	•				
Chromium (VI)	0.188	0.040	mg/kg	0.20			80-120			
LCS Dup (B8C2206-BSD1)					ed & Anal	•				
Chromium (VI)	0.196	0.040	mg/kg	0.20		98.0	80-120	3.90	20	
Duplicate (B8C2206-DUP1)	S	Source: 8C	16001-21	Prepare	ed & Anal	yzed: 0	3/22/18			
Chromium (VI)	<0.040	0.040	mg/kg		<0.040				40	
Batch B8C2845 - NO PREP										
Blank (B8C2845-BLK1)				Prepare	ed & Anal	yzed: 0	3/28/18			
Chromium (VI)	< 0.040	0.040	mg/kg							-
LCS (B8C2845-BS1)				Prepare	ed & Anal	yzed: 0	3/28/18			
Chromium (VI)	0.194	0.040	mg/kg	0.20		96.8	80-120			
LCS Dup (B8C2845-BSD1)			5 5	Prepare	ed & Anal					
Chromium (VI)	0.194	0.040	mg/kg	0.20		•	80-120	0.00	20	
Duplicate (B8C2845-DUP1)	9	Source: 8C		Prepare	ed & Anal					
Chromium (VI)	<0.040	0.040	mg/kg	•	<0.040	-			40	
T			5 5							

Total Metals CAM 17 - Quality Control

Batch B8C2024 - EPA 3050B





Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Co										
Batch B8C2024 - EPA 3050B										
Blank (B8C2024-BLK1)				Prepare	ed: 03/19	/18 Ana	alyzed: 03	3/22/18		
Antimony	<10	10	mg/kg			,	,	-,,-		
Arsenic	< 0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							
Cobalt	<3.0	3.0	mg/kg							
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	< 5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0	mg/kg							
Thallium	<5.0	5.0	mg/kg							
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							
Blank (B8C2024-BLK2)			0 0	Prepare	ed: 03/19	/18 Ana	alyzed: 03	3/22/18		
Antimony	<10	10	mg/kg							
Arsenic	< 0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							
Cobalt	<3.0	3.0	mg/kg							
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	<5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0	mg/kg							
Thallium	<5.0	5.0	mg/kg							

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Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result %R		%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor	ntrol									•
Batch B8C2024 - EPA 3050B										
Blank (B8C2024-BLK2) Continue	ed			Prepare	ed: 03/19/18	Anal	lvzed: 03	3/22/18		
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							
LCS (B8C2024-BS1)			3 3	Prepare	ed: 03/19/18	Anal	lyzed: 03	3/22/18		
Antimony	52.2	10	mg/kg	50	10	04	80-120			
Arsenic	51.8	0.50	mg/kg	50	10	04	80-120			
Barium	51.1	10	mg/kg	50	10	02	80-120			
Beryllium	54.8	1.0	mg/kg	50	11	10	80-120			
Cadmium	56.2	1.0	mg/kg	50	11	12	80-120			
Chromium	52.7	3.0	mg/kg	50	10	05	80-120			
Cobalt	54.0	3.0	mg/kg	50	10	80	80-120			
Copper	48.7	3.0	mg/kg	50	97	7.4	80-120			
Lead	52.2	3.0	mg/kg	50	10	04	80-120			
Molybdenum	53.6	5.0	mg/kg	50	10	07	80-120			
Nickel	55.1	3.0	mg/kg	50	11	10	80-120			
Selenium	54.3	0.50	mg/kg	50	10	09	80-120			
Silver	50.2	1.0	mg/kg	50	10	00	80-120			
Thallium	56.3	5.0	mg/kg	50	11	13	80-120			
Vanadium	52.8	10	mg/kg	50	10	06	80-120			
Zinc	56.7	3.0	mg/kg	50	11	13	80-120			
LCS (B8C2024-BS2)				Prepare	ed: 03/19/18	Anal	lyzed: 03	3/22/18		
Antimony	55.5	10	mg/kg	50	11	11	80-120			<u> </u>
Arsenic	51.9	0.50	mg/kg	50	10	04	80-120			
Barium	54.7	10	mg/kg	50	10	09	80-120			
Beryllium	54.8	1.0	mg/kg	50	11	10	80-120			
Cadmium	54.1	1.0	mg/kg	50	10	80	80-120			
Chromium	53.3	3.0	mg/kg	50	10	07	80-120			
Cobalt	54.4	3.0	mg/kg	50	10	09	80-120			
Copper	53.1	3.0	mg/kg	50	10	06	80-120			
Lead	53.4	3.0	mg/kg	50	10	07	80-120			
Molybdenum	54.1	5.0	mg/kg	50	10	80	80-120			
Nickel	54.8	3.0	mg/kg	50	11	10	80-120			

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Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Con									
Batch B8C2024 - EPA 3050B	•.								
LCS (B8C2024-BS2) Continued				Prenare	ed: 03/19/18 Ana	alvzed: 0'	3/22/18		
Selenium	53.0	0.50	mg/kg	50	106	80-120	3/22/10		
Silver	53.4	1.0		50 50	107	80-120			
Thallium	56.0	5.0	mg/kg mg/kg	50 50	112	80-120			
Vanadium	54.0	10	mg/kg	50 50	108	80-120			
Zinc	53.8	3.0	mg/kg	50 50	108	80-120			
	33.0	3.0	ilig/kg		ed: 03/19/18 Ana		2/22/10		
LCS Dup (B8C2024-BSD1)	51.0	10	200 ca /l co	50	102	80-120		20	
Antimony	50.5	0.50	mg/kg	50 50	102		2.35		
Arsenic	49.8	10	mg/kg		99.6	80-120	2.68	20	
Barium	53.8	1.0	mg/kg	50 50	108	80-120 80-120	2.62 1.84	20	
Beryllium	55.4	1.0	mg/kg		111			20 20	
Cadmium Chromium	51.4	3.0	mg/kg	50 50	103	80-120 80-120	1.49 2.48	20 20	
Cobalt	52.6	3.0	mg/kg	50 50	105	80-120	2.40 2.57	20	
	47.3	3.0	mg/kg	50 50	94.6	80-120	2.90	20	
Copper Lead	50.8	3.0	mg/kg	50 50	102	80-120	2.81	20	
Molybdenum	51.6	5.0	mg/kg	50 50	102	80-120	3.95	20	
Nickel	54.1	3.0	mg/kg	50 50	108	80-120	1.92	20	
Selenium	52.5	0.50	mg/kg	50 50	105	80-120	3.41	20	
Silver	49.2	1.0	mg/kg mg/kg	50 50	98.5	80-120	3. 4 1 1.81	20	
Thallium	55.3	5.0	mg/kg	50 50	111	80-120	1.76	20	
Vanadium	51.4	10	mg/kg	50 50	103	80-120	2.78	20	
Zinc	56.2	3.0	mg/kg	50 50	112	80-120		20	
LCS Dup (B8C2024-BSD2)	30.2	0.0	mg/kg		ed: 03/19/18 Ana			20	
Antimony	53.6	10	mg/kg	50	107	80-120	3.43	20	
Arsenic	50.2	0.50	mg/kg	50	100	80-120	3.37	20	
Barium	52.6	10	mg/kg	50	105	80-120	3.80	20	
Beryllium	53.6	1.0	mg/kg	50	107	80-120	2.38	20	
Cadmium	52.1	1.0	mg/kg	50	104	80-120	3.73	20	
Chromium	50.8	3.0	mg/kg	50	102	80-120	4.79	20	
Cobalt	52.5	3.0	mg/kg	50	105	80-120	3.48	20	
Copper	51.7	3.0	mg/kg	50	103	80-120	2.67	20	
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Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor			23							
Batch B8C2024 - EPA 3050B	01									
LCS Dup (B8C2024-BSD2) Conti	inued			Prenare	ed: 03/19/	18 Ans	alvzed. U	3/22/18		
Lead	51.5	3.0	mg/kg	50	a. 03/13/	103	80-120	3.57	20	
Molybdenum	52.3	5.0		50 50		105	80-120	3.33	20	
Nickel	52.0	3.0	mg/kg mg/kg	50 50		103	80-120	5.33 5.41	20	
Selenium	52.6	0.50	mg/kg	50 50		105	80-120		20	
Silver	53.0	1.0	mg/kg	50 50		106	80-120		20	
Thallium	54.5	5.0	mg/kg	50 50		109	80-120	2.71	20	
Vanadium	52.2	10	mg/kg	50		104	80-120	3.35	20	
Zinc	52.7	3.0	mg/kg	50		105	80-120	2.09	20	
Duplicate (B8C2024-DUP1)		Source: 8C1			ed: 03/19/				20	
Antimony	<10	10	mg/kg	•	<10				40	
Arsenic	4.73	0.50	mg/kg		5.88			21.7	40	
Barium	136	10	mg/kg		151			10.4	40	
Beryllium	<1.0	1.0	mg/kg		<1.0				40	
Cadmium	<1.0	1.0	mg/kg		<1.0				40	
Chromium	24.9	3.0	mg/kg		28.0			12.0	40	
Cobalt	6.98	3.0	mg/kg		8.00			13.6	40	
Copper	17.8	3.0	mg/kg		18.5			4.19	40	
Lead	120	3.0	mg/kg		137			13.3	40	
Molybdenum	<5.0	5.0	mg/kg		<5.0				40	
Nickel	20.7	3.0	mg/kg		23.1			10.9	40	
Selenium	<0.50	0.50	mg/kg		< 0.50				40	
Silver	<1.0	1.0	mg/kg		<1.0				40	
Thallium	<5.0	5.0	mg/kg		<5.0				40	
Vanadium	33.6	10	mg/kg		38.3			13.1	40	
Zinc	79.5	3.0	mg/kg		99.9			22.7	40	
Duplicate (B8C2024-DUP2)		Source: 8C1	6001-19	Prepare		18 Ana	alyzed: 0	3/22/18		
Antimony	<10	10	mg/kg		<10				40	
Arsenic	10.1	0.50	mg/kg		8.67			15.4	40	
Barium	175	10	mg/kg		168			3.91	40	
Beryllium	<1.0	1.0	mg/kg		<1.0				40	
Cadmium	<1.0	1.0	mg/kg		<1.0				40	

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Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	l Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cont			33			, 3 1.20				
Batch B8C2024 - EPA 3050B										
Duplicate (B8C2024-DUP2) Conti	nuad S	Courses 9C1	6004 40	Droporo	d: 02/10	10 Ans	alvzod: Oʻ	0/22/10		
· · · · · · · · · · · · · · · · · · ·	35.3			гтерате	35.3	10 Alla	alyzeu. U		40	
Chromium		3.0 3.0	mg/kg		9.10			0.227	40	
Cobalt	8.96	3.0	mg/kg		9.10 44.4			1.55	40	
Copper	43.8 46.4	3.0	mg/kg		44.4 45.6			1.47	40	
Lead	46.4 <5.0	5.0 5.0	mg/kg		45.6 <5.0			1.67	40	
Molybdenum		5.0 3.0	mg/kg		<5.0 20.1			0.40	40	
Nickel	19.6		mg/kg					2.12	40	
Selenium	<0.50	0.50	mg/kg		< 0.50				40	
Silver	<1.0	1.0	mg/kg		<1.0 <5.0				40	
Thallium	<5.0	5.0	mg/kg					4.04	40	
Vanadium	43.3	10 3.0	mg/kg		42.8			1.21	40	
Zinc	80.4		mg/kg	D	84.6	40 4	- l l- 00	5.10	40	
Matrix Spike (B8C2024-MS1)		Source: 8C1		•			-	3/22/18		
Antimony	12.6	10	mg/kg	50	<10		75-125			QM-07
Arsenic	47.4	0.50	mg/kg	50	7.30	80.3	75-125			
Barium	206	10	mg/kg	50		84.8	75-125			
Beryllium	41.6	1.0	mg/kg	50	<1.0		75-125			
Cadmium	40.0	1.0	mg/kg	50	<1.0		75-125			
Chromium	66.4	3.0	mg/kg	50	23.1	86.6	75-125			
Cobalt	49.6	3.0	mg/kg	50		79.4	75-125			
Copper	67.1	3.0	mg/kg	50	16.2	102	75-125			
Lead	68.1	3.0	mg/kg	50	25.0		75-125			
Molybdenum	44.4	5.0	mg/kg	50		88.8	75-125			
Nickel	59.0	3.0	mg/kg	50		79.1	75-125			
Selenium	30.4	0.50	mg/kg	50	< 0.50		75-125			QM-07
Silver	45.5	1.0	mg/kg	50	<1.0		75-125			
Thallium	30.8	5.0	mg/kg	50	< 5.0		60-140			
Vanadium	88.4	10	mg/kg	50	41.9		75-125			
Zinc	111	3.0	mg/kg	50		75.6	75-125			
Matrix Spike Dup (B8C2024-MSD		Source: 8C1								
Antimony	13.3	10	mg/kg	50	<10		75-125	5.49	40	QM-07
Arsenic	48.4	0.50	mg/kg	50	7.30	82.2	75-125	2.02	40	

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Client:The Source Group, Inc. (PH)AA Project No: A596137Project No:093-Chemoil-003Date Received: 03/16/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor		-								
Batch B8C2024 - EPA 3050B										
Matrix Spike Dup (B8C2024-MSI	01) S	ource: 8C1	6001-04	Prepare	ed: 03/19/	18 Ana	alvzed: 0	3/22/18		
Continued	,						,	-,,		
Barium	204	10	mg/kg	50	164	80.6	75-125	1.02	40	
Beryllium	42.2	1.0	mg/kg	50	<1.0	84.5	75-125	1.48	40	
Cadmium	40.0	1.0	mg/kg	50	<1.0	80.0	75-125	0.00	40	
Chromium	68.1	3.0	mg/kg	50	23.1	89.9	75-125	2.47	40	
Cobalt	50.2	3.0	mg/kg	50	9.94	80.4	75-125	1.06	40	
Copper	67.9	3.0	mg/kg	50	16.2	103	75-125	1.16	40	
Lead	70.6	3.0	mg/kg	50	25.0	91.3	75-125	3.72	40	
Molybdenum	45.1	5.0	mg/kg	50	<5.0		75-125	1.59	40	
Nickel	59.1	3.0	mg/kg	50	19.4		75-125		40	
Selenium	30.0	0.50	mg/kg	50	<0.50	60.0	75-125	1.26	40	QM-07
Silver	45.5	1.0	mg/kg	50	<1.0	91.0	75-125		40	
Thallium	40.0	5.0	mg/kg	50	<5.0		60-140	25.9	40	
Vanadium	87.7	10	mg/kg	50	41.9	91.6	75-125	0.761	40	
Zinc	114	3.0	mg/kg	50	72.9	81.2	75-125	2.50	40	
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8C2041 - EPA 7471A Prep										
Blank (B8C2041-BLK1)				Prepare	ed & Anal	yzed: 03	3/20/18			
Mercury	<0.020	0.020	mg/kg							<u> </u>
LCS (B8C2041-BS1)				Prepare	ed & Anal	yzed: 03	3/20/18			
Mercury	0.480	0.020	mg/kg	0.50		96.1	80-120			
LCS Dup (B8C2041-BSD1)				Prepare	ed & Anal	yzed: 03	3/20/18			
Mercury	0.482	0.020	mg/kg	0.50		96.5	80-120	0.415	25	
Duplicate (B8C2041-DUP1)	S	ource: 8C1	6001-07	Prepare	ed & Anal	yzed: 03	3/20/18			
Mercury	0.452	0.020	mg/kg		0.535			16.7	25	
Duplicate (B8C2041-DUP2)	S	ource: 8C1	6001-19	Prepare	ed & Anal	yzed: 03	3/20/18			
Mercury	0.631	0.020	mg/kg		0.499			23.4	25	
Matrix Spike (B8C2041-MS1)	S	ource: 8C1	6001-04	Prepare	ed & Analy	yzed: 0	3/20/18			
Mercury	0.640	0.020	mg/kg	0.50	0.104		75-125			
Matrix Spike Dup (B8C2041-MSI	01) S	ource: 8C1	0 0	Prepare	ed & Anal	zed: 0	3/20/18			
	•			•	•	•				





The Source Group, Inc. (PH) Client:

AA Project No: A596137 **Project No:** 093-Chemoil-003 Date Received: 03/16/18 Project Name: Former Chemoil Refinery Date Reported: 04/02/18

	Reporting	S	pike Source	%REC	RPD	
Analyte	Result Limit	Units L	evel Result %REC	Limits	RPD Limit	Notes

Total Metals CAM 17 - Quality Control

Batch B8C2041 - EPA 7471A Prep

Matrix Spike Dup (B8C2041-MSD1) **Source: 8C16001-04** Prepared & Analyzed: 03/20/18

Continued

0.578 0.020 0.104 94.6 75-125 Mercury mg/kg 0.50 10.3 25



Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

AA Project No: A596137

Date Received: 03/16/18

Project Name: Former Chemoil Refinery

Date Reported: 04/02/18

Special Notes

[1] = QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was

accepted based on acceptable LCS recovery.

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70050067 Page of 2

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Client: Apex Companies	SAINE	Project Name / No.:	me / No.:	ころとに つろうなをからしない	25	Z Z	<u>کا</u> آر	2	***************************************	Sampler's Name:		大きが ひらんかい	
Project Manager: 소호수 노란스	S. Oleo	Site	Site Address:	347x Buskirk	000		\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	公市 78		Sampler's Signature:	nature: //	J. D. J. Service Contract of the Contract of t	
Phone: 025 -951-	5276		City:	Pleasont Hill	wh		4			D.	P.O. No.:		
Fax:		St	State & Zip:	CA 94523	255	~				Quo	Quote No.:		
	TAT Turnaround Codes **	** Ø						ANAL	SIS REQU	ANALYSIS REQUESTED (Test Name)	t Name)		
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(2) = 24 Hour Rush	®	= 5 Day Rush				29 ₁₈₀	وبعاق	Z/W	_			_	
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15-8-01	2.0-		18:31	Soil	ANTE,	No.							
1-63	<u></u>	1314118	053	Ţ,		Der Zagan, All							
70-5-21	50-	3114118	8:55	Seci	حد	mover agoretic						433	
15-5-01	~ ^	3114/18	92.6	Sail	2170000	owo _{form}	year.com/10404						
1-5-9	5	3/14/18	12:55	501)	,,,,,,	omerce on	**************************************						
12-13-01	30-	3/14/18	13.05	50.1	موجو <u>ن</u>		200 f.200 rcp./200					TEST SECTION	T
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TP-2-21		3115118	8.13	5611	Careera							493	Π
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Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.

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70050068 Page 2 of 2

AA. COC NO.: 1 7-1 (12)

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Phone: 975-95	1-6376		City:	I ≸	Gm.t	7.4	`	1		P.O. No.:		A Company of the Comp
ax:		ŝ	State & Zip:	CA-9	CA 94523	.^				Quote No.:		
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(2) = 24 Hour Rush		5 Day Rush				Pie	lol		_	_	***************************************	
(3) = 48 Hour Rush	r Rush X =	10 Working Days (Standard TAT)	Days (Star	ndard TAT)		19'21						Special
Client I.D.	A.A.L.D.	Date	Time	Sample	Š, 20	1 3 /2 C						
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Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 02, 2018

Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100 Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596138 / 8C19010

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 03/19/18 17:04 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596138Project No:093-Chemoil-003Date Received: 03/19/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromium by IC -	Low Level				
TP-20-1'	8C19010-01	Soil	5	03/16/18 07:59	03/19/18 17:04
TP-20-5'	8C19010-03	Soil	5	03/16/18 08:30	03/19/18 17:04
CAM Metals Less Hg 6000/7000					
TP-20-1'	8C19010-01	Soil	5	03/16/18 07:59	03/19/18 17:04
TP-20-5'	8C19010-03	Soil	5	03/16/18 08:30	03/19/18 17:04
Mercury Total EPA 7470A/7471A					
TP-20-1'	8C19010-01	Soil	5	03/16/18 07:59	03/19/18 17:04
TP-20-5'	8C19010-03	Soil	5	03/16/18 08:30	03/19/18 17:04





Client:The Source Group, Inc. (PH)AA Project No: A596138Project No:093-Chemoil-003Date Received: 03/19/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Method: Cations by Ion Chromatography

AA I.D. No.	Client I.D. No.		Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavale	ent Chromium by IC	- Low Level (EPA 7199)					
8C19010-01	TP-20-1'	03/16/18	03/21/18	03/21/18	1	0.16	mg/kg	0.04
8C19010-03	TP-20-5'	03/16/18	03/21/18	03/21/18	1	< 0.040	mg/kg	0.04



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LABORATORY ANALYSIS RESULTS

Client:The Source Group, Inc. (PH)AA Project No: A596138Project No:093-Chemoil-003Date Received: 03/19/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18Method:Total Metals CAM 17Units: mg/kg

Date Sampled: 03/16/18 03/16/18 **Date Prepared:** 03/26/18 03/26/18 Date Analyzed: 03/26/18 03/26/18 AA ID No: 8C19010-01 8C19010-03 Client ID No: TP-20-1' TP-20-5' Soil Soil Matrix:

Dilution Factor: 1 1 1 MRL

<10

<u>CAM Metals Less Hg 6000/7000 (EPA 6010B/7000)</u> Antimony <10

Arsenic	4.8	3.4	0.50
Barium	130	110	10
Beryllium	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	1.0
Chromium	38	21	3.0
Cobalt	7.7	8.4	3.0
Copper	34	<3.0	3.0
Lead	84	8.1	3.0
Molybdenum	< 5.0	<5.0	5.0
Nickel	18	15	3.0
Selenium	< 0.50	<0.50	0.50
Silver	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	5.0
Vanadium	31	39	10
Zinc	120	37	3.0





Client:The Source Group, Inc. (PH)AA Project No: A596138Project No:093-Chemoil-003Date Received: 03/19/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18Method:Total Metals CAM 17Units: mg/kg

Date Sampled: 03/16/18 03/16/18 **Date Prepared:** 03/26/18 03/26/18 Date Analyzed: 03/26/18 03/26/18 AA ID No: 8C19010-01 8C19010-03 Client ID No: TP-20-1' TP-20-5' Soil Soil Matrix:

Dilution Factor: 2 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **1.7 0.080** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596138Project No:093-Chemoil-003Date Received: 03/19/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	l Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography										
Batch B8C2123 - NO PREP	•									
Blank (B8C2123-BLK1)				Prepare	ed & Analy	zed: 0	3/21/18			
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8C2123-BS1)				Prepare	ed & Analy	zed: 0	3/21/18			
Chromium (VI)	0.189	0.040	mg/kg	0.20			80-120			
LCS Dup (B8C2123-BSD1)			9/9		ed & Analy					
Chromium (VI)	0.207	0.040	mg/kg	0.20		103	80-120	8.89	20	
Matrix Spike (B8C2123-MS1)		ource: 8C2			ed & Analy			0.00		
Chromium (VI)	2.70	0.040	mg/kg	0.20	2.46		70-130			
Matrix Spike Dup (B8C2123-MS	D1) S	ource: 8C2	0 0							
Chromium (VI)	2.70	0.040	mg/kg	0.20	2.46	121	70-130	0.00	40	
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8C2616 - EPA 3050B										
Blank (B8C2616-BLK1)				Dropara	ed & Analy	170d: 0	2/26/19			
Antimony	<10	10	mg/kg	Гтерате	u & Allaly	/26u. U	3/20/10			
Arsenic	<0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							
Cobalt	<3.0	3.0	mg/kg							
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	<5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0	mg/kg							
Thallium	<5.0	5.0	mg/kg							
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							
LCS (B8C2616-BS1)					ed & Analy					
Antimony	57.0	10	mg/kg	50		114	80-120			

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Client:The Source Group, Inc. (PH)AA Project No: A596138Project No:093-Chemoil-003Date Received: 03/19/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC	RPD	RPD Limit	Notes
		Lillin	- Cinto	2010.	701120	Liiiito	11. 5		110100
Total Metals CAM 17 - Quality Con	itroi								
Batch B8C2616 - EPA 3050B									
LCS (B8C2616-BS1) Continued				•	ed & Analyzed: 0				
Arsenic	55.7	0.50	mg/kg	50	111	80-120			
Barium	55.0	10	mg/kg	50	110	80-120			
Beryllium	59.1	1.0	mg/kg	50	118	80-120			
Cadmium	59.1	1.0	mg/kg	50	118	80-120			
Chromium	56.8	3.0	mg/kg	50	114	80-120			
Cobalt	57.8	3.0	mg/kg	50	116	80-120			
Copper	52.9	3.0	mg/kg	50	106	80-120			
Lead	54.9	3.0	mg/kg	50	110	80-120			
Molybdenum	56.6	5.0	mg/kg	50	113	80-120			
Nickel	58.9	3.0	mg/kg	50	118	80-120			
Selenium	55.3	0.50	mg/kg	50	111	80-120			
Silver	54.7	1.0	mg/kg	50	109	80-120			
Thallium	60.0	5.0	mg/kg	50	120	80-120			
Vanadium	56.9	10	mg/kg	50	114	80-120			
Zinc	60.0	3.0	mg/kg	50	120	80-120			
LCS Dup (B8C2616-BSD1)				•	ed & Analyzed: 0				
Antimony	52.0	10	mg/kg	50	104	80-120	9.12	20	
Arsenic	51.1	0.50	mg/kg	50	102	80-120	8.54	20	
Barium	50.5	10	mg/kg	50	101	80-120	8.55	20	
Beryllium	54.3	1.0	mg/kg	50	109	80-120	8.51	20	
Cadmium	54.8	1.0	mg/kg	50	110	80-120	7.59	20	
Chromium	52.1	3.0	mg/kg	50	104	80-120	8.76	20	
Cobalt	53.0	3.0	mg/kg	50	106	80-120	8.65	20	
Copper	48.2	3.0	mg/kg	50	96.4	80-120	9.36	20	
Lead	49.7	3.0	mg/kg	50	99.5	80-120	9.94	20	
Molybdenum	51.8	5.0	mg/kg	50	104	80-120	8.87	20	
Nickel	54.6	3.0	mg/kg	50	109	80-120	7.67	20	
Selenium	50.7	0.50	mg/kg	50	101	80-120	8.77	20	
Silver	50.3	1.0	mg/kg	50	101	80-120	8.28	20	
Thallium	55.3	5.0	mg/kg	50	111	80-120	8.08	20	
Vanadium	52.1	10	mg/kg	50	104	80-120	8.86	20	





Client:The Source Group, Inc. (PH)AA Project No: A596138Project No:093-Chemoil-003Date Received: 03/19/18Project Name:Former Chemoil RefineryDate Reported: 04/02/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor	ntrol									
Batch B8C2616 - EPA 3050B										
LCS Dup (B8C2616-BSD1) Cont	inued			Prepare	ed & Anal	vzed: 0	3/26/18			
Zinc	55.6	3.0	mg/kg	50		111	80-120	7.59	20	
Duplicate (B8C2616-DUP1)	;	Source: 8C			ed & Anal	vzed: 0				
Antimony	<10		mg/kg			,			40	
Arsenic	4.26		mg/kg		3.48			20.2	40	
Barium	162		mg/kg		130			22.5	40	
Beryllium	<1.0	1.0	mg/kg						40	
Cadmium	<1.0	1.0	mg/kg						40	
Chromium	22.3	3.0	mg/kg		21.5			3.47	40	
Cobalt	6.76	3.0	mg/kg		6.53			3.46	40	
Copper	4.36	3.0	mg/kg		3.20			30.7	40	
Lead	3.51	3.0	mg/kg		4.05			14.3	40	
Molybdenum	<5.0	5.0	mg/kg						40	
Nickel	19.4	3.0	mg/kg		22.5			14.9	40	
Selenium	<0.50	0.50	mg/kg						40	
Silver	<1.0	1.0	mg/kg						40	
Thallium	<5.0	5.0	mg/kg						40	
Vanadium	52.2		mg/kg		47.3			9.87	40	
Zinc	42.2	3.0	mg/kg		37.1			12.7	40	
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8C2622 - EPA 7471A Prep										
Blank (B8C2622-BLK1)				Prepare	ed & Anal	vzed: 0	3/26/18			
Mercury	<0.020	0.020	mg/kg			,				
LCS (B8C2622-BS1)			9,9	Prepare	ed & Anal	vzed: 0	3/26/18			
Mercury	0.496	0.020	mg/kg	0.50		99.1	80-120			
LCS Dup (B8C2622-BSD1)	01.100		9,9		ed & Anal					
Mercury	0.482	0.020	mg/kg	0.50		96.5		2.66	25	
Duplicate (B8C2622-DUP1)		Source: 8C	0 0		ed & Anal				_0	
Mercury	0.0235		mg/kg	1	0.0225	<u>,</u>		4.35	25	
•										

A



Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

AA Project No: A596138 Date Received: 03/19/18 Date Reported: 04/02/18

Special Notes





AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

A.A. coc No:: |山山 50 70049081

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	e: Kevin Mainten	C	J.:).;	(8)		Special	Milan														Repeived by	The second of th	Received by	Received by	
	Sampler's Name:	Sampler's Signature:	P.O. No.:	Quote No.:	ANALYSIS REQUESTED (Test Name)																	Time	13.70	Time	Time	
		12 it /w			ANALYSIS RE	+100 100 100 Lange 100 Lange	- W. S.	ME US	×		7											Date	Mary	Date Care	Date	-
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	S. Cherry	- 1		Q			Days (Standard TAT)	Sample	Sail		<u>シ</u>											Relind		Keling	Relinq	
27000000000000	Project Name / No.:	Site Address:	Clty:	State & Zip:		72 Hour Rush 5 Day Rush		Date Time	55.4 SIPUR	*	830	***************************************	000000000000000000000000000000000000000		***************************************											
	Pro				d Codes **	(4) = 72 Hour Rush (5) = 5 Day Rush	X = 10 W		Õ	79-	~ ?	The state of the s		representative and a seal on the season of the spirit of the principles			000000000000000000000000000000000000000	***************************************					(1000	STATE OF THE SECOND SEC
	S 2000 S	. 1	- 6376-		TAT Turnaround Codes **	Same Day Rush 24 Hour Rush	r Rush	A.A. I.D.	6027%												***************************************	For Laboratory Use		<u>a</u>		A Locino
[C XSS C	lanager: Kirston	478-95		1	(1) = Same Day Ru $ (2) = 24 Hour Rush$	3 = 48 Hour Rush	Olient I.D.	P-26-1	1200	15-02-0	- APPENDANCE III - CONTRACTOR - CANTERNA - C	C		***************************************	Yaman (Edda Baan) - prophy prophy prophy by the state state of the sta		**************************************	MINISTER BERTHAMAN SERVICE STATE OF THE STAT	- The state of the		10	35.		1	
	Client	Project Manager:	Phone:	Fax:					TPT	10-20-	707			in the second se				***************************************	and the second desired the second sec						A.A. Project No.:	Note By relia

Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project.
Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.

SANCESCO SECTION SECTIONS



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 18, 2018

Kirsten Duey

The Source Group, Inc. (PH)

3478 Buskirk Ave., Suite 100

Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596141 / 8D12002

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/12/18 15:38 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromium by	IC - Low Level				
TP-34-1	8D12002-01	Soil	5	04/10/18 07:45	04/12/18 15:38
TP-34-5	8D12002-02	Soil	5	04/10/18 08:05	04/12/18 15:38
TP-34-10	8D12002-03	Soil	5	04/10/18 08:40	04/12/18 15:38
TP-35-1	8D12002-04	Soil	5	04/10/18 09:05	04/12/18 15:38
TP-35-5	8D12002-05	Soil	5	04/10/18 09:15	04/12/18 15:38
TP-35-10	8D12002-06	Soil	5	04/10/18 09:30	04/12/18 15:38
AE-04-1	8D12002-07	Soil	5	04/10/18 11:00	04/12/18 15:38
AE-04-5	8D12002-08	Soil	5	04/10/18 11:05	04/12/18 15:38
AE-04-10	8D12002-09	Soil	5	04/10/18 11:25	04/12/18 15:38
AN-24-1	8D12002-10	Soil	5	04/10/18 07:55	04/12/18 15:38
AN-24-5	8D12002-11	Soil	5	04/10/18 07:55	04/12/18 15:38
AN-24-10	8D12002-12	Soil	5	04/10/18 08:11	04/12/18 15:38
AN-26-1	8D12002-13	Soil	5	04/10/18 13:19	04/12/18 15:38
AN-26-5	8D12002-14	Soil	5	04/10/18 13:23	04/12/18 15:38
AN-26-10	8D12002-15	Soil	5	04/10/18 13:27	04/12/18 15:38
AS-14-1	8D12002-16	Soil	5	04/10/18 15:05	04/12/18 15:38
AS-14-5	8D12002-17	Soil	5	04/10/18 15:08	04/12/18 15:38
AS-14-10	8D12002-18	Soil	5	04/10/18 15:14	04/12/18 15:38





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
CAM Metals Less Hg 6000/7000					
TP-34-1	8D12002-01	Soil	5	04/10/18 07:45	04/12/18 15:38
TP-34-5	8D12002-02	Soil	5	04/10/18 08:05	04/12/18 15:38
TP-34-10	8D12002-03	Soil	5	04/10/18 08:40	04/12/18 15:38
TP-35-1	8D12002-04	Soil	5	04/10/18 09:05	04/12/18 15:38
TP-35-5	8D12002-05	Soil	5	04/10/18 09:15	04/12/18 15:38
TP-35-10	8D12002-06	Soil	5	04/10/18 09:30	04/12/18 15:38
AE-04-1	8D12002-07	Soil	5	04/10/18 11:00	04/12/18 15:38
AE-04-5	8D12002-08	Soil	5	04/10/18 11:05	04/12/18 15:38
AE-04-10	8D12002-09	Soil	5	04/10/18 11:25	04/12/18 15:38
AN-24-1	8D12002-10	Soil	5	04/10/18 07:55	04/12/18 15:38
AN-24-5	8D12002-11	Soil	5	04/10/18 07:55	04/12/18 15:38
AN-24-10	8D12002-12	Soil	5	04/10/18 08:11	04/12/18 15:38
AN-26-1	8D12002-13	Soil	5	04/10/18 13:19	04/12/18 15:38
AN-26-5	8D12002-14	Soil	5	04/10/18 13:23	04/12/18 15:38
AN-26-10	8D12002-15	Soil	5	04/10/18 13:27	04/12/18 15:38
AS-14-1	8D12002-16	Soil	5	04/10/18 15:05	04/12/18 15:38
AS-14-5	8D12002-17	Soil	5	04/10/18 15:08	04/12/18 15:38
AS-14-10	8D12002-18	Soil	5	04/10/18 15:14	04/12/18 15:38





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
Mercury Total EPA 7470A/7471A					
TP-34-1	8D12002-01	Soil	5	04/10/18 07:45	04/12/18 15:38
TP-34-5	8D12002-02	Soil	5	04/10/18 08:05	04/12/18 15:38
TP-34-10	8D12002-03	Soil	5	04/10/18 08:40	04/12/18 15:38
TP-35-1	8D12002-04	Soil	5	04/10/18 09:05	04/12/18 15:38
TP-35-5	8D12002-05	Soil	5	04/10/18 09:15	04/12/18 15:38
TP-35-10	8D12002-06	Soil	5	04/10/18 09:30	04/12/18 15:38
AE-04-1	8D12002-07	Soil	5	04/10/18 11:00	04/12/18 15:38
AE-04-5	8D12002-08	Soil	5	04/10/18 11:05	04/12/18 15:38
AE-04-10	8D12002-09	Soil	5	04/10/18 11:25	04/12/18 15:38
AN-24-1	8D12002-10	Soil	5	04/10/18 07:55	04/12/18 15:38
AN-24-5	8D12002-11	Soil	5	04/10/18 07:55	04/12/18 15:38
AN-24-10	8D12002-12	Soil	5	04/10/18 08:11	04/12/18 15:38
AN-26-1	8D12002-13	Soil	5	04/10/18 13:19	04/12/18 15:38
AN-26-5	8D12002-14	Soil	5	04/10/18 13:23	04/12/18 15:38
AN-26-10	8D12002-15	Soil	5	04/10/18 13:27	04/12/18 15:38
AS-14-1	8D12002-16	Soil	5	04/10/18 15:05	04/12/18 15:38
AS-14-5	8D12002-17	Soil	5	04/10/18 15:08	04/12/18 15:38
AS-14-10	8D12002-18	Soil	5	04/10/18 15:14	04/12/18 15:38





Client: The Source Group, Inc. (PH) AA Project No: A596141 **Project No:** 093-Chemoil-003 Date Received: 04/12/18

Project Name: Former Chemoil Refinery Date Reported: 04/18/18

Method: Cations by Ion Chromatography

wethou:	Callons by ion Ch	romatography						
AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavale	ent Chromium by IC	- Low Level (I	EPA 7199)					
8D12002-01	TP-34-1	04/10/18	04/16/18	04/16/18	1	<0.040	mg/kg	0.04
8D12002-02	TP-34-5	04/10/18	04/16/18	04/16/18	1	<0.040	mg/kg	0.04
8D12002-03	TP-34-10	04/10/18	04/16/18	04/16/18	1	0.048	mg/kg	0.04
8D12002-04	TP-35-1	04/10/18	04/16/18	04/16/18	1	0.061	mg/kg	0.04
8D12002-05	TP-35-5	04/10/18	04/16/18	04/16/18	1	0.067	mg/kg	0.04
8D12002-06	TP-35-10	04/10/18	04/16/18	04/16/18	1	<0.040	mg/kg	0.04
8D12002-07	AE-04-1	04/10/18	04/16/18	04/16/18	1	<0.040	mg/kg	0.04
8D12002-08	AE-04-5	04/10/18	04/16/18	04/16/18	1	<0.040	mg/kg	0.04
8D12002-09	AE-04-10	04/10/18	04/16/18	04/16/18	1	<0.040	mg/kg	0.04
8D12002-10	AN-24-1	04/10/18	04/16/18	04/16/18	1	<0.040	mg/kg	0.04
8D12002-11	AN-24-5	04/10/18	04/17/18	04/17/18	1	<0.040	mg/kg	0.04
8D12002-12	AN-24-10	04/10/18	04/17/18	04/17/18	1	< 0.040	mg/kg	0.04
8D12002-13	AN-26-1	04/10/18	04/17/18	04/17/18	1	< 0.040	mg/kg	0.04
8D12002-14	AN-26-5	04/10/18	04/17/18	04/17/18	1	< 0.040	mg/kg	0.04
8D12002-15	AN-26-10	04/10/18	04/17/18	04/17/18	1	< 0.040	mg/kg	0.04
8D12002-16	AS-14-1	04/10/18	04/17/18	04/17/18	1	< 0.040	mg/kg	0.04
8D12002-17	AS-14-5	04/10/18	04/17/18	04/17/18	1	<0.040	mg/kg	0.04
8D12002-18	AS-14-10	04/10/18	04/17/18	04/17/18	1	< 0.040	mg/kg	0.04



1.0

5.0

10

3.0



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Date Reported: 04/18/18

Project Name:	Former Chemoil Refine	ry			Date Reported: 04/18/18	,
Method:	Total Metals CAM 17				Units : mg/kg	
Date Sampled:	04/1	0/18	04/10/18	04/10/18	04/10/18	
Date Prepared:	04/1	3/18	04/13/18	04/13/18	04/13/18	
Date Analyzed:	04/1	7/18	04/17/18	04/17/18	04/17/18	
AA ID No:	8D120	02-01	8D12002-02	8D12002-03	8D12002-04	
Client ID No:	TP-3	34-1	TP-34-5	TP-34-10	TP-35-1	
Matrix:	Sc	lic	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	1	MRL
CAM Metals Les	ss Hg 6000/7000 (EPA (6010B/700	<u>0)</u>			
Antimony	<	10	<10	<10	<10	10
Arsenic	3.	.3	3.0	8.3	2.3	0.50
Barium	11	10	73	110	71	10
Beryllium	<1	.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1	.0	<1.0	<1.0	<1.0	1.0
Chromium	1	8	18	27	11	3.0
Cobalt	6.	.2	5.7	11	4.5	3.0
Copper	6.	.9	<3.0	15	6.8	3.0
Lead	3	7	3.9	6.0	11	3.0
Molybdenum	<5	5.0	<5.0	<5.0	<5.0	5.0
Nickel	1	3	12	19	7.1	3.0
Selenium	<0	.50	<0.50	< 0.50	<0.50	0.50

<1.0

< 5.0

28

24

<1.0

< 5.0

53

33

<1.0

< 5.0

22

44

<1.0

<5.0

30

56



Viorel Vasile Operations Manager

Silver

Zinc

Thallium

Vanadium



Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Froject Name.	i officer Chemon Rennery		Date Reported. 04/10/10			
Method:	Total Metals CAM 17				Units: mg/kg	
Date Sampled:	04/10/18	04/10/18	04/10/18	04/10/18		
Date Prepared:	04/13/18	04/13/18	04/13/18	04/13/18		
Date Analyzed:	04/17/18	04/17/18	04/17/18	04/17/18		
AA ID No:	8D12002-0	05 8D12002-0	6 8D12002-07	8D12002-08		
Client ID No:	TP-35-5	TP-35-10	AE-04-1	AE-04-5		
Matrix:	Soil	Soil	Soil	Soil		
Dilution Factor:	1	1	1	1	MRL	
CAM Metals Les	ss Hg 6000/7000 (EPA 6010	B/7000)				
Antimony	<10	<10	<10	<10	10	
Arsenic	2.6	8.1	5.9	3.1	0.50	
Barium	85	120	170	98	10	
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0	
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0	
Chromium	16	27	22	17	3.0	
Cobalt	6.9	11	10	6.3	3.0	
Copper	<3.0	17	22	<3.0	3.0	
Lead	6.0	6.6	12	4.3	3.0	
Molybdenum	<5.0	< 5.0	< 5.0	< 5.0	5.0	

Nickel 12 21 17 12 3.0 Selenium < 0.50 < 0.50 < 0.50 < 0.50 0.50 Silver <1.0 <1.0 <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 < 5.0 < 5.0 5.0 Vanadium 32 33 55 47 10 Zinc 38 28 34 61 3.0



3.0



LABORATORY ANALYSIS RESULTS

Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

i rojoot itamo.	i dillioi dildillioi i tolliloi y		Dato Roportoa. 6 1/16/16				
Method:	Total Metals CAM 17			Unit	s: mg/kg		
Date Sampled:	04/10/18	04/10/18	04/10/18	04/10/18			
Date Prepared:	04/13/18	04/13/18	04/13/18	04/13/18			
Date Analyzed:	04/17/18	04/17/18	04/17/18	04/17/18			
AA ID No:	8D12002-09	9 8D12002-10	8D12002-11	8D12002-12			
Client ID No:	AE-04-10	AN-24-1	AN-24-5	AN-24-10			
Matrix:	Soil	Soil	Soil	Soil			
Dilution Factor:	1	1	1	1	MRL		
CAM Metals Les	s Hg 6000/7000 (EPA 6010E	<u>3/7000)</u>					
Antimony	<10	<10	<10	<10	10		
Arsenic	7.6	4.7	5.6	6.5	0.50		
Barium	160	120	160	130	10		
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0		
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0		
Chromium	29	19	24	24	3.0		
Cobalt	11	8.1	10	8.9	3.0		
Copper	9.5	8.3	10	9.8	3.0		
Lead	6.5	4.9	6.3	5.8	3.0		
Molybdenum	<5.0	<5.0	< 5.0	< 5.0	5.0		
Nickel	20	14	18	16	3.0		
Selenium	<0.50	< 0.50	< 0.50	< 0.50	0.50		
Silver	<1.0	<1.0	<1.0	<1.0	1.0		
Thallium	<5.0	<5.0	<5.0	<5.0	5.0		
Vanadium	57	36	49	40	10		

29

39

50

29



Viorel Vasile Operations Manager

Zinc



Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Date Reported: 04/18/18

Method:	Total Metals CAM 1	17			Units: mg/kg	
Date Sampled:	(04/10/18	04/10/18	04/10/18	04/10/18	
Date Prepared:	(04/13/18	04/13/18	04/13/18	04/13/18	
Date Analyzed:	(04/17/18	04/17/18	04/17/18	04/17/18	
AA ID No:	38	012002-13	8D12002-14	8D12002-15	8D12002-16	
Client ID No:		AN-26-1	AN-26-5	AN-26-10	AS-14-1	
Matrix:		Soil	Soil	Soil	Soil	
Dilution Factor		1	1	1	1	MRL
CAM Metals Le	ss Hg 6000/7000 (E	PA 6010B/7	<u>000)</u>			_
Antimony		<10	<10	<10	<10	10
Arsenic		7.6	14	18	5.8	0.50
Barium		170	160	310	200	10
Beryllium		<1.0	<1.0	<1.0	<1.0	1.0
Cadmium		<1.0	<1.0	<1.0	<1.0	1.0
Chromium		26	23	20	29	3.0
Cobalt		10	10	8.6	11	3.0

Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	26	23	20	29	3.0
Cobalt	10	10	8.6	11	3.0
Copper	16	13	14	100	3.0
Lead	12	5.4	6.1	570	3.0
Molybdenum	< 5.0	<5.0	< 5.0	<5.0	5.0
Nickel	21	18	17	66	3.0
Selenium	< 0.50	< 0.50	< 0.50	<0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	<5.0	<5.0	5.0
Vanadium	51	45	39	94	10
Zinc	47	32	27	290	3.0

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Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Method: Total Metals CAM 17

AA Project No: A596141

Date Received: 04/12/18

Date Reported: 04/18/18

Units: mg/kg

Date Sampled: 04/10/18 04/10/18 **Date Prepared:** 04/13/18 04/13/18 **Date Analyzed:** 04/17/18 04/17/18 AA ID No: 8D12002-17 8D12002-18 Client ID No: AS-14-5 AS-14-10 Matrix: Soil Soil

Dilution Factor: 1 1 1 MRL

CAM Metals Less Hg 6000/7000 (EPA 6010B/7000) Antimony <10 <10 10 Arsenic 5.0 5.8 0.50 **Barium** 150 140 10 Beryllium <1.0 <1.0 1.0 Cadmium <1.0 <1.0 1.0 23 26 Chromium 3.0 Cobalt 3.0 10 11 Copper 6.9 9.5 3.0 Lead 34 5.5 3.0 Molybdenum < 5.0 < 5.0 5.0 Nickel 19 21 3.0 Selenium < 0.50 < 0.50 0.50 Silver <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 5.0 Vanadium 50 52 10 Zinc 47 43 3.0





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/10/18 04/10/18 04/10/18 04/10/18 **Date Prepared:** 04/16/18 04/16/18 04/16/18 04/16/18 Date Analyzed: 04/16/18 04/16/18 04/16/18 04/16/18 AA ID No: 8D12002-01 8D12002-02 8D12002-03 8D12002-04 Client ID No: TP-34-1 TP-34-5 TP-34-10 TP-35-1 Soil Soil Soil Soil Matrix: **Dilution Factor:** 1 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.047** <0.020 **0.076 0.048** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/10/18 04/10/18 04/10/18 04/10/18 **Date Prepared:** 04/16/18 04/16/18 04/16/18 04/16/18 **Date Analyzed:** 04/16/18 04/16/18 04/16/18 04/16/18 AA ID No: 8D12002-05 8D12002-06 8D12002-07 8D12002-08 TP-35-5 TP-35-10 AE-04-1 AE-04-5 **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 1 **MRL** 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury <0.020 **0.055 0.076 0.024** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/10/18 04/10/18 04/10/18 04/10/18 **Date Prepared:** 04/16/18 04/16/18 04/16/18 04/16/18 **Date Analyzed:** 04/16/18 04/16/18 04/16/18 04/16/18 AA ID No: 8D12002-09 8D12002-10 8D12002-11 8D12002-12 AE-04-10 AN-24-1 AN-24-5 AN-24-10 **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 1 **MRL** 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.076** < 0.020 **0.025 0.062** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/10/18 04/10/18 04/10/18 04/10/18 **Date Prepared:** 04/16/18 04/16/18 04/16/18 04/16/18 **Date Analyzed:** 04/16/18 04/16/18 04/16/18 04/16/18 AA ID No: 8D12002-16 8D12002-13 8D12002-14 8D12002-15 Client ID No: AN-26-1 AN-26-5 AN-26-10 AS-14-1 Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 50 MRL 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.052 0.051 0.061 25** 0.020





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Method: Total Metals CAM 17

AA Project No: A596141

Date Received: 04/12/18

Date Reported: 04/18/18

Units: mg/kg

Date Sampled: 04/10/18 04/10/18 **Date Prepared:** 04/16/18 04/16/18 **Date Analyzed:** 04/16/18 04/16/18 AA ID No: 8D12002-17 8D12002-18 **Client ID No:** AS-14-5 AS-14-10 Matrix: Soil Soil

Dilution Factor: 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.42 0.034** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography -										
Batch B8D1625 - NO PREP	•									
Blank (B8D1625-BLK1)				Prepare	d & Ana	lyzed: (04/16/18			
Chromium (VI)	< 0.040	0.040	mg/kg	•		,				
LCS (B8D1625-BS1)			0 0	Prepare	d & Ana	lyzed: (04/16/18			
Chromium (VI)	0.216	0.040	mg/kg	0.20		108	80-120			
LCS Dup (B8D1625-BSD1)				Prepare	d & Ana	lyzed: (04/16/18			
Chromium (VI)	0.216	0.040	mg/kg	0.20		108	80-120	0.0464	20	
Duplicate (B8D1625-DUP1)	5	Source: 8D1	2002-01	Prepare	d & Ana	lyzed: (04/16/18			
Chromium (VI)	<0.040	0.040	mg/kg		<0.040				40	
Batch B8D1727 - NO PREP										
Blank (B8D1727-BLK1)				Prepare	d & Ana	lyzed: ()4/17/18			
Chromium (VI)	<0.040	0.040	mg/kg	-						
LCS (B8D1727-BS1)				Prepare	d & Ana	lyzed: ()4/17/18			
Chromium (VI)	0.182	0.040	mg/kg	0.20		91.0	80-120			
LCS Dup (B8D1727-BSD1)				Prepare	d & Ana	lyzed: ()4/17/18			
Chromium (VI)	0.195	0.040	mg/kg	0.20		97.3	80-120	6.75	20	
Duplicate (B8D1727-DUP1)	5	Source: 8D1	2002-17	Prepare	d & Ana	lyzed: ()4/17/18			
Chromium (VI)	<0.040	0.040	mg/kg		0.00920				40	
Matrix Spike (B8D1727-MS1)	5	Source: 8D1	2002-18	Prepare	d & Ana	lyzed: ()4/17/18			
Chromium (VI)	0.195	0.040	mg/kg	0.20	<0.040	97.6	70-130			
Matrix Spike Dup (B8D1727-MSI	D1) S	Source: 8D1	2002-18	Prepare	d & Ana	lyzed: ()4/17/18			
Chromium (VI)	0.203	0.040	mg/kg	0.20	<0.040	101	70-130	3.87	40	
Total Metals CAM 17 - Quality Con	ntrol									
Batch B8D1309 - EPA 3050B										
Blank (B8D1309-BLK1)				Prepare	d: 04/13	/18 An	alyzed: 0	4/17/18		
Antimony	<10	10	mg/kg							
Arsenic	< 0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Analyte	F Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Co		-								
Batch B8D1309 - EPA 3050B										
Blank (B8D1309-BLK1) Continu	ied			Prepare	ed: 04/13	/18 Ana	alyzed: 04	1/17/18		
Cobalt	<3.0	3.0	mg/kg	opa. c	, a. 6 1, 16,		, _ 0 a. 0	., ,		
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	<5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0	mg/kg							
Thallium	<5.0	5.0	mg/kg							
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							
LCS (B8D1309-BS1)			9/.1.9	Prepare	ed: 04/13	/18 Ana	alyzed: 04	1/17/18		
Antimony	52.2	10	mg/kg	50		104	80-120			
Arsenic	50.6	0.50	mg/kg	50		101	80-120			
Barium	51.3	10	mg/kg	50		103	80-120			
Beryllium	51.3	1.0	mg/kg	50		103	80-120			
Cadmium	49.2	1.0	mg/kg	50		98.4	80-120			
Chromium	48.8	3.0	mg/kg	50		97.6	80-120			
Cobalt	50.3	3.0	mg/kg	50		101	80-120			
Copper	49.8	3.0	mg/kg	50		99.5	80-120			
Lead	49.1	3.0	mg/kg	50		98.3	80-120			
Molybdenum	50.3	5.0	mg/kg	50		101	80-120			
Nickel	49.6	3.0	mg/kg	50		99.2	80-120			
Selenium	52.4	0.50	mg/kg	50		105	80-120			
Silver	51.3	1.0	mg/kg	50		103	80-120			
Thallium	50.9	5.0	mg/kg	50		102	80-120			
Vanadium	50.6	10	mg/kg	50		101	80-120			
Zinc	49.9	3.0	mg/kg	50		99.8	80-120			
LCS Dup (B8D1309-BSD1)				Prepare	ed: 04/13	/18 Ana	alyzed: 04	1/17/18		
Antimony	53.7	10	mg/kg	50		107	80-120	2.91	20	
Arsenic	52.4	0.50	mg/kg	50		105	80-120	3.47	20	
Barium	52.1	10	mg/kg	50		104	80-120	1.60	20	
			, ,							

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Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor										
Batch B8D1309 - EPA 3050B										
LCS Dup (B8D1309-BSD1) Conti	inued			Prepare	ed: 04/13/	18 Ana	alvzed: 04	4/17/18		
Beryllium	53.3	1.0	mg/kg	50		107	80-120	3.90	20	
Cadmium	51.2	1.0	mg/kg	50		102	80-120	3.95	20	
Chromium	50.4	3.0	mg/kg	50		101	80-120	3.35	20	
Cobalt	52.2	3.0	mg/kg	50		104	80-120	3.65	20	
Copper	51.3	3.0	mg/kg	50		103	80-120	3.11	20	
Lead	50.4	3.0	mg/kg	50		101	80-120	2.57	20	
Molybdenum	53.4	5.0	mg/kg	50		107	80-120	5.96	20	
Nickel	51.4	3.0	mg/kg	50		103	80-120	3.53	20	
Selenium	55.3	0.50	mg/kg	50		111	80-120	5.46	20	
Silver	52.5	1.0	mg/kg	50		105	80-120	2.20	20	
Thallium	53.8	5.0	mg/kg	50		108	80-120	5.66	20	
Vanadium	52.4	10	mg/kg	50		105	80-120	3.48	20	
Zinc	52.1	3.0	mg/kg	50		104	80-120	4.26	20	
Duplicate (B8D1309-DUP1)		Source: 8D1	2002-16	Prepare	ed: 04/13/	18 Ana	alyzed: 04	4/17/18		
Antimony	<10	10	mg/kg		<10				40	
Arsenic	6.11	0.50	mg/kg		5.85			4.35	40	
Barium	212	10	mg/kg		204			3.61	40	
Beryllium	<1.0	1.0	mg/kg		<1.0				40	
Cadmium	<1.0	1.0	mg/kg		<1.0				40	
Chromium	30.0	3.0	mg/kg		28.9			3.80	40	
Cobalt	10.9	3.0	mg/kg		10.9			0.00	40	
Copper	122	3.0	mg/kg		100			19.0	40	
Lead	749	3.0	mg/kg		565			27.9	40	
Molybdenum	<5.0	5.0	mg/kg		<5.0				40	
Nickel	71.3	3.0	mg/kg		66.1			7.48	40	
Selenium	<0.50	0.50	mg/kg		< 0.50				40	
Silver	<1.0	1.0	mg/kg		<1.0				40	
Thallium	<5.0	5.0	mg/kg		<5.0				40	
Vanadium	97.9	10	mg/kg		93.5			4.63	40	
Zinc	294	3.0	mg/kg		286			2.66	40	
Matrix Spike (B8D1309-MS1)	5	Source: 8D1	2002-04	Prepare	ed: 04/13/	18 Ana	alyzed: 04	1/17/18		





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

AA Project No: A596141

Date Received: 04/12/18

Date Reported: 04/18/18

Analyte		Reporting	Unito		Source Result	0/ DEC	%REC	RPD	RPD Limit	Notes
Analyte	Result	Limit	Units	Level	Result	70KEU	LIMITS	ארט	Limit	Notes
Total Metals CAM 17 - Quality Cor	ntrol									
Batch B8D1309 - EPA 3050B										
Matrix Spike (B8D1309-MS1) Co	ntinued S	Source: 8D1	2002-04	Prepare	ed: 04/13/	18 Ana	alyzed: 0	4/17/18		
Antimony	16.8	10	mg/kg	50	<10	33.7	75-125			QM-07
Arsenic	50.6	0.50	mg/kg	50	2.27	96.7	75-125			
Barium	120	10	mg/kg	50	71.2	96.9	75-125			
Beryllium	50.1	1.0	mg/kg	50	<1.0	100	75-125			
Cadmium	39.5	1.0	mg/kg	50	<1.0	78.9	75-125			
Chromium	63.7	3.0	mg/kg	50	10.9	106	75-125			
Cobalt	53.5	3.0	mg/kg	50	4.48	98.0	75-125			
Copper	62.6	3.0	mg/kg	50	6.77	112	75-125			
Lead	64.3	3.0	mg/kg	50	10.9	107	75-125			
Molybdenum	54.1	5.0	mg/kg	50	<5.0	108	75-125			
Nickel	55.4	3.0	mg/kg	50	7.11	96.6	75-125			
Selenium	43.8	0.50	mg/kg	50	< 0.50		75-125			
Silver	50.7	1.0	mg/kg	50	<1.0	101	75-125			
Thallium	43.9	5.0	mg/kg	50	< 5.0		60-140			
Vanadium	76.2	10	mg/kg	50	21.7	109	75-125			
Zinc	93.5	3.0	mg/kg	50	43.8	99.5	75-125			
Matrix Spike Dup (B8D1309-MSI	01) S	Source: 8D1	2002-04	Prepare	ed: 04/13/	18 Ana	alyzed: 0	4/17/18		
Antimony	15.0	10	mg/kg	50	<10	30.0	75-125	11.7	40	QM-07
Arsenic	50.7	0.50	mg/kg	50	2.27	96.9	75-125	0.237	40	
Barium	126	10	mg/kg	50	71.2	110	75-125	5.37	40	
Beryllium	50.4	1.0	mg/kg	50	<1.0	101	75-125	0.637	40	
Cadmium	40.6	1.0	mg/kg	50	<1.0	81.1	75-125	2.70	40	
Chromium	64.1	3.0	mg/kg	50	10.9	106	75-125	0.657	40	
Cobalt	54.0	3.0	mg/kg	50	4.48	99.1	75-125	1.04	40	
Copper	63.8	3.0	mg/kg	50	6.77	114	75-125	1.87	40	
Lead	63.3	3.0	mg/kg	50	10.9	105	75-125	1.60	40	
Molybdenum	54.7	5.0	mg/kg	50	<5.0	109	75-125	1.08	40	
Nickel	55.6	3.0	mg/kg	50	7.11	97.0	75-125	0.414	40	
Selenium	43.5	0.50	mg/kg	50	< 0.50	87.0	75-125	0.733	40	
Silver	50.9	1.0	mg/kg	50	<1.0	102	75-125	0.393	40	



Viorel Vasile Operations Manager

Thallium

mg/kg

50

<5.0 91.3 60-140 3.82

40

45.6

5.0



Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Con	trol									
Batch B8D1309 - EPA 3050B										
Matrix Spike Dup (B8D1309-MSD Continued	1) S	Source: 8D1	2002-04	Prepare	ed: 04/13/	′18 Ana	alyzed: 04	4/17/18		
Vanadium	77.7	10	mg/kg	50	21.7	112	75-125	1.94	40	
Zinc	96.1	3.0	mg/kg	50	43.8	105	75-125	2.74	40	
Total Metals CAM 17 - Quality Control										
Batch B8D1617 - EPA 7471A Prep										
Blank (B8D1617-BLK1)	Prepared & Analyzed: 04/16/18									
Mercury	<0.020	0.020	mg/kg							
LCS (B8D1617-BS1)				Prepare	ed & Anal	yzed: 0	4/16/18			
Mercury	0.498	0.020	mg/kg	0.50		99.5	80-120			
LCS Dup (B8D1617-BSD1)		Prepared & Analyzed: 04/16/18								
Mercury	0.506	0.020	mg/kg	0.50		101	80-120	1.60	25	
Duplicate (B8D1617-DUP1) Source: 8D12002-16 Prepared & Analyzed: 04/16/18										
Mercury	23.1	1.0	mg/kg		25.1			8.19	25	
Matrix Spike (B8D1617-MS1)	S	Source: 8D1	2002-04	Prepare	ed & Anal	yzed: 0	4/16/18			
Mercury	0.573	0.020	mg/kg	0.50	0.0480	105	75-125			
Matrix Spike Dup (B8D1617-MSD1) Source: 8D12002-04 Prepared & Analyzed: 04/16/18										
Mercury	0.644	0.020	mg/kg	0.50	0.0480	119	75-125	11.7	25	





Client:The Source Group, Inc. (PH)AA Project No: A596141Project No:093-Chemoil-003Date Received: 04/12/18Project Name:Former Chemoil RefineryDate Reported: 04/18/18

Special Notes

[1] = QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was

accepted based on acceptable LCS recovery.

A

AMERICAN © TO ANALYTICS

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

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TP-35-10	90-		9:30						- PORTON CONTRACTOR CO	·
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A:2-04-5	80-	*	11:05				THE PROPERTY OF THE PROPERTY O			¥
AE-04-10	ΜP	>	11.25	>	> > -					
- HZ -	9 -	Dalah Garla Unia	7.55						Andrick particular and the state of the stat	
AN-24-51			7.55						CONCRETE AND	·g
AN-24-10	7 m.		8:11							·
AN-26-1'	i.		(3:19							·
42-26-51			13:23			emocran.		and a second		ç onean.
AN-26-10'		>	(35.27	\Rightarrow						quenan
For	ratory			Refin	Relinquished by	Date	Time	Re	Received by	
	1	ţ	M		2011	110118	17.36			
	2 () () () () () () () () () (S / B		Relin	Relinquished by	T Date	√Time → S	Re	Received by	
A.A. Project No.: A-E	7202/11/11/8/21/2007	D	la year	Relin	Relinquished by	Date		R.	Received by	
	The state of the s		4	***********************		× 1	1			

Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: |5|57 70051180 Page 2 of 2

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Sampler's Name: Revin Naven & Sean Miller	16: An Makade	0.:	:.0	(eu	Special		word.									Received by	Received by	Received by
Sampler's Nan	らい。よ。 いらSampler's Signature: 🥜	P.O. No.:	Quote No.:	ANALYSIS REQUESTED (Test Name)												Date Time	<i>j</i> õ	Date Time
	1	٠ ا			1000 / 000 / 100 /	- ANST			<i>></i>									
": Chemeil	Site Address: 3478 Buskick Ave	y. Pleasant	p: 94523			Sample Matrix			>							Relinguished by	Relinquished by	Relinquished by
Project Name / No.: Chemoi	Site Addres	City City	State & Zip:	***	72 Hour Rush 5 Day Rush	Date Tim	4/10/18/15:05	1	15/27									7
10a 10 6 5	ten Ducy	- 6376		TAT Turnaround Codes **	ժ գ Դ		1 12002-16		31							For Laboratory Use	Date 4 [13/18 Three O&CO	141/SD2802
Client: Agex Companies	Project Manager: 大いら	Phone: 925 - 951 - 6376	Fах:		(1) = Same (2) = 24 Ho	á	A5-14-1	AS-14-5'	A5-14-16	posisionam manustras e mesos de composito de	e de constitue de la constitue		***************************************	water of the state		2	ering d	A.A. Project No.z. ASGULLI SOLLOS

Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 24, 2018

Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100 Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596144 / 8D17014

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/17/18 15:06 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

. reject manner i onnor onomor no				zato itopol	
Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromium by IC	- Low Level				
TP-11-1	8D17014-01	Soil	5	04/16/18 07:48	04/17/18 15:06
TP-11-5	8D17014-02	Soil	5	04/16/18 07:53	04/17/18 15:06
TP-11-10	8D17014-03	Soil	5	04/16/18 08:10	04/17/18 15:06
TP-12-1	8D17014-04	Soil	5	04/16/18 08:35	04/17/18 15:06
TP-12-5	8D17014-05	Soil	5	04/16/18 08:47	04/17/18 15:06
TP-12-10	8D17014-06	Soil	5	04/16/18 08:54	04/17/18 15:06
TP-13-10	8D17014-07	Soil	5	04/16/18 09:30	04/17/18 15:06
TP-14-1	8D17014-08	Soil	5	04/16/18 09:48	04/17/18 15:06
TP-14-5	8D17014-09	Soil	5	04/16/18 09:52	04/17/18 15:06
TP-14-10	8D17014-10	Soil	5	04/16/18 10:03	04/17/18 15:06
TP-7-1	8D17014-11	Soil	5	04/16/18 10:45	04/17/18 15:06
TP-7-5	8D17014-12	Soil	5	04/16/18 11:09	04/17/18 15:06
TP-7-10	8D17014-13	Soil	5	04/16/18 11:14	04/17/18 15:06
TP-5-10	8D17014-14	Soil	5	04/16/18 14:26	04/17/18 15:06
TP-8-10	8D17014-15	Soil	5	04/16/18 13:16	04/17/18 15:06
CAM Metals Less Hg 6000/7000					
TP-11-1	8D17014-01	Soil	5	04/16/18 07:48	04/17/18 15:06
TP-11-5	8D17014-02	Soil	5	04/16/18 07:53	04/17/18 15:06

A



Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Project Name. Tomber Chemon Ne	ппету			Date Nepol	11eu. 04/24/10
Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TP-11-10	8D17014-03	Soil	5	04/16/18 08:10	04/17/18 15:06
TP-12-1	8D17014-04	Soil	5	04/16/18 08:35	04/17/18 15:06
TP-12-5	8D17014-05	Soil	5	04/16/18 08:47	04/17/18 15:06
TP-12-10	8D17014-06	Soil	5	04/16/18 08:54	04/17/18 15:06
TP-13-10	8D17014-07	Soil	5	04/16/18 09:30	04/17/18 15:06
TP-14-1	8D17014-08	Soil	5	04/16/18 09:48	04/17/18 15:06
TP-14-5	8D17014-09	Soil	5	04/16/18 09:52	04/17/18 15:06
TP-14-10	8D17014-10	Soil	5	04/16/18 10:03	04/17/18 15:06
TP-7-1	8D17014-11	Soil	5	04/16/18 10:45	04/17/18 15:06
TP-7-5	8D17014-12	Soil	5	04/16/18 11:09	04/17/18 15:06
TP-7-10	8D17014-13	Soil	5	04/16/18 11:14	04/17/18 15:06
TP-5-10	8D17014-14	Soil	5	04/16/18 14:26	04/17/18 15:06
TP-8-10	8D17014-15	Soil	5	04/16/18 13:16	04/17/18 15:06
Mercury Total EPA 7470A/7471A					
TP-11-1	8D17014-01	Soil	5	04/16/18 07:48	04/17/18 15:06
TP-11-5	8D17014-02	Soil	5	04/16/18 07:53	04/17/18 15:06
TP-11-10	8D17014-03	Soil	5	04/16/18 08:10	04/17/18 15:06
TP-12-1	8D17014-04	Soil	5	04/16/18 08:35	04/17/18 15:06
TP-12-5	8D17014-05	Soil	5	04/16/18 08:47	04/17/18 15:06
TP-12-10	8D17014-06	Soil	5	04/16/18 08:54	04/17/18 15:06





Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TP-13-10	8D17014-07	Soil	5	04/16/18 09:30	04/17/18 15:06
TP-14-1	8D17014-08	Soil	5	04/16/18 09:48	04/17/18 15:06
TP-14-5	8D17014-09	Soil	5	04/16/18 09:52	04/17/18 15:06
TP-14-10	8D17014-10	Soil	5	04/16/18 10:03	04/17/18 15:06
TP-7-1	8D17014-11	Soil	5	04/16/18 10:45	04/17/18 15:06
TP-7-5	8D17014-12	Soil	5	04/16/18 11:09	04/17/18 15:06
TP-7-10	8D17014-13	Soil	5	04/16/18 11:14	04/17/18 15:06
TP-5-10	8D17014-14	Soil	5	04/16/18 14:26	04/17/18 15:06
TP-8-10	8D17014-15	Soil	5	04/16/18 13:16	04/17/18 15:06





Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Method: Cations by Ion Chromatography

wethou.	Calloris by for Cir	Tomatography						
AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexaval	ent Chromium by IC	- Low Level (EPA 7199)					
8D17014-01	TP-11-1	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-02	TP-11-5	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-03	TP-11-10	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-04	TP-12-1	04/16/18	04/19/18	04/19/18	1	< 0.040	mg/kg	0.04
8D17014-05	TP-12-5	04/16/18	04/19/18	04/19/18	1	< 0.040	mg/kg	0.04
8D17014-06	TP-12-10	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-07	TP-13-10	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-08	TP-14-1	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-09	TP-14-5	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-10	TP-14-10	04/16/18	04/19/18	04/19/18	1	< 0.040	mg/kg	0.04
8D17014-11	TP-7-1	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-12	TP-7-5	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-13	TP-7-10	04/16/18	04/19/18	04/19/18	1	< 0.040	mg/kg	0.04
8D17014-14	TP-5-10	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04
8D17014-15	TP-8-10	04/16/18	04/19/18	04/19/18	1	<0.040	mg/kg	0.04



3.0

0.50

1.0

5.0

10 3.0



Nickel

Silver

Zinc

Selenium

Thallium

Vanadium

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH) AA Project No: A596144 093-Chemoil-003 **Project No:**

16

< 0.50

<1.0

<5.0

43

38

Date Received: 04/17/18 Project Name: Former Chemoil Refinery Date Reported: 04/24/18

Method:	Total Metals CAN	<i>I</i> 17			Un	nits: mg/kg
Date Sampled:		04/16/18	04/16/18	04/16/18	04/16/18	_
Date Prepared:		04/19/18	04/19/18	04/19/18	04/19/18	
Date Analyzed:		04/20/18	04/20/18	04/20/18	04/20/18	
AA ID No:		8D17014-01	8D17014-02	8D17014-03	8D17014-04	
Client ID No:		TP-11-1	TP-11-5	TP-11-10	TP-12-1	
Matrix:		Soil	Soil	Soil	Soil	
Dilution Factor:		1	1	1	1	MRL
CAM Metals Les	ss Hg 6000/7000	(EPA 6010B/7	000)			
Antimony		<10	<10	<10	<10	10
Arsenic		6.3	9.9	7.0	7.9	0.50
Barium		130	150	180	170	10
Beryllium		<1.0	<1.0	<1.0	<1.0	1.0
Cadmium		<1.0	<1.0	<1.0	<1.0	1.0
Chromium		22	30	18	17	3.0
Cobalt		9.5	12	7.4	4.9	3.0
Copper		7.6	14	7.0	7.4	3.0
Lead		5.3	7.0	4.7	410	3.0
Molybdenum		<5.0	< 5.0	<5.0	< 5.0	5.0

22

< 0.50

<1.0

< 5.0

61

41

14

< 0.50

<1.0

< 5.0

33

30

17

< 0.50

<1.0

< 5.0

40

27





Client: The Source Group, Inc. (PH) AA Project No: A596144 093-Chemoil-003 Project No:

Date Received: 04/17/18 Project Name: Former Chemoil Refinery Date Reported: 04/24/18

Method:	Total Metals CAM 1	7				Units: mg/kg	
Date Sampled:	0	4/16/18	04/16/18	04/16/18	04/16/18		
Date Prepared:	0	4/19/18	04/19/18	04/19/18	04/19/18		
Date Analyzed:	0	4/20/18	04/20/18	04/20/18	04/20/18		
AA ID No:	8D ⁻	17014-05	8D17014-06	8D17014-07	8D17014-08		
Client ID No:	7	ΓP-12-5	TP-12-10	TP-13-10	TP-14-1		
Matrix:		Soil	Soil	Soil	Soil		
Dilution Factor:		1	1	1	1		MRL
CAM Metals Les	ss Hg 6000/7000 (EP	A 6010B/7	000)				
Antimony		<10	<10	<10	<10		10
Arsenic		8.2	4.5	5.2	4.9		0.50
Barium		140	150	170	120		10
Beryllium		<1.0	<1.0	<1.0	<1.0		1.0
Cadmium		<1.0	<1.0	<1.0	<1.0		1.0
Chromium		32	16	18	20		3.0
Cobalt		12	6.6	8.2	8.4		3.0

beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	32	16	18	20	3.0
Cobalt	12	6.6	8.2	8.4	3.0
Copper	12	6.2	4.9	5.8	3.0
Lead	6.3	3.7	5.0	6.0	3.0
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
Nickel	22	13	16	15	3.0
Selenium	< 0.50	< 0.50	< 0.50	<0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	<5.0	<5.0	5.0
Vanadium	82	29	35	38	10
Zinc	48	25	27	35	3.0





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Date Received: 04/24/18

Project Name: Former Chemoil Refinery

Date Reported: 04/24/18

Method: Total Metals CAM 17

Units: mg/kg

	T / 114 / 1 0414 47				
Method:	Total Metals CAM 17			Units	: mg/kg
Date Sampled:	04/16/18	04/16/18	04/16/18	04/16/18	
Date Prepared:	04/19/18	04/19/18	04/19/18	04/19/18	
Date Analyzed:	04/20/18	04/20/18	04/20/18	04/20/18	
AA ID No:	8D17014-09	8D17014-10	8D17014-11	8D17014-12	
Client ID No:	TP-14-5	TP-14-10	TP-7-1	TP-7-5	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
CAM Metals Les	ss Hg 6000/7000 (EPA 6010B/	<u>7000)</u>			
Antimony	<10	<10	<10	<10	10
Arsenic	7.9	4.0	7.3	9.3	0.50
Barium	140	120	150	140	10
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	25	14	27	29	3.0
Cobalt	10	7.1	11	11	3.0
Copper	10	4.3	5.4	9.3	3.0
Lead	7.8	3.7	7.6	6.4	3.0
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
Nickel	20	13	20	21	3.0
Selenium	<0.50	< 0.50	< 0.50	< 0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	<5.0	<5.0	5.0
Vanadium	48	31	53	56	10
Zinc	35	28	48	37	3.0





The Source Group, Inc. (PH) Client: AA Project No: A596144 **Project No:** 093-Chemoil-003 Date Received: 04/17/18 **Project Name:** Former Chemoil Refinery Date Reported: 04/24/18 Method: **Total Metals CAM 17**

Units: mg/kg

Date Sampled:	04/16/18	04/16/18	04/16/18	
Date Prepared:	04/19/18	04/19/18	04/19/18	
Date Analyzed:	04/20/18	04/20/18	04/20/18	
AA ID No:	8D17014-13	8D17014-14	8D17014-15	
Client ID No:	TP-7-10	TP-5-10	TP-8-10	
Matrix:	Soil	Soil	Soil	
Dilution Factor:	1	1	1	N

CAM Metals Less Hg 6000/7000 (EPA 6010B/7000) <10 10 <10 <10 Antimony Arsenic 8.4 10 11 0.50 **Barium** 160 210 110 10 Beryllium <1.0 <1.0 <1.0 1.0 Cadmium <1.0 <1.0 <1.0 1.0 Chromium 23 22 28 3.0 Cobalt 9.5 8.9 12 3.0 Copper 8.4 17 12 3.0 7.1 Lead 6.0 5.6 3.0 <5.0 Molybdenum < 5.0 < 5.0 5.0 Nickel 19 22 3.0 17 Selenium < 0.50 < 0.50 < 0.50 0.50 Silver <1.0 <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 < 5.0 5.0 Vanadium 42 38 55 10 Zinc 35 33 39 3.0





Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/16/18 04/16/18 04/16/18 04/16/18 **Date Prepared:** 04/19/18 04/19/18 04/19/18 04/19/18 Date Analyzed: 04/19/18 04/19/18 04/19/18 04/19/18 AA ID No: 8D17014-01 8D17014-02 8D17014-03 8D17014-04 Client ID No: TP-11-1 TP-11-5 TP-11-10 TP-12-1 Soil Soil Soil Soil Matrix: **Dilution Factor:** 1 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.028 0.038 0.052 0.12** 0.020



AA Project No: A596144



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Date Received: 04/17/18

Date Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/16/18 04/16/18 04/16/18 04/16/18 **Date Prepared:** 04/19/18 04/19/18 04/19/18 04/19/18 **Date Analyzed:** 04/19/18 04/19/18 04/19/18 04/19/18 AA ID No: 8D17014-05 8D17014-06 8D17014-07 8D17014-08 TP-12-5 TP-12-10 TP-13-10 TP-14-1 **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 1 1 **MRL** 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.065 0.024 0.029 0.030** 0.020



AA Project No: A596144



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Date Received: 04/17/18

Date Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/16/18 04/16/18 04/16/18 04/16/18 **Date Prepared:** 04/19/18 04/19/18 04/19/18 04/19/18 **Date Analyzed:** 04/19/18 04/19/18 04/19/18 04/19/18 AA ID No: 8D17014-09 8D17014-10 8D17014-11 8D17014-12 TP-14-5 TP-14-10 TP-7-1 TP-7-5 **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 **MRL** 1 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.036 0.030 0.049 0.039** 0.020





The Source Group, Inc. (PH) Client: AA Project No: A596144 **Project No:** 093-Chemoil-003 Date Received: 04/17/18 **Project Name:** Former Chemoil Refinery Date Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/16/18 04/16/18 04/16/18 **Date Prepared:** 04/19/18 04/19/18 04/19/18 **Date Analyzed:** 04/19/18 04/19/18 04/19/18 AA ID No: 8D17014-15 8D17014-13 8D17014-14 Client ID No: TP-7-10 TP-5-10 TP-8-10 Soil Matrix: Soil Soil

Dilution Factor: 1 1 MRL 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury 0.066 0.052 0.020 0.082





Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography	- Quality (Control								
Batch B8D1910 - NO PREP										
Blank (B8D1910-BLK1)				Prepare	ed & Anal	yzed: 0	4/19/18			
Chromium (VI)	<0.040	0.040	mg/kg	•	•	<u> </u>				
LCS (B8D1910-BS1)			0 0	Prepare	ed & Analy	yzed: 0	4/19/18			
Chromium (VI)	0.214	0.040	mg/kg	0.20	•	107	80-120			
LCS Dup (B8D1910-BSD1)			0 0	Prepare	ed & Anal	yzed: 0	4/19/18			
Chromium (VI)	0.231	0.040	mg/kg	0.20		116	80-120	7.82	20	
Duplicate (B8D1910-DUP1)	9	Source: 8D1		Prepare	ed & Anal	vzed: 0	4/19/18			
Chromium (VI)	<0.040	0.040	mg/kg	•	0.0242	,		18.0	40	
Matrix Spike (B8D1910-MS1)	5	Source: 8D1		Prepare	ed & Analy	yzed: 0	4/19/18			
Chromium (VI)	0.106	0.040	mg/kg	0.20	<0.040	53.0	70-130			QM-07
Matrix Spike Dup (B8D1910-MS	D1) \$	Source: 8D1		Prepare	ed & Anal	yzed: 0	4/19/18			
Chromium (VI)	0.128	0.040	mg/kg	0.20	<0.040	64.0	70-130	18.7	40	QM-07
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8D1908 - EPA 3050B										
Blank (B8D1908-BLK1)				Prepare	ed: 04/19/	18 An	alyzed: 04	4/20/18		
Antimony	<10	10	mg/kg							
Arsenic	< 0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							
Cobalt	<3.0	3.0	mg/kg							
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	< 5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0	mg/kg							
Thallium	< 5.0	5.0	mg/kg							
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							





Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Analyte	F Result	Reporting Limit	Units	Spike Level	Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor									
Batch B8D1908 - EPA 3050B									
LCS (B8D1908-BS1)				Prepare	ed: 04/19/18 Ana	alvzed. U	4/20/18		
Antimony	54.4	10	mg/kg	50	109	80-120	1/20/10		
Arsenic	52.4	0.50	mg/kg	50	105	80-120			
Barium	48.0	10	mg/kg	50	96.1	80-120			
Beryllium	55.7	1.0	mg/kg	50	111	80-120			
Cadmium	51.8	1.0	mg/kg	50	104	80-120			
Chromium	50.1	3.0	mg/kg	50	100	80-120			
Cobalt	52.0	3.0	mg/kg	50	104	80-120			
Copper	49.8	3.0	mg/kg	50	99.7	80-120			
Lead	48.8	3.0	mg/kg	50	97.6	80-120			
Molybdenum	52.4	5.0	mg/kg	50	105	80-120			
Nickel	50.3	3.0	mg/kg	50	101	80-120			
Selenium	55.7	0.50	mg/kg	50	111	80-120			
Silver	49.9	1.0	mg/kg	50	99.8	80-120			
Thallium	47.6	5.0	mg/kg	50	95.1	80-120			
Vanadium	51.7	10	mg/kg	50	103	80-120			
Zinc	55.9	3.0	mg/kg	50	112	80-120			
LCS Dup (B8D1908-BSD1)				Prepare	ed: 04/19/18 Ana	alyzed: 04	4/20/18		
Antimony	53.1	10	mg/kg	50	106	80-120	2.46	20	
Arsenic	51.4	0.50	mg/kg	50	103	80-120	1.81	20	
Barium	46.8	10	mg/kg	50	93.5	80-120	2.70	20	
Beryllium	54.5	1.0	mg/kg	50	109	80-120	2.18	20	
Cadmium	50.9	1.0	mg/kg	50	102	80-120	1.79	20	
Chromium	48.9	3.0	mg/kg	50	97.8	80-120	2.38	20	
Cobalt	50.9	3.0	mg/kg	50	102	80-120	2.10	20	
Copper	48.4	3.0	mg/kg	50	96.8	80-120	2.93	20	
Lead	50.3	3.0	mg/kg	50	101	80-120	2.99	20	
Molybdenum	51.4	5.0	mg/kg	50	103	80-120	1.89	20	
Nickel	48.6	3.0	mg/kg	50	97.1	80-120	3.60	20	
Selenium	55.5	0.50	mg/kg	50	111	80-120	0.270	20	
Silver	48.5	1.0	mg/kg	50	97.1	80-120	2.78	20	
Thallium	47.2	5.0	mg/kg	50	94.4	80-120	0.696	20	

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Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

otal Metals CAM 17 - Quality Conf		Limit	Units	Level	Source Result		%REC Limits	RPD	RPD Limit	Notes
-	trol									
Batch B8D1908 - EPA 3050B										
LCS Dup (B8D1908-BSD1) Contin	nued			Prepare	ed: 04/19	/18 An	alyzed: 04	1/20/18		
Vanadium	50.4	10	mg/kg	50	· ·	101	80-120	2.55	20	
Zinc	54.9	3.0	mg/kg	50		110	80-120	1.77	20	
Duplicate (B8D1908-DUP1)		Source: 8D1			ed: 04/19					
Antimony	<10	10	mg/kg		<10				40	
Arsenic	4.20	0.50	mg/kg		3.99			5.13	40	
Barium	128	10	mg/kg		124			2.46	40	
Beryllium	<1.0	1.0	mg/kg		<1.0				40	
Cadmium	<1.0	1.0	mg/kg		<1.0				40	
Chromium	14.8	3.0	mg/kg		14.5			2.32	40	
Cobalt	7.33	3.0	mg/kg		7.13			2.77	40	
Copper	4.03	3.0	mg/kg		4.32			6.95	40	
Lead	3.79	3.0	mg/kg		3.70			2.40	40	
Molybdenum	<5.0	5.0	mg/kg		<5.0				40	
Nickel	13.3	3.0	mg/kg		12.6			5.02	40	
Selenium	<0.50	0.50	mg/kg		< 0.50				40	
Silver	<1.0	1.0	mg/kg		<1.0				40	
Thallium	<5.0	5.0	mg/kg		<5.0				40	
Vanadium	31.7	10	mg/kg		31.2			1.49	40	
Zinc	29.2	3.0	mg/kg		28.3			3.27	40	
otal Metals CAM 17 - Quality Co	ntrol									
Batch B8D1913 - EPA 7471A Prep										
Blank (B8D1913-BLK1)				Prepare	ed & Ana	lyzed: (04/19/18			
Mercury	<0.020	0.020	mg/kg	-		, , ,	,			
LCS (B8D1913-BS1)		-		Prepare	ed & Ana	lvzed: (04/19/18			
Mercury	0.514	0.020	mg/kg	0.50		•	80-120			
LCS Dup (B8D1913-BSD1)					ed & Ana		04/19/18			
Mercury	0.584	0.020	mg/kg	0.50	2 0, , 10	117	80-120	12.8	25	
Duplicate (B8D1913-DUP1)		Source: 8D1			ed & Ana				_0	
Mercury	0.0260	0.020	mg/kg		0.0305	•		15.9	25	
Matrix Spike (B8D1913-MS1)		Source: 8D1		Prepare			04/19/18	.0.0	20	
matrix opine (Dob 1313-MO1)		ouice. UD	1 0 1 7 -00	ricpare	u u Alla	ıyzeu. (טו וטו ודע			

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Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

	Reporting	Spike Source	%REC	RPD	
Analyte	Result Limit Units	Level Result %RE	EC Limits RP	D Limit No	otes

Total Metals CAM 17 - Quality Control

Batch B8D1913 - EPA 7471A Prep

Matrix Spike (B8D1913-MS1) Continued Source: 8D17014-08 Prepared & Analyzed: 04/19/18

Mercury 0.552 0.020 mg/kg 0.50 0.0305 104 75-125

Matrix Spike Dup (B8D1913-MSD1) Source: 8D17014-08 Prepared & Analyzed: 04/19/18

Mercury **0.594** 0.020 mg/kg 0.50 0.0305 113 75-125 7.34 25

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596144Project No:093-Chemoil-003Date Received: 04/17/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Special Notes

[1] = QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was

accepted based on acceptable LCS recovery.



& MERICAN & MALYTICS

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

70049084 Page 1 of [

A.A. COC No.: $|\Sigma|/|\xi|$

Client: Appx ((SIM COLINIC)	Project N	ame / No.: (mencil (Project Name / No.: Chemail Out 3 Cheme (1003	1-8 M		Sampler's Name:	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	207
Project Manager:	Kitchen Puez	Sife	Address:	34781	3478 Buskirk /	AVE, SLITE		Sampler's Signature:		The second secon
Phone: 925	951-6376		CIPY:	7.22.2	Pleasont Hill	.		P.O. No.:	:1	
Fax:		Ö	State & Zip:	かり	C4941523			Quote No.:	:1	
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A.A. Project No.: 45		Z		Relin	Relinquished by	<i>f</i>	Date	Time	Received by	

Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 24, 2018

Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100 Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596145 / 8D18011

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/18/18 13:48 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

•	,				
Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromic	um by IC - Low Level				
TP-6-10	8D18011-01	Soil	5	04/17/18 08:00	04/18/18 13:48
TP-4-1	8D18011-02	Soil	5	04/17/18 08:10	04/18/18 13:48
TP-4-5	8D18011-03	Soil	5	04/17/18 08:15	04/18/18 13:48
TP-4-10	8D18011-04	Soil	5	04/17/18 08:50	04/18/18 13:48
TP-2-10	8D18011-05	Soil	5	04/17/18 09:20	04/18/18 13:48
TP-1-1	8D18011-06	Soil	5	04/17/18 09:40	04/18/18 13:48
TP-1-5	8D18011-07	Soil	5	04/17/18 09:45	04/18/18 13:48
TP-1-10	8D18011-08	Soil	5	04/17/18 10:00	04/18/18 13:48
TP-18-1	8D18011-09	Soil	5	04/17/18 10:50	04/18/18 13:48
TP-18-5	8D18011-10	Soil	5	04/17/18 10:55	04/18/18 13:48
TP-18-10	8D18011-11	Soil	5	04/17/18 11:10	04/18/18 13:48
TP-17-1	8D18011-12	Soil	5	04/17/18 13:10	04/18/18 13:48
TP-17-5	8D18011-13	Soil	5	04/17/18 13:45	04/18/18 13:48
TP-17-10	8D18011-14	Soil	5	04/17/18 14:20	04/18/18 13:48
TP-16-10	8D18011-15	Soil	5	04/17/18 15:25	04/18/18 13:48
Dup-1-041718	8D18011-16	Soil	5	04/17/18 00:00	04/18/18 13:48
Dup-2-041718	8D18011-17	Soil	5	04/17/18 00:00	04/18/18 13:48
Dup-3-041718	8D18011-18	Soil	5	04/17/18 00:00	04/18/18 13:48
Dup-4-041718	8D18011-19	Soil	5	04/17/18 00:00	04/18/18 13:48





Client:The Source Group, Inc. (PH)AA Project No:A596145Project No:093-Chemoil-003Date Received:04/18/18Project Name:Former Chemoil RefineryDate Reported:04/24/18

Laboratory ID	Matrix	TAT	Date Sampled	Date Received
8D18011-01	Soil	5	04/17/18 08:00	04/18/18 13:48
8D18011-02	Soil	5	04/17/18 08:10	04/18/18 13:48
8D18011-03	Soil	5	04/17/18 08:15	04/18/18 13:48
8D18011-04	Soil	5	04/17/18 08:50	04/18/18 13:48
8D18011-05	Soil	5	04/17/18 09:20	04/18/18 13:48
8D18011-06	Soil	5	04/17/18 09:40	04/18/18 13:48
8D18011-07	Soil	5	04/17/18 09:45	04/18/18 13:48
8D18011-08	Soil	5	04/17/18 10:00	04/18/18 13:48
8D18011-09	Soil	5	04/17/18 10:50	04/18/18 13:48
8D18011-10	Soil	5	04/17/18 10:55	04/18/18 13:48
8D18011-11	Soil	5	04/17/18 11:10	04/18/18 13:48
8D18011-12	Soil	5	04/17/18 13:10	04/18/18 13:48
8D18011-13	Soil	5	04/17/18 13:45	04/18/18 13:48
8D18011-14	Soil	5	04/17/18 14:20	04/18/18 13:48
8D18011-15	Soil	5	04/17/18 15:25	04/18/18 13:48
8D18011-16	Soil	5	04/17/18 00:00	04/18/18 13:48
8D18011-17	Soil	5	04/17/18 00:00	04/18/18 13:48
8D18011-18	Soil	5	04/17/18 00:00	04/18/18 13:48
8D18011-19	Soil	5	04/17/18 00:00	04/18/18 13:48
	8D18011-01 8D18011-02 8D18011-03 8D18011-04 8D18011-05 8D18011-06 8D18011-07 8D18011-09 8D18011-10 8D18011-11 8D18011-12 8D18011-13 8D18011-14 8D18011-15 8D18011-16 8D18011-17 8D18011-17	8D18011-01 Soil 8D18011-02 Soil 8D18011-03 Soil 8D18011-04 Soil 8D18011-05 Soil 8D18011-06 Soil 8D18011-07 Soil 8D18011-09 Soil 8D18011-10 Soil 8D18011-11 Soil 8D18011-12 Soil 8D18011-13 Soil 8D18011-14 Soil 8D18011-15 Soil 8D18011-15 Soil 8D18011-16 Soil 8D18011-17 Soil	8D18011-01 Soil 5 8D18011-02 Soil 5 8D18011-03 Soil 5 8D18011-04 Soil 5 8D18011-05 Soil 5 8D18011-06 Soil 5 8D18011-07 Soil 5 8D18011-08 Soil 5 8D18011-09 Soil 5 8D18011-10 Soil 5 8D18011-11 Soil 5 8D18011-12 Soil 5 8D18011-13 Soil 5 8D18011-14 Soil 5 8D18011-15 Soil 5 8D18011-15 Soil 5 8D18011-16 Soil 5 8D18011-17 Soil 5 8D18011-17 Soil 5 8D18011-17 Soil 5	8D18011-01 Soil 5 04/17/18 08:00 8D18011-02 Soil 5 04/17/18 08:10 8D18011-03 Soil 5 04/17/18 08:15 8D18011-04 Soil 5 04/17/18 08:50 8D18011-05 Soil 5 04/17/18 09:20 8D18011-06 Soil 5 04/17/18 09:40 8D18011-07 Soil 5 04/17/18 09:45 8D18011-08 Soil 5 04/17/18 10:50 8D18011-09 Soil 5 04/17/18 10:50 8D18011-10 Soil 5 04/17/18 10:55 8D18011-11 Soil 5 04/17/18 11:10 8D18011-12 Soil 5 04/17/18 13:45 8D18011-14 Soil 5 04/17/18 13:45 8D18011-15 Soil 5 04/17/18 15:25 8D18011-16 Soil 5 04/17/18 00:00 8D18011-17 Soil 5 04/17/18 00:00 8D18011-17 Soil 5 04/17/18 00:00





Client:The Source Group, Inc. (PH)AA Project No:A596145Project No:093-Chemoil-003Date Received:04/18/18Project Name:Former Chemoil RefineryDate Reported:04/24/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
Mercury Total EPA 7470A/7471A					
TP-6-10	8D18011-01	Soil	5	04/17/18 08:00	04/18/18 13:48
TP-4-1	8D18011-02	Soil	5	04/17/18 08:10	04/18/18 13:48
TP-4-5	8D18011-03	Soil	5	04/17/18 08:15	04/18/18 13:48
TP-4-10	8D18011-04	Soil	5	04/17/18 08:50	04/18/18 13:48
TP-2-10	8D18011-05	Soil	5	04/17/18 09:20	04/18/18 13:48
TP-1-1	8D18011-06	Soil	5	04/17/18 09:40	04/18/18 13:48
TP-1-5	8D18011-07	Soil	5	04/17/18 09:45	04/18/18 13:48
TP-1-10	8D18011-08	Soil	5	04/17/18 10:00	04/18/18 13:48
TP-18-1	8D18011-09	Soil	5	04/17/18 10:50	04/18/18 13:48
TP-18-5	8D18011-10	Soil	5	04/17/18 10:55	04/18/18 13:48
TP-18-10	8D18011-11	Soil	5	04/17/18 11:10	04/18/18 13:48
TP-17-1	8D18011-12	Soil	5	04/17/18 13:10	04/18/18 13:48
TP-17-5	8D18011-13	Soil	5	04/17/18 13:45	04/18/18 13:48
TP-17-10	8D18011-14	Soil	5	04/17/18 14:20	04/18/18 13:48
TP-16-10	8D18011-15	Soil	5	04/17/18 15:25	04/18/18 13:48
Dup-1-041718	8D18011-16	Soil	5	04/17/18 00:00	04/18/18 13:48
Dup-2-041718	8D18011-17	Soil	5	04/17/18 00:00	04/18/18 13:48
Dup-3-041718	8D18011-18	Soil	5	04/17/18 00:00	04/18/18 13:48
Dup-4-041718	8D18011-19	Soil	5	04/17/18 00:00	04/18/18 13:48



AA Project No: A596145



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

Date Received: 04/18/18

Date Reported: 04/24/18

Method: Cations by Ion Chromatography

Method:	Cations by Ion Ch	romatography						
AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexaval	ent Chromium by IC	- Low Level (EPA 7199)					
8D18011-01	TP-6-10	04/17/18	04/20/18	04/20/18	1	<0.040	mg/kg	0.04
8D18011-02	TP-4-1	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-03	TP-4-5	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-04	TP-4-10	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-05	TP-2-10	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-06	TP-1-1	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-07	TP-1-5	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-08	TP-1-10	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-09	TP-18-1	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-10	TP-18-5	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-11	TP-18-10	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-12	TP-17-1	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-13	TP-17-5	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-14	TP-17-10	04/17/18	04/20/18	04/20/18	1	<0.040	mg/kg	0.04
8D18011-15	TP-16-10	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-16	Dup-1-041718	04/17/18	04/20/18	04/20/18	1	< 0.040	mg/kg	0.04
8D18011-17	Dup-2-041718	04/17/18	04/20/18	04/20/18	1	<0.040	mg/kg	0.04
8D18011-18	Dup-3-041718	04/17/18	04/20/18	04/20/18	1	<0.040	mg/kg	0.04
8D18011-19	Dup-4-041718	04/17/18	04/20/18	04/20/18	1	<0.040	mg/kg	0.04





Client: The Source Group, Inc. (PH) AA Project No: A596145 093-Chemoil-003 **Project No:**

Date Received: 04/18/18 Project Name: Former Chemoil Refinery Date Reported: 04/24/18

Method:	Total Metals CAN	<i>l</i> l 17			Units	: mg/kg
Date Sampled:		04/17/18	04/17/18	04/17/18	04/17/18	
Date Prepared:		04/20/18	04/20/18	04/20/18	04/20/18	
Date Analyzed:		04/23/18	04/23/18	04/23/18	04/23/18	
AA ID No:		8D18011-01	8D18011-02	8D18011-03	8D18011-04	
Client ID No:		TP-6-10	TP-4-1	TP-4-5	TP-4-10	
Matrix:		Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	1	MRL
CAM Metals Les	ss Hg 6000/7000	(EPA 6010B/7	<u>7000)</u>			
Antimony		<10	<10	<10	<10	10
Arsenic		8.2	5.4	8.0	6.9	0.50
Barium		240	150	200	120	10
Beryllium		<1.0	<1.0	<1.0	<1.0	1.0
Cadmium		<1.0	<1.0	<1.0	<1.0	1.0
Chromium		26	22	26	19	3.0
Cobalt		10	8.6	10	8.8	3.0
Copper		18	26	11	8.7	3.0
Lead		18	70	6.3	7.8	3.0
Molybdenum		<5.0	< 5.0	<5.0	<5.0	5.0
Nickel		21	18	20	16	3.0
Selenium		< 0.50	< 0.50	< 0.50	< 0.50	0.50
Silver		<1.0	<1.0	<1.0	<1.0	1.0
Thallium		<5.0	< 5.0	<5.0	<5.0	5.0
Vanadium		42	39	49	41	10
Zinc		44	150	38	40	3.0



5.0



Molybdenum

LABORATORY ANALYSIS RESULTS

The Source Group, Inc. (PH) Client: AA Project No: A596145 093-Chemoil-003 **Project No:**

< 5.0

Date Received: 04/18/18 Project Name: Former Chemoil Refinery Date Reported: 04/24/18

Method:	Total Metals CAM 17				Units: mg/kg	
Date Sampled:	04/17/18	04/17/18	04/17/18	04/17/18		
Date Prepared:	04/20/18	04/20/18	04/20/18	04/20/18		
Date Analyzed:	04/23/18	04/23/18	04/23/18	04/23/18		
AA ID No:	8D18011-0	5 8D18011-06	8D18011-07	8D18011-08		
Client ID No:	TP-2-10	TP-1-1	TP-1-5	TP-1-10		
Matrix:	Soil	Soil	Soil	Soil		
Dilution Factor:	1	1	1	1		MRL
CAM Metals Les	ss Hg 6000/7000 (EPA 6010	B/7000)				
Antimony	<10	<10	<10	<10		10
Arsenic	8.0	5.2	12	7.4		0.50
Barium	230	120	190	200		10
Beryllium	<1.0	<1.0	<1.0	<1.0		1.0
Cadmium	<1.0	<1.0	<1.0	<1.0		1.0
Chromium	25	21	37	23		3.0
Cobalt	9.1	8.1	14	9.4		3.0
Copper	15	7.9	18	14		3.0
Lead	9.7	9.5	9.4	6.0		3.0

Nickel 19 15 27 19 3.0 Selenium < 0.50 < 0.50 < 0.50 < 0.50 0.50 Silver <1.0 <1.0 <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 < 5.0 < 5.0 5.0 Vanadium 38 40 40 69 10 Zinc **72 50** 36 38 3.0

< 5.0

< 5.0

< 5.0





Client: The Source Group, Inc. (PH) AA Project No: A596145 **Project No:** 093-Chemoil-003 Date Received: 04/18/18

Project Name: Former Chemoil Refinery Date Reported: 04/24/18

Method: Tota	Il Metals CAM 17			Units:	mg/kg
Data Campled	04/47/40	04/47/40	04/47/40		
Date Sampled:	04/17/18	04/17/18	04/17/18	04/17/18	
Date Prepared:	04/20/18	04/20/18	04/20/18	04/20/18	
Date Analyzed:	04/23/18	04/23/18	04/23/18	04/23/18	
AA ID No:	8D18011-09	8D18011-10	8D18011-11	8D18011-12	
Client ID No:	TP-18-1	TP-18-5	TP-18-10	TP-17-1	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
CAM Metals Less Ho	g 6000/7000 (EPA 6010B/7	000)			
Antimony	<10	<10	<10	<10	10
Arsenic	5.1	3.1	7.7	9.2	0.50
Barium	130	120	150	180	10
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	28	20	27	38	3.0
Cobalt	8.2	7.9	12	10	3.0
Copper	26	3.8	8.9	38	3.0
Lead	70	4.9	7.4	110	3.0
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
Nickel	26	14	22	31	3.0
Selenium	<0.50	< 0.50	< 0.50	<0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	<5.0	<5.0	5.0
Vanadium	46	39	56	55	10
Zinc	130	35	38	130	3.0





Client: The Source Group, Inc. (PH)

Project No: 093-Chemoil-003

Project Name: Former Chemoil Refinery

AA Project No: A596145

Date Received: 04/18/18

Date Reported: 04/24/18

Method:	Total Metals CAM 17	•			Units: mg/kg	
Date Sampled:		1/17/18	04/17/18	04/17/18	04/17/18	
Date Prepared:	04	1/20/18	04/20/18	04/20/18	04/20/18	
Date Analyzed:	04	1/23/18	04/23/18	04/23/18	04/23/18	
AA ID No:	8D1	8011-13	8D18011-14	8D18011-15	8D18011-16	
Client ID No:	Т	P-17-5	TP-17-10	TP-16-10	Dup-1-041718	
Matrix:		Soil	Soil	Soil	Soil	
Dilution Factor:		1	1	1	1	MRL
CAM Metals Le	ss Hg 6000/7000 (EP	A 6010B/70	<u>00)</u>			
Antimony		<10	<10	<10	<10	10
Arsenic		2.8	5.6	4.4	6.9	0.50
Barium		110	120	140	210	10
Beryllium		<1.0	<1.0	<1.0	<1.0	1.0
Cadmium		<1.0	<1.0	<1.0	<1.0	1.0
Chromium		21	24	27	24	3.0
Cobalt		8.8	9.8	11	8.2	3.0
Copper		8.3	6.1	8.5	13	3.0
Lead		11	5.9	9.9	8.8	3.0
Molybdenum		<5.0	<5.0	< 5.0	<5.0	5.0
Nickel		16	18	22	18	3.0
Selenium	•	<0.50	< 0.50	< 0.50	<0.50	0.50
Silver		<1.0	<1.0	<1.0	<1.0	1.0
Thallium		<5.0	<5.0	<5.0	<5.0	5.0
Vanadium		42	52	53	35	10
Zinc		42	36	39	35	3.0



MRL



LABORATORY ANALYSIS RESULTS

The Source Group, Inc. (PH) Client: AA Project No: A596145 **Project No:** 093-Chemoil-003 Date Received: 04/18/18 **Project Name:** Former Chemoil Refinery Date Reported: 04/24/18 Method: **Total Metals CAM 17**

Units: mg/kg

Date Sampled:	04/17/18	04/17/18	04/17/18
Date Prepared:	04/20/18	04/20/18	04/20/18
Date Analyzed:	04/23/18	04/23/18	04/23/18
AA ID No:	8D18011-17	8D18011-18	8D18011-19
Client ID No:	Dup-2-041718	Dup-3-041718	Dup-4-041718
Matrix:	Soil	Soil	Soil
Dilution Factor:	1	1	1

CAM Metals Less Hg 6000/7000 (EPA 6010B/7000) Antimony <10 <10 <10 10 Arsenic 11 3.6 4.2 0.50 **Barium** 170 120 130 10 Beryllium <1.0 <1.0 <1.0 1.0 Cadmium <1.0 <1.0 <1.0 1.0 34 19 26 Chromium 3.0 Cobalt 11 3.0 13 7.7 Copper 18 4.0 8.4 3.0 Lead 7.8 10 3.0 6.0 Molybdenum < 5.0 < 5.0 <5.0 5.0 Nickel 25 14 22 3.0 Selenium < 0.50 < 0.50 < 0.50 0.50 Silver <1.0 <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 < 5.0 5.0 Vanadium 65 37 52 10 Zinc 46 36 39 3.0





Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/17/18 04/17/18 04/17/18 04/17/18 **Date Prepared:** 04/23/18 04/23/18 04/23/18 04/23/18 Date Analyzed: 04/23/18 04/23/18 04/23/18 04/23/18 AA ID No: 8D18011-01 8D18011-02 8D18011-03 8D18011-04 Client ID No: TP-6-10 TP-4-1 TP-4-5 TP-4-10 Soil Soil Soil Soil Matrix: **Dilution Factor:** 20 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.084 11 0.062 0.054** 0.020



AA Project No: A596145



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003

Project No:093-Chemoil-003Date Received:04/18/18Project Name:Former Chemoil RefineryDate Reported:04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/17/18 04/17/18 04/17/18 04/17/18 **Date Prepared:** 04/23/18 04/23/18 04/23/18 04/23/18 **Date Analyzed:** 04/23/18 04/23/18 04/23/18 04/23/18 AA ID No: 8D18011-05 8D18011-06 8D18011-07 8D18011-08 TP-2-10 TP-1-1 TP-1-5 TP-1-10 **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 1 **MRL** 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.15 0.045 0.052 0.041** 0.020





The Source Group, Inc. (PH) Client: AA Project No: A596145 **Project No:** 093-Chemoil-003 Date Received: 04/18/18

Project Name: Former Chemoil Refinery Date Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/17/18 04/17/18 04/17/18 04/17/18 **Date Prepared:** 04/23/18 04/23/18 04/23/18 04/23/18 **Date Analyzed:** 04/23/18 04/23/18 04/23/18 04/23/18 AA ID No: 8D18011-09 8D18011-10 8D18011-11 8D18011-12 TP-18-1 TP-18-5 TP-18-10 TP-17-1 **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 **MRL** 1 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury 0.57 0.024 0.61 0.088 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/17/18 04/17/18 04/17/18 04/17/18 **Date Prepared:** 04/23/18 04/23/18 04/23/18 04/23/18 Date Analyzed: 04/23/18 04/23/18 04/23/18 04/23/18 AA ID No: 8D18011-13 8D18011-14 8D18011-15 8D18011-16 Client ID No: TP-17-5 TP-17-10 TP-16-10 Dup-1-041718 Soil Soil Soil Soil Matrix: **Dilution Factor:** 1 1 MRL 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.038 0.12 0.13 0.13** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/17/18 04/17/18 04/17/18 **Date Prepared:** 04/23/18 04/23/18 04/23/18 **Date Analyzed:** 04/23/18 04/23/18 04/23/18 AA ID No: 8D18011-17 8D18011-18 8D18011-19 **Client ID No:** Dup-2-041718 Dup-3-041718 Dup-4-041718 Matrix: Soil Soil Soil

Dilution Factor: 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.062** < 0.020 **0.036** 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

		Reporting		Spike	Source	0/5	%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Cations by Ion Chromatography -	Quality C	Control								
Batch B8D2004 - NO PREP										
Blank (B8D2004-BLK1)				Prepare	ed & Anal	yzed: (04/20/18			
Chromium (VI)	<0.040	0.040	mg/kg							
Blank (B8D2004-BLK2)				Prepare	ed & Anal	yzed: ()4/24/18			
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8D2004-BS1)				Prepare	ed & Anal	yzed: ()4/20/18			
Chromium (VI)	0.193	0.040	mg/kg	0.20		96.7	80-120			
LCS (B8D2004-BS2)				Prepare	ed & Anal					
Chromium (VI)	0.188	0.040	mg/kg	0.20		93.8	80-120			
LCS Dup (B8D2004-BSD1)				Prepare	ed & Anal	•	04/20/18			
Chromium (VI)	0.230	0.040	mg/kg	0.20		115	80-120	17.3	20	
LCS Dup (B8D2004-BSD2)				•	ed & Anal	-)4/24/18			
Chromium (VI)	0.198	0.040	mg/kg	0.20		99.1	80-120	5.44	20	
Duplicate (B8D2004-DUP1)	5	Source: 8D1	18011-01	Prepare	ed & Anal	yzed: (04/20/18			
Chromium (VI)	<0.040	0.040	mg/kg		<0.040				40	
Matrix Spike (B8D2004-MS1)		Source: 8D1		•		/18 An		4/24/18		
Chromium (VI)	ND	0.040	mg/kg	0.20	<0.040		70-130			QM-01
Matrix Spike (B8D2004-MS2)		Source: 8D1				-				
Chromium (VI)	0.158	0.040	mg/kg	0.20			70-130			
Matrix Spike (B8D2004-MS3)		Source: 8D1		•		•				
Chromium (VI)	0.200	0.040	mg/kg	0.20	<0.040		70-130			
Matrix Spike (B8D2004-MS4)		Source: 8D1				•				
Chromium (VI)	0.225	0.040	mg/kg	0.20	< 0.040		70-130			
Matrix Spike Dup (B8D2004-MSI	,	Source: 8D1		•		/18 An	•	4/24/18		
Chromium (VI)	ND	0.040	mg/kg	0.20	<0.040		70-130		40	QM-01
Matrix Spike Dup (B8D2004-MSI		Source: 8D1				•				
Chromium (VI)	0.151	0.040	mg/kg	0.20	<0.040	75.6	70-130	4.46	40	
Total Metals CAM 17 - Quality Cor	ntrol									
Batch B8D2007 - EPA 3050B										
Blank (B8D2007-BLK1)				Prepare	ed: 04/20	/18 An	alyzed: 04	4/23/18		
Antimony	<10	10	mg/kg							

A



Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Analyte	Result	Reporting Limit	Units		Source Result %RE0	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor									
Batch B8D2007 - EPA 3050B									
Blank (B8D2007-BLK1) Continue	ed			Prepare	ed: 04/20/18 Ar	nalvzed: 0	4/23/18		
Arsenic	<0.50	0.50	mg/kg			,	.,_0, .0		
Barium	<10	10	mg/kg						
Beryllium	<1.0	1.0	mg/kg						
Cadmium	<1.0	1.0	mg/kg						
Chromium	<3.0	3.0	mg/kg						
Cobalt	<3.0	3.0	mg/kg						
Copper	<3.0	3.0	mg/kg						
Lead	<3.0	3.0	mg/kg						
Molybdenum	< 5.0	5.0	mg/kg						
Nickel	<3.0	3.0	mg/kg						
Selenium	< 0.50	0.50	mg/kg						
Silver	<1.0	1.0	mg/kg						
Thallium	<5.0	5.0	mg/kg						
Vanadium	<10	10	mg/kg						
Zinc	<3.0	3.0	mg/kg						
LCS (B8D2007-BS1)				Prepare	ed: 04/20/18 Ar	nalyzed: 0	4/23/18		
Antimony	53.6	10	mg/kg	50	107	80-120			
Arsenic	52.6	0.50	mg/kg	50	105	80-120			
Barium	51.5	10	mg/kg	50	103	80-120			
Beryllium	55.8	1.0	mg/kg	50	112	80-120			
Cadmium	55.0	1.0	mg/kg	50	110	80-120			
Chromium	52.7	3.0	mg/kg	50	105	80-120			
Cobalt	54.1	3.0	mg/kg	50	108	80-120			
Copper	51.6	3.0	mg/kg	50	103	80-120			
Lead	52.6	3.0	mg/kg	50	105	80-120			
Molybdenum	53.6	5.0	mg/kg	50	107	80-120			
Nickel	54.0	3.0	mg/kg	50	108	80-120			
Selenium	54.4	0.50	mg/kg	50	109	80-120			
Silver	51.3	1.0	mg/kg	50	103	80-120			
Thallium	55.9	5.0	mg/kg	50	112	80-120			
Vanadium	53.0	10	mg/kg	50	106	80-120			





Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC	RPD	RPD Limit	Notes
		Lillit	Offics	Level	Result /0KEO	Lillits	INI D	Lilling	110163
Total Metals CAM 17 - Quality Cor	itroi								
Batch B8D2007 - EPA 3050B				_	1 04/00/40 1		4 /00 /4 0		
LCS (B8D2007-BS1) Continued					ed: 04/20/18 Ana		4/23/18		
Zinc	57.8	3.0	mg/kg	50	116	80-120			
LCS Dup (B8D2007-BSD1)					ed: 04/20/18 Ana				
Antimony	54.4	10	mg/kg	50	109	80-120	1.39	20	
Arsenic	53.8	0.50	mg/kg	50	108	80-120	2.20	20	
Barium	52.0	10	mg/kg	50	104	80-120		20	
Beryllium	57.0	1.0	mg/kg	50	114	80-120	2.13	20	
Cadmium	56.2	1.0	mg/kg	50	112	80-120	2.18	20	
Chromium	53.6	3.0	mg/kg	50	107	80-120	1.71	20	
Cobalt	54.9	3.0	mg/kg	50	110	80-120	1.58	20	
Copper	52.2	3.0	mg/kg	50	104	80-120	1.08	20	
Lead	53.8	3.0	mg/kg	50	108	80-120	2.20	20	
Molybdenum	55.6	5.0	mg/kg	50	111	80-120	3.64	20	
Nickel	54.6	3.0	mg/kg	50	109	80-120	1.01	20	
Selenium	55.5	0.50	mg/kg	50	111	80-120	1.91	20	
Silver	52.0	1.0	mg/kg	50	104	80-120	1.36	20	
Thallium	56.6	5.0	mg/kg	50	113	80-120	1.26	20	
Vanadium	53.8	10	mg/kg	50	108	80-120	1.56	20	
Zinc	59.0	3.0	mg/kg	50	118	80-120	2.04	20	
Duplicate (B8D2007-DUP1)				Prepare	ed: 04/20/18 Ana	alyzed: 0	4/23/18		
Antimony	<10	10	mg/kg		<10			40	
Arsenic	3.46	0.50	mg/kg		3.11		10.7	40	
Barium	127	10	mg/kg		120		5.68	40	
Beryllium	<1.0	1.0	mg/kg		<1.0			40	
Cadmium	<1.0	1.0	mg/kg		<1.0			40	
Chromium	20.7	3.0	mg/kg		19.6		5.61	40	
Cobalt	8.37	3.0	mg/kg		7.87		6.16	40	
Copper	4.23	3.0	mg/kg		3.76		11.8	40	
Lead	4.81	3.0	mg/kg		4.93		2.46	40	
Molybdenum	<5.0	5.0	mg/kg		<5.0			40	
Nickel	14.9	3.0	mg/kg		14.0		6.15	40	
Selenium	<0.50	0.50	mg/kg		<0.50			40	

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Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Analyte	F Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Con		-								
Batch B8D2007 - EPA 3050B										
Duplicate (B8D2007-DUP1) Cont	inued S	ource: 8D1	8011-10	Prepare	ed: 04/20/	18 Ana	ılyzed: 04	1/23/18		
Silver	<1.0	1.0	mg/kg	·	<1.0				40	
Thallium	<5.0	5.0	mg/kg		< 5.0				40	
Vanadium	41.6	10	mg/kg		38.8			7.04	40	
Zinc	38.4	3.0	mg/kg		34.6			10.4	40	
Matrix Spike (B8D2007-MS1)	S	ource: 8D1	8011-04	Prepare	ed: 04/20/	18 Ana	ılyzed: 04	4/23/18		
Antimony	20.9	10	mg/kg	50	<10	41.8	75-125			
Arsenic	55.1	0.50	mg/kg	50	6.88	96.4	75-125			
Barium	168	10	mg/kg	50	119		75-125			
Beryllium	49.3	1.0	mg/kg	50	<1.0	98.6	75-125			
Cadmium	40.1	1.0	mg/kg	50	<1.0	80.2	75-125			
Chromium	73.3	3.0	mg/kg	50	19.2	108	75-125			
Cobalt	55.1	3.0	mg/kg	50	8.75	92.7	75-125			
Copper	70.2	3.0	mg/kg	50	8.74	123	75-125			
Lead	57.1	3.0	mg/kg	50	7.82	98.5	75-125			
Molybdenum	51.0	5.0	mg/kg	50	<5.0	102	75-125			
Nickel	62.4	3.0	mg/kg	50	15.6	93.6	75-125			
Selenium	40.4	0.50	mg/kg	50	< 0.50	80.8	75-125			
Silver	53.8	1.0	mg/kg	50	<1.0	108	75-125			
Thallium	36.6	5.0	mg/kg	50	<5.0	73.3	60-140			
Vanadium	93.0	10	mg/kg	50	41.0	104	75-125			
Zinc	85.9	3.0	mg/kg	50	40.3	91.2	75-125			
Matrix Spike Dup (B8D2007-MSD)1) S	ource: 8D1	8011-04	Prepare			ılyzed: 04	4/23/18		
Antimony	21.1	10	mg/kg	50	<10	42.3	75-125	1.14	40	
Arsenic	56.4	0.50	mg/kg	50	6.88	99.0	75-125	2.33	40	
Barium	169	10	mg/kg	50	119	99.8	75-125	0.712	40	
Beryllium	50.4	1.0	mg/kg	50	<1.0	101	75-125	2.11	40	
Cadmium	40.5	1.0	mg/kg	50	<1.0	80.9	75-125	0.844	40	
Chromium	70.8	3.0	mg/kg	50	19.2	103	75-125	3.52	40	
Cobalt	56.4	3.0	mg/kg	50	8.75	95.4	75-125	2.44	40	
Copper	71.0	3.0	mg/kg	50	8.74	125	75-125	1.10	40	
Lead	57.9	3.0	mg/kg	50	7.82	100	75-125	1.44	40	

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Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18Project Name:Former Chemoil RefineryDate Reported: 04/24/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Co	ontrol									
Batch B8D2007 - EPA 3050B										
Matrix Spike Dup (B8D2007-MS Continued	SD1) S	Source: 8D1	8011-04	Prepare	ed: 04/20/	18 Ana	alyzed: 0	4/23/18		
Molybdenum	51.0	5.0	mg/kg	50	<5.0	102	75-125	0.0392	40	
Nickel	61.8	3.0	mg/kg	50	15.6		75-125	0.950	40	
Selenium	41.4	0.50	mg/kg	50	< 0.50	82.8	75-125	2.47	40	
Silver	53.8	1.0	mg/kg	50	<1.0	108	75-125	0.130	40	
Thallium	37.8	5.0	mg/kg	50	<5.0	75.5	60-140	2.96	40	
Vanadium	96.1	10	mg/kg	50	41.0	110	75-125	3.34	40	
Zinc	91.7	3.0	mg/kg	50	40.3	103	75-125	6.58	40	
Total Metals CAM 17 - Quality C	ontrol									
Batch B8D2319 - EPA 7471A Pre	p									
Blank (B8D2319-BLK1)				Prepare	ed & Anal	yzed: 0	4/23/18			
Mercury	<0.020	0.020	mg/kg							
LCS (B8D2319-BS1)				Prepare	ed & Anal	yzed: 0	4/23/18			
Mercury	0.478	0.020	mg/kg	0.50		95.6	80-120			
LCS Dup (B8D2319-BSD1)				Prepare	ed & Anal	yzed: 0	4/23/18			
Mercury	0.480	0.020	mg/kg	0.50		96.1	80-120	0.522	25	
Duplicate (B8D2319-DUP1)	5	Source: 8D1	8011-10	Prepare	ed & Anal	yzed: 0	4/23/18			
Mercury	0.0270	0.020	mg/kg		0.0240			11.8	25	
Matrix Spike (B8D2319-MS1)	5	Source: 8D1	8011-04	Prepare	ed & Anal	yzed: 0	4/23/18			
Mercury	0.559	0.020	mg/kg	0.50	0.0545	101	75-125			
Matrix Spike Dup (B8D2319-MS	SD1) S	Source: 8D1	8011-04	Prepare	ed & Anal	yzed: 0	4/23/18			
Mercury	0.574	0.020	mg/kg	0.50	0.0545	104	75-125	2.65	25	





Client:The Source Group, Inc. (PH)AA Project No: A596145Project No:093-Chemoil-003Date Received: 04/18/18

Project Name: Former Chemoil Refinery Date Reported: 04/24/18

Special Notes

[1] = QM-01 : The spike recovery for this QC sample is outside of established control limits due to sample matrix

interference.

A



AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

70049085 Page of 2

A.A. COC No.: | 5/26/2

Tel: 818-998-5547 FAX: 818-998-7258

Sampler's Name: Sean M. Dowe II (Cearly on Instructions Special Received by Received by Received by Please enter the TAT Turnaround Codes ** below Sampler's Signature: Quote No.: ANALYSIS REQUESTED (Test Name) Time ジャルジ 13:72 Time Time 100% Date ∀ - I % - I % 4/10/18 Date 093-chemal 3479 BUSKICK Pleasant Hill 941523 Relinquished by Relinquished by Relinquished by Chemoil Cont Š Ž Sample Matrix = 10 Working Days (Standard TAT) 50-Project Name / No.: Š State & Zip: Site Address: 12,75 52.9 15:25 9:20 9.70 9.45 0 T.76 2.00 Time 8,50 13:10 00,00 (0.50 6.10 (4) = 72 Hour Rush (5) = 5 Day Rush 4/17/18 Date 689 TAT Turnaround Codes ** 807 15 9 9 Jo 80 ্ব 9 0 Companies Kirsten Duey Date 4/18/18 and the second 02108/3719657 A.A. I.D. For Laboratory Use 1081 08 -951-6376 1 = Same Day Rush 48 Hour Rush 2 = 24 Hour Rush ROCK 925 (60) 16-18-10 15-18-51 Client LD. 0) -0 Project Manager: 1-81-01 TP-6-10 ī, 19-2-10 'n FP-17-1 2 A.A. Project No.: TP-16-10 TP-17 TP-17 7-6-アームノ TP-4 7-01 10 Client Phone: 4 Fax

Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.

AMERICAN © TT ANALYTICS

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

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Client: Apex Co	Companies	Project Na	me / No.:	Project Name / No.: Ch emus	11 ogzehenel	000 "	Sampler's Name: Saun	lame: Saun M.J. Dwell	/Kevis Ni	2
Project Manager: (4: 15+2)	ten Osey	Site	Site Address:	3478	9		ampler's Sign		Zud	£ 2/2
Phone: 925 - 951	76376		čič		Pleasint Hill		P.0	P.O. No.:		
Fax:		Š	State & Zip:	CA	94523		ong	» No.:		
	TAT Turnaround Codes **	**				ANALYSIS REQUESTED (Test Name)	UESTED (Test I	Vame)		
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3 = 48 Hour Rush	r Rush X =		Days (Star	s (Standard TAT)	1200	400			Special	
Client I.D.	A.A. 1.D.	Date	0	Sample	No. A SYS SYS SYS SYS SYS SYS SYS SYS SYS S	्री है और में अर्थ में में Please enter the TAT Turnaround Codes **	ound Codes	* below		•
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A.A. Project No∷	H5461H5/8DI80U			Relin	Relinquished by	Date	Time	Recei	Received by	
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Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 25, 2018

Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100 Pleasant Hill, CA 94523

Re: Former Chemoil Refinery / 093-Chemoil-003

A596146 / 8D19011

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/19/18 16:41 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromium by IC	- Low Level				
TP-36-1	8D19011-01	Soil	5	04/18/18 08:20	04/19/18 16:41
TP-36-5	8D19011-02	Soil	5	04/18/18 08:30	04/19/18 16:41
TP-36-10	8D19011-03	Soil	5	04/18/18 12:00	04/19/18 16:41
TP-30-1	8D19011-04	Soil	5	04/18/18 08:55	04/19/18 16:41
TP-30-5	8D19011-05	Soil	5	04/18/18 09:05	04/19/18 16:41
TP-30-10	8D19011-06	Soil	5	04/18/18 10:00	04/19/18 16:41
TP-15-1	8D19011-07	Soil	5	04/18/18 10:44	04/19/18 16:41
TP-15-5	8D19011-08	Soil	5	04/18/18 10:55	04/19/18 16:41
TP-15-10	8D19011-09	Soil	5	04/18/18 11:30	04/19/18 16:41
TP-20-10	8D19011-10	Soil	5	04/18/18 13:40	04/19/18 16:41
TP-19-10	8D19011-11	Soil	5	04/18/18 15:05	04/19/18 16:41
CAM Metals Less Hg 6000/7000					
TP-36-1	8D19011-01	Soil	5	04/18/18 08:20	04/19/18 16:41
TP-36-5	8D19011-02	Soil	5	04/18/18 08:30	04/19/18 16:41
TP-36-10	8D19011-03	Soil	5	04/18/18 12:00	04/19/18 16:41
TP-30-1	8D19011-04	Soil	5	04/18/18 08:55	04/19/18 16:41
TP-30-5	8D19011-05	Soil	5	04/18/18 09:05	04/19/18 16:41
TP-30-10	8D19011-06	Soil	5	04/18/18 10:00	04/19/18 16:41

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Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TP-15-1	8D19011-07	Soil	5	04/18/18 10:44	04/19/18 16:41
TP-15-5	8D19011-08	Soil	5	04/18/18 10:55	04/19/18 16:41
TP-15-10	8D19011-09	Soil	5	04/18/18 11:30	04/19/18 16:41
TP-20-10	8D19011-10	Soil	5	04/18/18 13:40	04/19/18 16:41
TP-19-10	8D19011-11	Soil	5	04/18/18 15:05	04/19/18 16:41
Mercury Total EPA 7470A/7471A					
TP-36-1	8D19011-01	Soil	5	04/18/18 08:20	04/19/18 16:41
TP-36-5	8D19011-02	Soil	5	04/18/18 08:30	04/19/18 16:41
TP-36-10	8D19011-03	Soil	5	04/18/18 12:00	04/19/18 16:41
TP-30-1	8D19011-04	Soil	5	04/18/18 08:55	04/19/18 16:41
TP-30-5	8D19011-05	Soil	5	04/18/18 09:05	04/19/18 16:41
TP-30-10	8D19011-06	Soil	5	04/18/18 10:00	04/19/18 16:41
TP-15-1	8D19011-07	Soil	5	04/18/18 10:44	04/19/18 16:41
TP-15-5	8D19011-08	Soil	5	04/18/18 10:55	04/19/18 16:41
TP-15-10	8D19011-09	Soil	5	04/18/18 11:30	04/19/18 16:41
TP-20-10	8D19011-10	Soil	5	04/18/18 13:40	04/19/18 16:41
TP-19-10	8D19011-11	Soil	5	04/18/18 15:05	04/19/18 16:41





Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Method: Cations by Ion Chromatography

wethou:	Callons by for Cri	romatograpny						
AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexaval	ent Chromium by IC	- Low Level (EPA 7199)					
8D19011-01	TP-36-1	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-02	TP-36-5	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-03	TP-36-10	04/18/18	04/23/18	04/23/18	1	0.050	mg/kg	0.04
8D19011-04	TP-30-1	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-05	TP-30-5	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-06	TP-30-10	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-07	TP-15-1	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-08	TP-15-5	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-09	TP-15-10	04/18/18	04/23/18	04/23/18	1	< 0.040	mg/kg	0.04
8D19011-10	TP-20-10	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04
8D19011-11	TP-19-10	04/18/18	04/23/18	04/23/18	1	<0.040	mg/kg	0.04





AA Project No: A596146 Client: The Source Group, Inc. (PH) **Project No:** 093-Chemoil-003 Date Received: 04/19/18

Project Name: Former Chemoil Refinery Date Reported: 04/25/18

Method:	Total Metals CAM 17			Unit	s: mg/kg
Date Sampled:	04/18/18		04/18/18	04/18/18	
Date Prepared:	04/24/18	3 04/24/18	04/24/18	04/24/18	
Date Analyzed:	04/25/18	3 04/25/18	04/25/18	04/25/18	
AA ID No:	8D19011-	01 8D19011-02	8D19011-03	8D19011-04	
Client ID No:	TP-36-1	TP-36-5	TP-36-10	TP-30-1	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
CAM Metals Les	s Hg 6000/7000 (EPA 601	0B/7000 <u>)</u>			
Antimony	<10	<10	<10	<10	10
Arsenic	1.9	3.1	7.5	3.6	0.50
Barium	60	92	100	88	10
Beryllium	<1.0	<1.0	<1.0	<1.0	1.0
Cadmium	<1.0	<1.0	<1.0	<1.0	1.0
Chromium	12	21	30	16	3.0
Cobalt	4.6	7.3	12	6.5	3.0
Copper	<3.0	11	10	5.9	3.0
Lead	5.8	4.9	6.2	14	3.0
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
Nickel	7.2	14	20	11	3.0
Selenium	<0.50	< 0.50	< 0.50	< 0.50	0.50
Silver	<1.0	<1.0	<1.0	<1.0	1.0
Thallium	<5.0	<5.0	< 5.0	< 5.0	5.0
Vanadium	23	37	57	31	10
Zinc	29	36	43	68	3.0



3.0

0.50

1.0

5.0

10

3.0



Nickel

Silver

Zinc

Selenium

Thallium

Vanadium

LABORATORY ANALYSIS RESULTS

The Source Group, Inc. (PH) Client: AA Project No: A596146 093-Chemoil-003 Date Received: 04/19/18 **Project No:** Project Name: Former Chemoil Refinery Date Reported: 04/25/18

Method:	Total Metals CAM 17					Units: mg/kg	
Date Sampled:	04/18/	18 04/	/18/18	04/18/18	04/18/18		
Date Prepared:	04/24/	18 04/	24/18	04/24/18	04/24/18		
Date Analyzed:	04/25/	18 04/	25/18	04/25/18	04/25/18		
AA ID No:	8D1901	1-05 8D19	9011-06 8	D19011-07	8D19011-08		
Client ID No:	TP-30	-5 TP	-30-10	TP-15-1	TP-15-5		
Matrix:	Soil	;	Soil	Soil	Soil		
Dilution Factor:	1		1	1	1		MRL
CAM Metals Le	ss Hg 6000/7000 (EPA 60	10B/7000 <u>)</u>					
Antimony	<10		<10	<10	<10		10
Arsenic	2.6		3.8	5.2	6.0		0.50
Barium	80		93	120	240		10
Beryllium	<1.0) <	<1.0	<1.0	<1.0		1.0
Cadmium	<1.0) <	<1.0	<1.0	<1.0		1.0
Chromium	15		17	22	27		3.0
Cobalt	6.2		7.8	7.6	11		3.0
Copper	<3.0)	5.9	16	6.1		3.0
Lead	4.2		5.8	34	6.3		3.0
Molybdenum	<5.0) <	<5.0	<5.0	<5.0		5.0

12

< 0.50

<1.0

< 5.0

35

40

21

< 0.50

<1.0

< 5.0

39

110

19

< 0.50

<1.0

< 5.0

54

39

10

< 0.50

<1.0

< 5.0

30

33



MRL

3.0



LABORATORY ANALYSIS RESULTS

The Source Group, Inc. (PH) Client: AA Project No: A596146 **Project No:** 093-Chemoil-003 Date Received: 04/19/18 **Project Name:** Former Chemoil Refinery Date Reported: 04/25/18 Method:

Total Metals CAM 17 Units: mg/kg

Date Sampled:	04/18/18	04/18/18	04/18/18
Date Prepared:	04/24/18	04/24/18	04/24/18
Date Analyzed:	04/25/18	04/25/18	04/25/18
AA ID No:	8D19011-09	8D19011-10	8D19011-11
Client ID No:	TP-15-10	TP-20-10	TP-19-10
Matrix:	Soil	Soil	Soil
Dilution Factor:	1	1	1

CAM Metals Less Hg 6000/7000 (EPA 6010B/7000) Antimony <10 <10 <10 10 Arsenic 5.9 8.7 7.7 0.50 **Barium** 130 120 130 10 Beryllium <1.0 <1.0 <1.0 1.0 Cadmium <1.0 <1.0 <1.0 1.0 Chromium 25 30 29 3.0 Cobalt 12 9.8 12 3.0 Copper 6.6 14 13 3.0 Lead 6.2 9.5 8.5 3.0 Molybdenum < 5.0 < 5.0 <5.0 5.0 Nickel 19 22 22 3.0 Selenium < 0.50 < 0.50 < 0.50 0.50 Silver <1.0 <1.0 <1.0 1.0 Thallium < 5.0 < 5.0 < 5.0 5.0 Vanadium 48 59 57 10

46

45

36



Viorel Vasile Operations Manager

Zinc



Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/18/18 04/18/18 04/18/18 04/18/18 **Date Prepared:** 04/24/18 04/24/18 04/24/18 04/24/18 **Date Analyzed:** 04/24/18 04/24/18 04/24/18 04/24/18 AA ID No: 8D19011-01 8D19011-02 8D19011-03 8D19011-04 Client ID No: TP-36-1 TP-36-5 TP-36-10 TP-30-1 Soil Soil Soil Soil Matrix: **Dilution Factor:** 1 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.090 0.028 0.098 0.033** 0.020





The Source Group, Inc. (PH) Client: AA Project No: A596146 **Project No:** 093-Chemoil-003 Date Received: 04/19/18

Project Name: Former Chemoil Refinery Date Reported: 04/25/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/18/18 04/18/18 04/18/18 04/18/18 **Date Prepared:** 04/24/18 04/24/18 04/24/18 04/24/18 **Date Analyzed:** 04/24/18 04/24/18 04/24/18 04/24/18 AA ID No: 8D19011-05 8D19011-06 8D19011-07 8D19011-08 TP-30-5 TP-30-10 TP-15-1 TP-15-5 **Client ID No:** Matrix: Soil Soil Soil Soil **Dilution Factor:** 1 1 **MRL** 1 1

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury < 0.020 0.043 0.078 0.047 0.020





Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Method: Total Metals CAM 17 Units: mg/kg

Date Sampled: 04/18/18 04/18/18 04/18/18 **Date Prepared:** 04/24/18 04/24/18 04/24/18 **Date Analyzed:** 04/24/18 04/24/18 04/24/18 AA ID No: 8D19011-09 8D19011-10 8D19011-11 TP-15-10 TP-20-10 TP-19-10 **Client ID No:** Matrix: Soil Soil Soil

Dilution Factor: 1 1 1 1 MRL

Mercury Total EPA 7470A/7471A (EPA 7471A)

Mercury **0.060 0.17 0.13** 0.020





Client: The Source Group, Inc. (PH) AA Project No: A596146 093-Chemoil-003 Date Received: 04/19/18 **Project No:** Project Name: Former Chemoil Refinery Date Reported: 04/25/18

Analyte Cations by Ion Chromatography - Batch B8D2320 - NO PREP Blank (B8D2320-BLK1) Chromium (VI) LCS (B8D2320-BS1)	<0.040 0.230	0.040	mg/kg	Prepare	10.4					
Batch B8D2320 - NO PREP Blank (B8D2320-BLK1) Chromium (VI)	<0.040		ma/ka	Prepare						
Chromium (VI)		0.040	ma/ka	Prepare						
Chromium (VI)		0.040	ma/ka		ea & Anal	yzed: 0	4/23/18			
` ,	0.230		mg/kg			, : -				
	0.230		5 5	Prepare	d & Analy	yzed: 0	4/23/18			
Chromium (VI)		0.040	mg/kg	0.20	•		80-120			
LCS Dup (B8D2320-BSD1)			5 5	Prepare	d & Analy					
Chromium (VI)	0.220	0.040	mg/kg	0.20	.		80-120	4.44	20	
Duplicate (B8D2320-DUP1)	S	Source: 8D1		Prepare	d & Anal					
Chromium (VI)	<0.040	0.040	mg/kg	•	<0.040				40	
Matrix Spike (B8D2320-MS1)	S	Source: 8D1		Prepare	d & Analy	yzed: 0	4/23/18			
Chromium (VI)	0.200	0.040	mg/kg	0.20			70-130			
Matrix Spike Dup (B8D2320-MS	D1) S	Source: 8D1		Prepare	d & Analy	yzed: 0	4/23/18			
Chromium (VI)	0.180	0.040	mg/kg	0.20		•	70-130	10.4	40	
Total Metals CAM 17 - Quality Co	ntrol		- 3							
Batch B8D2423 - EPA 3050B										
Blank (B8D2423-BLK1)				Prepare	ed: 04/24/	18 Ana	alyzed: 04	1/25/18		
Antimony	<10	10	mg/kg	1			•			
Arsenic	< 0.50	0.50	mg/kg							
Barium	<10	10	mg/kg							
Beryllium	<1.0	1.0	mg/kg							
Cadmium	<1.0	1.0	mg/kg							
Chromium	<3.0	3.0	mg/kg							
Cobalt	<3.0	3.0	mg/kg							
Copper	<3.0	3.0	mg/kg							
Lead	<3.0	3.0	mg/kg							
Molybdenum	<5.0	5.0	mg/kg							
Nickel	<3.0	3.0	mg/kg							
Selenium	< 0.50	0.50	mg/kg							
Silver	<1.0	1.0 5.0	mg/kg							
Thallium	<5.0 <10	5.0 10	mg/kg							
Vanadium Zinc	<10 <3.0	10 3.0	mg/kg							
ZII IC	₹3.0	5.0	mg/kg							





Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Analyte	F Result	Reporting Limit	Units	Spike Level	Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Cor					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
Batch B8D2423 - EPA 3050B									
LCS (B8D2423-BS1)				Prepare	ed: 04/24/18 Ana	alvzed: 04	4/25/18		
Antimony	52.4	10	mg/kg	50	105	80-120	.,,		
Arsenic	51.8	0.50	mg/kg	50	104	80-120			
Barium	50.5	10	mg/kg	50	101	80-120			
Beryllium	54.9	1.0	mg/kg	50	110	80-120			
Cadmium	54.8	1.0	mg/kg	50	110	80-120			
Chromium	52.0	3.0	mg/kg	50	104	80-120			
Cobalt	53.3	3.0	mg/kg	50	107	80-120			
Copper	49.4	3.0	mg/kg	50	98.9	80-120			
Lead	52.9	3.0	mg/kg	50	106	80-120			
Molybdenum	55.0	5.0	mg/kg	50	110	80-120			
Nickel	53.5	3.0	mg/kg	50	107	80-120			
Selenium	53.0	0.50	mg/kg	50	106	80-120			
Silver	50.3	1.0	mg/kg	50	101	80-120			
Thallium	53.0	5.0	mg/kg	50	106	80-120			
Vanadium	52.2	10	mg/kg	50	104	80-120			
Zinc	56.9	3.0	mg/kg	50	114	80-120			
LCS Dup (B8D2423-BSD1)				Prepare	ed: 04/24/18 Ana	alyzed: 04	4/25/18		
Antimony	54.9	10	mg/kg	50	110	80-120	4.68	20	
Arsenic	54.5	0.50	mg/kg	50	109	80-120	5.06	20	
Barium	52.8	10	mg/kg	50	106	80-120	4.38	20	
Beryllium	57.3	1.0	mg/kg	50	115	80-120	4.35	20	
Cadmium	56.6	1.0	mg/kg	50	113	80-120	3.23	20	
Chromium	54.4	3.0	mg/kg	50	109	80-120	4.53	20	
Cobalt	55.5	3.0	mg/kg	50	111	80-120	4.05	20	
Copper	52.0	3.0	mg/kg	50	104	80-120	5.07	20	
Lead	51.7	3.0	mg/kg	50	103	80-120	2.31	20	
Molybdenum	56.1	5.0	mg/kg	50	112	80-120	2.07	20	
Nickel	56.0	3.0	mg/kg	50	112	80-120	4.60	20	
Selenium	55.9	0.50	mg/kg	50	112	80-120	5.25	20	
Silver	52.4	1.0	mg/kg	50	105	80-120	4.15	20	
Thallium	56.9	5.0	mg/kg	50	114	80-120	7.10	20	

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Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Analyte	I Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Co	ntrol									-
Batch B8D2423 - EPA 3050B										
LCS Dup (B8D2423-BSD1) Cont	inued			Prepare	ed: 04/24/	′18 Ana	alyzed: 04	4/25/18		
Vanadium	54.6	10	mg/kg	50		109	80-120	4.50	20	
Zinc	58.8	3.0	mg/kg	50		118	80-120	3.40	20	
Duplicate (B8D2423-DUP1)	S	ource: 8D1		Prepare	ed: 04/24/	/18 Ana	alyzed: 04	4/25/18		
Antimony	<10	10	mg/kg	-			-		40	
Arsenic	1.54	0.50	mg/kg		1.63			5.68	40	
Barium	276	10	mg/kg		120			78.7	40	**
Beryllium	<1.0	1.0	mg/kg						40	
Cadmium	<1.0	1.0	mg/kg						40	
Chromium	12.9	3.0	mg/kg		13.7			5.63	40	
Cobalt	5.75	3.0	mg/kg		5.81			1.04	40	
Copper	<3.0	3.0	mg/kg						40	
Lead	3.68	3.0	mg/kg		3.70			0.542	40	
Molybdenum	<5.0	5.0	mg/kg						40	
Nickel	8.91	3.0	mg/kg		9.38			5.14	40	
Selenium	<0.50	0.50	mg/kg						40	
Silver	<1.0	1.0	mg/kg						40	
Thallium	<5.0	5.0	mg/kg						40	
Vanadium	28.6	10	mg/kg		31.3			8.92	40	
Zinc	23.2	3.0	mg/kg		24.0			3.48	40	
Matrix Spike (B8D2423-MS1)		Source: 8D1	19011-06	Prepare			alyzed: 04	4/25/18		
Antimony	15.1	10	mg/kg	50	<10	30.1	75-125			QM-07
Arsenic	52.1	0.50	mg/kg	50	3.75	96.8	75-125			
Barium	149	10	mg/kg	50	92.5		75-125			
Beryllium	50.8	1.0	mg/kg	50	<1.0		75-125			
Cadmium	43.0	1.0	mg/kg	50	<1.0		75-125			
Chromium	69.4	3.0	mg/kg	50	16.9	105	75-125			
Cobalt	55.7	3.0	mg/kg	50	7.85		75-125			
Copper	67.1	3.0	mg/kg	50	5.91	122	75-125			
Lead	54.1	3.0	mg/kg	50	5.82		75-125			
Molybdenum	51.7	5.0	mg/kg	50	<5.0	103	75-125			
Nickel	60.0	3.0	mg/kg	50	12.4	95.2	75-125			

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Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

		Reporting	11.26		Source	0/ DEC	%REC	222	RPD	N. 4
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Total Metals CAM 17 - Quality Con	trol									
Batch B8D2423 - EPA 3050B										
Matrix Spike (B8D2423-MS1) Co	ntinued S	Source: 8D1	9011-06	Prepare	ed: 04/24/	'18 Ana	alyzed: 04	4/25/18		
Selenium	38.6	0.50	mg/kg	50	<0.50	77.1	75-125			
Silver	52.2	1.0	mg/kg	50	<1.0	104	75-125			
Thallium	38.2	5.0	mg/kg	50	<5.0	76.4	60-140			
Vanadium	90.2	10	mg/kg	50	35.0	111	75-125			
Zinc	91.9	3.0	mg/kg	50	40.4	103	75-125			
Matrix Spike Dup (B8D2423-MSD		Source: 8D1	9011-06	Prepare	ed: 04/24/	'18 Ana	alyzed: 04	4/25/18		
Antimony	15.7	10	mg/kg	50	<10		75-125	4.16	40	QM-07
Arsenic	50.9	0.50	mg/kg	50	3.75		75-125	2.33	40	
Barium	142	10	mg/kg	50	92.5		75-125	5.03	40	
Beryllium	49.5	1.0	mg/kg	50	<1.0		75-125	2.59	40	
Cadmium	41.8	1.0	mg/kg	50		83.7	75-125	2.83	40	
Chromium	67.0	3.0	mg/kg	50	16.9		75-125	3.49	40	
Cobalt	54.1	3.0	mg/kg	50	7.85		75-125	2.90	40	
Copper	65.2	3.0	mg/kg	50	5.91	119	75-125	2.86	40	
Lead	52.0	3.0	mg/kg	50	5.82		75-125	4.00	40	
Molybdenum	50.5	5.0	mg/kg	50	<5.0		75-125	2.29	40	
Nickel	57.6	3.0	mg/kg	50	12.4		75-125	4.01	40	
Selenium	38.4	0.50	mg/kg	50	<0.50		75-125		40	
Silver	50.8	1.0	mg/kg	50	<1.0	102	75-125	2.72	40	
Thallium	38.6	5.0	mg/kg	50	<5.0		60-140	0.912	40	
Vanadium	87.0	10	mg/kg	50	35.0	104	75-125	3.61	40	
Zinc	88.2	3.0	mg/kg	50	40.4	95.7	75-125	4.14	40	
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8D2418 - EPA 7471A Prep										
Blank (B8D2418-BLK1)				Prepare	ed & Anal	yzed: 0	4/24/18			
Mercury	<0.020	0.020	mg/kg							
LCS (B8D2418-BS1)				Prepare	ed & Anal	•				
Mercury	0.486	0.020	mg/kg	0.50		97.2	80-120			
LCS Dup (B8D2418-BSD1)				Prepare	ed & Anal	yzed: 0	4/24/18			
Mercury	0.490	0.020	mg/kg	0.50	·	97.9	80-120	0.718	25	





Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

	ı	Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Total Metals CAM 17 - Quality Co	ntrol									
Batch B8D2418 - EPA 7471A Prep										
Duplicate (B8D2418-DUP1)	S	ource: 8D1	9004-02	Prepare	d & Analy	zed: 0	4/24/18			
Mercury	<0.020	0.020	mg/kg						25	
Matrix Spike (B8D2418-MS1)	S	Source: 8D1	9011-06	Prepare	ed & Analy	zed: 0	4/24/18			
Mercury	0.586	0.020	mg/kg	0.50	0.0430	108	75-125			
Matrix Spike Dup (B8D2418-MSD)1) S	Source: 8D1	9011-06	Prepare	ed & Analy	zed: 0	4/24/18			
Mercury	0.543	0.020	mg/kg	0.50	0.0430	100	75-125	7.53	25	

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Client:The Source Group, Inc. (PH)AA Project No: A596146Project No:093-Chemoil-003Date Received: 04/19/18Project Name:Former Chemoil RefineryDate Reported: 04/25/18

Special Notes

[1] = ** : Exceeds RPD limit.

[2] = QM-07: The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was

accepted based on acceptable LCS recovery.



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AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

70049096 Page 1 of 1

A.A. GOC No.: / 5221

Tel: 818-998-5547 FAX: 818-998-7258

Sampler's Name: Seen McDowell / Kevin Nychen Instructions Special Site Address: 3478 Buskirk Ave suk 100 Sampler's Signature: Secon, M. Krwell Received by 39ceived by Received by 37-61-12 Please enter the TAT Turnaround Codes ** below Quote No.: 0.00 ANALYSIS REQUESTED (Test Name) 16.50 Time Time Time − Date − General Control 043-chemos/-003 Date SAMIT - EPA City: Pleasant Hill Relinquished by 4H523 Relinquished by Relinquished by 7 Cont ਰ ਵੇ Project Name / No.: Chemoil Sample Matrix = 10 Working Days (Standard TAT) 3 \$0°. State & Zip: 8,20 12:00 10:00 <u>니다. 0</u> 13:40 8.30 1.01.55 8:55 2,05 3.3 15:05 IIIO (4) = 72 Hour Rush (5) = 5 Day Rush 4/18/18 Date TAT Turnaround Codes ** 99 201 0 1 1 0 1 70 03 | | P 00 9 Date 4 19 18 Time A.A. I.D. For Laboratory Use Kirsten Duev 925-951-6376 Jompan 25 1 = Same Day Rush (2) = 24 Hour Rush (3) = 48 Hour RushTP-20-10' -15-10 TP-19-10 79-30-10 Cient I.D. 78-15-S TP-36-10 17-30-5 Project Manager: 18-30-1 TP-36-5 TP-15-1 TP-36-1 Phone: Client: 0 Fax:

Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.





May 22, 2017

Kirsten Duey The Source Group, Inc. 3478 Buskirk Avenue, Suite 100 Pleasant Hill, CA 94523

Re: PTS File No: 47257

Physical Properties Data

Former Chemoil Refinery; 093-Chemoil-001 Task 6

Dear Ms. Duey:

Please find enclosed report for Physical Properties analyses conducted upon the sample received from your Former Chemoil Refinery; 093-Chemoil-001 Task 6 project. All analyses were performed by applicable ASTM, EPA, or API methodologies. The sample is currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the sample will be disposed of at that time. You may contact me regarding storage, disposal, or return of the sample.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please give me a call at (562) 347-2502.

Sincerely,

PTS Laboratories, Inc.

Michael Mark Brady, P.G. Laboratory Director

Encl.

PTS Laboratories

Project Name: Former Chemoil Refinery

Project Number: 093-Chemoil-001 Task 6 Client: The Source Group, Inc.

TEST PROGRAM - 20170518

PTS File No: 47257

		Core	CAL-EPA			
CORE ID	Depth	Recovery	DTSC Vapor			
	ft.	ft.	Intrusion			Comments
		Plugs:	Various			
Date Received: 20170518						
AN-22-5	4.75-5.25	0.5	Х			
TOTALS:	1 Core	0.5	1			1

Laboratory Test Program Notes

Contaminant identification:

Standard TAT for basic analysis is 10-15 business days.

CAL-EPA DTSC Vapor Intrusion: Bulk & grain density, total porosity, moisture content, volumetric air & moisture, TOC/foc, and grain size distribution.

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PTS File No: 47257

Client: The Source Group, Inc.

Report Date: 05/22/17

PHYSICAL PROPERTIES DATA - CAL-EPA DTSC Vapor Intrusion Package

Project Name: Former Chemoil Refinery
Project No: 093-Chemoil-001 Task 6

				METHODS:	API RP40/A	STM D2216	API F	RP 40		API RP 40	
			SAMPLE		MOIS	TURE	DEN:	SITY		POROSITY, (2)	
	SAMPLE	DEPTH,	ORIENTATION	ANALYSIS	CON	TENT,	DRY BULK,	GRAIN,	TOTAL,	AIR-FILLED,	WATER-FILLED,
	ID.	ft.	(1)	DATE	% weight	cm ³ /cm ³	g/cm ³	g/cm ³	cm ³ /cm ³	cm ³ /cm ³	cm ³ /cm ³
·	AN-22-5	4.75-5.25	V	20170518	11.8	0.172	1.46	2.73	0.465	0.293	0.172

⁽¹⁾ Sample Orientation: H = horizontal; V = vertical; R = remold

⁽²⁾ Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.

Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected



The Source Group, Inc. PTS File No: 47257

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Form PROJECT NO: 093-0

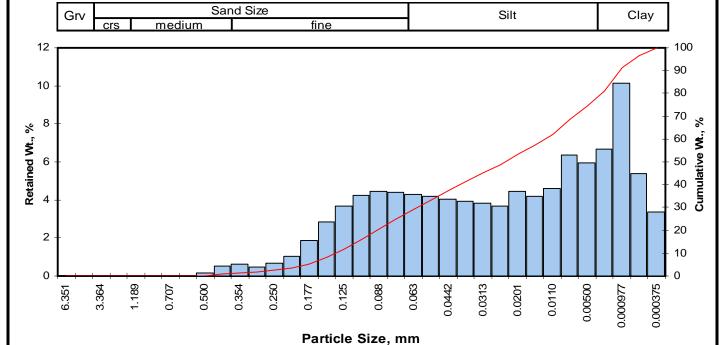
Former Chemoil Refinery 093-Chemoil-001 Task 6

Г				Median		Particle	Size Distril	bution, wt.	percent		Silt
			Mean Grain Size	Grain Size			Sand Size				&
	Sample ID	Depth, ft.	Description (1)	mm	Gravel	Coarse	Medium	Fine	Silt	Clay	Clay
	AN-22-5	4.75-5.25	Silt	0.024	0.00	0.00	0.66	24.25	49.55	25.55	75.10

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:The Source Group, Inc.PTS File No:47257Project:Former Chemoil RefinerySample ID:AN-22-5Project No:093-Chemoil-001 Task 6Depth, ft:4.75-5.25



				Sample	Increment	Cumulative
Оре	ening	Phi of	U.S.	Weight,	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.01	0.01	0.01
0.0197	0.500	1.00	35	0.15	0.15	0.16
0.0166	0.420	1.25	40	0.49	0.49	0.66
0.0139	0.354	1.50	45	0.64	0.64	1.30
0.0117	0.297	1.75	50	0.48	0.48	1.78
0.0098	0.250	2.00	60	0.68	0.68	2.46
0.0083	0.210	2.25	70	1.02	1.02	3.49
0.0070	0.177	2.50	80	1.85	1.86	5.35
0.0059	0.149	2.75	100	2.81	2.82	8.17
0.0049	0.125	3.00	120	3.67	3.68	11.85
0.0041	0.105	3.25	140	4.20	4.22	16.07
0.0035	0.088	3.50	170	4.41	4.43	20.50
0.0029	0.074	3.75	200	4.39	4.41	24.90
0.0025	0.063	4.00	230	4.28	4.30	29.20
0.0021	0.053	4.25	270	4.16	4.18	33.38
0.00174	0.0442	4.50	325	4.03	4.05	37.42
0.00146	0.0372	4.75	400	3.94	3.96	41.38
0.00123	0.0313	5.00	450	3.83	3.85	45.22
0.000986	0.0250	5.32	500	3.67	3.68	48.91
0.000790	0.0201	5.64	635	4.41	4.43	53.34
0.000615	0.0156	6.00		4.18	4.20	57.53
0.000435	0.0110	6.50		4.57	4.59	62.12
0.000308	0.00781	7.00		6.33	6.36	68.48
0.000197	0.00500	7.65		5.95	5.97	74.45
0.000077	0.00195	9.00		6.64	6.67	81.12
0.000038	0.000977	10.00		10.10	10.14	91.26
0.000019	0.000488	11.00		5.36	5.38	96.64
0.000015	0.000375	11.38		3.35	3.36	100.00
TOTALS				99.60	100.00	100.00

Cumula	Cumulative Weight Percent greater than							
Weight	Phi	Parti	icle Size					
percent	Value	Inches	Millimeters					
5	2.45	0.0072	0.183					
10	2.87	0.0054	0.136					
16	3.25	0.0041	0.105					
25	3.76	0.0029	0.074					
40	4.66	0.0016	0.039					
50	5.40	0.0009	0.024					
60	6.27	0.0005	0.013					
75	7.76	0.0002	0.005					
84	9.28	0.0001	0.002					
90	9.88	0.0000	0.001					
95	10.70	0.0000	0.001					

Measure	Trask	Inman	Folk-Ward
Median, phi	5.40	5.40	5.40
Median, in.	0.0009	0.0009	0.0009
Median, mm	0.024	0.024	0.024
Mean, phi	4.67	6.27	5.98
Mean, in.	0.0015	0.0005	0.0006
Mean, mm	0.039	0.013	0.016
Sorting	4.002	3.019	2.758
Skewness	0.781	0.287	0.286
Kurtosis	0.256	0.365	0.844
Cusin Cina Da	a a minetia m		C:It

Grain Size Description	Silt
(ASTM-USCS Scale)	(based on Mean from Trask)

Description	Retained	Weight
	on Sieve #	Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.66
Fine Sand	200	24.25
Silt	>0.005 mm	49.55
Clay	<0.005 mm	25.55
	Total	100



PTS File No: 47257

Client: The Source Group, Inc.

Report Date: 05/22/17

ORGANIC CARBON DATA - TOC (foc)

(Methodology: Walkley-Black)

Project Name: Former Chemoil Refinery
Project No: 093-Chemoil-001 Task 6

SAMPLE ID.	DEPTH, ft.	ANALYSIS DATE	ANALYSIS TIME	SAMPLE MATRIX	TOTAL ORGANIC CARBON, mg/kg	FRACTION ORGANIC CARBON, g/g
AN-22-5	4.75-5.25	20170520	1005	SOIL	2760	2.76E-03

Blank	N/A	20170520	1005	BLANK	ND	ND
SRM D093-542	N/A	20170520	1005	SRM	5930	5.93E-03

Reporting Limit: 100 1.00E-04

QC DATA

Q0 D71171						
			Certified	QC Performance		
SRM ID/Lot No.	REC (%)	Control Limits	Concentration	Acceptance	Limits, mg/kg	
			mg/kg	Lower	Upper	
SRM D093-542	106	75-125	5590	4193	6988	

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ON ICE 65° SAMPLE INTEGRITY (CHECK): 5 DAYS NORMAL COMMENTS TURNAROUND TIME スメ PTS QUOTE NO. 24 HOURS 48 HOURS 72 HOURS PTS FILE OTHER: INTACT K N PO# RECEIVED BY COMPANY Vapor Instrusion Package (Cal DTSC) ATTERBERG LIMITS, ASTM D4318 LOC: WALKLEY-BLACK BRAIN SIZE DISTRIBUTION, ASTM D422/4464M ANALYSIS REQUEST HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084 AIR PERMEABILITY, API RP40 TIME BULK DENSITY (DRY), API RP40 or ASTM D2937 SPECIFIC GRAVITY, ASTM D854 OOROSITY: EFFECTIVE, ASTM D425M m RELINQUISHED OPOSITY: TOTAL, API RP40 MOISTURE CONTENT, ASTM D2216 РНОТОСОС: СОВЕ РНОТОСЯАРНУ COMPANY FLUID PROPERTIES PACKAGE DATE CAPILLARITY PACKAGE CCEO/TURCO PROPERTIES PACKAGE ORE FLUID SATURATIONS PACKAGE 12:15 HYDRAULIC CONDUCTIVITY PACKAGE SOIL PROPERTIES PACKAGE NUMBER OF SAMPLES ZIP CODE 3478 Buskirk Ave, Suite 100, Pleasant Hill, CA 94523 925-951-6376 DEPTH, FT 475-675 PHONE NUMBER FAX NUMBER TIME から S 2020 Walnut Avenue, Signal Hill, sampler signature X 5 18 17 DATE Former Chemoil Refinery 093-Chemoil-001 Task 6 ID NUMBER The Source Group HED BY PROJECT MANAGER Kirsten Duey PROJECT NUMBER PROJECT NAME SITE LOCATION AN-22-5 SAMPLE ADDRESS RELINO

PTS Laboratories, Inc. • 8100 Secura Way • Santa Fe Springs, CA 90670 • Phone (562) 347-2500 • Fax (562) 907-3610



5730 Centralcrest St. • Houston, TX 77092 Telephone (713) 316-1800 • Fax (877) 225-9953

April 2, 2018

Kirsten L. Duey Project Manager Apex Companies, LLC 3478 Buskirk Avenue, Suite 100 Pleasant Hill, CA 94523

Re: PTS File No: 48057

Project Name: Chemoil Refinery Project Number: 093-Chemoil-003

Dear Ms. Duey,,

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Chemoil Refinery project. All analyses were performed by applicable ASTM, EPA, or API methodologies. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples

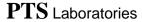
PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact myself or Emeka Anazodo at (713) 316-1800.

Sincerely, PTS Laboratories, Inc.

Rick Schweizer

Rick Schweizer Laboratory Supervisor

Encl.



Project Name: Chemoil Refinery PTS File No: 48057

Project Number: 093-Chemoil-003 Client: APEX Companies, LLC

TEST PROGRAM - 20180319

CORE ID	Depth ft.	Core Recovery ft.	CAL-EPA DTSC Vapor Intrusion			Comments
		Core	Various			
Date Received: 20180314						
TP-25	5	0.5	Х			2" x 6" Statinless Steel Sleeve
TP-27	5.5	0.5	Х			2" x 6" Statinless Steel Sleeve
TP-29	5	0.5	Х			2" x 6" Statinless Steel Sleeve
TOTALS:	3 Core	1.5	3			3

Laboratory Test Program Notes

Contaminant identification:

Standard TAT for basic analysis is 10-15 business days.

CAL-EPA DTSC Vapor Intrusion: Bulk & grain density, total porosity, moisture content, volumetric air & moisture, TOC/foc, and grain size distribution.

PTS Laboratories

PTS File No: 48057

Client: APEX Companies, LLC

Report Date: 04/02/18

PHYSICAL PROPERTIES DATA - CAL-EPA DTSC Vapor Intrusion Package

Project Name: Chemoil Refinery
Project No: 093-Chemoil-003

				METHODS:	API RP40/ASTM D2216		API R		API RP 40				
ſ			SAMPLE		MOIS	MOISTURE CONTENT,		MOISTURE DENSITY		SITY	POROSITY, (2)		
	SAMPLE	DEPTH,	ORIENTATION	ANALYSIS	CON			GRAIN,	TOTAL,	AIR-FILLED,	WATER-FILLED,		
L	ID.	ft.	(1)	DATE	% weight	cm ³ /cm ³	g/cm ³	g/cm ³	cm ³ /cm ³	cm ³ /cm ³	cm ³ /cm ³		
	TP-25	5.0	V	20180320	7.2	0.128	1.78	2.69	0.336	0.209	0.127		
	TP-27	5.6	V	20180320	7.4	0.127	1.71	2.70	0.365	0.238	0.127		
	TP-29	5.2	V	20180320	6.7	0.113	1.68	2.68	0.373	0.260	0.113		

⁽¹⁾ Sample Orientation: H = horizontal; V = vertical; R = remold

⁽²⁾ Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.

PTS File No:

48057

APEX Companies, LLC

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

PROJECT NAME: PROJECT NO:

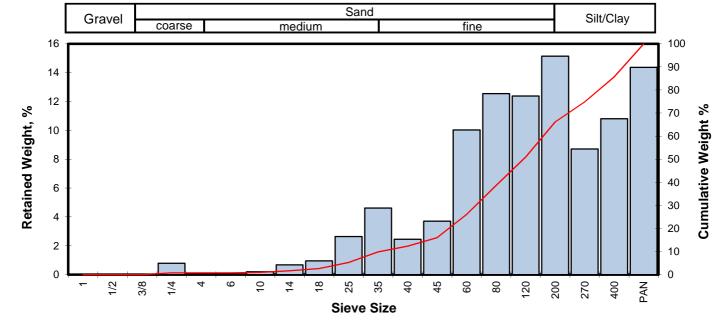
Chemoil Refinery 093-Chemoil-003

Report Date: April 2, 2018

		Mean Grain Size Description USCS/ASTM	Median Grain Size,	Gravel	Particle Siz	e Distribution Sand Size		cent Silt/Clay
Sample ID	Depth, ft.	(1)	mm		Coarse	Medium	Fine	
TP-25	5.20	Fine sand	0.129	0.79	0.20	11.34	53.79	33.87
TP-27	5.65	Fine sand	0.135	0.21	0.47	14.59	52.15	32.57
TP-29	5.10	Fine sand	0.143	4.68	1.06	12.65	52.51	29.11

Sieve Analysis Results - ASTM D422

Client:APEX Companies, LLCPTS File No:48057Project:Chemoil RefinerySample ID:TP-25Project No:093-Chemoil-003Depth, ft:5.2



			U.S.	Sample	Incremental	Cumulative
Оре	ening	Phi of	Sieve	Weight	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.93	0.79	0.79
0.1873	4.757	-2.25	4	0.00	0.00	0.79
0.1324	3.364	-1.75	6	0.00	0.00	0.79
0.0787	2.000	-1.00	10	0.24	0.20	0.99
0.0557	1.414	-0.50	14	0.80	0.68	1.67
0.0394	1.000	0.00	18	1.13	0.96	2.63
0.0278	0.707	0.50	25	3.12	2.64	5.27
0.0197	0.500	1.00	35	5.44	4.61	9.88
0.0166	0.420	1.25	40	2.89	2.45	12.33
0.0139	0.354	1.50	45	4.37	3.70	16.04
0.0098	0.250	2.00	60	11.83	10.03	26.07
0.0070	0.177	2.50	80	14.80	12.55	38.61
0.0049	0.125	3.00	120	14.60	12.38	50.99
0.0029	0.074	3.75	200	17.86	15.14	66.13
0.0021	0.053	4.25	270	10.27	8.71	74.83
0.0015	0.037	4.75	400	12.74	10.80	85.63
			PAN	16.95	14.37	100.00

Cumulative Weight Percent greater than				
Weight	Phi	Particle Size		
percent	Value	Inches	Millimeters	
5	0.45	0.0289	0.733	
10	1.01	0.0195	0.496	
16	1.50	0.0139	0.354	
25	1.95	0.0102	0.259	
40	2.56	0.0067	0.170	
50	2.96	0.0051	0.129	
60	3.45	0.0036	0.092	
75	4.26	0.0021	0.052	
84	4.67	0.0015	0.039	
90	3.31	0.0040	0.101	
95	1.65	0.0125	0.318	

Measure	Trask	Inman	Folk-Ward	
Median, phi	2.96	2.96	2.96	
Median, in.	0.0051	0.0051	0.0051	
Median, mm	0.129	0.129	0.129	
Mean, phi	2.68	3.09	3.04	
Mean, in.	0.0061	0.0046	0.0048	
Mean, mm	0.156	0.118	0.121	
Sorting	2.228	1.589	0.977	
Skewness	0.906	0.079	-1.546	
Kurtosis	0.262	-0.621	0.214	
Grain Size De	escription		Fine sand	
/ACTM LICA	Colonia)	(hoosed on Moon from Trools)		

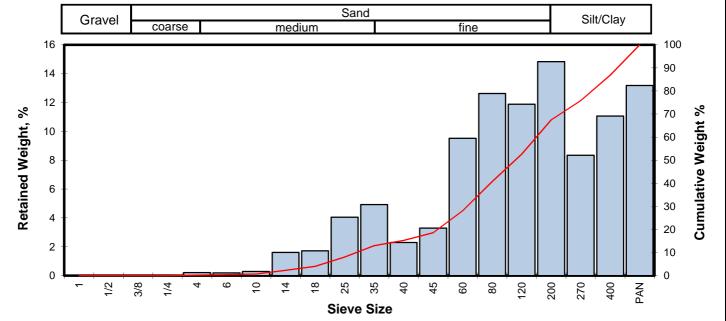
Description	Retained	Weight
	on Sieve #	Percent
Gravel	4	0.79
Coarse Sand	10	0.20
Medium Sand	40	11.34
Fine Sand	200	53.79
Silt/Clay	<200	33.87
	Total	100

TOTALS
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Sieve Analysis Results - ASTM D422

Client:APEX Companies, LLCPTS File No:48057Project:Chemoil RefinerySample ID:TP-27Project No:093-Chemoil-003Depth, ft:5.65



			U.S.	Sample	Incremental	Cumulative
Op	ening	Phi of	Sieve	Weight	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.31	0.21	0.21
0.1324	3.364	-1.75	6	0.28	0.19	0.40
0.0787	2.000	-1.00	10	0.42	0.28	0.68
0.0557	1.414	-0.50	14	2.38	1.61	2.29
0.0394	1.000	0.00	18	2.54	1.72	4.01
0.0278	0.707	0.50	25	5.99	4.05	8.06
0.0197	0.500	1.00	35	7.28	4.92	12.98
0.0166	0.420	1.25	40	3.39	2.29	15.27
0.0139	0.354	1.50	45	4.87	3.29	18.57
0.0098	0.250	2.00	60	14.08	9.52	28.09
0.0070	0.177	2.50	80	18.67	12.62	40.71
0.0049	0.125	3.00	120	17.57	11.88	52.59
0.0029	0.074	3.75	200	21.94	14.84	67.43
0.0021	0.053	4.25	270	12.33	8.34	75.77
0.0015	0.037	4.75	400	16.35	11.06	86.82
			PAN	19.49	13.18	100.00

Cumulative Weight Percent greater than				
Weight	Phi	Particle Size		
percent	Value	Inches	Millimeters	
5	0.12	0.0362	0.919	
10	0.70	0.0243	0.617	
16	1.31	0.0159	0.405	
25	1.84	0.0110	0.280	
40	2.47	0.0071	0.180	
50	2.89	0.0053	0.135	
60	3.37	0.0038	0.096	
75	4.20	0.0021	0.054	
84	4.62	0.0016	0.041	
90	3.60	0.0032	0.082	
95	1.80	0.0113	0.287	

Measure	Trask	Inman	Folk-Ward	
Median, phi	2.89	2.89	2.89	
Median, in.	0.0053	0.0053	0.0053	
Median, mm	0.135	0.135	0.135	
Mean, phi	2.58	2.96	2.94	
Mean, in.	0.0066	0.0050	0.0051	
Mean, mm	0.167	0.128	0.130	
Sorting	2.271	1.659	1.084	
Skewness	0.914	0.044	-1.126	
Kurtosis	0.211	-0.494	0.291	
Grain Size Do	escription	Fine sand		
/ASTM LIS	Ce Scala)	(based on Moon from Track)		

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.21
Coarse Sand	10	0.47
Medium Sand	40	14.59
Fine Sand	200	52.15
Silt/Clay	<200	32.57
	Total	100

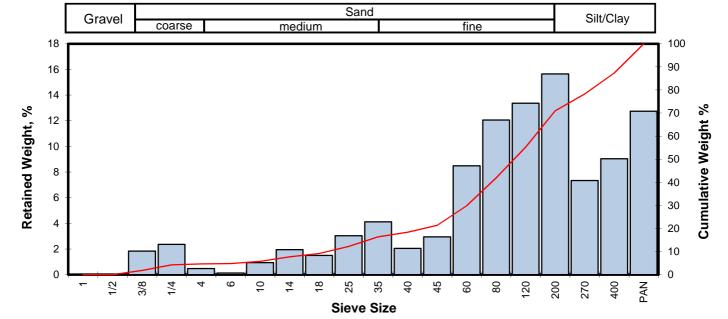
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Sieve Analysis Results - ASTM D422

Client:APEX Companies, LLCPTS File No:48057Project:Chemoil RefinerySample ID:TP-29Project No:093-Chemoil-003Depth, ft:5.10



			U.S.	Sample	Incremental	Cumulative
Op	ening	Phi of	Sieve	Weight	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	2.17	1.84	1.84
0.2500	6.351	-2.67	1/4	2.79	2.37	4.21
0.1873	4.757	-2.25	4	0.56	0.47	4.68
0.1324	3.364	-1.75	6	0.15	0.13	4.81
0.0787	2.000	-1.00	10	1.10	0.93	5.74
0.0557	1.414	-0.50	14	2.29	1.94	7.68
0.0394	1.000	0.00	18	1.77	1.50	9.18
0.0278	0.707	0.50	25	3.58	3.04	12.22
0.0197	0.500	1.00	35	4.86	4.12	16.34
0.0166	0.420	1.25	40	2.42	2.05	18.39
0.0139	0.354	1.50	45	3.47	2.94	21.33
0.0098	0.250	2.00	60	10.01	8.49	29.82
0.0070	0.177	2.50	80	14.22	12.06	41.87
0.0049	0.125	3.00	120	15.77	13.37	55.24
0.0029	0.074	3.75	200	18.46	15.65	70.89
0.0021	0.053	4.25	270	8.65	7.33	78.23
0.0015	0.037	4.75	400	10.65	9.03	87.26
			PAN	15.03	12.74	100.00

Cumulative Weight Percent greater than				
Weight	Phi	Particle Size		
percent	Value	Inches	Millimeters	
5	-1.59	0.1189	3.021	
10	0.13	0.0359	0.911	
16	0.96	0.0203	0.514	
25	1.72	0.0120	0.304	
40	2.42	0.0073	0.187	
50	2.80	0.0056	0.143	
60	3.23	0.0042	0.107	
75	4.03	0.0024	0.061	
84	4.57	0.0017	0.042	
90	3.73	0.0030	0.075	
95	1.86	0.0108	0.275	
			·	
Measure	Track	Inman	Folk-Ward	

Measure	Trask	Inman	Folk-Ward	
Median, phi	2.80	2.80	2.80	
Median, in.	0.0056	0.0056	0.0056	
Median, mm	0.143	0.143	0.143	
Mean, phi	2.45	2.76	2.78	
Mean, in.	0.0072	0.0058	0.0057	
Mean, mm	0.183	0.147	0.146	
Sorting	2.230	1.805	1.427	
Skewness	0.953	-0.022	-0.783	
Kurtosis	0.146	-0.042	0.613	
Grain Size D	escription		Fine sand	
(ASTMILIS	CS Scala)	(based on Moon from Track)		

Description	Retained on Sieve #	Weight Percent
Gravel	4	4.68
Coarse Sand	10	1.06
Medium Sand	40	12.65
Fine Sand	200	52.51
Silt/Clay	<200	29.11
	Total	100

TOTALS
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PTS File No: 48057

Client: APEX Companies, LLC

Report Date: 04/02/18

ORGANIC CARBON DATA - TOC (foc)

(Methodology: Walkley-Black)

Project Name: Chemoil Refinery
Project No: 093-Chemoil-003

SAMPLE ID.	DEPTH, ft.	ANALYSIS DATE	ANALYSIS TIME	SAMPLE MATRIX	TOTAL ORGANIC CARBON, mg/kg	FRACTION ORGANIC CARBON, g/g
TP-25	5.3	20180323	1400	SOIL	1181	1.18E-03
TP-27	5.5	20180323	1400	SOIL	107	1.07E-04
TP-29	5.0	20180323	1400	SOIL	3565	3.56E-03

Blank	N/A	20180323	1400	BLANK	ND	ND
SRM D096-542	N/A	20180323	1400	SRM	4019	4.02E-03
				Reporting Limit:	100	1.00E-04

QC DATA

SRM ID/Lot No.	REC (%)	Control Limits	Certified Concentration		formance Limits, mg/kg
			mg/kg	Lower	Upper
SRM D096-542	109	75-125	3890	2918	4863

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COMPANY								A	ANALYSIS	\Sis		REQUEST	18	<u> </u>					<u>-</u>	PO#	
Appress ADDRESS ADDRESS 3478 Buskirk Ave Pleas PROJECT MANAGER Kirsten Puck PROJECT NAME Chemoi Refine PROJECT NUMBER Octs — Chemoi Refine PROJECT NUMBER SAMPLE ID NUMBER SAMPLE ID NUMBER DATE	Olly Please	OITY Pleasant Aill (925 PHON Signal Hill 90755	2IP CODE 925)9441-2856 PHONE NUMBER FAX NUMBER	NUMBER OF SAMPLES SOIL PROPERTIES PACKAGE	HYDRAULIC CONDUCTIVITY PACKAGE	PORE FLUID SATURATIONS PACKAGE TCEQ/TNRCC PROPERTIES PACKAGE	CAPILLARITY PACKAGE FLUID PROPERTIES PACKAGE	PHOTOLOG: CORE PHOTOGRAPHY	MOISTURE CONTENT, ASTM D2216	POROSITY: EFFECTIVE, ASTM D425M	SPECIFIC GRAVITY, ASTM D854	BULK DENSITY (DRY), API RP40 or ASTM D2937	AIR PERMEABILITY, API RP40	HYDRAULIC CONDUCTIVITY, EPA9100, API RP40, D5084	TOC: WALKLEY-BLACK GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	ATTERBERG LIMITS, ASTM D4318	Cal DTSC Vapa Intrusion Petage		E 9.4% O Q 5 F F	TURNAROUND TIME 24 HOURS 5 DAYS 72 HOURS 10 NORMAL 10 NOR	34.99
TP-25	8/13/18	4:07	5.0 Ft			+				+	-			-	-		7				
10-27		11:39	SISER			-					-						7				
TP-29	->	13.00	470.5							-							7				
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ADEX COMPO		COMPANY	aborate re	4	2		COMPANY	AN≺									WOO CO	COMPANY			
US/13/18 15:4	~	DATE	# 84 <i>f</i>	TIME	42		DATE					TIME	Ш				DATE			TIME	
	PTS Lab	oratories, Inc. S Laboratorie	PTS Laboratories, Inc. • 8100 Secura Way • Santa Fe Springs, CA 90670 • Phone (562) 347-2500 • Fax (562) 907-3610 PTS Laboratories, Inc. • 4342 W. 12th St. • Houston, TX 77055 • Phone (713) 316-1800 • Fax (713) 316-1882	Santa	Fe floust	pring n, TX	CA 9	0670 • • Ph	- Pi	10ne (713	(562	2) 34 6-18	7-25	90	Fax	(56%	2) 907	-361			



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April 6, 2018

Kirsten L. Duey Project Manager Apex Companies, LLC 3478 Buskirk Avenue, Suite 100 Pleasant Hill, CA 94523

Re: PTS File No: 48061

Project Name: Former Chemoil Refinery Project Number: 093-Chemoil-003

Dear Ms. Duey,,

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Former Chemoil Refinery project. All analyses were performed by applicable ASTM, EPA, or API methodologies. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples

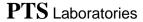
PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact myself or Emeka Anazodo at (713) 316-1800.

Sincerely, PTS Laboratories, Inc.

Rick Schweizer

Rick Schweizer Laboratory Supervisor

Encl.



Project Name: Former Chemoil Refinery PTS File No: 48061

Project Number: 093-Chemoil-003 Client: APEX Companies, LLC

TEST PROGRAM - 20180316

CORE ID	Depth ft.	Core Recovery ft.	CAL-EPA DTSC Vapor Intrusion			Comments
		SS Sleeve	Various			
Date Received: 20180316						
TP-3	5.0-5.5	0.5	Х			2" x 6" SS sleeves
TP-19	5.0-5.5	0.5	Х			2" x 6" SS sleeves
TOTALS:	3 sleeves	1.0	2			2

Laboratory Test Program Notes

Contaminant identification:

Standard TAT for basic analysis is 10-15 business days.

CAL-EPA DTSC Vapor Intrusion: Bulk & grain density, total porosity, moisture content, volumetric air & moisture, TOC/foc, and grain size distribution.

PTS Laboratories

PTS File No: 48061

Client: APEX Companies, LLC

Report Date: 04/06/18

PHYSICAL PROPERTIES DATA - CAL-EPA DTSC Vapor Intrusion Package

Project Name: Former Chemoil Refinery

Project No: 093-Chemoil-003

			METHODS:	API RP40/A	STM D2216	API R	P 40		API RP 40	
		SAMPLE		MOIS	TURE	DENS	SITY		POROSITY, (2)	
SAMPLE	DEPTH,	ORIENTATION	ANALYSIS	CON	TENT,	DRY BULK,	GRAIN,	TOTAL,	AIR-FILLED,	WATER-FILLED,
ID.	ft.	(1)	DATE	% weight	cm ³ /cm ³	g/cm ³	g/cm ³	cm ³ /cm ³	cm ³ /cm ³	cm ³ /cm ³
TP-3	5.3-5.45	V	20180328	13.0	0.227	1.74	2.67	0.349	0.122	0.227
TP-19	5.3-5.45	V	20180328	11.3	0.192	1.71	2.67	0.361	0.169	0.192

⁽¹⁾ Sample Orientation: H = horizontal; V = vertical; R = remold

⁽²⁾ Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.



PTS File No: 48061 Report Date: 4/6/18

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

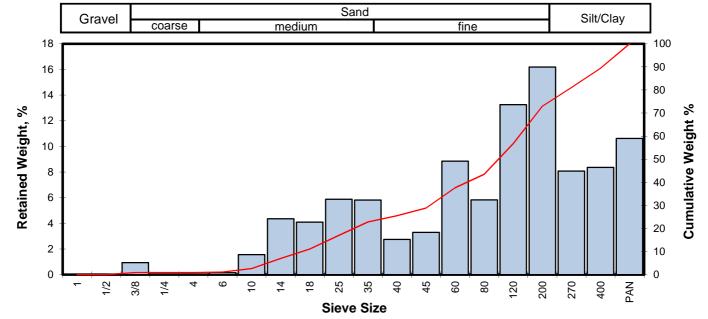
PROJECT NAME: Former Chemoil Refinery

PROJECT NO: 093-Chemoil-003

		Mean Grain Size Description	Median	Pa	article Size	Distribution	ı, wt. perce	ent
		USCS/ASTM	Grain Size,	Gravel		Sand Size		Silt/Clay
Sample ID	Depth, ft.	(1)	mm		Coarse	Medium	Fine	
TP-3	5.1-5.2	Fine sand	0.149	0.94	1.71	22.88	47.41	27.06

Sieve Analysis Results - ASTM D422

Client:APEX Companies, LLCPTS File No:48061Project:Former Chemoil RefinerySample ID:TP-3Project No:093-Chemoil-003Depth, ft:5.1-5.2



			U.S.	Comple	Incremental	Cumulative
	_			Sample		
Ope	ening	Phi of	Sieve	Weight	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.91	0.94	0.94
0.2500	6.351	-2.67	1/4	0.00	0.00	0.94
0.1873	4.757	-2.25	4	0.00	0.00	0.94
0.1324	3.364	-1.75	6	0.15	0.15	1.09
0.0787	2.000	-1.00	10	1.51	1.56	2.65
0.0557	1.414	-0.50	14	4.22	4.36	7.01
0.0394	1.000	0.00	18	3.96	4.09	11.10
0.0278	0.707	0.50	25	5.69	5.87	16.97
0.0197	0.500	1.00	35	5.63	5.81	22.78
0.0166	0.420	1.25	40	2.66	2.75	25.53
0.0139	0.354	1.50	45	3.19	3.29	28.82
0.0098	0.250	2.00	60	8.57	8.85	37.67
0.0070	0.177	2.50	80	5.65	5.83	43.50
0.0049	0.125	3.00	120	12.84	13.25	56.76
0.0029	0.074	3.75	200	15.68	16.19	72.94
0.0021	0.053	4.25	270	7.82	8.07	81.02
0.0015	0.037	4.75	400	8.10	8.36	89.38
			PAN	10.29	10.62	100.00

Cumula	tive Weight	Percent grea	ater than
Weight	Phi	Parti	cle Size
percent	Value	Inches	Millimeters
5	-0.73	0.0653	1.659
10	-0.13	0.0432	1.097
16	0.42	0.0295	0.749
25	1.20	0.0171	0.435
40	2.20	0.0086	0.218
50	2.75	0.0059	0.149
60	3.15	0.0044	0.113
75	3.88	0.0027	0.068
84	4.43	0.0018	0.046
90	4.47	0.0018	0.045
95	2.24	0.0084	0.212

Measure	Trask	Inman	Folk-Ward
Median, phi	2.75	2.75	2.75
Median, in.	0.0059	0.0059	0.0059
Median, mm	0.149	0.149	0.149
Mean, phi	1.99	2.42	2.53
Mean, in.	0.0099	0.0073	0.0068
Mean, mm	0.251	0.186	0.173
Sorting	2.528	2.006	1.452
Skewness	1.153	-0.161	-0.752
Kurtosis	0.174	-0.260	0.454
Grain Size De	escription		Fine sand
(ASTM-LISC)	(alco2 25	(hased on N	Apan from Track)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.94
Coarse Sand	10	1.71
Medium Sand	40	22.88
Fine Sand	200	47.41
Silt/Clay	<200	27.06
	Total	100

© PTS Laboratories, Inc.

TOTALS

6.87 100.00 10 Phone: (713) 316-1800

100.00



APEX Companies, LLC

PTS File No: 48061 Report Date: 04/06/18

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

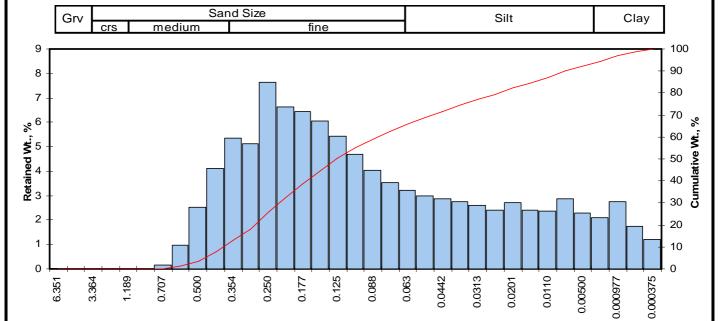
PROJECT NAME: Former Chemoil Refinery

PROJECT NO: 093-Chemoil-003

			Median		Particle	Size Distrib	oution, wt.	percent		Silt
		Mean Grain Size	Grain Size			Sand Size				&
Sample ID	Depth, ft.	Description (1)	mm	Gravel	Coarse	Medium	Fine	Silt	Clay	Clay
TP-19	5.1-5.2	Fine sand	0.127	0.00	0.00	7.71	54.96	29.50	7.83	37.33

Particle Size Analysis - ASTM D4464M

Client:APEX Companies, LLCPTS File No:48061Project:Former Chemoil RefinerySample ID:TP-19Project No:093-Chemoil-003Depth, ft:5.1-5.2



Particle Size, mm

Phone: (713) 316-1800

				Sample	Increment	Cumulative
Ope	ening	Phi of	U.S.	Weight,	Weight,	Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.14	0.14	0.14
0.0234	0.595	0.75	30	0.97	0.97	1.11
0.0197	0.500	1.00	35	2.50	2.50	3.61
0.0166	0.420	1.25	40	4.09	4.10	7.71
0.0139	0.354	1.50	45	5.35	5.36	13.07
0.0117	0.297	1.75	50	5.13	5.14	18.20
0.0098	0.250	2.00	60	7.62	7.63	25.83
0.0083	0.210	2.25	70	6.62	6.63	32.46
0.0070	0.177	2.50	80	6.45	6.46	38.92
0.0059	0.149	2.75	100	6.04	6.05	44.97
0.0049	0.125	3.00	120	5.42	5.43	50.40
0.0041	0.105	3.25	140	4.69	4.70	55.09
0.0035	0.088	3.50	170	4.03	4.04	59.13
0.0029	0.074	3.75	200	3.54	3.54	62.67
0.0025	0.063	4.00	230	3.21	3.21	65.89
0.0021	0.053	4.25	270	3.00	3.00	68.89
0.00174	0.0442	4.50	325	2.85	2.85	71.74
0.00146	0.0372	4.75	400	2.76	2.76	74.51
0.00123	0.0313	5.00	450	2.61	2.61	77.12
0.000986	0.0250	5.32	500	2.40	2.40	79.52
0.000790	0.0201	5.64	635	2.72	2.72	82.25
0.000615	0.0156	6.00		2.39	2.39	84.64
0.000435	0.0110	6.50		2.38	2.38	87.02
0.000308	0.00781	7.00		2.87	2.87	89.90
0.000197	0.00500	7.65		2.27	2.27	92.17
0.000077	0.00195	9.00		2.11	2.11	94.28
0.000038	0.000977	10.00		2.74	2.74	97.03
0.000019	0.000488	11.00		1.76	1.76	98.79
0.000015	0.000375	11.38		1.21	1.21	100.00
TOTALS				99.90	100.00	100.00

Cumula	tive Weight I	Percent grea	ater than		
Weight	Phi	Particle Size			
percent	Value	Inches	Millimeters		
5	1.08	0.0186	0.472		
10	1.36	0.0154	0.390		
16	1.64	0.0126	0.320		
25	1.97	0.0100	0.255		
40	2.54	0.0067	0.171		
50	2.98	0.0050	0.127		
60	3.56	0.0033	0.085		
75	4.80	0.0014	0.036		
84	5.90	0.0007	0.017		
90	7.03	0.0003	0.008		
95	9.26	0.0001	0.002		

Measure	Trask	Inman	Folk-Ward
Median, phi	2.98	2.98	2.98
Median, in.	0.0050	0.0050	0.0050
Median, mm	0.127	0.127	0.127
Mean, phi	2.78	3.77	3.51
Mean, in.	0.0057	0.0029	0.0035
Mean, mm	0.145	0.073	0.088
Sorting	2.662	2.130	2.304
Skewness	0.756	0.371	0.454
Kurtosis	0.286	0.919	1.186
Grain Sizo D	occrintion		Fine cand

Grain Size Description	Fine sand
(ASTM-USCS Scale)	(based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	7.71
Fine Sand	200	54.96
Silt	>0.005 mm	29.50
Clay	<0.005 mm	7.83
	Total	100



PTS File No: 48061

Client: APEX Companies, LLC

Report Date: 04/06/18

ORGANIC CARBON DATA - TOC (foc)

(Methodology: Walkley-Black)

Project Name: Former Chemoil Refinery

Project No: 093-Chemoil-003

SAMPLE ID.	DEPTH, ft.	ANALYSIS DATE	ANALYSIS TIME	SAMPLE MATRIX	TOTAL ORGANIC CARBON, mg/kg	FRACTION ORGANIC CARBON, g/g
TP-3	5.0-5.1	20180405	1030	SOIL	12136	1.21E-02
TP-19	5.0-5.1	20180405	1030	SOIL	5743	5.74E-03

 Blank
 N/A
 20180405
 1030
 BLANK
 ND
 ND

 SRM D096-542
 N/A
 20180405
 1030
 SRM
 4265
 4.27E-03

Reporting Limit: 100 1.00E-04

QC DATA

SRM ID/Lot No.	REC (%)	Control Limits	Certified Concentration		rformance Limits, mg/kg
ORIVITE/LOCINO.	NLO (70)	CONTROL EMMIS	mg/kg	Lower	Upper
SRM D096-542	109	75-125	3890	2918	4863

	PTS Laboratories, Inc.	s, Inc.		CHAIN	OF C	CUSTODY RECORD	00	>	Ä	S	Ä	_					,	PAGE	SE OF	
	COMPANY							< /	NA NA	LYS	ANALYSIS REQUEST	Ö	les Es	<u></u>					#Od	
	ADDRESS ADDRESS ADDRESS CITY S478 Buskirk Avenatsuite lac present PROJECT MANAGER Kirsten Duck PROJECT NAME FORME Chemoil Refinery (975) PROJECT NUMBER OG 3- Chemoil -003 SITE LOCATION 2020 Walnut Aue, Signal Hill C. SAMPLE AD NUMBER BATE TIME DATE TIME D		Jac Prens	TY ZIP CODE THE TIME DEPTH, FT	UMBER OF SAMPLES OIL PROPERTIES PACKAGE	ORE FLUID SATURATIONS PACKAGE	APILLARITY PACKAGE	нотогов: сояе рнотовярну	OISTURE CONTENT, ASTM D2216	049R14: TOTAL, API RP40	OROSITY: EFFECTIVE, ASTM D426M PECIFIC GRAVITY, ASTM D864	ULK DEUSITY (DRY), API RP40 of ASTM D2937	В РЕВМЕАВІГІТУ, АРІ ВР40	YDRAULIC CONDUCTIVITY, EPA9100, API RP40, D6084	OC: WALKLEY-BLACK BAIN SIZE DISTRIBUTION, ASTM D422/4464M	TERBERG LIMITS, ASTM D4318	25729 USISULFUT JOHN JSM 100		TURNAROUND TIME 24 HOURS 5 DAYS 72 HOURS 007HER: SAMPLE INTEGRITY (CHECK): INTACT 0N ICE 10 PTS GUOTE NO.	
1	TP-3	3/14/18 8:30	8:30	5,0-5,564	S	+		-	-	d	-	-	A	+	-	-) ×	+		
1	P1-9+	3/15/19 13:35	13:35	5,0-5.547												1				
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1	COMPANY		COMPANY	13	boratones,	75	COM	COMPANY						1		0	COMPANY	<u></u>		

37.89

PTS Laboratories, Inc. • 8100 Secura Way • Santa Fe Springs, CA 90670 • Phone (562) 347-2500 • Fax (562) 907-3610
PTS Laboratories, Inc. • 4342 W. 12th St. • Houston, TX 77055 • Phone (713) 316-1800 • Fax (713) 316-1882

TIME

DATE

TIME

DATE

S/16/17

PATE

abovatores, bec



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 20, 2018 Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100

Pleasant Hill, CA 94523

Re: Chemoil - SV Sampling

MB596142 / 8D12006

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/12/18 19:30 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager

AA Project No: MB596142



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No: NA Date Received: 04/12/18
Project Name: Chemoil - SV Sampling Date Reported: 04/20/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
Fixed Gases					
TP-18	8D12006-01	Vapor	5	04/12/18 08:15	04/12/18 19:30
TP-17	8D12006-02	Vapor	5	04/12/18 09:22	04/12/18 19:30
VP-4-5	8D12006-05	Vapor	5	04/12/18 11:32	04/12/18 19:30
TP-19	8D12006-08	Vapor	5	04/12/18 14:20	04/12/18 19:30
TP-12	8D12006-10	Vapor	5	04/12/18 15:44	04/12/18 19:30
Helium ASTM D1946M					
TP-18	8D12006-01	Vapor	5	04/12/18 08:15	04/12/18 19:30
TP-17	8D12006-02	Vapor	5	04/12/18 09:22	04/12/18 19:30
TP-16	8D12006-03	Vapor	5	04/12/18 10:03	04/12/18 19:30
TP-15	8D12006-04	Vapor	5	04/12/18 10:43	04/12/18 19:30
VP-4-5	8D12006-05	Vapor	5	04/12/18 11:32	04/12/18 19:30
TP-20	8D12006-07	Vapor	5	04/12/18 13:18	04/12/18 19:30
TP-19	8D12006-08	Vapor	5	04/12/18 14:20	04/12/18 19:30
TP-11	8D12006-09	Vapor	5	04/12/18 15:07	04/12/18 19:30
TP-12	8D12006-10	Vapor	5	04/12/18 15:44	04/12/18 19:30
TP-13	8D12006-11	Vapor	5	04/12/18 16:28	04/12/18 19:30
TP-14	8D12006-12	Vapor	5	04/12/18 17:04	04/12/18 19:30
TP-14 DUP	8D12006-13	Vapor	5	04/12/18 17:04	04/12/18 19:30

A

AA Project No: MB596142



LABORATORY ANALYSIS RESULTS

The Source Group, Inc. (PH) Client:

Project No:

Date Received: 04/12/18 Project Name: Chemoil - SV Sampling Date Reported: 04/20/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TO-15 (Mid Level)					
TP-18	8D12006-01	Vapor	5	04/12/18 08:15	04/12/18 19:30
TP-17	8D12006-02	Vapor	5	04/12/18 09:22	04/12/18 19:30
TP-16	8D12006-03	Vapor	5	04/12/18 10:03	04/12/18 19:30
TP-15	8D12006-04	Vapor	5	04/12/18 10:43	04/12/18 19:30
VP-4-5	8D12006-05	Vapor	5	04/12/18 11:32	04/12/18 19:30
TP-20	8D12006-07	Vapor	5	04/12/18 13:18	04/12/18 19:30
TP-19	8D12006-08	Vapor	5	04/12/18 14:20	04/12/18 19:30
TP-11	8D12006-09	Vapor	5	04/12/18 15:07	04/12/18 19:30
TP-12	8D12006-10	Vapor	5	04/12/18 15:44	04/12/18 19:30
TP-13	8D12006-11	Vapor	5	04/12/18 16:28	04/12/18 19:30
TP-14	8D12006-12	Vapor	5	04/12/18 17:04	04/12/18 19:30
TP-14 DUP	8D12006-13	Vapor	5	04/12/18 17:04	04/12/18 19:30





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Units: ug/L

,	`	,			G
Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/17/18	04/17/18	04/17/18	04/16/18	
Date Analyzed:	04/17/18	04/17/18	04/17/18	04/16/18	
AA ID No:	8D12006-01	8D12006-02	8D12006-03	8D12006-04	
Client ID No:	TP-18	TP-17	TP-16	TP-15	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	100	20	20	4	MRL
TO-15 (Mid Level) (TO-15)					
Acetone	<1.0	<0.20	<0.20	< 0.040	0.010
Allyl chloride	<1.0	< 0.20	< 0.20	< 0.040	0.010
tert-Amyl Methyl Ether (TAME)	<1.0	< 0.20	< 0.20	< 0.040	0.010
Benzene	<1.0	< 0.20	<0.20	< 0.040	0.010
Benzyl chloride	<1.0	< 0.20	< 0.20	< 0.040	0.010
Bromodichloromethane	<1.0	< 0.20	<0.20	< 0.040	0.010
Bromoform	<1.0	< 0.20	<0.20	< 0.040	0.010
Bromomethane	<1.0	< 0.20	<0.20	< 0.040	0.010
1,3-Butadiene	<1.0	< 0.20	<0.20	< 0.040	0.010
2-Butanone (MEK)	<1.0	< 0.20	<0.20	< 0.040	0.010
tert-Butyl alcohol (TBA)	<1.0	< 0.20	<0.20	< 0.040	0.010
Carbon Disulfide	<1.0	0.33	< 0.20	< 0.040	0.010
Carbon Tetrachloride	<1.0	< 0.20	<0.20	< 0.040	0.010
Chlorobenzene	<1.0	< 0.20	<0.20	< 0.040	0.010
Chloroethane	<1.0	< 0.20	< 0.20	< 0.040	0.010
Chloroform	<1.0	< 0.20	< 0.20	< 0.040	0.010
Chloromethane	<1.0	< 0.20	< 0.20	< 0.040	0.010
Cyclohexane	<1.0	< 0.20	< 0.20	< 0.040	0.010
Dibromochloromethane	<1.0	< 0.20	< 0.20	< 0.040	0.010
1,2-Dibromoethane (EDB)	<1.0	< 0.20	<0.20	< 0.040	0.010
1,2-Dichlorobenzene	<1.0	< 0.20	< 0.20	2.3	0.010
1,3-Dichlorobenzene	<1.0	< 0.20	< 0.20	1.1	0.010
1,4-Dichlorobenzene	<1.0	< 0.20	< 0.20	1.0	0.010
Dichlorodifluoromethane (R12)	<1.0	<0.20	< 0.20	< 0.040	0.010
1,1-Dichloroethane	<1.0	< 0.20	< 0.20	< 0.040	0.010
1,2-Dichloroethane (EDC)	<1.0	< 0.20	< 0.20	< 0.040	0.010
cis-1,2-Dichloroethylene	<1.0	<0.20	<0.20	<0.040	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18

Date Reported: 04/20/18 Units: ug/L

	-	-			
Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/17/18	04/17/18	04/17/18	04/16/18	
Date Analyzed:	04/17/18	04/17/18	04/17/18	04/16/18	
AA ID No:	8D12006-01	8D12006-02	8D12006-03	8D12006-04	
Client ID No:	TP-18	TP-17	TP-16	TP-15	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	100	20	20	4	MRL
TO-15 (Mid Level) (TO-15) (co	ntinued)				
1,1-Dichloroethylene	<1.0	< 0.20	<0.20	< 0.040	0.010
trans-1,2-Dichloroethylene	<1.0	< 0.20	< 0.20	< 0.040	0.010
1,2-Dichloropropane	<1.0	<0.20	< 0.20	< 0.040	0.010
trans-1,3-Dichloropropylene	<1.0	<0.20	< 0.20	< 0.040	0.010
cis-1,3-Dichloropropylene	<1.0	<0.20	< 0.20	< 0.040	0.010
Dichlorotetrafluoroethane	<1.0	<0.20	< 0.20	< 0.040	0.010
Diisopropyl ether (DIPE)	<1.0	<0.20	< 0.20	< 0.040	0.010
1,4-Dioxane	<1.0	<0.20	<0.20	< 0.040	0.010
Ethanol	<1.0	<0.20	< 0.20	< 0.040	0.010
Ethyl Acetate	<1.0	<0.20	<0.20	< 0.040	0.010
Ethylbenzene	<1.0	1.8	1.4	< 0.040	0.010
Ethyl-tert-Butyl Ether (ETBE)	<1.0	<0.20	<0.20	< 0.040	0.010
4-Ethyltoluene	<1.0	<0.20	<0.20	< 0.040	0.010
Heptane	<1.0	<0.20	<0.20	< 0.040	0.010
Hexachlorobutadiene	<1.0	<0.20	<0.20	< 0.040	0.010
n-Hexane	<1.0	<0.20	<0.20	< 0.040	0.010
2-Hexanone (MBK)	<1.0	<0.20	<0.20	< 0.040	0.010
Isopropanol (IPA)	<1.0	<0.20	<0.20	< 0.040	0.010
Methyl-tert-Butyl Ether (MTBE)	<1.0	<0.20	<0.20	< 0.040	0.010
Methylene Chloride	<1.0	<0.20	<0.20	< 0.040	0.010
4-Methyl-2-pentanone (MIBK)	<1.0	<0.20	<0.20	< 0.040	0.010
Naphthalene	<1.0	<0.20	<0.20	< 0.040	0.010
Propylene	<1.0	0.35	<0.20	0.078	0.010
Styrene	<1.0	<0.20	<0.20	< 0.040	0.010
1,1,2,2-Tetrachloroethane	<1.0	<0.20	<0.20	< 0.040	0.010
Tetrachloroethylene (PCE)	<1.0	2.0	1.1	< 0.040	0.010
Tetrahydrofuran (THF)	<1.0	<0.20	<0.20	<0.040	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Units: ug/L

-					
Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/17/18	04/17/18	04/17/18	04/16/18	
Date Analyzed:	04/17/18	04/17/18	04/17/18	04/16/18	
AA ID No:	8D12006-01	8D12006-02	8D12006-03	8D12006-04	
Client ID No:	TP-18	TP-17	TP-16	TP-15	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	100	20	20	4	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	<1.0	<0.20	<0.20	<0.040	0.010
1,2,4-Trichlorobenzene	<1.0	< 0.20	< 0.20	< 0.040	0.010
1,1,2-Trichloroethane	<1.0	< 0.20	< 0.20	< 0.040	0.010
1,1,1-Trichloroethane	<1.0	< 0.20	< 0.20	< 0.040	0.010
Trichloroethylene (TCE)	<1.0	< 0.20	< 0.20	< 0.040	0.010
Trichlorofluoromethane (R11)	<1.0	< 0.20	< 0.20	< 0.040	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	<1.0	< 0.20	< 0.20	< 0.040	0.010
ane (R113)					
1,3,5-Trimethylbenzene	<1.0	<0.20	<0.20	< 0.040	0.010
1,2,4-Trimethylbenzene	<1.0	<0.20	<0.20	< 0.040	0.010
2,2,4-Trimethylpentane	2.9	<0.20	<0.20	0.42	0.010
Vinyl acetate	<1.0	<0.20	<0.20	< 0.040	0.010
Vinyl bromide	<1.0	<0.20	< 0.20	< 0.040	0.010
Vinyl chloride	<1.0	<0.20	< 0.20	< 0.040	0.010
o-Xylene	<1.0	0.30	< 0.20	< 0.040	0.010
m,p-Xylenes	<1.0	<0.20	< 0.20	< 0.040	0.010
1,2,3-Trichloropropane	<1.0	<0.20	< 0.20	< 0.040	0.010
sec-Butylbenzene	<1.0	0.56	0.57	0.25	0.010
Isopropylbenzene	<1.0	0.93	1.3	0.088	0.010
n-Propylbenzene	<1.0	1.0	1.1	< 0.040	0.010
4-Isopropyltoluene	<1.0	< 0.20	< 0.20	< 0.040	0.010
n-Butylbenzene	<1.0	<0.20	<0.20	<0.040	0.010
Surrogates					%REC Limits
4-Bromofluorobenzene	114%	119%	125%	113%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Units: ug/L

Wethou.	10 LI A 10-13 (II	ilu Level)		Offic	3. ug/L
Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/17/18	04/17/18	04/16/18	04/17/18	
Date Analyzed:	04/17/18	04/17/18	04/16/18	04/17/18	
AA ID No:	8D12006-05	8D12006-07	8D12006-08	8D12006-09	
Client ID No:	VP-4-5	TP-20	TP-19	TP-11	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	20	250	4	50	MRL
TO-15 (Mid Level) (TO-15)					
Acetone	<0.20	<2.5	< 0.040	<0.50	0.010
Allyl chloride	<0.20	<2.5	< 0.040	< 0.50	0.010
tert-Amyl Methyl Ether (TAME)	<0.20	<2.5	< 0.040	< 0.50	0.010
Benzene	<0.20	<2.5	< 0.040	< 0.50	0.010
Benzyl chloride	<0.20	<2.5	< 0.040	< 0.50	0.010
Bromodichloromethane	<0.20	<2.5	< 0.040	< 0.50	0.010
Bromoform	<0.20	<2.5	< 0.040	< 0.50	0.010
Bromomethane	<0.20	<2.5	< 0.040	< 0.50	0.010
1,3-Butadiene	<0.20	<2.5	< 0.040	< 0.50	0.010
2-Butanone (MEK)	<0.20	<2.5	< 0.040	< 0.50	0.010
tert-Butyl alcohol (TBA)	<0.20	<2.5	< 0.040	< 0.50	0.010
Carbon Disulfide	<0.20	<2.5	< 0.040	< 0.50	0.010
Carbon Tetrachloride	<0.20	<2.5	< 0.040	< 0.50	0.010
Chlorobenzene	<0.20	<2.5	< 0.040	< 0.50	0.010
Chloroethane	<0.20	<2.5	< 0.040	< 0.50	0.010
Chloroform	<0.20	<2.5	< 0.040	< 0.50	0.010
Chloromethane	<0.20	<2.5	< 0.040	< 0.50	0.010
Cyclohexane	<0.20	<2.5	< 0.040	< 0.50	0.010
Dibromochloromethane	<0.20	<2.5	< 0.040	< 0.50	0.010
1,2-Dibromoethane (EDB)	<0.20	<2.5	< 0.040	< 0.50	0.010
1,2-Dichlorobenzene	<0.20	<2.5	< 0.040	< 0.50	0.010
1,3-Dichlorobenzene	<0.20	<2.5	< 0.040	< 0.50	0.010
1,4-Dichlorobenzene	<0.20	<2.5	< 0.040	< 0.50	0.010
Dichlorodifluoromethane (R12)	<0.20	<2.5	< 0.040	< 0.50	0.010
1,1-Dichloroethane	<0.20	<2.5	< 0.040	< 0.50	0.010
1,2-Dichloroethane (EDC)	<0.20	<2.5	< 0.040	< 0.50	0.010
cis-1,2-Dichloroethylene	<0.20	<2.5	< 0.040	< 0.50	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Units: ug/L

4/12/18 4/17/18 4/17/18 12006-05 VP-4-5 Vapor 20	04/12/18 04/17/18 04/17/18 8D12006-07 TP-20 Vapor 250	04/12/18 04/16/18 04/16/18 8D12006-08 TP-19 Vapor 4	04/12/18 04/17/18 04/17/18 8D12006-09 TP-11 Vapor 50		MRL
4/17/18 12006-05 VP-4-5 Vapor 20	04/17/18 8D12006-07 TP-20 Vapor	04/16/18 8D12006-08 TP-19 Vapor	04/17/18 8D12006-09 TP-11 Vapor		MRL
12006-05 VP-4-5 Vapor 20	8D12006-07 TP-20 Vapor	8D12006-08 TP-19 Vapor	8D12006-09 TP-11 Vapor		MRL
VP-4-5 Vapor 20 ed)	TP-20 Vapor	TP-19 Vapor	TP-11 Vapor		MRL
Vapor 20 ed)	Vapor	Vapor	Vapor		MRL
20 ed)	•	•	•		MRL
ed)	250	4	50		MRL
•					
<0.20	<2.5	< 0.040	<0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
<0.20	<2.5	< 0.040	< 0.50	(0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
0.26	<2.5	< 0.040	< 0.50		0.010
<0.20	<2.5	< 0.040	< 0.50		0.010
	<0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20 <0.20	<0.20	<0.20	<0.20	<0.20





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18

Date Reported: 04/20/18 Units: ug/L

Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/17/18	04/17/18	04/16/18	04/17/18	
Date Analyzed:	04/17/18	04/17/18	04/16/18	04/17/18	
AA ID No:	8D12006-05	8D12006-07	8D12006-08	8D12006-09	
Client ID No:	VP-4-5	TP-20	TP-19	TP-11	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	20	250	4	50	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	< 0.20	<2.5	< 0.040	< 0.50	0.010
1,2,4-Trichlorobenzene	< 0.20	<2.5	< 0.040	< 0.50	0.010
1,1,2-Trichloroethane	< 0.20	<2.5	< 0.040	< 0.50	0.010
1,1,1-Trichloroethane	< 0.20	<2.5	< 0.040	< 0.50	0.010
Trichloroethylene (TCE)	< 0.20	<2.5	< 0.040	< 0.50	0.010
Trichlorofluoromethane (R11)	< 0.20	<2.5	< 0.040	< 0.50	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	<0.20	<2.5	< 0.040	< 0.50	0.010
ane (R113)					
1,3,5-Trimethylbenzene	<0.20	<2.5	< 0.040	< 0.50	0.010
1,2,4-Trimethylbenzene	<0.20	3.5	<0.040	<0.50	0.010
2,2,4-Trimethylpentane	10	<2.5	0.35	2.6	0.010
Vinyl acetate	<0.20	<2.5	< 0.040	<0.50	0.010
Vinyl bromide	<0.20	<2.5	< 0.040	< 0.50	0.010
Vinyl chloride	< 0.20	<2.5	< 0.040	< 0.50	0.010
o-Xylene	<0.20	<2.5	< 0.040	< 0.50	0.010
m,p-Xylenes	<0.20	<2.5	< 0.040	< 0.50	0.010
1,2,3-Trichloropropane	<0.20	<2.5	< 0.040	< 0.50	0.010
sec-Butylbenzene	0.45	3.4	0.12	< 0.50	0.010
Isopropylbenzene	1.2	13	0.10	< 0.50	0.010
n-Propylbenzene	0.97	12	0.075	< 0.50	0.010
4-Isopropyltoluene	< 0.20	<2.5	< 0.040	< 0.50	0.010
n-Butylbenzene	<0.20	<2.5	<0.040	<0.50	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	110%	113%	102%	86%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Units: ug/L

wethou. Voca by dolvio Li A 10-13 (iviid Level)				Omis. ug/L		
Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18		
Date Prepared:	04/17/18	04/17/18	04/18/18	04/18/18		
Date Analyzed:	04/18/18	04/18/18	04/19/18	04/18/18		
AA ID No:	8D12006-10	8D12006-11	8D12006-12	8D12006-13		
Client ID No:	TP-12	TP-13	TP-14	TP-14 DUP		
Matrix:	Vapor	Vapor	Vapor	Vapor		
Dilution Factor:	300	300	1	1	MRL	
TO-15 (Mid Level) (TO-15)						
Acetone	<3.0	<3.0	< 0.010	<0.010	0.010	
Allyl chloride	<3.0	<3.0	< 0.010	< 0.010	0.010	
tert-Amyl Methyl Ether (TAME)	<3.0	<3.0	< 0.010	<0.010	0.010	
Benzene	<3.0	<3.0	< 0.010	< 0.010	0.010	
Benzyl chloride	<3.0	<3.0	< 0.010	<0.010	0.010	
Bromodichloromethane	<3.0	<3.0	< 0.010	<0.010	0.010	
Bromoform	<3.0	<3.0	< 0.010	<0.010	0.010	
Bromomethane	<3.0	<3.0	< 0.010	< 0.010	0.010	
1,3-Butadiene	<3.0	<3.0	< 0.010	<0.010	0.010	
2-Butanone (MEK)	<3.0	<3.0	< 0.010	<0.010	0.010	
tert-Butyl alcohol (TBA)	<3.0	<3.0	< 0.010	< 0.010	0.010	
Carbon Disulfide	<3.0	<3.0	< 0.010	<0.010	0.010	
Carbon Tetrachloride	<3.0	<3.0	< 0.010	< 0.010	0.010	
Chlorobenzene	<3.0	<3.0	< 0.010	< 0.010	0.010	
Chloroethane	<3.0	<3.0	< 0.010	<0.010	0.010	
Chloroform	<3.0	<3.0	< 0.010	< 0.010	0.010	
Chloromethane	<3.0	<3.0	< 0.010	< 0.010	0.010	
Cyclohexane	230	<3.0	0.13	0.15	0.010	
Dibromochloromethane	<3.0	<3.0	< 0.010	<0.010	0.010	
1,2-Dibromoethane (EDB)	<3.0	<3.0	< 0.010	<0.010	0.010	
1,2-Dichlorobenzene	<3.0	<3.0	<0.010	<0.010	0.010	
1,3-Dichlorobenzene	<3.0	<3.0	< 0.010	<0.010	0.010	
1,4-Dichlorobenzene	<3.0	<3.0	< 0.010	<0.010	0.010	
Dichlorodifluoromethane (R12)	<3.0	<3.0	< 0.010	<0.010	0.010	
1,1-Dichloroethane	<3.0	<3.0	< 0.010	<0.010	0.010	
1,2-Dichloroethane (EDC)	<3.0	<3.0	< 0.010	<0.010	0.010	
cis-1,2-Dichloroethylene	<3.0	<3.0	< 0.010	<0.010	0.010	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Units: ug/L

Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/17/18	04/17/18	04/18/18	04/18/18	
Date Analyzed:	04/18/18	04/18/18	04/19/18	04/18/18	
AA ID No:	8D12006-10	8D12006-11	8D12006-12	8D12006-13	
Client ID No:	TP-12	TP-13	TP-14	TP-14 DUP	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	300	300	1	1	MRL
TO-15 (Mid Level) (TO-15) (co	ntinued)				
1,1-Dichloroethylene	<3.0	<3.0	< 0.010	<0.010	0.010
trans-1,2-Dichloroethylene	<3.0	<3.0	< 0.010	<0.010	0.010
1,2-Dichloropropane	<3.0	<3.0	< 0.010	<0.010	0.010
trans-1,3-Dichloropropylene	<3.0	<3.0	< 0.010	<0.010	0.010
cis-1,3-Dichloropropylene	<3.0	<3.0	< 0.010	<0.010	0.010
Dichlorotetrafluoroethane	<3.0	<3.0	< 0.010	<0.010	0.010
Diisopropyl ether (DIPE)	<3.0	<3.0	< 0.010	<0.010	0.010
1,4-Dioxane	<3.0	<3.0	< 0.010	<0.010	0.010
Ethanol	<3.0	<3.0	< 0.010	<0.010	0.010
Ethyl Acetate	<3.0	<3.0	<0.010	<0.010	0.010
Ethylbenzene	19	7.2	0.013	0.014	0.010
Ethyl-tert-Butyl Ether (ETBE)	<3.0	<3.0	< 0.010	<0.010	0.010
4-Ethyltoluene	<3.0	<3.0	< 0.010	<0.010	0.010
Heptane	<3.0	<3.0	< 0.010	<0.010	0.010
Hexachlorobutadiene	<3.0	<3.0	< 0.010	<0.010	0.010
n-Hexane	7.9	<3.0	<0.010	<0.010	0.010
2-Hexanone (MBK)	<3.0	<3.0	< 0.010	<0.010	0.010
Isopropanol (IPA)	<3.0	<3.0	< 0.010	<0.010	0.010
Methyl-tert-Butyl Ether (MTBE)	<3.0	<3.0	< 0.010	<0.010	0.010
Methylene Chloride	<3.0	<3.0	< 0.010	<0.010	0.010
4-Methyl-2-pentanone (MIBK)	<3.0	<3.0	<0.010	<0.010	0.010
Naphthalene	<3.0	<3.0	< 0.010	<0.010	0.010
Propylene	<3.0	<3.0	<0.010	<0.010	0.010
Styrene	<3.0	<3.0	<0.010	<0.010	0.010
1,1,2,2-Tetrachloroethane	<3.0	<3.0	<0.010	<0.010	0.010
Tetrachloroethylene (PCE)	<3.0	<3.0	< 0.010	<0.010	0.010
Tetrahydrofuran (THF)	<3.0	<3.0	<0.010	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Units: ug/L

Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/17/18	04/17/18	04/18/18	04/18/18	
Date Analyzed:	04/18/18	04/18/18	04/19/18	04/18/18	
AA ID No:	8D12006-10	8D12006-11	8D12006-12	8D12006-13	
Client ID No:	TP-12	TP-13	TP-14	TP-14 DUP	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	300	300	1	1	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				_
Toluene	<3.0	<3.0	< 0.010	< 0.010	0.010
1,2,4-Trichlorobenzene	<3.0	<3.0	< 0.010	< 0.010	0.010
1,1,2-Trichloroethane	<3.0	<3.0	< 0.010	< 0.010	0.010
1,1,1-Trichloroethane	<3.0	<3.0	< 0.010	< 0.010	0.010
Trichloroethylene (TCE)	<3.0	<3.0	< 0.010	< 0.010	0.010
Trichlorofluoromethane (R11)	<3.0	<3.0	< 0.010	<0.010	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	<3.0	<3.0	<0.010	<0.010	0.010
ane (R113)					
1,3,5-Trimethylbenzene	<3.0	<3.0	<0.010	<0.010	0.010
1,2,4-Trimethylbenzene	3.9	7.0	<0.010	<0.010	0.010
2,2,4-Trimethylpentane	<3.0	<3.0	<0.010	<0.010	0.010
Vinyl acetate	<3.0	<3.0	<0.010	<0.010	0.010
Vinyl bromide	<3.0	<3.0	<0.010	<0.010	0.010
Vinyl chloride	<3.0	<3.0	<0.010	<0.010	0.010
o-Xylene	<3.0	<3.0	<0.010	<0.010	0.010
m,p-Xylenes	<3.0	3.0	<0.010	<0.010	0.010
1,2,3-Trichloropropane	<3.0	<3.0	<0.010	<0.010	0.010
sec-Butylbenzene	<3.0	<3.0	<0.010	<0.010	0.010
Isopropylbenzene	7.3	7.0	<0.010	<0.010	0.010
n-Propylbenzene	7.4	7.3	<0.010	<0.010	0.010
4-Isopropyltoluene	<3.0	<3.0	<0.010	<0.010	0.010
n-Butylbenzene	<3.0	<3.0	<0.010	<0.010	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	110%	118%	102%	108%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Fixed Gases by TCD

AA Project No: MB596142 Date Received: 04/12/18

Date Reported: 04/20/18
Units: % by Volume

•				•
04/12/18	04/12/18	04/12/18	04/12/18	
04/17/18	04/17/18	04/17/18	04/17/18	
04/17/18	04/17/18	04/17/18	04/17/18	
8D12006-01	8D12006-02	8D12006-05	8D12006-08	
TP-18	TP-17	VP-4-5	TP-19	
Vapor	Vapor	Vapor	Vapor	
2	2	2	2	MRL
0.58	0.78	6.0	2.1	0.10
15	16	2.4	2.5	0.10
0.71	3.9	12	9.9	0.10
< 0.20	< 0.20	< 0.20	<0.20	0.10
	04/17/18 04/17/18 8D12006-01 TP-18 Vapor 2 0.58 15 0.71	04/17/18	04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 8D12006-01 8D12006-02 8D12006-05 TP-18 TP-17 VP-4-5 Vapor Vapor Vapor 2 2 2 0.58 0.78 6.0 15 16 2.4 0.71 3.9 12	04/17/18 04/17/19 04/17/19 04/17/19 04/17/19 04/17/19 04/17/19 07/17/19 07/17/19 <td< td=""></td<>



0.10

0.10

0.10



LABORATORY ANALYSIS RESULTS

Client:The Source Group, Inc. (PH)AA Project No: MB596142Project No:NADate Received: 04/12/18Project Name:Chemoil - SV SamplingDate Reported: 04/20/18

Method: Fixed Gases by TCD Units: % by Volume

 Date Sampled:
 04/12/18

 Date Prepared:
 04/17/18

 Date Analyzed:
 04/17/18

 AA ID No:
 8D12006-10

 Client ID No:
 TP-12

 Matrix:
 Vapor

Dilution Factor: 2 MRL

Fixed Gases (EPA 3CM)

Methane 4.0
Oxygen 2.0
Carbon Dioxide 11

Carbon Monoxide <0.20 0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596142 Date Received: 04/12/18

Date Reported: 04/20/18

Units: % by Volume

Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/13/18	04/16/18	04/13/18	04/16/18	
Date Analyzed:	04/13/18	04/16/18	04/13/18	04/16/18	
AA ID No:	8D12006-01	8D12006-02	8D12006-03	8D12006-04	
Client ID No:	TP-18	TP-17	TP-16	TP-15	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	20	2	2	2	MRL

Helium ASTM D1946M (ASTM D1946M)

Helium 16 3.2 1.5 <0.20 0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596142 Date Received: 04/12/18

Date Received: 04/12/18 **Date Reported:** 04/20/18

Units: % by Volume

Date Sampled:	04/12/18	04/12/18	04/12/18	04/12/18	
Date Prepared:	04/13/18	04/16/18	04/16/18	04/16/18	
Date Analyzed:	04/13/18	04/16/18	04/16/18	04/16/18	
AA ID No:	8D12006-05	8D12006-07	8D12006-08	8D12006-09	
Client ID No:	VP-4-5	TP-20	TP-19	TP-11	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL

Helium ASTM D1946M (ASTM D1946M)

Helium	< 0.20	<0.20	< 0.20	<0.20	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596142 Date Received: 04/12/18

Date Reported: 04/20/18

Units: % by Volume

04/12/18	04/12/18	04/12/18	04/12/18	
04/13/18	04/16/18	04/13/18	04/13/18	
04/13/18	04/16/18	04/13/18	04/13/18	
8D12006-10	8D12006-11	8D12006-12	8D12006-13	
TP-12	TP-13	TP-14	TP-14 DUP	
Vapor	Vapor	Vapor	Vapor	
2	2	10	10	MRL
	04/13/18 04/13/18 8D12006-10 TP-12 Vapor	04/13/18 04/16/18 04/13/18 04/16/18 8D12006-10 8D12006-11 TP-12 TP-13 Vapor Vapor	04/13/18 04/16/18 04/13/18 04/13/18 04/16/18 04/13/18 8D12006-10 8D12006-11 8D12006-12 TP-12 TP-13 TP-14 Vapor Vapor Vapor	04/13/18 04/16/18 04/13/18 04/13/18 04/13/18 04/16/18 04/13/18 04/13/18 8D12006-10 8D12006-11 8D12006-12 8D12006-13 TP-12 TP-13 TP-14 TP-14 DUP Vapor Vapor Vapor Vapor

Helium ASTM D1946M (ASTM D1946M)

Helium	<0.20	0.50	26	29	0.10
Helium	<0.20	0.50	2.0	2. 3	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

F Result	Reporting Limit	Units				%REC Limits	RPD	RPD Limit	Notes
evel) - Qı	iality Conti	ol		_	_	_	_	_	_
EP ***									
			Prepare	ed & Ana	lyzed: 0	4/16/18			
<0.010	0.010	ug/L							
< 0.010	0.010	ug/L							
< 0.010	0.010	ug/L							
< 0.010	0.010	ug/L							
< 0.010	0.010	-							
<0.010	0.010	ug/L							
< 0.010	0.010	-							
< 0.010	0.010	ug/L							
< 0.010	0.010	ug/L							
< 0.010	0.010	_							
< 0.010	0.010	_							
< 0.010	0.010	-							
< 0.010	0.010	_							
< 0.010	0.010	•							
< 0.010	0.010	•							
< 0.010	0.010	•							
< 0.010	0.010	•							
< 0.010	0.010	-							
< 0.010	0.010	_							
< 0.010	0.010	•							
< 0.010	0.010	_							
< 0.010	0.010	•							
< 0.010	0.010	•							
< 0.010	0.010	_							
< 0.010	0.010	-							
< 0.010	0.010								
		-							
< 0.010	0.010	•							
< 0.010	0.010	•							
< 0.010	0.010	•							
<0.010	0.010	ug/L							
	Result Pevel - Question - Question	Country Coun	Result Limit Units evel) - Quality Control Units EP **** 40.010 0.010 <0.010	Result Limit Units Level Prepare Prepare	Company Control Cont	Result Limit Units Level Result %REC Revel) - Quality Control	Result Limit Units Level Result %REC Limits Evel) - Quality Control	Result Limit Units Level Result %REC Limits RPD	Company Comp

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L	•	uality Conti	rol							
Batch B8D1904 - *** DEFAULT PR	EP ***									
Blank (B8D1904-BLK1) Continue	ed			Prepare	ed & Ana	lyzed: 0	4/16/18			
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L							
Dichlorotetrafluoroethane	<0.010	0.010	ug/L							
Diisopropyl ether (DIPE)	<0.010	0.010	ug/L							
1,4-Dioxane	< 0.010	0.010	ug/L							
Ethanol	< 0.010	0.010	ug/L							
Ethyl Acetate	< 0.010	0.010	ug/L							
Ethylbenzene	< 0.010	0.010	ug/L							
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	0.010	ug/L							
4-Ethyltoluene	< 0.010	0.010	ug/L							
Heptane	< 0.010	0.010	ug/L							
Hexachlorobutadiene	< 0.010	0.010	ug/L							
n-Hexane	< 0.010	0.010	ug/L							
2-Hexanone (MBK)	< 0.010	0.010	ug/L							
Isopropanol (IPA)	< 0.010	0.010	ug/L							
Methyl-tert-Butyl Ether (MTBE)	< 0.010	0.010	ug/L							
Methylene Chloride	< 0.010	0.010	ug/L							
4-Methyl-2-pentanone (MIBK)	< 0.010	0.010	ug/L							
Naphthalene	< 0.010	0.010	ug/L							
Propylene	< 0.010	0.010	ug/L							
Styrene	< 0.010	0.010	ug/L							
1,1,2,2-Tetrachloroethane	< 0.010	0.010	ug/L							
Tetrachloroethylene (PCE)	< 0.010	0.010	ug/L							
Tetrahydrofuran (THF)	< 0.010	0.010	ug/L							
Toluene	<0.010	0.010	ug/L							
1,2,4-Trichlorobenzene	< 0.010	0.010	ug/L							
1,1,2-Trichloroethane	< 0.010	0.010	ug/L							
1,1,1-Trichloroethane	< 0.010	0.010	ug/L							
Trichloroethylene (TCE)	< 0.010	0.010	ug/L							
Trichlorofluoromethane (R11)	< 0.010	0.010	ug/L							
1,1,2-Trichloro-1,2,2-trifluoroethar (R113)	ne<0.010	0.010	ug/L							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L			ol						
Batch B8D1904 - *** DEFAULT PRI		-							
Blank (B8D1904-BLK1) Continue				Prepare	ed & Analyzed: 0	4/16/18			
1,2,4-Trimethylbenzene	<0.010	0.010	ug/L		•				
2,2,4-Trimethylpentane	< 0.010	0.010	ug/L						
Vinyl acetate	<0.010	0.010	ug/L						
Vinyl bromide	<0.010	0.010	ug/L						
Vinyl chloride	<0.010	0.010	ug/L						
o-Xylene	<0.010	0.010	ug/L						
m,p-Xylenes	<0.010	0.010	ug/L						
1,2,3-Trichloropropane	<0.010	0.010	ug/L						
sec-Butylbenzene	<0.010	0.010	ug/L						
Isopropylbenzene	<0.010	0.010	ug/L						
n-Propylbenzene	<0.010	0.010	ug/L						
4-Isopropyltoluene	<0.010	0.010	ug/L						
n-Butylbenzene	<0.010	0.010	ug/L						
Surrogate: 4-Bromofluorobenzene	0.137		ug/L	0.14	95.7	70-130			
LCS (B8D1904-BS1)				Prepare	ed & Analyzed: 0	4/16/18			
Acetone	0.101	0.010	ug/L	0.095	106	70-130			
Benzene	0.138	0.010	ug/L	0.13	108	70-130			
Benzyl chloride	0.224	0.010	ug/L	0.21	108	70-130			
Bromodichloromethane	0.295	0.010	ug/L	0.27	110	70-130			
Bromoform	0.467	0.010	ug/L	0.41	113	70-130			
Bromomethane	0.232	0.010	ug/L	0.16	149	70-130			*
2-Butanone (MEK)	0.127	0.010	ug/L	0.12	108	70-130			
Carbon Disulfide	0.141	0.010	ug/L	0.12	113	70-130			
Carbon Tetrachloride	0.297	0.010	ug/L	0.25	118	70-130			
Chlorobenzene	0.215	0.010	ug/L	0.18	117	70-130			
Chloroethane	0.131	0.010	ug/L	0.11	124	70-130			
Chloroform	0.219	0.010	ug/L	0.20	112	70-130			
Chloromethane	0.0836	0.010	ug/L	0.083	101	70-130			
Dibromochloromethane	0.411	0.010	ug/L	0.34	120	70-130			
1,2-Dibromoethane (EDB)	0.408	0.010	ug/L	0.31	133	70-130			*
1,2-Dichlorobenzene	0.266	0.010	ug/L	0.24	111	70-130			



RPD



LABORATORY ANALYSIS RESULTS

Spike Source

Reporting

Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142
Date Received: 04/12/18
Date Reported: 04/20/18

%REC

Analyte	Result	Limit	Units	Level	Result %REC	Limits	RPD	Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	evel) - Qu	ality Contr	ol						
Batch B8D1904 - *** DEFAULT PRE	EP ***								
LCS (B8D1904-BS1) Continued	Prepare	ed & Analyzed: 0	4/16/18						
1,3-Dichlorobenzene	0.268	0.010	ug/L	0.24	111	70-130			
1,4-Dichlorobenzene	0.259	0.010	ug/L	0.24	108	70-130			
Dichlorodifluoromethane (R12)	0.213	0.010	ug/L	0.20	108	70-130			
1,1-Dichloroethane	0.168	0.010	ug/L	0.16	104	70-130			
1,2-Dichloroethane (EDC)	0.182	0.010	ug/L	0.16	112	70-130			
cis-1,2-Dichloroethylene	0.175	0.010	ug/L	0.16	110	70-130			
1,1-Dichloroethylene	0.170	0.010	ug/L	0.16	107	70-130			
trans-1,2-Dichloroethylene	0.169	0.010	ug/L	0.16	106	70-130			
1,2-Dichloropropane	0.214	0.010	ug/L	0.18	116	70-130			
trans-1,3-Dichloropropylene	0.222	0.010	ug/L	0.18	122	70-130			
cis-1,3-Dichloropropylene	0.212	0.010	ug/L	0.18	117	70-130			
Dichlorotetrafluoroethane	0.293	0.010	ug/L	0.28	105	70-130			
Ethylbenzene	0.176	0.010	ug/L	0.17	101	70-130			
4-Ethyltoluene	0.200	0.010	ug/L	0.20	102	70-130			
Hexachlorobutadiene	0.429	0.010	ug/L	0.43	101	70-130			
2-Hexanone (MBK)	0.184	0.010	ug/L	0.16	112	70-130			
Isopropanol (IPA)	0.0999	0.010	ug/L	0.098	102	70-130			
Methylene Chloride	0.128	0.010	ug/L	0.14	91.8	70-130			
4-Methyl-2-pentanone (MIBK)	0.175	0.010	ug/L	0.16	107	70-130			
Styrene	0.187	0.010	ug/L	0.17	110	70-130			
1,1,2,2-Tetrachloroethane	0.238	0.010	ug/L	0.27	86.8	70-130			
Tetrachloroethylene (PCE)	0.334	0.010	ug/L	0.27	123	70-130			
Toluene	0.164	0.010	ug/L	0.15	109	70-130			
1,2,4-Trichlorobenzene	0.342	0.010	ug/L	0.30	115	70-130			
1,1,2-Trichloroethane	0.264	0.010	ug/L	0.22	121	70-130			
1,1,1-Trichloroethane	0.243	0.010	ug/L	0.22	111	70-130			
Trichloroethylene (TCE)	0.277	0.010	ug/L	0.21	129	70-130			
Trichlorofluoromethane (R11)	0.243	0.010	ug/L	0.22	108	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethane		0.010	ug/L	0.31	109	70-130			
(R113)	0.04.1	0.040	,		400	- 0.40-			
1,3,5-Trimethylbenzene	0.214	0.010	ug/L	0.20	109	70-130			
1,2,4-Trimethylbenzene	0.209	0.010	ug/L	0.20	106	70-130			





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Lo	evel) - Q	uality Conti	ol						
Batch B8D1904 - *** DEFAULT PRI	EP ***								
LCS (B8D1904-BS1) Continued				Prepare	ed & Analyzed: 0	4/16/18			
Vinyl acetate	0.151	0.010	ug/L	0.14	107	70-130			
Vinyl chloride	0.110	0.010	ug/L	0.10	108	70-130			
o-Xylene	0.177	0.010	ug/L	0.17	102	70-130			
m,p-Xylenes	0.344	0.010	ug/L	0.35	99.0	70-130			
1,2,3-Trichloropropane	0.270	0.010	ug/L	0.24	112	70-130			
sec-Butylbenzene	0.238	0.010	ug/L	0.22	108	70-130			
Isopropylbenzene	0.212	0.010	ug/L	0.20	108	70-130			
n-Propylbenzene	0.205	0.010	ug/L	0.20	104	70-130			
4-Isopropyltoluene	0.248	0.010	ug/L	0.22	113	70-130			
Surrogate: 4-Bromofluorobenzene	0.148		ug/L	0.14	103	70-130			
LCS Dup (B8D1904-BSD1)				Prepare	ed: 04/16/18 Ana	alyzed: 04	4/17/18		
Acetone	0.0771	0.010	ug/L	0.095	81.2	70-130	26.7	30	
Benzene	0.112	0.010	ug/L	0.13	87.9	70-130	20.5	30	
Benzyl chloride	0.189	0.010	ug/L	0.21	91.3	70-130	16.8	30	
Bromodichloromethane	0.245	0.010	ug/L	0.27	91.2	70-130	18.7	30	
Bromoform	0.420	0.010	ug/L	0.41	102	70-130	10.7	30	
Bromomethane	0.184	0.010	ug/L	0.16	118	70-130	23.0	30	
2-Butanone (MEK)	0.0991	0.010	ug/L	0.12	84.0	70-130	24.9	30	
Carbon Disulfide	0.111	0.010	ug/L	0.12	88.9	70-130	23.9	30	
Carbon Tetrachloride	0.252	0.010	ug/L	0.25	100	70-130	16.4	30	
Chlorobenzene	0.189	0.010	ug/L	0.18	102	70-130	13.1	30	
Chloroethane	0.0970	0.010	ug/L	0.11	91.9	70-130	29.5	30	
Chloroform	0.178	0.010	ug/L	0.20	91.0	70-130	20.6	30	
Chloromethane	0.0637	0.010	ug/L	0.083	77.2	70-130	26.9	30	
Dibromochloromethane	0.329	0.010	ug/L	0.34	96.5	70-130	22.2	30	
1,2-Dibromoethane (EDB)	0.332	0.010	ug/L	0.31	108	70-130	20.6	30	
1,2-Dichlorobenzene	0.234	0.010	ug/L	0.24	97.5	70-130	12.8	30	
1,3-Dichlorobenzene	0.241	0.010	ug/L	0.24	100	70-130	10.5	30	
1,4-Dichlorobenzene	0.231	0.010	ug/L	0.24	95.9	70-130	11.6	30	
Dichlorodifluoromethane (R12)	0.174	0.010	ug/L	0.20	87.8	70-130	20.3	30	
1,1-Dichloroethane	0.143	0.010	ug/L	0.16	88.4	70-130	15.9	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	•	uality Conti	ol						
Batch B8D1904 - *** DEFAULT PRE	EP ***								
LCS Dup (B8D1904-BSD1) Contin	nued			Prepare	ed: 04/16/18 Ana	alyzed: 04	1/17/18		
1,2-Dichloroethane (EDC)	0.143	0.010	ug/L	0.16	88.3	70-130	23.8	30	
cis-1,2-Dichloroethylene	0.143	0.010	ug/L	0.16	90.5	70-130	19.9	30	
1,1-Dichloroethylene	0.143	0.010	ug/L	0.16	90.2	70-130	17.1	30	
trans-1,2-Dichloroethylene	0.138	0.010	ug/L	0.16	86.8	70-130	20.3	30	
1,2-Dichloropropane	0.172	0.010	ug/L	0.18	93.2	70-130	21.7	30	
trans-1,3-Dichloropropylene	0.177	0.010	ug/L	0.18	97.5	70-130	22.5	30	
cis-1,3-Dichloropropylene	0.173	0.010	ug/L	0.18	95.3	70-130	20.4	30	
Dichlorotetrafluoroethane	0.255	0.010	ug/L	0.28	91.2	70-130	14.0	30	
Ethylbenzene	0.160	0.010	ug/L	0.17	91.9	70-130	9.61	30	
4-Ethyltoluene	0.180	0.010	ug/L	0.20	91.6	70-130	10.4	30	
Hexachlorobutadiene	0.373	0.010	ug/L	0.43	87.4	70-130	14.0	30	
2-Hexanone (MBK)	0.123	0.010	ug/L	0.16	75.3	70-130	39.3	30	
Isopropanol (IPA)	0.0800	0.010	ug/L	0.098	81.3	70-130	22.2	30	
Methylene Chloride	0.100	0.010	ug/L	0.14	72.3	70-130	23.8	30	
4-Methyl-2-pentanone (MIBK)	0.140	0.010	ug/L	0.16	85.3	70-130	22.6	30	
Styrene	0.159	0.010	ug/L	0.17	93.2	70-130	16.3	30	
1,1,2,2-Tetrachloroethane	0.209	0.010	ug/L	0.27	76.2	70-130	12.9	30	
Tetrachloroethylene (PCE)	0.281	0.010	ug/L	0.27	103	70-130	17.5	30	
Toluene	0.139	0.010	ug/L	0.15	92.1	70-130	16.8	30	
1,2,4-Trichlorobenzene	0.285	0.010	ug/L	0.30	96.0	70-130	18.2	30	
1,1,2-Trichloroethane	0.213	0.010	ug/L	0.22	97.5	70-130	21.4	30	
1,1,1-Trichloroethane	0.197	0.010	ug/L	0.22	90.5	70-130	20.6	30	
Trichloroethylene (TCE)	0.242	0.010	ug/L	0.21	113	70-130	13.4	30	
Trichlorofluoromethane (R11)	0.208	0.010	ug/L	0.22	92.7	70-130	15.3	30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	e 0.285	0.010	ug/L	0.31	93.0	70-130	15.6	30	
1,3,5-Trimethylbenzene	0.197	0.010	ug/L	0.20	100	70-130	8.07	30	
1,2,4-Trimethylbenzene	0.189	0.010	ug/L	0.20	96.1	70-130	10.1	30	
Vinyl acetate	0.127	0.010	ug/L	0.14	90.3	70-130	17.1	30	
Vinyl chloride	0.0975	0.010	ug/L	0.10	95.3	70-130	12.3	30	
o-Xylene	0.160	0.010	ug/L	0.17	91.9	70-130	10.5	30	
m,p-Xylenes	0.319	0.010	ug/L	0.35	91.9	70-130	7.40	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L	evel) - Qu	ality Contr	ol						
Batch B8D1904 - *** DEFAULT PR		-							
LCS Dup (B8D1904-BSD1) Conti	inued			Prepare	ed: 04/16/18 Ana	alyzed: 04	1/17/18		
1,2,3-Trichloropropane	0.225	0.010	ug/L	0.24	93.2	70-130	18.1	30	
sec-Butylbenzene	0.216	0.010	ug/L	0.22	98.4	70-130	9.60	30	
Isopropylbenzene	0.193	0.010	ug/L	0.20	98.2	70-130	9.46	30	
n-Propylbenzene	0.186	0.010	ug/L	0.20	94.8	70-130	9.66	30	
4-Isopropyltoluene	0.225	0.010	ug/L	0.22	102	70-130	9.87	30	
Surrogate: 4-Bromofluorobenzene			ug/L	0.14	99.1	70-130			
Batch B8D1906 - *** DEFAULT PR	EP ***								
Blank (B8D1906-BLK1)				Prepare	ed & Analyzed: 0	4/17/18			
Acetone	<0.010	0.010	ug/L						
Allyl chloride	<0.010	0.010	ug/L						
tert-Amyl Methyl Ether (TAME)	<0.010	0.010	ug/L						
Benzene	<0.010	0.010	ug/L						
Benzyl chloride	<0.010	0.010	ug/L						
Bromodichloromethane	<0.010	0.010	ug/L						
Bromoform	<0.010	0.010	ug/L						
Bromomethane	<0.010	0.010	ug/L						
1,3-Butadiene	<0.010	0.010	ug/L						
2-Butanone (MEK)	<0.010	0.010	ug/L						
tert-Butyl alcohol (TBA)	<0.010	0.010	ug/L						
Carbon Disulfide	<0.010	0.010	ug/L						
Carbon Tetrachloride	<0.010	0.010	ug/L						
Chlorobenzene	<0.010	0.010	ug/L						
Chloroethane	<0.010	0.010	ug/L						
Chloroform	< 0.010	0.010	ug/L						
Chloromethane	< 0.010	0.010	ug/L						
Cyclohexane	< 0.010	0.010	ug/L						
Dibromochloromethane	< 0.010	0.010	ug/L						
1,2-Dibromoethane (EDB)	<0.010	0.010	ug/L						
1,2-Dichlorobenzene	<0.010	0.010	ug/L						
1,3-Dichlorobenzene	<0.010	0.010	ug/L						
1,4-Dichlorobenzene	<0.010	0.010	ug/L						





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142

Date Received: 04/12/18

Date Reported: 04/20/18

Analyte	l Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Qu	uality Conti	rol							
Batch B8D1906 - *** DEFAULT P	=	•								
Blank (B8D1906-BLK1) Continu	ued			Prepare	ed & Ana	lyzed: 0	4/17/18			
Dichlorodifluoromethane (R12)	<0.010	0.010	ug/L	-						
1,1-Dichloroethane	< 0.010	0.010	ug/L							
1,2-Dichloroethane (EDC)	< 0.010	0.010	ug/L							
cis-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,1-Dichloroethylene	< 0.010	0.010	ug/L							
trans-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,2-Dichloropropane	< 0.010	0.010	ug/L							
trans-1,3-Dichloropropylene	< 0.010	0.010	ug/L							
cis-1,3-Dichloropropylene	< 0.010	0.010	ug/L							
Dichlorotetrafluoroethane	< 0.010	0.010	ug/L							
Diisopropyl ether (DIPE)	< 0.010	0.010	ug/L							
1,4-Dioxane	< 0.010	0.010	ug/L							
Ethanol	< 0.010	0.010	ug/L							
Ethyl Acetate	< 0.010	0.010	ug/L							
Ethylbenzene	< 0.010	0.010	ug/L							
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	0.010	ug/L							
4-Ethyltoluene	< 0.010	0.010	ug/L							
Heptane	< 0.010	0.010	ug/L							
Hexachlorobutadiene	< 0.010	0.010	ug/L							
n-Hexane	< 0.010	0.010	ug/L							
2-Hexanone (MBK)	<0.010	0.010	ug/L							
Isopropanol (IPA)	<0.010	0.010	ug/L							
Methyl-tert-Butyl Ether (MTBE)	<0.010	0.010	ug/L							
Methylene Chloride	<0.010	0.010	ug/L							
4-Methyl-2-pentanone (MIBK)	<0.010	0.010	ug/L							
Naphthalene	< 0.010	0.010	ug/L							
Propylene	<0.010	0.010	ug/L							
Styrene	<0.010	0.010	ug/L							
1,1,2,2-Tetrachloroethane	<0.010	0.010	ug/L							
Tetrachloroethylene (PCE)	<0.010	0.010	ug/L							
T () ((TIE)	0.040	0.040								



Tetrahydrofuran (THF)

Viorel Vasile Operations Manager ug/L

< 0.010

0.010

RPD



LABORATORY ANALYSIS RESULTS

Spike Source

Reporting

Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

%REC

Analyte	Result .	Limit	Units	Level	Result %REC	Limits	RPD	Limit	Notes
OCs by GCMS EPA TO-15 (Mid	Level) - Qı	uality Conti	ol						
Batch B8D1906 - *** DEFAULT P	REP ***								
Blank (B8D1906-BLK1) Contin	ued			Prepare	ed & Analyzed: 0	4/17/18			
Toluene	< 0.010	0.010	ug/L		-				
1,2,4-Trichlorobenzene	< 0.010	0.010	ug/L						
1,1,2-Trichloroethane	< 0.010	0.010	ug/L						
1,1,1-Trichloroethane	< 0.010	0.010	ug/L						
Trichloroethylene (TCE)	< 0.010	0.010	ug/L						
Trichlorofluoromethane (R11)	< 0.010	0.010	ug/L						
1,1,2-Trichloro-1,2,2-trifluoroetha (R113)	ane<0.010	0.010	ug/L						
1,3,5-Trimethylbenzene	< 0.010	0.010	ug/L						
1,2,4-Trimethylbenzene	< 0.010	0.010	ug/L						
2,2,4-Trimethylpentane	< 0.010	0.010	ug/L						
Vinyl acetate	< 0.010	0.010	ug/L						
Vinyl bromide	< 0.010	0.010	ug/L						
Vinyl chloride	< 0.010	0.010	ug/L						
o-Xylene	< 0.010	0.010	ug/L						
m,p-Xylenes	< 0.010	0.010	ug/L						
1,2,3-Trichloropropane	< 0.010	0.010	ug/L						
sec-Butylbenzene	< 0.010	0.010	ug/L						
Isopropylbenzene	< 0.010	0.010	ug/L						
n-Propylbenzene	< 0.010	0.010	ug/L						
4-Isopropyltoluene	< 0.010	0.010	ug/L						
n-Butylbenzene	<0.010	0.010	ug/L						
Surrogate: 4-Bromofluorobenzer	ne 0.125		ug/L	0.14	87.3	70-130			
LCS (B8D1906-BS1)				Prepare	ed & Analyzed: 0	4/17/18			
Acetone	0.0777	0.010	ug/L	0.095	81.8	70-130			
Benzene	0.113	0.010	ug/L	0.13	88.7	70-130			
Benzyl chloride	0.191	0.010	ug/L	0.21	92.2	70-130			
Bromodichloromethane	0.237	0.010	ug/L	0.27	88.3	70-130			
Bromoform	0.405	0.010	ug/L	0.41	98.0	70-130			
Bromomethane	0.186	0.010	ug/L	0.16	120	70-130			
2-Butanone (MEK)	0.103	0.010	ug/L	0.12	86.9	70-130			





LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No:

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	l Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L	evel) - Qı	uality Conti	rol						
Batch B8D1906 - *** DEFAULT PR	EP ***								
LCS (B8D1906-BS1) Continued				Prepare	ed & Analyzed: 0	4/17/18			
Carbon Disulfide	0.114	0.010	ug/L	0.12	91.2	70-130			·
Carbon Tetrachloride	0.245	0.010	ug/L	0.25	97.2	70-130			
Chlorobenzene	0.181	0.010	ug/L	0.18	98.2	70-130			
Chloroethane	0.103	0.010	ug/L	0.11	97.8	70-130			
Chloroform	0.177	0.010	ug/L	0.20	90.7	70-130			
Chloromethane	0.0653	0.010	ug/L	0.083	79.1	70-130			
Dibromochloromethane	0.315	0.010	ug/L	0.34	92.4	70-130			
1,2-Dibromoethane (EDB)	0.320	0.010	ug/L	0.31	104	70-130			
1,2-Dichlorobenzene	0.233	0.010	ug/L	0.24	96.8	70-130			
1,3-Dichlorobenzene	0.234	0.010	ug/L	0.24	97.2	70-130			
1,4-Dichlorobenzene	0.229	0.010	ug/L	0.24	95.4	70-130			
Dichlorodifluoromethane (R12)	0.179	0.010	ug/L	0.20	90.2	70-130			
1,1-Dichloroethane	0.146	0.010	ug/L	0.16	90.2	70-130			
1,2-Dichloroethane (EDC)	0.145	0.010	ug/L	0.16	89.4	70-130			
cis-1,2-Dichloroethylene	0.144	0.010	ug/L	0.16	90.7	70-130			
1,1-Dichloroethylene	0.146	0.010	ug/L	0.16	92.1	70-130			
trans-1,2-Dichloroethylene	0.140	0.010	ug/L	0.16	88.6	70-130			
1,2-Dichloropropane	0.168	0.010	ug/L	0.18	91.0	70-130			
trans-1,3-Dichloropropylene	0.173	0.010	ug/L	0.18	95.2	70-130			
cis-1,3-Dichloropropylene	0.169	0.010	ug/L	0.18	93.0	70-130			
Dichlorotetrafluoroethane	0.262	0.010	ug/L	0.28	93.6	70-130			
Ethylbenzene	0.152	0.010	ug/L	0.17	87.7	70-130			
4-Ethyltoluene	0.176	0.010	ug/L	0.20	89.5	70-130			
Hexachlorobutadiene	0.407	0.010	ug/L	0.43	95.4	70-130			
2-Hexanone (MBK)	0.130	0.010	ug/L	0.16	79.4	70-130			
Isopropanol (IPA)	0.0812	0.010	ug/L	0.098	82.6	70-130			
Methylene Chloride	0.102	0.010	ug/L	0.14	73.3	70-130			
4-Methyl-2-pentanone (MIBK)	0.139	0.010	ug/L	0.16	84.6	70-130			
Styrene	0.157	0.010	ug/L	0.17	92.3	70-130			
1,1,2,2-Tetrachloroethane	0.204	0.010	ug/L	0.27	74.4	70-130			
Tetrachloroethylene (PCE)	0.269	0.010	ug/L	0.27	99.0	70-130			





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142

Date Received: 04/12/18

Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	vel) - Q	uality Contr	ol						
Batch B8D1906 - *** DEFAULT PRE	:P ***								
LCS (B8D1906-BS1) Continued				Prepare	ed & Analyzed: 0	4/17/18			
Toluene	0.134	0.010	ug/L	0.15	88.6	70-130			
1,2,4-Trichlorobenzene	0.331	0.010	ug/L	0.30	111	70-130			
1,1,2-Trichloroethane	0.205	0.010	ug/L	0.22	94.1	70-130			
1,1,1-Trichloroethane	0.202	0.010	ug/L	0.22	92.6	70-130			
Trichloroethylene (TCE)	0.232	0.010	ug/L	0.21	108	70-130			
Trichlorofluoromethane (R11)	0.207	0.010	ug/L	0.22	92.3	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethane	0.285	0.010	ug/L	0.31	92.9	70-130			
(R113)			5						
1,3,5-Trimethylbenzene	0.186	0.010	ug/L	0.20	94.8	70-130			
1,2,4-Trimethylbenzene	0.184	0.010	ug/L	0.20	93.6	70-130			
Vinyl acetate	0.128	0.010	ug/L	0.14	90.6	70-130			
Vinyl chloride	0.104	0.010	ug/L	0.10	101	70-130			
o-Xylene	0.153	0.010	ug/L	0.17	88.1	70-130			
m,p-Xylenes	0.307	0.010	ug/L	0.35	88.2	70-130			
1,2,3-Trichloropropane	0.222	0.010	ug/L	0.24	92.1	70-130			
sec-Butylbenzene	0.213	0.010	ug/L	0.22	96.8	70-130			
Isopropylbenzene	0.189	0.010	ug/L	0.20	96.2	70-130			
n-Propylbenzene	0.181	0.010	ug/L	0.20	92.0	70-130			
4-Isopropyltoluene	0.223	0.010	ug/L	0.22	102	70-130			
Surrogate: 4-Bromofluorobenzene	0.143		ug/L	0.14	100	70-130			
LCS Dup (B8D1906-BSD1)				Prepare	ed: 04/17/18 Ana	alyzed: 04	1/18/18		
Acetone	0.0913	0.010	ug/L	0.095	96.1	70-130	16.1	30	
Benzene	0.128	0.010	ug/L	0.13	101	70-130	12.6	30	
Benzyl chloride	0.223	0.010	ug/L	0.21	107	70-130	15.3	30	
Bromodichloromethane	0.274	0.010	ug/L	0.27	102	70-130	14.5	30	
Bromoform	0.461	0.010	ug/L	0.41	111	70-130	12.8	30	
Bromomethane	0.207	0.010	ug/L	0.16	133	70-130	10.3	30	**
2-Butanone (MEK)	0.121	0.010	ug/L	0.12	103	70-130	16.8	30	
Carbon Disulfide	0.125	0.010	ug/L	0.12	100	70-130	9.53	30	
Carbon Tetrachloride	0.279	0.010	ug/L	0.25	111	70-130	13.3	30	
Chlorobenzene	0.204	0.010	ug/L	0.18	111	70-130	12.1	30	
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Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	•	uality Conti	rol						
Batch B8D1906 - *** DEFAULT PI	REP ***								
LCS Dup (B8D1906-BSD1) Con	tinued			Prepare	ed: 04/17/18 An	alyzed: 04	4/18/18		
Chloroethane	0.113	0.010	ug/L	0.11	107	70-130	9.48	30	
Chloroform	0.205	0.010	ug/L	0.20	105	70-130	14.4	30	
Chloromethane	0.0705	0.010	ug/L	0.083	85.4	70-130	7.66	30	
Dibromochloromethane	0.372	0.010	ug/L	0.34	109	70-130	16.6	30	
1,2-Dibromoethane (EDB)	0.380	0.010	ug/L	0.31	124	70-130	17.2	30	
1,2-Dichlorobenzene	0.269	0.010	ug/L	0.24	112	70-130	14.3	30	
1,3-Dichlorobenzene	0.273	0.010	ug/L	0.24	114	70-130	15.5	30	
1,4-Dichlorobenzene	0.265	0.010	ug/L	0.24	110	70-130	14.3	30	
Dichlorodifluoromethane (R12)	0.199	0.010	ug/L	0.20	100	70-130	10.7	30	
1,1-Dichloroethane	0.165	0.010	ug/L	0.16	102	70-130	12.2	30	
1,2-Dichloroethane (EDC)	0.163	0.010	ug/L	0.16	101	70-130	12.0	30	
cis-1,2-Dichloroethylene	0.165	0.010	ug/L	0.16	104	70-130	13.7	30	
1,1-Dichloroethylene	0.165	0.010	ug/L	0.16	104	70-130	12.0	30	
trans-1,2-Dichloroethylene	0.160	0.010	ug/L	0.16	101	70-130	13.0	30	
1,2-Dichloropropane	0.197	0.010	ug/L	0.18	106	70-130	15.6	30	
trans-1,3-Dichloropropylene	0.206	0.010	ug/L	0.18	113	70-130	17.3	30	
cis-1,3-Dichloropropylene	0.195	0.010	ug/L	0.18	107	70-130	14.4	30	
Dichlorotetrafluoroethane	0.282	0.010	ug/L	0.28	101	70-130	7.41	30	
Ethylbenzene	0.175	0.010	ug/L	0.17	101	70-130	13.7	30	
4-Ethyltoluene	0.204	0.010	ug/L	0.20	104	70-130	14.7	30	
Hexachlorobutadiene	0.467	0.010	ug/L	0.43	109	70-130	13.7	30	
2-Hexanone (MBK)	0.166	0.010	ug/L	0.16	101	70-130	24.0	30	
Isopropanol (IPA)	0.0973	0.010	ug/L	0.098	99.0	70-130	18.0	30	
Methylene Chloride	0.115	0.010	ug/L	0.14	82.6	70-130	12.0	30	
4-Methyl-2-pentanone (MIBK)	0.171	0.010	ug/L	0.16	104	70-130	20.9	30	
Styrene	0.181	0.010	ug/L	0.17	106	70-130	13.9	30	
1,1,2,2-Tetrachloroethane	0.235	0.010	ug/L	0.27	85.6	70-130	14.1	30	
Tetrachloroethylene (PCE)	0.317	0.010	ug/L	0.27	117	70-130	16.6	30	
Toluene	0.157	0.010	ug/L	0.15	104	70-130	16.3	30	
1,2,4-Trichlorobenzene	0.365	0.010	ug/L	0.30	123	70-130	9.73	30	
1,1,2-Trichloroethane	0.239	0.010	ug/L	0.22	109	70-130	15.0	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le		uality Contr	ol						
Batch B8D1906 - *** DEFAULT PRE	P ***								
LCS Dup (B8D1906-BSD1) Contin	ued			Prepare	ed: 04/17/18 Ana	alyzed: 04	1/18/18		
1,1,1-Trichloroethane	0.230	0.010	ug/L	0.22	105	70-130	12.9	30	
Trichloroethylene (TCE)	0.269	0.010	ug/L	0.21	125	70-130	14.9	30	
Trichlorofluoromethane (R11)	0.235	0.010	ug/L	0.22	104	70-130	12.3	30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	0.324	0.010	ug/L	0.31	106	70-130	12.8	30	
1,3,5-Trimethylbenzene	0.211	0.010	ug/L	0.20	107	70-130	12.5	30	
1,2,4-Trimethylbenzene	0.213	0.010	ug/L	0.20	108	70-130	14.6	30	
Vinyl acetate	0.149	0.010	ug/L	0.14	106	70-130	15.5	30	
Vinyl chloride	0.122	0.010	ug/L	0.10	119	70-130	16.2	30	
o-Xylene	0.177	0.010	ug/L	0.17	102	70-130	14.4	30	
m,p-Xylenes	0.353	0.010	ug/L	0.35	102	70-130	14.0	30	
1,2,3-Trichloropropane	0.253	0.010	ug/L	0.24	105	70-130	13.1	30	
sec-Butylbenzene	0.248	0.010	ug/L	0.22	113	70-130	15.3	30	
Isopropylbenzene	0.217	0.010	ug/L	0.20	111	70-130	13.9	30	
n-Propylbenzene	0.208	0.010	ug/L	0.20	106	70-130	13.8	30	
4-Isopropyltoluene	0.259	0.010	ug/L	0.22	118	70-130	14.6	30	
Surrogate: 4-Bromofluorobenzene Batch B8D1912 - *** DEFAULT PRE	0.140		ug/L	0.14	97.7	70-130			
	<i>r</i>			Dronoro	ad O Applymadi O	4/40/40			
Blank (B8D1912-BLK1)	<0.010	0.010	/1	Prepare	ed & Analyzed: 0	4/10/10			
Acetone	<0.010	0.010	ug/L						
Allyl chloride	<0.010	0.010	ug/L						
tert-Amyl Methyl Ether (TAME)	<0.010	0.010	ug/L						
Benzele phorida	<0.010	0.010	ug/L						
Benzyl chloride	<0.010	0.010	ug/L						
Bromodichloromethane	<0.010	0.010	ug/L						
Bromoform Bromomethane	<0.010	0.010	ug/L						
1,3-Butadiene	<0.010	0.010	ug/L						
2-Butanone (MEK)	<0.010	0.010	ug/L ug/L						
tert-Butyl alcohol (TBA)	<0.010	0.010	_						
Carbon Disulfide	<0.010	0.010	ug/L ug/L						
	\0.010	0.010	ug/L						





The Source Group, Inc. (PH) Client:

Project No: NA

AA Project No: MB596142 Date Received: 04/12/18

Project Name: Chemoil - SV Sampling						Da	ate Repo	orted: 0	4/20/18	
Analyte	l Result	Reporting Limit	Units	Spike Level	Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Qı	uality Conti	ol							
Batch B8D1912 - *** DEFAULT PI	REP ***									
Blank (B8D1912-BLK1) Continu	ıed			Prepare	ed & Ana	lyzed: 0	4/18/18			
Carbon Tetrachloride	<0.010	0.010	ug/L							
Chlorobenzene	< 0.010	0.010	ug/L							
Chloroethane	< 0.010	0.010	ug/L							
Chloroform	< 0.010	0.010	ug/L							
Chloromethane	< 0.010	0.010	ug/L							
Cyclohexane	< 0.010	0.010	ug/L							
Dibromochloromethane	< 0.010	0.010	ug/L							
1,2-Dibromoethane (EDB)	< 0.010	0.010	ug/L							
1,2-Dichlorobenzene	< 0.010	0.010	ug/L							
1,3-Dichlorobenzene	< 0.010	0.010	ug/L							
1,4-Dichlorobenzene	< 0.010	0.010	ug/L							
Dichlorodifluoromethane (R12)	< 0.010	0.010	ug/L							
1,1-Dichloroethane	< 0.010	0.010	ug/L							
1,2-Dichloroethane (EDC)	< 0.010	0.010	ug/L							
cis-1,2-Dichloroethylene	<0.010	0.010	ug/L							
1,1-Dichloroethylene	< 0.010	0.010	ug/L							
trans-1,2-Dichloroethylene	<0.010	0.010	ug/L							

ug/L

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Viorel Vasile Operations Manager

1,2-Dichloropropane

trans-1,3-Dichloropropylene

Ethyl-tert-Butyl Ether (ETBE)

cis-1,3-Dichloropropylene

Dichlorotetrafluoroethane

Diisopropyl ether (DIPE)

1,4-Dioxane

Ethyl Acetate

Ethylbenzene

4-Ethyltoluene

Hexachlorobutadiene

Ethanol

Heptane

n-Hexane



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142

Date Received: 04/12/18

Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L	•	uality Contr	ol							
Batch B8D1912 - *** DEFAULT PR	EP ***									
Blank (B8D1912-BLK1) Continue	ed			Prepare	ed & Ana	alyzed: 0	4/18/18			
2-Hexanone (MBK)	<0.010	0.010	ug/L							
Isopropanol (IPA)	< 0.010	0.010	ug/L							
Methyl-tert-Butyl Ether (MTBE)	<0.010	0.010	ug/L							
Methylene Chloride	<0.010	0.010	ug/L							
4-Methyl-2-pentanone (MIBK)	<0.010	0.010	ug/L							
Naphthalene	<0.010	0.010	ug/L							
Propylene	<0.010	0.010	ug/L							
Styrene	<0.010	0.010	ug/L							
1,1,2,2-Tetrachloroethane	<0.010	0.010	ug/L							
Tetrachloroethylene (PCE)	<0.010	0.010	ug/L							
Tetrahydrofuran (THF)	<0.010	0.010	ug/L							
Toluene	<0.010	0.010	ug/L							
1,2,4-Trichlorobenzene	<0.010	0.010	ug/L							
1,1,2-Trichloroethane	<0.010	0.010	ug/L							
1,1,1-Trichloroethane	<0.010	0.010	ug/L							
Trichloroethylene (TCE)	<0.010	0.010	ug/L							
Trichlorofluoromethane (R11)	<0.010	0.010	ug/L							
1,1,2-Trichloro-1,2,2-trifluoroethar (R113)	e<0.010	0.010	ug/L							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							
1,2,4-Trimethylbenzene	<0.010	0.010	ug/L							
2,2,4-Trimethylpentane	<0.010	0.010	ug/L							
Vinyl acetate	<0.010	0.010	ug/L							
Vinyl bromide	<0.010	0.010	ug/L							
Vinyl chloride	<0.010	0.010	ug/L							
o-Xylene	<0.010	0.010	ug/L							
m,p-Xylenes	<0.010	0.010	ug/L							
1,2,3-Trichloropropane	<0.010	0.010	ug/L							
sec-Butylbenzene	<0.010	0.010	ug/L							
Isopropylbenzene	<0.010	0.010	ug/L							
n-Propylbenzene	<0.010	0.010	ug/L							
4-Isopropyltoluene	<0.010	0.010	ug/L							

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Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

	Reporting		Spike Source	%REC		RPD	
Analyte	Result Limit	Units	Level Result %REC	Limits	RPD	Limit	Notes

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

Batch B8D1912 - *** DEFAULT PREP ***

Blank (B8D1912-BLK1) Continu	ed			Prepared	& Analyzed: 0	4/18/18	
n-Butylbenzene	<0.010	0.010	ug/L				
Surrogate: 4-Bromofluorobenzene	e 0.131		ug/L	0.14	91.4	70-130	
LCS (B8D1912-BS1)				Prepared	l: 04/18/18 Ana	alyzed: 04/19/18	
Acetone	0.0807	0.010	ug/L	0.095	85.0	70-130	
Benzene	0.118	0.010	ug/L	0.13	92.3	70-130	
Benzyl chloride	0.206	0.010	ug/L	0.21	99.7	70-130	
Bromodichloromethane	0.255	0.010	ug/L	0.27	95.3	70-130	
Bromoform	0.407	0.010	ug/L	0.41	98.4	70-130	
Bromomethane	0.195	0.010	ug/L	0.16	125	70-130	
2-Butanone (MEK)	0.109	0.010	ug/L	0.12	92.1	70-130	
Carbon Disulfide	0.116	0.010	ug/L	0.12	92.8	70-130	
Carbon Tetrachloride	0.250	0.010	ug/L	0.25	99.5	70-130	
Chlorobenzene	0.187	0.010	ug/L	0.18	101	70-130	
Chloroethane	0.106	0.010	ug/L	0.11	100	70-130	
Chloroform	0.185	0.010	ug/L	0.20	94.8	70-130	
Chloromethane	0.0643	0.010	ug/L	0.083	77.9	70-130	
Dibromochloromethane	0.332	0.010	ug/L	0.34	97.5	70-130	
1,2-Dibromoethane (EDB)	0.348	0.010	ug/L	0.31	113	70-130	
1,2-Dichlorobenzene	0.263	0.010	ug/L	0.24	109	70-130	
1,3-Dichlorobenzene	0.259	0.010	ug/L	0.24	108	70-130	
1,4-Dichlorobenzene	0.251	0.010	ug/L	0.24	104	70-130	
Dichlorodifluoromethane (R12)	0.183	0.010	ug/L	0.20	92.3	70-130	
1,1-Dichloroethane	0.149	0.010	ug/L	0.16	91.9	70-130	
1,2-Dichloroethane (EDC)	0.151	0.010	ug/L	0.16	93.4	70-130	
cis-1,2-Dichloroethylene	0.150	0.010	ug/L	0.16	94.9	70-130	
1,1-Dichloroethylene	0.146	0.010	ug/L	0.16	92.3	70-130	
trans-1,2-Dichloroethylene	0.140	0.010	ug/L	0.16	88.2	70-130	
1,2-Dichloropropane	0.178	0.010	ug/L	0.18	96.2	70-130	
trans-1,3-Dichloropropylene	0.193	0.010	ug/L	0.18	106	70-130	
cis-1,3-Dichloropropylene	0.184	0.010	ug/L	0.18	101	70-130	
Dichlorotetrafluoroethane	0.259	0.010	ug/L	0.28	92.5	70-130	



RPD



LABORATORY ANALYSIS RESULTS

Spike Source

Reporting

Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

%REC

Analyte	Result	Limit	Units	Level	Result %REC	Limits	RPD	Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	vel) - Qı	uality Conti	rol				_	_	
Batch B8D1912 - *** DEFAULT PRE	P ***								
LCS (B8D1912-BS1) Continued				Prepare	ed: 04/18/18 Ana	alyzed: 04	4/19/18		
Ethylbenzene	0.158	0.010	ug/L	0.17	91.0	70-130			
4-Ethyltoluene	0.178	0.010	ug/L	0.20	90.4	70-130			
Hexachlorobutadiene	0.535	0.010	ug/L	0.43	126	70-130			
2-Hexanone (MBK)	0.140	0.010	ug/L	0.16	85.2	70-130			
Isopropanol (IPA)	0.0848	0.010	ug/L	0.098	86.3	70-130			
Methylene Chloride	0.107	0.010	ug/L	0.14	76.7	70-130			
4-Methyl-2-pentanone (MIBK)	0.147	0.010	ug/L	0.16	89.9	70-130			
Styrene	0.168	0.010	ug/L	0.17	98.8	70-130			
1,1,2,2-Tetrachloroethane	0.204	0.010	ug/L	0.27	74.3	70-130			
Tetrachloroethylene (PCE)	0.280	0.010	ug/L	0.27	103	70-130			
Toluene	0.144	0.010	ug/L	0.15	95.6	70-130			
1,2,4-Trichlorobenzene	0.419	0.010	ug/L	0.30	141	70-130			**
1,1,2-Trichloroethane	0.218	0.010	ug/L	0.22	99.7	70-130			
1,1,1-Trichloroethane	0.203	0.010	ug/L	0.22	92.9	70-130			
Trichloroethylene (TCE)	0.257	0.010	ug/L	0.21	120	70-130			
Trichlorofluoromethane (R11)	0.211	0.010	ug/L	0.22	93.9	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	0.292	0.010	ug/L	0.31	95.2	70-130			
1,3,5-Trimethylbenzene	0.199	0.010	ug/L	0.20	101	70-130			
1,2,4-Trimethylbenzene	0.197	0.010	ug/L	0.20	100	70-130			
Vinyl acetate	0.130	0.010	ug/L	0.14	92.6	70-130			
Vinyl chloride	0.115	0.010	ug/L	0.10	112	70-130			
o-Xylene	0.160	0.010	ug/L	0.17	92.4	70-130			
m,p-Xylenes	0.317	0.010	ug/L	0.35	91.1	70-130			
1,2,3-Trichloropropane	0.214	0.010	ug/L	0.24	88.6	70-130			
sec-Butylbenzene	0.205	0.010	ug/L	0.22	93.6	70-130			
Isopropylbenzene	0.180	0.010	ug/L	0.20	91.5	70-130			
n-Propylbenzene	0.174	0.010	ug/L	0.20	88.3	70-130			
4-Isopropyltoluene	0.213	0.010	ug/L	0.22	97.0	70-130			
Surrogate: 4-Bromofluorobenzene	0.142		ug/L	0.14	99.0	70-130			
LCS Dup (B8D1912-BSD1)			J	Prepare	ed: 04/18/18 Ana	alyzed: 04	4/19/18		





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142

Date Received: 04/12/18

Date Reported: 04/20/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid I	Level) - Qu	uality Conti	ol						
Batch B8D1912 - *** DEFAULT PF	REP ***								
LCS Dup (B8D1912-BSD1) Cont	tinued			Prepare	ed: 04/18/18 Ana	alyzed: 04	4/19/18		
Acetone	0.0782	0.010	ug/L	0.095	82.3	70-130	3.17	30	
Benzene	0.113	0.010	ug/L	0.13	88.6	70-130	4.15	30	
Benzyl chloride	0.199	0.010	ug/L	0.21	96.0	70-130	3.70	30	
Bromodichloromethane	0.238	0.010	ug/L	0.27	88.7	70-130	7.12	30	
Bromoform	0.405	0.010	ug/L	0.41	97.9	70-130	0.510	30	
Bromomethane	0.187	0.010	ug/L	0.16	121	70-130	3.88	30	
2-Butanone (MEK)	0.103	0.010	ug/L	0.12	87.1	70-130	5.50	30	
Carbon Disulfide	0.111	0.010	ug/L	0.12	88.8	70-130	4.38	30	
Carbon Tetrachloride	0.245	0.010	ug/L	0.25	97.2	70-130	2.39	30	
Chlorobenzene	0.182	0.010	ug/L	0.18	99.1	70-130	2.34	30	
Chloroethane	0.102	0.010	ug/L	0.11	97.0	70-130	3.39	30	
Chloroform	0.181	0.010	ug/L	0.20	92.5	70-130	2.48	30	
Chloromethane	0.0618	0.010	ug/L	0.083	74.8	70-130	3.96	30	
Dibromochloromethane	0.322	0.010	ug/L	0.34	94.4	70-130	3.23	30	
1,2-Dibromoethane (EDB)	0.336	0.010	ug/L	0.31	109	70-130	3.49	30	
1,2-Dichlorobenzene	0.254	0.010	ug/L	0.24	106	70-130	3.30	30	
1,3-Dichlorobenzene	0.258	0.010	ug/L	0.24	107	70-130	0.581	30	
1,4-Dichlorobenzene	0.249	0.010	ug/L	0.24	104	70-130	0.673	30	
Dichlorodifluoromethane (R12)	0.178	0.010	ug/L	0.20	89.9	70-130	2.55	30	
1,1-Dichloroethane	0.145	0.010	ug/L	0.16	89.6	70-130	2.45	30	
1,2-Dichloroethane (EDC)	0.146	0.010	ug/L	0.16	90.0	70-130	3.71	30	
cis-1,2-Dichloroethylene	0.144	0.010	ug/L	0.16	91.0	70-130	4.17	30	
1,1-Dichloroethylene	0.145	0.010	ug/L	0.16	91.4	70-130	0.980	30	
trans-1,2-Dichloroethylene	0.137	0.010	ug/L	0.16	86.2	70-130	2.29	30	
1,2-Dichloropropane	0.169	0.010	ug/L	0.18	91.3	70-130	5.17	30	
trans-1,3-Dichloropropylene	0.184	0.010	ug/L	0.18	102	70-130	4.36	30	
cis-1,3-Dichloropropylene	0.173	0.010	ug/L	0.18	95.3	70-130	6.20	30	
Dichlorotetrafluoroethane	0.276	0.010	ug/L	0.28	98.6	70-130	6.36	30	
Ethylbenzene	0.152	0.010	ug/L	0.17	87.3	70-130	4.15	30	
4-Ethyltoluene	0.174	0.010	ug/L	0.20	88.6	70-130	2.01	30	
Hexachlorobutadiene	0.499	0.010	ug/L	0.43	117	70-130	7.01	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	evel) - Qı	uality Contr	ol						•
Batch B8D1912 - *** DEFAULT PRE		•							
LCS Dup (B8D1912-BSD1) Contir	nued			Prepare	ed: 04/18/18 Ana	alyzed: 0	4/19/18		
2-Hexanone (MBK)	0.130	0.010	ug/L	0.16	79.2	70-130	7.39	30	
Isopropanol (IPA)	0.0816	0.010	ug/L	0.098	83.0	70-130	3.84	30	
Methylene Chloride	0.102	0.010	ug/L	0.14	73.6	70-130	4.16	30	
4-Methyl-2-pentanone (MIBK)	0.140	0.010	ug/L	0.16	85.5	70-130	5.02	30	
Styrene	0.161	0.010	ug/L	0.17	94.3	70-130	4.74	30	
1,1,2,2-Tetrachloroethane	0.198	0.010	ug/L	0.27	72.2	70-130	2.87	30	
Tetrachloroethylene (PCE)	0.276	0.010	ug/L	0.27	102	70-130	1.61	30	
Toluene	0.137	0.010	ug/L	0.15	90.8	70-130	5.17	30	
1,2,4-Trichlorobenzene	0.387	0.010	ug/L	0.30	130	70-130	7.93	30	
1,1,2-Trichloroethane	0.211	0.010	ug/L	0.22	96.7	70-130	3.05	30	
1,1,1-Trichloroethane	0.198	0.010	ug/L	0.22	90.8	70-130	2.29	30	
Trichloroethylene (TCE)	0.253	0.010	ug/L	0.21	118	70-130	1.64	30	
Trichlorofluoromethane (R11)	0.209	0.010	ug/L	0.22	93.0	70-130	1.02	30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	0.290	0.010	ug/L	0.31	94.5	70-130	0.791	30	
1,3,5-Trimethylbenzene	0.193	0.010	ug/L	0.20	98.1	70-130	3.04	30	
1,2,4-Trimethylbenzene	0.191	0.010	ug/L ug/L	0.20	97.0	70-130	3.39	30	
Vinyl acetate	0.125	0.010	ug/L	0.20	88.4	70-130	4.59	30	
Vinyl chloride	0.112	0.010	ug/L	0.14	109	70-130	2.51	30	
o-Xylene	0.156	0.010	ug/L	0.17	90.0	70-130	2.66	30	
m,p-Xylenes	0.307	0.010	ug/L	0.35	88.4	70-130	2.99	30	
1,2,3-Trichloropropane	0.209	0.010	ug/L	0.24	86.4	70-130	2.43	30	
sec-Butylbenzene	0.197	0.010	ug/L	0.22	89.7	70-130	4.23	30	
Isopropylbenzene	0.176	0.010	ug/L	0.20	89.3	70-130	2.43	30	
n-Propylbenzene	0.168	0.010	ug/L	0.20	85.2	70-130	3.52	30	
4-Isopropyltoluene	0.206	0.010	ug/L	0.22	93.6	70-130	3.52	30	
Surrogate: 4-Bromofluorobenzene	0.141		ug/L	0.14	98.5	70-130			

Fixed Gases by TCD - Quality Control

Batch B8D1726 - *** DEFAULT PREP ***

Blank (B8D1726-BLK1)

Prepared & Analyzed: 04/17/18





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

		Reporting			Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
ixed Gases by TCD - Quality Co	ontrol									
Batch B8D1726 - *** DEFAULT P	PREP ***									
Blank (B8D1726-BLK1) Contin	ued			Prepare	ed & Anal	yzed: 0	4/17/18			
Methane	<0.10	0.10	% by Volume							
Oxygen	<0.10	0.10	% by Volume							
Carbon Dioxide	<0.10	0.10	% by Volume							
Carbon Monoxide	<0.10	0.10	% by Volume							
LCS (B8D1726-BS1)				Prepare	d & Anal	yzed: 0	4/17/18			
Methane	4.19	0.20	% by Volume	4.5		93.2	75-125			
Oxygen	3.85	0.20	% by Volume	4.0		96.2	75-125			
Carbon Dioxide	14.0	0.20	% by Volume	15		93.0	75-125			
Carbon Monoxide	6.53	0.20	% by Volume	7.0		93.3	75-125			
LCS Dup (B8D1726-BSD1)				Prepare	d & Anal	yzed: 0	4/17/18			
Methane	4.19	0.20	% by Volume	4.5		93.1	75-125	0.0477	30	
Oxygen	3.90	0.20	% by Volume	4.0		97.4	75-125	1.19	30	
Carbon Dioxide	14.0	0.20	% by Volume	15		93.1	75-125	0.115	30	
Carbon Monoxide	6.57	0.20	% by Volume	7.0		93.8	75-125	0.580	30	
Duplicate (B8D1726-DUP1)	S	ource: 8D		Prepare	d & Anal	yzed: 0	4/17/18			
Methane	3.50	0.20	% by Volume	<u>-</u>	3.57			2.21	30	
Oxygen	5.08	0.20	% by Volume		4.78			6.08	30	

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Fixed Gases by TCD - Quality Con	trol									
Batch B8D1726 - *** DEFAULT PR	EP ***									
Duplicate (B8D1726-DUP1) Cont	inued S	Source: 8D1	3013-02	Prepare	d & Anal	yzed: 0	4/17/18			
Carbon Dioxide	8.87	0.20	% by Volume		9.12			2.69	30	
Carbon Monoxide	<0.20	0.20	% by Volume						30	
Helium by GC/TCD - Quality Contr	ol									
Batch B8D1303 - *** DEFAULT PR	EP ***									
Blank (B8D1303-BLK1)				Prepare	d & Anal	yzed: 0	4/13/18			
Helium	<0.10	0.10	% by Volume							
LCS (B8D1303-BS1)				Prepare	d & Anal	yzed: 0	4/13/18			
Helium	0.370	0.10	% by Volume	0.50		74.0	70-130			
LCS Dup (B8D1303-BSD1)				•	d & Anal	•				
Helium	0.367	0.10	% by Volume	0.50		73.4	70-130	0.760	30	
Duplicate (B8D1303-DUP1)		Source: 8D1	2006-03	Prepare		yzed: 0	4/13/18			
Helium	1.41	0.20	% by Volume		1.50			6.09	30	
Batch B8D1626 - *** DEFAULT PR	EP ***									
Blank (B8D1626-BLK1)				Prepare	d & Anal	yzed: 0	4/16/18			
Helium	<0.10	0.10	% by Volume							
LCS (B8D1626-BS1)				•	d & Anal	·				
Helium	0.381	0.10	% by Volume	0.50		76.3	70-130			
LCS Dup (B8D1626-BSD1)					d & Anal	·				
Helium	0.400	0.10	% by Volume	0.50		80.0	70-130	4.81	30	
Duplicate (B8D1626-DUP1)	\$	Source: 8D1	2006-02	Prepare	d & Anal	yzed: 0	4/16/18			

A



Client:The Source Group, Inc. (PH)AA Project No: MB596142Project No:NADate Received: 04/12/18

Project Name: Chemoil - SV Sampling

Date Reported: 04/20/18

	Reporting		Spike Source	%REC		RPD	
Analyte	Result Limit	Units	Level Result %REC	Limits	RPD	Limit	Notes

Helium by GC/TCD - Quality Control

Batch B8D1626 - *** DEFAULT PREP ***

Duplicate (B8D1626-DUP1) Continued Source: 8D12006-02 Prepared & Analyzed: 04/16/18

Helium 3.13 0.20 % by 3.18 1.62 30

Volume

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596142 Date Received: 04/12/18 Date Reported: 04/20/18

Special Notes

[1] = ** : Exceeds upper control limit.



AMERICAN © TO AMALYTICS

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

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Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 20, 2018 Kirsten Duey The Source Group, Inc. (PH)

3478 Buskirk Ave., Suite 100

Pleasant Hill, CA 94523

Re: Chemoil - SV Sampling

MB596143 / 8D13013

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/13/18 18:45 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager

AA Project No: MB596143



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No:

Date Received: 04/13/18 Project Name: Chemoil - SV Sampling Date Reported: 04/20/18

Troject Name. Onemon - 57 Samp	Jii 19			Date Nepol	teu. 04/20/10
Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
Fixed Gases					
TP-9	8D13013-02	Vapor	5	04/13/18 08:46	04/13/18 18:45
TP-8	8D13013-03	Vapor	5	04/13/18 09:34	04/13/18 18:45
TP-6	8D13013-05	Vapor	5	04/13/18 11:06	04/13/18 18:45
TP-2	8D13013-07	Vapor	5	04/13/18 13:22	04/13/18 18:45
TP-3	8D13013-09	Vapor	5	04/13/18 14:54	04/13/18 18:45
TP-3 DUP	8D13013-10	Vapor	5	04/13/18 14:54	04/13/18 18:45
AN-8	8D13013-12	Vapor	5	04/13/18 16:12	04/13/18 18:45
Helium ASTM D1946M					
TP-10	8D13013-01	Vapor	5	04/13/18 08:03	04/13/18 18:45
TP-9	8D13013-02	Vapor	5	04/13/18 08:46	04/13/18 18:45
TP-8	8D13013-03	Vapor	5	04/13/18 09:34	04/13/18 18:45
TP-7	8D13013-04	Vapor	5	04/13/18 10:22	04/13/18 18:45
TP-6	8D13013-05	Vapor	5	04/13/18 11:06	04/13/18 18:45
TP-4	8D13013-06	Vapor	5	04/13/18 12:44	04/13/18 18:45
TP-2	8D13013-07	Vapor	5	04/13/18 13:22	04/13/18 18:45
TP-1	8D13013-08	Vapor	5	04/13/18 14:07	04/13/18 18:45
TP-3	8D13013-09	Vapor	5	04/13/18 14:54	04/13/18 18:45
TP-3 DUP	8D13013-10	Vapor	5	04/13/18 14:54	04/13/18 18:45





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143
Date Received: 04/13/18
Date Reported: 04/20/18

	, ,				
Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TP-5	8D13013-11	Vapor	5	04/13/18 15:36	04/13/18 18:45
AN-8	8D13013-12	Vapor	5	04/13/18 16:12	04/13/18 18:45
TO-15 (Mid Level)					
TP-10	8D13013-01	Vapor	5	04/13/18 08:03	04/13/18 18:45
TP-9	8D13013-02	Vapor	5	04/13/18 08:46	04/13/18 18:45
TP-8	8D13013-03	Vapor	5	04/13/18 09:34	04/13/18 18:45
TP-7	8D13013-04	Vapor	5	04/13/18 10:22	04/13/18 18:45
TP-6	8D13013-05	Vapor	5	04/13/18 11:06	04/13/18 18:45
TP-4	8D13013-06	Vapor	5	04/13/18 12:44	04/13/18 18:45
TP-2	8D13013-07	Vapor	5	04/13/18 13:22	04/13/18 18:45
TP-1	8D13013-08	Vapor	5	04/13/18 14:07	04/13/18 18:45
TP-3	8D13013-09	Vapor	5	04/13/18 14:54	04/13/18 18:45
TP-3 DUP	8D13013-10	Vapor	5	04/13/18 14:54	04/13/18 18:45
TP-5	8D13013-11	Vapor	5	04/13/18 15:36	04/13/18 18:45
AN-8	8D13013-12	Vapor	5	04/13/18 16:12	04/13/18 18:45





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Units: ug/L

•	•	,			J
Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/19/18	04/19/18	04/19/18	04/18/18	
Date Analyzed:	04/19/18	04/20/18	04/20/18	04/18/18	
AA ID No:	8D13013-01	8D13013-02	8D13013-03	8D13013-04	
Client ID No:	TP-10	TP-9	TP-8	TP-7	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	30000	22500	50	MRL
TO-15 (Mid Level) (TO-15)					
Acetone	<0.010	<300	<220	< 0.50	0.010
Allyl chloride	< 0.010	<300	<220	< 0.50	0.010
tert-Amyl Methyl Ether (TAME)	< 0.010	<300	<220	< 0.50	0.010
Benzene	< 0.010	2000	620	< 0.50	0.010
Benzyl chloride	< 0.010	<300	<220	< 0.50	0.010
Bromodichloromethane	< 0.010	<300	<220	< 0.50	0.010
Bromoform	< 0.010	<300	<220	< 0.50	0.010
Bromomethane	< 0.010	<300	<220	< 0.50	0.010
1,3-Butadiene	< 0.010	<300	<220	< 0.50	0.010
2-Butanone (MEK)	< 0.010	<300	<220	< 0.50	0.010
tert-Butyl alcohol (TBA)	< 0.010	<300	<220	< 0.50	0.010
Carbon Disulfide	< 0.010	<300	<220	0.52	0.010
Carbon Tetrachloride	< 0.010	<300	<220	< 0.50	0.010
Chlorobenzene	< 0.010	<300	<220	< 0.50	0.010
Chloroethane	< 0.010	<300	<220	< 0.50	0.010
Chloroform	< 0.010	<300	<220	< 0.50	0.010
Chloromethane	< 0.010	<300	<220	< 0.50	0.010
Cyclohexane	< 0.010	2800	3600	8.6	0.010
Dibromochloromethane	< 0.010	<300	<220	< 0.50	0.010
1,2-Dibromoethane (EDB)	< 0.010	<300	<220	< 0.50	0.010
1,2-Dichlorobenzene	< 0.010	<300	<220	< 0.50	0.010
1,3-Dichlorobenzene	< 0.010	<300	<220	< 0.50	0.010
1,4-Dichlorobenzene	< 0.010	<300	<220	< 0.50	0.010
Dichlorodifluoromethane (R12)	< 0.010	<300	<220	< 0.50	0.010
1,1-Dichloroethane	< 0.010	<300	<220	< 0.50	0.010
1,2-Dichloroethane (EDC)	< 0.010	<300	<220	< 0.50	0.010
cis-1,2-Dichloroethylene	<0.010	<300	<220	<0.50	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Units: ug/L

·	•	,			S .
Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/19/18	04/19/18	04/19/18	04/18/18	
Date Analyzed:	04/19/18	04/20/18	04/20/18	04/18/18	
AA ID No:	8D13013-01	8D13013-02	8D13013-03	8D13013-04	
Client ID No:	TP-10	TP-9	TP-8	TP-7	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	30000	22500	50	MRL
TO-15 (Mid Level) (TO-15) (co	ntinued)				
1,1-Dichloroethylene	< 0.010	<300	<220	<0.50	0.010
trans-1,2-Dichloroethylene	< 0.010	<300	<220	< 0.50	0.010
1,2-Dichloropropane	< 0.010	<300	<220	< 0.50	0.010
trans-1,3-Dichloropropylene	< 0.010	<300	<220	< 0.50	0.010
cis-1,3-Dichloropropylene	< 0.010	<300	<220	< 0.50	0.010
Dichlorotetrafluoroethane	< 0.010	<300	<220	< 0.50	0.010
Diisopropyl ether (DIPE)	< 0.010	<300	<220	< 0.50	0.010
1,4-Dioxane	< 0.010	<300	<220	< 0.50	0.010
Ethanol	< 0.010	<300	<220	< 0.50	0.010
Ethyl Acetate	< 0.010	<300	<220	<0.50	0.010
Ethylbenzene	< 0.010	3000	2200	<0.50	0.010
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	<300	<220	< 0.50	0.010
4-Ethyltoluene	< 0.010	350	290	<0.50	0.010
Heptane	< 0.010	3900	1200	0.99	0.010
Hexachlorobutadiene	<0.010	<300	<220	< 0.50	0.010
n-Hexane	<0.010	1500	1200	1.5	0.010
2-Hexanone (MBK)	< 0.010	<300	<220	<0.50	0.010
Isopropanol (IPA)	<0.010	<300	<220	< 0.50	0.010
Methyl-tert-Butyl Ether (MTBE)	< 0.010	<300	<220	< 0.50	0.010
Methylene Chloride	< 0.010	<300	<220	< 0.50	0.010
4-Methyl-2-pentanone (MIBK)	<0.010	<300	<220	<0.50	0.010
Naphthalene	<0.010	<300	<220	<0.50	0.010
Propylene	< 0.010	<300	<220	0.66	0.010
Styrene	<0.010	<300	<220	<0.50	0.010
1,1,2,2-Tetrachloroethane	<0.010	<300	<220	<0.50	0.010
Tetrachloroethylene (PCE)	<0.010	<300	<220	<0.50	0.010
Tetrahydrofuran (THF)	< 0.010	<300	<220	<0.50	0.010



AA Project No: MB596143



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: NA

Project No: NA Date Received: 04/13/18
Project Name: Chemoil - SV Sampling Date Reported: 04/20/18

Method: VOCs by GCMS EPA TO-15 (Mid Level) Units: ug/L

<u>Surrogates</u> 4-Bromofluorobenzene	96%	101%	94%	94%	%REC Limits 70-130
n-Butylbenzene	<0.010	<300	<220	<0.50	0.010
4-Isopropyltoluene	<0.010	<300	<220	<0.50	0.010
n-Propylbenzene	<0.010	300	240	<0.50	0.010
Isopropylbenzene	<0.010	<300	<220	<0.50	0.010
sec-Butylbenzene	<0.010	<300	<220	<0.50	0.010
1,2,3-Trichloropropane	<0.010	<300	<220	< 0.50	0.010
m,p-Xylenes	<0.010	11000	8300	<0.50	0.010
o-Xylene	<0.010	3200	2600	<0.50	0.010
Vinyl chloride	<0.010	<300	<220	<0.50	0.010
Vinyl bromide	< 0.010	<300	<220	< 0.50	0.010
Vinyl acetate	< 0.010	<300	<220	< 0.50	0.010
2,2,4-Trimethylpentane	< 0.010	15000 [4]	<220	< 0.50	0.010
1,2,4-Trimethylbenzene	< 0.010	580	530	< 0.50	0.010
1,3,5-Trimethylbenzene	< 0.010	370	310	< 0.50	0.010
ane (R113)					
1,1,2-Trichloro-1,2,2-trifluoroeth	< 0.010	<300	<220	< 0.50	0.010
Trichlorofluoromethane (R11)	<0.010	<300	<220	<0.50	0.010
Trichloroethylene (TCE)	<0.010	<300	<220	<0.50	0.010
1,1,1-Trichloroethane	< 0.010	<300	<220	< 0.50	0.010
1,1,2-Trichloroethane	<0.010	<300	<220	<0.50	0.010
1,2,4-Trichlorobenzene	< 0.010	<300	<220	<0.50	0.010
Toluene	< 0.010	13000 [4]	5100	<0.50	0.010
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Dilution Factor:	1	30000	22500	50	MRL
Matrix:	Vapor	Vapor	Vapor	Vapor	
Client ID No:	TP-10	TP-9	TP-8	TP-7	
AA ID No:	8D13013-01	8D13013-02	8D13013-03	8D13013-04	
Date Analyzed:	04/19/18	04/20/18	04/20/18	04/18/18	
Date Prepared:	04/19/18	04/19/18	04/19/18	04/18/18	
Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Units: ug/L

Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/18/18	04/18/18	04/19/18	04/19/18	
Date Analyzed:	04/18/18	04/18/18	04/19/18	04/19/18	
AA ID No:	8D13013-05	8D13013-06	8D13013-07	8D13013-08	
Client ID No:	TP-6	TP-4	TP-2	TP-1	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	50	50	i	1	MRL
TO-15 (Mid Level) (TO-15)					
Acetone	<0.50	<0.50	0.027	0.011	0.010
Allyl chloride	< 0.50	< 0.50	< 0.010	< 0.010	0.010
tert-Amyl Methyl Ether (TAME)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Benzene	12	< 0.50	< 0.010	< 0.010	0.010
Benzyl chloride	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Bromodichloromethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Bromoform	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Bromomethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,3-Butadiene	< 0.50	< 0.50	< 0.010	< 0.010	0.010
2-Butanone (MEK)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
tert-Butyl alcohol (TBA)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Carbon Disulfide	5.9	< 0.50	< 0.010	< 0.010	0.010
Carbon Tetrachloride	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Chlorobenzene	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Chloroethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Chloroform	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Chloromethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Cyclohexane	180 [4]	9.7	< 0.010	< 0.010	0.010
Dibromochloromethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,2-Dibromoethane (EDB)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,2-Dichlorobenzene	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,3-Dichlorobenzene	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,4-Dichlorobenzene	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Dichlorodifluoromethane (R12)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,1-Dichloroethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,2-Dichloroethane (EDC)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
cis-1,2-Dichloroethylene	< 0.50	<0.50	< 0.010	< 0.010	0.010





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Units: ug/L

Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/18/18	04/18/18	04/19/18	04/19/18	
Date Analyzed:	04/18/18	04/18/18	04/19/18	04/19/18	
AA ID No:	8D13013-05	8D13013-06	8D13013-07	8D13013-08	
Client ID No:	TP-6	TP-4	TP-2	TP-1	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	50	50	1	1	MRL
TO-15 (Mid Level) (TO-15) (co	ntinued)				
1,1-Dichloroethylene	<0.50	<0.50	<0.010	< 0.010	0.010
trans-1,2-Dichloroethylene	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,2-Dichloropropane	< 0.50	< 0.50	< 0.010	<0.010	0.010
trans-1,3-Dichloropropylene	< 0.50	< 0.50	< 0.010	<0.010	0.010
cis-1,3-Dichloropropylene	< 0.50	< 0.50	< 0.010	<0.010	0.010
Dichlorotetrafluoroethane	< 0.50	< 0.50	<0.010	<0.010	0.010
Diisopropyl ether (DIPE)	< 0.50	< 0.50	<0.010	<0.010	0.010
1,4-Dioxane	<0.50	<0.50	<0.010	<0.010	0.010
Ethanol	<0.50	<0.50	0.012	<0.010	0.010
Ethyl Acetate	<0.50	<0.50	<0.010	<0.010	0.010
Ethylbenzene	11	2.0	<0.010	<0.010	0.010
Ethyl-tert-Butyl Ether (ETBE)	<0.50	<0.50	<0.010	<0.010	0.010
4-Ethyltoluene	19	<0.50	<0.010	<0.010	0.010
Heptane	83	3.2	<0.010	<0.010	0.010
Hexachlorobutadiene	<0.50	<0.50	<0.010	<0.010	0.010
n-Hexane	12	<0.50	<0.010	<0.010	0.010
2-Hexanone (MBK)	<0.50	<0.50	<0.010	<0.010	0.010
Isopropanol (IPA)	<0.50	<0.50	<0.010	<0.010	0.010
Methyl-tert-Butyl Ether (MTBE)	<0.50	<0.50	< 0.010	<0.010	0.010
Methylene Chloride	<0.50	<0.50	<0.010	<0.010	0.010
4-Methyl-2-pentanone (MIBK)	<0.50	<0.50	<0.010	<0.010	0.010
Naphthalene	1.3	<0.50	<0.010	<0.010	0.010
Propylene	<0.50	<0.50	<0.010	<0.010	0.010
Styrene	<0.50	<0.50	<0.010	<0.010	0.010
1,1,2,2-Tetrachloroethane	<0.50	<0.50	<0.010	<0.010	0.010
Tetrachloroethylene (PCE)	<0.50	<0.50	<0.010	<0.010	0.010
Tetrahydrofuran (THF)	<0.50	<0.50	<0.010	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Units: ug/L

Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/18/18	04/18/18	04/19/18	04/19/18	
Date Analyzed:	04/18/18	04/18/18	04/19/18	04/19/18	
AA ID No:	8D13013-05	8D13013-06	8D13013-07	8D13013-08	
Client ID No:	TP-6	TP-4	TP-2	TP-1	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	50	50	1	1	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	19	<0.50	< 0.010	<0.010	0.010
1,2,4-Trichlorobenzene	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,1,2-Trichloroethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,1,1-Trichloroethane	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Trichloroethylene (TCE)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
Trichlorofluoromethane (R11)	< 0.50	< 0.50	< 0.010	< 0.010	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	< 0.50	< 0.50	< 0.010	< 0.010	0.010
ane (R113)					
1,3,5-Trimethylbenzene	39	<0.50	<0.010	<0.010	0.010
1,2,4-Trimethylbenzene	19	0.55	<0.010	<0.010	0.010
2,2,4-Trimethylpentane	< 0.50	< 0.50	<0.010	<0.010	0.010
Vinyl acetate	< 0.50	<0.50	<0.010	<0.010	0.010
Vinyl bromide	< 0.50	<0.50	<0.010	<0.010	0.010
Vinyl chloride	< 0.50	<0.50	<0.010	<0.010	0.010
o-Xylene	130	1.6	<0.010	<0.010	0.010
m,p-Xylenes	230	4.8	<0.010	<0.010	0.010
1,2,3-Trichloropropane	< 0.50	<0.50	<0.010	<0.010	0.010
sec-Butylbenzene	4.3	<0.50	<0.010	<0.010	0.010
Isopropylbenzene	7.7	<0.50	<0.010	<0.010	0.010
n-Propylbenzene	5.7	< 0.50	< 0.010	<0.010	0.010
4-Isopropyltoluene	9.8	< 0.50	< 0.010	< 0.010	0.010
n-Butylbenzene	<0.50	<0.50	<0.010	<0.010	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	99%	99%	93%	86%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Units: ug/L

Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/19/18	04/19/18	04/18/18	04/19/18	
Date Analyzed:	04/19/18	04/19/18	04/19/18	04/20/18	
AA ID No:	8D13013-09	8D13013-10	8D13013-11	8D13013-12	
Client ID No:	TP-3	TP-3 DUP	TP-5	AN-8	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	i	1	50	1	MRL
TO-15 (Mid Level) (TO-15)					_
Acetone	0.089	0.023	<0.50 [3]	0.064	0.010
Allyl chloride	< 0.010	< 0.010	<0.50 [3]	< 0.010	0.010
tert-Amyl Methyl Ether (TAME)	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Benzene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Benzyl chloride	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Bromodichloromethane	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Bromoform	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Bromomethane	< 0.010	< 0.010	<0.50 [3]	< 0.010	0.010
1,3-Butadiene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
2-Butanone (MEK)	< 0.010	< 0.010	<0.50 [3]	< 0.010	0.010
tert-Butyl alcohol (TBA)	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Carbon Disulfide	< 0.010	< 0.010	<0.50 [3]	< 0.010	0.010
Carbon Tetrachloride	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Chlorobenzene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Chloroethane	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Chloroform	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Chloromethane	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Cyclohexane	<0.010	< 0.010	<0.50 [3]	<0.010	0.010
Dibromochloromethane	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
1,2-Dibromoethane (EDB)	<0.010	< 0.010	<0.50 [3]	<0.010	0.010
1,2-Dichlorobenzene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
1,3-Dichlorobenzene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
1,4-Dichlorobenzene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Dichlorodifluoromethane (R12)	<0.010	< 0.010	<0.50 [3]	<0.010	0.010
1,1-Dichloroethane	<0.010	< 0.010	<0.50 [3]	<0.010	0.010
1,2-Dichloroethane (EDC)	<0.010	< 0.010	<0.50 [3]	<0.010	0.010
cis-1,2-Dichloroethylene	< 0.010	<0.010	<0.50 [3]	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Units: ug/L

Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/19/18	04/19/18	04/18/18	04/19/18	
Date Analyzed:	04/19/18	04/19/18	04/19/18	04/20/18	
AA ID No:	8D13013-09	8D13013-10	8D13013-11	8D13013-12	
Client ID No:	TP-3	TP-3 DUP	TP-5	AN-8	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	50	1	MRL
TO-15 (Mid Level) (TO-15) (co	ntinued)				
1,1-Dichloroethylene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
trans-1,2-Dichloroethylene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
1,2-Dichloropropane	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
trans-1,3-Dichloropropylene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
cis-1,3-Dichloropropylene	< 0.010	< 0.010	<0.50 [3]	<0.010	0.010
Dichlorotetrafluoroethane	< 0.010	<0.010	<0.50 [3]	<0.010	0.010
Diisopropyl ether (DIPE)	< 0.010	<0.010	<0.50 [3]	<0.010	0.010
1,4-Dioxane	< 0.010	<0.010	<0.50 [3]	<0.010	0.010
Ethanol	<0.010	<0.010	<0.50 [3]	0.012	0.010
Ethyl Acetate	< 0.010	<0.010	<0.50 [3]	<0.010	0.010
Ethylbenzene	< 0.010	<0.010	<0.50 [3]	<0.010	0.010
Ethyl-tert-Butyl Ether (ETBE)	<0.010	<0.010	<0.50 [3]	<0.010	0.010
4-Ethyltoluene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Heptane	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Hexachlorobutadiene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
n-Hexane	<0.010	<0.010	<0.50 [3]	<0.010	0.010
2-Hexanone (MBK)	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Isopropanol (IPA)	0.014	0.012	<0.50 [3]	<0.010	0.010
Methyl-tert-Butyl Ether (MTBE)	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Methylene Chloride	<0.010	<0.010	<0.50 [3]	<0.010	0.010
4-Methyl-2-pentanone (MIBK)	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Naphthalene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Propylene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Styrene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
1,1,2,2-Tetrachloroethane	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Tetrachloroethylene (PCE)	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Tetrahydrofuran (THF)	<0.010	<0.010	<0.50 [3]	<0.010	0.010



Units: ug/L



Method:

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No: NA

AA Project No: MB596143

Date Received: 04/13/18

VOCs by GCMS EPA TO-15 (Mid Level)

Project Name: Chemoil - SV Sampling

Date Reported: 04/20/18

Date Sampled: 04/13/18 04/13/18 04/13/18 04/13/18 **Date Prepared:** 04/19/18 04/18/18 04/19/18 04/19/18 **Date Analyzed:** 04/19/18 04/19/18 04/19/18 04/20/18 AA ID No: 8D13013-09 8D13013-10 8D13013-11 8D13013-12 TP-3 TP-3 DUP TP-5 AN-8 **Client ID No:** Matrix: Vapor Vapor Vapor Vapor **Dilution Factor:** 50 **MRL** 1 1 1 TO-15 (Mid Level) (TO-15) (continued) Toluene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 1.2.4-Trichlorobenzene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 1,1,2-Trichloroethane < 0.010 <0.50 [3] < 0.010 0.010 < 0.010 1,1,1-Trichloroethane < 0.010 < 0.010 < 0.50 [3] < 0.010 0.010 Trichloroethylene (TCE) < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 Trichlorofluoromethane (R11) < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 1,1,2-Trichloro-1,2,2-trifluoroeth < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 ane (R113) 1,3,5-Trimethylbenzene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 1,2,4-Trimethylbenzene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 2,2,4-Trimethylpentane < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 Vinyl acetate < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 Vinyl bromide < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 Vinyl chloride < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 o-Xylene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 m,p-Xylenes <0.50 [3] < 0.010 < 0.010 < 0.010 0.010 1,2,3-Trichloropropane < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 sec-Butylbenzene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 Isopropylbenzene < 0.010 < 0.010 < 0.50 [3] < 0.010 0.010 n-Propylbenzene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 4-Isopropyltoluene <0.50 [3] < 0.010 < 0.010 < 0.010 0.010 n-Butylbenzene < 0.010 < 0.010 <0.50 [3] < 0.010 0.010 **%REC Limits Surrogates**

A

4-Bromofluorobenzene

Viorel Vasile Operations Manager 93%

90%

94% [3]

96%

70-130



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Fixed Gases by TCD

AA Project No: MB596143 Date Received: 04/13/18

Date Reported: 04/20/18

Units: % by Volume

-				
04/13/18	04/13/18	04/13/18	04/13/18	
04/17/18	04/17/18	04/17/18	04/17/18	
04/17/18	04/17/18	04/17/18	04/17/18	
8D13013-02	8D13013-03	8D13013-05	8D13013-07	
TP-9	TP-8	TP-6	TP-2	
Vapor	Vapor	Vapor	Vapor	
2	2	2	2	MRL
3.6	3.2	1.2	<0.20	0.10
4.8	1.9	3.0	5.5	0.10
9.1	7.3	9.9	10	0.10
< 0.20	< 0.20	< 0.20	< 0.20	0.10
	04/17/18 04/17/18 8D13013-02 TP-9 Vapor 2 3.6 4.8 9.1	04/17/18	04/17/18	04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 8D13013-02 8D13013-03 8D13013-05 8D13013-07 TP-9 TP-8 TP-6 TP-2 Vapor Vapor Vapor Vapor 2 2 2 2 3.6 3.2 1.2 <0.20





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Fixed Gases by TCD

AA Project No: MB596143 Date Received: 04/13/18

Date Reported: 04/20/18

Units: % by Volume

04/13/18	04/13/18	04/13/18	
04/17/18	04/17/18	04/17/18	
04/17/18	04/17/18	04/17/18	
8D13013-09	8D13013-10	8D13013-12	
TP-3	TP-3 DUP	AN-8	
Vapor	Vapor	Vapor	
2	2	2	MRL
<0.20	<0.20	<0.20	0.10
4.7	4.1	15	0.10
11	10	2.6	0.10
< 0.20	~ 0.20	∠ 0.20	0.10
	04/17/18 04/17/18 8D13013-09 TP-3 Vapor 2 <0.20 4.7 11	04/17/18 04/17/18 04/17/18 04/17/18 8D13013-09 8D13013-10 TP-3 TP-3 DUP Vapor 2 2 <0.20 <0.20 4.7 4.1 11 10	04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 04/17/18 8D13013-09 8D13013-10 8D13013-12 TP-3 TP-3 DUP AN-8 Vapor Vapor Vapor 2 2 2 <0.20





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Units: % by Volume

Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/16/18	04/16/18	04/16/18	04/16/18	
Date Analyzed:	04/16/18	04/16/18	04/16/18	04/16/18	
AA ID No:	8D13013-01	8D13013-02	8D13013-03	8D13013-04	
Client ID No:	TP-10	TP-9	TP-8	TP-7	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL

Helium ASTM D1946M (ASTM D1946M)

Helium <0.20 **2.1** <0.20 <0.20 0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Units: % by Volume

04/13/18	04/13/18	04/13/18	04/13/18	
			,,	
04/16/18	04/16/18	04/16/18	04/16/18	
04/16/18	04/16/18	04/16/18	04/16/18	
8D13013-05	8D13013-06	8D13013-07	8D13013-08	
TP-6	TP-4	TP-2	TP-1	
Vapor	Vapor	Vapor	Vapor	
2	10	2	2	MRL
	8D13013-05 TP-6 Vapor	04/16/18 04/16/18 04/16/18 04/16/18 8D13013-05 8D13013-06 TP-6 TP-4 Vapor Vapor	04/16/18 04/16/18 04/16/18 04/16/18 04/16/18 04/16/18 8D13013-05 8D13013-06 8D13013-07 TP-6 TP-4 TP-2 Vapor Vapor Vapor	04/16/18 04/16/18 04/16/18 04/16/18 04/16/18 04/16/18 04/16/18 04/16/18 8D13013-05 8D13013-06 8D13013-07 8D13013-08 TP-6 TP-4 TP-2 TP-1 Vapor Vapor Vapor Vapor

Helium ASTM D1946M (ASTM D1946M)

Helium	< 0.20	7.8	< 0.20	<0.20	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Units: % by Volume

Date Sampled: 04/13/18 04/13/18 04/13/18 04/13/18 **Date Prepared:** 04/16/18 04/16/18 04/16/18 04/16/18 **Date Analyzed:** 04/16/18 04/16/18 04/16/18 04/16/18 AA ID No: 8D13013-09 8D13013-10 8D13013-11 8D13013-12 TP-3 TP-3 DUP TP-5 AN-8 **Client ID No:** Matrix: Vapor Vapor Vapor Vapor **Dilution Factor:** 2 2 2 **MRL** 2

Helium ASTM D1946M (ASTM D1946M)

Helium <0.20 <0.20 <0.20 **0.69** 0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Qı	uality Conti	rol							
Batch B8D1912 - *** DEFAULT P	REP ***									
Blank (B8D1912-BLK1)				Prepare	ed & Ana	lyzed: 0	4/18/18			
Acetone	<0.010	0.010	ug/L							
Allyl chloride	< 0.010	0.010	ug/L							
tert-Amyl Methyl Ether (TAME)	< 0.010	0.010	ug/L							
Benzene	< 0.010	0.010	ug/L							
Benzyl chloride	< 0.010	0.010	ug/L							
Bromodichloromethane	< 0.010	0.010	ug/L							
Bromoform	< 0.010	0.010	ug/L							
Bromomethane	< 0.010	0.010	ug/L							
1,3-Butadiene	< 0.010	0.010	ug/L							
2-Butanone (MEK)	< 0.010	0.010	ug/L							
tert-Butyl alcohol (TBA)	< 0.010	0.010	ug/L							
Carbon Disulfide	< 0.010	0.010	ug/L							
Carbon Tetrachloride	< 0.010	0.010	ug/L							
Chlorobenzene	< 0.010	0.010	ug/L							
Chloroethane	< 0.010	0.010	ug/L							
Chloroform	< 0.010	0.010	ug/L							
Chloromethane	< 0.010	0.010	ug/L							
Cyclohexane	< 0.010	0.010	ug/L							
Dibromochloromethane	< 0.010	0.010	ug/L							
1,2-Dibromoethane (EDB)	< 0.010	0.010	ug/L							
1,2-Dichlorobenzene	< 0.010	0.010	ug/L							
1,3-Dichlorobenzene	< 0.010	0.010	ug/L							
1,4-Dichlorobenzene	< 0.010	0.010	ug/L							
Dichlorodifluoromethane (R12)	< 0.010	0.010	ug/L							
1,1-Dichloroethane	< 0.010	0.010	ug/L							
1,2-Dichloroethane (EDC)	< 0.010	0.010	ug/L							
cis-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,1-Dichloroethylene	< 0.010	0.010	ug/L							
trans-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,2-Dichloropropane	< 0.010	0.010	ug/L							
40511	0.040	0.040								



trans-1,3-Dichloropropylene

<0.010

0.010

Viorel Vasile Operations Manager ug/L



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Analyte	l Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Qu	uality Contr	ol							
Batch B8D1912 - *** DEFAULT P	REP ***									
Blank (B8D1912-BLK1) Continu	ued			Prepare	ed & Ana	lyzed: 0	4/18/18			
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L							
Dichlorotetrafluoroethane	< 0.010	0.010	ug/L							
Diisopropyl ether (DIPE)	< 0.010	0.010	ug/L							
1,4-Dioxane	< 0.010	0.010	ug/L							
Ethanol	< 0.010	0.010	ug/L							
Ethyl Acetate	< 0.010	0.010	ug/L							
Ethylbenzene	< 0.010	0.010	ug/L							
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	0.010	ug/L							
4-Ethyltoluene	< 0.010	0.010	ug/L							
Heptane	< 0.010	0.010	ug/L							
Hexachlorobutadiene	< 0.010	0.010	ug/L							
n-Hexane	< 0.010	0.010	ug/L							
2-Hexanone (MBK)	< 0.010	0.010	ug/L							
Isopropanol (IPA)	< 0.010	0.010	ug/L							
Methyl-tert-Butyl Ether (MTBE)	< 0.010	0.010	ug/L							
Methylene Chloride	< 0.010	0.010	ug/L							
4-Methyl-2-pentanone (MIBK)	< 0.010	0.010	ug/L							
Naphthalene	< 0.010	0.010	ug/L							
Propylene Propylene	< 0.010	0.010	ug/L							
Styrene	< 0.010	0.010	ug/L							
1,1,2,2-Tetrachloroethane	< 0.010	0.010	ug/L							
Tetrachloroethylene (PCE)	< 0.010	0.010	ug/L							
Tetrahydrofuran (THF)	< 0.010	0.010	ug/L							
Toluene	< 0.010	0.010	ug/L							
1,2,4-Trichlorobenzene	< 0.010	0.010	ug/L							
1,1,2-Trichloroethane	< 0.010	0.010	ug/L							
1,1,1-Trichloroethane	< 0.010	0.010	ug/L							
Trichloroethylene (TCE)	< 0.010	0.010	ug/L							
Trichlorofluoromethane (R11)	< 0.010	0.010	ug/L							
1,1,2-Trichloro-1,2,2-trifluoroetha (R113)	ane<0.010	0.010	ug/L							
(R113)		0.010								

A

1,3,5-Trimethylbenzene

Viorel Vasile Operations Manager ug/L

< 0.010 0.010



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	F Result	Reporting Limit	Units		Source Result %RE0	%REC C Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Lo		ıality Contr	ol						
Batch B8D1912 - *** DEFAULT PR	EP ***								
Blank (B8D1912-BLK1) Continue	ed			Prepare	ed & Analyzed:	04/18/18			
1,2,4-Trimethylbenzene	<0.010	0.010	ug/L	<u> </u>	-				
2,2,4-Trimethylpentane	<0.010	0.010	ug/L						
Vinyl acetate	<0.010	0.010	ug/L						
Vinyl bromide	<0.010	0.010	ug/L						
Vinyl chloride	<0.010	0.010	ug/L						
o-Xylene	<0.010	0.010	ug/L						
m,p-Xylenes	<0.010	0.010	ug/L						
1,2,3-Trichloropropane	<0.010	0.010	ug/L						
sec-Butylbenzene	<0.010	0.010	ug/L						
Isopropylbenzene	<0.010	0.010	ug/L						
n-Propylbenzene	<0.010	0.010	ug/L						
4-Isopropyltoluene	<0.010	0.010	ug/L						
n-Butylbenzene	<0.010	0.010	ug/L						
Surrogate: 4-Bromofluorobenzene	0.131		ug/L	0.14	91.4	70-130			
LCS (B8D1912-BS1)			-	Prepare	ed: 04/18/18 Ar	nalyzed: 04	4/19/18		
Acetone	0.0807	0.010	ug/L	0.095	85.0				
Benzene	0.118	0.010	ug/L	0.13	92.3	70-130			
Benzyl chloride	0.206	0.010	ug/L	0.21	99.7				
Bromodichloromethane	0.255	0.010	ug/L	0.27	95.3				
Bromoform	0.407	0.010	ug/L	0.41	98.4				
Bromomethane	0.195	0.010	ug/L	0.16	125	70-130			
2-Butanone (MEK)	0.109	0.010	ug/L	0.12	92.1				
Carbon Disulfide	0.116	0.010	ug/L	0.12	92.8				
Carbon Tetrachloride	0.250	0.010	ug/L	0.25	99.5				
Chlorobenzene	0.187	0.010	ug/L	0.18	101	70-130			
Chloroethane	0.106	0.010	ug/L	0.11	100	70-130			
Chloroform	0.185	0.010	ug/L	0.20	94.8				
Chloromethane	0.0643	0.010	ug/L	0.083	77.9				
Dibromochloromethane	0.332	0.010	ug/L	0.34	97.5				
1,2-Dibromoethane (EDB)	0.348	0.010	ug/L	0.31	113	70-130			
1,2-Dichlorobenzene	0.263	0.010	ug/L	0.24	109	70-130			

A



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No:

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Lo	evel) - Q	uality Conti	rol						
Batch B8D1912 - *** DEFAULT PRE	EP ***								
LCS (B8D1912-BS1) Continued				Prepare	ed: 04/18/18 Ana	alyzed: 04	4/19/18		
1,3-Dichlorobenzene	0.259	0.010	ug/L	0.24	108	70-130			
1,4-Dichlorobenzene	0.251	0.010	ug/L	0.24	104	70-130			
Dichlorodifluoromethane (R12)	0.183	0.010	ug/L	0.20	92.3	70-130			
1,1-Dichloroethane	0.149	0.010	ug/L	0.16	91.9	70-130			
1,2-Dichloroethane (EDC)	0.151	0.010	ug/L	0.16	93.4	70-130			
cis-1,2-Dichloroethylene	0.150	0.010	ug/L	0.16	94.9	70-130			
1,1-Dichloroethylene	0.146	0.010	ug/L	0.16	92.3	70-130			
trans-1,2-Dichloroethylene	0.140	0.010	ug/L	0.16	88.2	70-130			
1,2-Dichloropropane	0.178	0.010	ug/L	0.18	96.2	70-130			
trans-1,3-Dichloropropylene	0.193	0.010	ug/L	0.18	106	70-130			
cis-1,3-Dichloropropylene	0.184	0.010	ug/L	0.18	101	70-130			
Dichlorotetrafluoroethane	0.259	0.010	ug/L	0.28	92.5	70-130			
Ethylbenzene	0.158	0.010	ug/L	0.17	91.0	70-130			
4-Ethyltoluene	0.178	0.010	ug/L	0.20	90.4	70-130			
Hexachlorobutadiene	0.535	0.010	ug/L	0.43	126	70-130			
2-Hexanone (MBK)	0.140	0.010	ug/L	0.16	85.2	70-130			
Isopropanol (IPA)	0.0848	0.010	ug/L	0.098	86.3	70-130			
Methylene Chloride	0.107	0.010	ug/L	0.14	76.7	70-130			
4-Methyl-2-pentanone (MIBK)	0.147	0.010	ug/L	0.16	89.9	70-130			
Styrene	0.168	0.010	ug/L	0.17	98.8	70-130			
1,1,2,2-Tetrachloroethane	0.204	0.010	ug/L	0.27	74.3	70-130			
Tetrachloroethylene (PCE)	0.280	0.010	ug/L	0.27	103	70-130			
Toluene	0.144	0.010	ug/L	0.15	95.6	70-130			
1,2,4-Trichlorobenzene	0.419	0.010	ug/L	0.30	141	70-130			**
1,1,2-Trichloroethane	0.218	0.010	ug/L	0.22	99.7	70-130			
1,1,1-Trichloroethane	0.203	0.010	ug/L	0.22	92.9	70-130			
Trichloroethylene (TCE)	0.257	0.010	ug/L	0.21	120	70-130			
Trichlorofluoromethane (R11)	0.211	0.010	ug/L	0.22	93.9	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethane	e 0.292	0.010	ug/L	0.31	95.2	70-130			
(R113)			_						
1,3,5-Trimethylbenzene	0.199	0.010	ug/L	0.20	101	70-130			
1,2,4-Trimethylbenzene	0.197	0.010	ug/L	0.20	100	70-130			





LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No:

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	l Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	-	uality Contr	ol						
Batch B8D1912 - *** DEFAULT PRI	EP ***								
LCS (B8D1912-BS1) Continued				Prepare	ed: 04/18/18 Ana	alyzed: 04	4/19/18		
Vinyl acetate	0.130	0.010	ug/L	0.14	92.6	70-130			
Vinyl chloride	0.115	0.010	ug/L	0.10	112	70-130			
o-Xylene	0.160	0.010	ug/L	0.17	92.4	70-130			
m,p-Xylenes	0.317	0.010	ug/L	0.35	91.1	70-130			
1,2,3-Trichloropropane	0.214	0.010	ug/L	0.24	88.6	70-130			
sec-Butylbenzene	0.205	0.010	ug/L	0.22	93.6	70-130			
Isopropylbenzene	0.180	0.010	ug/L	0.20	91.5	70-130			
n-Propylbenzene	0.174	0.010	ug/L	0.20	88.3	70-130			
4-Isopropyltoluene	0.213	0.010	ug/L	0.22	97.0	70-130			
Surrogate: 4-Bromofluorobenzene	0.142		ug/L	0.14	99.0	70-130			
LCS Dup (B8D1912-BSD1)				Prepare	ed: 04/18/18 Ana	alyzed: 04	4/19/18		
Acetone	0.0782	0.010	ug/L	0.095	82.3	70-130	3.17	30	
Benzene	0.113	0.010	ug/L	0.13	88.6	70-130	4.15	30	
Benzyl chloride	0.199	0.010	ug/L	0.21	96.0	70-130	3.70	30	
Bromodichloromethane	0.238	0.010	ug/L	0.27	88.7	70-130	7.12	30	
Bromoform	0.405	0.010	ug/L	0.41	97.9	70-130	0.510	30	
Bromomethane	0.187	0.010	ug/L	0.16	121	70-130	3.88	30	
2-Butanone (MEK)	0.103	0.010	ug/L	0.12	87.1	70-130	5.50	30	
Carbon Disulfide	0.111	0.010	ug/L	0.12	88.8	70-130	4.38	30	
Carbon Tetrachloride	0.245	0.010	ug/L	0.25	97.2	70-130	2.39	30	
Chlorobenzene	0.182	0.010	ug/L	0.18	99.1	70-130	2.34	30	
Chloroethane	0.102	0.010	ug/L	0.11	97.0	70-130	3.39	30	
Chloroform	0.181	0.010	ug/L	0.20	92.5	70-130	2.48	30	
Chloromethane	0.0618	0.010	ug/L	0.083	74.8	70-130	3.96	30	
Dibromochloromethane	0.322	0.010	ug/L	0.34	94.4	70-130	3.23	30	
1,2-Dibromoethane (EDB)	0.336	0.010	ug/L	0.31	109	70-130	3.49	30	
1,2-Dichlorobenzene	0.254	0.010	ug/L	0.24	106	70-130	3.30	30	
1,3-Dichlorobenzene	0.258	0.010	ug/L	0.24	107	70-130	0.581	30	
1,4-Dichlorobenzene	0.249	0.010	ug/L	0.24	104	70-130	0.673	30	
Dichlorodifluoromethane (R12)	0.178	0.010	ug/L	0.20	89.9	70-130	2.55	30	
1,1-Dichloroethane	0.145	0.010	ug/L	0.16	89.6	70-130	2.45	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le		uality Conti	rol						
Batch B8D1912 - *** DEFAULT PRE	P ***								
LCS Dup (B8D1912-BSD1) Contin	ued			Prepare	ed: 04/18/18 Ana	alyzed: 0	4/19/18		
1,2-Dichloroethane (EDC)	0.146	0.010	ug/L	0.16	90.0	70-130	3.71	30	
cis-1,2-Dichloroethylene	0.144	0.010	ug/L	0.16	91.0	70-130	4.17	30	
1,1-Dichloroethylene	0.145	0.010	ug/L	0.16	91.4	70-130	0.980	30	
trans-1,2-Dichloroethylene	0.137	0.010	ug/L	0.16	86.2	70-130	2.29	30	
1,2-Dichloropropane	0.169	0.010	ug/L	0.18	91.3	70-130	5.17	30	
trans-1,3-Dichloropropylene	0.184	0.010	ug/L	0.18	102	70-130	4.36	30	
cis-1,3-Dichloropropylene	0.173	0.010	ug/L	0.18	95.3	70-130	6.20	30	
Dichlorotetrafluoroethane	0.276	0.010	ug/L	0.28	98.6	70-130	6.36	30	
Ethylbenzene	0.152	0.010	ug/L	0.17	87.3	70-130	4.15	30	
4-Ethyltoluene	0.174	0.010	ug/L	0.20	88.6	70-130	2.01	30	
Hexachlorobutadiene	0.499	0.010	ug/L	0.43	117	70-130	7.01	30	
2-Hexanone (MBK)	0.130	0.010	ug/L	0.16	79.2	70-130	7.39	30	
Isopropanol (IPA)	0.0816	0.010	ug/L	0.098	83.0	70-130	3.84	30	
Methylene Chloride	0.102	0.010	ug/L	0.14	73.6	70-130	4.16	30	
4-Methyl-2-pentanone (MIBK)	0.140	0.010	ug/L	0.16	85.5	70-130	5.02	30	
Styrene	0.161	0.010	ug/L	0.17	94.3	70-130	4.74	30	
1,1,2,2-Tetrachloroethane	0.198	0.010	ug/L	0.27	72.2	70-130	2.87	30	
Tetrachloroethylene (PCE)	0.276	0.010	ug/L	0.27	102	70-130	1.61	30	
Toluene	0.137	0.010	ug/L	0.15	90.8	70-130	5.17	30	
1,2,4-Trichlorobenzene	0.387	0.010	ug/L	0.30	130	70-130	7.93	30	
1,1,2-Trichloroethane	0.211	0.010	ug/L	0.22	96.7	70-130	3.05	30	
1,1,1-Trichloroethane	0.198	0.010	ug/L	0.22	90.8	70-130	2.29	30	
Trichloroethylene (TCE)	0.253	0.010	ug/L	0.21	118	70-130	1.64	30	
Trichlorofluoromethane (R11)	0.209	0.010	ug/L	0.22	93.0	70-130	1.02	30	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.290	0.010	ug/L	0.31	94.5	70-130	0.791	30	
(R113)									
1,3,5-Trimethylbenzene	0.193	0.010	ug/L	0.20	98.1	70-130	3.04	30	
1,2,4-Trimethylbenzene	0.191	0.010	ug/L	0.20	97.0	70-130	3.39	30	
Vinyl acetate	0.125	0.010	ug/L	0.14	88.4	70-130	4.59	30	
Vinyl chloride	0.112	0.010	ug/L	0.10	109	70-130	2.51	30	
o-Xylene	0.156		ug/L	0.17	90.0	70-130	2.66	30	
m,p-Xylenes	0.307	0.010	ug/L	0.35	88.4	70-130	2.99	30	



Date Reported: 04/20/18



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No: NA

AA Project No: MB596143

Date Received: 04/13/18

Project Name: Chemoil - SV Sampling

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Qı	uality Cont	rol						
Batch B8D1912 - *** DEFAULT PI									
LCS Dup (B8D1912-BSD1) Con	tinued			Prepare	ed: 04/18/18 Ana	alvzed: 04	4/19/18		
1,2,3-Trichloropropane	0.209	0.010	ug/L	0.24	86.4	70-130	2.43	30	
sec-Butylbenzene	0.197	0.010	ug/L	0.22	89.7	70-130	4.23	30	
Isopropylbenzene	0.176	0.010	ug/L	0.20	89.3	70-130	2.43	30	
n-Propylbenzene	0.168	0.010	ug/L	0.20	85.2	70-130	3.52	30	
4-Isopropyltoluene	0.206	0.010	ug/L	0.22	93.6	70-130	3.52	30	
Surrogate: 4-Bromofluorobenzen	e 0.141		ug/L	0.14	98.5	70-130			
Batch B8D2010 - *** DEFAULT PI	~		ug/ =	01.1	00.0	70 700			
Blank (B8D2010-BLK1)				Prepare	ed & Analyzed: 0	4/19/18			
Acetone	<0.010	0.010	ug/L						
Allyl chloride	< 0.010	0.010	ug/L						
tert-Amyl Methyl Ether (TAME)	< 0.010	0.010	ug/L						
Benzene	< 0.010	0.010	ug/L						
Benzyl chloride	< 0.010	0.010	ug/L						
Bromodichloromethane	< 0.010	0.010	ug/L						
Bromoform	< 0.010	0.010	ug/L						
Bromomethane	< 0.010	0.010	ug/L						
1,3-Butadiene	< 0.010	0.010	ug/L						
2-Butanone (MEK)	< 0.010	0.010	ug/L						
tert-Butyl alcohol (TBA)	< 0.010	0.010	ug/L						
Carbon Disulfide	< 0.010	0.010	ug/L						
Carbon Tetrachloride	< 0.010	0.010	ug/L						
Chlorobenzene	< 0.010	0.010	ug/L						
Chloroethane	< 0.010	0.010	ug/L						
Chloroform	< 0.010	0.010	ug/L						
Chloromethane	< 0.010	0.010	ug/L						
Cyclohexane	< 0.010	0.010	ug/L						
Dibromochloromethane	< 0.010	0.010	ug/L						
1,2-Dibromoethane (EDB)	< 0.010	0.010	ug/L						
1,2-Dichlorobenzene	< 0.010	0.010	ug/L						
1,3-Dichlorobenzene	< 0.010	0.010	ug/L						
4.4.D'.111	.0.040	0.040	. /1						



Viorel Vasile Operations Manager

1,4-Dichlorobenzene

ug/L

<0.010

0.010



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

		Reporting			Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Q	uality Conti	rol							
Batch B8D2010 - *** DEFAULT PI	REP ***	-								
Blank (B8D2010-BLK1) Continu	ıed			Prepare	ed & Ana	lyzed: 0	4/19/18			
Dichlorodifluoromethane (R12)	<0.010	0.010	ug/L							
1,1-Dichloroethane	< 0.010	0.010	ug/L							
1,2-Dichloroethane (EDC)	< 0.010	0.010	ug/L							
cis-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,1-Dichloroethylene	< 0.010	0.010	ug/L							
trans-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,2-Dichloropropane	< 0.010	0.010	ug/L							
trans-1,3-Dichloropropylene	< 0.010	0.010	ug/L							
cis-1,3-Dichloropropylene	< 0.010	0.010	ug/L							
Dichlorotetrafluoroethane	< 0.010	0.010	ug/L							
Diisopropyl ether (DIPE)	< 0.010	0.010	ug/L							
1,4-Dioxane	< 0.010	0.010	ug/L							
Ethanol	<0.010	0.010	ug/L							
Ethyl Acetate	<0.010	0.010	ug/L							
Ethylbenzene	<0.010	0.010	ug/L							
Ethyl-tert-Butyl Ether (ETBE)	<0.010	0.010	ug/L							
4-Ethyltoluene	< 0.010	0.010	ug/L							
Heptane	<0.010	0.010	ug/L							
Hexachlorobutadiene	<0.010	0.010	ug/L							
n-Hexane	<0.010	0.010	ug/L							
2-Hexanone (MBK)	<0.010	0.010	ug/L							
Isopropanol (IPA)	< 0.010	0.010	ug/L							
Methyl-tert-Butyl Ether (MTBE)	< 0.010	0.010	ug/L							
Methylene Chloride	< 0.010	0.010	ug/L							
4-Methyl-2-pentanone (MIBK)	< 0.010	0.010	ug/L							
Naphthalene	<0.010	0.010	ug/L							
Propylene	<0.010	0.010	ug/L							



1,1,2,2-Tetrachloroethane

Tetrachloroethylene (PCE)

Tetrahydrofuran (THF)

Viorel Vasile Operations Manager

Styrene

ug/L

ug/L

ug/L

ug/L

< 0.010

< 0.010

< 0.010

< 0.010

0.010

0.010

0.010

0.010



Client: The Source Group, Inc. (PH)

Project No:

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L	-	uality Contr	ol							
Batch B8D2010 - *** DEFAULT PR	EP ***									
Blank (B8D2010-BLK1) Continue	ed			Prepare	ed & Ana	lyzed: 0	4/19/18			
Toluene	<0.010	0.010	ug/L							
1,2,4-Trichlorobenzene	<0.010	0.010	ug/L							
1,1,2-Trichloroethane	<0.010	0.010	ug/L							
1,1,1-Trichloroethane	<0.010	0.010	ug/L							
Trichloroethylene (TCE)	<0.010	0.010	ug/L							
Trichlorofluoromethane (R11)	<0.010	0.010	ug/L							
1,1,2-Trichloro-1,2,2-trifluoroethan	e<0.010	0.010	ug/L							
(R113)			_							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							
1,2,4-Trimethylbenzene	<0.010	0.010	ug/L							
2,2,4-Trimethylpentane	<0.010	0.010	ug/L							
Vinyl acetate	<0.010	0.010	ug/L							
Vinyl bromide	<0.010	0.010	ug/L							
Vinyl chloride	<0.010	0.010	ug/L							
o-Xylene	<0.010	0.010	ug/L							
m,p-Xylenes	<0.010	0.010	ug/L							
1,2,3-Trichloropropane	<0.010	0.010	ug/L							
sec-Butylbenzene	<0.010	0.010	ug/L							
Isopropylbenzene	<0.010	0.010	ug/L							
n-Propylbenzene	<0.010	0.010	ug/L							
4-Isopropyltoluene	<0.010	0.010	ug/L							
n-Butylbenzene	<0.010	0.010	ug/L							
Surrogate: 4-Bromofluorobenzene	0.131		ug/L	0.14		91.2	70-130			
LCS (B8D2010-BS1)				Prepare	ed & Ana	lyzed: 0	4/19/18			
Acetone	0.0806	0.010	ug/L	0.095		84.8	70-130			
Benzene	0.111	0.010	ug/L	0.13		86.7	70-130			
Benzyl chloride	0.173	0.010	ug/L	0.21		83.3	70-130			
Bromodichloromethane	0.234	0.010	ug/L	0.27		87.5	70-130			
Bromoform	0.392	0.010	ug/L	0.41		94.7	70-130			
Bromomethane	0.183	0.010	ug/L	0.16		118	70-130			
2-Butanone (MEK)	0.101	0.010	ug/L	0.12		85.8	70-130			
			-							





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L			ol						
Batch B8D2010 - *** DEFAULT PR	-	•							
LCS (B8D2010-BS1) Continued				Prepare	ed & Analyzed: 0	4/19/18			
Carbon Disulfide	0.111	0.010	ug/L	0.12	88.9	70-130			
Carbon Tetrachloride	0.247	0.010	ug/L	0.25	98.2	70-130			
Chlorobenzene	0.179	0.010	ug/L	0.18	97.2	70-130			
Chloroethane	0.0987	0.010	ug/L	0.11	93.5	70-130			
Chloroform	0.177	0.010	ug/L	0.20	90.7	70-130			
Chloromethane	0.0737	0.010	ug/L	0.083	89.2	70-130			
Dibromochloromethane	0.320	0.010	ug/L	0.34	93.8	70-130			
1,2-Dibromoethane (EDB)	0.337	0.010	ug/L	0.31	110	70-130			
1,2-Dichlorobenzene	0.225	0.010	ug/L	0.24	93.4	70-130			
1,3-Dichlorobenzene	0.229	0.010	ug/L	0.24	95.0	70-130			
1,4-Dichlorobenzene	0.225	0.010	ug/L	0.24	93.7	70-130			
Dichlorodifluoromethane (R12)	0.182	0.010	ug/L	0.20	91.9	70-130			
1,1-Dichloroethane	0.139	0.010	ug/L	0.16	86.0	70-130			
1,2-Dichloroethane (EDC)	0.146	0.010	ug/L	0.16	90.1	70-130			
cis-1,2-Dichloroethylene	0.143	0.010	ug/L	0.16	90.2	70-130			
1,1-Dichloroethylene	0.143	0.010	ug/L	0.16	90.4	70-130			
trans-1,2-Dichloroethylene	0.134	0.010	ug/L	0.16	84.8	70-130			
1,2-Dichloropropane	0.169	0.010	ug/L	0.18	91.2	70-130			
trans-1,3-Dichloropropylene	0.178	0.010	ug/L	0.18	97.9	70-130			
cis-1,3-Dichloropropylene	0.171	0.010	ug/L	0.18	94.0	70-130			
Dichlorotetrafluoroethane	0.289	0.010	ug/L	0.28	103	70-130			
Ethylbenzene	0.148	0.010	ug/L	0.17	85.3	70-130			
4-Ethyltoluene	0.157	0.010	ug/L	0.20	79.6	70-130			
Hexachlorobutadiene	0.207	0.010	ug/L	0.43	48.4	70-130			**
2-Hexanone (MBK)	0.137	0.010	ug/L	0.16	83.6	70-130			
Isopropanol (IPA)	0.0742	0.010	ug/L	0.098	75.4	70-130			
Methylene Chloride	0.103	0.010	ug/L	0.14	74.0	70-130			
4-Methyl-2-pentanone (MIBK)	0.133	0.010	ug/L	0.16	81.0	70-130			
Styrene	0.154	0.010	ug/L	0.17	90.3	70-130			
1,1,2,2-Tetrachloroethane	0.182	0.010	ug/L	0.27	66.4	70-130			**:
Tetrachloroethylene (PCE)	0.276	0.010	ug/L	0.27	102	70-130			

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Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	evel) - Q	uality Conti	rol						
Batch B8D2010 - *** DEFAULT PRE	EP ***								
LCS (B8D2010-BS1) Continued				Prepare	ed & Analyzed: 0	4/19/18			
Toluene	0.137	0.010	ug/L	0.15	90.7	70-130			
1,2,4-Trichlorobenzene	0.167	0.010	ug/L	0.30	56.1	70-130			***
1,1,2-Trichloroethane	0.212	0.010	ug/L	0.22	97.3	70-130			
1,1,1-Trichloroethane	0.198	0.010	ug/L	0.22	90.8	70-130			
Trichloroethylene (TCE)	0.245	0.010	ug/L	0.21	114	70-130			
Trichlorofluoromethane (R11)	0.206	0.010	ug/L	0.22	91.9	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethane	0.288	0.010	ug/L	0.31	94.0	70-130			
(R113)			J						
1,3,5-Trimethylbenzene	0.172	0.010	ug/L	0.20	87.3	70-130			
1,2,4-Trimethylbenzene	0.171	0.010	ug/L	0.20	86.9	70-130			
Vinyl acetate	0.123	0.010	ug/L	0.14	87.6	70-130			
Vinyl chloride	0.109	0.010	ug/L	0.10	106	70-130			
o-Xylene	0.148	0.010	ug/L	0.17	85.3	70-130			
m,p-Xylenes	0.294	0.010	ug/L	0.35	84.7	70-130			
1,2,3-Trichloropropane	0.186	0.010	ug/L	0.24	77.2	70-130			
sec-Butylbenzene	0.176	0.010	ug/L	0.22	80.3	70-130			
Isopropylbenzene	0.163	0.010	ug/L	0.20	83.1	70-130			
n-Propylbenzene	0.151	0.010	ug/L	0.20	76.9	70-130			
4-Isopropyltoluene	0.180	0.010	ug/L	0.22	81.9	70-130			
Surrogate: 4-Bromofluorobenzene	0.135		ug/L	0.14	94.6	70-130			
LCS Dup (B8D2010-BSD1)				Prepare	ed: 04/19/18 Ana	alyzed: 04	1/20/18		
Acetone	0.0905	0.010	ug/L	0.095	95.2	70-130	11.5	30	
Benzene	0.130	0.010	ug/L	0.13	102	70-130	15.8	30	
Benzyl chloride	0.220	0.010	ug/L	0.21	106	70-130	24.4	30	
Bromodichloromethane	0.278	0.010	ug/L	0.27	104	70-130	16.9	30	
Bromoform	0.433	0.010	ug/L	0.41	105	70-130	10.0	30	
Bromomethane	0.209	0.010	ug/L	0.16	135	70-130	13.6	30	**
2-Butanone (MEK)	0.117	0.010	ug/L	0.12	99.4	70-130	14.8	30	
Carbon Disulfide	0.122	0.010	ug/L	0.12	97.8	70-130	9.51	30	
Carbon Tetrachloride	0.287	0.010	ug/L	0.25	114	70-130	14.9	30	
Chlorobenzene	0.213	0.010	ug/L	0.18	116	70-130	17.5	30	
			-						

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Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	•	uality Conti	rol						
Batch B8D2010 - *** DEFAULT PI	REP ***								
LCS Dup (B8D2010-BSD1) Con	tinued			Prepare	ed: 04/19/18 Ana	alyzed: 04	4/20/18		
Chloroethane	0.110	0.010	ug/L	0.11	104	70-130	10.6	30	
Chloroform	0.209	0.010	ug/L	0.20	107	70-130	16.4	30	
Chloromethane	0.0692	0.010	ug/L	0.083	83.8	70-130	6.30	30	
Dibromochloromethane	0.375	0.010	ug/L	0.34	110	70-130	15.9	30	
1,2-Dibromoethane (EDB)	0.392	0.010	ug/L	0.31	128	70-130	15.1	30	
1,2-Dichlorobenzene	0.287	0.010	ug/L	0.24	119	70-130	24.2	30	
1,3-Dichlorobenzene	0.284	0.010	ug/L	0.24	118	70-130	21.7	30	
1,4-Dichlorobenzene	0.281	0.010	ug/L	0.24	117	70-130	21.9	30	
Dichlorodifluoromethane (R12)	0.202	0.010	ug/L	0.20	102	70-130	10.6	30	
1,1-Dichloroethane	0.164	0.010	ug/L	0.16	101	70-130	16.5	30	
1,2-Dichloroethane (EDC)	0.169	0.010	ug/L	0.16	104	70-130	14.7	30	
cis-1,2-Dichloroethylene	0.161	0.010	ug/L	0.16	102	70-130	11.9	30	
1,1-Dichloroethylene	0.160	0.010	ug/L	0.16	101	70-130	11.2	30	
trans-1,2-Dichloroethylene	0.150	0.010	ug/L	0.16	94.4	70-130	10.7	30	
1,2-Dichloropropane	0.192	0.010	ug/L	0.18	104	70-130	12.9	30	
trans-1,3-Dichloropropylene	0.205	0.010	ug/L	0.18	113	70-130	14.4	30	
cis-1,3-Dichloropropylene	0.195	0.010	ug/L	0.18	107	70-130	13.2	30	
Dichlorotetrafluoroethane	0.291	0.010	ug/L	0.28	104	70-130	0.892	30	
Ethylbenzene	0.181	0.010	ug/L	0.17	104	70-130	19.9	30	
4-Ethyltoluene	0.202	0.010	ug/L	0.20	103	70-130	25.4	30	
Hexachlorobutadiene	0.519	0.010	ug/L	0.43	122	70-130	86.1	30	
2-Hexanone (MBK)	0.142	0.010	ug/L	0.16	86.8	70-130	3.75	30	
Isopropanol (IPA)	0.0888	0.010	ug/L	0.098	90.4	70-130	18.0	30	
Methylene Chloride	0.117	0.010	ug/L	0.14	84.5	70-130	13.2	30	
4-Methyl-2-pentanone (MIBK)	0.167	0.010	ug/L	0.16	102	70-130	23.0	30	
Styrene	0.186	0.010	ug/L	0.17	109	70-130	19.1	30	
1,1,2,2-Tetrachloroethane	0.240	0.010	ug/L	0.27	87.5	70-130	27.4	30	
Tetrachloroethylene (PCE)	0.304	0.010	ug/L	0.27	112	70-130	9.81	30	
Toluene	0.161	0.010	ug/L	0.15	107	70-130	16.3	30	
1,2,4-Trichlorobenzene	0.385	0.010	ug/L	0.30	130	70-130	79.3	30	
1,1,2-Trichloroethane	0.253	0.010	ug/L	0.22	116	70-130	17.4	30	





Client: The Source Group, Inc. (PH)

Project No:

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	vel) - Q	uality Cont	rol						
Batch B8D2010 - *** DEFAULT PRE	P ***								
LCS Dup (B8D2010-BSD1) Contin	ued			Prepare	ed: 04/19/18 Ana	alyzed: 04	4/20/18		
1,1,1-Trichloroethane	0.230	0.010	ug/L	0.22	106	70-130	15.1	30	
Trichloroethylene (TCE)	0.286	0.010	ug/L	0.21	133	70-130	15.3	30	**
Trichlorofluoromethane (R11)	0.236	0.010	ug/L	0.22	105	70-130	13.2	30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	0.312	0.010	ug/L	0.31	102	70-130	8.02	30	
1,3,5-Trimethylbenzene	0.221	0.010	ug/L	0.20	112	70-130	25.0	30	
1,2,4-Trimethylbenzene	0.220	0.010	ug/L	0.20	112	70-130	25.4	30	
Vinyl acetate	0.144	0.010	ug/L	0.14	102	70-130	15.5	30	
Vinyl chloride	0.121	0.010	ug/L	0.10	118	70-130	10.6	30	
o-Xylene	0.185	0.010	ug/L	0.17	107	70-130	22.3	30	
m,p-Xylenes	0.362	0.010	ug/L	0.35	104	70-130	20.8	30	
1,2,3-Trichloropropane	0.246	0.010	ug/L	0.24	102	70-130	27.5	30	
sec-Butylbenzene	0.233	0.010	ug/L	0.22	106	70-130	27.9	30	
Isopropylbenzene	0.204	0.010	ug/L	0.20	104	70-130	22.0	30	
n-Propylbenzene	0.202	0.010	ug/L	0.20	103	70-130	28.5	30	
4-Isopropyltoluene	0.239	0.010	ug/L	0.22	109	70-130	28.1	30	
Surrogate: 4-Bromofluorobenzene	0.144		ug/L	0.14	101	70-130			
Fixed Gases by TCD - Quality Cont	rol								

Batch B8D1726 - *** DEFAULT PREP ***

		Prepared & Analyzed: 04/17/18
<0.10	0.10	% by
		Volume
< 0.10	0.10	% by
		Volume
< 0.10	0.10	% by
		Volume
<0.10	0.10	% by
		Volume
		Prepared & Analyzed: 04/17/18
4.19	0.20	% by 4.5 93.2 75-125
		Volume
	<0.10 <0.10 <0.10	<0.10 0.10 <0.10 0.10 <0.10 0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Fixed Gases by TCD - Quality Con	trol									
Batch B8D1726 - *** DEFAULT PRE	EP ***									
LCS (B8D1726-BS1) Continued				Prepare	ed & Analy	zed: 0	4/17/18			
Oxygen	3.85	0.20	% by Volume	4.0		96.2	75-125			
Carbon Dioxide	14.0	0.20	% by Volume	15		93.0	75-125			
Carbon Monoxide	6.53	0.20	% by Volume	7.0		93.3	75-125			
LCS Dup (B8D1726-BSD1)				Prepare	ed & Analy	zed: 0	4/17/18			
Methane	4.19	0.20	% by Volume	4.5		93.1	75-125	0.0477	30	
Oxygen	3.90	0.20	% by Volume	4.0		97.4	75-125	1.19	30	
Carbon Dioxide	14.0	0.20	% by Volume	15		93.1	75-125	0.115	30	
Carbon Monoxide	6.57	0.20	% by Volume	7.0		93.8	75-125	0.580	30	
Duplicate (B8D1726-DUP1)		Source: 8D	13013-02	Prepare	ed & Analy	zed: 0	4/17/18			
Methane	3.50	0.20	% by Volume		3.57			2.21	30	
Oxygen	5.08	0.20	% by Volume		4.78			6.08	30	
Carbon Dioxide	8.87	0.20	% by Volume		9.12			2.69	30	
Carbon Monoxide	<0.20	0.20	% by Volume		<0.20				30	
Helium by GC/TCD - Quality Contro	ol									
Batch B8D1626 - *** DEFAULT PR	EP ***									
Blank (B8D1626-BLK1)				Prepare	ed & Analy	zed: 0	4/16/18			
Helium	<0.10	0.10	% by Volume	-						
LCS (B8D1626-BS1)				Prepare	ed & Analy	zed: 0	4/16/18			

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143 Date Received: 04/13/18 Date Reported: 04/20/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Helium by GC/TCD - Quality Contro	ol									
Batch B8D1626 - *** DEFAULT PRE	EP ***									
LCS (B8D1626-BS1) Continued				Prepare	ed & Anal	yzed: 0	4/16/18			
Helium	0.381	0.10	% by Volume	0.50		76.3	70-130			
LCS Dup (B8D1626-BSD1)				Prepare	ed & Anal	yzed: 0	4/16/18			
Helium	0.400	0.10	% by Volume	0.50		80.0	70-130	4.81	30	
Duplicate (B8D1626-DUP1)		Source: 8D	12006-02	Prepare	ed & Anal	yzed: 0	4/16/18			
Helium	3.13	0.20	% by Volume		3.18			1.62	30	

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596143

Date Received: 04/13/18

Date Reported: 04/20/18

Special Notes

[1] = ** : Exceeds upper control limit.

[2] = *** : Exceeds lower control limit.

[3] = AA-C1 : The sample required dilution due to the presence of high moisture content.

[4] = E : The concentration indicated for this analyte is an estimated value above the calibration range of

the instrument. This value is considered an estimate (CLP E-flag).



AMERICAN * MAR YTICS

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel: 818-998-5547 FAX: 818-998-7258

70048466 Page of

A.A. COC No.: 15/80

Client: APEX		, market	Project Name / No.:	ıme / No.:	Chrewoi	Ĺ				Sampler's Name:	Name: Cary	> 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
Project Manager:	Kirken Duck		Site	Address:	, ,	L Sal	4	, ŠŠ	Sai	Sampler's Signature:	lature:		-
Phone:				Ç.	Sign					P.C	P.O. No.:	ó bu datistrádó kisdda dalorretrarretra entra entratorio kistakki kvadotaki merepezemenen	
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# (**)	Same Day Rush	4	72 Hour Rush	rts.									·
" (2)		11	5 Day Rush				è	and the same of th					····
= (3)	48 Hour Rush	× "	10 Working		Days (Standard TAT)		un		C			Special	
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Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

April 30, 2018

Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100 Pleasant Hill, CA 94523

Re: Chemoil - SV Sampling

MB596147 / 8D24011

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/24/18 17:00 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager

AA Project No: MB596147



LABORATORY ANALYSIS RESULTS

The Source Group, Inc. (PH) Client:

Project No:

Date Received: 04/24/18 Project Name: Chemoil - SV Sampling Date Reported: 04/30/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
Helium ASTM D1946M					
TP-30	8D24011-01	Vapor	5	04/24/18 08:31	04/24/18 17:00
TP-31	8D24011-02	Vapor	5	04/24/18 09:10	04/24/18 17:00
TP-29	8D24011-03	Vapor	5	04/24/18 10:00	04/24/18 17:00
TP-35	8D24011-04	Vapor	5	04/24/18 10:43	04/24/18 17:00
TP-35 DUP	8D24011-05	Vapor	5	04/24/18 10:43	04/24/18 17:00
TP-28	8D24011-06	Vapor	5	04/24/18 11:26	04/24/18 17:00
TP-34	8D24011-07	Vapor	5	04/24/18 12:11	04/24/18 17:00
TP-27	8D24011-08	Vapor	5	04/24/18 12:53	04/24/18 17:00
TP-26	8D24011-09	Vapor	5	04/24/18 13:46	04/24/18 17:00
TP-25	8D24011-10	Vapor	5	04/24/18 14:30	04/24/18 17:00
TO-15 (Mid Level)					
TP-30	8D24011-01	Vapor	5	04/24/18 08:31	04/24/18 17:00
TP-31	8D24011-02	Vapor	5	04/24/18 09:10	04/24/18 17:00
TP-29	8D24011-03	Vapor	5	04/24/18 10:00	04/24/18 17:00
TP-35	8D24011-04	Vapor	5	04/24/18 10:43	04/24/18 17:00
TP-35 DUP	8D24011-05	Vapor	5	04/24/18 10:43	04/24/18 17:00
TP-28	8D24011-06	Vapor	5	04/24/18 11:26	04/24/18 17:00
TP-34	8D24011-07	Vapor	5	04/24/18 12:11	04/24/18 17:00



Client:The Source Group, Inc. (PH)AA Project No: MB596147Project No:NADate Received: 04/24/18Project Name:Chemoil - SV SamplingDate Reported: 04/30/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TP-27	8D24011-08	Vapor	5	04/24/18 12:53	04/24/18 17:00
TP-26	8D24011-09	Vapor	5	04/24/18 13:46	04/24/18 17:00
TP-25	8D24011-10	Vapor	5	04/24/18 14:30	04/24/18 17:00





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596147 Date Received: 04/24/18

Date Reported: 04/30/18 **Units:** ug/L

Date Sampled:	04/24/18	04/24/18	04/24/18	04/24/18	
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D24011-01	8D24011-02	8D24011-03	8D24011-04	
Client ID No:	TP-30	TP-31	TP-29	TP-35	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	1	1	MRL
TO-15 (Mid Level) (TO-15)	·	·	·	•	
Acetone	0.015	<0.010	0.040	<0.010	0.010
Allyl chloride	< 0.010	< 0.010	< 0.010	< 0.010	0.010
tert-Amyl Methyl Ether (TAME)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Benzene	< 0.010	<0.010	< 0.010	<0.010	0.010
Benzyl chloride	<0.010	<0.010	<0.010	< 0.010	0.010
Bromodichloromethane	<0.010	<0.010	<0.010	< 0.010	0.010
Bromoform	<0.010	<0.010	< 0.010	< 0.010	0.010
Bromomethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,3-Butadiene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
2-Butanone (MEK)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
tert-Butyl alcohol (TBA)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Carbon Disulfide	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Carbon Tetrachloride	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chloroethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chloroform	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chloromethane	<0.010	0.013	<0.010	< 0.010	0.010
Cyclohexane	<0.010	<0.010	<0.010	< 0.010	0.010
Dibromochloromethane	<0.010	<0.010	<0.010	<0.010	0.010
1,2-Dibromoethane (EDB)	<0.010	<0.010	<0.010	<0.010	0.010
1,2-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010	0.010
1,3-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010	0.010
1,4-Dichlorobenzene	<0.010	<0.010	<0.010	<0.010	0.010
Dichlorodifluoromethane (R12)	<0.010	<0.010	<0.010	<0.010	0.010
1,1-Dichloroethane	<0.010	<0.010	<0.010	<0.010	0.010
1,2-Dichloroethane (EDC)	<0.010	<0.010	<0.010	<0.010	0.010
cis-1,2-Dichloroethylene	<0.010	<0.010	<0.010	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596147 Date Received: 04/24/18

Date Reported: 04/30/18

Units: ug/L

Date Sampled:	04/24/18	04/24/18	04/24/18	04/24/18	
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D24011-01	8D24011-02	8D24011-03	8D24011-04	
Client ID No:	TP-30	TP-31	TP-29	TP-35	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	1	1	MRL
TO-15 (Mid Level) (TO-15) (co	ntinued)				
1,1-Dichloroethylene	<0.010	<0.010	< 0.010	< 0.010	0.010
trans-1,2-Dichloroethylene	< 0.010	<0.010	< 0.010	< 0.010	0.010
1,2-Dichloropropane	< 0.010	<0.010	< 0.010	< 0.010	0.010
trans-1,3-Dichloropropylene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
cis-1,3-Dichloropropylene	< 0.010	< 0.010	< 0.010	<0.010	0.010
Dichlorotetrafluoroethane	< 0.010	< 0.010	< 0.010	<0.010	0.010
Diisopropyl ether (DIPE)	< 0.010	<0.010	< 0.010	<0.010	0.010
1,4-Dioxane	< 0.010	<0.010	< 0.010	<0.010	0.010
Ethanol	< 0.010	<0.010	0.017	<0.010	0.010
Ethyl Acetate	<0.010	<0.010	< 0.010	<0.010	0.010
Ethylbenzene	<0.010	<0.010	< 0.010	<0.010	0.010
Ethyl-tert-Butyl Ether (ETBE)	<0.010	<0.010	< 0.010	<0.010	0.010
4-Ethyltoluene	<0.010	<0.010	< 0.010	<0.010	0.010
Heptane	<0.010	<0.010	< 0.010	<0.010	0.010
Hexachlorobutadiene	<0.010	<0.010	<0.010	<0.010	0.010
n-Hexane	<0.010	<0.010	< 0.010	<0.010	0.010
2-Hexanone (MBK)	<0.010	<0.010	<0.010	<0.010	0.010
Isopropanol (IPA)	<0.010	<0.010	<0.010	<0.010	0.010
Methyl-tert-Butyl Ether (MTBE)	<0.010	<0.010	< 0.010	<0.010	0.010
Methylene Chloride	<0.010	<0.010	<0.010	<0.010	0.010
4-Methyl-2-pentanone (MIBK)	<0.010	<0.010	<0.010	<0.010	0.010
Naphthalene	<0.010	<0.010	<0.010	<0.010	0.010
Propylene	<0.010	<0.010	<0.010	<0.010	0.010
Styrene	<0.010	<0.010	<0.010	<0.010	0.010
1,1,2,2-Tetrachloroethane	<0.010	<0.010	<0.010	<0.010	0.010
Tetrachloroethylene (PCE)	<0.010	<0.010	< 0.010	<0.010	0.010
Tetrahydrofuran (THF)	<0.010	<0.010	<0.010	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

AA Project No: MB596147

Date Received: 04/24/18

Project No: NA Date Received: 04/24/18
Project Name: Chemoil - SV Sampling Date Reported: 04/30/18

Method: VOCs by GCMS EPA TO-15 (Mid Level) Units: ug/L

Date Sampled:	04/24/18	04/24/18	04/24/18	04/24/18	
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D24011-01	8D24011-02	8D24011-03	8D24011-04	
Client ID No:	TP-30	TP-31	TP-29	TP-35	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	1	1	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	< 0.010	< 0.010	< 0.010	<0.010	0.010
1,2,4-Trichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,1,2-Trichloroethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,1,1-Trichloroethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Trichloroethylene (TCE)	< 0.010	< 0.010	< 0.010	<0.010	0.010
Trichlorofluoromethane (R11)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	< 0.010	< 0.010	< 0.010	<0.010	0.010
ane (R113)					
1,3,5-Trimethylbenzene	<0.010	<0.010	< 0.010	<0.010	0.010
1,2,4-Trimethylbenzene	<0.010	<0.010	< 0.010	<0.010	0.010
2,2,4-Trimethylpentane	< 0.010	<0.010	< 0.010	<0.010	0.010
Vinyl acetate	< 0.010	<0.010	< 0.010	<0.010	0.010
Vinyl bromide	<0.010	<0.010	< 0.010	<0.010	0.010
Vinyl chloride	<0.010	<0.010	< 0.010	<0.010	0.010
o-Xylene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
m,p-Xylenes	< 0.010	<0.010	< 0.010	<0.010	0.010
1,2,3-Trichloropropane	<0.010	<0.010	< 0.010	<0.010	0.010
sec-Butylbenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Isopropylbenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
n-Propylbenzene	< 0.010	<0.010	< 0.010	<0.010	0.010
4-Isopropyltoluene	< 0.010	<0.010	< 0.010	<0.010	0.010
n-Butylbenzene	<0.010	<0.010	<0.010	<0.010	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	103%	96%	100%	93%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596147 Date Received: 04/24/18 Date Reported: 04/30/18

Units: ug/L

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Date Sampled:	04/24/18	04/24/18	04/24/18	04/24/18		
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18		
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18		
AA ID No:	8D24011-05	8D24011-06	8D24011-07	8D24011-08		
Client ID No:	TP-35 DUP	TP-28	TP-34	TP-27		
Matrix:	Vapor	Vapor	Vapor	Vapor		
Dilution Factor:	1	1	1	1		MRL
TO-15 (Mid Level) (TO-15)						
Acetone	< 0.010	<0.010	< 0.010	< 0.010		0.010
Allyl chloride	< 0.010	< 0.010	< 0.010	< 0.010		0.010
tert-Amyl Methyl Ether (TAME)	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Benzene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Benzyl chloride	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Bromodichloromethane	<0.010	< 0.010	< 0.010	< 0.010		0.010
Bromoform	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Bromomethane	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,3-Butadiene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
2-Butanone (MEK)	< 0.010	< 0.010	< 0.010	< 0.010		0.010
tert-Butyl alcohol (TBA)	<0.010	< 0.010	< 0.010	< 0.010		0.010
Carbon Disulfide	<0.010	< 0.010	< 0.010	< 0.010		0.010
Carbon Tetrachloride	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Chlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Chloroethane	<0.010	< 0.010	< 0.010	< 0.010		0.010
Chloroform	< 0.010	< 0.010	0.020	< 0.010		0.010
Chloromethane	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Cyclohexane	<0.010	< 0.010	< 0.010	< 0.010		0.010
Dibromochloromethane	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,2-Dibromoethane (EDB)	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,2-Dichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,3-Dichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,4-Dichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Dichlorodifluoromethane (R12)	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,1-Dichloroethane	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,2-Dichloroethane (EDC)	< 0.010	< 0.010	< 0.010	< 0.010		0.010
cis-1,2-Dichloroethylene	<0.010	<0.010	<0.010	< 0.010		0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596147 Date Received: 04/24/18 Date Reported: 04/30/18

Units: ug/L

motrica: vocaby com	0 21 / 10 10 (1	, iid 2010i)			Gillion ag/L	
Date Sampled:	04/24/18	04/24/18	04/24/18	04/24/18		
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18		
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18		
AA ID No:	8D24011-05	8D24011-06	8D24011-07	8D24011-08		
Client ID No:	TP-35 DUP	TP-28	TP-34	TP-27		
Matrix:	Vapor	Vapor	Vapor	Vapor		
Dilution Factor:	1	1	1	1		MRL
TO-15 (Mid Level) (TO-15) (con	ntinued)					
1,1-Dichloroethylene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
trans-1,2-Dichloroethylene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,2-Dichloropropane	< 0.010	< 0.010	< 0.010	< 0.010		0.010
trans-1,3-Dichloropropylene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
cis-1,3-Dichloropropylene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Dichlorotetrafluoroethane	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Diisopropyl ether (DIPE)	< 0.010	< 0.010	< 0.010	< 0.010		0.010
1,4-Dioxane	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Ethanol	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Ethyl Acetate	< 0.010	< 0.010	< 0.010	<0.010		0.010
Ethylbenzene	< 0.010	< 0.010	< 0.010	< 0.010		0.010
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	< 0.010	< 0.010	<0.010		0.010
4-Ethyltoluene	<0.010	<0.010	<0.010	<0.010		0.010
Heptane	< 0.010	< 0.010	< 0.010	<0.010		0.010
Hexachlorobutadiene	< 0.010	< 0.010	< 0.010	<0.010		0.010
n-Hexane	<0.010	<0.010	<0.010	<0.010		0.010
2-Hexanone (MBK)	< 0.010	< 0.010	< 0.010	<0.010		0.010
Isopropanol (IPA)	<0.010	<0.010	<0.010	<0.010		0.010
Methyl-tert-Butyl Ether (MTBE)	<0.010	<0.010	<0.010	<0.010		0.010
Methylene Chloride	<0.010	<0.010	<0.010	<0.010		0.010
4-Methyl-2-pentanone (MIBK)	<0.010	<0.010	<0.010	<0.010		0.010
Naphthalene	<0.010	<0.010	<0.010	<0.010		0.010
Propylene	<0.010	<0.010	< 0.010	<0.010		0.010
Styrene	< 0.010	< 0.010	< 0.010	<0.010		0.010
1,1,2,2-Tetrachloroethane	< 0.010	<0.010	< 0.010	<0.010		0.010
Tetrachloroethylene (PCE)	< 0.010	<0.010	< 0.010	<0.010		0.010
Tetrahydrofuran (THF)	<0.010	< 0.010	< 0.010	<0.010		0.010





Client: The Source Group, Inc. (PH)

Project No:

Project Name: Chemoil - SV Sampling

VOCs by GCMS EPA TO-15 (Mid Level) Method:

AA Project No: MB596147 Date Received: 04/24/18

Date Reported: 04/30/18

Units: ug/L

Date Sampled:	04/24/18	04/24/18	04/24/18	04/24/18	
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D24011-05	8D24011-06	8D24011-07	8D24011-08	
Client ID No:	TP-35 DUP	TP-28	TP-34	TP-27	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	1	1	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	<0.010	<0.010	<0.010	<0.010	0.010
1,2,4-Trichlorobenzene	<0.010	<0.010	<0.010	<0.010	0.010
1,1,2-Trichloroethane	< 0.010	<0.010	< 0.010	<0.010	0.010
1,1,1-Trichloroethane	< 0.010	< 0.010	<0.010	<0.010	0.010
Trichloroethylene (TCE)	< 0.010	< 0.010	<0.010	<0.010	0.010
Trichlorofluoromethane (R11)	<0.010	<0.010	< 0.010	<0.010	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	<0.010	<0.010	< 0.010	<0.010	0.010
ane (R113)					
1,3,5-Trimethylbenzene	< 0.010	< 0.010	< 0.010	<0.010	0.010
1,2,4-Trimethylbenzene	< 0.010	< 0.010	< 0.010	<0.010	0.010
2,2,4-Trimethylpentane	< 0.010	< 0.010	< 0.010	<0.010	0.010
Vinyl acetate	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Vinyl bromide	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Vinyl chloride	< 0.010	< 0.010	< 0.010	< 0.010	0.010
o-Xylene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
m,p-Xylenes	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,2,3-Trichloropropane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
sec-Butylbenzene	<0.010	< 0.010	< 0.010	<0.010	0.010
Isopropylbenzene	<0.010	< 0.010	< 0.010	<0.010	0.010
n-Propylbenzene	<0.010	< 0.010	< 0.010	<0.010	0.010
4-Isopropyltoluene	<0.010	< 0.010	<0.010	<0.010	0.010
n-Butylbenzene	<0.010	<0.010	<0.010	<0.010	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	103%	100%	101%	99%	70-130





Client:The Source Group, Inc. (PH)AA Project No: MB596147Project No:NADate Received: 04/24/18Project Name:Chemoil - SV SamplingDate Reported: 04/30/18

Method: VOCs by GCMS EPA TO-15 (Mid Level) Units: ug/L

TO-15 (Mid Level) (TO-1	E\		
Dilution Factor:	6000	1	MRL
Matrix:	Vapor	Vapor	
Client ID No:	TP-26	TP-25	
AA ID No:	8D24011-09	8D24011-10	
Date Analyzed:	04/26/18	04/25/18	
Date Prepared:	04/25/18	04/25/18	
Date Sampled:	04/24/18	04/24/18	

TO-15 (Mid Level) (TO-15)			
Acetone	<60	<0.010	0.010
Allyl chloride	<60	<0.010	0.010
tert-Amyl Methyl Ether (TAME)	<60	<0.010	0.010
Benzene	<60	<0.010	0.010
Benzyl chloride	<60	<0.010	0.010
Bromodichloromethane	<60	<0.010	0.010
Bromoform	<60	<0.010	0.010
Bromomethane	<60	<0.010	0.010
1,3-Butadiene	<60	<0.010	0.010
2-Butanone (MEK)	<60	<0.010	0.010
tert-Butyl alcohol (TBA)	<60	<0.010	0.010
Carbon Disulfide	<60	<0.010	0.010
Carbon Tetrachloride	<60	<0.010	0.010
Chlorobenzene	<60	<0.010	0.010
Chloroethane	<60	<0.010	0.010
Chloroform	<60	<0.010	0.010
Chloromethane	<60	0.043	0.010
Cyclohexane	280	0.033	0.010

Dibromochloromethane <60 < 0.010 0.010 1,2-Dibromoethane (EDB) <60 < 0.010 0.010 1,2-Dichlorobenzene <60 < 0.010 0.010 1,3-Dichlorobenzene <60 < 0.010 0.010 1,4-Dichlorobenzene <60 0.010 < 0.010 Dichlorodifluoromethane (R12) <60 < 0.010 0.010 1,1-Dichloroethane <60 < 0.010 0.010 1,2-Dichloroethane (EDC) <60 < 0.010 0.010 cis-1,2-Dichloroethylene <60 < 0.010 0.010





Client:The Source Group, Inc. (PH)AA Project No: MB596147Project No:NADate Received: 04/24/18Project Name:Chemoil - SV SamplingDate Reported: 04/30/18

Method: VOCs by GCMS EPA TO-15 (Mid Level) Units: ug/L

Date Sampled: 04/24/18 04/24/18 **Date Prepared:** 04/25/18 04/25/18 **Date Analyzed:** 04/26/18 04/25/18 AA ID No: 8D24011-09 8D24011-10 TP-26 TP-25 **Client ID No:** Matrix: Vapor Vapor

Matrix:VaporVaporDilution Factor:60001MRL

TO-15 (Mid Level) (TO-15) (continued)

•	-		
1,1-Dichloroethylene	<60	<0.010	0.010
trans-1,2-Dichloroethylene	<60	<0.010	0.010
1,2-Dichloropropane	<60	<0.010	0.010
trans-1,3-Dichloropropylene	<60	<0.010	0.010
cis-1,3-Dichloropropylene	<60	<0.010	0.010
Dichlorotetrafluoroethane	<60	<0.010	0.010
Diisopropyl ether (DIPE)	<60	<0.010	0.010
1,4-Dioxane	<60	<0.010	0.010
Ethanol	<60	<0.010	0.010
Ethyl Acetate	<60	<0.010	0.010
Ethylbenzene	<60	<0.010	0.010
Ethyl-tert-Butyl Ether (ETBE)	<60	<0.010	0.010
4-Ethyltoluene	<60	<0.010	0.010
Heptane	180	0.020	0.010
Hexachlorobutadiene	<60	<0.010	0.010
n-Hexane	83	<0.010	0.010
2-Hexanone (MBK)	<60	<0.010	0.010
Isopropanol (IPA)	<60	<0.010	0.010
Methyl-tert-Butyl Ether (MTBE)	<60	<0.010	0.010
Methylene Chloride	<60	<0.010	0.010
4-Methyl-2-pentanone (MIBK)	<60	<0.010	0.010
Naphthalene	<60	<0.010	0.010
Propylene	<60	<0.010	0.010
Styrene	<60	<0.010	0.010
1,1,2,2-Tetrachloroethane	<60	<0.010	0.010
Tetrachloroethylene (PCE)	<60	<0.010	0.010
Tetrahydrofuran (THF)	<60	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596147

Date Received: 04/24/18

Date Reported: 04/30/18

Units: ug/L

 Date Sampled:
 04/24/18
 04/24/18

 Date Prepared:
 04/25/18
 04/25/18

 Date Analyzed:
 04/26/18
 04/25/18

 AA ID No:
 8D24011-09
 8D24011-10

 Client ID No:
 TP-26
 TP-25

 Matrix:
 Vapor
 Vapor

 Dilution Factor:
 6000
 1

Matrix:	Vapor	Vapor	MRL
Dilution Factor:	6000	1	

TO-15 (Mid Level) (TO-15) (contin	ued)		
Toluene	<60	<0.010	0.010
1,2,4-Trichlorobenzene	<60	<0.010	0.010
1,1,2-Trichloroethane	<60	<0.010	0.010
1,1,1-Trichloroethane	<60	<0.010	0.010
Trichloroethylene (TCE)	<60	<0.010	0.010
Trichlorofluoromethane (R11)	<60	<0.010	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	<60	<0.010	0.010
ane (R113)			
1,3,5-Trimethylbenzene	<60	<0.010	0.010
1,2,4-Trimethylbenzene	<60	<0.010	0.010
2,2,4-Trimethylpentane	<60	<0.010	0.010
Vinyl acetate	<60	<0.010	0.010
Vinyl bromide	<60	<0.010	0.010
Vinyl chloride	<60	<0.010	0.010
o-Xylene	<60	<0.010	0.010
m,p-Xylenes	<60	<0.010	0.010
1,2,3-Trichloropropane	<60	<0.010	0.010
sec-Butylbenzene	<60	<0.010	0.010
Isopropylbenzene	<60	<0.010	0.010
n-Propylbenzene	<60	<0.010	0.010
4-Isopropyltoluene	<60	<0.010	0.010
n-Butylbenzene	<60	<0.010	0.010

<u>Surrogates</u>			%REC Limits
4-Bromofluorobenzene	91%	94%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596147 Date Received: 04/24/18

Date Received: 04/24/18 **Date Reported:** 04/30/18

Units: % by Volume

Date Sampled:	04/24/18	04/24/18	04/24/18	04/24/18	
Date Prepared:	04/24/18	04/24/18	04/24/18	04/24/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D24011-01	8D24011-02	8D24011-03	8D24011-04	
Client ID No:	TP-30	TP-31	TP-29	TP-35	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL

Helium ASTM D1946M (ASTM D1946M)

Helium	< 0.20	< 0.20	<0.20	<0.20	0.10
Honam	~O.ZO	~O.ZO	₹0. 20	10.20	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596147 Date Received: 04/24/18

Date Reported: 04/30/18

Units: % by Volume

04/24/18	04/24/18	04/24/18	04/24/18	
04/24/18	04/24/18	04/24/18	04/24/18	
04/25/18	04/25/18	04/25/18	04/25/18	
8D24011-05	8D24011-06	8D24011-07	8D24011-08	
TP-35 DUP	TP-28	TP-34	TP-27	
Vapor	Vapor	Vapor	Vapor	
2	2	2	2	MRL
	04/24/18 04/25/18 8D24011-05 TP-35 DUP	04/24/18 04/24/18 04/25/18 04/25/18 8D24011-05 8D24011-06 TP-35 DUP TP-28	04/24/18 04/24/18 04/24/18 04/25/18 04/25/18 04/25/18 8D24011-05 8D24011-06 8D24011-07 TP-35 DUP TP-28 TP-34	04/24/18 04/24/18 04/24/18 04/24/18 04/25/18 04/25/18 04/25/18 04/25/18 8D24011-05 8D24011-06 8D24011-07 8D24011-08 TP-35 DUP TP-28 TP-34 TP-27

Helium ASTM D1946M (ASTM D1946M)

Helium	< 0.20	<0.20	<0.20	<0.20	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Date Received: 04/24/18

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

Date Reported: 04/30/18

Units: % by Volume

Date Sampled: 04/24/18 04/24/18 **Date Prepared:** 04/24/18 04/24/18 **Date Analyzed:** 04/25/18 04/25/18 AA ID No: 8D24011-09 8D24011-10 TP-26 TP-25 **Client ID No:** Matrix: Vapor Vapor

Dilution Factor: 2 2 MRL

Helium ASTM D1946M (ASTM D1946M)

Helium <0.20 <0.20 0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596147

Date Received: 04/24/18

Date Reported: 04/30/18

	F	Reporting			Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Qι	ality Contr	ol							
Batch B8D2608 - *** DEFAULT PR	REP ***									
Blank (B8D2608-BLK1)				Prepare	ed & Ana	lyzed: 0	4/25/18			
Acetone	<0.010	0.010	ug/L							
Allyl chloride	<0.010	0.010	ug/L							
tert-Amyl Methyl Ether (TAME)	<0.010	0.010	ug/L							
Benzene	< 0.010	0.010	ug/L							
Benzyl chloride	< 0.010	0.010	ug/L							
Bromodichloromethane	< 0.010	0.010	ug/L							
Bromoform	< 0.010	0.010	ug/L							
Bromomethane	< 0.010	0.010	ug/L							
1,3-Butadiene	< 0.010	0.010	ug/L							
2-Butanone (MEK)	< 0.010	0.010	ug/L							
tert-Butyl alcohol (TBA)	< 0.010	0.010	ug/L							
Carbon Disulfide	< 0.010	0.010	ug/L							
Carbon Tetrachloride	< 0.010	0.010	ug/L							
Chlorobenzene	< 0.010	0.010	ug/L							
Chloroethane	< 0.010	0.010	ug/L							
Chloroform	< 0.010	0.010	ug/L							
Chloromethane	< 0.010	0.010	ug/L							
Cyclohexane	< 0.010	0.010	ug/L							
Dibromochloromethane	< 0.010	0.010	ug/L							
1,2-Dibromoethane (EDB)	< 0.010	0.010	ug/L							
1,2-Dichlorobenzene	< 0.010	0.010	ug/L							
1,3-Dichlorobenzene	< 0.010	0.010	ug/L							
1,4-Dichlorobenzene	< 0.010	0.010	ug/L							
Dichlorodifluoromethane (R12)	< 0.010	0.010	ug/L							
1,1-Dichloroethane	< 0.010	0.010	ug/L							
1,2-Dichloroethane (EDC)	< 0.010	0.010	ug/L							
cis-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,1-Dichloroethylene	< 0.010	0.010	ug/L							
trans-1,2-Dichloroethylene	< 0.010	0.010	ug/L							
1,2-Dichloropropane	< 0.010	0.010	ug/L							
trans-1,3-Dichloropropylene	< 0.010	0.010	ug/L							

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596147

Date Received: 04/24/18

Date Reported: 04/30/18

Analyte	l Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
Batch B8D2608 - *** DEFAULT PR	EP ***									
Blank (B8D2608-BLK1) Continued			Prepared & Analyzed: 04/25/18							
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L							
Dichlorotetrafluoroethane	< 0.010	0.010	ug/L							
Diisopropyl ether (DIPE)	< 0.010	0.010	ug/L							
1,4-Dioxane	< 0.010	0.010	ug/L							
Ethanol	< 0.010	0.010	ug/L							
Ethyl Acetate	< 0.010	0.010	ug/L							
Ethylbenzene	< 0.010	0.010	ug/L							
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	0.010	ug/L							
4-Ethyltoluene	< 0.010	0.010	ug/L							
Heptane	< 0.010	0.010	ug/L							
Hexachlorobutadiene	< 0.010	0.010	ug/L							
n-Hexane	< 0.010	0.010	ug/L							
2-Hexanone (MBK)	<0.010	0.010	ug/L							
Isopropanol (IPA)	<0.010	0.010	ug/L							
Methyl-tert-Butyl Ether (MTBE)	<0.010	0.010	ug/L							
Methylene Chloride	<0.010	0.010	ug/L							
4-Methyl-2-pentanone (MIBK)	<0.010	0.010	ug/L							
Naphthalene	<0.010	0.010	ug/L							
Propylene	<0.010	0.010	ug/L							
Styrene	<0.010	0.010	ug/L							
1,1,2,2-Tetrachloroethane	<0.010	0.010	ug/L							
Tetrachloroethylene (PCE)	<0.010	0.010	ug/L							
Tetrahydrofuran (THF)	<0.010	0.010	ug/L							
Toluene	<0.010	0.010	ug/L							
1,2,4-Trichlorobenzene	<0.010	0.010	ug/L							
1,1,2-Trichloroethane	<0.010	0.010	ug/L							
1,1,1-Trichloroethane	<0.010	0.010	ug/L							
Trichloroethylene (TCE)	<0.010	0.010	ug/L							
Trichlorofluoromethane (R11)	<0.010	0.010	ug/L							
1,1,2-Trichloro-1,2,2-trifluoroethar (R113)	e<0.010	0.010	ug/L							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596147 Date Received: 04/24/18 Date Reported: 04/30/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes		
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control											
Batch B8D2608 - *** DEFAULT PREP ***											
Blank (B8D2608-BLK1) Continued				Prepare	ed & Analyzed: ()4/25/18					
1,2,4-Trimethylbenzene	<0.010	0.010	ug/L	-	-						
2,2,4-Trimethylpentane	< 0.010	0.010	ug/L								
Vinyl acetate	< 0.010	0.010	ug/L								
Vinyl bromide	< 0.010	0.010	ug/L								
Vinyl chloride	< 0.010	0.010	ug/L								
o-Xylene	< 0.010	0.010	ug/L								
m,p-Xylenes	< 0.010	0.010	ug/L								
1,2,3-Trichloropropane	< 0.010	0.010	ug/L								
sec-Butylbenzene	< 0.010	0.010	ug/L								
Isopropylbenzene	< 0.010	0.010	ug/L								
n-Propylbenzene	<0.010	0.010	ug/L								
4-Isopropyltoluene	<0.010	0.010	ug/L								
n-Butylbenzene	<0.010	0.010	ug/L								
Surrogate: 4-Bromofluorobenzene	0.135		ug/L	0.14	94.4	70-130					
LCS (B8D2608-BS1)				Prepare	ed & Analyzed: 0)4/25/18					
Acetone	0.0876	0.010	ug/L	0.095	92.2	70-130					
Benzene	0.123	0.010	ug/L	0.13	95.9	70-130					
Benzyl chloride	0.209	0.010	ug/L	0.21	101	70-130					
Bromodichloromethane	0.268	0.010	ug/L	0.27	100	70-130					
Bromoform	0.421	0.010	ug/L	0.41	102	70-130					
Bromomethane	0.186	0.010	ug/L	0.16	120	70-130					
2-Butanone (MEK)	0.112	0.010	ug/L	0.12	94.6	70-130					
Carbon Disulfide	0.121	0.010	ug/L	0.12	97.1	70-130					
Carbon Tetrachloride	0.255	0.010	ug/L	0.25	101	70-130					
Chlorobenzene	0.188	0.010	ug/L	0.18	102	70-130					
Chloroethane	0.112	0.010	ug/L	0.11	106	70-130					
Chloroform	0.191	0.010	ug/L	0.20	97.6	70-130					
Chloromethane	0.0763	0.010	ug/L	0.083	92.3	70-130					
Dibromochloromethane	0.354	0.010	ug/L	0.34	104	70-130					
1,2-Dibromoethane (EDB)	0.353	0.010	ug/L	0.31	115	70-130					
1,2-Dichlorobenzene	0.248	0.010	ug/L	0.24	103	70-130					





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596147

Date Received: 04/24/18

Date Reported: 04/30/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L									
Batch B8D2608 - *** DEFAULT PR	-	•							
LCS (B8D2608-BS1) Continued				Prepare	ed & Analyzed: 0	4/25/18			
1,3-Dichlorobenzene	0.247	0.010	ug/L	0.24	103	70-130			
1,4-Dichlorobenzene	0.246	0.010	ug/L	0.24	102	70-130			
Dichlorodifluoromethane (R12)	0.184	0.010	ug/L	0.20	92.9	70-130			
1,1-Dichloroethane	0.151	0.010	ug/L	0.16	93.2	70-130			
1,2-Dichloroethane (EDC)	0.153	0.010	ug/L	0.16	94.6	70-130			
cis-1,2-Dichloroethylene	0.150	0.010	ug/L	0.16	94.6	70-130			
1,1-Dichloroethylene	0.150	0.010	ug/L	0.16	94.6	70-130			
trans-1,2-Dichloroethylene	0.148	0.010	ug/L	0.16	93.5	70-130			
1,2-Dichloropropane	0.181	0.010	ug/L	0.18	97.8	70-130			
trans-1,3-Dichloropropylene	0.188	0.010	ug/L	0.18	104	70-130			
cis-1,3-Dichloropropylene	0.180	0.010	ug/L	0.18	99.3	70-130			
Dichlorotetrafluoroethane	0.286	0.010	ug/L	0.28	102	70-130			
Ethylbenzene	0.159	0.010	ug/L	0.17	91.7	70-130			
4-Ethyltoluene	0.187	0.010	ug/L	0.20	94.9	70-130			
Hexachlorobutadiene	0.382	0.010	ug/L	0.43	89.6	70-130			
2-Hexanone (MBK)	0.167	0.010	ug/L	0.16	102	70-130			
Isopropanol (IPA)	0.0889	0.010	ug/L	0.098	90.4	70-130			
Methylene Chloride	0.108	0.010	ug/L	0.14	77.7	70-130			
4-Methyl-2-pentanone (MIBK)	0.164	0.010	ug/L	0.16	99.9	70-130			
Styrene	0.167	0.010	ug/L	0.17	98.0	70-130			
1,1,2,2-Tetrachloroethane	0.203	0.010	ug/L	0.27	73.8	70-130			
Tetrachloroethylene (PCE)	0.289	0.010	ug/L	0.27	107	70-130			
Toluene	0.144	0.010	ug/L	0.15	95.8	70-130			
1,2,4-Trichlorobenzene	0.298	0.010	ug/L	0.30	101	70-130			
1,1,2-Trichloroethane	0.231	0.010	ug/L	0.22	106	70-130			
1,1,1-Trichloroethane	0.210	0.010	ug/L	0.22	96.0	70-130			
Trichloroethylene (TCE)	0.260	0.010	ug/L	0.21	121	70-130			
Trichlorofluoromethane (R11)	0.215	0.010	ug/L	0.22	95.8	70-130			
1,1,2-Trichloro-1,2,2-trifluoroethan (R113)	e 0.295	0.010	ug/L	0.31	96.3	70-130			
1,3,5-Trimethylbenzene	0.195	0.010	ug/L	0.20	99.1	70-130			
1,2,4-Trimethylbenzene	0.190	0.010	ug/L	0.20	96.4	70-130			





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596147

Date Received: 04/24/18

Date Reported: 04/30/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Lo	evel) - Qu	uality Contr	ol						
Batch B8D2608 - *** DEFAULT PRI	ΞP ***								
LCS (B8D2608-BS1) Continued				Prepare	ed & Analyzed: 0	4/25/18			
Vinyl acetate	0.135	0.010	ug/L	0.14	95.8	70-130			
Vinyl chloride	0.104	0.010	ug/L	0.10	102	70-130			
o-Xylene	0.161	0.010	ug/L	0.17	92.9	70-130			
m,p-Xylenes	0.320	0.010	ug/L	0.35	92.0	70-130			
1,2,3-Trichloropropane	0.216	0.010	ug/L	0.24	89.4	70-130			
sec-Butylbenzene	0.202	0.010	ug/L	0.22	91.8	70-130			
Isopropylbenzene	0.176	0.010	ug/L	0.20	89.6	70-130			
n-Propylbenzene	0.169	0.010	ug/L	0.20	85.9	70-130			
4-Isopropyltoluene	0.209	0.010	ug/L	0.22	95.2	70-130			
Surrogate: 4-Bromofluorobenzene	0.142		ug/L	0.14	99.5	70-130			
LCS Dup (B8D2608-BSD1)				Prepare	ed: 04/25/18 Ana	alyzed: 04	1/26/18		
Acetone	0.0942	0.010	ug/L	0.095	99.1	70-130	7.27	30	_
Benzene	0.130	0.010	ug/L	0.13	102	70-130	5.80	30	
Benzyl chloride	0.222	0.010	ug/L	0.21	107	70-130	6.10	30	
Bromodichloromethane	0.294	0.010	ug/L	0.27	110	70-130	9.06	30	
Bromoform	0.451	0.010	ug/L	0.41	109	70-130	6.76	30	
Bromomethane	0.189	0.010	ug/L	0.16	122	70-130	1.62	30	
2-Butanone (MEK)	0.119	0.010	ug/L	0.12	100	70-130	5.97	30	
Carbon Disulfide	0.129	0.010	ug/L	0.12	104	70-130	6.84	30	
Carbon Tetrachloride	0.290	0.010	ug/L	0.25	115	70-130	12.8	30	
Chlorobenzene	0.209	0.010	ug/L	0.18	113	70-130	10.4	30	
Chloroethane	0.0919	0.010	ug/L	0.11	87.1	70-130	19.3	30	
Chloroform	0.206	0.010	ug/L	0.20	106	70-130	7.92	30	
Chloromethane	0.0836	0.010	ug/L	0.083	101	70-130	9.22	30	
Dibromochloromethane	0.395	0.010	ug/L	0.34	116	70-130	10.9	30	
1,2-Dibromoethane (EDB)	0.396	0.010	ug/L	0.31	129	70-130	11.5	30	
1,2-Dichlorobenzene	0.274	0.010	ug/L	0.24	114	70-130	10.0	30	
1,3-Dichlorobenzene	0.275	0.010	ug/L	0.24	114	70-130	10.7	30	
1,4-Dichlorobenzene	0.275	0.010	ug/L	0.24	114	70-130	11.0	30	
Dichlorodifluoromethane (R12)	0.215	0.010	ug/L	0.20	109	70-130	15.6	30	
1,1-Dichloroethane	0.161	0.010	ug/L	0.16	99.5	70-130	6.51	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596147 Date Received: 04/24/18 Date Reported: 04/30/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	evel) - Q	uality Conti	rol						•
Batch B8D2608 - *** DEFAULT PRE	EP ***								
LCS Dup (B8D2608-BSD1) Conti	nued			Prepare	ed: 04/25/18 Ana	alyzed: 04	1/26/18		
1,2-Dichloroethane (EDC)	0.170	0.010	ug/L	0.16	105	70-130	10.6	30	
cis-1,2-Dichloroethylene	0.161	0.010	ug/L	0.16	101	70-130	6.79	30	
1,1-Dichloroethylene	0.165	0.010	ug/L	0.16	104	70-130	9.25	30	
trans-1,2-Dichloroethylene	0.157	0.010	ug/L	0.16	99.2	70-130	5.92	30	
1,2-Dichloropropane	0.202	0.010	ug/L	0.18	109	70-130	11.1	30	
trans-1,3-Dichloropropylene	0.211	0.010	ug/L	0.18	116	70-130	11.5	30	
cis-1,3-Dichloropropylene	0.200	0.010	ug/L	0.18	110	70-130	10.3	30	
Dichlorotetrafluoroethane	0.308	0.010	ug/L	0.28	110	70-130	7.38	30	
Ethylbenzene	0.175	0.010	ug/L	0.17	101	70-130	9.71	30	
4-Ethyltoluene	0.205	0.010	ug/L	0.20	104	70-130	9.29	30	
Hexachlorobutadiene	0.426	0.010	ug/L	0.43	99.8	70-130	10.8	30	
2-Hexanone (MBK)	0.178	0.010	ug/L	0.16	109	70-130	6.82	30	
Isopropanol (IPA)	0.0931	0.010	ug/L	0.098	94.7	70-130	4.64	30	
Methylene Chloride	0.112	0.010	ug/L	0.14	80.9	70-130	4.06	30	
4-Methyl-2-pentanone (MIBK)	0.180	0.010	ug/L	0.16	110	70-130	9.76	30	
Styrene	0.180	0.010	ug/L	0.17	106	70-130	7.47	30	
1,1,2,2-Tetrachloroethane	0.223	0.010	ug/L	0.27	81.2	70-130	9.65	30	
Tetrachloroethylene (PCE)	0.325	0.010	ug/L	0.27	120	70-130	11.7	30	
Toluene	0.165	0.010	ug/L	0.15	109	70-130	13.1	30	
1,2,4-Trichlorobenzene	0.329	0.010	ug/L	0.30	111	70-130	9.83	30	
1,1,2-Trichloroethane	0.258	0.010	ug/L	0.22	118	70-130	11.0	30	
1,1,1-Trichloroethane	0.230	0.010	ug/L	0.22	106	70-130	9.47	30	
Trichloroethylene (TCE)	0.275	0.010	ug/L	0.21	128	70-130	5.56	30	
Trichlorofluoromethane (R11)	0.237	0.010	ug/L	0.22	106	70-130	9.68	30	
1,1,2-Trichloro-1,2,2-trifluoroethane	e 0.318	0.010	ug/L	0.31	104	70-130	7.50	30	
(R113)									
1,3,5-Trimethylbenzene	0.217	0.010	ug/L	0.20	110	70-130	10.7	30	
1,2,4-Trimethylbenzene	0.212	0.010	ug/L	0.20	108	70-130	11.3	30	
Vinyl acetate	0.144	0.010	ug/L	0.14	102	70-130	6.44	30	
Vinyl chloride	0.110	0.010	ug/L	0.10	107	70-130	5.13	30	
o-Xylene	0.180	0.010	ug/L	0.17	103	70-130	10.8	30	
m,p-Xylenes	0.350	0.010	ug/L	0.35	101	70-130	9.18	30	





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Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596147 Date Received: 04/24/18 Date Reported: 04/30/18

Analyte	Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Lo						<u> </u>				
Batch B8D2608 - *** DEFAULT PRI	-		•							
LCS Dup (B8D2608-BSD1) Conti				Prepare	ed: 04/25/	18 Ana	alvzed: 04	1/26/18		
1,2,3-Trichloropropane	0.235	0.010	ug/L	0.24			70-130	8.57	30	
sec-Butylbenzene	0.222	0.010	ug/L	0.22		101	70-130	9.89	30	
Isopropylbenzene	0.193	0.010	ug/L	0.20		98.4	70-130	9.39	30	
n-Propylbenzene	0.188	0.010	ug/L	0.20		95.5	70-130	10.6	30	
4-Isopropyltoluene	0.228	0.010	ug/L	0.22		104	70-130	8.79	30	
Surrogate: 4-Bromofluorobenzene	0.141		ug/L	0.14		98.6	70-130			
Duplicate (B8D2608-DUP1)	5	Source: 8D2	4011-01	Prepare	ed: 04/25/	18 Ana	alyzed: 04	1/26/18		
Acetone	0.0168	0.010	ug/L	•	0.0146			13.8	30	
Allyl chloride	<0.010	0.010	ug/L		< 0.010				30	
tert-Amyl Methyl Ether (TAME)	<0.010	0.010	ug/L		<0.010				30	
Benzene	<0.010	0.010	ug/L		<0.010				30	
Benzyl chloride	<0.010	0.010	ug/L		<0.010				30	
Bromodichloromethane	<0.010	0.010	ug/L		<0.010				30	
Bromoform	<0.010	0.010	ug/L		<0.010				30	
Bromomethane	<0.010	0.010	ug/L		<0.010				30	
1,3-Butadiene	<0.010	0.010	ug/L		<0.010				30	
2-Butanone (MEK)	<0.010	0.010	ug/L		<0.010				30	
tert-Butyl alcohol (TBA)	<0.010	0.010	ug/L		<0.010				30	
Carbon Disulfide	<0.010	0.010	ug/L		<0.010				30	
Carbon Tetrachloride	<0.010	0.010	ug/L		<0.010				30	
Chlorobenzene	<0.010	0.010	ug/L		<0.010				30	
Chloroethane	<0.010	0.010	ug/L		<0.010				30	
Chloroform	<0.010	0.010	ug/L		<0.010				30	
Chloromethane	<0.010	0.010	ug/L		<0.010				30	
Cyclohexane	<0.010	0.010	ug/L		< 0.010				30	
Dibromochloromethane	<0.010	0.010	ug/L		< 0.010				30	
1,2-Dibromoethane (EDB)	<0.010	0.010	ug/L		<0.010				30	
1,2-Dichlorobenzene	<0.010	0.010	ug/L		< 0.010				30	
1,3-Dichlorobenzene	<0.010	0.010	ug/L		<0.010				30	
1,4-Dichlorobenzene	<0.010	0.010	ug/L		<0.010				30	
Dichlorodifluoromethane (R12)	<0.010	0.010	ug/L		<0.010				30	





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Analyte	l Result	Reporting Limit	Units		Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	•	uality Contr	ol							
Batch B8D2608 - *** DEFAULT PF	REP ***									
Duplicate (B8D2608-DUP1) Con	tinued S	ource: 8D2	4011-01	Prepared	d: 04/25/	18 Ana	ılyzed: 04	4/26/18		
1,1-Dichloroethane	<0.010	0.010	ug/L		<0.010				30	
1,2-Dichloroethane (EDC)	<0.010	0.010	ug/L		<0.010				30	
cis-1,2-Dichloroethylene	<0.010	0.010	ug/L		<0.010				30	
1,1-Dichloroethylene	<0.010	0.010	ug/L		<0.010				30	
trans-1,2-Dichloroethylene	<0.010	0.010	ug/L		<0.010				30	
1,2-Dichloropropane	<0.010	0.010	ug/L		<0.010				30	
trans-1,3-Dichloropropylene	<0.010	0.010	ug/L		<0.010				30	
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L		<0.010				30	
Dichlorotetrafluoroethane	<0.010	0.010	ug/L		<0.010				30	
Diisopropyl ether (DIPE)	<0.010	0.010	ug/L		<0.010				30	
1,4-Dioxane	<0.010	0.010	ug/L		<0.010				30	
Ethanol	<0.010	0.010	ug/L		<0.010				30	
Ethyl Acetate	<0.010	0.010	ug/L		< 0.010				30	
Ethylbenzene	<0.010	0.010	ug/L		< 0.010				30	
Ethyl-tert-Butyl Ether (ETBE)	<0.010	0.010	ug/L		< 0.010				30	
4-Ethyltoluene	<0.010	0.010	ug/L		< 0.010				30	
Heptane	<0.010	0.010	ug/L		< 0.010				30	
Hexachlorobutadiene	<0.010	0.010	ug/L		< 0.010				30	
n-Hexane	<0.010	0.010	ug/L		<0.010				30	
2-Hexanone (MBK)	<0.010	0.010	ug/L		<0.010				30	
Isopropanol (IPA)	<0.010	0.010	ug/L		<0.010				30	
Methyl-tert-Butyl Ether (MTBE)	<0.010	0.010	ug/L		< 0.010				30	
Methylene Chloride	<0.010	0.010	ug/L		< 0.010				30	
4-Methyl-2-pentanone (MIBK)	<0.010	0.010	ug/L		< 0.010				30	
Naphthalene	<0.010	0.010	ug/L		< 0.010				30	
Propylene	<0.010	0.010	ug/L		<0.010				30	
Styrene	<0.010	0.010	ug/L		<0.010				30	
1,1,2,2-Tetrachloroethane	<0.010	0.010	ug/L		<0.010				30	
Tetrachloroethylene (PCE)	<0.010	0.010	ug/L		<0.010				30	
Tetrahydrofuran (THF)	<0.010	0.010	ug/L		<0.010				30	
Toluene	<0.010	0.010	ug/L		<0.010				30	

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AA Project No: MB596147 Date Received: 04/24/18 Date Reported: 04/30/18

Analyte	Result	Reporting Limit	Units		Source Result %		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	evel) - Q	uality Contr	ol							
Batch B8D2608 - *** DEFAULT PRI	-	-								
Duplicate (B8D2608-DUP1) Cont		Source: 8D2	24011-01	Prepare	ed: 04/25/18	8 Ana	lyzed: 04	4/26/18		
1,2,4-Trichlorobenzene	<0.010		ug/L		<0.010				30	
1,1,2-Trichloroethane	<0.010	0.010	ug/L		<0.010				30	
1,1,1-Trichloroethane	<0.010	0.010	ug/L		<0.010				30	
Trichloroethylene (TCE)	<0.010	0.010	ug/L		<0.010				30	
Trichlorofluoromethane (R11)	<0.010	0.010	ug/L		<0.010				30	
1,1,2-Trichloro-1,2,2-trifluoroethan (R113)	e <0.010	0.010	ug/L		<0.010				30	
1,3,5-Trimethylbenzene	<0.010		ug/L		<0.010				30	
1,2,4-Trimethylbenzene	<0.010		ug/L		<0.010				30	
2,2,4-Trimethylpentane	<0.010		ug/L		<0.010				30	
Vinyl acetate	<0.010		ug/L		<0.010				30	
Vinyl bromide	<0.010		ug/L		<0.010				30	
Vinyl chloride	<0.010		ug/L		<0.010				30	
o-Xylene	<0.010		ug/L		<0.010				30	
m,p-Xylenes	<0.010		ug/L		<0.010				30	
1,2,3-Trichloropropane	<0.010		ug/L		<0.010				30	
sec-Butylbenzene	<0.010		ug/L		<0.010				30	
Isopropylbenzene	<0.010		ug/L		<0.010				30	
n-Propylbenzene	<0.010		ug/L		<0.010				30	
4-Isopropyltoluene	<0.010		ug/L		<0.010				30	
n-Butylbenzene	<0.010	0.010	ug/L		<0.010				200	
Surrogate: 4-Bromofluorobenzene	0.137		ug/L	0.14	:	95.9	70-130			
Helium by GC/TCD - Quality Control	ol									
Batch B8D2422 - *** DEFAULT PRI										
Blank (B8D2422-BLK1)				Prepare	ed: 04/24/18	8 Ana	lyzed: 04	4/25/18		
Helium	<0.10	0.10	% by Volume							
LCS (B8D2422-BS1)				Prepare	ed: 04/24/18	8 Ana	lyzed: 04	4/25/18		
Helium	0.418	0.10	% by Volume	0.50	8	83.7	70-130			



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Project Name: Chemoil - SV Sampling

AA Project No: MB596147

Date Received: 04/24/18

Date Reported: 04/30/18

	F	Reporting		Spike	Source		%REC		RPD	
Analyte	Result	Limit	Units	Level	Result	%REC	Limits	RPD	Limit	Notes
Helium by GC/TCD - Quality Contro	ol									
Batch B8D2422 - *** DEFAULT PR	EP ***									
LCS Dup (B8D2422-BSD1)				Prepare	ed: 04/24/	18 Ana	alyzed: 0	4/25/18		
Helium	0.421	0.10	% by	0.50		84.2	70-130	0.643	30	
			Volume							
Duplicate (B8D2422-DUP1)	S	ource: 8D2	24011-10	Prepare	ed: 04/24/	18 Ana	alyzed: 0	4/25/18		
Helium	<0.20	0.20	% by Volume		<0.20				30	

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Project Name: Chemoil - SV Sampling

AA Project No: MB596147 Date Received: 04/24/18 Date Reported: 04/30/18

Special Notes





AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

Tel; 818-998-5547 FAX: 818-998-7258

A.A. coc No.: 152c.

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Phone: 905-683-	6177		City:	Signal	Ž				P.0	P.O. No.:		- 1
Fax:	-	Sta	State & Zip:	CA.	GOISS				Quot	Quote No.:		
	TAT Turnaround Codes **	**					¥	ANALYSIS REQUESTED (Test Name)	ESTED (Test I	Vame)		- 1
(1) = Same Day Ru $(2) = 24 Hour Rush$	Same Day Rush $(4) = 24 \text{ Hour Rush}$	72 Hour Rush 5 Day Rush	ا ر					1 /2				
(3) = 48 Hour Rush	r Rush X =	10 Working	Days (Standard TAT)	idard TAT)		S)C	tija Bas		<u></u>	<u></u>	Special / Instructions	
Client I.D.	AA ID.	Date	Time	Sample Matrix	of of			enter the TAT Turnaround Codes ** below	und Codes	/* below		
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For	For Laboratory Use		•	Relin	Relinquished by	fq		Date (1)	Time	No.	Received by	
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Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and any additional client-requested analyses. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.



9765 Eton Avenue Chatsworth California 91311 Tel: (818) 998-5547

Fax: (818) 998-7258

May 01, 2018 Kirsten Duey The Source Group, Inc. (PH) 3478 Buskirk Ave., Suite 100

Pleasant Hill, CA 94523

Re: Chemoil - SV Sampling

MB596148 / 8D25030

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received on 04/25/18 17:15 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Assurance Program Manual, applicable standard operating procedures, and other related documentation. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report or require additional information please call me at American Analytics.

Sincerely,

Viorel Vasile

Operations Manager



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling Date R

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
Helium ASTM D1946M					
TP-24	8D25030-01	Vapor	5	04/25/18 07:09	04/25/18 17:15
TP-23	8D25030-02	Vapor	5	04/25/18 07:50	04/25/18 17:15
TP-33	8D25030-03	Vapor	5	04/25/18 08:47	04/25/18 17:15
TP-22	8D25030-04	Vapor	5	04/25/18 09:35	04/25/18 17:15
TP-32	8D25030-05	Vapor	5	04/25/18 10:16	04/25/18 17:15
TP-21	8D25030-06	Vapor	5	04/25/18 10:58	04/25/18 17:15
TP-18	8D25030-07	Vapor	5	04/25/18 11:47	04/25/18 17:15
TP-18 DUP	8D25030-08	Vapor	5	04/25/18 11:47	04/25/18 17:15
TP-17	8D25030-09	Vapor	5	04/25/18 12:26	04/25/18 17:15
AN-6	8D25030-10	Vapor	5	04/25/18 13:10	04/25/18 17:15
TP-4	8D25030-11	Vapor	5	04/25/18 14:00	04/25/18 17:15
AN-7	8D25030-12	Vapor	5	04/25/18 14:45	04/25/18 17:15
TO-15 (Mid Level)					
TP-24	8D25030-01	Vapor	5	04/25/18 07:09	04/25/18 17:15
TP-23	8D25030-02	Vapor	5	04/25/18 07:50	04/25/18 17:15
TP-33	8D25030-03	Vapor	5	04/25/18 08:47	04/25/18 17:15
TP-22	8D25030-04	Vapor	5	04/25/18 09:35	04/25/18 17:15
TP-32	8D25030-05	Vapor	5	04/25/18 10:16	04/25/18 17:15





Client:The Source Group, Inc. (PH)AA Project No: MB596148Project No:NADate Received: 04/25/18Project Name:Chemoil - SV SamplingDate Reported: 05/01/18

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
TP-21	8D25030-06	Vapor	5	04/25/18 10:58	04/25/18 17:15
TP-18	8D25030-07	Vapor	5	04/25/18 11:47	04/25/18 17:15
TP-18 DUP	8D25030-08	Vapor	5	04/25/18 11:47	04/25/18 17:15
TP-17	8D25030-09	Vapor	5	04/25/18 12:26	04/25/18 17:15
AN-6	8D25030-10	Vapor	5	04/25/18 13:10	04/25/18 17:15
TP-4	8D25030-11	Vapor	5	04/25/18 14:00	04/25/18 17:15
AN-7	8D25030-12	Vapor	5	04/25/18 14:45	04/25/18 17:15





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/27/18	04/27/18	04/27/18	04/23/18	
Date Analyzed:	04/27/18	04/27/18	04/27/18	04/27/18	
AA ID No:	8D25030-01	8D25030-02	8D25030-03	8D25030-04	
Client ID No:	TP-24	TP-23	TP-33	TP-22	
Matrix:	Vapor	Vapor	Vapor	Vapor	MDI
Dilution Factor:	1	1	1	1	MRL
TO-15 (Mid Level) (TO-15)					
Acetone	0.012	0.021	< 0.010	< 0.010	0.010
Allyl chloride	< 0.010	< 0.010	< 0.010	< 0.010	0.010
tert-Amyl Methyl Ether (TAME)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Benzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Benzyl chloride	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Bromodichloromethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Bromoform	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Bromomethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,3-Butadiene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
2-Butanone (MEK)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
tert-Butyl alcohol (TBA)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Carbon Disulfide	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Carbon Tetrachloride	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chloroethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chloroform	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Chloromethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Cyclohexane	< 0.010	< 0.010	< 0.010	0.029	0.010
Dibromochloromethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,2-Dibromoethane (EDB)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,2-Dichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,3-Dichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,4-Dichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Dichlorodifluoromethane (R12)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,1-Dichloroethane	< 0.010	<0.010	< 0.010	< 0.010	0.010
1,2-Dichloroethane (EDC)	< 0.010	<0.010	< 0.010	< 0.010	0.010
cis-1,2-Dichloroethylene	< 0.010	<0.010	<0.010	< 0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/27/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/27/18	04/27/18	04/27/18	04/27/18	
AA ID No:	8D25030-01	8D25030-02	8D25030-03	8D25030-04	
Client ID No:	TP-24	TP-23	TP-33	TP-22	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	1	1	MRL
TO-15 (Mid Level) (TO-15) (co	ntinued)				
1,1-Dichloroethylene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
trans-1,2-Dichloroethylene	<0.010	< 0.010	< 0.010	< 0.010	0.010
1,2-Dichloropropane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
trans-1,3-Dichloropropylene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
cis-1,3-Dichloropropylene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Dichlorotetrafluoroethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Diisopropyl ether (DIPE)	<0.010	<0.010	<0.010	< 0.010	0.010
1,4-Dioxane	<0.010	<0.010	<0.010	< 0.010	0.010
Ethanol	<0.010	0.013	<0.010	< 0.010	0.010
Ethyl Acetate	< 0.010	<0.010	<0.010	< 0.010	0.010
Ethylbenzene	<0.010	<0.010	<0.010	<0.010	0.010
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	<0.010	<0.010	<0.010	0.010
4-Ethyltoluene	<0.010	<0.010	<0.010	<0.010	0.010
Heptane	<0.010	<0.010	<0.010	<0.010	0.010
Hexachlorobutadiene	<0.010	<0.010	<0.010	<0.010	0.010
n-Hexane	<0.010	<0.010	<0.010	<0.010	0.010
2-Hexanone (MBK)	<0.010	<0.010	<0.010	<0.010	0.010
Isopropanol (IPA)	<0.010	<0.010	<0.010	<0.010	0.010
Methyl-tert-Butyl Ether (MTBE)	<0.010	<0.010	<0.010	<0.010	0.010
Methylene Chloride	< 0.010	<0.010	<0.010	<0.010	0.010
4-Methyl-2-pentanone (MIBK)	<0.010	<0.010	<0.010	<0.010	0.010
Naphthalene	< 0.010	<0.010	<0.010	<0.010	0.010
Propylene	< 0.010	<0.010	<0.010	<0.010	0.010
Styrene	<0.010	<0.010	<0.010	<0.010	0.010
1,1,2,2-Tetrachloroethane	<0.010	<0.010	<0.010	<0.010	0.010
Tetrachloroethylene (PCE)	<0.010	<0.010	<0.010	<0.010	0.010
Tetrahydrofuran (THF)	<0.010	<0.010	<0.010	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

AA Project No: MB596148

Date Received: 04/25/18

Project Name: Chemoil - SV Sampling

Date Received: 04/23/18

Date Reported: 05/01/18

Method: VOCs by GCMS EPA TO-15 (Mid Level) Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/27/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/27/18	04/27/18 8D25030-02	04/27/18 8D25030-03	04/27/18	
AA ID No:	8D25030-01			8D25030-04	
Client ID No:	TP-24	TP-23	TP-33	TP-22	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	1	1	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	<0.010	< 0.010	< 0.010	<0.010	0.010
1,2,4-Trichlorobenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,1,2-Trichloroethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,1,1-Trichloroethane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Trichloroethylene (TCE)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Trichlorofluoromethane (R11)	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	< 0.010	< 0.010	< 0.010	< 0.010	0.010
ane (R113)					
1,3,5-Trimethylbenzene	< 0.010	<0.010	< 0.010	<0.010	0.010
1,2,4-Trimethylbenzene	<0.010	<0.010	<0.010	0.014	0.010
2,2,4-Trimethylpentane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Vinyl acetate	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Vinyl bromide	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Vinyl chloride	< 0.010	< 0.010	< 0.010	< 0.010	0.010
o-Xylene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
m,p-Xylenes	< 0.010	< 0.010	< 0.010	< 0.010	0.010
1,2,3-Trichloropropane	< 0.010	< 0.010	< 0.010	< 0.010	0.010
sec-Butylbenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
Isopropylbenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
n-Propylbenzene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
4-Isopropyltoluene	< 0.010	< 0.010	< 0.010	< 0.010	0.010
n-Butylbenzene	<0.010	<0.010	<0.010	<0.010	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	122%	119%	120%	126%	70-130

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/27/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/27/18	04/27/18	04/27/18	04/28/18	
AA ID No:	8D25030-05	8D25030-06	8D25030-07	8D25030-08	
Client ID No:	TP-32	TP-21	TP-18	TP-18 DUP	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	3000	3000	MRL
TO-15 (Mid Level) (TO-15)					
Acetone	< 0.010	< 0.010	<30	<30	0.010
Allyl chloride	< 0.010	< 0.010	<30	<30	0.010
tert-Amyl Methyl Ether (TAME)	< 0.010	< 0.010	<30	<30	0.010
Benzene	< 0.010	< 0.010	46	65	0.010
Benzyl chloride	< 0.010	< 0.010	<30	<30	0.010
Bromodichloromethane	< 0.010	< 0.010	<30	<30	0.010
Bromoform	< 0.010	< 0.010	<30	<30	0.010
Bromomethane	< 0.010	< 0.010	<30	<30	0.010
1,3-Butadiene	< 0.010	< 0.010	<30	<30	0.010
2-Butanone (MEK)	< 0.010	< 0.010	<30	<30	0.010
tert-Butyl alcohol (TBA)	< 0.010	< 0.010	<30	<30	0.010
Carbon Disulfide	< 0.010	< 0.010	<30	<30	0.010
Carbon Tetrachloride	< 0.010	< 0.010	<30	<30	0.010
Chlorobenzene	< 0.010	< 0.010	<30	<30	0.010
Chloroethane	< 0.010	< 0.010	<30	<30	0.010
Chloroform	< 0.010	< 0.010	<30	<30	0.010
Chloromethane	< 0.010	< 0.010	<30	<30	0.010
Cyclohexane	< 0.010	< 0.010	950	1200	0.010
Dibromochloromethane	< 0.010	< 0.010	<30	<30	0.010
1,2-Dibromoethane (EDB)	< 0.010	< 0.010	<30	<30	0.010
1,2-Dichlorobenzene	< 0.010	< 0.010	<30	<30	0.010
1,3-Dichlorobenzene	< 0.010	< 0.010	<30	<30	0.010
1,4-Dichlorobenzene	< 0.010	< 0.010	<30	<30	0.010
Dichlorodifluoromethane (R12)	< 0.010	<0.010	<30	<30	0.010
1,1-Dichloroethane	< 0.010	< 0.010	<30	<30	0.010
1,2-Dichloroethane (EDC)	< 0.010	<0.010	<30	<30	0.010
cis-1,2-Dichloroethylene	< 0.010	<0.010	<30	<30	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/27/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/27/18	04/27/18	04/27/18	04/28/18	
AA ID No:	8D25030-05	8D25030-06	8D25030-07	8D25030-08	
Client ID No:	TP-32	TP-21	TP-18	TP-18 DUP	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	3000	3000	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
1,1-Dichloroethylene	<0.010	<0.010	<30	<30	0.010
trans-1,2-Dichloroethylene	<0.010	< 0.010	<30	<30	0.010
1,2-Dichloropropane	<0.010	<0.010	<30	<30	0.010
trans-1,3-Dichloropropylene	<0.010	<0.010	<30	<30	0.010
cis-1,3-Dichloropropylene	<0.010	<0.010	<30	<30	0.010
Dichlorotetrafluoroethane	<0.010	<0.010	<30	<30	0.010
Diisopropyl ether (DIPE)	<0.010	<0.010	<30	<30	0.010
1,4-Dioxane	<0.010	<0.010	<30	<30	0.010
Ethanol	<0.010	<0.010	<30	<30	0.010
Ethyl Acetate	<0.010	<0.010	<30	<30	0.010
Ethylbenzene	<0.010	< 0.010	<30	<30	0.010
Ethyl-tert-Butyl Ether (ETBE)	<0.010	< 0.010	<30	<30	0.010
4-Ethyltoluene	<0.010	<0.010	<30	<30	0.010
Heptane	< 0.010	< 0.010	130	170	0.010
Hexachlorobutadiene	< 0.010	< 0.010	<30	<30	0.010
n-Hexane	<0.010	<0.010	<30	32	0.010
2-Hexanone (MBK)	<0.010	<0.010	<30	<30	0.010
Isopropanol (IPA)	<0.010	<0.010	<30	<30	0.010
Methyl-tert-Butyl Ether (MTBE)	< 0.010	< 0.010	<30	<30	0.010
Methylene Chloride	<0.010	<0.010	<30	<30	0.010
4-Methyl-2-pentanone (MIBK)	<0.010	<0.010	<30	<30	0.010
Naphthalene	<0.010	< 0.010	<30	<30	0.010
Propylene	<0.010	< 0.010	<30	<30	0.010
Styrene	<0.010	<0.010	<30	<30	0.010
1,1,2,2-Tetrachloroethane	< 0.010	< 0.010	<30	<30	0.010
Tetrachloroethylene (PCE)	< 0.010	< 0.010	<30	<30	0.010
Tetrahydrofuran (THF)	< 0.010	< 0.010	<30	<30	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148

Date Received: 04/25/18

Date Reported: 05/01/18 Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/27/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/27/18	04/27/18	04/27/18	04/28/18	
AA ID No:	8D25030-05	8D25030-06	8D25030-07	8D25030-08	
Client ID No:	TP-32	TP-21	TP-18	TP-18 DUP	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	1	1	3000	3000	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	0.010	0.088	<30	<30	0.010
1,2,4-Trichlorobenzene	< 0.010	< 0.010	<30	<30	0.010
1,1,2-Trichloroethane	< 0.010	< 0.010	<30	<30	0.010
1,1,1-Trichloroethane	< 0.010	< 0.010	<30	<30	0.010
Trichloroethylene (TCE)	<0.010	< 0.010	<30	<30	0.010
Trichlorofluoromethane (R11)	<0.010	< 0.010	<30	<30	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	<0.010	< 0.010	<30	<30	0.010
ane (R113)					
1,3,5-Trimethylbenzene	<0.010	<0.010	<30	<30	0.010
1,2,4-Trimethylbenzene	<0.010	<0.010	<30	<30	0.010
2,2,4-Trimethylpentane	<0.010	<0.010	<30	<30	0.010
Vinyl acetate	<0.010	<0.010	<30	<30	0.010
Vinyl bromide	<0.010	<0.010	<30	<30	0.010
Vinyl chloride	<0.010	<0.010	<30	<30	0.010
o-Xylene	<0.010	<0.010	<30	<30	0.010
m,p-Xylenes	<0.010	< 0.010	30	44	0.010
1,2,3-Trichloropropane	< 0.010	< 0.010	<30	<30	0.010
sec-Butylbenzene	< 0.010	< 0.010	<30	<30	0.010
Isopropylbenzene	<0.010	< 0.010	<30	<30	0.010
n-Propylbenzene	< 0.010	< 0.010	<30	<30	0.010
4-Isopropyltoluene	< 0.010	< 0.010	<30	<30	0.010
n-Butylbenzene	<0.010	<0.010	<30	<30	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	120%	128%	99%	96%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Units: ug/L

wethod: VOCS by GCIV	15 EPA 10-15 (N	ila Eovol)		Units: u	9, =
Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/30/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/30/18	04/28/18	04/28/18	04/27/18	
AA ID No:	8D25030-09	8D25030-10	8D25030-11	8D25030-12	
Client ID No:	TP-17	AN-6	TP-4	AN-7	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	75	1500	1500	1	MRL
TO-15 (Mid Level) (TO-15)					
Acetone	<0.75	<15	<15	0.022	0.010
Allyl chloride	< 0.75	<15	<15	<0.010	0.010
tert-Amyl Methyl Ether (TAME)	< 0.75	<15	<15	<0.010	0.010
Benzene	< 0.75	230	<15	<0.010	0.010
Benzyl chloride	< 0.75	<15	<15	<0.010	0.010
Bromodichloromethane	< 0.75	<15	<15	<0.010	0.010
Bromoform	< 0.75	<15	<15	<0.010	0.010
Bromomethane	< 0.75	<15	<15	<0.010	0.010
1,3-Butadiene	< 0.75	<15	<15	<0.010	0.010
2-Butanone (MEK)	< 0.75	<15	<15	<0.010	0.010
tert-Butyl alcohol (TBA)	< 0.75	<15	<15	<0.010	0.010
Carbon Disulfide	< 0.75	<15	<15	<0.010	0.010
Carbon Tetrachloride	< 0.75	<15	<15	<0.010	0.010
Chlorobenzene	< 0.75	<15	<15	<0.010	0.010
Chloroethane	< 0.75	<15	<15	<0.010	0.010
Chloroform	< 0.75	<15	<15	<0.010	0.010
Chloromethane	< 0.75	<15	<15	<0.010	0.010
Cyclohexane	< 0.75	1500	330	<0.010	0.010
Dibromochloromethane	< 0.75	<15	<15	<0.010	0.010
1,2-Dibromoethane (EDB)	< 0.75	<15	<15	<0.010	0.010
1,2-Dichlorobenzene	< 0.75	<15	<15	<0.010	0.010
1,3-Dichlorobenzene	< 0.75	<15	<15	<0.010	0.010
1,4-Dichlorobenzene	< 0.75	<15	<15	<0.010	0.010
Dichlorodifluoromethane (R12)	< 0.75	<15	<15	<0.010	0.010
1,1-Dichloroethane	< 0.75	<15	<15	<0.010	0.010
1,2-Dichloroethane (EDC)	< 0.75	<15	<15	<0.010	0.010
cis-1,2-Dichloroethylene	< 0.75	<15	<15	<0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	_
Date Prepared:	04/30/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/30/18	04/28/18	04/28/18	04/27/18	
AA ID No:	8D25030-09	8D25030-10	8D25030-11	8D25030-12	
Client ID No:	TP-17	AN-6	TP-4	AN-7	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	75	1500	1500	1	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
1,1-Dichloroethylene	<0.75	<15	<15	<0.010	0.010
trans-1,2-Dichloroethylene	< 0.75	<15	<15	<0.010	0.010
1,2-Dichloropropane	<0.75	<15	<15	<0.010	0.010
trans-1,3-Dichloropropylene	< 0.75	<15	<15	<0.010	0.010
cis-1,3-Dichloropropylene	< 0.75	<15	<15	<0.010	0.010
Dichlorotetrafluoroethane	<0.75	<15	<15	<0.010	0.010
Diisopropyl ether (DIPE)	<0.75	<15	<15	<0.010	0.010
1,4-Dioxane	<0.75	<15	<15	<0.010	0.010
Ethanol	<0.75	<15	<15	<0.010	0.010
Ethyl Acetate	<0.75	<15	<15	<0.010	0.010
Ethylbenzene	<0.75	28	100	<0.010	0.010
Ethyl-tert-Butyl Ether (ETBE)	<0.75	<15	<15	<0.010	0.010
4-Ethyltoluene	<0.75	<15	18	<0.010	0.010
Heptane	< 0.75	330	130	<0.010	0.010
Hexachlorobutadiene	< 0.75	<15	<15	<0.010	0.010
n-Hexane	< 0.75	460	<15	<0.010	0.010
2-Hexanone (MBK)	< 0.75	<15	<15	<0.010	0.010
Isopropanol (IPA)	< 0.75	<15	<15	<0.010	0.010
Methyl-tert-Butyl Ether (MTBE)	<0.75	<15	<15	<0.010	0.010
Methylene Chloride	<0.75	<15	<15	<0.010	0.010
4-Methyl-2-pentanone (MIBK)	<0.75	<15	<15	<0.010	0.010
Naphthalene	<0.75	<15	<15	<0.010	0.010
Propylene	1.0	<15	<15	<0.010	0.010
Styrene	<0.75	<15	<15	<0.010	0.010
1,1,2,2-Tetrachloroethane	<0.75	<15	<15	<0.010	0.010
Tetrachloroethylene (PCE)	< 0.75	<15	<15	<0.010	0.010
Tetrahydrofuran (THF)	<0.75	<15	<15	< 0.010	0.010





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: VOCs by GCMS EPA TO-15 (Mid Level)

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Units: ug/L

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/30/18	04/27/18	04/27/18	04/27/18	
Date Analyzed:	04/30/18	04/28/18	04/28/18	04/27/18	
AA ID No:	8D25030-09	8D25030-10	8D25030-11	8D25030-12	
Client ID No:	TP-17	AN-6	TP-4	AN-7	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	75	1500	1500	1	MRL
TO-15 (Mid Level) (TO-15) (cor	ntinued)				
Toluene	< 0.75	<15	21	< 0.010	0.010
1,2,4-Trichlorobenzene	< 0.75	<15	<15	< 0.010	0.010
1,1,2-Trichloroethane	< 0.75	<15	<15	< 0.010	0.010
1,1,1-Trichloroethane	< 0.75	<15	<15	< 0.010	0.010
Trichloroethylene (TCE)	< 0.75	<15	<15	< 0.010	0.010
Trichlorofluoromethane (R11)	< 0.75	<15	<15	< 0.010	0.010
1,1,2-Trichloro-1,2,2-trifluoroeth	<0.75	<15	<15	<0.010	0.010
ane (R113)					
1,3,5-Trimethylbenzene	<0.75	<15	21	<0.010	0.010
1,2,4-Trimethylbenzene	<0.75	<15	53	<0.010	0.010
2,2,4-Trimethylpentane	<0.75	<15	<15	<0.010	0.010
Vinyl acetate	<0.75	<15	<15	<0.010	0.010
Vinyl bromide	<0.75	<15	<15	<0.010	0.010
Vinyl chloride	<0.75	<15	<15	<0.010	0.010
o-Xylene	<0.75	<15	93	<0.010	0.010
m,p-Xylenes	<0.75	<15	260	<0.010	0.010
1,2,3-Trichloropropane	<0.75	<15	<15	<0.010	0.010
sec-Butylbenzene	<0.75	<15	<15	<0.010	0.010
Isopropylbenzene	<0.75	<15	29	<0.010	0.010
n-Propylbenzene	<0.75	<15	27	<0.010	0.010
4-Isopropyltoluene	<0.75	<15	<15	<0.010	0.010
n-Butylbenzene	<0.75	<15	<15	<0.010	0.010
<u>Surrogates</u>					%REC Limits
4-Bromofluorobenzene	113%	100%	111%	121%	70-130





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596148 Date Received: 04/25/18

Date Reported: 05/01/18

Units: % by Volume

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D25030-01	8D25030-02	8D25030-03	8D25030-04	
Client ID No:	TP-24	TP-23	TP-33	TP-22	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL

Helium ASTM D1946M (ASTM D1946M)

Helium	<0.20	< 0.20	<0.20	<0.20	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596148 Date Received: 04/25/18

Date Reported: 05/01/18

Units: % by Volume

Data Carriella I	0.4/05/40	0.4/05/40	0.4/05/40	0.4/0.5/4.0	
Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D25030-05	8D25030-06	8D25030-07	8D25030-08	
Client ID No:	TP-32	TP-21	TP-18	TP-18 DUP	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL

Helium ASTM D1946M (ASTM D1946M)

Helium	< 0.20	0.40	<0.20	<0.20	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

Method: Helium by GC/TCD

AA Project No: MB596148 Date Received: 04/25/18

Date Received: 04/25/18 **Date Reported:** 05/01/18

Units: % by Volume

Date Sampled:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Prepared:	04/25/18	04/25/18	04/25/18	04/25/18	
Date Analyzed:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D25030-09	8D25030-10	8D25030-11	8D25030-12	
Client ID No:	TP-17	AN-6	TP-4	AN-7	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL

Helium ASTM D1946M (ASTM D1946M)

Helium	3.2	<0.20	<0.20	2.0	0.10





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148

Date Received: 04/25/18

Date Reported: 05/01/18

	R	eporting				%REC		RPD	
Analyte	Result	Limit	Units	Level	Result %REC	Limits	RPD	Limit	Notes

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

Batch B8D3026 - *** DEFAULT PREP ***

Batch B8D3026 - *** DEFAULT PI	REP ***			
Blank (B8D3026-BLK1)			Prepared & Analyzed: 04/27/18	
Acetone	<0.010	0.010	ug/L	
Allyl chloride	< 0.010	0.010	ug/L	
tert-Amyl Methyl Ether (TAME)	<0.010	0.010	ug/L	
Benzene	<0.010	0.010	ug/L	
Benzyl chloride	<0.010	0.010	ug/L	
Bromodichloromethane	<0.010	0.010	ug/L	
Bromoform	<0.010	0.010	ug/L	
Bromomethane	<0.010	0.010	ug/L	
1,3-Butadiene	<0.010	0.010	ug/L	
2-Butanone (MEK)	<0.010	0.010	ug/L	
tert-Butyl alcohol (TBA)	<0.010	0.010	ug/L	
Carbon Disulfide	<0.010	0.010	ug/L	
Carbon Tetrachloride	<0.010	0.010	ug/L	
Chlorobenzene	<0.010	0.010	ug/L	
Chloroethane	<0.010	0.010	ug/L	
Chloroform	<0.010	0.010	ug/L	
Chloromethane	<0.010	0.010	ug/L	
Cyclohexane	<0.010	0.010	ug/L	
Dibromochloromethane	<0.010	0.010	ug/L	
1,2-Dibromoethane (EDB)	<0.010	0.010	ug/L	
1,2-Dichlorobenzene	<0.010	0.010	ug/L	
1,3-Dichlorobenzene	<0.010	0.010	ug/L	
1,4-Dichlorobenzene	<0.010	0.010	ug/L	
Dichlorodifluoromethane (R12)	<0.010	0.010	ug/L	
1,1-Dichloroethane	<0.010	0.010	ug/L	
1,2-Dichloroethane (EDC)	<0.010	0.010	ug/L	
cis-1,2-Dichloroethylene	<0.010	0.010	ug/L	
1,1-Dichloroethylene	<0.010	0.010	ug/L	
trans-1,2-Dichloroethylene	<0.010	0.010	ug/L	
1,2-Dichloropropane	<0.010	0.010	ug/L	
trans-1,3-Dichloropropylene	<0.010	0.010	ug/L	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	l Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	-	uality Conti	ol							
Batch B8D3026 - *** DEFAULT P	REP ***									
Blank (B8D3026-BLK1) Continu	ued			Prepare	ed & Ana	lyzed: 0	4/27/18			
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L							
Dichlorotetrafluoroethane	< 0.010	0.010	ug/L							
Diisopropyl ether (DIPE)	< 0.010	0.010	ug/L							
1,4-Dioxane	< 0.010	0.010	ug/L							
Ethanol	< 0.010	0.010	ug/L							
Ethyl Acetate	< 0.010	0.010	ug/L							
Ethylbenzene	< 0.010	0.010	ug/L							
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	0.010	ug/L							
4-Ethyltoluene	< 0.010	0.010	ug/L							
Heptane	< 0.010	0.010	ug/L							
Hexachlorobutadiene	< 0.010	0.010	ug/L							
n-Hexane	< 0.010	0.010	ug/L							
2-Hexanone (MBK)	< 0.010	0.010	ug/L							
Isopropanol (IPA)	< 0.010	0.010	ug/L							
Methyl-tert-Butyl Ether (MTBE)	< 0.010	0.010	ug/L							
Methylene Chloride	< 0.010	0.010	ug/L							
4-Methyl-2-pentanone (MIBK)	< 0.010	0.010	ug/L							
Naphthalene	< 0.010	0.010	ug/L							
Propylene	< 0.010	0.010	ug/L							
Styrene	< 0.010	0.010	ug/L							
1,1,2,2-Tetrachloroethane	< 0.010	0.010	ug/L							
Tetrachloroethylene (PCE)	< 0.010	0.010	ug/L							
Tetrahydrofuran (THF)	< 0.010	0.010	ug/L							
Toluene	< 0.010	0.010	ug/L							
1,2,4-Trichlorobenzene	< 0.010	0.010	ug/L							
1,1,2-Trichloroethane	< 0.010	0.010	ug/L							
1,1,1-Trichloroethane	< 0.010	0.010	ug/L							
Trichloroethylene (TCE)	< 0.010	0.010	ug/L							
Trichlorofluoromethane (R11)	< 0.010	0.010	ug/L							
1,1,2-Trichloro-1,2,2-trifluoroetha (R113)	ane<0.010	0.010	ug/L							
(/	0.040	0.040	,,							

A

1,3,5-Trimethylbenzene

Viorel Vasile Operations Manager ug/L

< 0.010 0.010



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L	-	uality Conti	ol						
Batch B8D3026 - *** DEFAULT PR	EP ***								
Blank (B8D3026-BLK1) Continue	ed			Prepare	ed & Analyzed: ()4/27/18			
1,2,4-Trimethylbenzene	<0.010	0.010	ug/L						
2,2,4-Trimethylpentane	<0.010	0.010	ug/L						
Vinyl acetate	<0.010	0.010	ug/L						
Vinyl bromide	<0.010	0.010	ug/L						
Vinyl chloride	<0.010	0.010	ug/L						
o-Xylene	<0.010	0.010	ug/L						
m,p-Xylenes	<0.010	0.010	ug/L						
1,2,3-Trichloropropane	<0.010	0.010	ug/L						
sec-Butylbenzene	<0.010	0.010	ug/L						
Isopropylbenzene	<0.010	0.010	ug/L						
n-Propylbenzene	<0.010	0.010	ug/L						
4-Isopropyltoluene	<0.010	0.010	ug/L						
n-Butylbenzene	<0.010	0.010	ug/L						
Surrogate: 4-Bromofluorobenzene	0.145		ug/L	0.14	101	70-130			
LCS (B8D3026-BS1)				Prepare	ed & Analyzed: ()4/27/18			
Acetone	0.0921	0.010	ug/L	0.095	96.9	70-130		30	
Benzene	0.109	0.010	ug/L	0.13	85.7	70-130		30	
Benzyl chloride	0.225	0.010	ug/L	0.21	109	70-130		30	
Bromodichloromethane	0.294	0.010	ug/L	0.27	110	70-130		30	
Bromoform	0.397	0.010	ug/L	0.41	95.9	70-130		30	
Bromomethane	0.163	0.010	ug/L	0.16	105	70-130		30	
2-Butanone (MEK)	0.109	0.010	ug/L	0.12	92.7	70-130		30	
Carbon Disulfide	0.105	0.010	ug/L	0.12	84.4	70-130		30	
Carbon Tetrachloride	0.282	0.010	ug/L	0.25	112	70-130		30	
Chlorobenzene	0.171	0.010	ug/L	0.18	93.1	70-130		30	
Chloroethane	0.0816	0.010	ug/L	0.11	77.3	70-130		30	
Chloroform	0.207	0.010	ug/L	0.20	106	70-130		30	
Chloromethane	0.0596	0.010	ug/L	0.083	72.2	70-130		30	
Dibromochloromethane	0.316	0.010	ug/L	0.34	92.7	70-130		30	
1,2-Dibromoethane (EDB)	0.339	0.010	ug/L	0.31	110	70-130		30	
1,2-Dichlorobenzene	0.260	0.010	ug/L	0.24	108	70-130		30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD RPD Limi	
VOCs by GCMS EPA TO-15 (Mid Le			ol					
Batch B8D3026 - *** DEFAULT PRE	•	•						
LCS (B8D3026-BS1) Continued				Prepare	ed & Analyzed: 0	4/27/18		
1,3-Dichlorobenzene	0.250	0.010	ug/L	0.24	104	70-130	30	
1,4-Dichlorobenzene	0.252	0.010	ug/L	0.24	105	70-130	30	
Dichlorodifluoromethane (R12)	0.206	0.010	ug/L	0.20	104	70-130	30	
1,1-Dichloroethane	0.150	0.010	ug/L	0.16	92.4	70-130	30	
1,2-Dichloroethane (EDC)	0.186	0.010	ug/L	0.16	115	70-130	30	
cis-1,2-Dichloroethylene	0.155	0.010	ug/L	0.16	97.8	70-130	30	
1,1-Dichloroethylene	0.160	0.010	ug/L	0.16	101	70-130	30	
trans-1,2-Dichloroethylene	0.150	0.010	ug/L	0.16	94.8	70-130	30	
1,2-Dichloropropane	0.157	0.010	ug/L	0.18	84.8	70-130	30	
trans-1,3-Dichloropropylene	0.214	0.010	ug/L	0.18	118	70-130	30	
cis-1,3-Dichloropropylene	0.184	0.010	ug/L	0.18	101	70-130	30	
Dichlorotetrafluoroethane	0.273	0.010	ug/L	0.28	97.7	70-130	30	
Ethylbenzene	0.172	0.010	ug/L	0.17	99.0	70-130	30	
4-Ethyltoluene	0.194	0.010	ug/L	0.20	98.9	70-130	30	
Hexachlorobutadiene	0.477	0.010	ug/L	0.43	112	70-130	30	
2-Hexanone (MBK)	0.172	0.010	ug/L	0.16	105	70-130	30	
Isopropanol (IPA)	0.0877	0.010	ug/L	0.098	89.2	70-130	30	
Methylene Chloride	0.117	0.010	ug/L	0.14	84.3	70-130	30	
4-Methyl-2-pentanone (MIBK)	0.153	0.010	ug/L	0.16	93.4	70-130	30	
Styrene	0.164	0.010	ug/L	0.17	96.0	70-130	30	
1,1,2,2-Tetrachloroethane	0.192	0.010	ug/L	0.27	69.9	70-130	30	***
Tetrachloroethylene (PCE)	0.273	0.010	ug/L	0.27	101	70-130	30	
Toluene	0.143	0.010	ug/L	0.15	94.8	70-130	30	
1,2,4-Trichlorobenzene	0.414	0.010	ug/L	0.30	140	70-130	30	**
1,1,2-Trichloroethane	0.219	0.010	ug/L	0.22	100	70-130	30	
1,1,1-Trichloroethane	0.239	0.010	ug/L	0.22	110	70-130	30	
Trichloroethylene (TCE)	0.237	0.010	ug/L	0.21	110	70-130	30	
Trichlorofluoromethane (R11)	0.219	0.010	ug/L	0.22	97.6	70-130	30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)		0.010	ug/L	0.31	95.8	70-130	30	
1,3,5-Trimethylbenzene	0.218	0.010	ug/L	0.20	111	70-130	30	
1,2,4-Trimethylbenzene	0.215	0.010	ug/L	0.20	109	70-130	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Lo									
Batch B8D3026 - *** DEFAULT PRI	-								
LCS (B8D3026-BS1) Continued				Prepare	ed & Analyzed: 04	4/27/18			
Vinyl acetate	0.133	0.010	ug/L	0.14	94.7	70-130		30	
Vinyl chloride	0.0971	0.010	ug/L	0.10	94.9	70-130		30	
o-Xylene	0.181	0.010	ug/L	0.17	104	70-130		30	
m,p-Xylenes	0.380	0.010	ug/L	0.35	110	70-130		30	
1,2,3-Trichloropropane	0.163	0.010	ug/L	0.24	67.4	70-130		30	***
sec-Butylbenzene	0.136	0.010	ug/L	0.22	62.0	70-130		30	***
Isopropylbenzene	0.131	0.010	ug/L	0.20	66.8	70-130		30	***
n-Propylbenzene	0.133	0.010	ug/L	0.20	67.7	70-130		30	***
4-Isopropyltoluene	0.133	0.010	ug/L	0.22	60.6	70-130		30	***
Surrogate: 4-Bromofluorobenzene	0.167		ug/L	0.14	117	70-130			
LCS Dup (B8D3026-BSD1)				Prepare	ed: 04/27/18 Ana	alyzed: 0	4/28/18		
Acetone	0.0884	0.010	ug/L	0.095	93.0	70-130	4.11	30	
Benzene	0.107	0.010	ug/L	0.13	83.9	70-130	2.09	30	
Benzyl chloride	0.241	0.010	ug/L	0.21	116	70-130	6.60	30	
Bromodichloromethane	0.294	0.010	ug/L	0.27	110	70-130	0.0455	30	
Bromoform	0.403	0.010	ug/L	0.41	97.4	70-130	1.50	30	
Bromomethane	0.162	0.010	ug/L	0.16	104	70-130	0.812	30	
2-Butanone (MEK)	0.109	0.010	ug/L	0.12	92.1	70-130	0.703	30	
Carbon Disulfide	0.104	0.010	ug/L	0.12	83.3	70-130	1.34	30	
Carbon Tetrachloride	0.284	0.010	ug/L	0.25	113	70-130	0.422	30	
Chlorobenzene	0.177	0.010	ug/L	0.18	96.0	70-130	3.07	30	
Chloroethane	0.0824	0.010	ug/L	0.11	78.1	70-130	0.965	30	
Chloroform	0.205	0.010	ug/L	0.20	105	70-130	0.998	30	
Chloromethane	0.0579	0.010	ug/L	0.083	70.1	70-130	2.88	30	
Dibromochloromethane	0.320	0.010	ug/L	0.34	93.8	70-130	1.21	30	
1,2-Dibromoethane (EDB)	0.338	0.010	ug/L	0.31	110	70-130	0.341	30	
1,2-Dichlorobenzene	0.264	0.010	ug/L	0.24	110	70-130	1.38	30	
1,3-Dichlorobenzene	0.256	0.010	ug/L	0.24	107	70-130	2.45	30	
1,4-Dichlorobenzene	0.252	0.010	ug/L	0.24	105	70-130	0.0715	30	
Dichlorodifluoromethane (R12)	0.205	0.010	ug/L	0.20	104	70-130	0.192	30	
1,1-Dichloroethane	0.145	0.010	ug/L	0.16	89.4	70-130	3.36	30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le		uality Conti	rol						
Batch B8D3026 - *** DEFAULT PRE	EP ***								
LCS Dup (B8D3026-BSD1) Contin	nued			Prepare	ed: 04/27/18 Ana	alyzed: 0	4/28/18		
1,2-Dichloroethane (EDC)	0.185	0.010	ug/L	0.16	114	70-130	0.197	30	
cis-1,2-Dichloroethylene	0.149	0.010	ug/L	0.16	94.1	70-130	3.80	30	
1,1-Dichloroethylene	0.156	0.010	ug/L	0.16	98.4	70-130	2.58	30	
trans-1,2-Dichloroethylene	0.144	0.010	ug/L	0.16	90.7	70-130	4.48	30	
1,2-Dichloropropane	0.167	0.010	ug/L	0.18	90.3	70-130	6.28	30	
trans-1,3-Dichloropropylene	0.217	0.010	ug/L	0.18	119	70-130	1.43	30	
cis-1,3-Dichloropropylene	0.185	0.010	ug/L	0.18	102	70-130	0.640	30	
Dichlorotetrafluoroethane	0.271	0.010	ug/L	0.28	96.8	70-130	0.951	30	
Ethylbenzene	0.178	0.010	ug/L	0.17	102	70-130	3.35	30	
4-Ethyltoluene	0.196	0.010	ug/L	0.20	99.6	70-130	0.680	30	
Hexachlorobutadiene	0.506	0.010	ug/L	0.43	119	70-130	5.92	30	
2-Hexanone (MBK)	0.184	0.010	ug/L	0.16	112	70-130	6.35	30	
Isopropanol (IPA)	0.0907	0.010	ug/L	0.098	92.2	70-130	3.31	30	
Methylene Chloride	0.118	0.010	ug/L	0.14	84.8	70-130	0.591	30	
4-Methyl-2-pentanone (MIBK)	0.160	0.010	ug/L	0.16	97.6	70-130	4.42	30	
Styrene	0.172		ug/L	0.17	101	70-130	4.90	30	
1,1,2,2-Tetrachloroethane	0.198	0.010	ug/L	0.27	72.3	70-130	3.31	30	
Tetrachloroethylene (PCE)	0.266	0.010	ug/L	0.27	98.2	70-130	2.61	30	
Toluene	0.147		ug/L	0.15	97.5	70-130	2.81	30	
1,2,4-Trichlorobenzene	0.443	0.010	ug/L	0.30	149	70-130	6.84	30	**
1,1,2-Trichloroethane	0.217	0.010	ug/L	0.22	99.3	70-130	1.05	30	
1,1,1-Trichloroethane	0.241	0.010	ug/L	0.22	110	70-130	0.591	30	
Trichloroethylene (TCE)	0.236		ug/L	0.21	110	70-130	0.546	30	
Trichlorofluoromethane (R11)	0.215	0.010	ug/L	0.22	95.7	70-130	1.94	30	
1,1,2-Trichloro-1,2,2-trifluoroethane	e 0.287	0.010	ug/L	0.31	93.6	70-130	2.32	30	
(R113)									
1,3,5-Trimethylbenzene	0.218		ug/L	0.20	111	70-130		30	
1,2,4-Trimethylbenzene	0.218		ug/L	0.20	111	70-130	1.57	30	
Vinyl acetate	0.135		ug/L	0.14	96.0	70-130	1.31	30	
Vinyl chloride	0.0940		ug/L	0.10	91.9	70-130	3.24	30	
o-Xylene	0.182		ug/L	0.17	105	70-130		30	
m,p-Xylenes	0.380	0.010	ug/L	0.35	109	70-130	0.0685	30	



Date Reported: 05/01/18



LABORATORY ANALYSIS RESULTS

Client:The Source Group, Inc. (PH)AA Project No: MB596148Project No:NADate Received: 04/25/18

Project Name: Chemoil - SV Sampling

Analyte Result	i imit	-		Source	%REC		RPD	Matac
•		Units	Level	Result %REC	Limits	RPD	Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - 0	Quality Cont	trol						
Batch B8D3026 - *** DEFAULT PREP ***								
LCS Dup (B8D3026-BSD1) Continued			Prepare	ed: 04/27/18 Ana	alyzed: 04	1/28/18		
1,2,3-Trichloropropane 0.166	0.010	ug/L	0.24	68.7	70-130	1.98	30	***
sec-Butylbenzene 0.140	0.010	ug/L	0.22	63.9	70-130	2.98	30	***
Isopropylbenzene 0.137	0.010	ug/L	0.20	69.8	70-130	4.39	30	***
n-Propylbenzene 0.136	0.010	ug/L	0.20	69.0	70-130	1.83	30	***
4-Isopropyltoluene 0.134	0.010	ug/L	0.22	61.2	70-130	1.07	30	***
Surrogate: 4-Bromofluorobenzene 0.169		ug/L	0.14	118	70-130			
Batch B8E0117 - *** DEFAULT PREP ***		J						
Blank (B8E0117-BLK1)			Prepare	ed & Analyzed: 0	4/27/18			
Acetone <0.010	0.010	ug/L		<u> </u>				
Allyl chloride <0.010	0.010	ug/L						
tert-Amyl Methyl Ether (TAME) <0.010	0.010	ug/L						
Benzene <0.010	0.010	ug/L						
Benzyl chloride <0.010	0.010	ug/L						
Bromodichloromethane <0.010	0.010	ug/L						
Bromoform <0.010	0.010	ug/L						
Bromomethane <0.010	0.010	ug/L						
1,3-Butadiene <0.010	0.010	ug/L						
2-Butanone (MEK) <0.010	0.010	ug/L						
tert-Butyl alcohol (TBA) <0.010		ug/L						
Carbon Disulfide <0.010		ug/L						
Carbon Tetrachloride <0.010		ug/L						
Chlorobenzene <0.010		ug/L						
Chloroethane <0.010		ug/L						
Chloroform <0.010		ug/L						
Chloromethane <0.010		ug/L						
Cyclohexane <0.010		ug/L						
Dibromochloromethane <0.010		ug/L						
1,2-Dibromoethane (EDB) <0.010		ug/L						
1,2-Dichlorobenzene <0.010		ug/L						
1,3-Dichlorobenzene <0.010		ug/L						
1,4-Dichlorobenzene <0.010	0.010	ug/L						





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148

Date Received: 04/25/18

Date Reported: 05/01/18

	F	Reporting		Spike	Source	%REC		RPD	
Analyte	Result	Limit	Units	Level	Result %R	REC Limits	RPD	Limit	Notes
VOCs by GCMS EPA TO-15 (Mid	Level) - Qu	uality Con	trol						
Batch B8E0117 - *** DEFAULT PF	REP ***								
Blank (B8E0117-BLK1) Continu	ed			Prepare	d & Analyze	d: 04/27/18			
Dichlorodifluoromethane (R12)	<0.010	0.010	ug/L						
1,1-Dichloroethane	<0.010	0.010	ug/L						

Dichlorodifluoromethane (R12)	<0.010	0.010	ug/L	
1,1-Dichloroethane	< 0.010	0.010	ug/L	
1,2-Dichloroethane (EDC)	< 0.010	0.010	ug/L	
cis-1,2-Dichloroethylene	< 0.010	0.010	ug/L	
1,1-Dichloroethylene	< 0.010	0.010	ug/L	
trans-1,2-Dichloroethylene	< 0.010	0.010	ug/L	
1,2-Dichloropropane	< 0.010	0.010	ug/L	
trans-1,3-Dichloropropylene	<0.010	0.010	ug/L	
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L	
Dichlorotetrafluoroethane	<0.010	0.010	ug/L	
Diisopropyl ether (DIPE)	<0.010	0.010	ug/L	
1,4-Dioxane	<0.010	0.010	ug/L	
Ethanol	<0.010	0.010	ug/L	
Ethyl Acetate	<0.010	0.010	ug/L	
Ethylbenzene	<0.010	0.010	ug/L	
Ethyl-tert-Butyl Ether (ETBE)	<0.010	0.010	ug/L	
4-Ethyltoluene	<0.010	0.010	ug/L	
Heptane	<0.010	0.010	ug/L	
Hexachlorobutadiene	<0.010	0.010	ug/L	
n-Hexane	<0.010	0.010	ug/L	
2-Hexanone (MBK)	<0.010	0.010	ug/L	
Isopropanol (IPA)	<0.010	0.010	ug/L	
Methyl-tert-Butyl Ether (MTBE)	<0.010	0.010	ug/L	
Methylene Chloride	<0.010	0.010	ug/L	
4-Methyl-2-pentanone (MIBK)	<0.010	0.010	ug/L	
Naphthalene	<0.010	0.010	ug/L	
Propylene	<0.010	0.010	ug/L	
Styrene	<0.010	0.010	ug/L	
1,1,2,2-Tetrachloroethane	<0.010	0.010	ug/L	
Tetrachloroethylene (PCE)	<0.010	0.010	ug/L	
Tetrahydrofuran (THF)	<0.010	0.010	ug/L	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result		%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	-	uality Contr	ol							
Batch B8E0117 - *** DEFAULT PRE	EP ***									
Blank (B8E0117-BLK1) Continue	ed			Prepare	ed & Ana	lyzed: 0	4/27/18			
Toluene	<0.010	0.010	ug/L							
1,2,4-Trichlorobenzene	<0.010	0.010	ug/L							
1,1,2-Trichloroethane	<0.010	0.010	ug/L							
1,1,1-Trichloroethane	<0.010	0.010	ug/L							
Trichloroethylene (TCE)	<0.010	0.010	ug/L							
Trichlorofluoromethane (R11)	<0.010	0.010	ug/L							
1,1,2-Trichloro-1,2,2-trifluoroethan	e<0.010	0.010	ug/L							
(R113)			ŭ							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							
1,2,4-Trimethylbenzene	<0.010	0.010	ug/L							
2,2,4-Trimethylpentane	<0.010	0.010	ug/L							
Vinyl acetate	<0.010	0.010	ug/L							
Vinyl bromide	<0.010	0.010	ug/L							
Vinyl chloride	<0.010	0.010	ug/L							
o-Xylene	<0.010	0.010	ug/L							
m,p-Xylenes	<0.010	0.010	ug/L							
1,2,3-Trichloropropane	<0.010	0.010	ug/L							
sec-Butylbenzene	<0.010	0.010	ug/L							
Isopropylbenzene	<0.010	0.010	ug/L							
n-Propylbenzene	<0.010	0.010	ug/L							
4-Isopropyltoluene	<0.010	0.010	ug/L							
n-Butylbenzene	<0.010	0.010	ug/L							
Surrogate: 4-Bromofluorobenzene	0.130		ug/L	0.14		90.8	70-130			
LCS (B8E0117-BS1)				Prepare	ed: 04/27	/18 Ana	alyzed: 04	1/28/18		
Acetone	0.0939	0.010	ug/L	0.095		98.8	70-130		30	
Benzene	0.126	0.010	ug/L	0.13		98.4	70-130		30	
Benzyl chloride	0.234	0.010	ug/L	0.21		113	70-130		30	
Bromodichloromethane	0.290	0.010	ug/L	0.27		108	70-130		30	
Bromoform	0.458	0.010	ug/L	0.41		111	70-130		30	
Bromomethane	0.205	0.010	ug/L	0.16		132	70-130		30	**
2-Butanone (MEK)	0.120	0.010	ug/L	0.12		101	70-130		30	
			-							





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control									
Batch B8E0117 - *** DEFAULT PREP ***									
LCS (B8E0117-BS1) Continued				Prepare	ed: 04/27/18 Ana	alyzed: 04	4/28/18		
Carbon Disulfide	0.123	0.010	ug/L	0.12	99.1	70-130		30	
Carbon Tetrachloride	0.276	0.010	ug/L	0.25	110	70-130		30	
Chlorobenzene	0.207	0.010	ug/L	0.18	112	70-130		30	
Chloroethane	0.115	0.010	ug/L	0.11	109	70-130		30	
Chloroform	0.200	0.010	ug/L	0.20	103	70-130		30	
Chloromethane	0.0805	0.010	ug/L	0.083	97.5	70-130		30	
Dibromochloromethane	0.381	0.010	ug/L	0.34	112	70-130		30	
1,2-Dibromoethane (EDB)	0.386	0.010	ug/L	0.31	126	70-130		30	
1,2-Dichlorobenzene	0.290	0.010	ug/L	0.24	121	70-130		30	
1,3-Dichlorobenzene	0.289	0.010	ug/L	0.24	120	70-130		30	
1,4-Dichlorobenzene	0.286	0.010	ug/L	0.24	119	70-130		30	
Dichlorodifluoromethane (R12)	0.195	0.010	ug/L	0.20	98.4	70-130		30	
1,1-Dichloroethane	0.157	0.010	ug/L	0.16	97.0	70-130		30	
1,2-Dichloroethane (EDC)	0.165	0.010	ug/L	0.16	102	70-130		30	
cis-1,2-Dichloroethylene	0.158	0.010	ug/L	0.16	99.4	70-130		30	
1,1-Dichloroethylene	0.156	0.010	ug/L	0.16	98.4	70-130		30	
trans-1,2-Dichloroethylene	0.153	0.010	ug/L	0.16	96.6	70-130		30	
1,2-Dichloropropane	0.199	0.010	ug/L	0.18	108	70-130		30	
trans-1,3-Dichloropropylene	0.213	0.010	ug/L	0.18	117	70-130		30	
cis-1,3-Dichloropropylene	0.201	0.010	ug/L	0.18	110	70-130		30	
Dichlorotetrafluoroethane	0.282	0.010	ug/L	0.28	101	70-130		30	
Ethylbenzene	0.173	0.010	ug/L	0.17	99.5	70-130		30	
4-Ethyltoluene	0.202	0.010	ug/L	0.20	103	70-130		30	
Hexachlorobutadiene	0.559	0.010	ug/L	0.43	131	70-130		30	**
2-Hexanone (MBK)	0.177	0.010	ug/L	0.16	108	70-130		30	
Isopropanol (IPA)	0.0923	0.010	ug/L	0.098	93.8	70-130		30	
Methylene Chloride	0.112	0.010	ug/L	0.14	80.7	70-130		30	
4-Methyl-2-pentanone (MIBK)	0.176	0.010	ug/L	0.16	108	70-130		30	
Styrene	0.185	0.010	ug/L	0.17	108	70-130		30	
1,1,2,2-Tetrachloroethane	0.210	0.010	ug/L	0.27	76.5	70-130		30	
Tetrachloroethylene (PCE)	0.311	0.010	ug/L	0.27	115	70-130		30	





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control									
Batch B8E0117 - *** DEFAULT PRE	P ***								
LCS (B8E0117-BS1) Continued				Prepare	ed: 04/27/18 Ana	alyzed: 04	4/28/18		
Toluene	0.157	0.010	ug/L	0.15	104	70-130		30	
1,2,4-Trichlorobenzene	0.426	0.010	ug/L	0.30	144	70-130		30	**
1,1,2-Trichloroethane	0.250	0.010	ug/L	0.22	115	70-130		30	
1,1,1-Trichloroethane	0.220	0.010	ug/L	0.22	101	70-130		30	
Trichloroethylene (TCE)	0.276	0.010	ug/L	0.21	129	70-130		30	
Trichlorofluoromethane (R11)	0.224	0.010	ug/L	0.22	99.6	70-130		30	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.315	0.010	ug/L	0.31	103	70-130		30	
(R113)			Ŭ						
1,3,5-Trimethylbenzene	0.223	0.010	ug/L	0.20	113	70-130		30	
1,2,4-Trimethylbenzene	0.216	0.010	ug/L	0.20	110	70-130		30	
Vinyl acetate	0.139	0.010	ug/L	0.14	98.6	70-130		30	
Vinyl chloride	0.102	0.010	ug/L	0.10	99.4	70-130		30	
o-Xylene	0.178	0.010	ug/L	0.17	102	70-130		30	
m,p-Xylenes	0.343	0.010	ug/L	0.35	98.7	70-130		30	
1,2,3-Trichloropropane	0.188	0.010	ug/L	0.24	77.9	70-130		30	
sec-Butylbenzene	0.178	0.010	ug/L	0.22	81.1	70-130		30	
Isopropylbenzene	0.158	0.010	ug/L	0.20	80.3	70-130		30	
n-Propylbenzene	0.152	0.010	ug/L	0.20	77.2	70-130		30	
4-Isopropyltoluene	0.181	0.010	ug/L	0.22	82.6	70-130		30	
Surrogate: 4-Bromofluorobenzene	0.142		ug/L	0.14	99.3	70-130			
LCS Dup (B8E0117-BSD1)	SD1)				Prepared: 04/27/18 Analyzed: 04/28/18				
Acetone	0.0898	0.010	ug/L	0.095	94.5	70-130	4.45	30	
Benzene	0.123	0.010	ug/L	0.13	96.4	70-130	2.08	30	
Benzyl chloride	0.229	0.010	ug/L	0.21	111	70-130	1.90	30	
Bromodichloromethane	0.282	0.010	ug/L	0.27	105	70-130	2.58	30	
Bromoform	0.454	0.010	ug/L	0.41	110	70-130	0.929	30	
Bromomethane	0.201	0.010	ug/L	0.16	129	70-130	1.95	30	
2-Butanone (MEK)	0.118	0.010	ug/L	0.12	100	70-130	1.19	30	
Carbon Disulfide	0.122	0.010	ug/L	0.12	98.2	70-130	0.862	30	
Carbon Tetrachloride	0.272	0.010	ug/L	0.25	108	70-130	1.68	30	
Chlorobenzene	0.203	0.010	ug/L	0.18	110	70-130	1.87	30	
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Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes			
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control												
Batch B8E0117 - *** DEFAULT PREP ***												
LCS Dup (B8E0117-BSD1) Continued				Prepared: 04/27/18 Analyzed: 04/28/18								
Chloroethane	0.112	0.010	ug/L	0.11	106	70-130	2.33	30				
Chloroform	0.197	0.010	ug/L	0.20	101	70-130	1.62	30				
Chloromethane	0.0781	0.010	ug/L	0.083	94.5	70-130	3.10	30				
Dibromochloromethane	0.373	0.010	ug/L	0.34	109	70-130	2.19	30				
1,2-Dibromoethane (EDB)	0.378	0.010	ug/L	0.31	123	70-130	2.29	30				
1,2-Dichlorobenzene	0.285	0.010	ug/L	0.24	119	70-130	1.86	30				
1,3-Dichlorobenzene	0.287	0.010	ug/L	0.24	119	70-130	0.709	30				
1,4-Dichlorobenzene	0.281	0.010	ug/L	0.24	117	70-130	1.87	30				
Dichlorodifluoromethane (R12)	0.191	0.010	ug/L	0.20	96.5	70-130	1.92	30				
1,1-Dichloroethane	0.153	0.010	ug/L	0.16	94.6	70-130	2.48	30				
1,2-Dichloroethane (EDC)	0.160	0.010	ug/L	0.16	98.6	70-130	3.51	30				
cis-1,2-Dichloroethylene	0.155	0.010	ug/L	0.16	97.9	70-130	1.52	30				
1,1-Dichloroethylene	0.155	0.010	ug/L	0.16	97.6	70-130	0.842	30				
trans-1,2-Dichloroethylene	0.151	0.010	ug/L	0.16	95.2	70-130	1.43	30				
1,2-Dichloropropane	0.192	0.010	ug/L	0.18	104	70-130	3.50	30				
trans-1,3-Dichloropropylene	0.209	0.010	ug/L	0.18	115	70-130	2.17	30				
cis-1,3-Dichloropropylene	0.197	0.010	ug/L	0.18	109	70-130	1.76	30				
Dichlorotetrafluoroethane	0.272	0.010	ug/L	0.28	97.3	70-130	3.51	30				
Ethylbenzene	0.170	0.010	ug/L	0.17	98.1	70-130	1.39	30				
4-Ethyltoluene	0.201	0.010	ug/L	0.20	102	70-130	0.586	30				
Hexachlorobutadiene	0.546	0.010	ug/L	0.43	128	70-130	2.34	30				
2-Hexanone (MBK)	0.176	0.010	ug/L	0.16	107	70-130	0.998	30				
Isopropanol (IPA)	0.0906	0.010	ug/L	0.098	92.2	70-130	1.83	30				
Methylene Chloride	0.108	0.010	ug/L	0.14	77.6	70-130	3.95	30				
4-Methyl-2-pentanone (MIBK)	0.173	0.010	ug/L	0.16	106	70-130	1.88	30				
Styrene	0.184	0.010	ug/L	0.17	108	70-130	0.115	30				
1,1,2,2-Tetrachloroethane	0.208	0.010	ug/L	0.27	75.6	70-130	1.08	30				
Tetrachloroethylene (PCE)	0.307	0.010	ug/L	0.27	113	70-130	1.23	30				
Toluene	0.154	0.010	ug/L	0.15	102	70-130	1.84	30				
1,2,4-Trichlorobenzene	0.419	0.010	ug/L	0.30	141	70-130	1.76	30	**			
1,1,2-Trichloroethane	0.246	0.010	ug/L	0.22	113	70-130	1.78	30				





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le	evel) - Q	uality Conti	rol						
Batch B8E0117 - *** DEFAULT PRE	EP ***								
LCS Dup (B8E0117-BSD1) Contin	nued			Prepare	ed: 04/27/18 Ana	alyzed: 0	4/28/18		
1,1,1-Trichloroethane	0.215	0.010	ug/L	0.22	98.4	70-130	2.33	30	
Trichloroethylene (TCE)	0.272	0.010	ug/L	0.21	126	70-130	1.73	30	
Trichlorofluoromethane (R11)	0.221	0.010	ug/L	0.22	98.2	70-130	1.36	30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	0.301	0.010	ug/L	0.31	98.2	70-130	4.41	30	
1,3,5-Trimethylbenzene	0.216	0.010	ug/L	0.20	110	70-130	3.13	30	
1,2,4-Trimethylbenzene	0.214	0.010	ug/L	0.20	109	70-130	0.892	30	
Vinyl acetate	0.136	0.010	ug/L	0.14	96.6	70-130	2.00	30	
Vinyl chloride	0.0984	0.010	ug/L	0.10	96.2	70-130	3.19	30	
o-Xylene	0.175	0.010	ug/L	0.17	101	70-130	1.35	30	
m,p-Xylenes	0.339	0.010	ug/L	0.35	97.7	70-130	1.03	30	
1,2,3-Trichloropropane	0.182	0.010	ug/L	0.24	75.3	70-130	3.39	30	
sec-Butylbenzene	0.175	0.010	ug/L	0.22	79.9	70-130	1.46	30	
Isopropylbenzene	0.155	0.010	ug/L	0.20	78.6	70-130	2.04	30	
n-Propylbenzene	0.150	0.010	ug/L	0.20	76.2	70-130	1.30	30	
4-Isopropyltoluene	0.179	0.010	ug/L	0.22	81.5	70-130	1.37	30	
Surrogate: 4-Bromofluorobenzene	0.143		ug/L	0.14	100	70-130			
Batch B8E0119 - *** DEFAULT PRE	:P			D	0 A h 0	4/00/40			
Blank (B8E0119-BLK1)	0.040	0.040	/1	Prepare	ed & Analyzed: 0	4/30/18			
Acetone	< 0.010	0.010	ug/L						
Allyl chloride	<0.010	0.010	ug/L						
tert-Amyl Methyl Ether (TAME)	<0.010	0.010	ug/L						
Benzene	<0.010	0.010	ug/L						
Benzyl chloride	<0.010	0.010	ug/L						
Bromodichloromethane	< 0.010	0.010	ug/L						
Bromoform Bromomothana	<0.010	0.010 0.010	ug/L						
Bromomethane	<0.010	0.010	ug/L						
1,3-Butadiene	<0.010	0.010	ug/L						
2-Butanone (MEK)	<0.010	0.010	ug/L						
tert-Butyl alcohol (TBA) Carbon Disulfide	<0.010	0.010	ug/L						
Carbon Distillide	\0.010	0.010	ug/L						

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Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

	F	Reporting		Spike	Source	%REC		RPD	
Analyte	Result	Limit	Units	Level	Result %	6REC Limits	RPD	Limit	Notes
VOCs by GCMS EPA TO-15 (Mid I	Level) - Qu	uality Cont	rol						
Batch B8E0119 - *** DEFAULT PR	REP ***								
Blank (B8E0119-BLK1) Continu	ed			Prepare	ed & Analyz	zed: 04/30/18			

				-1
Carbon Tetrachloride	<0.010	0.010	ug/L	
Chlorobenzene	< 0.010	0.010	ug/L	
Chloroethane	< 0.010	0.010	ug/L	
Chloroform	< 0.010	0.010	ug/L	
Chloromethane	< 0.010	0.010	ug/L	
Cyclohexane	< 0.010	0.010	ug/L	
Dibromochloromethane	< 0.010	0.010	ug/L	
1,2-Dibromoethane (EDB)	< 0.010	0.010	ug/L	
1,2-Dichlorobenzene	< 0.010	0.010	ug/L	
1,3-Dichlorobenzene	< 0.010	0.010	ug/L	
1,4-Dichlorobenzene	< 0.010	0.010	ug/L	
Dichlorodifluoromethane (R12)	< 0.010	0.010	ug/L	
1,1-Dichloroethane	< 0.010	0.010	ug/L	
1,2-Dichloroethane (EDC)	< 0.010	0.010	ug/L	
cis-1,2-Dichloroethylene	< 0.010	0.010	ug/L	
1,1-Dichloroethylene	< 0.010	0.010	ug/L	
trans-1,2-Dichloroethylene	< 0.010	0.010	ug/L	
1,2-Dichloropropane	< 0.010	0.010	ug/L	
trans-1,3-Dichloropropylene	<0.010	0.010	ug/L	
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L	
Dichlorotetrafluoroethane	< 0.010	0.010	ug/L	
Diisopropyl ether (DIPE)	< 0.010	0.010	ug/L	
1,4-Dioxane	< 0.010	0.010	ug/L	
Ethanol	< 0.010	0.010	ug/L	
Ethyl Acetate	< 0.010	0.010	ug/L	
Ethylbenzene	< 0.010	0.010	ug/L	
Ethyl-tert-Butyl Ether (ETBE)	< 0.010	0.010	ug/L	
4-Ethyltoluene	<0.010	0.010	ug/L	
Heptane	<0.010	0.010	ug/L	
Hexachlorobutadiene	<0.010	0.010	ug/L	
n-Hexane	<0.010	0.010	ug/L	
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The Source Group, Inc. (PH) Client:

Project No: NA

AA Project No: MB596148 Date Received: 04/25/18

Project Name: Chemoil - SV Sa	ampling			Date Reported: 05/01/18
Analyte	l Result	Reporting Limit	Units	Spike Source %REC RPD Level Result %REC Limits RPD Limit No
VOCs by GCMS EPA TO-15 (Mid	Level) - Qu	uality Cont	rol	
Batch B8E0119 - *** DEFAULT PI	REP ***			
Blank (B8E0119-BLK1) Continu	ued			Prepared & Analyzed: 04/30/18
2-Hexanone (MBK)	<0.010	0.010	ug/L	
Isopropanol (IPA)	< 0.010	0.010	ug/L	
Methyl-tert-Butyl Ether (MTBE)	< 0.010	0.010	ug/L	
Methylene Chloride	< 0.010	0.010	ug/L	
4-Methyl-2-pentanone (MIBK)	< 0.010	0.010	ug/L	
Naphthalene	<0.010	0.010	ug/L	
Propylene	<0.010	0.010	ug/L	
Styrene	<0.010	0.010	ug/L	
1,1,2,2-Tetrachloroethane	<0.010	0.010	ug/L	
Tetrachloroethylene (PCE)	<0.010	0.010	ug/L	
Tetrahydrofuran (THF)	<0.010	0.010	ug/L	
Toluene	<0.010	0.010	ug/L	
1,2,4-Trichlorobenzene	<0.010	0.010	ug/L	
1,1,2-Trichloroethane	<0.010	0.010	ug/L	
1,1,1-Trichloroethane	<0.010	0.010	ug/L	
Trichloroethylene (TCE)	<0.010	0.010	ug/L	
Trichlorofluoromethane (R11)	<0.010	0.010	ug/L	
1,1,2-Trichloro-1,2,2-trifluoroetha (R113)	ne<0.010	0.010	ug/L	

ug/L

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1,3,5-Trimethylbenzene

1,2,4-Trimethylbenzene

2,2,4-Trimethylpentane

1,2,3-Trichloropropane

sec-Butylbenzene

Isopropylbenzene

n-Propylbenzene

4-Isopropyltoluene

Vinyl acetate

Vinyl bromide

Vinyl chloride

m,p-Xylenes

o-Xylene



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

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Analyte	F Result	Reporting Limit	Units	Spike Level	Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L	evel) - Qı	uality Conti	rol						
Batch B8E0119 - *** DEFAULT PRE	EP ***								
Blank (B8E0119-BLK1) Continue	ed			Prepare	ed & Analyzed: 0	4/30/18			
n-Butylbenzene	<0.010	0.010	ug/L	-					
Surrogate: 4-Bromofluorobenzene	0.130		ug/L	0.14	90.6	70-130			
LCS (B8E0119-BS1)				Prepare	ed & Analyzed: 0	4/30/18			
Acetone	0.0882	0.010	ug/L	0.095	92.8	70-130		30	
Benzene	0.123	0.010	ug/L	0.13	96.0	70-130		30	
Benzyl chloride	0.228	0.010	ug/L	0.21	110	70-130		30	
Bromodichloromethane	0.255	0.010	ug/L	0.27	95.3	70-130		30	
Bromoform	0.447	0.010	ug/L	0.41	108	70-130		30	
Bromomethane	0.202	0.010	ug/L	0.16	130	70-130		30	
2-Butanone (MEK)	0.114	0.010	ug/L	0.12	96.5	70-130		30	
Carbon Disulfide	0.122	0.010	ua/l	0.12	97.8	70-130		30	

Benzene	0.123	0.010	ug/L	0.13	96.0	70-130	30
Benzyl chloride	0.228	0.010	ug/L	0.21	110	70-130	30
Bromodichloromethane	0.255	0.010	ug/L	0.27	95.3	70-130	30
Bromoform	0.447	0.010	ug/L	0.41	108	70-130	30
Bromomethane	0.202	0.010	ug/L	0.16	130	70-130	30
2-Butanone (MEK)	0.114	0.010	ug/L	0.12	96.5	70-130	30
Carbon Disulfide	0.122	0.010	ug/L	0.12	97.8	70-130	30
Carbon Tetrachloride	0.258	0.010	ug/L	0.25	103	70-130	30
Chlorobenzene	0.199	0.010	ug/L	0.18	108	70-130	30
Chloroethane	0.113	0.010	ug/L	0.11	107	70-130	30
Chloroform	0.192	0.010	ug/L	0.20	98.3	70-130	30
Chloromethane	0.0718	0.010	ug/L	0.083	86.9	70-130	30
Dibromochloromethane	0.358	0.010	ug/L	0.34	105	70-130	30
1,2-Dibromoethane (EDB)	0.359	0.010	ug/L	0.31	117	70-130	30
1,2-Dichlorobenzene	0.281	0.010	ug/L	0.24	117	70-130	30
1,3-Dichlorobenzene	0.278	0.010	ug/L	0.24	115	70-130	30
1,4-Dichlorobenzene	0.275	0.010	ug/L	0.24	114	70-130	30
Dichlorodifluoromethane (R12)	0.180	0.010	ug/L	0.20	90.7	70-130	30
1,1-Dichloroethane	0.152	0.010	ug/L	0.16	94.2	70-130	30
1,2-Dichloroethane (EDC)	0.157	0.010	ug/L	0.16	97.0	70-130	30
cis-1,2-Dichloroethylene	0.152	0.010	ug/L	0.16	95.9	70-130	30
1,1-Dichloroethylene	0.153	0.010	ug/L	0.16	96.3	70-130	30
trans-1,2-Dichloroethylene	0.149	0.010	ug/L	0.16	94.2	70-130	30
1,2-Dichloropropane	0.185	0.010	ug/L	0.18	99.9	70-130	30
trans-1,3-Dichloropropylene	0.200	0.010	ug/L	0.18	110	70-130	30
cis-1,3-Dichloropropylene	0.189	0.010	ug/L	0.18	104	70-130	30
Dichlorotetrafluoroethane	0.256	0.010	ug/L	0.28	91.5	70-130	30





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	F Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Le									110100
Batch B8E0119 - *** DEFAULT PRE		ianty Conti	OI .						
LCS (B8E0119-BS1) Continued	•			Prepare	ed & Analyzed: 0	4/30/18			
Ethylbenzene	0.167	0.010	ug/L	0.17	96.3	70-130		30	
4-Ethyltoluene	0.195	0.010	ug/L	0.17	99.0	70-130		30	
Hexachlorobutadiene	0.554	0.010	ug/L	0.43	130	70-130		30	
2-Hexanone (MBK)	0.163	0.010	ug/L	0.46	99.8	70-130		30	
Isopropanol (IPA)	0.0907	0.010	ug/L	0.098	92.2	70-130		30	
Methylene Chloride	0.122	0.010	ug/L	0.14	87.7	70-130		30	
4-Methyl-2-pentanone (MIBK)	0.161	0.010	ug/L	0.16	98.5	70-130		30	
Styrene (Wilbry)	0.181	0.010	ug/L	0.17	106	70-130		30	
1,1,2,2-Tetrachloroethane	0.203	0.010	ug/L	0.27	74.1	70-130		30	
Tetrachloroethylene (PCE)	0.287	0.010	ug/L	0.27	106	70-130		30	
Toluene	0.147	0.010	ug/L	0.15	97.4	70-130		30	
1,2,4-Trichlorobenzene	0.436	0.010	ug/L	0.30	147	70-130		30	**
1,1,2-Trichloroethane	0.230	0.010	ug/L	0.22	105	70-130		30	
1,1,1-Trichloroethane	0.211	0.010	ug/L	0.22	96.6	70-130		30	
Trichloroethylene (TCE)	0.270	0.010	ug/L	0.21	126	70-130		30	
Trichlorofluoromethane (R11)	0.218	0.010	ug/L	0.22	97.1	70-130		30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	0.298	0.010	ug/L	0.31	97.2	70-130		30	
1,3,5-Trimethylbenzene	0.208	0.010	ug/L	0.20	106	70-130		30	
1,2,4-Trimethylbenzene	0.208	0.010	ug/L	0.20	106	70-130		30	
Vinyl acetate	0.132	0.010	ug/L	0.14	93.6	70-130		30	
Vinyl chloride	0.0978	0.010	ug/L	0.10	95.7	70-130		30	
o-Xylene	0.171	0.010	ug/L	0.17	98.5	70-130		30	
m,p-Xylenes	0.331	0.010	ug/L	0.35	95.2	70-130		30	
1,2,3-Trichloropropane	0.188	0.010	ug/L	0.24	77.8	70-130		30	
sec-Butylbenzene	0.172	0.010	ug/L	0.22	78.5	70-130		30	
Isopropylbenzene	0.152	0.010	ug/L	0.20	77.2	70-130		30	
n-Propylbenzene	0.147	0.010	ug/L	0.20	75.0	70-130		30	
4-Isopropyltoluene	0.178	0.010	ug/L	0.22	81.2	70-130		30	
Surrogate: 4-Bromofluorobenzene	0.143		ug/L	0.14	100	70-130			
LCS Dup (B8E0119-BSD1)			-	Prepare	ed & Analyzed: 0	4/30/18			





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid I			ol						
Batch B8E0119 - *** DEFAULT PR		•							
LCS Dup (B8E0119-BSD1) Cont				Prepare	ed & Analyzed: 0	4/30/18			
Acetone	0.0917	0.010	ug/L	0.095	96.5	70-130	3.86	30	
Benzene	0.125	0.010	ug/L	0.13	97.9	70-130	2.01	30	
Benzyl chloride	0.235	0.010	ug/L	0.21	114	70-130	3.22	30	
Bromodichloromethane	0.276	0.010	ug/L	0.27	103	70-130	7.55	30	
Bromoform	0.466	0.010	ug/L	0.41	113	70-130	4.14	30	
Bromomethane	0.202	0.010	ug/L	0.16	130	70-130		30	
2-Butanone (MEK)	0.118	0.010	ug/L	0.12	100	70-130	3.91	30	
Carbon Disulfide	0.124	0.010	ug/L	0.12	99.3	70-130	1.52	30	
Carbon Tetrachloride	0.275	0.010	ug/L	0.25	109	70-130	6.53	30	
Chlorobenzene	0.213	0.010	ug/L	0.18	115	70-130	6.48	30	
Chloroethane	0.110	0.010	ug/L	0.11	104	70-130	2.44	30	
Chloroform	0.198	0.010	ug/L	0.20	101	70-130	3.13	30	
Chloromethane	0.0695	0.010	ug/L	0.083	84.2	70-130	3.19	30	
Dibromochloromethane	0.378	0.010	ug/L	0.34	111	70-130	5.46	30	
1,2-Dibromoethane (EDB)	0.381	0.010	ug/L	0.31	124	70-130	6.11	30	
1,2-Dichlorobenzene	0.297	0.010	ug/L	0.24	123	70-130	5.35	30	
1,3-Dichlorobenzene	0.296	0.010	ug/L	0.24	123	70-130	6.25	30	
1,4-Dichlorobenzene	0.290	0.010	ug/L	0.24	121	70-130	5.26	30	
Dichlorodifluoromethane (R12)	0.202	0.010	ug/L	0.20	102	70-130	11.6	30	
1,1-Dichloroethane	0.156	0.010	ug/L	0.16	96.1	70-130	1.97	30	
1,2-Dichloroethane (EDC)	0.164	0.010	ug/L	0.16	101	70-130	4.43	30	
cis-1,2-Dichloroethylene	0.155	0.010	ug/L	0.16	98.0	70-130	2.17	30	
1,1-Dichloroethylene	0.156	0.010	ug/L	0.16	98.4	70-130	2.18	30	
trans-1,2-Dichloroethylene	0.152	0.010	ug/L	0.16	95.8	70-130	1.69	30	
1,2-Dichloropropane	0.194	0.010	ug/L	0.18	105	70-130	4.83	30	
trans-1,3-Dichloropropylene	0.206	0.010	ug/L	0.18	113	70-130	2.84	30	
cis-1,3-Dichloropropylene	0.194	0.010	ug/L	0.18	107	70-130	2.99	30	
Dichlorotetrafluoroethane	0.259	0.010	ug/L	0.28	92.7	70-130	1.38	30	
Ethylbenzene	0.175	0.010	ug/L	0.17	101	70-130	4.39	30	
4-Ethyltoluene	0.204	0.010	ug/L	0.20	104	70-130	4.85	30	
Hexachlorobutadiene	0.627	0.010	ug/L	0.43	147	70-130	12.3	30	**





Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148
Date Received: 04/25/18
Date Reported: 05/01/18

Analyte	Result	Reporting Limit	Units		Source Result %REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid L			ol						
Batch B8E0119 - *** DEFAULT PR	•	•							
LCS Dup (B8E0119-BSD1) Conti	nued			Prepare	ed & Analyzed: 0	4/30/18			
2-Hexanone (MBK)	0.165	0.010	ug/L	0.16	101	70-130	0.749	30	-
Isopropanol (IPA)	0.0914	0.010	ug/L	0.098	93.0	70-130	0.864	30	
Methylene Chloride	0.124	0.010	ug/L	0.14	89.0	70-130	1.44	30	
4-Methyl-2-pentanone (MIBK)	0.169	0.010	ug/L	0.16	103	70-130	4.42	30	
Styrene	0.187	0.010	ug/L	0.17	110	70-130	2.96	30	
1,1,2,2-Tetrachloroethane	0.213	0.010	ug/L	0.27	77.6	70-130	4.68	30	
Tetrachloroethylene (PCE)	0.304	0.010	ug/L	0.27	112	70-130	5.64	30	
Toluene	0.153	0.010	ug/L	0.15	102	70-130	4.32	30	
1,2,4-Trichlorobenzene	0.475	0.010	ug/L	0.30	160	70-130	8.68	30	**
1,1,2-Trichloroethane	0.245	0.010	ug/L	0.22	112	70-130	6.37	30	
1,1,1-Trichloroethane	0.222	0.010	ug/L	0.22	102	70-130	5.34	30	
Trichloroethylene (TCE)	0.274	0.010	ug/L	0.21	127	70-130	1.46	30	
Trichlorofluoromethane (R11)	0.225	0.010	ug/L	0.22	100	70-130	3.02	30	
1,1,2-Trichloro-1,2,2-trifluoroethan (R113)	e 0.305	0.010	ug/L	0.31	99.4	70-130	2.26	30	
1,3,5-Trimethylbenzene	0.223	0.010	ug/L	0.20	114	70-130	7.28	30	
1,2,4-Trimethylbenzene	0.220	0.010	ug/L	0.20	112	70-130	5.35	30	
Vinyl acetate	0.136	0.010	ug/L	0.14	96.3	70-130	2.84	30	
Vinyl chloride	0.0981	0.010	ug/L	0.10	96.0	70-130	0.313	30	
o-Xylene	0.179	0.010	ug/L	0.17	103	70-130	4.37	30	
m,p-Xylenes	0.348	0.010	ug/L	0.35	100	70-130	4.97	30	
1,2,3-Trichloropropane	0.188	0.010	ug/L	0.24	78.1	70-130	0.417	30	
sec-Butylbenzene	0.181	0.010	ug/L	0.22	82.3	70-130	4.76	30	
Isopropylbenzene	0.159	0.010	ug/L	0.20	81.1	70-130	4.90	30	
n-Propylbenzene	0.154	0.010	ug/L	0.20	78.2	70-130	4.15	30	
4-Isopropyltoluene	0.189	0.010	ug/L	0.22	86.2	70-130	6.04	30	
Surrogate: 4-Bromofluorobenzene			ug/L	0.14	99.5	70-130			
Duplicate (B8E0119-DUP1)				Prepare	ed & Analyzed: 0	4/30/18			
Acetone	<0.010	0.010	ug/L					30	
Allyl chloride	<0.010	0.010	ug/L					30	
tert-Amyl Methyl Ether (TAME)	<0.010	0.010	ug/L					30	





Client: The Source Group, Inc. (PH) AA Project No: MB596148 Date Received: 04/25/18 **Project No:** Date Reported: 05/01/18

Project Name: Chemoil - SV Sampling

	R	eporting		Spike	Source	%REC		RPD	
Analyte	Result	Limit	Units	Level	Result %REC	Limits	RPD	Limit	Notes

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

Batch B8E0119 - *** DEFAULT PREP ***

Benzene	<0.010	0.010	ug/L	30
Benzyl chloride	<0.010	0.010	ug/L	30
Bromodichloromethane	<0.010	0.010	ug/L	30
Bromoform	<0.010	0.010	ug/L	30
Bromomethane	<0.010	0.010	ug/L	30
1,3-Butadiene	<0.010	0.010	ug/L	30
2-Butanone (MEK)	<0.010	0.010	ug/L	30
tert-Butyl alcohol (TBA)	<0.010	0.010	ug/L	30
Carbon Disulfide	<0.010	0.010	ug/L	30
Carbon Tetrachloride	<0.010	0.010	ug/L	30
Chlorobenzene	<0.010	0.010	ug/L	30
Chloroethane	<0.010	0.010	ug/L	30
Chloroform	<0.010	0.010	ug/L	30
Chloromethane	<0.010	0.010	ug/L	30
Cyclohexane	<0.010	0.010	ug/L	30
Dibromochloromethane	<0.010	0.010	ug/L	30
1,2-Dibromoethane (EDB)	<0.010	0.010	ug/L	30
1,2-Dichlorobenzene	<0.010	0.010	ug/L	30
1,3-Dichlorobenzene	<0.010	0.010	ug/L	30
1,4-Dichlorobenzene	<0.010	0.010	ug/L	30
Dichlorodifluoromethane (R12)	<0.010	0.010	ug/L	30
1,1-Dichloroethane	<0.010	0.010	ug/L	30
1,2-Dichloroethane (EDC)	<0.010	0.010	ug/L	30
cis-1,2-Dichloroethylene	<0.010	0.010	ug/L	30
1,1-Dichloroethylene	<0.010	0.010	ug/L	30
trans-1,2-Dichloroethylene	<0.010	0.010	ug/L	30
1,2-Dichloropropane	<0.010	0.010	ug/L	30
trans-1,3-Dichloropropylene	<0.010	0.010	ug/L	30
cis-1,3-Dichloropropylene	<0.010	0.010	ug/L	30
Dichlorotetrafluoroethane	<0.010	0.010	ug/L	30
Diisopropyl ether (DIPE)	<0.010	0.010	ug/L	30



30

30



LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148

Date Received: 04/25/18

Date Reported: 05/01/18

Reporting Spike Source %REC RPD

Units Level Result %REC Limits **RPD Limit Notes** Analyte Result Limit VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control Batch B8E0119 - *** DEFAULT PREP *** Duplicate (B8E0119-DUP1) Continued Source: 8D23008-03 Prepared & Analyzed: 04/30/18 1,4-Dioxane <0.010 0.010 30 ug/L < 0.010 0.010 30 Ethanol ug/L Ethyl Acetate < 0.010 0.010 ug/L 30 < 0.010 0.010 30 Ethylbenzene ug/L ug/L Ethyl-tert-Butyl Ether (ETBE) < 0.010 0.010 30 < 0.010 0.010 30 4-Ethyltoluene ug/L 0.010 30 Heptane < 0.010 ug/L Hexachlorobutadiene < 0.010 0.010 ug/L 30 n-Hexane < 0.010 0.010 30 ug/L < 0.010 0.010 30 2-Hexanone (MBK) ug/L Isopropanol (IPA) < 0.010 0.010 ug/L 30 Methyl-tert-Butyl Ether (MTBE) < 0.010 0.010 30 ug/L Methylene Chloride < 0.010 0.010 ug/L 30 < 0.010 0.010 30 4-Methyl-2-pentanone (MIBK) ug/L Naphthalene < 0.010 0.010 ug/L 30 Propylene < 0.010 0.010 30 ug/L Styrene < 0.010 0.010 ug/L 30 < 0.010 0.010 30 1,1,2,2-Tetrachloroethane ug/L Tetrachloroethylene (PCE) < 0.010 0.010 ug/L 30 < 0.010 0.010 30 Tetrahydrofuran (THF) ug/L Toluene < 0.010 0.010 ug/L 30 1,2,4-Trichlorobenzene < 0.010 0.010 ug/L 30 1,1,2-Trichloroethane <0.010 0.010 ug/L 30 < 0.010 0.010 30 1.1.1-Trichloroethane ua/L Trichloroethylene (TCE) < 0.010 0.010 ug/L 30 Trichlorofluoromethane (R11) < 0.010 0.010 30 ug/L 1,1,2-Trichloro-1,2,2-trifluoroethane<0.010 0.010 30 ug/L (R113) < 0.010 0.010 30 1,3,5-Trimethylbenzene ug/L < 0.010 0.010 30 1,2,4-Trimethylbenzene ug/L



2,2,4-Trimethylpentane

Vinyl acetate

Viorel Vasile Operations Manager ug/L

ug/L

0.010

0.010

< 0.010

< 0.010



Client:The Source Group, Inc. (PH)AA Project No: MB596148Project No:NADate Received: 04/25/18Project Name:Chemoil - SV SamplingDate Reported: 05/01/18

Vinyl bromide	<0.010	0.010	ug/L				30	
Vinyl chloride	<0.010	0.010	ug/L				30	
o-Xylene	<0.010	0.010	ug/L				30	
m,p-Xylenes	<0.010	0.010	ug/L				30	
1,2,3-Trichloropropane	<0.010	0.010	ug/L				30	
sec-Butylbenzene	<0.010	0.010	ug/L				30	
Isopropylbenzene	<0.010	0.010	ug/L				30	
n-Propylbenzene	<0.010	0.010	ug/L				30	
4-Isopropyltoluene	<0.010	0.010	ug/L				30	
n-Butylbenzene	<0.010	0.010	ug/L				30	
Surrogate: 4-Bromofluorobenzene	0.141		ug/L	0.14	98.8	70-130		

Helium by GC/TCD - Quality Control

Batch B8D2521 - *** DEFAULT PREP ***

Blank (B8D2521-BLK1)				Prepared	d & Analyzed: 0	4/25/18			
Helium	<0.10	0.10	% by						
			Volume						
LCS (B8D2521-BS1)				Prepared	d & Analyzed: 0	4/25/18			
Helium	0.417	0.10	% by	0.50	83.3	70-130			
			Volume						
LCS Dup (B8D2521-BSD1)				Prepared	d & Analyzed: 0	4/25/18			
Helium	0.428	0.10	% by	0.50	85.6	70-130	2.75	30	
			Volume						
Duplicate (B8D2521-DUP1)	S	ource: 8	D25030-09	Prepared	d & Analyzed: 0	4/25/18			
Helium	2.99	0.20	% by		3.22		7.33	30	
			Volume						

A



Client: The Source Group, Inc. (PH)

Project No: NA

Project Name: Chemoil - SV Sampling

AA Project No: MB596148 Date Received: 04/25/18 Date Reported: 05/01/18

Special Notes

[1] = ** : Exceeds upper control limit.

[2] = *** : Exceeds lower control limit.

A

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Note: By relinquishing samples to American Analytics, client agrees to pay for the services requested on this chain of custody form and additional client-requested analyses performed on this project. Payment for services is due within 30 days from the date of invoice. Sample(s) will be disposed of after 45 days following the submittal of the sample(s) to American Analytics.

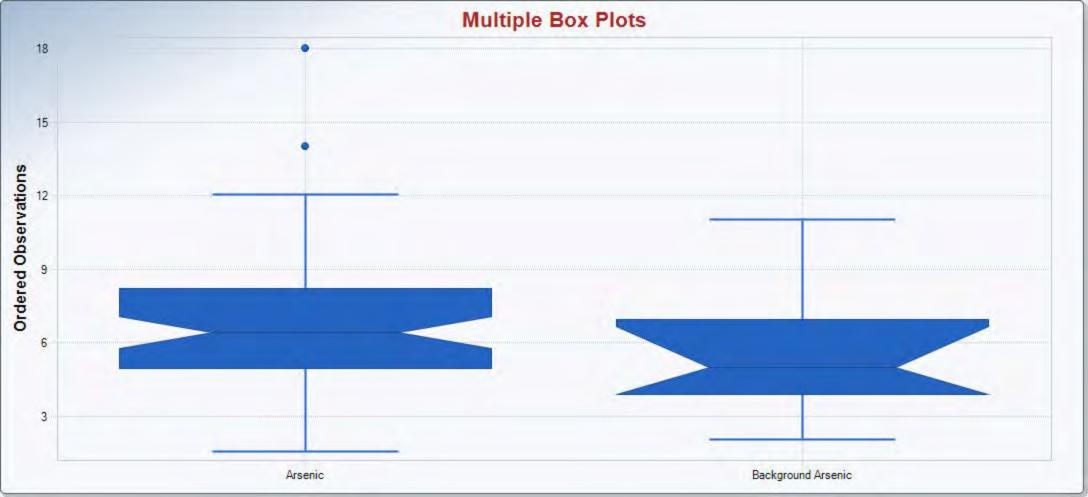
APPENDIX E

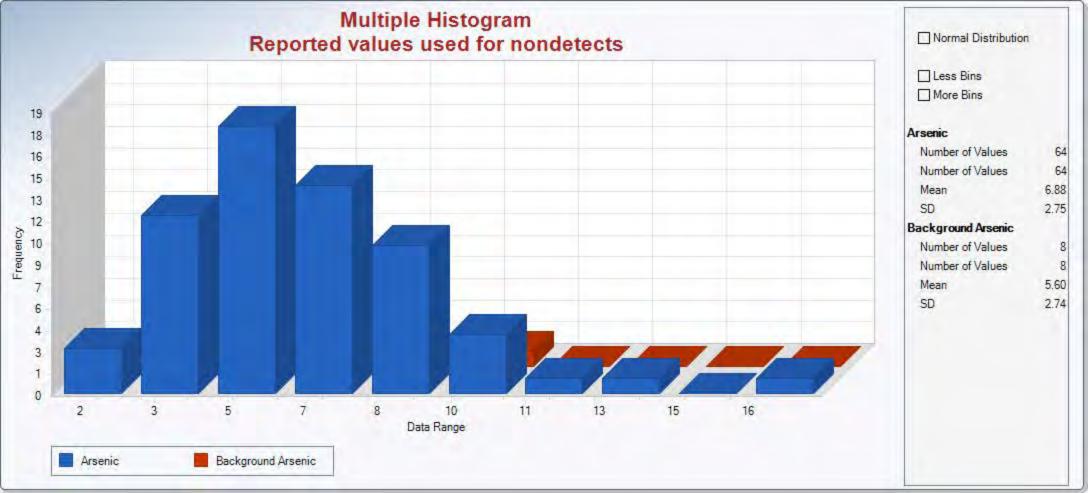
Metals Statistics Onsite to Background Western Parcel

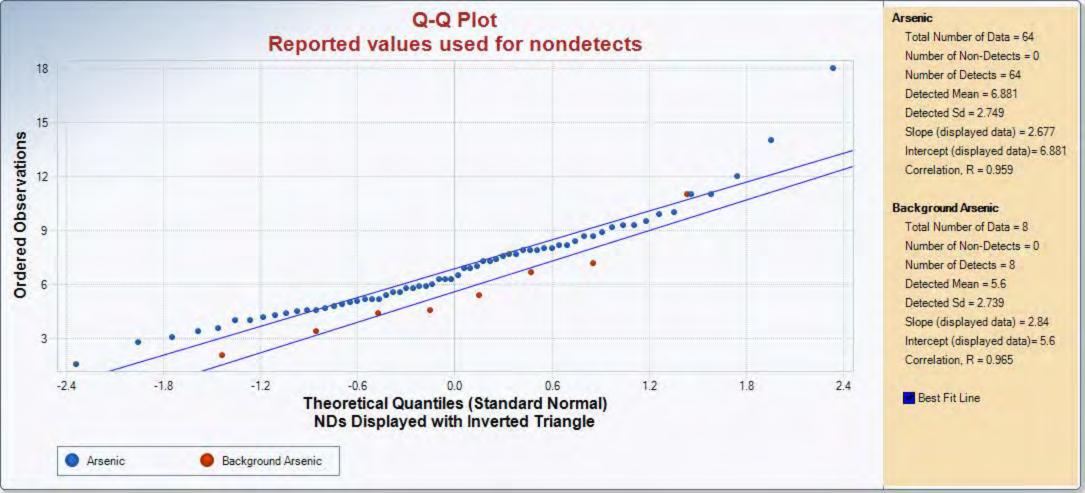
	А	В	С	D	ΙE	F	G	Тн	<u> </u>	J	K	TL
1	·		Gehan S	ample 1 vs	Sample 2 Co	omparison H	ypothesis Te	est for Data	Sets with No	n-Detects	•	
2												
3		User Sele	ected Options									
4	Date	e/Time of C	omputation	ProUCL 5.1	5/23/2018 1	:50:21 PM						
5			From File	Onsite Meta	als Input w B	ackground.xl	s					
6		Fu	III Precision	OFF								
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8	Sel	lected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	Mean/Medi	an (Form 1)				
9	,	Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Media	n				
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12	Sample 1 Da	ata: Arseni	С									
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20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	1.6	2.1						
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25				of Detects	6.881	5.6						
26				of Detects	6.4	5						
27				of Detects	2.749	2.739						
28				KM Mean	6.881	5.6						
29				KM SD	2.749	2.739						
30												
31			Sample 1 v	s Sample 2	Genan Test							
32	UO: Mas=#4	adian of C		oon/Mad!a	of book	und						
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34			Cabar	z Test Value	1.362							
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36			Cri	tical z (0.05) P-Value								
37				r-value	0.000							
38	Conclusion v	with Alpha	= 0.05									
33			= 0.05 onclude Sam	nle 1 /- S-	mnle ?							
40		eject Hu, C r= alpha (0.		ihie i <= 29	iiipie Z							
41	r-value >	aipna (0.	.00)									
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	A B C	D	l E	l F	G	н	ı	J	K	\top	L
1	_	_					a Sets with	Non-Detects			
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5	From File	Onsite Meta	ıls Input w Ba	ackground.xls	3						
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)					
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 M	Mean/Mediar	1					
10											
11											
12	Sample 1 Data: Arsenic										
13	Sample 2 Data: Background Arseni	С									
14											
15		Raw Statistic	s								
16			Sample 1								
17	Number of	Valid Data	64								
18	Number of No	on-Detects	0	0							
19	Number	of Detects	64	8							
20	Minimum N	Ion-Detect	N/A	N/A							
21	Maximum N	Ion-Detect	N/A	N/A							
22	Percent No	on-detects	0.00%	0.00%							
23	Minim	um Detect	1.6	2.1							
24	Maxim	um Detect	18	11							
25		of Detects	6.881	5.6							
26	Median	of Detects	6.4	5							
27	SD	of Detects	2.749	2.739							
28		KM Mean	6.881	5.6							
29		KM SD	2.749	2.739							
30											
31	Sample 1 vs S	Sample 2 Tar	one-Ware T	est						_	
32											
33	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample 2	<u>'</u>							
34		TM 0: :: ::		T						\perp	
35	THE:	TW Statistic							\perp		
36	I W Critical	Value (0.05)									
37		P-Value	0.0791								
38	Operation with Alata - 0.05									\perp	
39	Conclusion with Alpha = 0.05		I- O						\perp		
40	Do Not Reject H0, Conclude Sam	npie 1 <= Sar	mpie 2							\perp	
41	P-Value >= alpha (0.05)										
42											

	A B C	D	E	l F	G	Н	l 1	J	K	ΤL
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2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/23/2018 1	:52:24 PM						
5	From File	Onsite Meta	ls Input w B	ackground.xl	s					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2	Mean/Mediar	n				
10										
11										
12	Sample 1 Data: Arsenic									
13	Sample 2 Data: Background Arsenic	•								
14										
15	F	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of \	Valid Data	64	8						
18	Number of No	n-Detects	0	0						
19	Number of De	etect Data	64	8						
20	Minimum N	on-Detect	N/A	N/A						
21	Maximum N	on-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minim	um Detect	1.6	2.1						
24	Maximi	um Detect	18	11						
25	Mean	of Detects	6.881	5.6						
26	Median	of Detects	6.4	5						
27	SD	of Detects	2.749	2.739						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample	2						
32										
33	Sample 1 Rank									
34	Standardized V									
35		Mean (U)	256							
36		(U) - Adj ties	55.79							
37	Approximate U-Stat Critical	, ,	1.645							
38	P-Value (Adjus	ted for Fies)	0.0784							
39	One shorten as the All I. C.C.									
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sar	nple 2							
42	P-Value >= alpha (0.05)									
43										



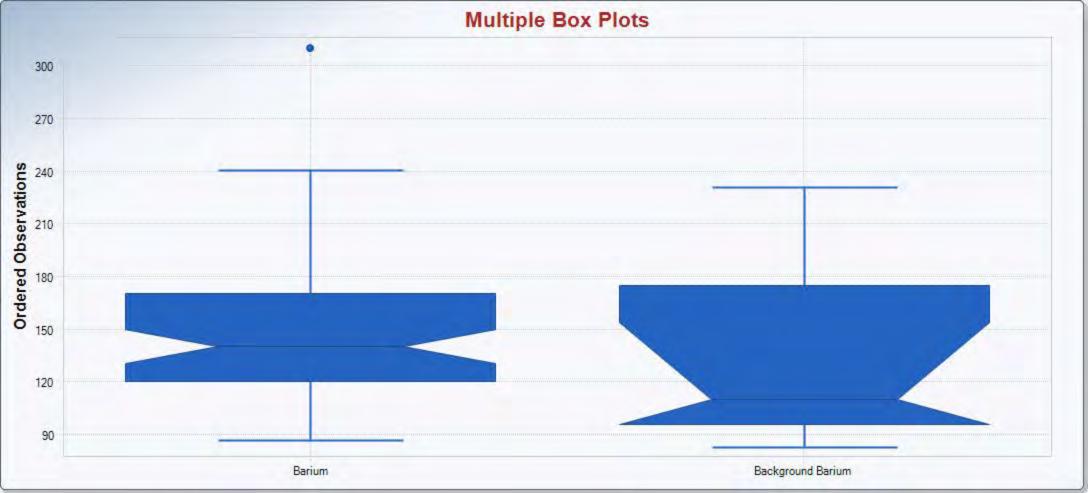


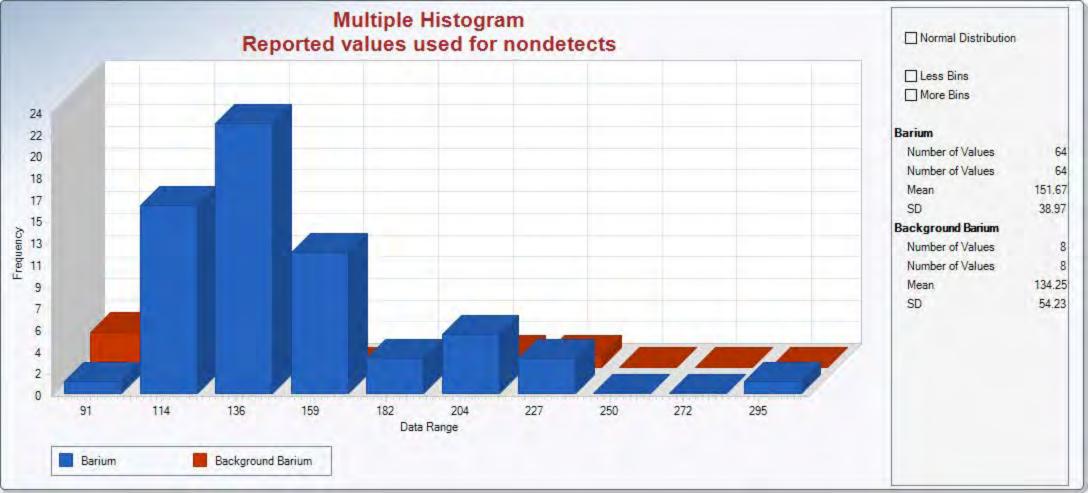


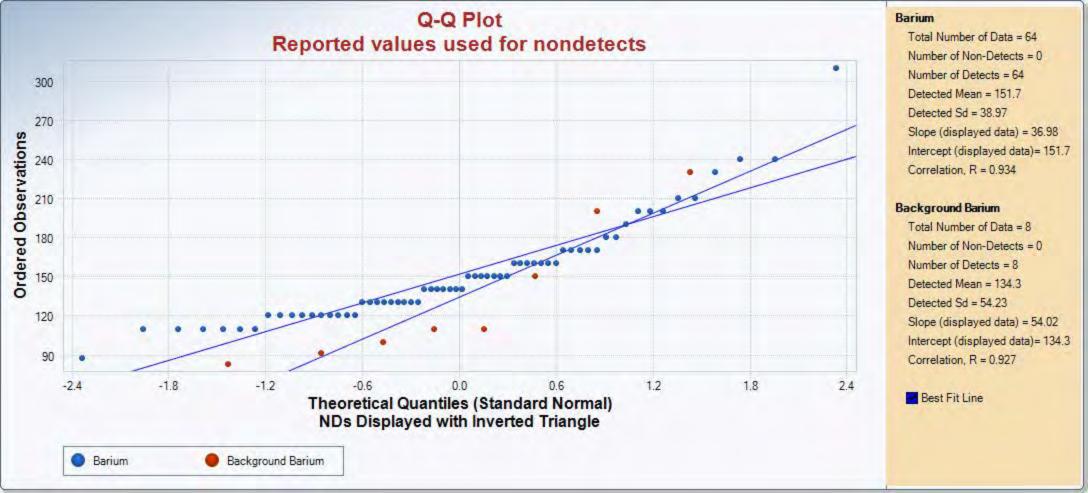
	A	В	С	D	l E	F	G	Т	<u> </u>	J	K	L
1	•		Gehan S	ample 1 vs	Sample 2 Co	omparison H	ypothesis Te	est for Data	Sets with No	n-Detects	•	
2												
3	Us	er Sele	cted Options									
4	Date/Tir	ne of Co	omputation	ProUCL 5.1	5/23/2018 1	:59:14 PM						
5			From File	Onsite Meta	als Input w B	ackground.xl	s					
6		Ful	I Precision	OFF								
7	Con	fidence	Coefficient	95%								
8	Selecte	ed Null H	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Medi	an (Form 1)				
9	Alte	rnative H	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Media	n				
10												
11												
12	Sample 1 Data:	Barium										
13	Sample 2 Data:	Backgro	ound Barium									
14												
15			F	Raw Statistic								
16					Sample 1	Sample 2						
17			Number of \		64	8						
18			lumber of No		0	0						
19		ľ	Number of De		64	8						
20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	87	83						
24				um Detect	310	230						
25				of Detects	151.7	134.3						
26				of Detects	140	110						
27				of Detects	38.97	54.23						
28				KM Mean	151.7	134.3						
29				KM SD	38.97	54.23						
30												
31			Sample 1 v	s Sample 2	Gehan Test							
32	110-14 04 "			/b /	-611							
33	H0: Mean/Media	an of Sa	mpie 1 <= M	iean/Median	of backgrou	ına						
34			0.1	- T41/ I	4 454	<u> </u>						
35				z Test Value								
36			Cri	tical z (0.05)								
37				P-Value	0.0733							
38	Canaluatan!iii	Almba	- 0.0E									
33	Conclusion with				I- C							
40	Do Not Rejec			pie 1 <= Sa	mpie 2							
41	P-Value >= al	pna (0.0	ບວ)									
42												

	А	В	С	D	l E	T F	G	Н	1	1 1	K	1 1
1	Λ		_	_		Comparisor			ta Sets wit	h Non-Detec		L
				•	-	•						
2		User Selec	cted Options									
3	Date	e/Time of Co	•	ProUCL 5.1	5/23/2018 2	:00:04 PM						
4			From File			ackground.xl	 S					
5		Ful	Il Precision	OFF								
6		Confidence		95%								
7		lected Null I			lean/Median	<= Sample 2	Mean/Media	an (Form 1)				
8		Alternative I				> Sample 2		, ,				
9			71									
10												
11	Sample 1 Da	ata: Barium										
13	-		ound Barium	 I								
14	•											
15			F	Raw Statistic	s							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	64	8						
18		N	lumber of No	n-Detects	0	0						
19			Number	of Detects	64	8						
20			Minimum N	on-Detect	N/A	N/A						
21			Maximum N	on-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minimu	um Detect	87	83						
24			Maximu	um Detect	310	230						
25			Mean	of Detects	151.7	134.3						
26			Median	of Detects	140	110						
27			SD	of Detects	38.97	54.23						
28				KM Mean	151.7	134.3						
29				KM SD	38.97	54.23						
30					1		1					
31		Sa	ample 1 vs S	ample 2 Tar	one-Ware T	est						
32												
33	H0: Mean/M	ledian of Sa	mple 1 <= M	lean/Median	of Sample 2	2						
34												
35				TW Statistic	2.119							
36			TW Critical	Value (0.05)	1.645							
37				P-Value	0.017							
38					•							
39	Conclusion	with Alpha =	= 0.05									
40	Reject H0), Conclude	Sample 1 >	Sample 2								
41	P-Value <	alpha (0.0	5)									
42												
										1	1	Į.

	A B C	D	E	l F	G	Н	<u> </u>	J	K	ΤL
1				-	Comparison		a Sets with	,		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/23/2018 2	:00:49 PM						
5	From File	Onsite Meta	ıls Input w B	ackground.x	ls					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	2 Mean/Media	ın (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2	Mean/Median	1				
10		I								
11										
12	Sample 1 Data: Barium									
13	Sample 2 Data: Background Barium)								
14										
15	ı	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of '	Valid Data	64	8						
18	Number of No	n-Detects	0	0						
19	Number of D	etect Data	64	8						
20	Minimum N	lon-Detect	N/A	N/A						
21	Maximum N	lon-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minim	um Detect	87	83						
24	Maxim	um Detect	310	230						
25	Mean	of Detects	151.7	134.3						
26	Median	of Detects	140	110						
27	SD	of Detects	38.97	54.23						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample	2						
32			T							
33	Sample 1 Rank									
34	Standardized V									
35	-	Mean (U)								
36		(U) - Adj ties								
37	Approximate U-Stat Critical									
38	P-Value (Adjus	sted for Ties)	0.0488							
39										
40	Conclusion with Alpha = 0.05	0								
41	Reject H0, Conclude Sample 1 >	Sample 2								
42	P-Value < alpha (0.05)									
43										



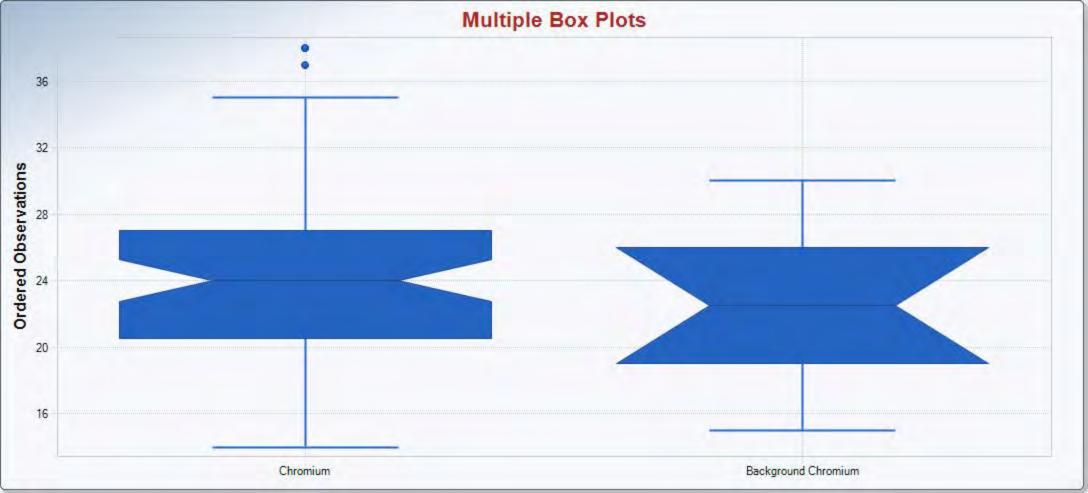


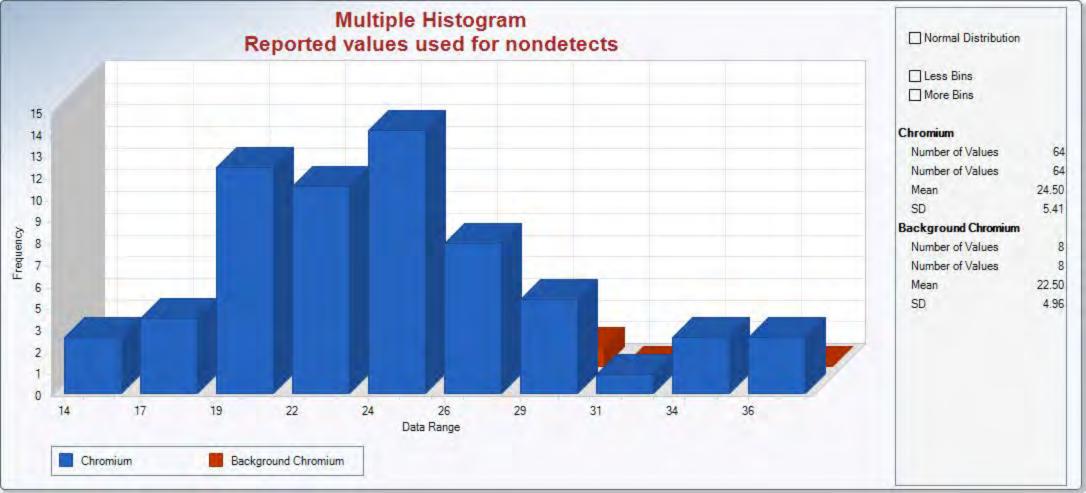


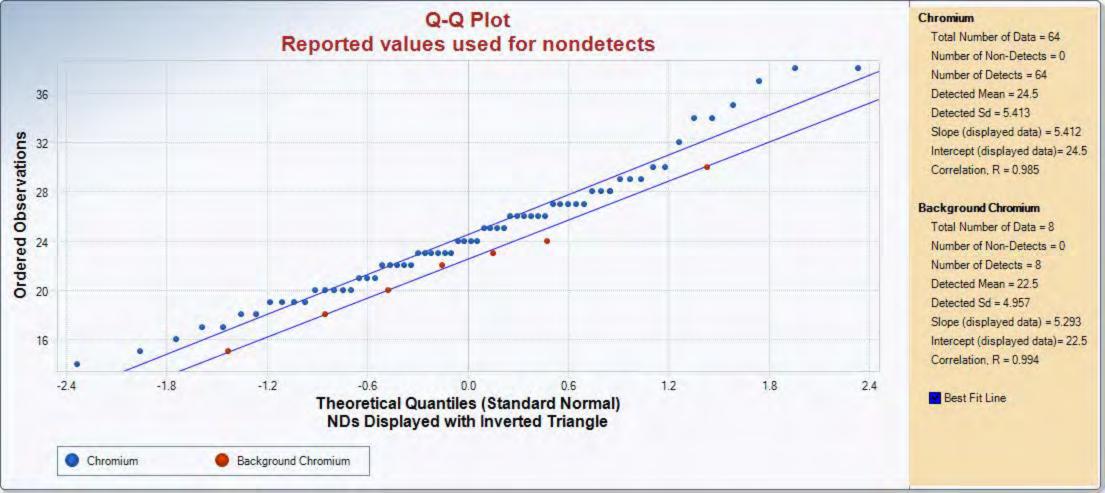
	А	В	С	l D	l E	l F	G	Н		J	K	T 1
1	^	ь		_			lypothesis Te		I ' Sets with N		K	L
2				•	•	<u> </u>	<u></u>					
3		User Sele	ected Options									
4	Da	te/Time of C	Computation	ProUCL 5.1	5/23/2018 2	:04:55 PM						
5			From File	Onsite Meta	als Input w B	ackground.x	ls					
6		Fu	ull Precision	OFF	<u> </u>							
7		Confidence	e Coefficient	95%								
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample	2 Mean/Media	an (Form 1)				
			Hypothesis				Mean/Mediar					
9			,,	'		<u>'</u>						
10												
	Sample 1 D	Data: Chrom	nium									
12			round Chrom	ium								
13												
14				Raw Statistic	es es							
15					Sample 1	Sample 2						
16			Number of '	Valid Data	64	8						
17			Number of No		0	0						
18			Number of D		64	8						
19			Minimum N		N/A	N/A						
20			Maximum N		N/A	N/A						
21			Percent No		0.00%	0.00%						
22				um Detect	14	15						
23				um Detect	38	30						
24				of Detects	24.5	22.5						
25				of Detects	24	22.5						
26				of Detects	5.413	4.957						
27				KM Mean	24.5	22.5						
28				KM SD	5.413	4.957						
29					1	1						
30			Sample 1 v	s Sample 2	Gehan Test	<u> </u>						
31												
33	H0: Mean/N	Median of S	ample 1 <= N	lean/Median	of backgrou	und						
34												
35			Gehan	z Test Value	0.609							
36				tical z (0.05)								
36				P-Value								
38					1							
38	Conclusion	with Alpha	= 0.05									
40			onclude Sam	ple 1 <= Sa	mple 2							
		>= alpha (0			r							
41			-,									
42	Ī							1				1

	Α	В	С	l D	l E	l F	G	Н	1	J	K	
1		<u> </u>	_	_		2 Compariso	_		a Sets with	·		<u> </u>
2												
3		User Sele	ected Options									
4	Da	te/Time of C	Computation	ProUCL 5.1	5/23/2018 2	2:05:47 PM						
5			From File	Onsite Meta	als Input w B	Background.xl	S					
6		Fu	ıll Precision	OFF								
7		Confidence	Coefficient	95%								
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	n <= Sample 2	Mean/Media	an (Form 1)				
9		Alternative	Hypothesis	Sample 1 M	lean/Median	n > Sample 2	Mean/Mediar	า				
10												
11												
	Sample 1 D	Data: Chrom	ium									
13	Sample 2 D	Data: Backg	round Chrom	ium								-
14												
15			ı	Raw Statistic	cs							
16					Sample 1	Sample 2						
17			Number of	Valid Data	64	8						
18			Number of No	n-Detects	0	0						
19			Number	of Detects	64	8						
20			Minimum N	lon-Detect	N/A	N/A						
21			Maximum N	lon-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minim	um Detect	14	15						
24			Maxim	um Detect	38	30						
25			Mean	of Detects	24.5	22.5						
26			Median	of Detects	24	22.5						
27			SD	of Detects	5.413	4.957						
28				KM Mean	24.5	22.5						
29				KM SD	5.413	4.957						
30												
31		S	Sample 1 vs S	Sample 2 Tar	rone-Ware 1	Гest						
32												
33	H0: Mean/N	Median of Sa	ample 1 <= N	lean/Median	of Sample	2						
34												
35				TW Statistic								
36			TW Critical	Value (0.05)								
37				P-Value	0.194							
38												
39		with Alpha										
40		•	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value	>= alpha (0	.05)									
42												-

	A B C	D	E	l F	G	Н	1	J	K	ΤL
1	Wilcoxon-Ma						a Sets with	,		
2										
3	User Selected Options									
4	Date/Time of Computation F	ProUCL 5.1	5/23/2018 2	:06:38 PM						
5	From File (Onsite Meta	ıls Input w B	ackground.x	ls					
6	Full Precision (OFF							-	
7	Confidence Coefficient S	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	2 Mean/Media	n (Form 1)				
9	Alternative Hypothesis S	Sample 1 M	ean/Median	> Sample 2	Mean/Median					
10	'									
11										
12	Sample 1 Data: Chromium									
13	Sample 2 Data: Background Chromiu	ım								-
14										
15	Ra	aw Statistic	s							
16			Sample 1	Sample 2						
17	Number of Va		64	8						
18	Number of Non	-Detects	0	0						
19	Number of Det	ect Data	64	8						
20	Minimum No	n-Detect	N/A	N/A						
21	Maximum No	n-Detect	N/A	N/A						
22	Percent Nor	n-detects	0.00%	0.00%						
23	Minimur	m Detect	14	15						
24	Maximur	m Detect	38	30						
25	Mean of	Detects	24.5	22.5						
26	Median of	Detects	24	22.5						
27	SD of	Detects	5.413	4.957						
28										
29	Wilcoxon-Mar	nn-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= Me	an/Median	of Sample	2						
32										
33	Sample 1 Rank S									
34	Standardized W									
35		Mean (U)								
36	·	J) - Adj ties								
37	Approximate U-Stat Critical V									
38	P-Value (Adjuste	ed for Ties)	0.197							
39	0 1 1 111 111 1 2 2 7									
40	Conclusion with Alpha = 0.05	I- 4 · ^								
41	Do Not Reject H0, Conclude Samp	ie 1 <= Sai	mpie 2							
42	P-Value >= alpha (0.05)									
43										



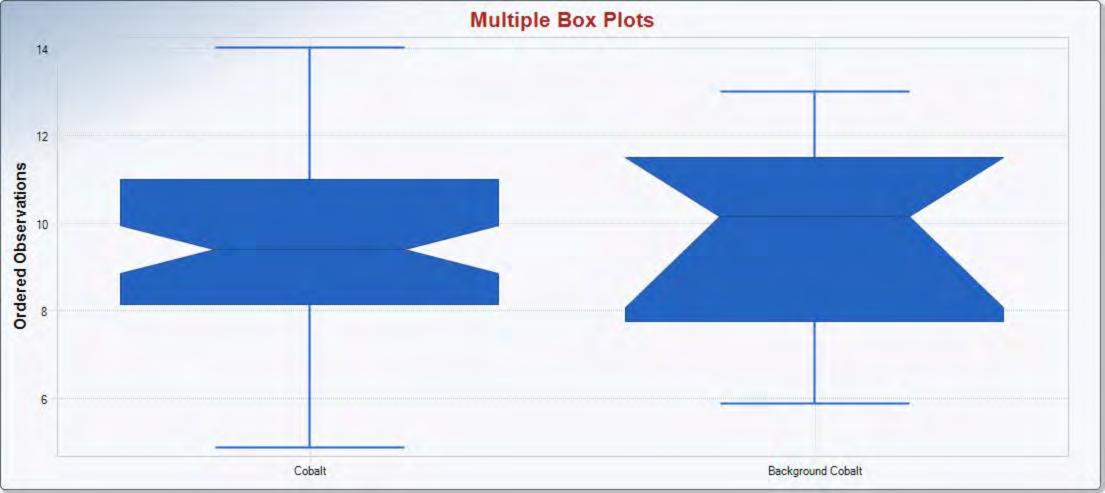


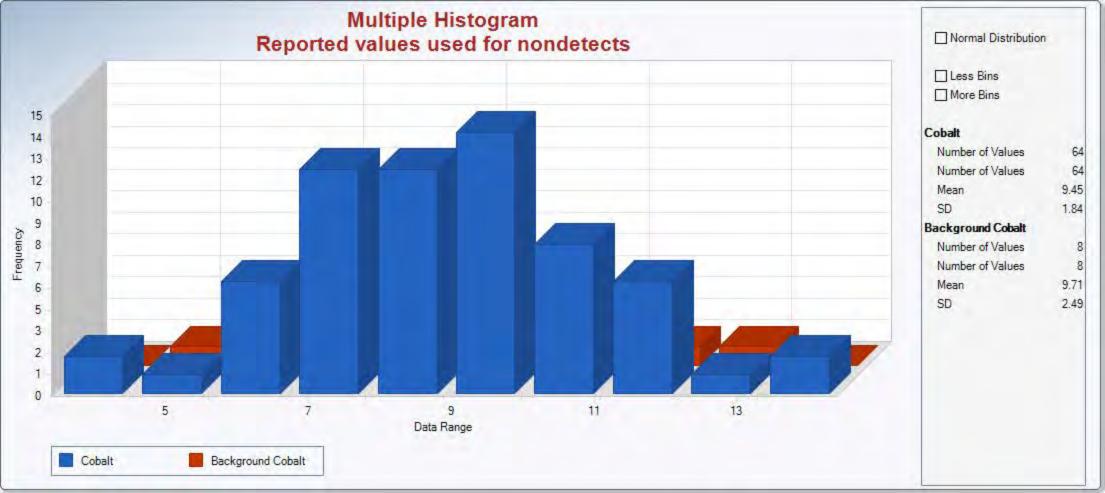


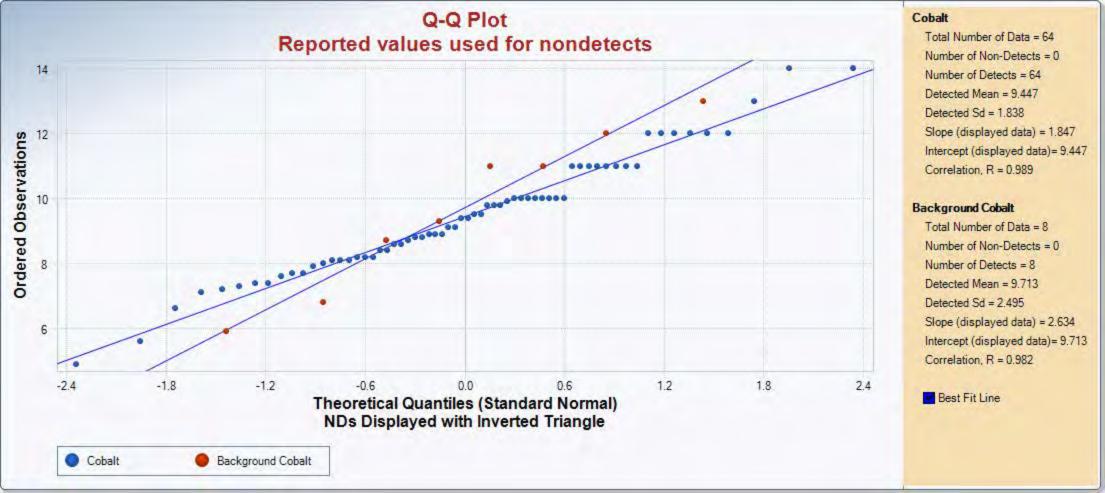
	А	В	С	D	l E	F	G	Тн	<u> </u>	J	K	TL		
1				ample 1 vs	Sample 2 Co	omparison H			Sets with No	n-Detects				
2														
3		cted Options												
4	Date	/Time of C	omputation	ProUCL 5.1	ProUCL 5.15/23/2018 2:11:15 PM									
5		From File Onsite Met				ackground.xl	S							
6		Fu	II Precision	OFF										
7	C	Confidence	Coefficient	95%										
8	Sele	ected Null	Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)										
9	Д	Alternative Hypothesis Sample 1 Mean/Median > Sample 2 Mean/Me						n						
10				ı										
11														
12	Sample 1 Da	ta: Cobalt												
13	Sample 2 Da	ta: Backgr	ound Cobalt											
14														
15			F	Raw Statistic	cs									
16					Sample 1	Sample 2								
17			Number of \	Valid Data	64	8								
18		1	Number of No	n-Detects	0	0								
19			Number of De		64	8								
20			Minimum N		N/A	N/A								
21		Maximum Non-Detect N/A N/A												
22			Percent No	on-detects	0.00%	0.00%								
23		Minimum Detect 4.9 5.9												
24				um Detect	14	13								
25			Mean	of Detects	9.447	9.713								
26				of Detects	9.4	10.15								
27				of Detects	1.838	2.495								
28						9.713								
29				KM SD	1.838	2.495								
30														
31			Sample 1 v	s Sample 2	Gehan Test									
32	110 11													
33	H0: Mean/Me	edian of Sa	ample 1 <= M	lean/Median	of backgrou	und								
34						1	ı							
35	Gehan z Test Value -0.663													
36	Critical z (0.05) 1.645													
37				P-Value	0.746									
38	• • •													
33	Conclusion w			1.4 : 5										
40	B) / 1 / 0.05)													
41	P-Value >= alpha (0.05)													
42														

	Α	В	С	l D	l E	l F	G	Н	1	J	K			
1		<u> </u>	_	_		2 Compariso			a Sets with	Ü			<u> </u>	
2														
3		User Selected Options												
4	Da	Date/Time of Computation ProUCL !				UCL 5.15/23/2018 2:12:32 PM								
5		From File Onsite Metals Input w Background.xls												
6		Fu	ıll Precision	OFF										
7		Confidence	Coefficient	95%										
8	Se	elected Null	Hypothesis	Sample 1 M	e 1 Mean/Median <= Sample 2 Mean/Median (Form 1)									
9		Alternative Hypothesis Sample 1 Mean/Median > Sample 2 Mean/Media												
10														
11														
	Sample 1 D	Data: Cobalt	İ											
13	Sample 2 D	Data: Backgi	round Cobalt										-	
14														
15			ı	Raw Statistic	cs									
16					Sample 1	Sample 2								
17			Number of	Valid Data	64	8								
18		1	Number of No	n-Detects	0	0								
19		Number of Detects				8								
20		Minimum Non-Detect				N/A								
21		Maximum Non-Detect				N/A								
22	Percent Non-detects				0.00%	0.00%								
23		Minimum Detect				5.9								
24		Maximum Detect				13								
25	Mean of Detects				9.447	9.713								
26		Median of Detects				10.15								
27		SD of Detects				2.495								
28		KM Mean 9.447 9.713												
29		KM SD				2.495								
30														
31		S	Sample 1 vs S	Sample 2 Tar	rone-Ware 1	est								
32														
33	H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2													
34														
35	TW Statistic													
36		TW Critical Value (0.05) 1.645												
37				P-Value	0.557									
38														
39		with Alpha												
40														
41	P-Value	P-Value >= alpha (0.05)												
42													-	

	A B C	D	E	l F	I G I	Н		J	K	ΙL
1		ann-Whitney	/ Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	Date/Time of Computation ProUCL 5.15/23/2018 2:13:14 PM								
5	From File									
6	Full Precision									
7	Confidence Coefficient									
8	Selected Null Hypothesis	n (Form 1)								
9	Alternative Hypothesis									
10	'									
11										
12	Sample 1 Data: Cobalt									
13	Sample 2 Data: Background Cobalt									
14										
15	F	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of \	/alid Data	64	8						
18	Number of No	0	0							
19	Number of De	64	8							
20	Minimum No	N/A	N/A							
21	Maximum No	N/A	N/A							
22	Percent No	0.00%	0.00%							
23	Minimu	4.9	5.9							
24	Maximu	14	13							
25	Mean o	of Detects	9.447	9.713						
26	Median o	of Detects	9.4	10.15						
27	SD	of Detects	1.838	2.495						
28										
29	Wilcoxon-Ma	nn-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	ean/Median	of Sample	2						
32										
33	Sample 1 Rank									
34	Standardized V									
35		256								
36	SD(
37	Approximate U-Stat Critical Value (0.05) 1.645									
38	P-Value (Adjus	ted for Ties)	0.677							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sample 1 <= Sample 2									
42	P-Value >= alpha (0.05)									
43										



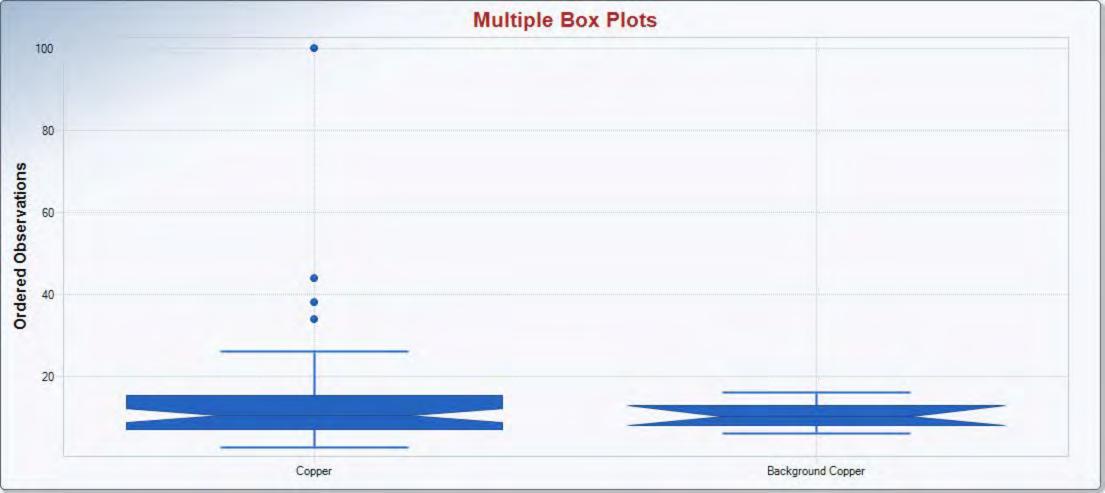


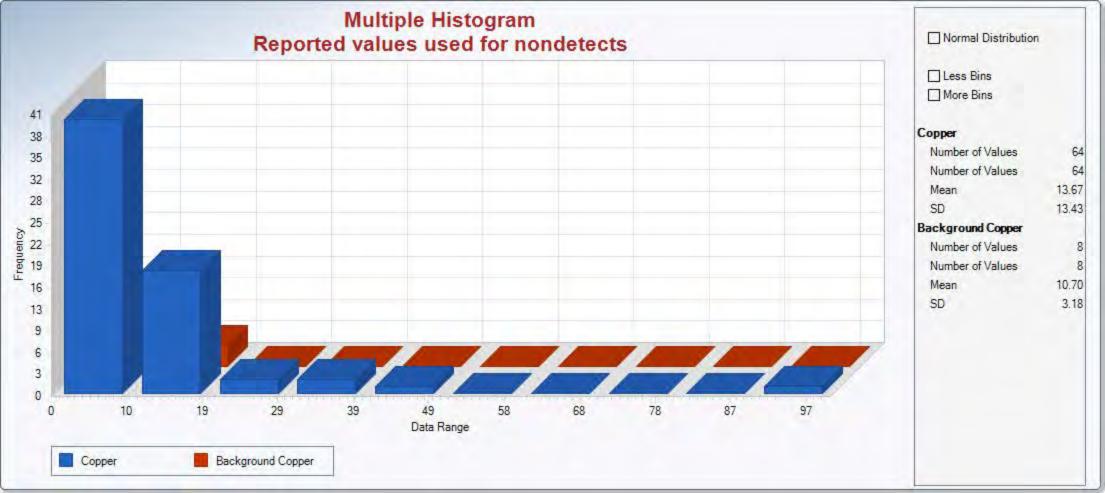


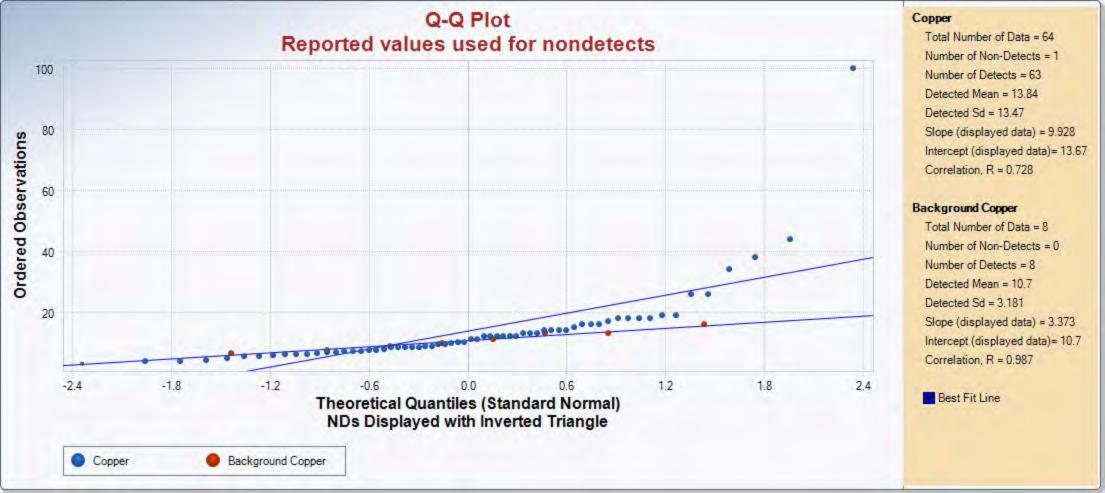
	А	В	С	D	l E	T F	G	Т	<u> </u>	J	K	T L
1				ample 1 vs	Sample 2 C	omparison H	_		Sets with No	n-Detects		
2												
3		User Sele	ected Options									
4	Date	e/Time of C	omputation	ProUCL 5.1	5/23/2018 2	:18:18 PM						
5			From File	Onsite Meta	als Input w B	ackground.xl	S					
6		Fu	III Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Se	lected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Medi	an (Form 1)				
9	-	Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Media	n				
10				I.								
11												
12	Sample 1 Da	ata: Coppe	r									
13	Sample 2 Da	ata: Backgr	round Copper	r								
14												
15			F	Raw Statistic	cs							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	64	8						
18		1	Number of No	n-Detects	1	0						
19			Number of De	etect Data	63	8						
20			Minimum N	on-Detect	3	N/A						
21			Maximum N	on-Detect	3	N/A						
22			Percent No	on-detects	1.56%	0.00%						
23			Minim	um Detect	3.8	6.5						
24			Maxim	um Detect	100	16						
25			Mean	of Detects	13.84	10.7						
26			Median	of Detects	11	10.4						
27			SD	of Detects	13.47	3.181						
28				KM Mean	13.67	10.7						
29				KM SD	13.32	3.181						
30												
31			Sample 1 v	s Sample 2	Gehan Test							
32												
33	H0: Mean/M	edian of Sa	ample 1 <= M	lean/Median	of backgrou	und						
34												
35				z Test Value								
36			Cri	tical z (0.05)								
37				P-Value	0.507							
38												
39	Conclusion											
40		-	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >	= alpha (0.	.05)									
42												

	A B C	D	l E	l F	G	н	1	J	K	\top	L
1	_	re Sample 1					a Sets with				
2											
3	User Selected Options	;									
4	Date/Time of Computation	ProUCL 5.1	5/23/2018 2:	19:09 PM							
5	From File	Onsite Meta	ıls Input w Ba	ackground.xls	8						
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)					
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 N	/lean/Mediar	1					
10		1									
11											
12	Sample 1 Data: Copper										
13	Sample 2 Data: Background Coppe	r									
14											
15		Raw Statistic	s								
16			Sample 1	Sample 2							
17	Number of	Valid Data	64	8							
18	Number of No	on-Detects	1	0							
19	Number	of Detects	63	8							
20	Minimum N		3	N/A							
21	Maximum N		3	N/A							
22	Percent No	on-detects	1.56%	0.00%							
23	Minim	um Detect	3.8	6.5							
24		um Detect	100	16							
25		of Detects	13.84	10.7							
26		of Detects	11	10.4							
27	SD	of Detects	13.47	3.181							
28		KM Mean	13.67	10.7							
29		KM SD	13.32	3.181							
30											
31	Sample 1 vs S	sample 2 Tar	one-Ware T	est							
32	HO. Maan/Madlers at Co. 1. 4	1/1- "	-f0 ! :								
33	H0: Mean/Median of Sample 1 <= N	nean/Median	of Sample 2	<u> </u>							
34		TM 0: :: ::	0.404								
35	T\A/ \C \. \.	TW Statistic								_	
36	I W Critical	Value (0.05)								_	
37		P-Value	0.576								
38	Conclusion with Alaka - 0.05										
39	Conclusion with Alpha = 0.05		mmla O								
40	Do Not Reject H0, Conclude San	ipie i <= Sar	ripie 2								
41	P-Value >= alpha (0.05)										
42											

	A B C	D	E	l F	G	Ιн	ı	J	K	TL
1							a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.15	5/23/2018 2	:19:54 PM						
5	From File	Onsite Meta	ls Input w B	ackground.xl	s					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								-
8	Selected Null Hypothesis	Sample 1 Me	ean/Median	<= Sample 2	Mean/Media	an (Form 1)				
9	Alternative Hypothesis	Sample 1 Me	ean/Median	> Sample 2	Mean/Mediar	n				
10		I								
11										
12	Sample 1 Data: Copper									
13	Sample 2 Data: Background Copper	•								
14										
15	F	Raw Statistics	s							
16			Sample 1	Sample 2						
17	Number of \	/alid Data	64	8						
18	Number of No	n-Detects	1	0						
19	Number of De	etect Data	63	8						
20	Minimum N	on-Detect	3	N/A						
21	Maximum N	on-Detect	3	N/A						
22	Percent No	on-detects	1.56%	0.00%						
23	Minimo	um Detect	3.8	6.5						
24	Maximo	um Detect	100	16						
25	Mean	of Detects	13.84	10.7						
26	Median (of Detects	11	10.4						
27	SD	of Detects	13.47	3.181						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	ean/Median	of Sample 2	2						
32					1					
33	Sample 1 Rank									
34	Standardized V		0.0986							
35		Mean (U)	256							
36		(U) - Adj ties	55.76							
37	Approximate U-Stat Critical	, ,	1.645							
38	P-Value (Adjus	ted for Ties)	0.461							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	ple 1 <= San	nple 2							
42	P-Value >= alpha (0.05)									
43										



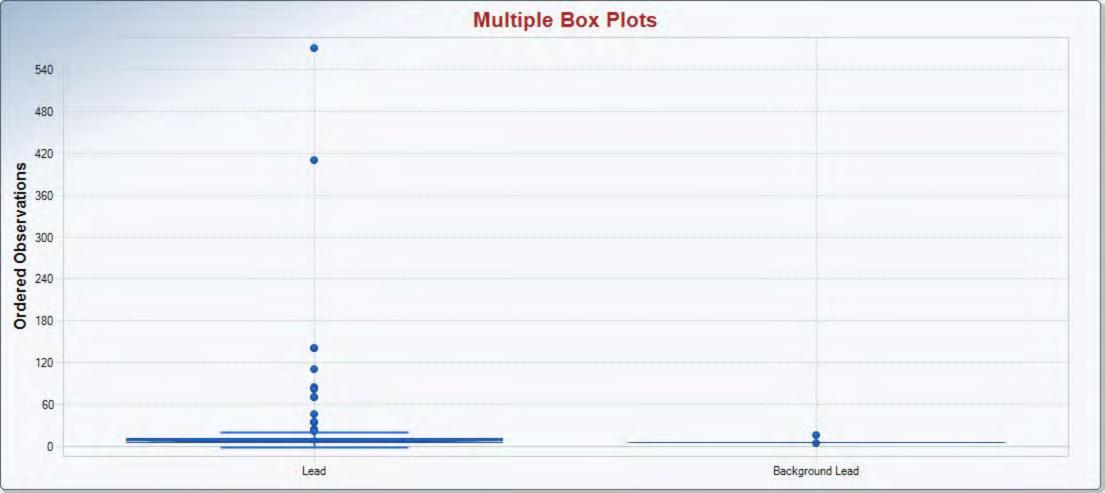


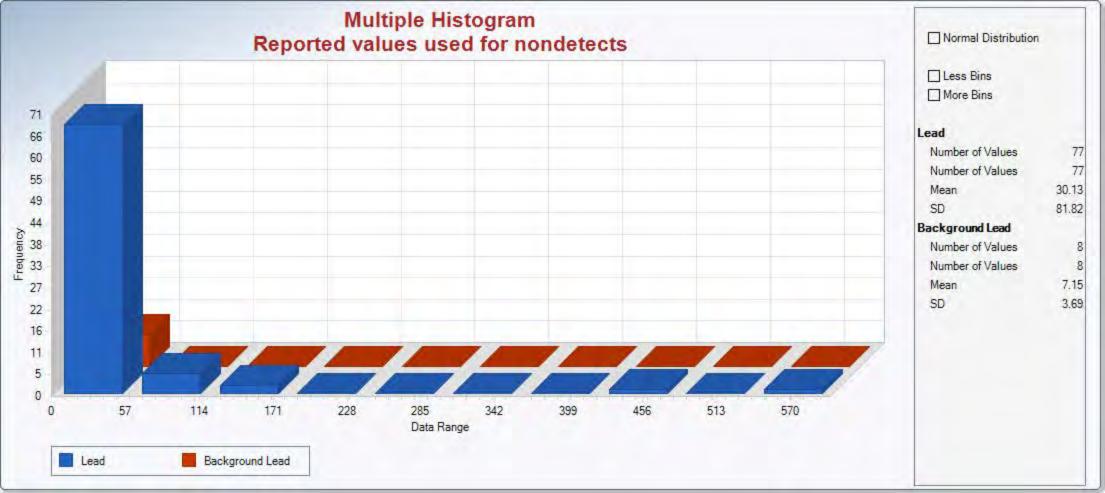


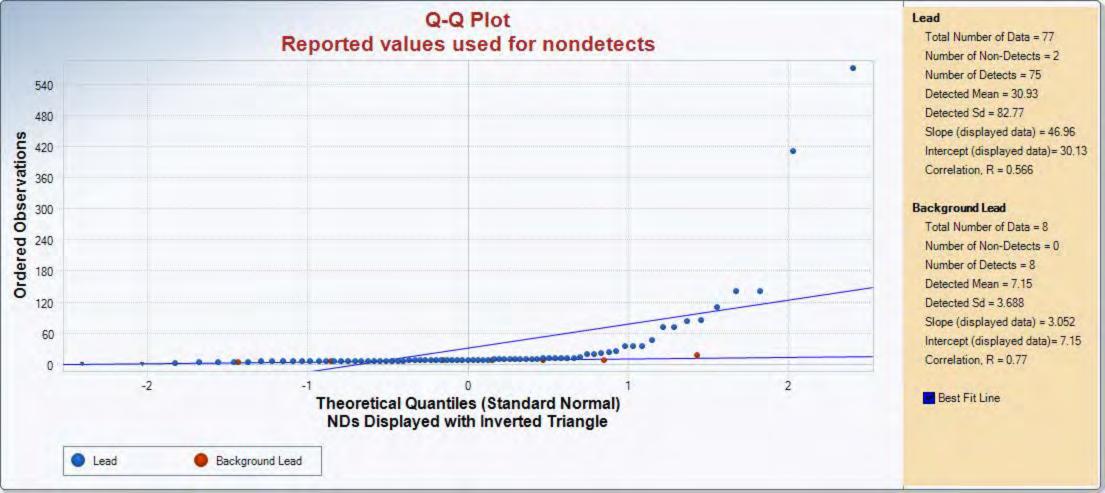
	A	В	С	D	ΤE	T F	G	Т	I 1	J	K	T L
1				_	_	omparison H	_		Sets with No	_		
2												
3		User Sele	cted Options									
4	Date/	Time of Co	omputation	ProUCL 5.	15/23/2018 2	:24:29 PM						
5			From File	Onsite Met	als Input w B	ackground.xl	S					
6		Fu	II Precision	OFF								
7	Co	onfidence	Coefficient	95%								
8	Sele	cted Null I	Hypothesis	Sample 1 N	/lean/Median	<= Sample 2	Mean/Medi	an (Form 1)				
9	Al	Iternative I	Hypothesis	Sample 1 N	/lean/Median	> Sample 2	Mean/Media	n				
10				ı								
11												
12	Sample 1 Dat	a: Lead										
13	Sample 2 Dat	a: Backgr	ound Lead									
14												
15			F	Raw Statisti	cs							
16					Sample 1	Sample 2						
17			Number of \		77	8						
18		١	Number of No	n-Detects	2	0						
19			Number of De		75	8						
20			Minimum N		0.1	N/A						
21			Maximum N		0.2	N/A						
22			Percent No		2.60%	0.00%						
23				um Detect	0.522	3.8						
24				um Detect	570	16						
25				of Detects	30.93	7.15						
26				of Detects	7.6	6.4						
27				of Detects	82.77	3.688						
28				KM Mean	30.13	7.15						
29				KM SD	81.29	3.688						
30												
31			Sample 1 v	s Sample 2	Gehan Tes	<u> </u>						
32	110-14- 7-											
33	H0: Mean/Me	gian of Sa	impie 1 <= M	iean/Mediar	n of backgro	ına						
34			0.1	- T 1 \ / 1	1 000	1						
35				z Test Value								
36			Cri	tical z (0.05								
37				P-Value	0.153							
38	Osmalı ızlan	lab Almba	- 0 0F									
33	Conclusion w			la 1 C								
40			onclude Sam	ipie 1 <= Sa	impie 2							
41	P-Value >=	alpha (0.	U5)									
42												

	Α	В	С	l D	l E	T F	G	Н	ı	J	K	$\overline{}$	
1		<u> </u>	_	_		2 Compariso	_		a Sets with	·			
2													
3		User Sele	ected Options										
4	Dat	te/Time of C	Computation	ProUCL 5.1	5/23/2018 2	:25:18 PM							
5			From File	Onsite Meta	als Input w B	ackground.xl	S						
6		Fu	ıll Precision	OFF									
7		Confidence	Coefficient	95%									
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Media	an (Form 1)					
9		Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Mediar	า					
10													
11													-
	Sample 1 D	ata: Lead											
13	Sample 2 D	ata: Backg	round Lead										
14													
15			ı	Raw Statistic	cs								
16					Sample 1	Sample 2							
17			Number of '	Valid Data	77	8							
18		I	Number of No	n-Detects	2	0							
19			Number	of Detects	75	8							
20			Minimum N	lon-Detect	0.1	N/A							
21			Maximum N	lon-Detect	0.2	N/A							
22			Percent No	on-detects	2.60%	0.00%							
23			Minim	um Detect	0.522	3.8							
24			Maxim	um Detect	570	16							
25			Mean	of Detects	30.93	7.15							
26			Median	of Detects	7.6	6.4							
27			SD	of Detects	82.77	3.688							
28				KM Mean	30.13	7.15							
29				KM SD	81.29	3.688							
30													
31		S	Sample 1 vs S	Sample 2 Tar	rone-Ware 1	est							
32													
33	H0: Mean/M	Median of Sa	ample 1 <= M	lean/Median	of Sample	2							
34						T							
35				TW Statistic									
36			TW Critical	Value (0.05)									
37				P-Value	0.244								
38	0	tale A1 '	- 0.05										
39	Conclusion	•		mla 1 = C	la C							_	
40			conclude Sam	ipie i <= Sai	mpie 2								
41	r-value :	>= alpha (0.	.05)										
42	l												

	А В С	D	E	F	G	Н	I	J	K	L
1	Wilcoxon-M	ann-Whitney	Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects	3	
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/23/2018 2	:25:57 PM						
5	From File	Onsite Meta	ls Input w B	ackground.xl	S					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	n (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2	Mean/Median					
10		1								
11										
12	Sample 1 Data: Lead									
13	Sample 2 Data: Background Lead									
14										
15	F	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of \		77	8						
18	Number of No	on-Detects	2	0						
19	Number of De	etect Data	75	8						
20	Minimum N	lon-Detect	0.1	N/A						
21	Maximum N	lon-Detect	0.2	N/A						
22	Percent No	on-detects	2.60%	0.00%						
23	Minime	um Detect	0.522	3.8						
24	Maxim	um Detect	570	16						
25	Mean	of Detects	30.93	7.15						
26	Median	of Detects	7.6	6.4						
27	SD	of Detects	82.77	3.688						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample	2						
32										
33	Sample 1 Rank									
34	Standardized V		1.054							
35		Mean (U)	308							
36		(U) - Adj ties	66.42							
37	Approximate U-Stat Critical		1.645							
38	P-Value (Adjus	sted for Ties)	0.146							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sar	mple 2							
42	P-Value >= alpha (0.05)									
43										



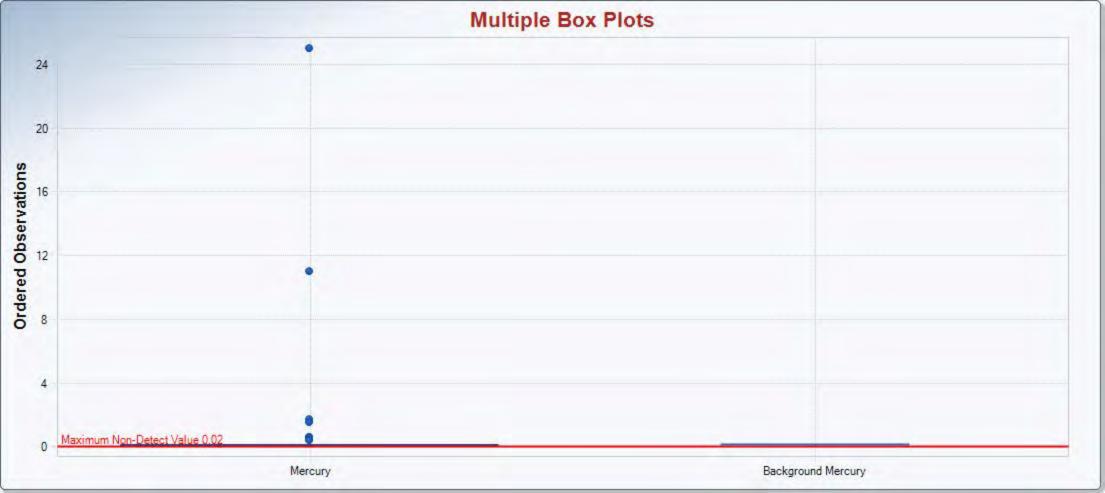


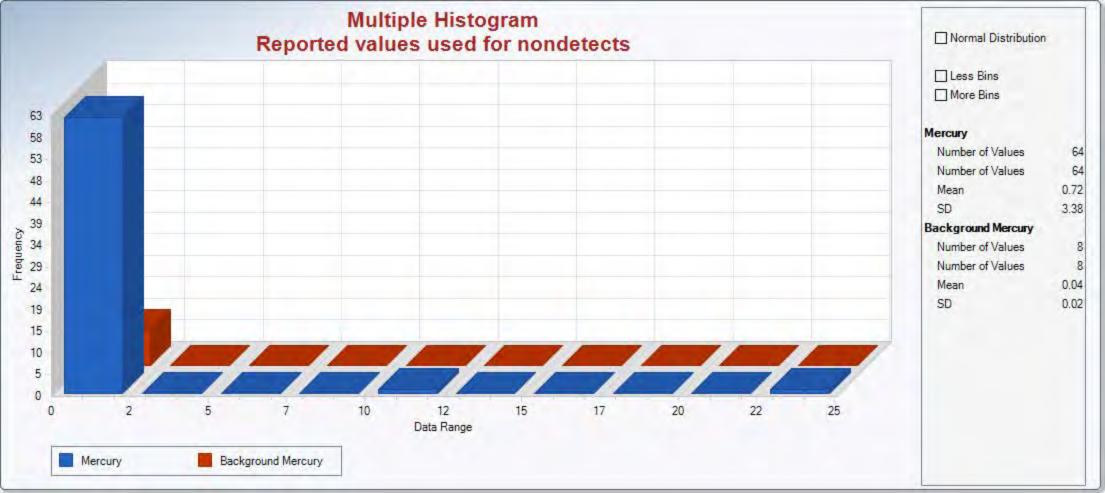


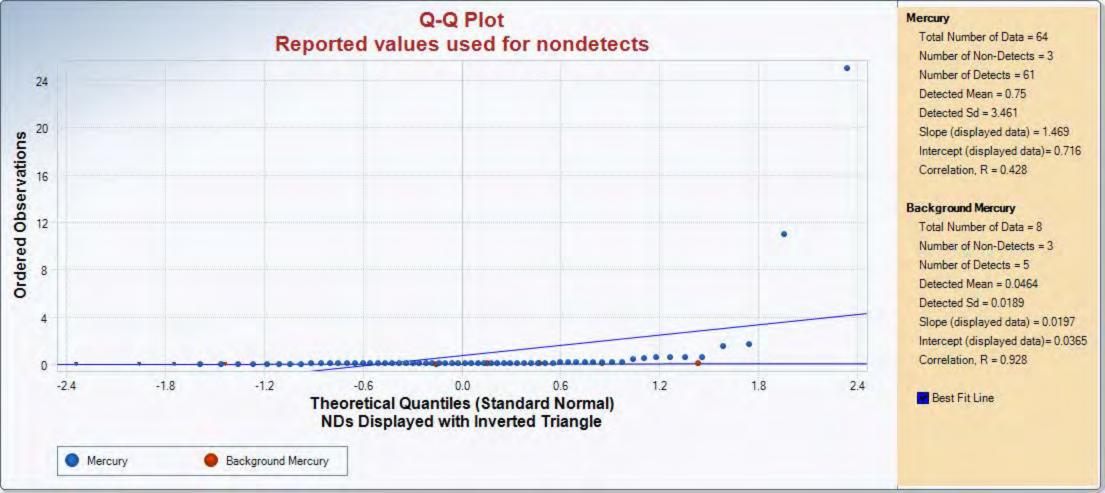
	А	В	С	D	l E	l F	G	I н	1	1		K	1 1
1				_	_	omparison Hy			Sets wi	th Non	-Detects	I K	
2													
3		User Selec	cted Options										
4	Date	e/Time of Co	omputation	ProUCL 5.1	5/23/2018 2	:46:57 PM							
5			From File	Onsite Meta	als Input w B	ackground.xl	S						
6		Ful	Il Precision	OFF									
7	(Confidence	Coefficient	95%									
8	Se	lected Null I	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	Mean/Medi	an (Form 1))				
9		Alternative I	Hypothesis	Sample 1 M	lean/Median	> Sample 2 I	Mean/Media	n					
10													
11													
12	Sample 1 Da	ata: Mercury	у										
13	Sample 2 Da	ata: Backgro	ound Mercur	у									
14													
15			F	Raw Statistic	s								
16					Sample 1	Sample 2							
17			Number of \	Valid Data	64	8							
18		N	lumber of No	n-Detects	3	3							
19		1	Number of De	etect Data	61	5							
20			Minimum N	on-Detect	0.02	0.02							
21			Maximum N	on-Detect	0.02	0.02							
22			Percent No	on-detects	4.69%	37.50%							
23			Minim	um Detect	0.024	0.024							
24			Maxim	um Detect	25	0.074							
25			Mean	of Detects	0.75	0.0464							
26			Median	of Detects	0.061	0.044							
27			SD	of Detects	3.461	0.0189							
28				KM Mean	0.716	0.0365							
29				KM SD	3.355	0.0185							
30													
31			Sample 1 v	s Sample 2	Gehan Test								
32													
33	H0: Mean/M	ledian of Sa	mple 1 <= M	lean/Median	of backgrou	ınd							
34													
35	Gehan z Test Value 2.554												
36			Cri	tical z (0.05)									
37				P-Value	0.00532								
38													
39	Conclusion	_											
40	_		Sample 1 >	Sample 2									
41	P-Value <	alpha (0.0	5)										
42													

	Α	В	С	D	l E	F	G	Н	ı	J	K		
1						Comparisor			a Sets with	Ü			
2													
3		User Sele	ected Options										
4	Dat	te/Time of C	Computation	ProUCL 5.1	5/23/2018 2	:47:39 PM							
5			From File	Onsite Meta	als Input w B	ackground.xl	S						
6		Fu	III Precision	OFF									
7		Confidence	Coefficient	95%									
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	Mean/Media	an (Form 1)					
9		Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2 I	Mean/Mediar	า					
10													
11													
	Sample 1 D	ata: Mercui	ry										
13	Sample 2 D	ata: Backgı	round Mercur	у									
14													
15			F	Raw Statistic	s								
16					Sample 1	Sample 2							
17			Number of \	Valid Data	64	8							
18		I	Number of No	n-Detects	3	3							
19			Number	of Detects	61	5							
20			Minimum N	lon-Detect	0.02	0.02							
21			Maximum N	lon-Detect	0.02	0.02							
22			Percent No	on-detects	4.69%	37.50%						+	
23			Minim	um Detect	0.024	0.024							
24			Maxim	um Detect	25	0.074							
25			Mean	of Detects	0.75	0.0464							
26			Median	of Detects	0.061	0.044							
27			SD	of Detects	3.461	0.0189							
28				KM Mean	0.716	0.0365							
29				KM SD	3.355	0.0185							
30													
31		S	Sample 1 vs S	Sample 2 Tar	one-Ware T	est							
32													
33	H0: Mean/N	Median of Sa	ample 1 <= M	lean/Median	of Sample 2	2							
34													
35				TW Statistic									
36			TW Critical	Value (0.05)									
37				P-Value	0.00686								
38													
39	Conclusion												
40			Sample 1 >	Sample 2									
41	P-Value	< alpha (0.0	05)										
42													

	А В С	D	Е	F	G	Н		J	K	L
1	Wilcoxon-M	ann-Whitney	Sample 1 v	s Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/23/2018 2:	48:20 PM						
5	From File	Onsite Meta	Is Input w B	ackground.xls	3					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	n (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 N	/lean/Median					
10										
11										
12	Sample 1 Data: Mercury									
13	Sample 2 Data: Background Mercur	у								
14										
15	I	Raw Statistic								
16			Sample 1	Sample 2						
17	Number of		64	8						
18	Number of No	n-Detects	3	3						
19	Number of D	etect Data	61	5						
20	Minimum N	lon-Detect	0.02	0.02						
21	Maximum N	lon-Detect	0.02	0.02						
22	Percent No	on-detects	4.69%	37.50%						
23	Minim	um Detect	0.024	0.024						
24	Maxim	um Detect	25	0.074						
25	Mean	of Detects	0.75	0.0464						
26	Median	of Detects	0.061	0.044						
27	SD	of Detects	3.461	0.0189						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Tes	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample 2	2						
32										
33	Sample 1 Rank									
34	Standardized \		2.591							
35		Mean (U)	256							
36		(U) - Adj ties	55.79							
37	Approximate U-Stat Critical		1.645							
38	P-Value (Adjus	sted for Ties)	0.00479							
39										
40	Conclusion with Alpha = 0.05									
41	Reject H0, Conclude Sample 1 >	Sample 2								
42	P-Value < alpha (0.05)									
43										



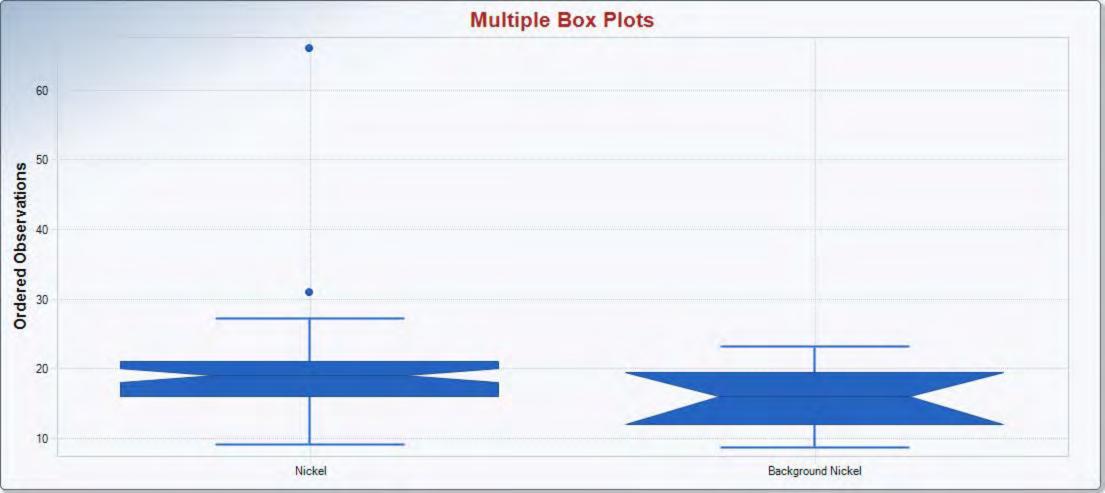


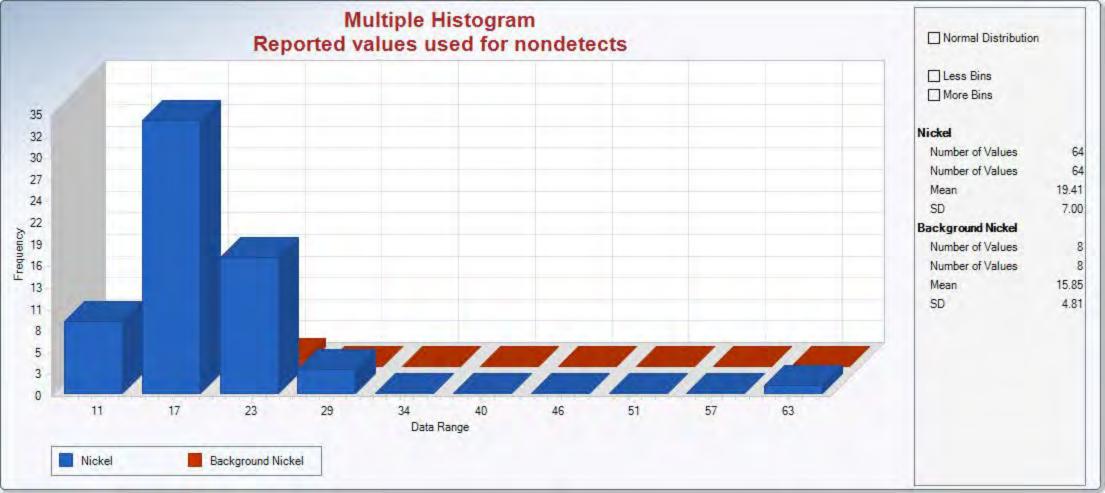


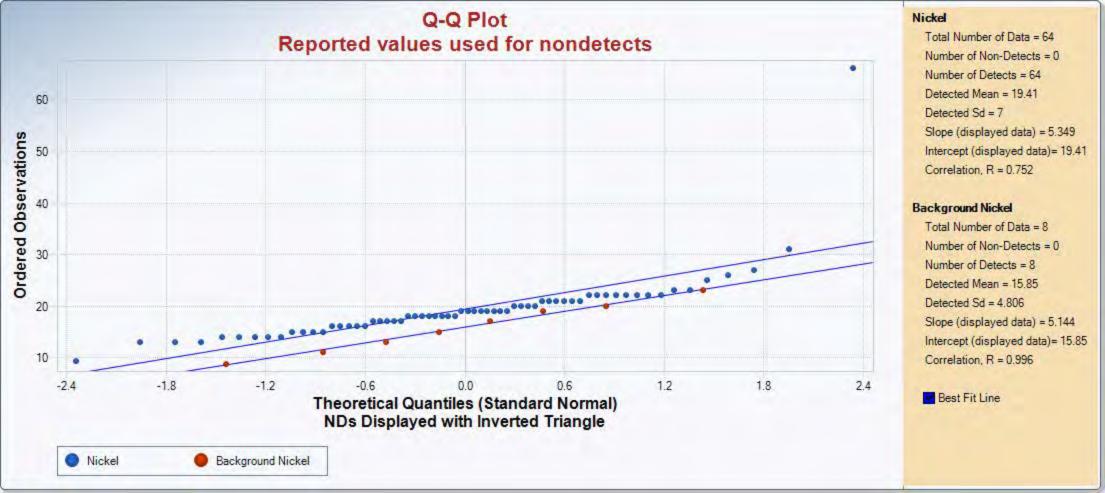
	А	В	С	D	ΓE	F	G	Т	<u> </u>	J	K	L
1				ample 1 vs	Sample 2 Co	omparison H	_		Sets with No	n-Detects		
2												
3		User Sele	ected Options									
4	Date	e/Time of C	omputation	ProUCL 5.1	5/23/2018 2	:30:22 PM						
5			From File	Onsite Meta	als Input w B	ackground.xl	S					
6		Fu	III Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Se	lected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Medi	an (Form 1)				
9	-	Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Media	n				
10				I								
11												
12	Sample 1 Da	ata: Nickel										
13	Sample 2 Da	ata: Backgr	round Nickel									
14												
15			F	Raw Statistic	s							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	64	8						
18		1	Number of No	n-Detects	0	0						
19			Number of De		64	8						
20			Minimum N		N/A	N/A						
21			Maximum N	on-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minim	um Detect	9.3	8.8						
24				um Detect	66	23						
25			Mean	of Detects	19.41	15.85						
26			Median	of Detects	19	16						
27				of Detects	7	4.806						
28				KM Mean	19.41	15.85						
29				KM SD	7	4.806						
30												
31			Sample 1 v	s Sample 2	Gehan Test							
32				, and								
33	H0: Mean/M	edian of Sa	ample 1 <= M	lean/Median	of backgrou	und						
34					1 222							
35				z Test Value								
36			Cri	tical z (0.05)								
37				P-Value	0.0924							
38	0	- 1st- A 1 1	0.05									
33	Conclusion				l- 0							
40		-	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >	= alpha (0.	.05)									
42												

	А	В	С	D	l E	T F	G	Н	ı	J	K	TL
1			Tarone-War	e Sample 1	vs Sample 2	2 Compariso	n Hypothesis	Test for Da	a Sets with	Non-Detects		
2												
3		User Sele	cted Options									
4	Date	e/Time of Co	omputation	ProUCL 5.1	5/23/2018 2	:31:14 PM						
5			From File	Onsite Meta	als Input w B	ackground.xl	S					
6		Fu	II Precision	OFF								
7	(Confidence	Coefficient	95%								-
8	Sel	ected Null I	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Media	an (Form 1)				
9	,	Alternative I	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Mediar	า				
10												
11												
12	Sample 1 Da	ata: Nickel										
13	Sample 2 Da	ata: Backgr	ound Nickel									
14												1
15			F	Raw Statistic	cs							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	64	8						
18		N	Number of No	n-Detects	0	0						
19			Number	of Detects	64	8						
20			Minimum N	on-Detect	N/A	N/A						
21			Maximum N	on-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minimu	um Detect	9.3	8.8						
24			Maximu	um Detect	66	23						
25			Mean	of Detects	19.41	15.85						
26			Median	of Detects	19	16						
27			SD	of Detects	7	4.806						
28				KM Mean	19.41	15.85						
29				KM SD	7	4.806						
30												
31		S	ample 1 vs S	ample 2 Ta	rone-Ware 1	est						
32												
33	H0: Mean/M	edian of Sa	mple 1 <= M	lean/Median	of Sample	2						
34												
35				TW Statistic								
36			TW Critical	, ,								
37				P-Value	0.0387							
38												
39	Conclusion v	-										
40			Sample 1 >	Sample 2								
41	P-Value <	alpha (0.0	5)									
42												

	A B C	D	E	F	G	Н		J	K	ΤL
1		ann-Whitney		vs Sample 2		Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/23/2018 2	:31:58 PM						
5	From File	Onsite Meta	ls Input w B	ackground.xl	S					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 I	Mean/Mediar	า				
10		I								
11										
12	Sample 1 Data: Nickel									
13	Sample 2 Data: Background Nickel									
14										
15	F	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of \	Valid Data	64	8						
18	Number of No	n-Detects	0	0						
19	Number of De	etect Data	64	8						
20	Minimum N	on-Detect	N/A	N/A						
21	Maximum N	on-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minimo	um Detect	9.3	8.8						
24	Maximi	um Detect	66	23						
25		of Detects	19.41	15.85						
26		of Detects	19	16						
27	SD	of Detects	7	4.806						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample 2	2						
32		_			1					
33	Sample 1 Rank									
34	Standardized V		1.556							
35		Mean (U)	256							
36		(U) - Adj ties	55.61							
37	Approximate U-Stat Critical		1.645							
38	P-Value (Adjus	ted for Ties)	0.0599							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sar	nple 2							
42	P-Value >= alpha (0.05)									
43										



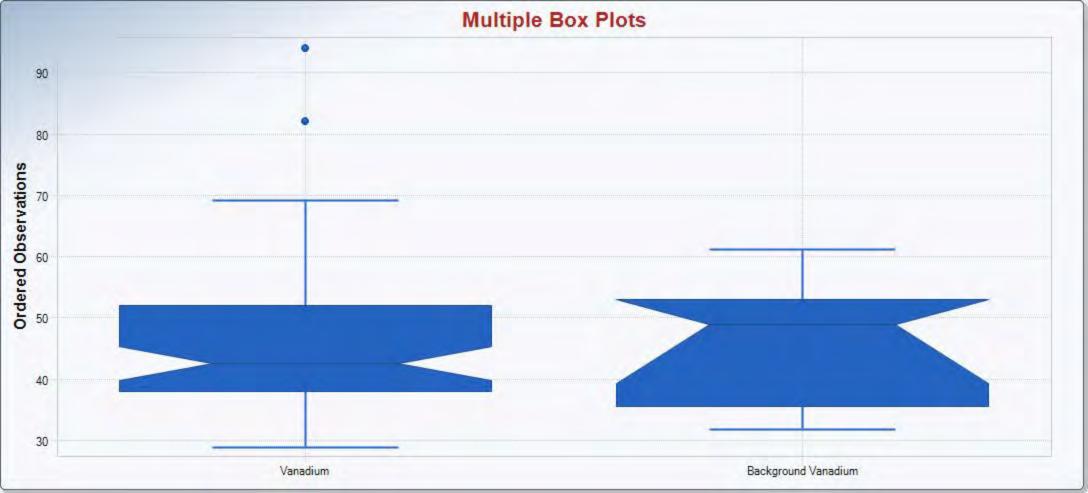


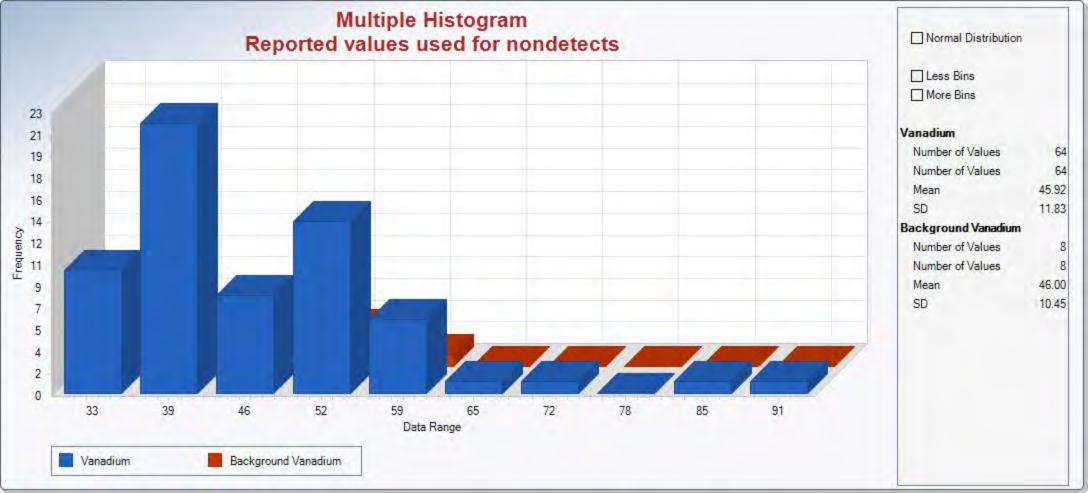


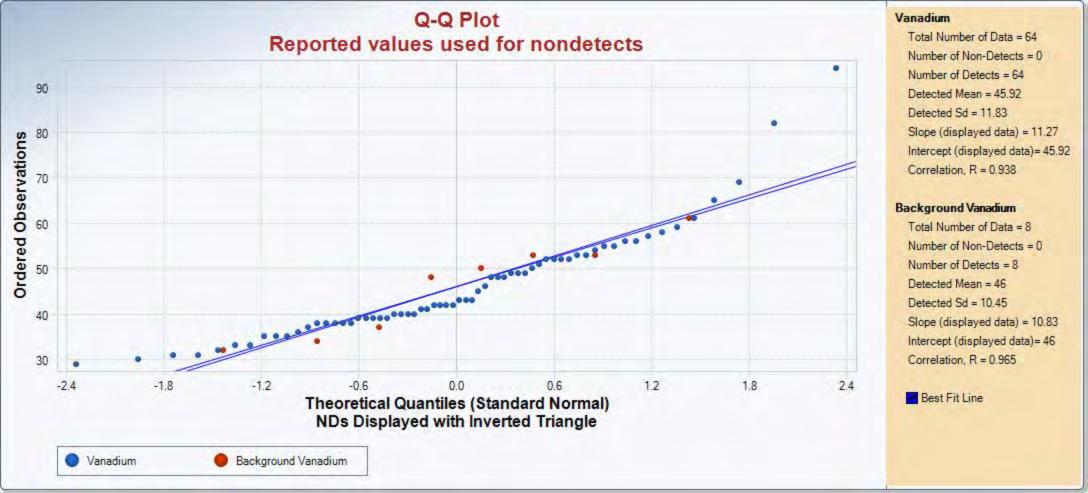
	А	В	С	D	ΙE	T F	G	Тн	<u> </u>	J	K	TL
1			Gehan S	ample 1 vs	Sample 2 C	omparison H	ypothesis Te	est for Data	Sets with No	n-Detects	•	
2												
3		User Sele	cted Options									
4	Date	e/Time of C	omputation	ProUCL 5.1	5/23/2018 2							
5			From File	Onsite Meta	als Input w B	ackground.xl	s					
6		Fu	II Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Sel	lected Null	Hypothesis	Sample 1 N	lean/Median	<= Sample 2	Mean/Medi	ian (Form 1)				
9	1	Alternative	Hypothesis	Sample 1 N	lean/Median	> Sample 2	Mean/Media	n				
10												
11												
12	Sample 1 Da	ata: Vanadi	ium									
13	Sample 2 Da	ata: Backgr	ound Vanadi	um								
14												
15			F	Raw Statistic								
16					Sample 1	Sample 2						
17			Number of \		64	8						
18			Number of No		0	0						
19			Number of De		64	8						
20			Minimum N		N/A	N/A						
21		Maximum Non-Detect N/A N/A										
22			Percent No		0.00%	0.00%						
23				um Detect	29	32						
24				um Detect	94	61						
25				of Detects	45.92	46						
26				of Detects	42.5	49						
27				of Detects	11.83	10.45						
28				KM Mean	45.92	46						
29				KM SD	11.83	10.45						
30			0	0 ! 0	O-1- T							
31			Sample 1 v	s Sample 2	Gehan Tes	[
32	U0. Mas=#4	adian of C	mmle 1 4- 14	loon/Madle	of had	ınd						
33	nu: Mean/M	euian ot Sa	ample 1 <= M	iean/Mediar	or backgrou	JI I U						
34			Cabar	7 Toot \/-!	0.051							
35		Gehan z Test Value -0.251 Critical z (0.05) 1.645										
36			Cri	P-Value								1
37				r-value	0.599							
38	Conclusion v	with Alpha	= 0.05									
33			= 0.05 onclude Sam	nle 1 /- S-	mnle ?							
40		= alpha (0.		ihie i <= 28	mpi e Z							
41	r-value >	– aipna (0.	ເບວງ									
42												

	A B C	D	l E	F	G	н	ı	J	K		L
1	_	_					a Sets with	Non-Detects			
2											
3	User Selected Options										
4	Date/Time of Computation	ProUCL 5.1	5/23/2018 2:								
5	From File	Onsite Meta	ıls Input w Ba	ackground.xls	3						
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	n (Form 1)				-	
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 N	/lean/Mediar	1					
10											
11											
12	Sample 1 Data: Vanadium										
13	Sample 2 Data: Background Vanad	ium									
14											
15		Raw Statistic	s								
16			Sample 1	Sample 2							
17	Number of	Valid Data	64	8							
18	Number of No	on-Detects	0	0							
19	Number	of Detects	64	8							
20	Minimum N		N/A	N/A							
21	Maximum N		N/A	N/A							
22	Percent No	on-detects	0.00%	0.00%							
23	Minim	um Detect	29	32							
24		um Detect	94	61							
25		of Detects	45.92	46							
26		of Detects	42.5	49							
27	SD	of Detects	11.83	10.45							
28		KM Mean	45.92	46							
29		KM SD	11.83	10.45							
30											
31	Sample 1 vs S	sample 2 Tar	one-Ware T	est							
32	HO. Maan/Madlers at Co. 1. 4	1	-f0 ! :								
33	H0: Mean/Median of Sample 1 <= N	rean/Median	of Sample 2	<u> </u>						_	
34		TM 04 ** **	0.0500	1							
35	T\A/ \C \. \.	TW Statistic									
36	I W Critical	Value (0.05) P-Value								_	
37											
38	Conclusion with Alaka - 0.05									_	
39	Conclusion with Alpha = 0.05						_				
40	Do Not Reject H0, Conclude San										
41	P-Value >= alpha (0.05)										
42											

	А В С	D	Е	F	G	Н	I	J	K	L
1	Wilcoxon-M	ann-Whitney	Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects	3	
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.15	5/23/2018 2							
5	From File	Onsite Meta	ls Input w B	ackground.xl	S					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	ın (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2	Mean/Median	1				
10										
11										
12	Sample 1 Data: Vanadium									
13	Sample 2 Data: Background Vanadi	ium								
14										
15	F	Raw Statistic								
16			Sample 1	Sample 2						
17	Number of \		64	8						
18	Number of No	on-Detects	0	0						
19	Number of D	etect Data	64	8						
20	Minimum N	lon-Detect	N/A	N/A						
21	Maximum N	lon-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minim	um Detect	29	32						
24	Maxim	um Detect	94	61						
25	Mean	of Detects	45.92	46						
26	Median	of Detects	42.5	49						
27	SD	of Detects	11.83	10.45						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample 2	2						
32										
33	Sample 1 Rank									
34	Standardized V		-0.161							
35		Mean (U)	256							
36		(U) - Adj ties	55.76							
37	Approximate U-Stat Critical		1.645							
38	P-Value (Adjus	sted for Ties)	0.564							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sar	nple 2							
42	P-Value >= alpha (0.05)									
43										



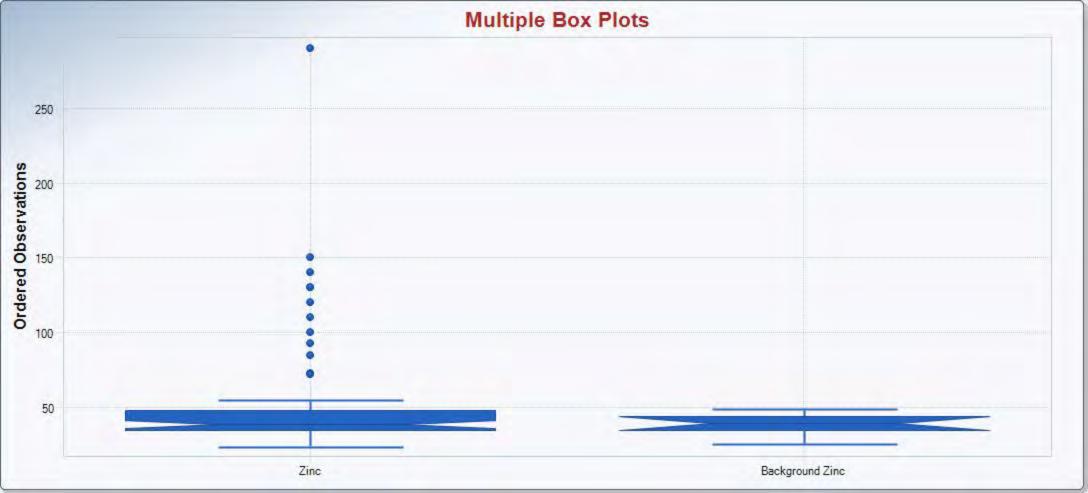


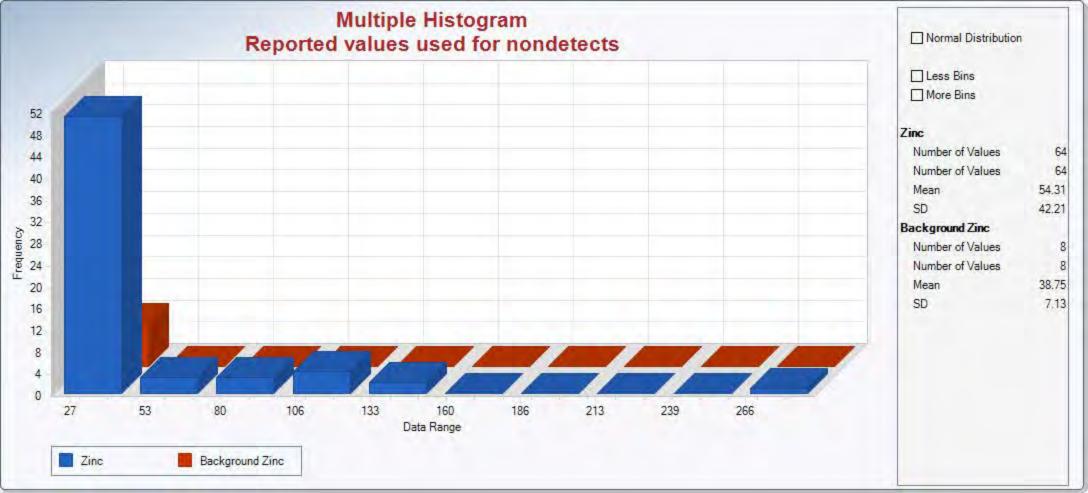


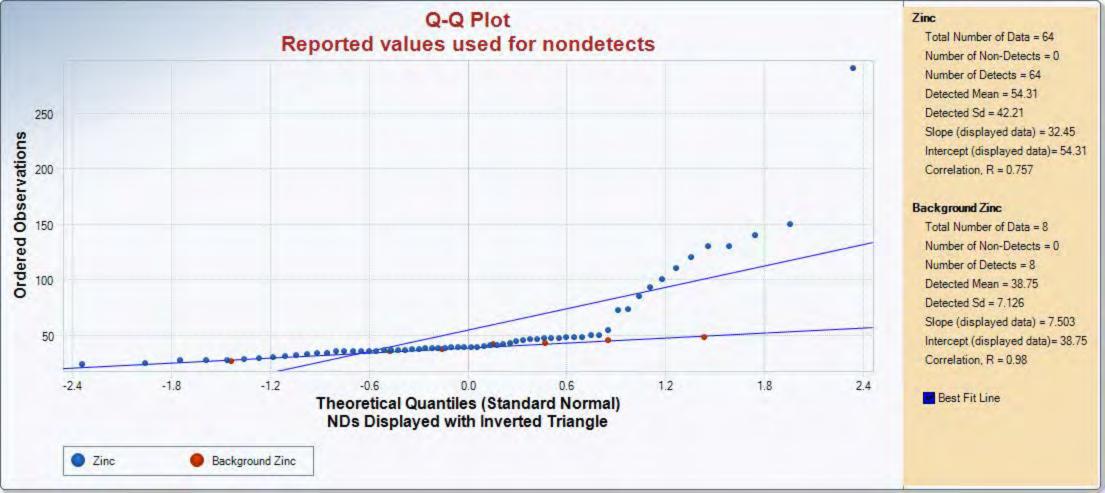
	A B C	D	E	F	G	Т	l 1	J	К	TL
1		Sample 1 vs S	ample 2 Co	omparison H	pothesis Te	est for Data	Sets with No	n-Detects	•	
2										
3	User Selected Options	3								
4	Date/Time of Computation	ProUCL 5.15	5/23/2018 2:							
5	From File	Onsite Metal	s Input w B	ackground.xl	s					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 Me	ean/Median	<= Sample 2	Mean/Medi	an (Form 1)				
9	Alternative Hypothesis	Sample 1 Me	ean/Median	> Sample 2	Mean/Media	n				
10										
11										
12	Sample 1 Data: Zinc									
13	Sample 2 Data: Background Zinc									
14										
15		Raw Statistics								
16			Sample 1	Sample 2						
17	Number of		64	8						
18	Number of No		0	0						
19	Number of D		64	8						
20	Minimum N		N/A N/A	N/A N/A						
21	Maximum N									
22	Percent No		0.00%	0.00%						
23		um Detect	24	26						
24		um Detect	290	48						
25		of Detects	54.31	38.75						
26		of Detects	39	39.5						
27	SD	of Detects	42.21	7.126						
28		KM Mean	54.31	38.75						
29		KM SD	42.21	7.126						
30										
31	Sample 1 V	vs Sample 2 C	ienan lest							
32	HO. M /M Harris Commission A. A. N.	4 /8 4 11	. 							
33	H0: Mean/Median of Sample 1 <= N	nean/Median (or backgrou	ırıa						
34	0-1	z Test Value	0.538							
35										
36	Cri									
37		P-Value	0.295							
38	Conclusion with Alpha = 0.05									
33	Do Not Reject H0, Conclude Sam	ania 1 C	nlo ?							
40	P-Value >= alpha (0.05)	ihie i Z= Sau	ihie 5							
41	r-value >= alpna (0.05)									
42										

	А	В	С	D	ΙE	l F	G	Н	I	J	K	TL
1	<u> </u>		Tarone-War	e Sample 1	vs Sample	2 Comparisor	n Hypothesis	Test for Da	a Sets with	Non-Detects		
2												
3		User Sele	cted Options									
4	Date	/Time of Co	omputation	ProUCL 5.1	5/23/2018 2							
5			From File	Onsite Meta	als Input w E	ackground.xl	s					
6		Fu	II Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Sel	ected Null I	Hypothesis	Sample 1 M	lean/Mediar	<= Sample 2	Mean/Media	an (Form 1)				
9	A	Alternative I	Hypothesis	Sample 1 M	lean/Mediar	> Sample 2	Mean/Mediar	1				
10												
11												
12	Sample 1 Da											
13	Sample 2 Da	ita: Backgr	ound Zinc									
14												
15			F	Raw Statistic								
16					Sample 1	Sample 2						
17			Number of \		64	8						
18		١	Number of No		0	0						
19				of Detects	64	8						
20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	24	26						
24				um Detect	290	48						
25				of Detects	54.31	38.75						
26				of Detects	39	39.5						
27				of Detects	42.21	7.126						
28				KM Mean	54.31	38.75						
29				KM SD	42.21	7.126						
30												
31		S	ample 1 vs S	ample 2 Ta	rone-Ware	est						
32	110-14 22			/b /		•						
33	HU: Mean/Mo	edian of Sa	ample 1 <= M	iean/Median	of Sample	2						
34				TM 0: :: ::	0.544		1					
35	TW Statistic 0.544											
36		TW Critical Value (0.05) 1.645										
37				P-Value	0.293							
38	Oamaki-alais :	عطسا ۸ ماهان	- 0 0F									
33	Conclusion v				I- O							
40		-	onclude Sam	pie 1 <= Sa	mpie 2							
41	P-Value >	= aipha (0.	U5)									
42												

	A B C	D	E	T F	G	Н	1	J	K	T
1	Wilcoxon-Mann-						a Sets with	-		
2										
3	User Selected Options									
4	Date/Time of Computation Prol	JCL 5.1								
5	From File Ons	ite Meta	ls Input w B	ackground.x	s					
6	Full Precision OFF	=								
7	Confidence Coefficient 95%	, D								
8	Selected Null Hypothesis Sam	nple 1 M	ean/Median	<= Sample 2	2 Mean/Media	n (Form 1)				
9	Alternative Hypothesis Sam	nple 1 M	ean/Median	> Sample 2	Mean/Median					
10										
11										
12	Sample 1 Data: Zinc									
13	Sample 2 Data: Background Zinc									
14										
15	Raw	Statistic	s							
16			Sample 1	Sample 2						
17	Number of Valid	Data	64	8						
18	Number of Non-De	etects	0	0						
19	Number of Detect	Data	64	8						
20	Minimum Non-D	etect	N/A	N/A						
21	Maximum Non-D	etect	N/A	N/A						
22	Percent Non-de	etects	0.00%	0.00%						
23	Minimum D	etect	24	26						
24	Maximum D	etect	290	48						
25	Mean of De	etects	54.31	38.75						
26	Median of De	etects	39	39.5						
27	SD of De	etects	42.21	7.126						
28										
29	Wilcoxon-Mann-\	Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= Mean/	Median	of Sample	2						
32			T							
33	Sample 1 Rank Sum									
34	Standardized WMW									
35	Mean (U) 256 SD(U) - Adj ties 55.75									
36	SD(U) -						1			
37	Approximate U-Stat Critical Value									1
38	P-Value (Adjusted f	or Ties)	0.251							1
39										1
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sample 1	ı <= Sar	mple 2							1
42	P-Value >= alpha (0.05)									
43										







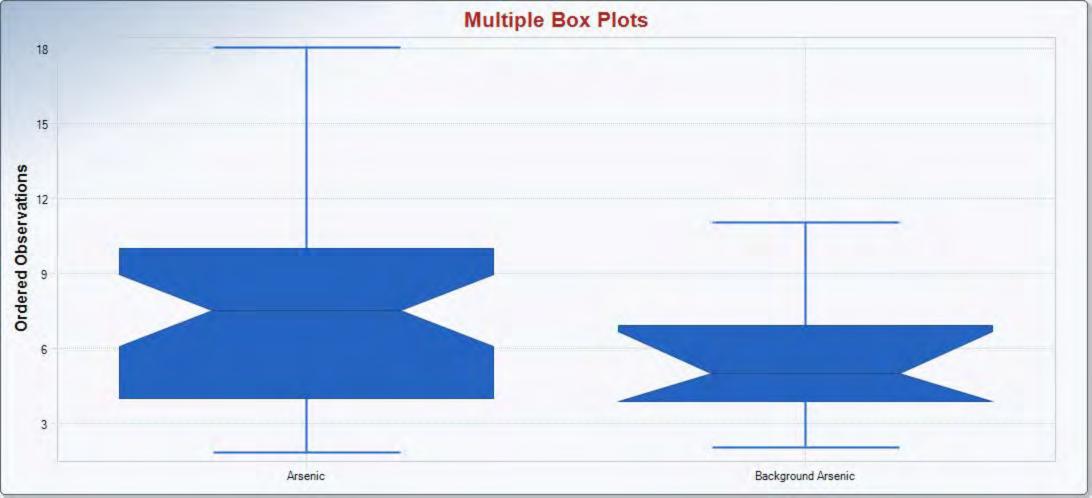
APPENDIX F

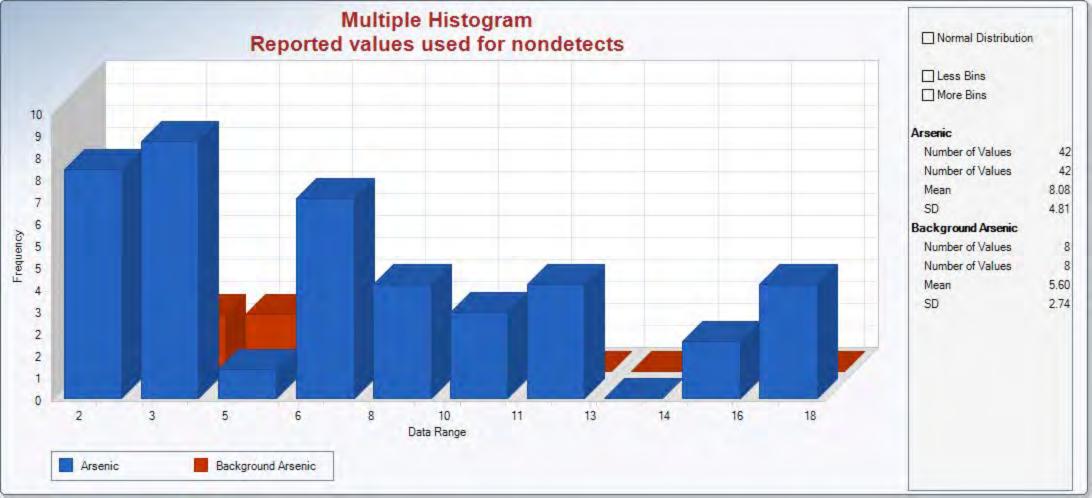
Metals Statistics Onsite to Background Eastern Parcel

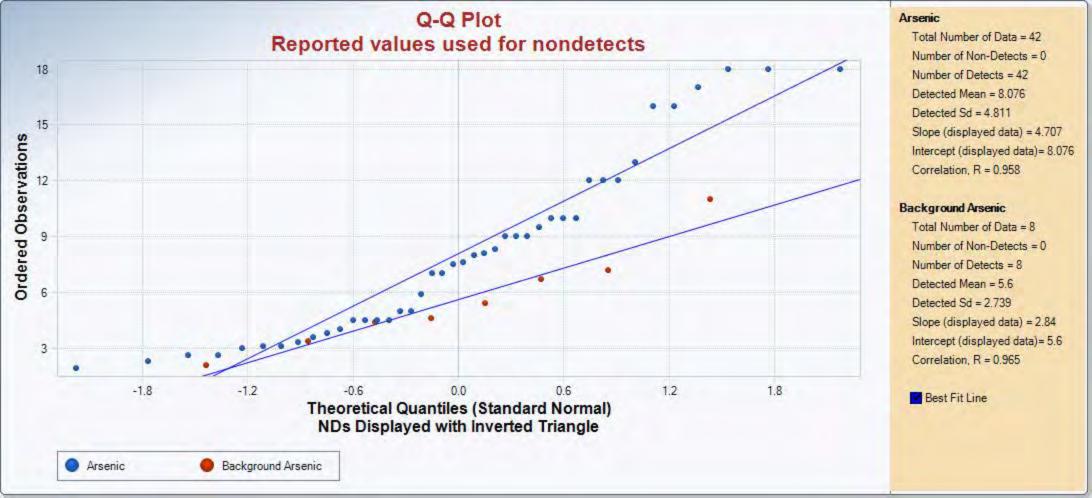
	А	В	С	D	ΤE	T F	G	Т	<u> </u>	J	K	T L
1				ample 1 vs	Sample 2 C	omparison H			Sets with No	n-Detects		
2												
3		User Sele	ected Options									
4	Date	e/Time of C	omputation	ProUCL 5.	15/28/2018 3	:53:47 PM						
5			From File	Metals with	Background	d Metals Inpu	t.xls					
6		Fu	III Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Se	lected Null	Hypothesis	Sample 1 N	/lean/Median	<= Sample 2	2 Mean/Medi	an (Form 1)				
9	-	Alternative	Hypothesis	Sample 1 N	/lean/Median	> Sample 2	Mean/Media	n				
10				ı								
11												
12	Sample 1 Da	ata: Arsenio	С									
13	Sample 2 Da	ata: Backgr	round Arsenic	3								
14												
15			F	Raw Statisti	cs							
16					Sample 1	Sample 2						
17			Number of \		42	8						
18			Number of No		0	0						
19			Number of De		42	8						
20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	1.9	2.1						
24				um Detect	18	11						
25				of Detects	8.076	5.6						
26				of Detects	7.55	5						
27				of Detects	4.811	2.739						
28				KM Mean	8.076	5.6						
29				KM SD	4.811	2.739						
30												
31			Sample 1 v	s Sample 2	Gehan Tes							
32	110-14 ***					4						
33	HU: Mean/M	edian of Sa	ample 1 <= M	iean/Mediar	n of backgro	und						
34			0.1	- T 1 \ / 1	1047							
35				z Test Value								
36			Cri	tical z (0.05								
37				P-Value	0.112							
38	Canalizata	- ما سالم ماهاده	- 0.0F									
33	Conclusion v			la 1 C								
40		-	onclude Sam	ipie 1 <= Sa	impie 2							
41	P-Value >	= alpha (0.	.05)									
42												

	А	В	С	D	E	l F	G	Н	ı	J	K	T
1			Tarone-War	e Sample 1	vs Sample	2 Comparison	n Hypothesis	Test for Da	ta Sets with	Non-Detects		
2												
3		User Sele	cted Options									
4	Date	e/Time of Co	omputation	ProUCL 5.	15/28/2018	3:54:58 PM						
5			From File	Metals with	Backgroun	d Metals Input	t.xls					
6		Fu	II Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Sel	lected Null I	Hypothesis	Sample 1 N	/lean/Media	n <= Sample 2	2 Mean/Media	an (Form 1)				
9	,	Alternative I	Hypothesis	Sample 1 N	/lean/Media	n > Sample 2	Mean/Mediar	า				
10				l								
11												
12	Sample 1 Da	ata: Arsenio	;									
13	Sample 2 Da	ata: Backgr	ound Arsenic									
14												
15			F	Raw Statisti	cs							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	42	8						
18		N	Number of No	n-Detects	0	0						
19			Number	of Detects	42	8						
20			Minimum N	on-Detect	N/A	N/A						
21			Maximum N	on-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minimu	um Detect	1.9	2.1						
24			Maximu	um Detect	18	11						
25			Mean	of Detects	8.076	5.6						
26			Median	of Detects	7.55	5						
27			SD	of Detects	4.811	2.739						
28				KM Mean	8.076	5.6						
29				KM SD	4.811	2.739						
30												
31		S	ample 1 vs S	ample 2 Ta	rone-Ware	Test						
32												
33	H0: Mean/M	edian of Sa	mple 1 <= M	lean/Mediar	of Sample	2						
34												
35				TW Statistic								
36			TW Critical									
37				P-Value	0.174							
38												
39	Conclusion v											
40		•	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >	= alpha (0.	05)									
42												

	A B C	D	l E	l F	G	Ιн	ı	J	K	TL
1							a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4	:05:29 PM						
5	From File	Metals with	Background	Metals Input	xls					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	lean/Median	<= Sample 2	Mean/Media	an (Form 1)				
9	Alternative Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Mediar	n				
10										
11										
12	Sample 1 Data: Arsenic									
13	Sample 2 Data: Background Arsenic	C								
14										
15	F	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of \	Valid Data	42	8						
18	Number of No	n-Detects	0	0						
19	Number of De	etect Data	42	8						
20	Minimum N	lon-Detect	N/A	N/A						
21	Maximum N	lon-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minim	um Detect	1.9	2.1						
24	Maximo	um Detect	18	11						
25	Mean	of Detects	8.076	5.6						
26	Median	of Detects	7.55	5						
27	SD	of Detects	4.811	2.739						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample	2						
32				_						
33	Sample 1 Rank									
34	Standardized V									
35		Mean (U)								
36		(U) - Adj ties								
37	Approximate U-Stat Critical	` '								
38	P-Value (Adjus	sted for Ties)	0.114							
39	0 1 1 11 11 11 1 1 1 1									
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	iple 1 <= Sa	mple 2							
42	P-Value >= alpha (0.05)									
43										



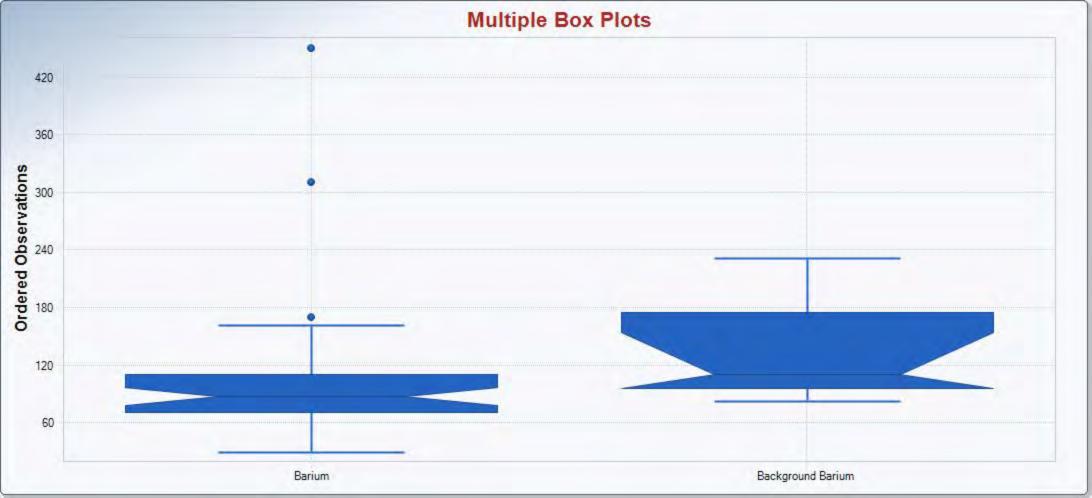


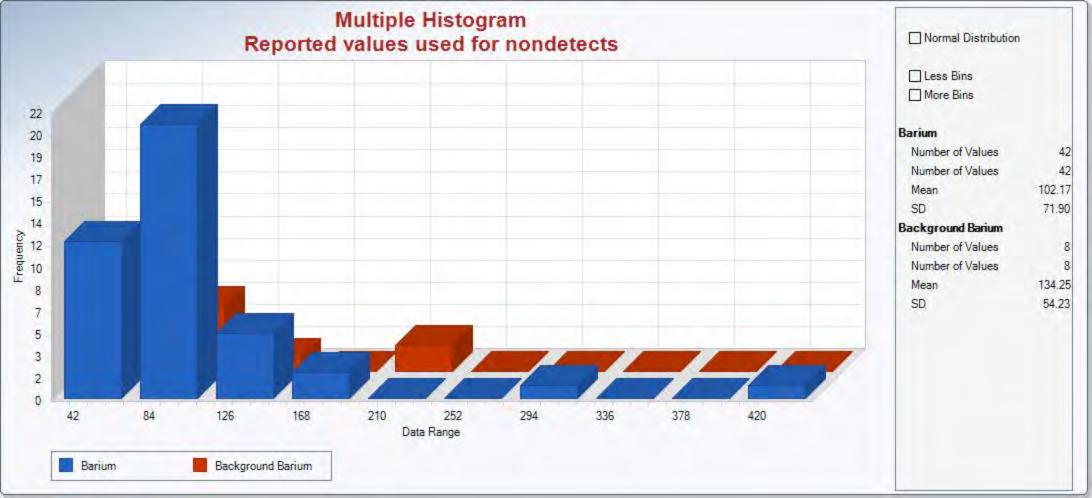


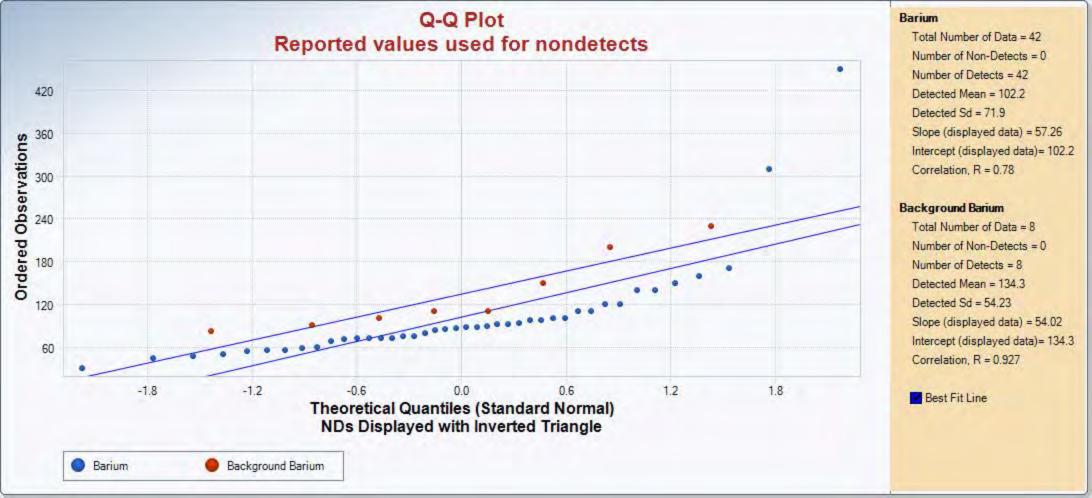
	А	В	С	D	ΙE	T F	G	Н	<u> </u>	J	K	T L
1			Gehan S	ample 1 vs	Sample 2 C	omparison H	ypothesis Te	est for Data	Sets with No	n-Detects		
2												
3		User Sele	ected Options									
4	Date	/Time of C	omputation	ProUCL 5.	15/28/2018 4	:09:16 PM						
5			From File	Metals with	Backgroun	d Metals Input	t.xls					
6		Fu	III Precision	OFF								
7	C	Confidence	Coefficient	95%								
8	Sel	ected Null	Hypothesis	Sample 1 N	/lean/Mediar	n <= Sample 2	2 Mean/Medi	an (Form 1)				
9	P	Alternative	Hypothesis	Sample 1 N	/lean/Mediar	n > Sample 2	Mean/Media	n				
10				ı								
11												
12	Sample 1 Da	ta: Barium	1									
13	Sample 2 Da	ta: Backgr	round Barium	1								
14												
15			F	Raw Statisti	cs							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	42	8						
18		1	Number of No	n-Detects	0	0						
19			Number of De	etect Data	42	8						
20			Minimum N		N/A	N/A						
21			Maximum N	on-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minim	um Detect	30	83						
24			Maximi	um Detect	450	230						
25			Mean	of Detects	102.2	134.3						
26			Median	of Detects	87	110						
27				of Detects	71.9	54.23						
28				KM Mean	102.2	134.3						
29				KM SD	71.9	54.23						
30					_							
31			Sample 1 v	s Sample 2	Gehan Tes	t						
32												
33	H0: Mean/Me	edian of Sa	ample 1 <= M	lean/Mediar	of backgro	und						
34							1					
35				z Test Value								
36			Cri	tical z (0.05								
37				P-Value	0.991							
38												
39	Conclusion v											
40		-	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >	= alpha (0.	.05)									
42												

	А	В	ГС	D	l E	l F	G	Н	1	J J	K		
1	Λ	Ь	_			2 Compariso	_		ta Sets with	ŭ			<u> </u>
2													
3		User Sele	ected Options										
4	Dat	e/Time of C	Computation	ProUCL 5.1	5/28/2018 4	:10:09 PM							
5			From File	Metals with	Background	Metals Input	i.xls						
6		Fu	III Precision	OFF									
7		Confidence	Coefficient	95%									
8	Se	lected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	Mean/Media	an (Form 1)					
9		Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Mediar	า					
10				1									
11													
12	Sample 1 D	ata: Barium	1										
13	Sample 2 D	ata: Backgı	round Barium)									
14													
15			F	Raw Statistic	cs								
16					Sample 1	Sample 2							
17			Number of \	Valid Data	42	8							
18		ı	Number of No	n-Detects	0	0							
19			Number	of Detects	42	8							
20			Minimum N	lon-Detect	N/A	N/A							
21			Maximum N	lon-Detect	N/A	N/A							
22			Percent No	on-detects	0.00%	0.00%							
23			Minim	um Detect	30	83							
24				um Detect	450	230							
25			Mean	of Detects	102.2	134.3							
26				of Detects	87	110							
27			SD	of Detects	71.9	54.23							
28				KM Mean	102.2	134.3							
29				KM SD	71.9	54.23							
30													
31		S	sample 1 vs S	sample 2 Tar	rone-Ware 1	est							
32	110.14 "	L. dl		L / A /	-10-								
33	HU: Mean/N	iedian of Sa	ample 1 <= M	iean/Median	of Sample	2							
34				TM 04-4:-4:	0.700								
35				TW Statistic									
36			i w Critical	Value (0.05)									
37				P-Value	0.997							_	
38	Conclusion	with Alaba	- 0.05										
39			= 0.05 onclude Sam	nle 1 /- Sa	mnle ?							_	
40		eject Hu, C >= alpha (0.			inple Z							_	
41	r-value /	- aipiia (V.	.00)										
42													

	A B C	D	ΙE	l F	G	Н	<u> </u>	J	K	ΙL
1	Wilcoxon-Ma	nn-Whitne	y Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4	:10:50 PM						
5	From File	Metals with	Background	l Metals Inpu	t.xls					
6	Full Precision (OFF								
7	Confidence Coefficient S	95%								
8	Selected Null Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Media	ın (Form 1)				
9	Alternative Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Median	1				
10	'									
11										
12	Sample 1 Data: Barium									
13	Sample 2 Data: Background Barium									
14										
15	Ra	aw Statistic	s							
16			Sample 1	Sample 2						
17	Number of Va	alid Data	42	8						
18	Number of Non	-Detects	0	0						
19	Number of Det	ect Data	42	8						
20	Minimum No	n-Detect	N/A	N/A						
21	Maximum No	n-Detect	N/A	N/A						
22	Percent Nor	n-detects	0.00%	0.00%						
23	Minimu	m Detect	30	83						
24	Maximui	m Detect	450	230						
25	Mean of	Detects	102.2	134.3						
26	Median of	Detects	87	110						
27	SD of	Detects	71.9	54.23						
28										
29	Wilcoxon-Mar	n-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= Me	an/Median	of Sample	2						
32										
33	Sample 1 Rank S									
34	Standardized W									
35		Mean (U)								
36	•	J) - Adj ties								
37	Approximate U-Stat Critical V									
38	P-Value (Adjuste	ed for Ties)	0.989							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Samp	le 1 <= Sa	mple 2							
42	P-Value >= alpha (0.05)									
43										



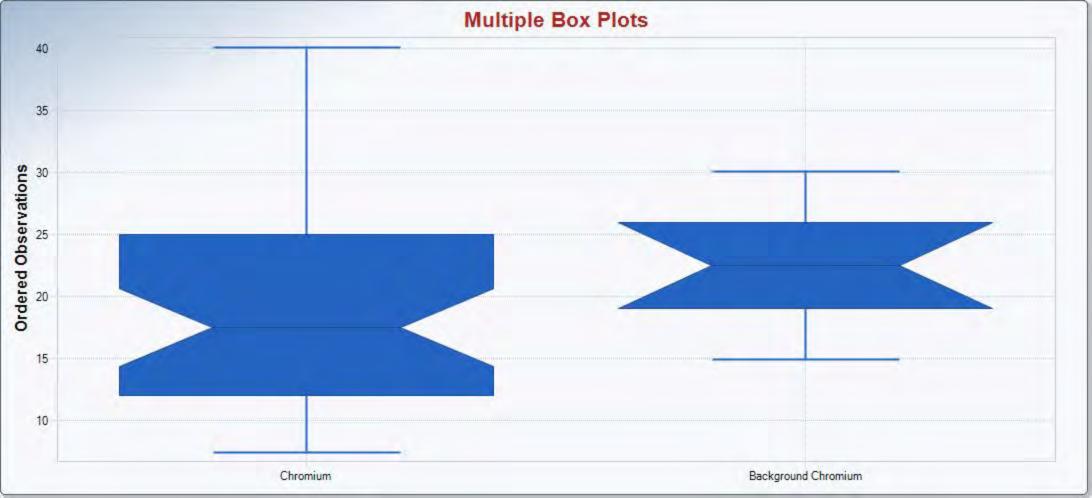


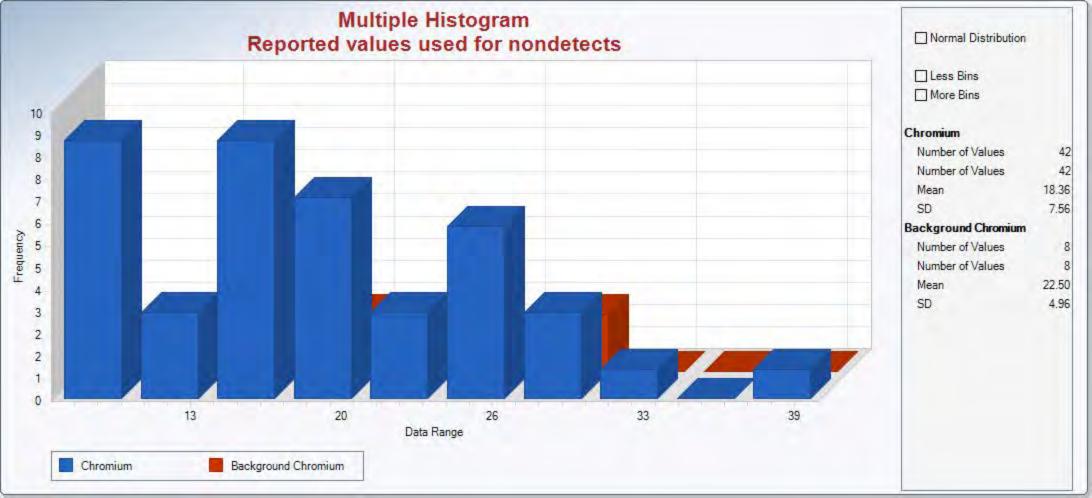


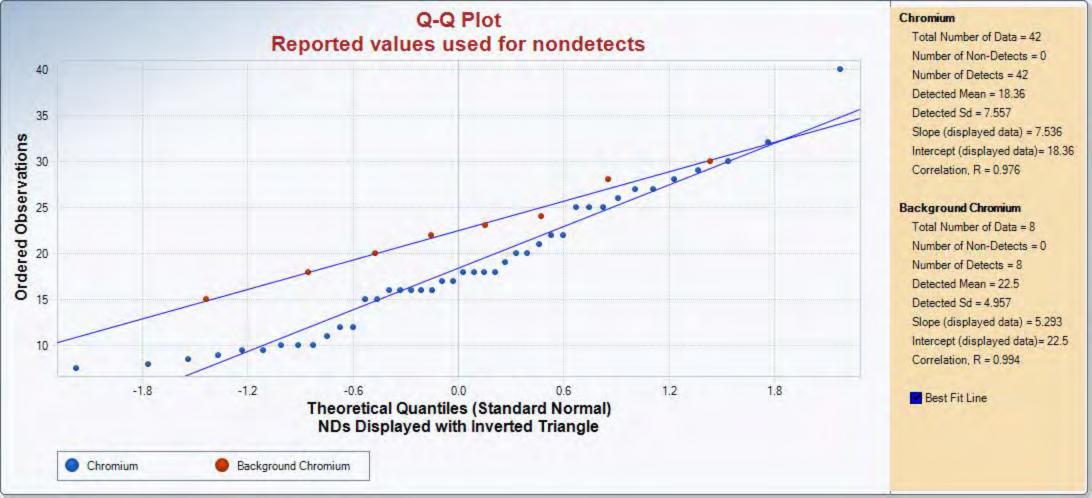
	A B C	D	E	F	G	Гн	<u> </u>	J	K	TL	
1		ple 1 vs S	Sample 2 Co	omparison H	pothesis Te	est for Data	Sets with No	n-Detects	•		
2											
3	User Selected Options										
4	Date/Time of Computation Pro	oUCL 5.1	5/28/2018 4	:14:14 PM							
5	From File Me	etals with	Background	Metals Input	.xls						
6	Full Precision OF	F									
7	Confidence Coefficient 95	%									
8	Selected Null Hypothesis Sa	mple 1 M	ean/Median	<= Sample 2	Mean/Medi	an (Form 1)					
9	Alternative Hypothesis Sa	mple 1 M	ean/Median	> Sample 2 I	Mean/Media	n					
10											-
11											
	Sample 1 Data: Chromium										
	Sample 2 Data: Background Chromium	1									
14											
15	Rav	v Statistic	:S								
16			Sample 1	Sample 2							
17	Number of Vali	id Data	42	8							
18	Number of Non-E	Detects	0	0							
19	Number of Detec	ct Data	42	8							
20	Minimum Non-	Detect	N/A	N/A							
21	Maximum Non-	Detect	N/A	N/A							
22	Percent Non-o	detects	0.00%	0.00%							
23	Minimum	Detect	7.5	15							
24	Maximum	Detect	40	30							
25	Mean of D	Detects	18.36	22.5							
26	Median of D	Detects	17.5	22.5							
27	SD of D	Detects	7.557	4.957							
28	KN	1 Mean	18.36	22.5							
29		KM SD	7.557	4.957							
30											
31	Sample 1 vs S	Sample 2	Gehan Test								
32	·	-									
	H0: Mean/Median of Sample 1 <= Mean	n/Median	of backgrou	ınd							
34	·										
35	Gehan z To	est Value	-1.852								
36		al z (0.05)	1.645								
36		P-Value	0.968								
38	Conclusion with Alpha = 0.05										
33	Do Not Reject H0, Conclude Sample	1 <= Sar	mple 2								
40	P-Value >= alpha (0.05)										
41											
42											

	А	В	С	D	ΙE	l F	G	Н	ı	J	K	T
1			Tarone-War	e Sample 1	vs Sample	2 Compariso	n Hypothesis	Test for Da	a Sets with	Non-Detects		
2												
3		User Sele	cted Options									
4	Date	e/Time of Co	omputation	ProUCL 5.1	15/28/2018 4	1:15:09 PM						
5			From File	Metals with	Backgroun	d Metals Input	i.xls					
6		Fu	II Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Sel	lected Null I	Hypothesis	Sample 1 N	lean/Media	n <= Sample 2	Mean/Media	an (Form 1)				
9	/	Alternative I	Hypothesis	Sample 1 N	lean/Media	n > Sample 2	Mean/Mediar	า				
10												
11												
12	Sample 1 Da	ata: Chromi	ium									
13	Sample 2 Da	ata: Backgr	ound Chromi	ium								
14												
15			F	Raw Statistic								
16					Sample 1	Sample 2	_					
17			Number of \		42	8						
18		١	Number of No		0	0						
19				of Detects	42	8						
20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	7.5	15						
24				um Detect	40	30						
25				of Detects	18.36	22.5						
26				of Detects	17.5	22.5						
27				of Detects	7.557	4.957						
28				KM Mean	18.36	22.5						
29				KM SD	7.557	4.957						
30					147	T1						
31		S	ample 1 vs S	ampie 2 Ta	rone-ware	ı est						
32	U0. Mas=#4	adian of C	mnle 4 4- 14	loon/Madle	of Correct:	2						
33	nu: Mean/M	ecian of Sa	mple 1 <= M	ean/Mediar	ı oı sampie	4						
34				TW Statistic	-2.031							
35												
36			TW Critical	P-Value								
37				r-value	0.979							
38	Conclusion v	with Alpha	= 0.05									
39		•	= 0.05 onclude Sam	nle 1 /- S-	mple ?							
40		= alpha (0.		ipie i <= 58	ilihie 7							
41	r-value >	– aipna (V.	ua)									
42												

	А В С	D	Е	F	G	Н	l	J	K	L
1	Wilcoxon-M	lann-Whitney	/ Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4	:15:53 PM						
5	From File	Metals with	Background	Metals Input	.xls					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	n (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 I	Mean/Median					
10										
11										
12	Sample 1 Data: Chromium									
13	Sample 2 Data: Background Chrom	ium								
14										
15	ı	Raw Statistic	S							
16			Sample 1	Sample 2						
17	Number of '		42	8						
18	Number of No	on-Detects	0	0						
19	Number of D	etect Data	42	8						
20	Minimum N	Ion-Detect	N/A	N/A						
21	Maximum N	Ion-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minim	um Detect	7.5	15						
24	Maxim	um Detect	40	30						
25	Mean	of Detects	18.36	22.5						
26	Median	of Detects	17.5	22.5						
27	SD	of Detects	7.557	4.957						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample 2	2						
32										
33	Sample 1 Rank									
34	Standardized \									
35		Mean (U)	168							
36		(U) - Adj ties	37.73							
37	Approximate U-Stat Critical									
38	P-Value (Adjus	sted for Ties)	0.956							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sai	mple 2							
42	P-Value >= alpha (0.05)									
43										



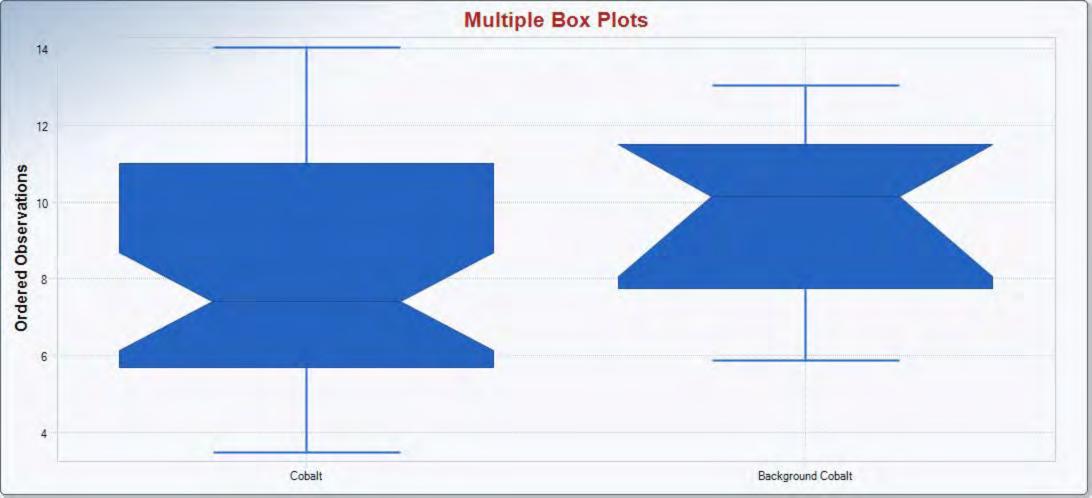


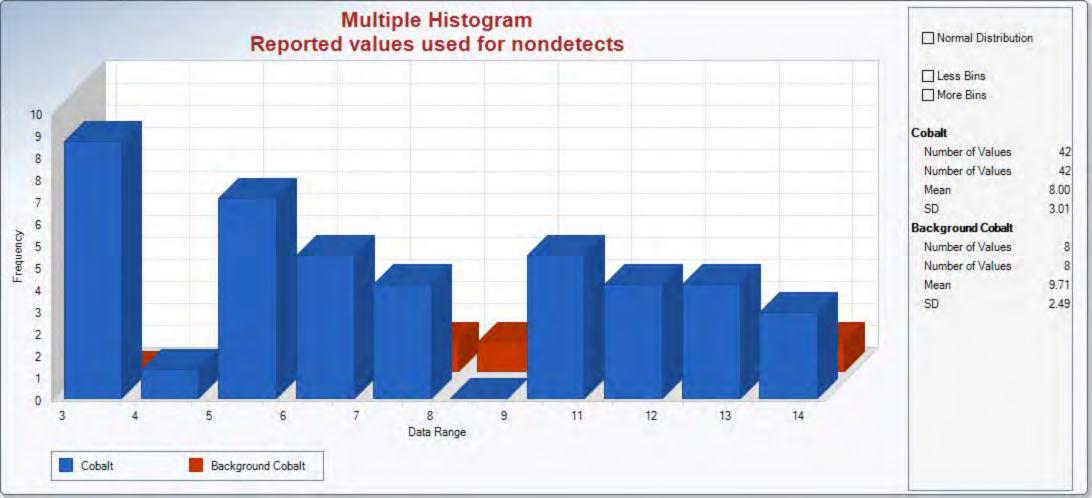


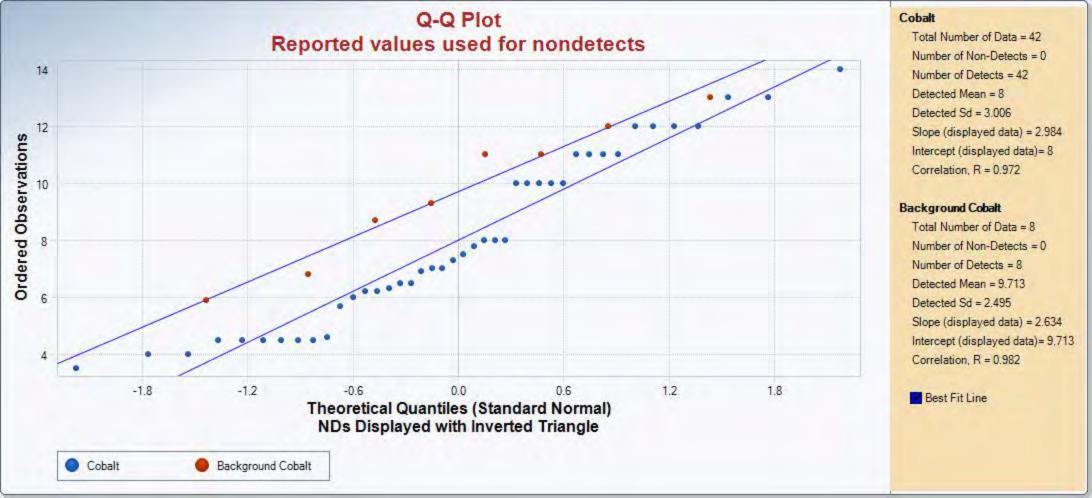
	А	В	С	D	ΙE	F	G	Тн	<u> </u>	J	K	T L
1				ample 1 vs	Sample 2 Co	omparison H	_		Sets with No	n-Detects		
2												
3		User Sele	ected Options									
4	Date	e/Time of C	omputation	ProUCL 5.1	5/28/2018 4	:20:27 PM						
5			From File	Metals with	Background	Metals Input	t.xls					
6		Fu	III Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Se	lected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Medi	an (Form 1)				
9		Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Media	n				
10												
11												
12	Sample 1 Da	ata: Cobalt										
13	Sample 2 Da	ata: Backgr	round Cobalt									
14												
15			F	Raw Statistic								
16					Sample 1	Sample 2						
17			Number of \		42	8						
18			Number of No		0	0						
19			Number of De		42	8						
20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	3.5	5.9						
24				um Detect	14	13						
25				of Detects	8	9.713						
26				of Detects	7.4	10.15						
27				of Detects	3.006	2.495						
28				KM Mean	8	9.713						
29				KM SD	3.006	2.495						
30			Comple 1 v	o Comple 2	Cohon Toot							
31			Sample 1 V	o oampie 2	Gehan Test	•						
32	HO: Mean/M	edian of Sc	ample 1 <= M	lean/Medica	of backgrou	ınd						
33	i io. ivi c ati/ivi	cuiaii VI 38	ampi o i >- IV I	cai i/ ivieuidi	i oi nackyiol	anu						
34			Gehan :	z Test Value	-1.641							
35				tical z (0.05)								
36			OII	P-Value								
37				ı -vaiue	0.00							
38	Conclusion	with Alnha	= 0.05									
33			onclude Sam	nle 1 <= Sa	mple 2							
40		= alpha (0.		.p.o i oa	pio 2							
41	ı value -	aipila (0.										
42												

	A B C	D	l E	l F	G	Н	ı	J	K	I	$\overline{}$
1				vs Sample 2			a Sets with		IX	<u> </u>	
2											
3	User Selected Options										
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4	1:22:35 PM							
5	From File	Metals with	Background	d Metals Inpu	t.xls						
	Full Precision	OFF		<u> </u>							
6	Confidence Coefficient	95%									
7	Selected Null Hypothesis		lean/Mediar	n <= Sample 2	2 Mean/Media	an (Form 1)					
8	Alternative Hypothesis	-		n > Sample 2		,					
9	,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,	'		<u>'</u>							
10											
11	Sample 1 Data: Cobalt										
12	Sample 2 Data: Background Cobalt										
13											
14	<u> </u>	Raw Statistic	es								
15			Sample 1	Sample 2							
16	Number of N	Valid Data	42	8							
17	Number of No		0	0							
18	Number of D		42	8							
19	Minimum N		N/A	N/A							
20	Maximum N		N/A	N/A							
21	Percent No.		0.00%	0.00%							
22		um Detect	3.5	5.9							
23		um Detect	14	13							
24		of Detects	8	9.713							
25 26	Median	of Detects	7.4	10.15							
27	SD	of Detects	3.006	2.495							
28											
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	est							
30											
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample	2							
32											
33	Sample 1 Rank	Sum W-Stat	1016								
34	Standardized V										
35		Mean (U)	168								
36	SD	(U) - Adj ties	37.68								
37	Approximate U-Stat Critical	Value (0.05)	1.645								,
38	P-Value (Adjus	sted for Ties)	0.93								
39			1								
40	Conclusion with Alpha = 0.05										
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sa	mple 2								
42	P-Value >= alpha (0.05)										
43											

	Α	В	С	l D	l E	T F	G	Н	1	J	K	
1			_	_		2 Compariso	_		ta Sets with	ŭ		 <u> </u>
2												
3		User Sele	ected Options									
4	Da	te/Time of C	Computation	ProUCL 5.1	5/28/2018 4	:21:12 PM						
5			From File	Metals with	Background	Metals Input	i.xls					
6		Fu	III Precision	OFF								
7		Confidence	Coefficient	95%								
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Media	an (Form 1)				
9		Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Mediar	า				
10												
11												
	Sample 1 D	ata: Cobalt	İ									
13	Sample 2 D	Data: Backg	round Cobalt									
14												
15			i	Raw Statistic	cs							
16					Sample 1	Sample 2						
17			Number of	Valid Data	42	8						
18			Number of No	n-Detects	0	0						
19			Number	of Detects	42	8						
20			Minimum N	lon-Detect	N/A	N/A						
21			Maximum N	lon-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minim	um Detect	3.5	5.9						
24			Maxim	um Detect	14	13						
25			Mean	of Detects	8	9.713						
26			Median	of Detects	7.4	10.15						
27			SD	of Detects	3.006	2.495						
28				KM Mean	8	9.713						
29				KM SD	3.006	2.495						
30												
31		S	Sample 1 vs S	Sample 2 Tar	rone-Ware 1	est						
32												
33	H0: Mean/N	Median of S	ample 1 <= N	lean/Median	of Sample	2						
34												
35				TW Statistic								
36			TW Critical	Value (0.05)								
37				P-Value	0.958							
38												
39		with Alpha										
40			onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value	>= alpha (0	.05)									
42												





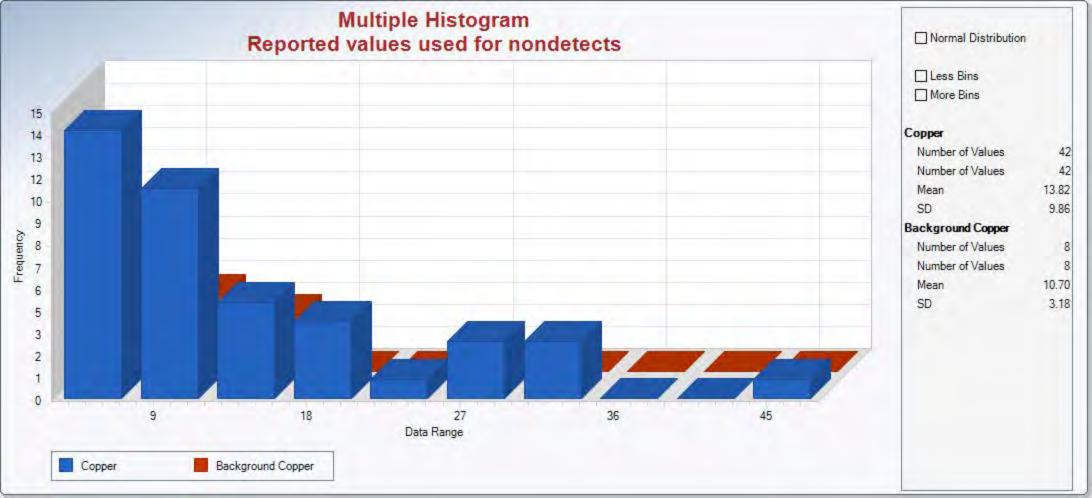


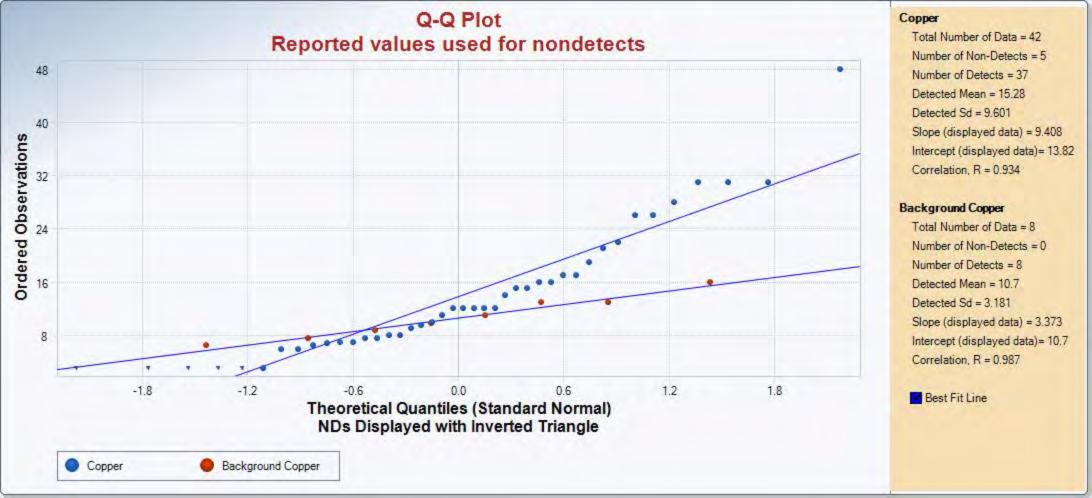
	Α	В	С	D	l E	l F	G	Н	<u> </u>	J	Ικ	
1	A	Ь	_				lypothesis Te		I ' Sets with N	_	K	L
2				•								
3		User Sele	ected Options									
4	Dat	e/Time of C	Computation	ProUCL 5.1								
5			From File	Metals with								
6		Fu	ıll Precision	OFF		· ·						
7		Confidence	Coefficient	95%								
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample	2 Mean/Media	an (Form 1)				
			Hypothesis				Mean/Mediar					
9			,,	'		· ·						
10												
	Sample 1 D	ata: Coppe	r									
12			round Coppe									
13 14			···									
15			F	Raw Statistic	S							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	42	8						
			Number of No		5	0						
18			Number of D		37	8						
19			Minimum N		3	N/A						
20			Maximum N		3	N/A						
21			Percent No	on-detects	11.90%	0.00%						
22				um Detect	3	6.5						
23				um Detect	48	16						
24			Mean	of Detects	15.28	10.7						
25				of Detects	12	10.4						
26				of Detects	9.601	3.181						
27				KM Mean	13.82	10.7						
28 29				KM SD	9.738	3.181						
30												
31			Sample 1 v	s Sample 2	Gehan Test	<u> </u>						
32			•	-								
33	H0: Mean/M	ledian of Sa	ample 1 <= M	lean/Median	of backgrou	und						
34			-						1			
35			Gehan	z Test Value	0.291							
36				tical z (0.05)			+					
37				P-Value								
38					1	1	1					
39	Conclusion	with Alpha	= 0.05									
40		•	onclude Sam	ple 1 <= Sai	mple 2							
41		>= alpha (0		<u>-</u>								
41			•									
42								1				

	A B C	D	l E	F	G	н	ı	J	K		L
1		re Sample 1					a Sets with				
2											
3	User Selected Options	3									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4:								
5	From File	Metals with	Background	.xls							
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	n (Form 1)					
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 N	Mean/Mediar	1					
10		1									
11											
12	Sample 1 Data: Copper										
13	Sample 2 Data: Background Coppe	r									
14											
15		Raw Statistic	s								
16			Sample 1	Sample 2							
17	Number of		42	8							
18	Number of No		5	0							
19		of Detects	37	8							
20	Minimum N		3	N/A							
21	Maximum N		3	N/A							
22		on-detects	11.90%	0.00%							
23	Minim	um Detect	3	6.5							
24		um Detect	48	16							
25		of Detects	15.28	10.7							
26		of Detects	12	10.4							
27	SD	of Detects	9.601	3.181							
28		KM Mean	13.82	10.7							
29		KM SD	9.738	3.181							
30	01-4	Dammir O.T.	\A/ -							_	
31	Sample 1 vs S	oampie 2 i ar	one-ware I	est							
32	UO: Moon/Median of Carrels 4 4 4	100n/Madia	of Committee	1							
33	H0: Mean/Median of Sample 1 <= N	nean/Median	or Sample 2								
34		T\\/ C+-+:-+:-	0.0407								
35	T\\/ (~'.i.'	TW Statistic									
36	i w Critical	Value (0.05)									
37		P-Value	0.52							_	
38	Conclusion with Alpha = 0.05										
39	Do Not Reject H0, Conclude San	ania 1 <= Sa:	mplo 2							_	
40	-	ipie i <= Sal	npie 2							_	
41	P-Value >= alpha (0.05)						_				
42											

	A B C	D	l E	l F	G	Н	1	J	K	ΤL
1		ann-Whitne	/ Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4							
5	From File	Metals with	Background	t.xls						
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Media	ın (Form 1)				
9	Alternative Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Median	1				
10		11								
11										
12	Sample 1 Data: Copper									
13	Sample 2 Data: Background Copper	•								
14										
15	F	Raw Statistic								
16			Sample 1	Sample 2						
17	Number of \		42	8						
18	Number of No		5	0						
19	Number of De		37	8						
20	Minimum N		3	N/A						
21	Maximum N		3	N/A						
22	Percent No		11.90%	0.00%						
23		um Detect	3	6.5						
24		um Detect	48	16						
25		of Detects	15.28	10.7						
26		of Detects	12	10.4						
27	SD (of Detects	9.601	3.181						
28		14 <i>0</i> 11	040000							
29	Wilcoxon-Ma	ann-wnitney	(WMW) IE	St						
30	H0: Mean/Median of Sample 1 <= M	oon/Modion	of Comple	<u> </u>						
31	no: Mean/Median of Sample 1 <= M	ean/wedian	oi Sample							
32	Sample 1 Rank	Sum W. Stat	1084							
33	Sample i Rank Standardized V									
34	Standardized V	Mean (U)								
35	SU	(U) - Adj ties								
36	Approximate U-Stat Critical									-
37	P-Value (Adjus									
38	i valuo (viajuo		0.07							
39	Conclusion with Alpha = 0.05									-
40	Do Not Reject H0, Conclude Sam	ple 1 <= Sai	mple 2							-
41 42	P-Value >= alpha (0.05)	,	<u></u>							
	, ,									
43										1



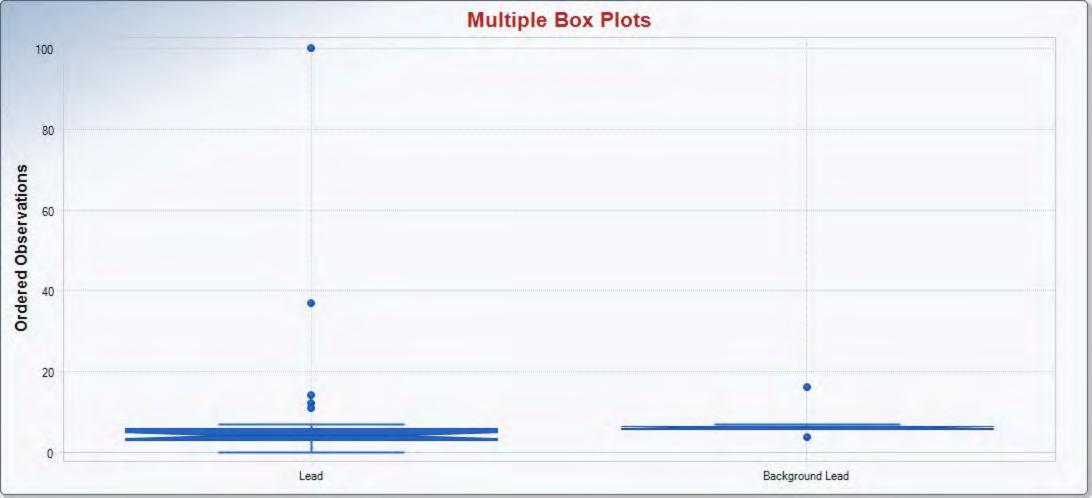


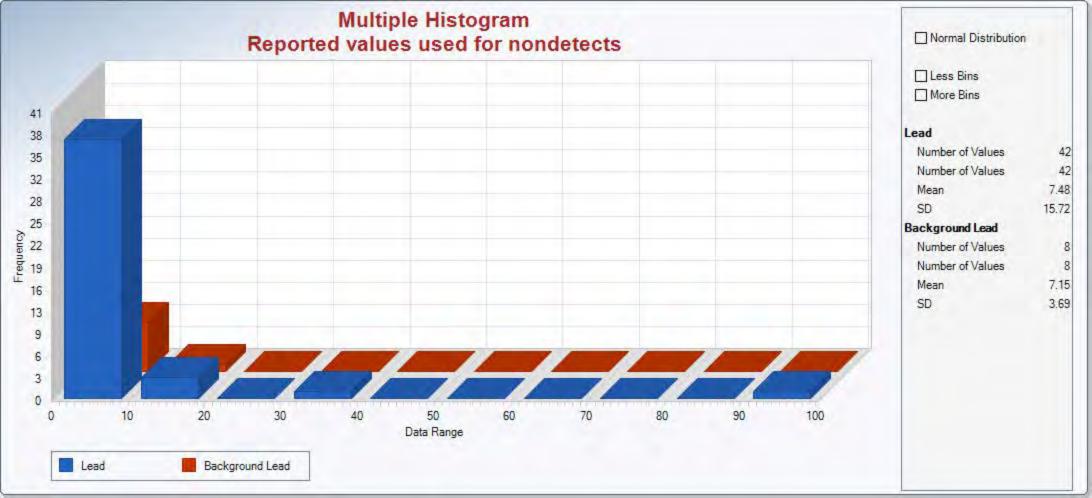


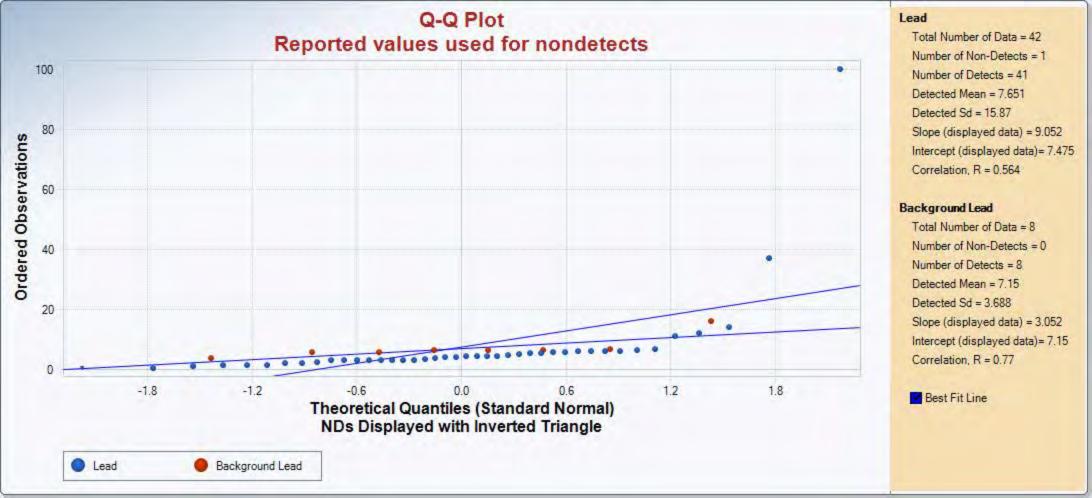
	А	В	С	D	ΙE	T F	G	Т	<u> </u>	J	K	T i
1			_	_	_	omparison H			Sets with No	_		
2												
3		User Sele	cted Options									
4	Date	e/Time of C	omputation	ProUCL 5.	15/28/2018 4							
5			From File	Metals with	Background	t.xls						
6		Fu	II Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Se	lected Null	Hypothesis	/lean/Mediar	2 Mean/Medi	an (Form 1)						
9	,	Alternative	Hypothesis	Sample 1 N	/lean/Mediar	n > Sample 2	Mean/Media	n				
10				I								
11												
12	Sample 1 Da	ata: Lead										
13	Sample 2 Da	ata: Backgr	ound Lead									
14												
15			F	Raw Statisti	cs							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	42	8						
18		1	Number of No	n-Detects	1	0						
19			Number of De	etect Data	41	8						
20			Minimum N		0.25	N/A						
21			Maximum N	on-Detect	0.25	N/A						
22			Percent No	on-detects	2.38%	0.00%						
23			Minimu	um Detect	0.5	3.8						
24			Maximu	um Detect	100	16						
25			Mean	of Detects	7.651	7.15						
26			Median	of Detects	4.3	6.4						
27			SD	of Detects	15.87	3.688						
28				KM Mean	7.475	7.15						
29				KM SD	15.53	3.688						
30			_									
31			Sample 1 v	s Sample 2	Gehan Tes	t						
32												
33	H0: Mean/M	edian of Sa	ample 1 <= M	lean/Mediar	of backgro	und						
34												
35				z Test Value								
36			Cri	tical z (0.05								
37				P-Value	0.993							
38												
39	Conclusion v											
40		•	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >	= alpha (0.	.05)									
42												

	Α	В	С	l D	l E	l F	G	Н	ı	J	K	$\overline{}$	
1	A	ь	_	_			_		ta Sets with	Non-Detects			<u> </u>
2													
3		User Sele	ected Options										
4	Dat	te/Time of C	Computation	ProUCL 5.1	5/28/2018 4					-			
5			From File	Metals with	Background								
6		Fu	ıll Precision	OFF									
7		Confidence	Coefficient	95%									
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Media	an (Form 1)				-	-
9		Alternative	Hypothesis			> Sample 2							
10													
11													
	Sample 1 D	ata: Lead									_		
13	Sample 2 D	ata: Backg	round Lead										
14													
15			F	Raw Statistic	cs								
16					Sample 1	Sample 2							
17			Number of '	Valid Data	42	8							
18			Number of No	n-Detects	1	0							
19			Number	of Detects	41	8							
20			Minimum N	lon-Detect	0.25	N/A							
21			Maximum N	lon-Detect	0.25	N/A							
22			Percent No	on-detects	2.38%	0.00%							
23			Minim	um Detect	0.5	3.8							
24			Maxim	um Detect	100	16							
25			Mean	of Detects	7.651	7.15							
26			Median	of Detects	4.3	6.4							
27			SD	of Detects	15.87	3.688							
28				KM Mean	7.475	7.15							
29				KM SD	15.53	3.688							
30													
31		S	Sample 1 vs S	Sample 2 Tar	rone-Ware T	est							
32						_							
33	H0: Mean/N	Median of Sa	ample 1 <= M	lean/Median	of Sample 2	2							
34													
35				TW Statistic									
36			TW Critical	Value (0.05)								\perp	
37				P-Value	0.999							\perp	
38			0.05									\perp	
39	Conclusion			1.4.5								\perp	
40		-	conclude Sam	ipie 1 <= Sai	mple 2								
41	P-Value :	>= alpha (0	.05)										
42										1			

	А В С	D	Е	F	G	Н	l	J	K	L					
1	Wilcoxon-Ma	ann-Whitney	/ Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects							
2															
3	User Selected Options														
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4												
5	From File	Metals with	Background	.xls											
6		OFF													
7		95%													
8	• •	•		-	! Mean/Media	` '									
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 I	Mean/Median										
10															
11															
12	Sample 1 Data: Lead														
13	Sample 2 Data: Background Lead														
14															
15	R	taw Statistic		0											
16		, :: LD :	Sample 1	Sample 2											
17	Number of V		42	8											
18	Number of No		1	0											
19		Number of Detect Data 41 8 Minimum Non-Detect 0.25 N/A													
20	Maximum No		0.25 0.25	N/A N/A											
21			2.38%												
22		Percent Non-detects 2.38% 0.00% Minimum Detect 0.5 3.8													
23		ım Detect	100	16											
24		of Detects	7.651	7.15											
25		of Detects	4.3	6.4											
26		of Detects	15.87	3.688											
27															
28 29	Wilcoxon-Ma	nn-Whitnev	(WMW) Te	st											
30			• •												
31	H0: Mean/Median of Sample 1 <= Mo	ean/Median	of Sample 2	2											
32															
33	Sample 1 Rank S	Sum W-Stat	979.5												
34	Standardized W	/MW U-Stat	-2.441												
35		Mean (U)	168												
36	SD(U) - Adj ties	37.7												
37	Approximate U-Stat Critical \	Value (0.05)	1.645												
38	P-Value (Adjust	ted for Ties)	0.993												
39															
40	Conclusion with Alpha = 0.05														
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sar	mple 2												
42	P-Value >= alpha (0.05)														
43				·											



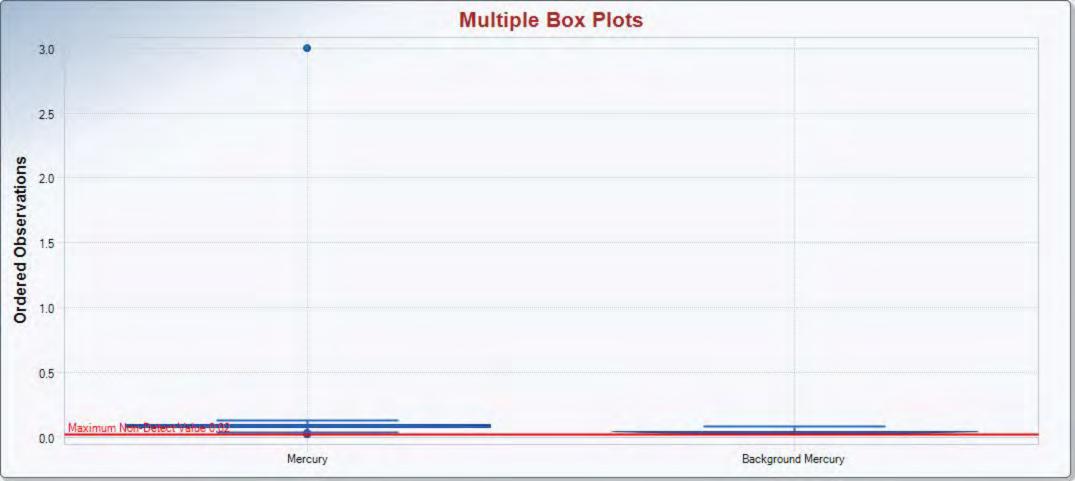


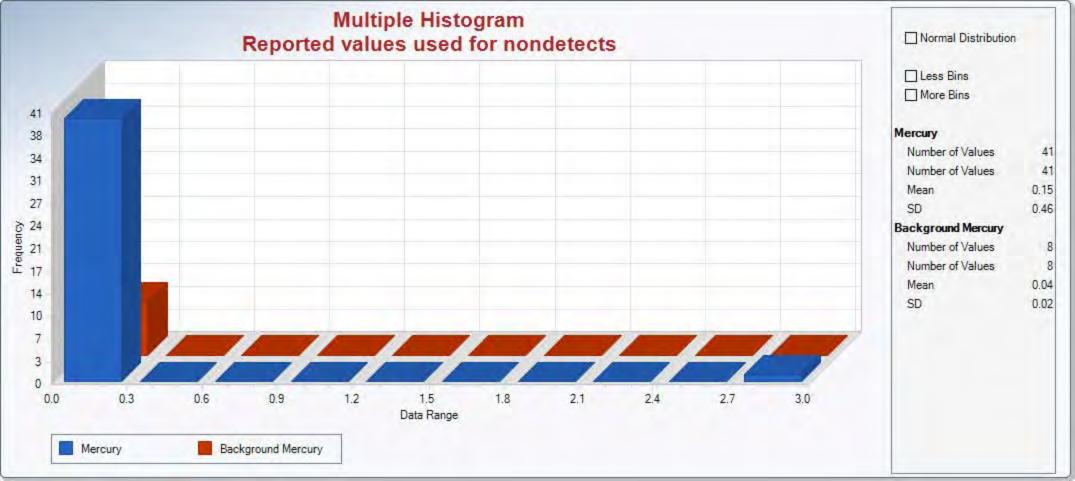


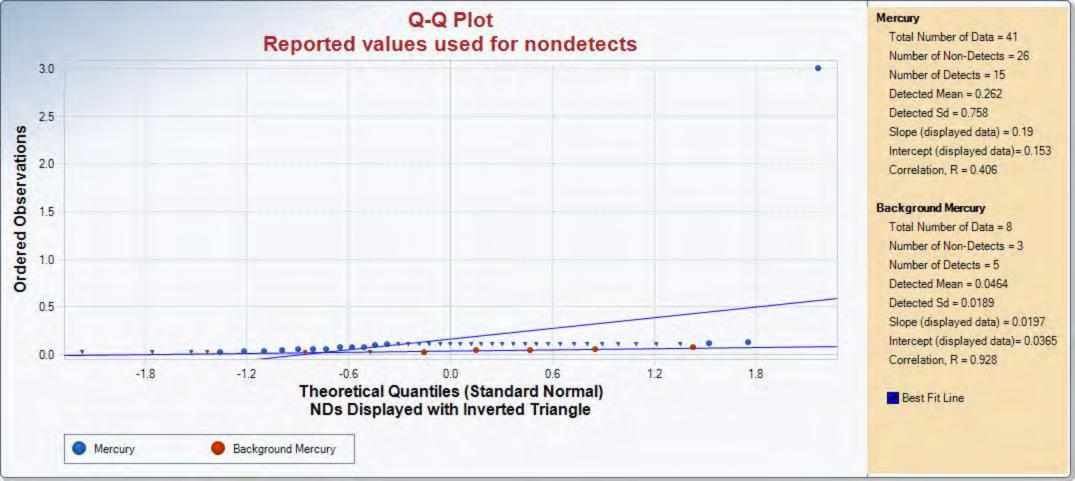
	А	В	С	D	ΤE	T F	G	Тн	<u> </u>	J	K	L
1				ample 1 vs	Sample 2 C	omparison H			Sets with No	n-Detects		
2												
3		User Sele	ected Options									
4	Date	e/Time of C	omputation	ProUCL 5.1	15/28/2018 4	:58:51 PM						
5			From File	Metals with	Background	l Metals Input	xls					
6		Fu	III Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Se	lected Null	Hypothesis	Sample 1 N	lean/Median	<= Sample 2	Mean/Medi	an (Form 1)				
9	,	Alternative	Hypothesis	Sample 1 N	lean/Median	> Sample 2	Mean/Media	n				
10				I.								
11												
12	Sample 1 Da	ata: Mercur	у									
13	Sample 2 Da	ata: Backgr	round Mercur	у								
14												
15			F	Raw Statistic	cs							
16					Sample 1							
17			Number of \	/alid Data	41	8						
18		1	Number of No	n-Detects	26	3						
19			Number of De	etect Data	15	5						
20			Minimum N	on-Detect	0.02	0.02						
21			Maximum N	on-Detect	0.1	0.02						
22			Percent No	on-detects	63.41%	37.50%						
23			Minim	um Detect	0.024	0.024						
24			Maxim	um Detect	3	0.074						
25			Mean	of Detects	0.262	0.0464						
26			Median	of Detects	0.076	0.044						
27			SD	of Detects	0.758	0.0189						
28				KM Mean	0.125	0.0365						
29				KM SD	0.455	0.0185						
30												
31			Sample 1 v	s Sample 2	Gehan Tes	l						
32												
33	H0: Mean/M	edian of Sa	ample 1 <= M	lean/Mediar	of backgro	und						
34												
35				z Test Value								
36			Cri	tical z (0.05)								
37				P-Value	0.0518							
38												
39	Conclusion v	•										
40		-	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >	= alpha (0.	.05)									
42												

	Α	В	С	D	l E	l F	G	Н	ı	l j	K	$\overline{}$	
1	A		_			Comparisor			a Sets with	•			<u> </u>
2													
3		User Sele	ected Options										
4	Dat	te/Time of C	Computation	ProUCL 5.1	5/28/2018 4	:59:32 PM							
5			From File	Metals with	Background	Metals Input	.xls						
6		Fu	ıll Precision	OFF									
7		Confidence	Coefficient	95%									
8	Se	elected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	Mean/Media	an (Form 1)					
9		Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2 I	Mean/Mediar	า					
10													
11													
	Sample 1 D	ata: Mercui	ry										
13	Sample 2 D	ata: Backgı	round Mercur	у									
14													
15			i	Raw Statistic	cs								
16					Sample 1	Sample 2							
17			Number of	Valid Data	41	8							
18		I	Number of No	n-Detects	26	3							
19			Number	of Detects	15	5							
20			Minimum N	lon-Detect	0.02	0.02							
21			Maximum N	lon-Detect	0.1	0.02							
22			Percent No	on-detects	63.41%	37.50%							
23			Minim	um Detect	0.024	0.024							
24			Maxim	um Detect	3	0.074							
25			Mean	of Detects	0.262	0.0464							
26			Median	of Detects	0.076	0.044							
27			SD	of Detects	0.758	0.0189							
28				KM Mean	0.125	0.0365							
29				KM SD	0.455	0.0185							
30													
31		S	Sample 1 vs S	Sample 2 Tar	rone-Ware T	est							
32													
33	H0: Mean/N	dedian of Sa	ample 1 <= M	lean/Median	of Sample 2	2							
34													
35				TW Statistic									
36			TW Critical	Value (0.05)									
37				P-Value	0.0795								
38													
39	Conclusion												
40			onclude Sam	ple 1 <= Sai	mple 2								
41	P-Value	>= alpha (0.	.05)										
42													

	Ι Δ	В	ГС	l D	ΙE	l F	G	Н		T 1	Ικ	
1	A	Ь		_	_				a Sets with	Non-Detects		
2						<u> </u>	<u> </u>					
3		User Sele	cted Options	3								
4	Dat	te/Time of C	omputation	ProUCL 5.	15/28/2018 5	:00:12 PM						
5			From File	Metals with	Background	d Metals Input	.xls					
6		Fu	II Precision	OFF								
7		Confidence	Coefficient	95%								
8	Se	elected Null	Hypothesis	Sample 1 N	/lean/Median	<= Sample 2	Mean/Media	an (Form 1)				
9		Alternative	Hypothesis	Sample 1 N	/lean/Mediar	Mean/Mediar	า					
10												
11												
12	Sample 1 D		-									
13	Sample 2 D	ata: Backgr	ound Mercur	ry								
14												
15			ı	Raw Statisti		1						
16					Sample 1	Sample 2						
17			Number of		41	8						
18			Number of No		26	3						
19			Number of D		15	5						
20			Minimum N		0.02	0.02						
21			Maximum N		0.1	0.02						
22			Percent No		63.41%	37.50%						
23				um Detect	0.024	0.024						
24				of Detects	0.262	0.074						
25				of Detects	0.202	0.0404						
26				of Detects	0.758	0.044						
27				OI DOIGUS	0.730	0.0103						
28		WMW t	est is meant	for a Single	Detection L	imit Case						
29	Use of Ge					ection limits a	re present					
30			ervations <= (_
31												
33			Wilcoxon-Ma	ann-Whitne	/ (WMW) Te	st						
34					• •							+
35	H0: Mean/N	Median of Sa	ample 1 <= N	/lean/Mediar	n of Sample	2						+
36	All observa	tions are ide	entical in at le	east one gro	oup							-
37	No analysis											
38												
JO	I										1	



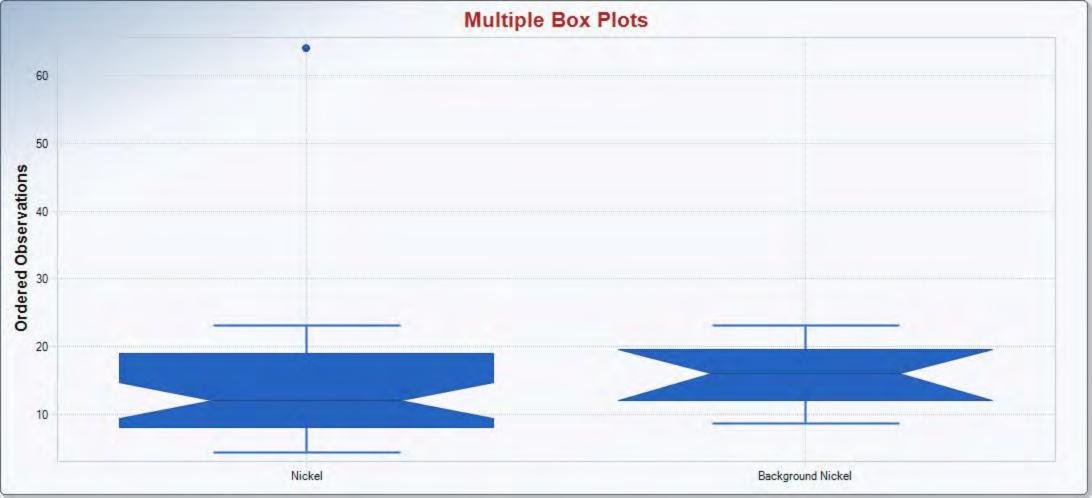


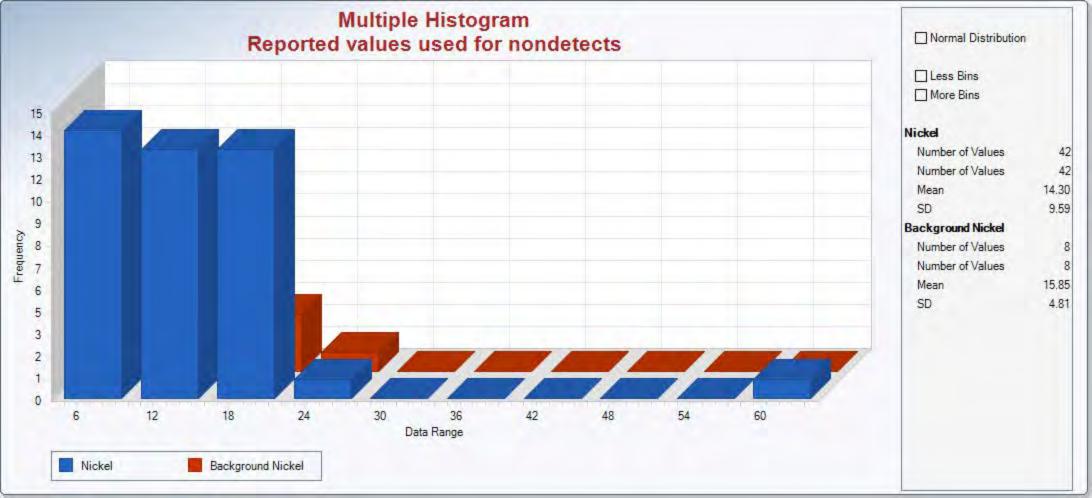


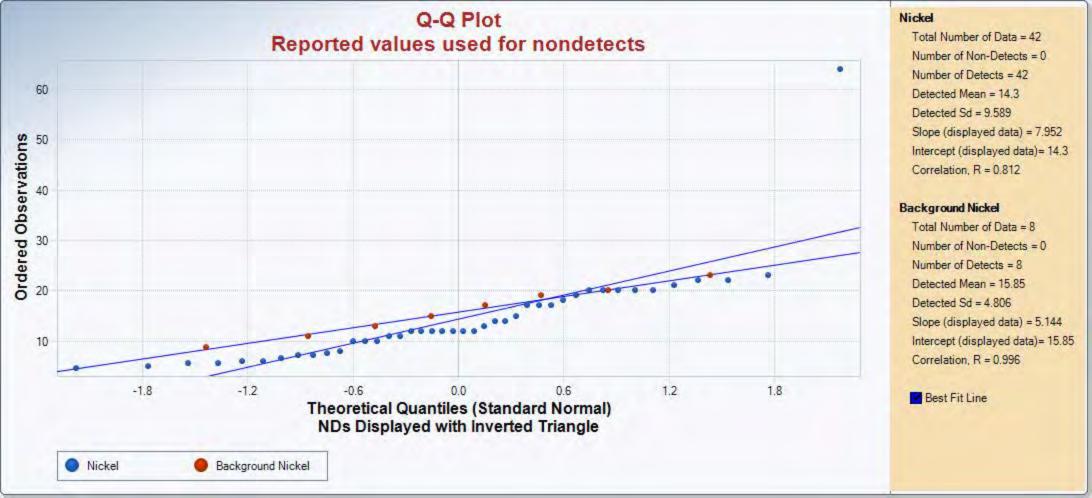
	А	В	С	D	T E	T F	G	Т	<u> </u>	J	K	T L
1				ample 1 vs	Sample 2 C	omparison H	_		Sets with No	n-Detects		
2												
3		User Sele	cted Options									
4	Date	e/Time of C	omputation	ProUCL 5.1	5/28/2018 4	:44:11 PM						
5			From File	Metals with	Background	Metals Input	t.xls					
6		Fu	II Precision	OFF								
7	(Confidence	Coefficient	95%								
8	Sel	lected Null	Hypothesis	Sample 1 M	lean/Median	<= Sample 2	2 Mean/Medi	an (Form 1)				
9	,	Alternative	Hypothesis	Sample 1 M	lean/Median	> Sample 2	Mean/Media	n				
10				ı								
11												
12	Sample 1 Da	ata: Nickel										
13	Sample 2 Da	ata: Backgr	ound Nickel									
14												
15			F	Raw Statistic								
16					Sample 1	Sample 2						
17			Number of \		42	8						
18		1	Number of No	n-Detects	0	0						
19			Number of Do		42	8						
20			Minimum N		N/A	N/A						
21			Maximum N	on-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minim	um Detect	4.5	8.8						
24				um Detect	64	23						
25			Mean	of Detects	14.3	15.85						
26				of Detects	12	16						
27				of Detects	9.589	4.806						
28				KM Mean	14.3	15.85						
29				KM SD	9.589	4.806						
30												
31			Sample 1 v	s Sample 2	Gehan Test	<u> </u>						
32			1 4									
33	H0: Mean/M	edian of Sa	ample 1 <= M	lean/Median	of backgro	und						
34					4 222							
35				z Test Value								
36			Cri	tical z (0.05)								
37				P-Value	0.907							
38	0	. Jal. Al .	0.05									
33	Conclusion v	-		unio di si Co								
40		•	onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >	= alpha (0.	.05)									
42												

	А	В	С	D	ΙE	l F	G	Н	I	J	K	TL
1	<u> </u>		Tarone-War	e Sample 1	vs Sample	2 Compariso	n Hypothesis	Test for Da	a Sets with	Non-Detects		
2												
3		User Sele	cted Options									
4	Date	/Time of Co	omputation	ProUCL 5.1	5/28/2018 4	:44:56 PM						
5			From File	Metals with	Background	d Metals Input	xls					
6		Ful	II Precision	OFF								
7	C	Confidence	Coefficient	95%								
8	Sele	ected Null I	Hypothesis	Sample 1 M	lean/Mediar	<= Sample 2	Mean/Media	an (Form 1)				
9	A	Alternative I	Hypothesis	Sample 1 M	lean/Mediar	> Sample 2	Mean/Mediar	1				
10												
11												
12	Sample 1 Da	ta: Nickel										
13	Sample 2 Da	ta: Backgr	ound Nickel									
14												
15			F	Raw Statistic		_						
16					Sample 1	Sample 2						
17			Number of \		42	8						
18		N	lumber of No		0	0						
19				of Detects	42	8						
20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	4.5	8.8						
24				um Detect	64	23						
25				of Detects	14.3	15.85						
26				of Detects	12	16						
27				of Detects	9.589	4.806						
28				KM Mean	14.3	15.85						
29				KM SD	9.589	4.806						
30						F						
31		S	ample 1 vs S	ample 2 Ta	rone-ware	est						
32	U0. No 'A4	adion of C	mnle 4 14	loon/Maddia	of Commit	2						
33	H0: Mean/Me	auan ot Sa	mpie i <= M	ean/Median	or Sample	4						
34				TW Statistic	-1.405							
35												
36			TW Critical	P-Value		1						
37				r-value	0.92							
38	Conclusion w	vith Alpha :	= 0.05									
39		•	= 0.05 onclude Sam	nle 1 /- S-	mnle ?							
40	P-Value >:	-		ihie i <= 29	iiipie Z							
41	r-value >	- aipna (0.	υ υ)									
42												

	A B C	D	E	l F	G	Ιн	ı	J	K	Τι
1							a Sets with	Non-Detects		<u> </u>
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4	:45:35 PM						
5	From File	Metals with	Background	Metals Input	xls					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2	Mean/Mediar	n				
10										
11										
12	Sample 1 Data: Nickel									
13	Sample 2 Data: Background Nickel									
14										1
15	F	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of \	Valid Data	42	8						
18	Number of No	n-Detects	0	0						
19	Number of De	etect Data	42	8						
20	Minimum N	on-Detect	N/A	N/A						
21	Maximum N	on-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minim	um Detect	4.5	8.8						
24	Maximi	um Detect	64	23						
25	Mean	of Detects	14.3	15.85						
26	Median	of Detects	12	16						
27	SD	of Detects	9.589	4.806						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample	2						
32										
33	Sample 1 Rank									
34	Standardized V									
35		Mean (U)	168							
36		(U) - Adj ties								1
37	Approximate U-Stat Critical		1.645							
38	P-Value (Adjus	ted for Ties)	0.876							
39	One shorten as the All I. C.C.									1
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	pie 1 <= Sai	mple 2							
42	P-Value >= alpha (0.05)									1
43										





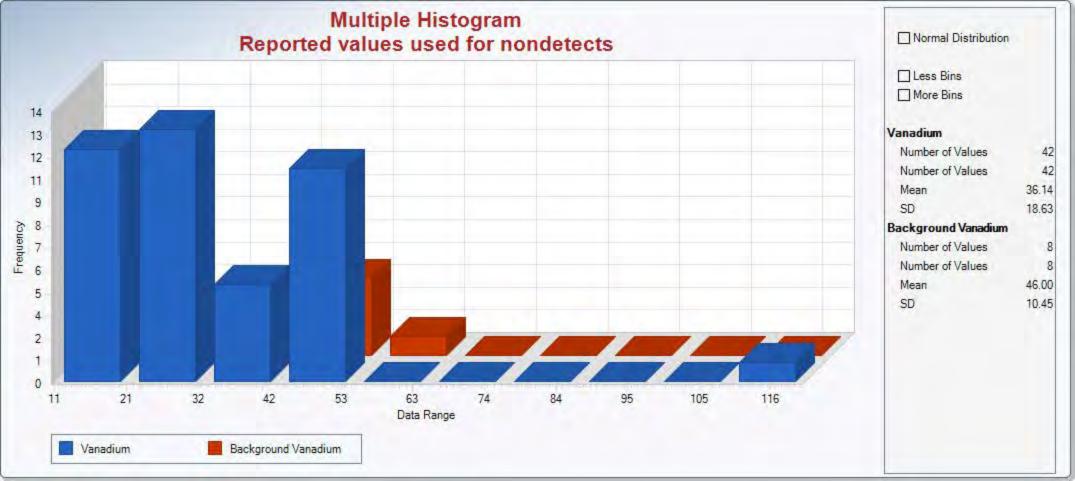


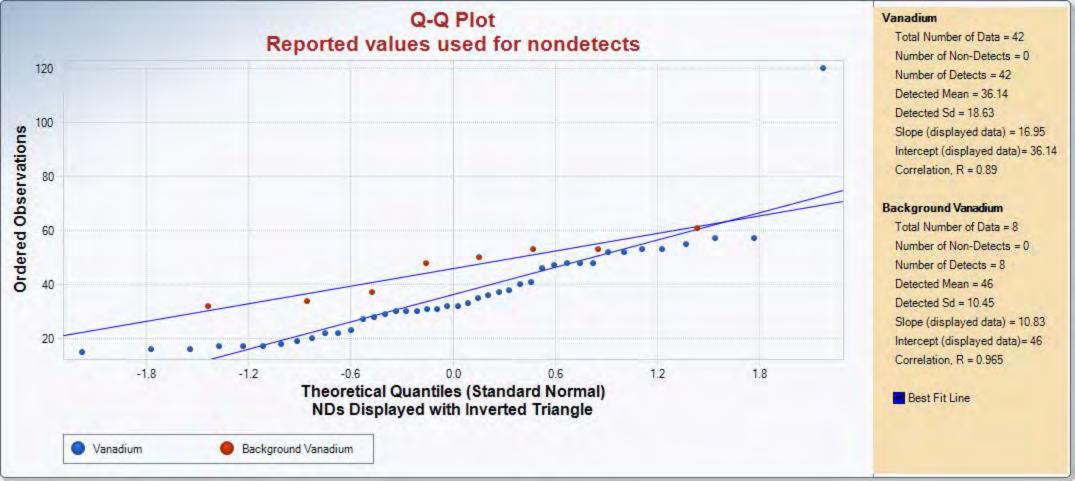
	А	В	С	D	ΤE	T F	G	Т	<u> </u>	J	K	T L
1		-		ample 1 vs	Sample 2 C	omparison H	_		Sets with No	n-Detects		
2												
3		User Sele	cted Options									
4	Date	/Time of C	omputation	ProUCL 5.	15/28/2018 4	:49:39 PM						
5			From File	Metals with	Background	d Metals Input	t.xls					
6		Fu	II Precision	OFF								
7	C	Confidence	Coefficient	95%								
8	Sele	ected Null	Hypothesis	Sample 1 N	/lean/Mediar	<= Sample 2	2 Mean/Medi	an (Form 1)				
9	Δ	Alternative	Hypothesis	Sample 1 N	/lean/Mediar	n > Sample 2	Mean/Media	n				
10				ı								
11												
12	Sample 1 Da	ta: Vanadi	ium									
13	Sample 2 Da	ta: Backgr	ound Vanadi	um								
14												
15			F	Raw Statisti	cs							
16					Sample 1	Sample 2						
17			Number of \		42	8						
18			Number of No		0	0						
19			Number of De		42	8						
20			Minimum N		N/A	N/A						
21			Maximum N		N/A	N/A						
22			Percent No		0.00%	0.00%						
23				um Detect	15	32						
24				um Detect	120	61						
25				of Detects	36.14	46						
26				of Detects	32	49						
27				of Detects	18.63	10.45						
28				KM Mean	36.14	46						
29				KM SD	18.63	10.45						
30												
31			Sample 1 v	s Sample 2	Gehan Tes	t						
32	110-14 ""											
33	H0: Mean/Me	edian of Sa	ampie 1 <= M	iean/Mediar	n of backgro	und						
34			0.1	- T 1 / 1	0.000							
35				z Test Value								
36			Cri	tical z (0.05)								
37				P-Value	0.99							
38	Oanalustar :	- حاددا ۵ ماهاد	- 0.0F									
33	Conclusion w			la 1 C	I- O							
40		-	onclude Sam	ipie 1 <= Sa	impie 2							
41	P-Value >=	= aipna (0.	.05)									
42												

	A B C	D	E	F	G	н	1	J	K	\top	L
1	_	re Sample 1					a Sets with				
2											
3	User Selected Options										
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4:	50:26 PM							
5	From File	Metals with	Background	Metals Input.	.xls						
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)				-	-
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 N	Mean/Mediar	1					
10											
11											
12	Sample 1 Data: Vanadium										
13	Sample 2 Data: Background Vanad	ium									
14											
15		Raw Statistic	:s								
16			Sample 1	Sample 2							
17	Number of	Valid Data	42	8							
18	Number of No	on-Detects	0	0							
19	Number	of Detects	42	8							
20	Minimum N		N/A	N/A							
21	Maximum N		N/A	N/A							
22	Percent No	on-detects	0.00%	0.00%							
23	Minim	um Detect	15	32							
24		um Detect	120	61							
25		of Detects	36.14	46							
26		of Detects	32	49							
27	SD	of Detects	18.63	10.45							
28		KM Mean	36.14	46							
29		KM SD	18.63	10.45							
30											
31	Sample 1 vs S	Sample 2 Tar	one-Ware T	est							
32	110 14 /14 /1 40 1 4										
33	H0: Mean/Median of Sample 1 <= N	iean/Median	of Sample 2							_	
34		TM 0: :: ::									
35	7110	TW Statistic									
36	I W Critical	Value (0.05)								_	
37		P-Value	0.996							_	
38	Operation with Alata - 0.05									_	
39	Conclusion with Alpha = 0.05		I- O								
40	Do Not Reject H0, Conclude Sam	npie 1 <= Sar	mpie 2							_	
41	P-Value >= alpha (0.05)									_	
42											

	A B C	D	Е	l F	G	Ιн	ı	J	K	T L
1		ann-Whitney		vs Sample 2		Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4	:51:11 PM						
5	From File	Metals with	Background	Metals Input	.xls					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2 I	Mean/Mediar	n				
10										
11										
12	Sample 1 Data: Vanadium									
13	Sample 2 Data: Background Vanadi	um								
14										
15	F	Raw Statistic	s							
16			Sample 1	Sample 2						
17	Number of \	Valid Data	42	8						
18	Number of No	n-Detects	0	0						
19	Number of De	etect Data	42	8						
20	Minimum N	on-Detect	N/A	N/A						
21	Maximum N	on-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minimo	um Detect	15	32						
24	Maximi	um Detect	120	61						
25	Mean	of Detects	36.14	46						
26	Median o	of Detects	32	49						
27	SD	of Detects	18.63	10.45						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample 2	2						
32										
33	Sample 1 Rank									
34	Standardized V									
35		Mean (U)	168							
36		(U) - Adj ties	37.76							
37	Approximate U-Stat Critical	, ,	1.645							
38	P-Value (Adjus	sted for Ties)	0.987							
39										
40	Conclusion with Alpha = 0.05	·								
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sai	mple 2							
42	P-Value >= alpha (0.05)									
43										



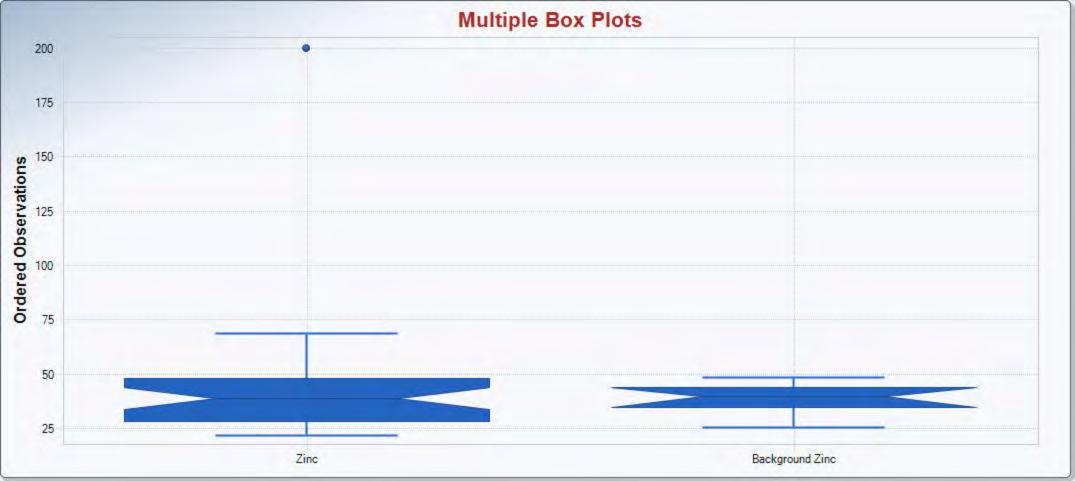


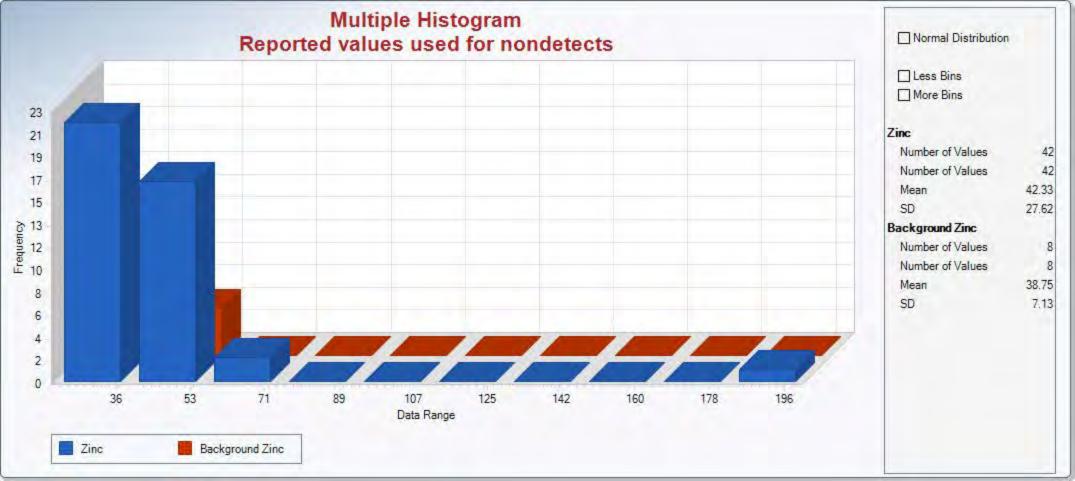


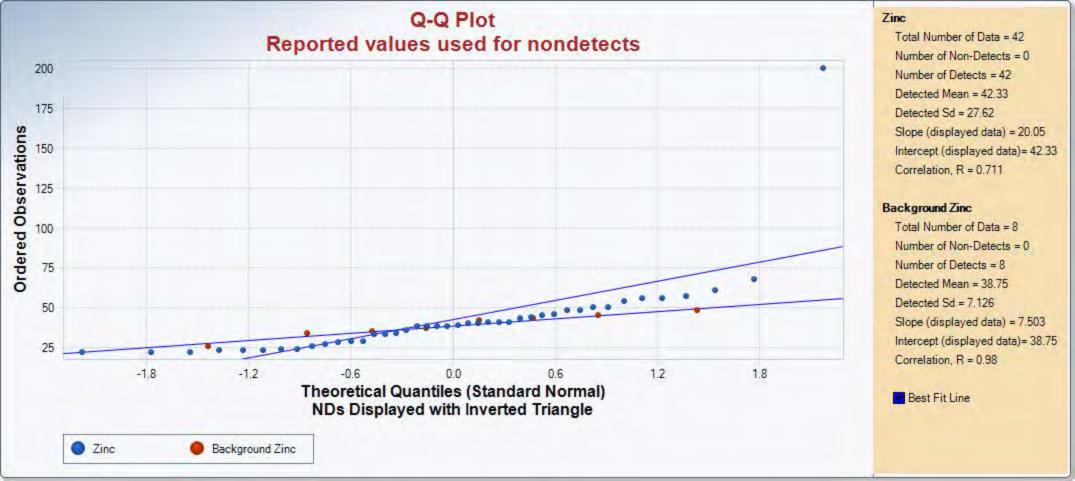
	А	В	С	D	ΙE	T F	G	Тн	<u> </u>	J	K	T L
1		_		ample 1 vs	Sample 2 C	omparison H	_		Sets with No	n-Detects		
2												
3	ι	Jser Sele	cted Options									
4	Date/T	ime of Co	omputation	ProUCL 5.	15/28/2018 4	:54:24 PM						
5			From File	Metals with	Backgroun	d Metals Input	t.xls					
6		Ful	II Precision	OFF								
7	Со	nfidence	Coefficient	95%								
8	Selec	ted Null I	Hypothesis	Sample 1 N	/lean/Mediar	n <= Sample 2	Mean/Medi	an (Form 1)				
9	Alt	ernative l	Hypothesis	Sample 1 N	/lean/Mediar	n > Sample 2	Mean/Media	n				
10				I								
11												
12	Sample 1 Data	: Zinc										
13	Sample 2 Data	: Backgr	ound Zinc									
14												
15			F	Raw Statisti	cs							
16					Sample 1	Sample 2						
17			Number of \	Valid Data	42	8						
18		N	lumber of No	n-Detects	0	0						
19		1	Number of De	etect Data	42	8						
20			Minimum N		N/A	N/A						
21			Maximum N	on-Detect	N/A	N/A						
22			Percent No	on-detects	0.00%	0.00%						
23			Minim	um Detect	22	26						
24			Maximi	um Detect	200	48						
25			Mean	of Detects	42.33	38.75						
26			Median	of Detects	38.5	39.5						
27				of Detects	27.62	7.126						
28				KM Mean	42.33	38.75						
29				KM SD	27.62	7.126						
30			_		_							
31			Sample 1 v	s Sample 2	Gehan Tes	t						
32												
33	H0: Mean/Med	ian of Sa	mple 1 <= M	lean/Mediar	of backgro	und						
34						T						
35				z Test Value								
36			Cri	tical z (0.05)								
37				P-Value	0.584							
38												
39	Conclusion wit											
40	·-		onclude Sam	ple 1 <= Sa	mple 2							
41	P-Value >=	alpha (0.	05)									
42												

	A B C	D	l E	F	G	Н	I	J	K	T	
1	Tarone-Ware			-			a Sets with				
2											
3	User Selected Options										
4	Date/Time of Computation F	ProUCL 5.1	5/28/2018 4:	55:07 PM							
5	From File N	Metals with	Background	Metals Input	.xls						
6		OFF		· · · · · ·							
7	Confidence Coefficient 9	95%									
		Sample 1 M	ean/Median	<= Sample 2	Mean/Media	an (Form 1)					
8				> Sample 2 M							
9											
10											
11	Sample 1 Data: Zinc									_	
12	Sample 2 Data: Background Zinc										
13	Cample 2 Data. Background 2mc										
14	D	aw Statistic	•							+-	
15	110	aw Statistic	Sample 1	Sample 2						_	
16	Number of Va	olid Data	42	8							
17	Number of Non		0	0						_	
18	Number of Number of		42	8						_	
19	Minimum No		N/A	N/A							
20											
21	Maximum No		N/A	N/A							
22	Percent Nor		0.00%	0.00%							
23		m Detect	22	26							
24		m Detect	200	48							
25		Detects	42.33	38.75							
26	Median of		38.5	39.5							
27		Detects	27.62	7.126							
28	K	(M Mean	42.33	38.75							
29		KM SD	27.62	7.126							
30											
31	Sample 1 vs Sa	mple 2 Tar	one-Ware T	est							
32											
33	H0: Mean/Median of Sample 1 <= Me	an/Median	of Sample 2	2							
34											
35	Т										
36	TW Critical V	TW Critical Value (0.05) 1.645									
37		P-Value	0.667								
38			1	1	<u> </u>						
	Conclusion with Alpha = 0.05										
40	Do Not Reject H0, Conclude Samp	le 1 <= Sar	mple 2								
41	P-Value >= alpha (0.05)										
	- , ,										
42											

	АВС	D	E	F	G	Н		J	K	L
1	Wilcoxon-M	ann-Whitney	Sample 1	vs Sample 2	Comparison	Test for Dat	a Sets with	Non-Detects		
2										
3	User Selected Options									
4	Date/Time of Computation	ProUCL 5.1	5/28/2018 4	:55:46 PM						
5	From File	Metals with	Background	l Metals Input	:.xls					
6	Full Precision	OFF								
7	Confidence Coefficient	95%								
8	Selected Null Hypothesis	Sample 1 M	ean/Median	<= Sample 2	Mean/Media	n (Form 1)				
9	Alternative Hypothesis	Sample 1 M	ean/Median	> Sample 2	Mean/Median					
10										
11										
12	Sample 1 Data: Zinc									
13	Sample 2 Data: Background Zinc									
14										
15	F	Raw Statistic	S							
16			Sample 1	Sample 2						
17	Number of \		42	8						
18	Number of No	n-Detects	0	0						
19	Number of De	etect Data	42	8						
20	Minimum N	on-Detect	N/A	N/A						
21	Maximum N	on-Detect	N/A	N/A						
22	Percent No	on-detects	0.00%	0.00%						
23	Minimu	um Detect	22	26						
24	Maximu	um Detect	200	48						
25	Mean o	of Detects	42.33	38.75						
26	Median o	of Detects	38.5	39.5						
27	SD	of Detects	27.62	7.126						
28										
29	Wilcoxon-Ma	ann-Whitney	(WMW) Te	st						
30										
31	H0: Mean/Median of Sample 1 <= M	lean/Median	of Sample	2						
32										
33	Sample 1 Rank									
34	Standardized V		-0.146							
35		Mean (U)	168							
36		(U) - Adj ties	37.76							
37	Approximate U-Stat Critical		1.645							
38	P-Value (Adjus	ted for Ties)	0.558							
39										
40	Conclusion with Alpha = 0.05									
41	Do Not Reject H0, Conclude Sam	ple 1 <= Sar	mple 2							
42	P-Value >= alpha (0.05)									
43		·								







APPENDIX G

ProUCL Statistics Soil Matrix Western Parcel

	А	В	С	D	E	F	G	Н	I	J	K	L
1				U	CL Statist	ucs for Data	Sets with No	n-Detects				
2		Hoor Cal-	atad Onting									
3	Dot	e/Time of Co	cted Options	ProUCL 5.15/2	2/2019 12	·58·50 DM						
4	Dat	e/Time of Co	From File	Onsite Metals I		.56.59 PIVI						
5		Ful	Il Precision	OFF	riput.xis							
6		Confidence		95%								
7		of Bootstrap		2000								
8	rvamber o	Поотопар	Орстанопо	2000								
9												
10	Arsenic											
12												
13						General	Statistics					
14			Total	Number of Obs	ervations	64			Numbe	r of Distinct (Observations	45
15									Numbe	r of Missing (Observations	0
16					Minimum	1.6					Mean	6.881
17				N	/laximum	18					Median	6.4
18					SD	2.749				Std. E	rror of Mean	0.344
19				Coefficient of	Variation	0.399					Skewness	1.271
20												
21							GOF Test					
22				Shapiro Wilk Tes		0.935				ilk GOF Test		
23				5% Shapiro Will		0.0032		Data No		5% Significar	nce Level	
24				Lilliefors Tes		0.0837				GOF Test		
25			5	% Lilliefors Critic		0.111				t 5% Signific	ance Level	
26				Data ap	pear Appr	oximate No	rmal at 5% Si	gnificance	Level			
27					Δε	suming Nor	mal Distributio	n .				
28			95% No	ormal UCL	75:	sulling NOI			LICLe (Adii	sted for Ske	wnees)	
29				95% Studer	t's-t UCI	7.455				ed-CLT UCL		7.505
30						7.100			-		hnson-1978)	7.464
31												
33						Gamma	GOF Test					
34				A-D Tes	t Statistic	0.243		Ander	son-Darling	Gamma GC	F Test	
35				5% A-D Criti	cal Value	0.753	Detected	data appea	r Gamma D	istributed at 5	5% Significan	ce Level
36				K-S Tes	t Statistic	0.0489		Kolmog	orov-Smirne	ov Gamma G	OF Test	
37				5% K-S Criti	cal Value	0.112	Detected	data appea	r Gamma D	istributed at 5	5% Significan	ce Level
38				Detected da	ta appear	Gamma Di	stributed at 59	% Significa	nce Level			
39												
40							Statistics					
41					at (MLE)	6.707				,	rrected MLE)	6.403
42					at (MLE)	1.026			Theta	`	rected MLE)	1.075
43					at (MLE)	858.5				•	as corrected)	819.6
44			MI	LE Mean (bias c	orrected)	6.881				`	as corrected)	2.719
45										Chi Square		754.2
46			Adjus	sted Level of Sig	niticance	0.0463			A	ajusted Chi S	Square Value	752.7
47					A	umina Oa	ma Distributi					
48		E0/ A	moto Carri	NICL (var inte			nma Distributio		iuoto d O = -	ma HOL /···	bo= =	7 400
49	9:	o% Approxir	nate Gamma	UCL (use wher	ı ((UC= <ii)< th=""><th>7.478</th><th></th><th>95% Ad</th><th>justed Gam</th><th>ına UCL (use</th><th>when n<50)</th><th>7.493</th></ii)<>	7.478		95% Ad	justed Gam	ına UCL (use	when n<50)	7.493
50												

	А	В	Гс	T D	ΙE	F	G	Н	<u> </u>		1	L	\ 	1 1
51	А	Б	C	l D			I GOF Test	П	<u> </u>		J	<u> </u>	\	L
52			5	Shapiro Wilk	Test Statistic	0.985		Shap	iro Wilk L	Lognorn	nal GOF	- Test		
53				5% Shapiro	Wilk P Value	0.87		Data appea	r Lognorn	nal at 59	% Signif	icance	Level	
54				Lilliefors	Test Statistic	0.0691		Lill	iefors Lo	gnorma	I GOF T	Test		
55				5% Lilliefors (Critical Value	0.111		Data appea	r Lognorn	nal at 59	% Signif	icance	Level	
56					Data appea	r Lognormal	at 5% Signifi	icance Leve	l					
57														
58						Lognorma	l Statistics							
59				Minimum of	Logged Data	0.47				ı	Mean of	logged	d Data	1.852
60				Maximum of	Logged Data	2.89					SD of	logged	d Data	0.403
61														
62					Ass	uming Logno	ormal Distrib	ution						
63					95% H-UCL	7.579			90	% Cheb	oyshev (MVUE)) UCL	7.985
64				Chebyshev (97.5	% Cheb	oyshev (MVUE)) UCL	9.153
65			99%	Chebyshev ((MVUE) UCL	. 10.49								
66													·	
67					•	etric Distribu								
68				Data appea	r to follow a	Discernible	Distribution a	at 5% Signifi	cance Le	evel				
69														
70						rametric Dis	tribution Free	e UCLs						
71					5% CLT UCL						95% Ja			7.455
72				Standard Bo							95% Boo			7.519
73				95% Hall's Bo					95	% Perce	entile Bo	otstrap	UCL	7.45
74				95% BCA Bo										
75				hebyshev(Me						•	shev(Me		·	8.379
76			97.5% CI	hebyshev(Me	ean, Sd) UCL	9.027			99%	Chebys	shev(Me	an, Sd) UCL	10.3
77														
78							UCL to Use							
79				95% Stu	ident's-t UCL	7.455								
80			147	1.1			p. 11 - 1				<u> </u>			
81		140		data set follo										
82		when app	olicable, it is	suggested to	use a UCL b	ased upon a	aistribution (e.g., gamma) passing	both G	OF tests	s in Pro	UCL	
83	k i	atai Cuma-	ations =====	ding the sele	ation of a OF	/ LICL	ovidad ta bal	n tha	0010-44-	0 m t :	onnr	oto OF	0/ 1101	
84	N	ote: Sugge		ding the selec		-		-			appropri	ate 95%	% UCL.	
85		Those res		Recommenda			•				oblo or	d I co /	2006)	
86				s are based o	-									n .
87	HOV	vever, simu	ııalıorıs resul	lts will not co	vei ali Keal V	vonu data se	is, ioi additto	ınaı msigni tr	ie user ma	ay want	io cons	uit a St	austicia	111.
88														

	Α	В	С	D	E	F	G	Н	I	J	K	L
1				U	CL Statis	tics for Data	Sets with No	n-Detects				
2		Hoor Cal-	otod Ontine									
3	Dot	e/Time of Co	cted Options	ProUCL 5.15/2	3/2 ∩19 1	∩∩·12 DN/I						
4	Dat	e/Time of Co	From File	Onsite Metals I		00.13 PW						
5		Ful	Il Precision	OFF	присхіѕ							
6		Confidence		95%								
7		f Bootstrap (2000								
8	TValliber 0	п Бооізігар (Орстанопо	2000								
9												
10	Barium											
12												
13						General	Statistics					
14			Total	Number of Obs	ervations	64			Numbe	r of Distinct C	Observations	15
15									Numbe	r of Missing C	Observations	0
16					Minimum	87					Mean	151.7
17				N	Maximum	310					Median	140
18					SD	38.97				Std. E	rror of Mean	4.872
19				Coefficient of	Variation	0.257					Skewness	1.543
20												
21							GOF Test					
22				hapiro Wilk Tes		0.887			<u> </u>	ilk GOF Test		
23				5% Shapiro Will				Data No		5% Significar	nce Level	
24				Lilliefors Tes		0.15				GOF Test		
25			5	% Lilliefors Critic		0.111			t Normal at	5% Significar	nce Level	
26					Data Not	Normal at	5% Significan	ce Level				
27					۸۵	cumina Nor	mal Distribution					
28			95% No	ormal UCL		Summy No			IICI e (Adii	sted for Ske	wnee)	
29				95% Studer	nt's-t UCI	159.8				ed-CLT UCL	-	160.7
30						100.0			•	ed-t UCL (Jol	`	160
31											,	
33						Gamma	GOF Test					
34				A-D Tes	t Statistic	1.217		Ander	son-Darling	Gamma GO	F Test	
35				5% A-D Criti	cal Value	0.749	Da	ta Not Gam	ma Distribut	ted at 5% Sig	nificance Lev	el
36				K-S Tes	t Statistic	0.117		Kolmog	orov-Smirno	ov Gamma G	OF Test	
37				5% K-S Criti	cal Value	0.111	Da	ta Not Gam	ma Distribut	ted at 5% Sig	nificance Lev	el
38				Data	Not Gamı	ma Distribut	ed at 5% Sigr	ificance Le	vel			
39												
40							Statistics					
41					nat (MLE)	17.85				star (bias cor	<i>*</i>	17.02
42					nat (MLE)	8.497			Theta	star (bias cor	,	8.909
43					nat (MLE)						as corrected)	2179
44			MI	LE Mean (bias c	orrected)	151.7				•	as corrected)	36.76
45						0.0455				Chi Square		2072
46			Adjus	sted Level of Sig	niticance	0.0463			A	djusted Chi S	square Value	2069
47					A :-	oumles Os	me Distriburi	on.				
48	0.0	E0/ A	mata Carre	ALIOL Avec mile		-	nma Distributi		iuoto d O = ::	ma LIOL /···	who = = = = = = = = = = = = = = = = = = =	150.7
49	9:	o% Approxin	nate Gamma	UCL (use wher	ı rı>=5U))	159.5		95% Ad	justed Gami	ma UCL (use	wnen n<50)	159.7
50												

	Α	В	С	D	l E	F	G	Н	1	J	Ικ	l 1	
51	Λ	Ь			<u> </u>	-	I GOF Test	11		J	IX	<u> </u>	
52			S	Shapiro Wilk	Test Statistic	0.959		Shap	iro Wilk Lo	ognormal GO	F Test		
53				5% Shapiro	Wilk P Value	0.0754		Data appea	r Lognorma	al at 5% Signit	ficance Level		
54	5% Shapiro Wilk P Value 0.0754 Data appear Lognormal at 5% Significance Level Lilliefors Test Statistic 0.112 Lilliefors Lognormal GOF Test 5% Lilliefors Critical Value 0.111 Data Not Lognormal at 5% Significance Level Data appear Approximate Lognormal at 5% Significance Level Lognormal Statistics Minimum of Logged Data 4.466 Mean of logged Data Maximum of Logged Data 5.737 SD of logged Data 5.737 SD of logged Data 95% H-UCL 159.4 90% Chebyshev (MVUE) UCL 160												
55	5% Shapiro Wilk P Value 0.0754 Data appear Lognormal at 5% Significance Level Lilliefors Test Statistic 0.112 Lilliefors Lognormal GOF Test 5% Lilliefors Critical Value 0.111 Data Not Lognormal at 5% Significance Level Data appear Approximate Lognormal at 5% Significance Level Lognormal Statistics Minimum of Logged Data 4.466 Mean of logged Data 4.99 Maximum of Logged Data 5.737 SD of logged Data 0.23 Assuming Lognormal Distribution 95% H-UCL 159.4 90% Chebyshev (MVUE) UCL 164.8												
56		Lognormal Statistics Minimum of Logged Data 4.466 Mean of logged Data 4.993 Maximum of Logged Data 5.737 SD of logged Data 0.233 Assuming Lognormal Distribution											
57													
58						Lognorma	l Statistics						
59				Minimum of	Logged Data	4.466				Mean of	logged Data	4.993	
60			ı	Maximum of	Logged Data	5.737				SD of	logged Data	0.233	
61							ı						
62					Assı	uming Logno	ormal Distrib	ution					
63					95% H-UCL	159.4			90%	6 Chebyshev	(MVUE) UCL	164.8	
64			95%	Chebyshev (MVUE) UCL	170.9			97.5%	6 Chebyshev	(MVUE) UCL	179.3	
65			99%	Chebyshev (MVUE) UCL	195.9							
66						I	1					I	
67					Nonparame	etric Distribu	tion Free UC	L Statistics					
68				Data appea	r to follow a	Discernible	Distribution a	at 5% Signifi	cance Lev	rel			
69													
70					Nonpa	rametric Dis	tribution Fre	e UCLs					
71				95	5% CLT UCL	159.7				95% Ja	ackknife UCL	159.8	
72			95%	Standard Bo	ootstrap UCL	159.7				95% Boo	otstrap-t UCL	160.9	
73			9	95% Hall's Bo	otstrap UCL	162			95%	Percentile Bo	ootstrap UCL	159.6	
74				95% BCA Bo	ootstrap UCL	160.3							
75			90% Ch	nebyshev(Me	an, Sd) UCL	166.3			95% C	Chebyshev(Me	ean, Sd) UCL	172.9	
76			97.5% Ch	nebyshev(Me	an, Sd) UCL	182.1			99% C	Chebyshev(Me	ean, Sd) UCL	200.1	
77							•						
78						Suggested	UCL to Use						
79				95% Stu	dent's-t UCL	159.8				or 95% M	odified-t UCL	160	
80				or	95% H-UCL	159.4							
81													
82	1	Note: Sugge	stions regard	ling the selec	ction of a 95%	UCL are pr	ovided to hel	p the user to	select the	most appropr	iate 95% UCL		
83					ations are bas								
84										h, Maichle, an	, ,		
85	Но	wever, simu	ılations resul	ts will not cov	er all Real W	orld data se	ts; for addition	nal insight th	e user ma	y want to cons	sult a statistici	ian.	
86													
87					es and outpu					-			
88		H-statistic								s in the Techi	nical Guide.		
89					recommend								
90	Üs	e of nonpar	ametric met	nods are pre	ferred to con	pute UCL9	for skewed	data sets w	hich do no	t follow a gam	nma distributi	on.	

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2				T								
3			cted Options		100100101	14 00 DM						
4	Date	e/Time of Co		ProUCL 5.15)1:00 PM						
5			From File	Onsite Metals	s Input.xIs							
6			Il Precision	OFF								
7		Confidence		95%								
8	Number o	f Bootstrap	Operations	2000								
9												
10	Chromium											
11	Chiomium											
12						General	Statistics					
13			Total	Number of Ob	eenvations	64	Statistics		Numbe	er of Distinct (Observations	22
14			Total	Trumber of Ot	osei valions	04				r of Missing (0
15					Minimum	14			Numbe	. or missing (Mean	24.5
16					Maximum	38					Median	24.5
17					SD	5.413				Std. F	Frror of Mean	0.677
18				Coefficient of		0.221				J.G. L	Skewness	0.582
19						·						
20						Normal (GOF Test					
21			S	hapiro Wilk Te	est Statistic	0.958			Shapiro W	ilk GOF Test	1	
22				5% Shapiro W		0.0715		Data appe	-	at 5% Signific		
23				Lilliefors Te		0.0877				GOF Test		
24 25			5	% Lilliefors Cr	itical Value	0.111		Data appe	ear Normal a	at 5% Signific	ance Level	
26					Data appea	ar Normal a	t 5% Signific	ance Level				
27												
28					Ass	suming Nor	mal Distribut	ion				
29			95% No	ormal UCL				95%	UCLs (Adju	usted for Ske	wness)	
30				95% Stud	ent's-t UCL	25.63			95% Adjusto	ed-CLT UCL	(Chen-1995)	25.67
31									95% Modifi	ed-t UCL (Jo	hnson-1978)	25.64
32							ll.				<u> </u>	
33							GOF Test					
34					est Statistic	0.271				g Gamma GC		
35				5% A-D Cr		0.749	Detected				5% Significand	ce Level
36					est Statistic	0.0645		•		ov Gamma G		
37					itical Value	0.111				istributed at §	5% Significand	ce Level
38				Detected (data appear	Gamma Di	stributed at {	5% Significa	nce Level			
39							O					
40				-	1		Statistics		-			00.00
41					(hat (MLE)	21.3				star (bias cor	-	20.32
42					hat (MLE)	1.15			Theta	star (bias cor	,	1.206
43			B 41		ı hat (MLE)	2727				· ·	as corrected)	2600
44			MI	_E Mean (bias	corrected)	24.5			Anne	•	as corrected)	5.436
45			۸ ۵:۰۰-	tod Lovel of C	ianificanas	0.0463				e Chi Square djusted Chi S		2483 2480
46			Aajus	sted Level of S	igillicance	0.0463			A	ujustea Chi S	oquare value	246U
47					۸۵۵	eumina Gan	ıma Distribu	tion				
48	01	50/ Annrasi:	nata Camma	UCL (use wh		25.66	iiiia Distribui		liveted Cor-	ma UCL (use	whon no EO	25.69
49	9:	o /o Approxir	nate Gallillia	OCL (use wn	c ((11/-30))	∠3.00		95% A0	ijusieu Gam	ına UCL (USE	wileli (I<50)	23.09
50												

	Α	В	С	D	E	<u> </u>	F	G	Н	I	Т	J	I	K	L
51			•		•		Lognorma	GOF Test			•			•	
52				Shapiro Wilk	Test St	atistic	0.98		Shap	iro Wilk	Logn	ormal GOI	F Test	t	
53				5% Shapiro	Wilk P	Value	0.671		Data appea	r Lognorr	nal a	t 5% Signif	ficanc	e Level	
54				Lilliefors	Test Sta	atistic	0.0566		Lil	iefors Lo	gnor	mal GOF	Γest		
55				5% Lilliefors	Critical '	Value	0.111		Data appea	r Lognorr	nal a	t 5% Signif	ficanc	e Level	
56					Data a	ppear	Lognormal	at 5% Signif	icance Leve						
57															
58							_	l Statistics							
59				Minimum o			2.639					Mean of			3.175
60				Maximum o	f Logged	l Data	3.638					SD of	logge	ed Data	0.22
61															
62								rmal Distrib	ution						
63					95% H		25.7					hebyshev (•	·	26.54
64				Chebyshev	` '	<i>'</i>	27.46			97.5	5% CI	hebyshev ((MVUI	E) UCL	28.74
65			99%	Chebyshev	(MVUE)) UCL	31.26								
66															
67					•			tion Free UC							
68				Data appe	ear to foll	low a l	Discernible	Distribution a	at 5% Signifi	cance Le	evel				
69															
70						-		tribution Fre	e UCLs						
71					95% CLT		25.61					95% Ja			25.63
72				6 Standard E			25.58					95% Boo			25.67
73				95% Hall's E			25.72			95	% Pe	ercentile Bo	ootstra	ap UCL	25.66
74				95% BCA E			25.61								
75				hebyshev(N			26.53					byshev(Me			27.45
76			97.5% C	hebyshev(N	lean, Sd)) UCL	28.73			99%	Chel	byshev(Me	ean, S	d) UCL	31.23
77															
78				250/ 0-				UCL to Use							
79				95% St	tudent's-	t UCL	25.63								
80		Note: O.	a:	adia a da a		- 050/	1101			14"				-0/ 1101	
81		Note: Sugge						ovided to hel					ate 9	o% UCL.	
82		Theorem					•	a size, data (- الم	(2000)	
83	11.							ulation studi							
84	Ho	wever, simi	uiations resu	iits will not co	over all F	keal W	rona aata se	ts; for additio	onai insignt th	ie user m	ay w	ant to cons	suit a s	statisticia	in.
85															

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	Sets with N	on-Detects				
2				T								
3	<u> </u>		cted Options		100100101	N. 44 DM						
4	Dat	e/Time of Co		ProUCL 5.15)1:44 PM						
5			From File	Onsite Metals	Input.xls							
6			Il Precision	OFF								
7		Confidence		95%								
8	Number o	f Bootstrap	Operations	2000								
9												
10	Cobalt											
11	Copail											
12						General	Statistics					
13			Total	Number of Ob	servations	64	Statistics		Numbe	er of Distinct C	hearyatione	28
14			Total	Number of Ob	isei valions	04				r of Missing (0
15					Minimum	4.9			Numbe	. or missing C	Mean	9.447
16					Maximum	14					Median	9.447
17					SD	1.838				Std. F	rror of Mean	0.23
18				Coefficient of	_	0.195				J.u. L	Skewness	0.258
19												2.230
20						Normal (GOF Test					
21			S	hapiro Wilk Te	est Statistic	0.976			Shapiro W	ilk GOF Test		
22				5% Shapiro W		0.47		Data appe	-	at 5% Signific		
23				Lilliefors Te		0.116				GOF Test		
24 25			5	% Lilliefors Cri	itical Value	0.111		Data No	t Normal at	5% Significar	nce Level	
26				Data a	ppear Appr	oximate No	rmal at 5% S	Significance	Level			
27												
28					Ass	suming Nor	mal Distribut	ion				
29			95% No	ormal UCL				95%	UCLs (Adju	usted for Ske	wness)	
30				95% Stude	ent's-t UCL	9.831			95% Adjust	ed-CLT UCL	(Chen-1995)	9.833
31									95% Modifi	ed-t UCL (Jo	hnson-1978)	9.832
32					<u>'</u>		1				<u> </u>	
33						Gamma	GOF Test					
34					est Statistic	0.373				Gamma GO		
35				5% A-D Cri		0.749	Detected				5% Significand	ce Level
36					est Statistic	0.0941				ov Gamma G		
37				5% K-S Cri		0.111				istributed at 5	5% Significand	ce Level
38				Detected o	iata appear	Gamma Di	stributed at 8	5% Significa	nce Level			
39							O					
40					1 . /		Statistics					05.00
41					hat (MLE)	26.24				star (bias cor	-	25.02
42					hat (MLE)	0.36			Theta	star (bias cor	,	0.378
43			B 41		hat (MLE)	3359					as corrected)	3203
44			MI	_E Mean (bias	corrected)	9.447			Anne	•	as corrected)	1.889
45			۸ ۵:۰۰-	tod Lovel of C	ianificanas	0.0463				e Chi Square djusted Chi S		3072 3069
46			Aajus	ited Level of S	igriiiicance	0.0463			A	ujustea CNI S	quare value	3009
47					۸۵۵	suming Con	nma Distribut	tion				
48	0	5% Annrayir	nate Camma	UCL (use who		9.848	וווווווווווווווווווווווווווווווווווווו		lineted Com	ma UCL (use	when n/EO)	9.858
49	9:	o /o Approxir	nate Gallillia	OCL (use Wh	- 1111/-30))	ჟ.048		90% A0	ijusieu Gam	ına UCL (USE	wilen ii<50)	შ.00გ
50												

	A	В	С	l D	T E	- 1	F	G	Н	ı	-	J	1	K	1 1
51	A	Ь	C	D		-		GOF Test	П			J		N.	L
52				Shapiro Wilk	Test Sta	atistic	0.973		Shap	iro Wilk I	Logno	rmal GOF	F Tes	st	
53				5% Shapiro	Wilk P \	Value	0.379		Data appea	r Lognorn	nal at	5% Signif	ficanc	ce Level	
54				Lilliefors	Test Sta	atistic	0.0862		Lill	iefors Lo	gnorm	nal GOF 1	Test		
55			į	5% Lilliefors	Critical \	Value	0.111		Data appea	r Lognorn	nal at	5% Signif	ficanc	ce Level	
56					Data a	ppear	Lognormal	at 5% Signifi	icance Leve						
57															
58							Lognorma	l Statistics							
59				Minimum of	f Logged	Data	1.589					Mean of	logge	ed Data	2.227
60				Maximum of	f Logged	Data	2.639					SD of	logge	ed Data	0.2
61														'	
62						Assu	ıming Logno	rmal Distrib	ution						
63					95% H	-UCL	9.872			90	% Ch	ebyshev ((MVU	IE) UCL	10.17
64				Chebyshev	, ,		10.49			97.5	% Ch	ebyshev ((MVU	IE) UCL	10.94
65			99%	Chebyshev	(MVUE)	UCL	11.82								
66															
67								tion Free UC							
68				Data appe	ar to foll	low a [Discernible I	Distribution a	at 5% Signifi	cance Le	evel				
69															
70								ribution Free	e UCLs						
71					95% CLT		9.825							ife UCL	9.831
72				Standard B			9.821					95% Boo		•	9.836
73				95% Hall's B			9.823			95	% Per	centile Bo	ootstr	ap UCL	9.827
74				95% BCA B			9.838								
75				hebyshev(M			10.14					yshev(Me		,	10.45
76			97.5% C	hebyshev(M	ean, Sd)	UCL	10.88			99%	Cheb	yshev(Me	ean, S	Sd) UCL	11.73
77															
78							Suggested	UCL to Use							
79				95% St	udent's-t	UCL	9.831								
80			100	1				p 10 - 0			^	05			
81	10.0	,						normal) distri	-						
82	W	nen app	licable, it is	suggested to	o use a L	JCL ba	ased upon a	distribution (e.g., gamma) passing	both (GOF tests	s in P	roUCL	
83	NI-4-		ationo =====	dina the est-	ation of	o 050/	LICL are con	ovidad ta bal	n tha	00 0=++1-	0 m = =	+ onn=====	into O	E0/ 1101	
84	Note	. Sugges					-	ovided to hel	-			ı appropri	iate 9	o% UCL	
85	Ть.	00 roos					•	a size, data o	•			nioble an	dlas	(2006)	
86								ulation studions; for addition							an
87	nowev	ei, simu	iauoris resu	no will flot CC	vei ali R	veal VV	onu uata se	is, ioi additto	ııaı ırısıgnı tr	e user m	ay wa	TIL TO COUS	ouit a	StatiStiCli	dII.
88															

	Α	В	С	D	E LIOL Obstice	F	G Octovrith N	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaav Cala										
3	Dot	e/Time of C	ected Options		5/23/2018 1:0							
4	Dat	e/ Time of C	From File	Onsite Meta								
5		Fu	III Precision	OFF	is iriput.xis							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- rambor o	. 20010114p		2000								
9	Copper											
10												
12						General	Statistics					
13			Total	Number of O	bservations	64			Numbe	er of Distinct C	Observations	40
14				Numbe	er of Detects	63				Number of	Non-Detects	1
15			Nı	umber of Dist	tinct Detects	39			Numbe	er of Distinct	Non-Detects	1
16				Mini	mum Detect	3.8				Minimum	Non-Detect	3
17				Maxi	mum Detect	100				Maximum	n Non-Detect	3
18				Varia	nce Detects	181.4				Percent	Non-Detects	1.563%
19				M	ean Detects	13.84					SD Detects	13.47
20				Med	dian Detects	11					CV Detects	0.973
21				Skewn	ess Detects	4.657				Kurt	tosis Detects	27.42
22		Mean of Logged Detect								SD of Log	ged Detects	0.597
23		No										
24							t on Detects					
25				hapiro Wilk T		0.567					rvations Only	
26				5% Shapiro V		0		Detected Date			ificance Level	<u> </u>
27					est Statistic	0.256	_			GOF Test		
28			5	% Lilliefors C		0.111				al at 5% Sign	ificance Level	l
29					etected Data	Not Norma	at 5% Sign	ificance Lev	'el			
30			Vanlan	Maior (IZM) C	Ptatiatias vair	a Normal C	hitiaal \/alua		Nonnoromo	aturia LICI a		
31				vieler (Kivi) S	Statistics usin KM Mean	13.67	nucai value:		-	M Standard E	fror of Moon	1.679
32					KM SD	13.32					(BCA) UCL	16.9
33				95%	KW (t) UCL	16.47			95% KM (F	Percentile Boo	, ,	16.63
34					KM (z) UCL	16.43			`	95% KM Boo	* *	18.43
35				90% KM Chel		18.7				95% KM Che	•	20.99
36				.5% KM Chel	-	24.15				99% KM Che	•	30.37
37												
38				G	amma GOF	Tests on De	tected Obse	ervations Or	ıly			
40					Test Statistic	2.031				arling GOF Te	est	
41				5% A-D C	Critical Value	0.761	Detect	ed Data Not	Gamma Dis	stributed at 59	% Significance	Level
42		K-S Test Stati							Kolmogorov-	-Smirnov GO	F	
43				5% K-S C	Critical Value	0.113	Detecto	ed Data Not	Gamma Dis	stributed at 59	% Significance	Level
44				Detecte	ed Data Not G	amma Dist	ributed at 5%	6 Significan	ce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47					k hat (MLE)	2.442			k	star (bias cor	rected MLE)	2.337
48				Thet	ta hat (MLE)	5.666			Theta	star (bias cor	rected MLE)	5.922
		nu hat (ML								nu star (bia	as corrected)	294.4
49					`						,	

	А	В	С		D	E	F	G	Н	I	J	K		L
51														
52							S Statistics u							
53			_				set has > 50%		-		-			
54		GROS may					s small such a				`	g., <15-20. ————)	
55			Fc	or such			6 method may	•			TVs			
56							cially true who							
57		For gan	nma distribu	ited de	tected		and UCLs ma	ay be compu	uted using ga	amma distribu	ition on KM e			
58						Minimu						Mea		3.62
59						Maximu						Media		0.5
60						S				1.	-t/b:	C\		.989
61						k hat (MLE	-				star (bias cor			.677
62						ta hat (MLE	<i>'</i>			rneta	`	as corrected	,	
63			Λ divistos	ا میرما		nu hat (MLE nificance (('				Tiu Stai (Dia) 214	+. /
64		Anne	oximate Chi		•		*			Adjusted Chi	Square Value		3) 181	1 1
65		95% Gamma		•		•	*				ted UCL (use	•		3.15
66		95% Gaillina	Арргохіпіац	ie UCL	. (use v	vnen n>-50	10.09		95% G	aamma Aujus	ied OCL (use	when h<50) 10). IS ———
67					Ec	timatas af	Gamma Para	motore usir	a KM Estim	otos				
68						Mean (KN		illeters usii	ig Kivi Estilli	ales		SD (KM	1:	3.32
69					\/s	ariance (KN	′				SE o	f Mean (KM	,	.679
70					V C	k hat (KN	-					k star (KM	′	.014
71						nu hat (KN	′					nu star (KM	′	
72						eta hat (KN	′					eta star (KM	<i>'</i>	3.48
73			809	% nam		centile (KN	′			900	% gamma per	•	,	1.37
74				_	-	centile (KN	-				% gamma per	·		2.52
75				, o ga			.,				, o gaa po.		/ 02	
76						Gam	ma Kaplan-M	eier (KM) S	Statistics					
77		Appro	oximate Chi	Square	e Value			(,		Adjusted Chi	Square Value	e (129.75, ß	3) 103	3.9
78 79	95%	Gamma Apr		-		•	-			-	· KM-UCL (use			7.07
80		• • • • • • • • • • • • • • • • • • • •			•		•			-	•			
81					Lo	gnormal G	OF Test on D	etected Ob	servations (Only				
82		Sh	napiro Wilk A	Approxi	imate 1	est Statist	c 0.952			Shapiro W	ilk GOF Test			
83				5% Sh	napiro \	Nilk P Valu	e 0.0334	Г	Detected Dat	a Not Lognor	mal at 5% Sig	nificance L	evel	
84				Lilli	iefors T	est Statist	c 0.0894			Lilliefors	GOF Test			
85			5	5% Lilli	efors C	ritical Valu	e 0.111	De	tected Data	appear Logno	ormal at 5% S	ignificance	Level	
86				Dete	cted D	ata appeai	Approximate	Lognormal	at 5% Signi	ficance Leve	l			
87														
88					Lo	gnormal R	OS Statistics	Using Impu	ted Non-De	tects				
89				Mea	an in O	riginal Sca	e 13.66				Mean	in Log Scal	e 2	.385
90				S	D in O	riginal Sca	e 13.44				SD	in Log Scal	е 0	.623
91		95% t L	JCL (assume	es norr	nality c	f ROS data	16.46			95%	Percentile Bo	otstrap UC	16	5.44
92				95% B	BCA Bo	otstrap UC	L 18.19				95% Boo	otstrap t UC	_ 19	9.03
93				95%	H-UCI	_ (Log ROS	3) 15.36							
94														
			Statio	stics u	sing K	M estimate	s on Logged	Data and A	ssuming Log	gnormal Distr	ibution			
95			Otatio				0.000				KI	10 11	n 10	0.9
			Otatio		KM Me	ean (logge	1) 2.388					M Geo Mea		
95					KM	SD (logged	0.609			95%	Critical H Val		1)	.94
95 96			KM Standa		KM	SD (logged	0.609			95%	Critical H Val		1) 1.	.94 5.22
95 96 97				rd Erro	KM or of Me KM	SD (loggedean (logged	0.609 0.0768 0.609				Critical H Val	ue (KM-Log CL (KM -Log	i) 1.	

	Α	В	С	D	Е	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-1	Transformed		
104				Mean in C	riginal Scale	13.65				Mean i	in Log Scale	2.378
105				SD in C	riginal Scale	13.45				SD i	in Log Scale	0.643
106			95% t l	JCL (Assum	es normality)	16.45				95%	H-Stat UCL	15.54
107			DL/2	is not a reco	mmended m	ethod, provi	ded for comp	parisons and	l historical re	easons		
108												
109					Nonparame	etric Distribu	tion Free UC	CL Statistics				
110			Dete	cted Data a	ppear Approx	cimate Logn	ormal Distrib	outed at 5%	Significance	Level		
111												
112						Suggested	UCL to Use					
113					KM H-UCL	15.22						
114												
115	١	lote: Sugges	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL	
116			F	Recommend	ations are bas	sed upon dat	a size, data	distribution,	and skewnes	SS.		
117		These recor	mmendations	s are based	upon the resu	Ilts of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006).	
118	Hov	wever, simul	lations result	s will not co	ver all Real W	orld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistici	an.
119												

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					UCL Statist	ics for Data	Sets with No	on-Detects				
2		Lloss C-1	oted Omiti-									
3	Dot	e/Time of Co	cted Options	ProUCL 5.15/	122/2019 1.0)6.00 DM						
4	Dati	e/Time of Co	From File	Onsite Metals		0.00 PIVI						
5		Ful	Il Precision	OFF	3 IIIput.xiS							
6		Confidence		95%								
7		f Bootstrap (2000								
8	110111501 0	. Boototiap (
9	Hexavalent	Chromium										
10												
12						General	Statistics					
13			Total	Number of Ob	servations	64			Numb	er of Distinct	Observations	3
14				Number	of Detects	2				Number of	f Non-Detects	62
15			Nı	umber of Distir	nct Detects	2			Numb	per of Distinc	t Non-Detects	1
16				Minim	num Detect	0.057				Minimu	m Non-Detect	0.04
17				Maxim	num Detect	0.16				Maximu	m Non-Detect	0.04
18				Varian	ice Detects	0.0053				Percen	t Non-Detects	96.88%
19				Me	an Detects	0.109					SD Detects	0.0728
20				Medi	ian Detects	0.109					CV Detects	0.671
21				Skewne	ess Detects	N/A				Ku	rtosis Detects	N/A
22				Mean of Logg	ed Detects	-2.349				SD of Lo	gged Detects	0.73
23												
24							only 2 Detect					
25			TI	his is not enou	ugh to comp	ute meanin	gful or reliabl	e statistics	and estima	ites.		
26												
27					NI	-1 00E T-	D	0-1-				
28							st on Detects					
29					NOT END	ugn Data ti	o Perform GC	P Test				
30			Kanlan-	Meier (KM) St	tatietice ueir	a Normal (ritical Value	s and other	Nonnaram	etric I ICI e		
31				INIGIGI (IXIVI) SI	KM Mean	0.0421	Tillical Values	, and other			Error of Mean	0.00265
32					KM SD	0.0421					M (BCA) UCL	N/A
33				95% I	KM (t) UCL	0.0466			95% KM (ootstrap) UCL	N/A
34					KM (z) UCL	0.0465					otstrap t UCL	N/A
35				90% KM Cheby		0.0501					ebyshev UCL	0.0537
36				.5% KM Cheby		0.0587					ebyshev UCL	0.0685
37							1					<u>. </u>
39				Ga	mma GOF	Tests on D	etected Obse	rvations O	nly			
40					Not Enc	ough Data to	o Perform GC)F Test				
41												
42					Gamma	Statistics or	n Detected Da	ata Only				
43				k	k hat (MLE)	4.077				star (bias co	orrected MLE)	N/A
44				Theta	a hat (MLE)	0.0266			Theta	a star (bias co	orrected MLE)	N/A
45				nu	ı hat (MLE)	16.31				nu star (b	ias corrected)	N/A
46				Mea	n (detects)	0.109						
47												
48						amma Para	meters using	KM Estima	ates			
			_		Mean (KM)	0.0421		_	_		SD (KM)	0.015
49					riance (KM)						of Mean (KM)	0.00265

						_		_	1	-				17	, , , , , , , , , , , , , , , , , , ,
51	A	В	С	D	k l	E hat (KM)	7.895	G	<u> </u>		<u> </u>	J		k star (KM)	7.535
52					nu l	nat (KM)	1011						r	nu star (KM)	964.5
53					theta l	nat (KM)	0.00534						the	ta star (KM)	0.00559
54			80%	gamma	percen	tile (KM)	0.0542				909	% gamma	a per	centile (KM)	0.0626
55			95%	gamma	percen	tile (KM)	0.0702				999	% gamma	a per	centile (KM)	0.0858
56								1							:
57						Gamm	a Kaplan-M	eier (KM) (Statistics						
58											•		·	nificance (β)	
59		• • • • • • • • • • • • • • • • • • • •	oximate Chi S		•		893.4			-				(964.51, β)	
60	95%	Gamma App	proximate KM	I-UCL (us	se wher	n n>=50)	0.0455		95% Gam	ıma Adjı	usted k	KM-UCL	(use	when n<50)	0.0456
61															
62					Logno				bservations	Only					
63						Not End	ough Data to	Perform (GOF Test						
64									=						
65					-			Jsing Impi	uted Non-De	etects					10.50
66						al Scale	0.00412							n Log Scale	
67		050/	101 /		_	al Scale	0.0211				050/			n Log Scale	
68		95% t C	JCL (assume				0.00852				95%			otstrap UCL	
69				95% BCA		•	0.0126					95%	B001	tstrap t UCL	0.0411
70				95% H-l	JCL (LC	og ROS)	0.173								
71			Ctatio	tion volna	- VM -	atimataa	on Logged [Sate and A	ssuming Lo		l Diete	lhudan			
72			Statis				-3.192	Jala and A	ssuming Lo	gnorma	II DISII	ibulion	IZN/	1 Geo Mean	0.0411
73						(logged) (logged)	0.177				0E9/ /	Critical L		ie (KM-Log)	
74			KM Standar			, ,	0.177				95%			L (KM -Log)	
75			NIVI Statitual			(logged)	0.0312				059/			ie (KM-Log)	
76			KM Standar			, ,	0.177				95 /6	Cillical II	valu	ie (Kivi-Log)	1.704
77			NW Standar	u Liioi oi	i weari	(logged)	0.0312								
78							DL/2 S	tatistics							
79			DL/2 N	lormal						DL/2	2 Log-1	Fransforr	ned		
80					n Origin	al Scale	0.0228							n Log Scale	-3.863
81						al Scale	0.018							n Log Scale	
83			95% t U	CL (Assu	ımes no	ormality)	0.0265						95%	H-Stat UCL	0.0233
84			DL/2 i	s not a re	comme	ended me	ethod, provid	ded for cor	mparisons a	nd histo	rical r	easons			
85															
86					No	nparame	tric Distribu	tion Free l	JCL Statistic	cs					
87				Data de	o not fo	llow a Di	scernible Di	stribution	at 5% Signif	icance	Level				
88															
89							Suggested	UCL to Us	е						
90			95	% KM (CI	hebysh	ev) UCL	0.0537								
91								I							
92	1	Note: Sugge	stions regard	ng the se	election	of a 95%	UCL are pro	ovided to h	elp the user	to selec	ct the n	nost appr	opria	te 95% UC	Ē.
93			R	ecomme	ndation	s are bas	ed upon dat	a size, dat	a distribution	, and sl	kewnes	SS.			
94		These recor	mmendations	are base	ed upon	the resu	Its of the sim	ulation stu	dies summa	rized in	Singh,	, Maichle	, and	Lee (2006)	
95	Но	wever, simu	lations results	s will not	cover a	II Real W	orld data se	ts; for addi	tional insight	the use	er may	want to d	consu	ılt a statistic	ian.
96															

	Α	В	С	D	E	F	G	H	I	J	K	L
1					UCL Statist	lics for Data	Sets with N	on-Detects				
2		Llaav Cala										
3	Dot	e/Time of C	ected Options		5/23/2018 1:0	22.E7 DM						
4	Date	e/ Time of C	From File	Onsite Meta		12.37 FIVI						
5		Fu	III Precision	OFF	is iriput.xis							
6				95%								
7		f Bootstrap		2000								
8	- Namber 6	Воогонар		2000								
10	Lead											
11												
12						General	Statistics					
13			Total	Number of O	bservations	77			Numbe	er of Distinct C	Observations	55
14				Numbe	er of Detects	75				Number of	Non-Detects	2
15			Nı	umber of Dist	inct Detects	53			Numbe	er of Distinct	Non-Detects	2
16				Mini	mum Detect	0.522				Minimum	Non-Detect	0.1
17				Maxi	mum Detect	570				Maximum	Non-Detect	0.2
18				Varia	nce Detects	6850				Percent	Non-Detects	2.597%
19				M	ean Detects	30.93					SD Detects	82.77
20				Med	dian Detects	7.6					CV Detects	2.676
21				Skewn	ess Detects	5.235				Kurt	osis Detects	29.81
22				Mean of Log	ged Detects	2.391				SD of Log	ged Detects	1.155
23												
24							t on Detects					
25				hapiro Wilk T		0.359					rvations Only	
26				5% Shapiro V		0		Detected Date			ificance Leve	<u> </u>
27					Test Statistic	0.357				GOF Test		
28			5	% Lilliefors C		0.102				al at 5% Sign	ificance Leve	
29					etected Data	Not Norma	at 5% Sign	ificance Lev	/el 			
30			Vanlan	Major (IZM) C	Statistics well	an Normal C	hitiaal \/alua		Nonnarama	aturia LICI a		
31				vieler (Kivi) S	Statistics usin	30.13	nucai value		<u> </u>	M Standard E	rror of Moon	9.326
32					KM SD	81.29					1 (BCA) UCL	48.23
33				95%	KW (t) UCL	45.66			95% KM (F	Percentile Boo	` ,	45.83
34					KM (z) UCL	45.47			•	95% KM Boo	• /	69.95
35				90% KM Chel		58.11				95% KM Che	•	70.78
36				.5% KM Chel	•	88.37				99% KM Che	-	122.9
37					,						,	-
38				G	amma GOF	Tests on De	etected Obse	ervations Or	ıly			
40					est Statistic	10.15			•	arling GOF Te	est	
41				5% A-D C	Critical Value	0.808	Detect	ed Data Not	Gamma Dis	stributed at 5%	% Significance	Level
42				K-S T	Test Statistic	0.335			Kolmogorov	-Smirnov GO	F	
43				5% K-S C	Critical Value	0.108	Detect	ed Data Not	Gamma Dis	stributed at 5%	% Significance	Level
44				Detecte	ed Data Not C	amma Dist	ributed at 59	6 Significan	ce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47					k hat (MLE)	0.594			k	star (bias cor	rected MLE)	0.58
48				Thet	ta hat (MLE)	52.04			Theta	star (bias cor	rected MLE)	53.38
40				n	nu hat (MLE)	89.16				nu star (bia	as corrected)	86.93
49						30.93						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u	• •					
53			•					•	servations at	•		
54		GROS may	not be used	l when kstar	of detects is	small such a	s <1.0, espe	ecially when	the sample s	ize is small (e	e.g., <15-20)	
55			Fo	r such situa	tions, GROS	method may	yield incorr	ect values o	f UCLs and B	TVs		
56					This is espec	cially true who	en the samp	le size is sm	nall.			
57		For gar	nma distribut	ted detected	data, BTVs	and UCLs ma	y be compu	uted using ga	amma distribu	ıtion on KM e	stimates	
58					Minimun	0.01					Mean	30.13
59					Maximum	570					Median	7.6
60					SE	81.82					CV	2.716
61					k hat (MLE	0.527			k	star (bias cor	rected MLE)	0.515
62				The	eta hat (MLE	57.21			Theta	star (bias cor	rected MLE)	58.52
63					nu hat (MLE	81.11				nu star (bia	s corrected)	79.28
64			Adjusted	Level of Sig	gnificance (β	0.0469						
65		App	roximate Ch	i Square Va	lue (79.28, α	59.77			Adjusted Ch	ni Square Valu	ue (79.28, β)	59.45
66		95% Gamma	Approximat	e UCL (use	when n>=50	39.97		95% C	Gamma Adjus	ted UCL (use	when n<50)	40.18
67						<u>.u</u>	1					L
68				Е	stimates of (Gamma Para	meters usin	ng KM Estim	nates			
69					Mean (KM	30.13					SD (KM)	81.29
70				V	ariance (KM	6607				SE o	f Mean (KM)	9.326
71					k hat (KM	0.137					k star (KM)	0.141
72					nu hat (KM	21.16					nu star (KM)	21.67
73				th	neta hat (KM	219.3				the	eta star (KM)	214.1
74			80%	6 gamma pe	ercentile (KM	31.05			909	% gamma per	centile (KM)	88.47
75			95%	6 gamma pe	ercentile (KM	167.8			999	% gamma per	centile (KM)	401.2
76												
77					Gamı	na Kaplan-M	eier (KM) S	tatistics				
78		App	roximate Ch	i Square Va	lue (21.67, α	12.09			Adjusted Ch	ni Square Valu	ue (21.67, β)	11.96
79	95%	Gamma App	oroximate KN	Л-UCL (use	when n>=50	54		95% Gam	ma Adjusted k	KM-UCL (use	when n<50)	54.62
80							1					
81				L	ognormal G	OF Test on D	etected Ob	servations (Only			
82		Sł	napiro Wilk A	pproximate	Test Statistic	0.838			Shapiro W	ilk GOF Test		
83				5% Shapiro	Wilk P Value	2.734E-11	С	Detected Dat	ta Not Lognori	mal at 5% Sig	nificance Le	vel
84				Lilliefors	Test Statistic	0.244			Lilliefors	GOF Test		
85			5	% Lilliefors	Critical Value	0.102	С	Detected Dat	ta Not Lognori	mal at 5% Sig	nificance Le	vel
86				De	etected Data	Not Lognorn	nal at 5% S	ignificance	Level			
87												
88				Lo	ognormal RC	S Statistics	Using Impu	ted Non-De	tects			
89				Mean in C	Original Scale	30.15				Mean	in Log Scale	2.322
90				SD in C	Original Scale	81.81				SD	in Log Scale	1.216
91		95% t L	JCL (assume	s normality	of ROS data	45.68			95%	Percentile Bo	otstrap UCL	46.78
92			!	95% BCA B	ootstrap UCI	53.44				95% Boo	tstrap t UCL	70.9
93				95% H-UC	L (Log ROS	30.21						
94						1	<u> </u>					
95			Statis	stics using k	KM estimates	on Logged	Data and As	ssuming Lo	gnormal Distr	ibution		
96				KM N	lean (logged	2.269				KI	M Geo Mean	9.67
97				KN	1 SD (logged	1.356			95%	Critical H Val	ue (KM-Log)	2.64
98			KM Standa	rd Error of M	lean (logged	0.156				95% H-UC	L (KM -Log)	36.59
99				KN	1 SD (logged	1.356			95%	Critical H Val	ue (KM-Log)	2.64
100			KM Standa		lean (logged							
100					. 33.55	1	<u> </u>					<u> </u>

	Α	В	С	D	Е	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-1	Transformed		
104				Mean in C	riginal Scale	30.13				Mean i	in Log Scale	2.26
105				SD in C	riginal Scale	81.82				SD i	in Log Scale	1.398
106			95% t l	JCL (Assum	es normality)	45.66				95%	H-Stat UCL	39.17
107			DL/2	is not a reco	mmended m	ethod, provi	ded for comp	parisons and	l historical re	easons		
108												
109					Nonparame	etric Distribu	tion Free UC	CL Statistics				
110				Data do n	ot follow a D	iscernible D	istribution at	5% Signific	ance Level			
111												
112						Suggested	UCL to Use					
113			95	5% KM (Che	byshev) UCL	70.78						
114												
115	١	lote: Sugges	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL	
116			F	Recommend	ations are bas	sed upon dat	a size, data	distribution,	and skewnes	SS.		
117		These recor	mmendations	are based	upon the resu	lts of the sim	nulation studi	ies summariz	zed in Singh,	Maichle, and	d Lee (2006).	
118	Hov	wever, simu	lations result	s will not co	ver all Real W	orld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.
119												

	Α	В	С	D	E LIOL Otation	F	G Octovrith N	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	ion-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	/22/2019 1.0	E-26 DM						
4	Dat	e/Time of C	From File	Onsite Metals		J.20 F W						
5		Fu	Il Precision	OFF	s iriput.xis							
6		Confidence		95%								
7		f Bootstrap		2000								
8	14dmbci c	Воогопар	Орогацопо	2000								
9	Mercury											
10	,											
11						General	Statistics					
13			Total	Number of Ob	oservations	64			Numbe	r of Distinct C	Observations	46
14				Number	of Detects	61				Number of	Non-Detects	3
15			N	umber of Disti	nct Detects	45			Numbe	er of Distinct	Non-Detects	1
16				Minin	num Detect	0.024				Minimum	n Non-Detect	0.02
17				Maxin	num Detect	25				Maximum	n Non-Detect	0.02
18				Varian	ice Detects	11.98				Percent	Non-Detects	4.688%
19				Me	an Detects	0.75					SD Detects	3.461
20				Medi	ian Detects	0.061					CV Detects	4.617
21				Skewne	ess Detects	6.366				Kurt	tosis Detects	42.64
22				Mean of Logg	jed Detects	-2.36				SD of Log	gged Detects	1.387
23					I.		L					
24					Norm	al GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Te	est Statistic	0.227	ı	Normal GOF	Test on De	tected Obse	ervations Only	į.
26				5% Shapiro W	/ilk P Value	0	[Detected Da	ta Not Norma	al at 5% Sign	ificance Level	I
27				Lilliefors Te	est Statistic	0.451			Lilliefors	GOF Test		
28			5	% Lilliefors Cr		0.113				al at 5% Sign	ificance Level	j
29				De	etected Data	Not Norma	l at 5% Sign	ificance Lev	rel			
30												
31			Kaplan-	Meier (KM) St			ritical Value	s and other	•			
32					KM Mean	0.716			KI		rror of Mean	0.423
33					KM SD	3.355					II (BCA) UCL	1.481
34					KM (t) UCL	1.421			`		otstrap) UCL	1.52
35					KM (z) UCL	1.411					otstrap t UCL	7.726
36				00% KM Cheb	-	1.984					ebyshev UCL	2.559
37			97	.5% KM Cheb	ysnev UCL	3.356				99% KIVI Che	ebyshev UCL	4.923
38					mmo COE	Taeta an D	etected Obse	anyations O	nhy			
39					est Statistic	12			•	rling GOF Te		
40					itical Value	0.857	Detect				% Significance	ו פעפן
41					est Statistic	0.369	Detecti			Smirnov GO		, LCVGI
42					itical Value	0.309	Detect				% Significance	Level
43							ributed at 59					
44												
45					Gamma 5	Statistics or	Detected D	ata Only				
46					k hat (MLE)	0.328			k	star (bias cor	rrected MLE)	0.323
47					a hat (MLE)	2.286				`	rrected MLE)	2.323
49					u hat (MLE)	40.02				•	as corrected)	39.38
					n (detects)	0.75				(31-	/	
50	I				,/	-						

	Α	В	С	D		Е	F	G	Н		l	J	P	K	L
51							00000								
52			0000				S Statistics u					pr 1 =:			
53		0000	-				set has > 509		=			-			
54		GROS may					small such a		<u> </u>		<u> </u>		e.g., <1	5-20)	
55			Fo	or such si			method may	•			Ls and E	SIVS			
56		F	بريانسفونا ومسو				cially true who				. مانمه شاه	ution on ICM			
57		For gan	nma distribu	tea aetec	ctea c	Minimun	and UCLs m	ay be com	putea using	gamm	a distribi	ution on Kivi		es Mean	0.715
58						Maximun								ledian	0.715
59						SI	_							CV	4.729
60						k hat (MLE					k	star (bias co	rrected		0.316
61						a hat (MLE	-					star (bias co		,	2.265
62						u hat (MLE	<u> </u>					nu star (bi		,	40.41
63			Adjusted	l Level of		nificance (β	'					Tid Stai (B			10.11
64		Ann	roximate Ch		-		*			Adi	iusted Cl	ni Square Va	lue (40	41 B)	26.59
65		95% Gamma					′		95%	-		ted UCL (us	•		1.087
66			-F-1 -7.11110C				,,					(40			
67					Es	timates of	Gamma Para	meters us	sing KM Est	imates					
68						Mean (KM							SD	(KM)	3.355
69 70					Va	riance (KM	′					SE	of Mean	` ,	0.423
71						k hat (KM	-							r (KM)	0.053
72						nu hat (KM	•						nu star	r (KM)	6.883
73					the	eta hat (KM) 15.73					th	neta star	r (KM)	13.31
74			80%	% gamma	a per	centile (KM) 0.124				90	% gamma pe	ercentile	(KM)	1.195
75			95%	% gamma	a per	centile (KM) 3.898				99	% gamma pe	ercentile	(KM)	15.12
76															
77						Gam	ma Kaplan-M	leier (KM)	Statistics						
78		Ap	proximate C	hi Squar	e Val	ue (6.88, o) 2.106			Ad	djusted (Chi Square V	alue (6.	88, β)	2.046
79	95%	Gamma App	oroximate KN	M-UCL (ι	use w	hen n>=50) 2.338		95% Ga	mma A	djusted	KM-UCL (us	e when	n<50)	2.407
80							- 1								
81					Lo	gnormal G	OF Test on D	Detected C	Observation	s Only					
82		Sh	napiro Wilk A	pproxim	ate T	est Statisti	0.771			Sł	napiro W	ilk GOF Tes	;t		
83				5% Shap	piro V	Vilk P Valu	e 1.782E-12		Detected D	ata No	t Lognor	mal at 5% S	gnifican	nce Lev	vel
84				Lillief	ors T	est Statisti	0.209					GOF Test			
85			5	5% Lilliefo		ritical Valu						mal at 5% S	gnifican	nce Lev	/el
86					Det	ected Data	Not Lognori	nal at 5%	Significanc	e Leve					
87															
88						-	OS Statistics	Using Imp	outed Non-E	Detects	;				
89						iginal Scal							n in Log		-2.501
90		050/ - 1	101 /			iginal Scal					0501) in Log		
91		95% t L	JCL (assume		•		*				95%	Percentile B			1.5
92			!			otstrap UC						95% Bo	otstrap	t UCL	7.918
93				95% H	-UCL	. (Log ROS) 0.401								
94			Charl	otios ::s!-	ng 1/4	A octionata	000100001	Doto ond	Acoumina 1	0000	mal Dist	ihutian			
95			Statis			an (logged	s on Logged) -2.433	vala and	Assuming L	_ognoff	וופו טופעו		(M Geo	Maar	0.0878
96						SD (logged	•				QE0/	Critical H Va			2.304
97			KM Standa				•				90%	95% H-U			0.341
98			Vivi Stating			SD (logged	*				QE0/	Critical H Va	•	٠,	2.304
99			KM Standa								93%	Chucai H Va	iiue (NIV	i-Log)	2.304
100			NIVI SIdIIUd	iu EIIOI (OI IVIE	an (logged) 0.174								

	Α	В	С	D	Е	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-1	Transformed		
104				Mean in C	riginal Scale	0.715				Mean	in Log Scale	-2.465
105				SD in C	riginal Scale	3.382				SD	in Log Scale	1.435
106			95% t l	JCL (Assum	es normality)	1.421				95%	H-Stat UCL	0.365
107			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons and	l historical re	easons		
108												
109					Nonparame	etric Distribu	tion Free U	CL Statistics				
110				Data do n	ot follow a D	iscernible D	istribution a	t 5% Signific	ance Level			
111												
112						Suggested	UCL to Use					
113			95	5% KM (Che	byshev) UCL	2.559						
114												
115	N	lote: Sugges	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL	
116			F	Recommend	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.		
117		These recor	mmendations	s are based	upon the resu	ılts of the sim	nulation stud	ies summariz	zed in Singh,	Maichle, and	d Lee (2006).	
118	Hov	wever, simul	lations result	ts will not co	ver all Real W	/orld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.
119												

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					JCL Statis	tics for Data	Sets with No	n-Detects				
2		Hoor Cala	otod Ontina									
3	Dot	e/Time of Co	cted Options	ProUCL 5.15/2	2/2019 1.0	73·37 DN/I						
4	Dat	er i iiile di C(From File	Onsite Metals		/ FIVI						
5		Ful	I Precision	OFF	πιραι.λίδ							
6		Confidence		95%								
7		f Bootstrap (2000								
8	- rambor o	. Boototiap (o por duorio	2000								
9												
10 11	Nickel											
12												
13						General	Statistics					
14			Total	Number of Obs	ervations	64			Numbe	r of Distinct O	bservations	17
15									Numbe	r of Missing O	bservations	0
16					Minimum	9.3					Mean	19.41
17					Maximum	66					Median	19
18					SD	7				Std. Ei	rror of Mean	0.875
19				Coefficient of	Variation	0.361					Skewness	4.804
20												
21							GOF Test					
22				hapiro Wilk Tes		0.621				ilk GOF Test		
23				5% Shapiro Wil		0		Data No		5% Significan	ce Level	
24				Lilliefors Tes		0.246				GOF Test		
25			5	% Lilliefors Criti		0.111			t Normal at	5% Significan	ce Level	
26					Data Not	Normal at	5% Significan	ce Level				
27					Λο.	oumina Nor	mal Diatributia					
28			05% No	ormal UCL	AS	suming Nor	mal Distributio		LICLe (Adii	sted for Skev	unace)	
29			95 /6 140	95% Stude	nt's_t I ICI	20.87				ed-CLT UCL (-	21.41
30				33 % Stude	it s-t OCL	20.07			•	ed-t UCL (Joh	•	20.96
31											1070)	
32						Gamma	GOF Test					
33				A-D Tes	t Statistic	2.152		Ander	son-Darling	Gamma GO	F Test	
35				5% A-D Criti	ical Value	0.75	Da			ted at 5% Sigr		el
36				K-S Tes	t Statistic	0.181		Kolmog	orov-Smirno	ov Gamma G	OF Test	
37				5% K-S Crit	ical Value	0.111	Da	ta Not Gam	ma Distribut	ted at 5% Sigr	nificance Lev	el
38				Data	Not Gamr	na Distribut	ed at 5% Sign	ificance Le	vel			
39												
40						Gamma	Statistics					
41				k l	hat (MLE)	12.92			k	star (bias cori	rected MLE)	12.33
42					hat (MLE)	1.502			Theta	star (bias cori	,	1.574
43					hat (MLE)	1654					s corrected)	1578
44			MI	LE Mean (bias o	corrected)	19.41				MLE Sd (bia	•	5.528
45										e Chi Square \		1487
46			Adjus	sted Level of Sig	gnificance	0.0463			A	djusted Chi S	quare Value	1485
47												
48		F0/ A :		1101 /			ma Distributi			1101 /	1 =2:	00.00
49	9!	5% Approxin	nate Gamma	UCL (use whe	n n>=50))	20.6		95% Ad	justed Gami	ma UCL (use	when n<50)	20.63
50												

	А	В	С	D		E	F	G	Н	I		J	K		L
51							Lognorma	GOF Test		-					
52			;	Shapiro W	/ilk Te	st Statistic	0.896		Shap	iro Wilk L	.ogno	rmal GOF	Test		
53				5% Shap	oiro Wi	ilk P Value	9.6824E-6		Data Not	Lognorma	l at 5%	% Signific	ance Lev	el	
54				Lilliefo	ors Te	st Statistic	0.154		Lil	iefors Log	norm	al GOF T	est		
55			!	5% Lilliefo	ors Cri	tical Value	0.111		Data Not	Lognorma	l at 5%	% Signific	ance Lev	el	
56						Data Not	Lognormal a	5% Significa	ance Level						
57															
58							_	I Statistics							
59				Minimum	of Lo	gged Data	2.23					Mean of	logged D)ata	2.927
60				Maximum	of Lo	gged Data	4.19					SD of	logged D)ata	0.26
61															
62								ormal Distrib	ution						
63						5% H-UCL						ebyshev (21.2
64				Chebysh	•	•				97.5	% Che	ebyshev (MVUE) l	JCL	23.26
65			99%	Chebysh	iev (M	VUE) UCL	25.62								
66															
67						•		tion Free UC							
68					Da	ta do not	follow a Disc	ernible Distr	ibution (0.05	5)					
69															
70						· · · · · · · · · · · · · · · · · · ·		tribution Free	e UCLs						
71						CLT UCL							ckknife l		20.87
72				6 Standard								95% Boo			21.83
73				95% Hall's						959	% Per	centile Bo	otstrap l	JCL	20.95
74						tstrap UCL									
75				hebyshev								yshev(Me			23.23
76			97.5% C	hebyshev	(Mear	n, Sd) UCL	24.88			99%	Cheby	yshev(Me	an, Sd) l	JCL	28.12
77															
78								UCL to Use							
79				95%	Stude	ent's-t UCL	20.87				C	or 95% Mo	odified-t l	JCL	20.96
80															
81	N	ote: Sugge						ovided to hel	•			t appropri	ate 95%	UCL.	
82								a size, data d							
83								nulation studi					`		
84	Hov	vever, simu	ılations resu	lts will not	t cove	r all Real V	Vorld data se	ts; for additio	nal insight th	ne user ma	ay wa	nt to cons	ult a stat	isticia	an.
85															

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	Sets with N	on-Detects				
2				T								
3	5.		cted Options		100100101	24.40.534						
4	Dat	e/Time of Co		ProUCL 5.15		J4:13 PM						
5			From File	Onsite Metals	s Input.xIs							
6			Il Precision	OFF								
7		Confidence		95%								
8	Number o	f Bootstrap	Operations	2000								
9												
10	Vanadium											
11	vanaulum											
12						General	Statistics					
13			Total	Number of Ob	servations	64	Otationes		Numbe	or of Distinct (Observations	33
14			Total	Number of Ob	osei valions						Observations	0
15					Minimum	29			Numbe	. or wildonly	Mean	45.92
16					Maximum	94					Median	42.5
17					SD	11.83				Std. F	Frror of Mean	1.479
18				Coefficient of	-	0.258				J.G. E	Skewness	1.567
19											0.1.01111000	
20						Normal	GOF Test					
21			S	hapiro Wilk Te	est Statistic	0.89			Shapiro W	ilk GOF Test	<u> </u>	
22				5% Shapiro W		4.4560E-6		Data No		5% Significa		
23				Lilliefors Te		0.144				GOF Test		
25			5	% Lilliefors Cri	itical Value	0.111		Data No	t Normal at	5% Significa	nce Level	
26					Data Not	Normal at	⊥ 5% Significar	nce Level				
27												
28					As	suming Nor	mal Distribut	ion				
29			95% No	ormal UCL				95%	UCLs (Adju	usted for Ske	ewness)	
30				95% Stude	ent's-t UCL	48.39			95% Adjust	ed-CLT UCL	(Chen-1995)	48.66
31									95% Modifi	ed-t UCL (Jo	hnson-1978)	48.44
32							'				-	
33							GOF Test					
34				A-D Te	est Statistic	0.769				g Gamma GC		
35				5% A-D Cri		0.749	D				nificance Lev	el
36					est Statistic	0.124				ov Gamma G		
37				5% K-S Cri		0.111				ted at 5% Sig	nificance Lev	el
38				Data	a Not Gamr	na Distribut	ed at 5% Sig	nificance Le	evel			
39							O					
40				-	1 . / 1		Statistics		-			40.00
41					hat (MLE)	17.68				· ·	rrected MLE)	16.86
42					hat (MLE)	2.598			Theta	star (bias co	*	2.724
43			B 41		hat (MLE)	2263					as corrected)	2158
44			MI	_E Mean (bias	corrected)	45.92			Anne	•	as corrected)	11.18
45			۸ ۵:۰۰-	ted Level of S	ianificanas	0.0463				e Chi Square	Value (0.05) Square Value	2051
46			Aajus	neu Level 01 S	igninicance	0.0403			A	ujusteu Cfii S	oquare value	2049
47					۸۵	sumina Gen	nma Distribut	tion				
48	O	5% Annrovir	nate Cammo	UCL (use who		48.32	ייים הייים פוניים		liusted Cam	ma LICL /uso	when n<50)	48.37
49	99	o whhinxii	nate Gaillilla	OCE (USE MIII	GIT II/-30))	70.3∠		33 /0 AU	gust e u Gaill	ina OCL (use	, wileli II~30)	TO.J/
50												

	•				-						1/2		
E-1	Α	В	С	D	Е	F Lognorma	G GOF Test	Н	l	J	K	L	
51 52			S	hapiro Wilk	est Statistic	0.963		Shar	oiro Wilk Lo	gnormal GOF	Test		
53				5% Shapiro \		0.136				l at 5% Signifi			
54				Lilliefors	Test Statistic	0.11		Lil	liefors Logn	ormal GOF T	est		
55			5	% Lilliefors C	Critical Value	0.111		Data appea	r Lognorma	l at 5% Signifi	icance Level		
56					Data appear	Lognormal	at 5% Signif	icance Leve	l				
57													
58						Lognorma	l Statistics						
59				Minimum of I	ogged Data	3.367				Mean of	logged Data	3.798	
60			N	Maximum of I	ogged Data	4.543				SD of	logged Data	0.235	
61							I						
62					Assı	ıming Logno	ormal Distrib	ution					
63					95% H-UCL	48.28			90%	Chebyshev (MVUE) UCL	49.94	
64			95%	Chebyshev (MVUE) UCL	51.8			97.5%	Chebyshev (MVUE) UCL	54.37	
65			99%	Chebyshev (MVUE) UCL	59.41							
66													
67					Nonparame	tric Distribu	tion Free UC	CL Statistics					
68				Data appea	r to follow a	Discernible	Distribution a	at 5% Signifi	icance Leve	el			
69													
70					Nonpa	ametric Dis	tribution Fre	e UCLs					
71				95	% CLT UCL	48.35				95% Ja	ckknife UCL	48.39	
72				Standard Bo		48.3					tstrap-t UCL	48.8	
73			9	5% Hall's Bo	otstrap UCL	48.9			95%	Percentile Bo	otstrap UCL	48.38	
74				95% BCA Bo	•	48.47							
75				ebyshev(Me	•	50.36				hebyshev(Me		52.37	
76			97.5% Ch	ebyshev(Me	an, Sd) UCL	55.16			99% C	hebyshev(Me	an, Sd) UCL	60.64	
77													
78							UCL to Use						
79					dent's-t UCL	48.39				or 95% Mo	dified-t UCL	48.44	
80				or	95% H-UCL	48.28							
81													
82	<u> </u>	Note: Sugge:								most appropri	ate 95% UCL		
83					itions are bas								
84										, Maichle, and			
85	Ho	wever, simu	lations result	s will not cov	er all Real W	orld data se	ts; for additio	nal insight th	ne user may	want to cons	ult a statistici	an.	
86													
87					es and outpu								
88		H-statistic			•	•			-	in the Techn	ical Guide.		
89					recommende								
90	Us	e of nonpara	ametric meth	ods are pre	terred to com	pute UCL9	tor skewed	data sets w	nich do not	follow a gam	ma distributi	on.	
91													

	Α	В	С	D	E	F	G	Н	I	J	K	L
1				U	CL Statis	tics for Data	Sets with No	n-Detects				
2		Hoor Cal-	otod Ontine									
3	Det		cted Options		2/2010 1./	04:40 DM						
4	Dat	e/Time of Co	From File	ProUCL 5.15/2		J4.49 PIVI						
5		Ent	Il Precision	Onsite Metals	iiiput.xis							
6		Confidence		95%								
7		f Bootstrap (2000								
8	Number o	ТВооізпар	Орегацопъ	2000								
9												
10	Zinc											
12												
13						General	Statistics					
14			Total	Number of Obs	ervations	64			Numbe	r of Distinct C	Observations	37
15									Numbe	r of Missing C	Observations	0
16					Minimum	24					Mean	54.31
17				ľ	Maximum	290					Median	39
18					SD	42.21				Std. E	rror of Mean	5.277
19				Coefficient of	Variation	0.777					Skewness	3.435
20												
21							GOF Test					
22				Shapiro Wilk Tes		0.604			<u> </u>	ilk GOF Test		
23				5% Shapiro Will		0		Data No		5% Significar	ice Level	
24				Lilliefors Tes		0.338				GOF Test		
25			5	% Lilliefors Criti		0.111			t Normal at	5% Significar	ice Level	
26					Data Not	Normal at	5% Significan	ce Level				
27					Δe	eumina Nor	mal Distribution	n .				
28			95% No	ormal UCL	79	sulling Noi			IICI e (Adii	sted for Ske	wnee)	
29			0070110	95% Studer	nt's-t UCI	63.12				ed-CLT UCL (65.41
30						00.12			-	ed-t UCL (Jol	` '	63.5
31											,	
33						Gamma	GOF Test					
34				A-D Tes	t Statistic	5.919		Ander	son-Darling	Gamma GO	F Test	
35				5% A-D Criti	cal Value	0.757	Da	ta Not Gam	ma Distribut	ted at 5% Sig	nificance Lev	el
36				K-S Tes	t Statistic	0.282		Kolmog	orov-Smirno	ov Gamma G	OF Test	
37				5% K-S Criti	cal Value	0.112	Da	ta Not Gam	ma Distribut	ted at 5% Sig	nificance Lev	el
38				Data	Not Gamr	na Distribut	ed at 5% Sign	ificance Le	vel			
39												
40							Statistics					
41					nat (MLE)	3.282				star (bias cor	1	3.138
42					nat (MLE)	16.55			Theta	star (bias cor	,	17.31
43					nat (MLE)	420.1					s corrected)	401.7
44			MI	LE Mean (bias o	corrected)	54.31				MLE Sd (bia	,	30.66
45			A !!		:¢:	0.0400				Chi Square		356.3
46			Adjus	sted Level of Sig	Initicance	0.0463			A	djusted Chi S	quare Value	355.3
47					A		ma Diatribut	<u> </u>				
48	0	E0/ Annaci:	mata Carrer	IICI /was ···b =			nma Distributi		insted Carri	ma LICL /···a =	whom no EOV	61 11
49	9:	o% Approxin	nate Gamma	UCL (use wher	LU>=5U))	61.24		95% Ad	justed Gami	ma UCL (use	wnen n<50)	61.41
50												

	А	В	С	D	T	E	F	G	Н	1	T	J	K		L
51	•						Lognorma	GOF Test			•			-	
52			;	Shapiro V	Vilk Te	est Statistic	0.824		Shap	oiro Wilk L	.ogno	ormal GOI	- Test		
53				5% Shap	piro W	ilk P Value	3.661E-10		Data Not	Lognorma	l at 5	% Signific	ance Lev	el	
54				Lillief	fors Te	est Statistic	0.237		Lil	liefors Log	gnorr	nal GOF 1	Γest		
55			!	5% Lilliefo	ors Cr	itical Value	0.111		Data Not	Lognorma	l at 5	% Signific	ance Lev	el e	
56						Data Not	Lognormal a	t 5% Significa	ance Level						
57															
58								I Statistics							
59						ogged Data							logged [3.835
60				Maximun	n of Lo	ogged Data	5.67					SD of	logged [Data	0.501
61															
62		Assuming Lognormal Distribution 95% H-UCL 59.01 90% Chebyshev (MVUE) UCL													
63						5% H-UCL							,		62.69
64					•	IVUE) UCL				97.5	% Cr	nebyshev ((MVUE) l	JCL	73.88
65			99%	Chebysh	hev (N	IVUE) UCL	86.66								
66															
67						•	etric Distribu								
68					D	ata do not	follow a Disc	ernible Distr	ibution (0.0	5)					
69															
70							rametric Dis	tribution Free	e UCLs						
71						6 CLT UCL							nckknife l		63.12
72						tstrap UCL						95% Boo	•		67.06
73						tstrap UCL				959	% Pe	rcentile Bo	ootstrap l	JCL	63.44
74			220/ 0			tstrap UCL				050/	01 1		0.11.1	101	77.04
75						n, Sd) UCL						yshev(Me			77.31
76			97.5% C	hebyshev	v(Mea	n, Sd) UCL	87.27			99%	Cheb	yshev(Me	ean, Sd) l	JCL	106.8
77															
78			050/ 01			0 1) 1101		UCL to Use							
79			95% Cl	nebyshev	(Mea	n, Sd) UCL	. 77.31								
80		-1 0	-4:	allia ar Ala	1 **		V 1101		Al	147			-+- OF0/		
81	N	ote: Sugge					% UCL are pr		•			st appropri	ate 95%	UCL	•
82	Recommendations are based upon data size, data distribution, and skewness. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).														
83													•		- n
84	Hov	vever, sımu	liations resu	its will no	i cove	er all Keal \	Vorld data se	ts; for additio	mai insight ti	ie user ma	ay wa	int to cons	uit a stat	ISTICI	arı.
85															

	Α	В	С	D	E LIOL Otatio	F	G	H		J	K	L
1					UCL Statis	tics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	12412019 10	1.10.E7 AM						
4	Dat	e/Time of C	From File	ProUCL Input								
5		Fu	Il Precision	OFF	TIFING IFI	IU.XIS						
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Number o	Воогопар	Ороганопо	2000								
9	TPH-d											
10												
11						General	Statistics					
13			Total	Number of Ob	servations	114			Numbe	r of Distinct C	Observations	93
14				Number	of Detects	94				Number of	Non-Detects	20
15			Nı	umber of Distir	nct Detects	91			Numbe	er of Distinct	Non-Detects	3
16				Minim	num Detect	2.1				Minimum	Non-Detect	5
17				Maxim	num Detect	23000				Maximum	Non-Detect	25
18				Varian	ce Detects	19489301				Percent	Non-Detects	17.54%
19				Me	an Detects	3465					SD Detects	4415
20				Medi	an Detects	1326					CV Detects	1.274
21				Skewne	ss Detects	1.91				Kurt	tosis Detects	4.307
22				Mean of Logg	ed Detects	6.908				SD of Log	ged Detects	2.116
23												
24					Norm	nal GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Te	est Statistic	0.771	ı	Normal GOF	Test on De	tected Obse	rvations Only	,
26			!	5% Shapiro W	ilk P Value	0]	Detected Da	ta Not Norma	al at 5% Sign	ificance Leve	;l
27				Lilliefors Te		0.216				GOF Test		
28			5	% Lilliefors Cri		0.0916				al at 5% Sign	ificance Leve	4
29				De	tected Data	a Not Norma	l at 5% Sign	ificance Lev	rel .			
30												
31			Kaplan-	Meier (KM) St			ritical Value	s and other	<u>-</u>			
32					KM Mean				KI		rror of Mean	395.4
33				050/ 1	KM SD				050/ 1/14 /5		(BCA) UCL	3549
34					KM (t) UCL				•	Percentile Boo	• /	3521
35				95% K 90% KM Cheb	(M (z) UCL					95% KM Boo	·	3653 4581
36				.5% KM Cheb						95% KM Che	byshev UCL	6792
37			97	.5 /6 INW CHED	yonev OCL	0027				JO /U IXIVI CITE	Dydilev UCL	
38				Ga	mma GOF	Tests on De	etected Obse	ervations Or	nlv			
39					est Statistic	0.467			•	rling GOF Te	est	
40				5% A-D Cri		0.817	Detected				5% Significan	ce Level
41					est Statistic	0.0735				Smirnov GO		
42				5% K-S Cr		0.0976	Detected				5% Significan	ce Level
44							stributed at 5					
45												
46					Gamma	Statistics or	Detected D	ata Only				
47				k	hat (MLE)	0.51			k	star (bias cor	rrected MLE)	0.5
48				Theta	hat (MLE)	6798			Theta	star (bias cor	rected MLE)	6923
49				nu	hat (MLE)	95.82				nu star (bia	as corrected)	94.09
50				Mea	n (detects)	3465						
50							<u> </u>					

	A B C D E	F	G H I J K	L
51	Commo DOS	Chatlatias	sing Imputed Non Detecto	
52			sing Imputed Non-Detects	
53			5 NDs with many tied observations at multiple DLs s <1.0, especially when the sample size is small (e.g., <15-20)	
54			yield incorrect values of UCLs and BTVs	
55			en the sample size is small.	
56		-	by be computed using gamma distribution on KM estimates	
57	Minimum	0.01	Mean	2857
58	Maximum		Median	651
59	SD	4218	CV	1.476
60	k hat (MLE)	0.234	k star (bias corrected MLE)	0.234
61	Theta hat (MLE)		Theta star (bias corrected MLE)	12231
62	nu hat (MLE)	53.33	nu star (bias corrected)	53.26
63	Adjusted Level of Significance (β)	0.0479	The star (stas corrected)	
64	Approximate Chi Square Value (53.26, α)	37.49	Adjusted Chi Square Value (53.26, β)	37.32
65 66	95% Gamma Approximate UCL (use when n>=50)	4058	95% Gamma Adjusted UCL (use when n<50)	4077
67	· · · · · · · · · · · · · · · · · · ·		, , , , , , , , , , , , , , , , , , ,	
68	Estimates of G	amma Parai	meters using KM Estimates	
69	Mean (KM)	2858	SD (KM)	4199
70	Variance (KM)	17632117	SE of Mean (KM)	395.4
71	k hat (KM)	0.463	k star (KM)	0.457
72	nu hat (KM)	105.6	nu star (KM)	104.2
73	theta hat (KM)	6170	theta star (KM)	6256
74	80% gamma percentile (KM)	4669	90% gamma percentile (KM)	7874
75	95% gamma percentile (KM)	11335	99% gamma percentile (KM)	19921
76				
77	Gamm	a Kaplan-M	eier (KM) Statistics	
78	Approximate Chi Square Value (104.16, α)	81.61	Adjusted Chi Square Value (104.16, β)	81.35
79	95% Gamma Approximate KM-UCL (use when n>=50)	3647	95% Gamma Adjusted KM-UCL (use when n<50)	3659
80				
81	Lognormal GC	F Test on D	etected Observations Only	
82	Shapiro Wilk Approximate Test Statistic	0.91	Shapiro Wilk GOF Test	
83	5% Shapiro Wilk P Value	3.2299E-7	Detected Data Not Lognormal at 5% Significance Lev	/el
84	Lilliefors Test Statistic	0.12	Lilliefors GOF Test	
85	5% Lilliefors Critical Value	0.0916	Detected Data Not Lognormal at 5% Significance Lev	/el
86	Detected Data	Not Lognorm	nal at 5% Significance Level	
87				
88			Using Imputed Non-Detects	
89	Mean in Original Scale		Mean in Log Scale	6.201
90	SD in Original Scale		SD in Log Scale	2.489
91	95% t UCL (assumes normality of ROS data)	3516	95% Percentile Bootstrap UCL	3531
92	95% BCA Bootstrap UCL		95% Bootstrap t UCL	3572
93	95% H-UCL (Log ROS)	27518		
94	Observation and the LORA control	an I	Date and Accuming Lagranger Distribution	
95			Data and Assuming Lognormal Distribution	200.0
96	KM SD (logged)	5.912	KM Geo Mean	369.3
97	KM Standard Error of Moon (logged)	2.89	95% Critical H Value (KM-Log)	4.47
98	KM Standard Error of Mean (logged)	0.275	95% H-UCL (KM -Log)	81040
99	KM SD (logged) KM Standard Error of Mean (logged)	2.89 0.275	95% Critical H Value (KM-Log)	4.47
100	kivi Standard Error of Mean (logged)	0.275		

	Α	В	С	D	E	F	G	Н	I	J	K	L			
101															
102						DL/2 S	tatistics								
103			DL/2 I	Normal					DL/2 Log-1	ransformed					
104				Mean in O	riginal Scale	2858				Mean i	n Log Scale	6.012			
105				SD in O	riginal Scale	4217				SD i	n Log Scale	2.742			
106			95% t l	JCL (Assume	es normality)	3513				95%	H-Stat UCL	52869			
107			DL/2	s not a reco	mmended m	ethod, provi	ded for comp	parisons and	l historical re	easons					
108															
109		Nonparametric Distribution Free UCL Statistics													
110				Detected	Data appea	r Gamma Di	stributed at	5% Significa	nce Level						
111															
112						Suggested	UCL to Use								
113			95% KM A	pproximate (Gamma UCL	3647									
114															
115	١	Note: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	p the user to	select the m	nost appropria	ate 95% UCI				
116			F	Recommenda	itions are ba	sed upon dat	a size, data	distribution, a	and skewnes	SS.					
117		These recor	mmendations	are based u	pon the resu	ılts of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	Lee (2006).				
118	Ho	wever, simu	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.			
119									·						

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	Sets with No	n-Detects				
2		110-1-	-11-01	1								
3	Dot	e/Time of Co	cted Options	ProUCL 5.15	124/2019 10	1.10.E0 AM						
4	Date	e/Time of Co	From File	ProUCL 5.15								
5		Eul	I Precision	OFF	it IPHY IPF	iu.xis						
6		Confidence		95%								
7		f Bootstrap (2000								
8	110111501 0	. 200toti ap	- Porduorio	2000								
9	TPH-g											
11												
12						General	Statistics					
13			Total	Number of Ol	bservations	110			Numbe	r of Distinct C)bservations	84
14									Number	r of Missing C)bservations	2
15				Number	r of Detects	90				Number of I	Non-Detects	20
16			Nı	umber of Disti	nct Detects	82			Numbe	er of Distinct I	Non-Detects	2
17				Minin	num Detect	1.5				Minimum	Non-Detect	1
18				Maxin	num Detect	19000				Maximum	Non-Detect	4.5
19				Variar	nce Detects	9096832				Percent I	Non-Detects	18.18%
20					ean Detects						SD Detects	
21					ian Detects	757.5					CV Detects	1.52
22					ess Detects	3.117					osis Detects	12.49
23				Mean of Logg	ged Detects	6.383				SD of Log	ged Detects	2.063
24						10057		<u> </u>				
25				hanina Mille T			t on Detects (Toot on Do	tected Obse	mretiene Onli	
26				hapiro Wilk To 5% Shapiro W		0.657				al at 5% Signi	-	<u></u>
27			,		est Statistic	0.255		elected Dat		GOF Test		1
28			5	% Lilliefors Cr		0.0936	D	etected Dat		al at 5% Signi	ificance Leve	 .l
29							al at 5% Signif					
30												
32			Kaplan-	Meier (KM) S	tatistics usi	ng Normal C	Critical Values	and other I	Nonparame	tric UCLs		
33					KM Mean	1624			KI	M Standard E	rror of Mean	270.3
34					KM SD	2819				95% KM	1 (BCA) UCL	2085
35				95%	KM (t) UCL	2072			95% KM (F	Percentile Boo	otstrap) UCL	2072
36				95% I	KM (z) UCL	2069				95% KM Boo	tstrap t UCL	2189
37			S	90% KM Cheb	yshev UCL	2435			,	95% KM Che	byshev UCL	2802
38			97	.5% KM Cheb	yshev UCL	3312			,	99% KM Che	byshev UCL	4313
39												
40							etected Obser		-			
41					est Statistic	0.331				rling GOF Te		
42					ritical Value	0.816	Detected			istributed at 5		ce Level
43					est Statistic	0.0554	Doto -t		_	Smirnov GO		00 015
44					ritical Value	0.0995	stributed at 59			istributed at 5	o Significan	Le Level
45				Detected (uaia appea	daniilid Di	อแเมนเซน ฮิเ ฮิวิ	o Significal	ICE LEVEI			
46					Gamma	Statistics of	n Detected Da	ıta Onlv				
47				I	k hat (MLE)				k	star (bias cor	rected MI F)	0.512
48					a hat (MLE)	3806				star (bias con	· ·	3880
49					u hat (MLE)	93.87				`	as corrected)	92.07
50					()	55.57				0.0. (510		

	Α	В	С	D	Е	F	G	Н	l	J	K	L
51				N	lean (detects)	1985						
52												
53					Gamma ROS							
54					d when data s							
55		GROS may			r of detects is			-	-	-	e.g., <15-20)	
56			Fo	r such situa	ations, GROS		-			TVs		
57					This is espec	-						
58		For gar	mma distribut	ed detected	d data, BTVs a	and UCLs ma	y be compu	ited using ga	mma distribu	ition on KM e	stimates	
59					Minimum	0.01					Mean	1624
60					Maximum	19000					Median	487
61					SD	2832					CV	1.744
62					k hat (MLE)	0.238			k	star (bias co	rrected MLE)	0.238
63				Th	eta hat (MLE)	6821			Theta	star (bias co	rrected MLE)	6833
64					nu hat (MLE)	52.37				nu star (bia	as corrected)	52.28
65			Adjusted	Level of S	gnificance (β)	0.0478						
66		App	oroximate Ch	i Square Va	alue (52.28, α)	36.67			Adjusted Ch	i Square Val	ue (52.28, β)	36.5
67	!	95% Gamma	a Approximat	e UCL (use	when n>=50)	2315		95% G	amma Adjust	ted UCL (use	when n<50)	2326
68												
69		Estimates of Gamma Parameters using KM Estimates										
70					Mean (KM)	1624					SD (KM)	2819
71				\	/ariance (KM)	7945483				SE c	of Mean (KM)	270.3
72					k hat (KM)	0.332					k star (KM)	0.329
73					nu hat (KM)	73.02					nu star (KM)	72.37
74				1	theta hat (KM)	4893				the	eta star (KM)	4937
75			80%	6 gamma p	ercentile (KM)	2542			909	% gamma pe	rcentile (KM)	4733
76			95%	6 gamma p	ercentile (KM)	7209			999	% gamma pe	rcentile (KM)	13575
77												II.
78					Gamm	na Kaplan-M	eier (KM) S	tatistics				
79		App	oroximate Ch	i Square Va	alue (72.37, α)	53.78			Adjusted Ch	i Square Val	ue (72.37, β)	53.57
80	95%	Gamma App	proximate KN	Л-UCL (use	when n>=50)	2185		95% Gamm	na Adjusted k	KM-UCL (use	when n<50)	2194
81												I.
82				ı	_ognormal GC	F Test on D	etected Ob	servations C	nly			
83		Sł	hapiro Wilk A	pproximate	Test Statistic	0.899			Shapiro Wi	ilk GOF Test	1	
84				5% Shapiro	Wilk P Value	6.4744E-8	D	etected Data	Not Lognorr	mal at 5% Sig	gnificance Le	vel
85				Lilliefors	Test Statistic	0.127			Lilliefors	GOF Test		
86			5	% Lilliefors	Critical Value	0.0936	D	etected Data	Not Lognorr	mal at 5% Sig	gnificance Le	vel
87				D	etected Data	Not Lognorn	nal at 5% Si	ignificance L	evel			
88												
89				L	ognormal RO	S Statistics	Using Impu	ted Non-Det	ects			
90				Mean in	Original Scale	1626				Mean	in Log Scale	5.61
91				SD in	Original Scale	2831				SD	in Log Scale	2.518
92		95% t U	JCL (assume	s normality	of ROS data)	2074			95%	Percentile Bo	ootstrap UCL	2107
93			!	95% BCA E	Bootstrap UCL	2151				95% Boo	otstrap t UCL	2248
94				95% H-U	CL (Log ROS)	16958						
95							I					1
96			Statis	stics using	KM estimates	on Logged I	Data and As	ssuming Log	normal Distri	ibution		
97					Mean (logged)						M Geo Mean	186.2
98					M SD (logged)				95% (Critical H Val	ue (KM-Log)	4.703
99			KM Standa		Mean (logged)						CL (KM -Log)	
					M SD (logged)	3.076			95% (Critical H Val	` ,	4.703
100					(.09900)	2.0.0					(= -9)	

	Α	В	С	D	Е	F	G	Н	I	J	K	L				
101			KM Standar	rd Error of M	lean (logged)	0.295										
102																
103						DL/2 S	tatistics									
104			DL/2 N	Vormal					DL/2 Log-1	Transformed						
105				Mean in C	Original Scale	1624				Mean i	n Log Scale	5.138				
106				SD in C	Original Scale	2832				SD i	n Log Scale	3.252				
107			95% t L	JCL (Assum	es normality)	2072				95%	H-Stat UCL	156831				
108		DL/2 is not a recommended method, provided for comparisons and historical reasons														
109																
110		Nonparametric Distribution Free UCL Statistics														
111				Detected	d Data appea	r Gamma D	stributed at	5% Significa	nce Level							
112																
113						Suggested	UCL to Use)								
114			95% KM A	pproximate	Gamma UCL	2185										
115																
116	ļ	Note: Sugge	stions regard	ing the sele	ction of a 95%	6 UCL are pi	ovided to he	lp the user to	select the n	nost appropria	ate 95% UCL					
117			F	Recommend	ations are ba	sed upon da	ta size, data	distribution,	and skewnes	SS.						
118		These reco	mmendations	are based	upon the resu	ults of the sin	nulation stud	ies summari:	zed in Singh,	Maichle, and	Lee (2006).					
119	Ho	wever, simu	ılations result	s will not co	ver all Real V	Vorld data se	ts; for addition	onal insight t	he user may	want to consi	ult a statistic	ian.				
120																

	Α	В	С	D	E LIOL Obstice	F	G Octovrith N	H		J	K	L
1					UCL Statist	tics for Data	Sets with N	on-Detects				
2		Llaav Cala	-td Oti									
3	Det	e/Time of C	cted Options	ProUCL 5.15/	24/2019 12	.26.20 DM						
4	Dati	e/ Tillle of C	From File	ProUCL Input		.20.30 FIVI						
5		Fu	Il Precision	OFF	. VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Trainbor o	. Bootonap										
9	1,2,4-Trimet	thvlbenzene										
10												
12						General	Statistics					
13			Total	Number of Ob	servations	50			Numbe	r of Distinct C	Observations	36
14				Number	of Detects	34				Number of	Non-Detects	16
15			Nu	ımber of Distir	nct Detects	33			Numbe	er of Distinct	Non-Detects	3
16				Minim	um Detect	0.012				Minimum	Non-Detect	0.005
17				Maxim	um Detect	170				Maximum	Non-Detect	0.5
18				Varian	ce Detects	1310				Percent	Non-Detects	32%
19				Me	an Detects	26.36					SD Detects	36.19
20				Media	an Detects	10.6					CV Detects	1.373
21				Skewne	ss Detects	2.299				Kurt	osis Detects	6.621
22				Mean of Logg	ed Detects	1.89				SD of Log	ged Detects	2.404
23												
24							t on Detects	Only				
25				hapiro Wilk Te		0.728			-	ik GOF Test		
26			5% SI	napiro Wilk Cri		0.933	[Detected Da			ificance Leve	
27				Lilliefors Te		0.253				GOF Test		
28			5	% Lilliefors Cri		0.15				al at 5% Sign	ificance Leve	
29				De	tected Data	Not Norma	l at 5% Sign	ificance Lev	el			
30			/	M-! (IZM) Ot	_4 _4	N I G			N	w. 1101 -		
31			Kapian-i	Meier (KM) St			ritical value	s and otner	<u> </u>		·	4 575
32					KM Mean KM SD	17.93			Ki		rror of Mean	4.575
33				0E9/ L	KM (t) UCL	31.87 25.6			OE9/ KM/F	ercentile Bo	1 (BCA) UCL	25.82 25.84
34					(M (z) UCL	25.45			`	95% KM Boo	. ,	28.68
35			C	95% N 10% KM Cheby	` '	31.65					byshev UCL	37.87
36				.5% KM Cheby		46.5				99% KM Che	-	63.45
37					, 302				·		.,	
38				Ga	mma GOF	Tests on De	etected Obse	ervations Or	ıly			
					est Statistic	0.29				rling GOF Te	est	
40				5% A-D Cri		0.819	Detected			_	5% Significand	ce Level
42				K-S Te	st Statistic	0.0796				Smirnov GO		
43				5% K-S Cri	tical Value	0.16	Detected	d data appea	ır Gamma D	istributed at 5	5% Significand	ce Level
44				Detected d	lata appear	Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47				k	hat (MLE)	0.465			k	star (bias cor	rected MLE)	0.444
48				Theta	hat (MLE)	56.68			Theta	star (bias cor	rected MLE)	59.42
49				nu	hat (MLE)	31.62				nu star (bia	as corrected)	30.17
50				Mea	n (detects)	26.36						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	servations at	•		
54		GROS may							the sample s		e.g., <15 - 20)	
55			Fo			•	•		f UCLs and B	TVs		
56					-	cially true who	-					
57		For gar	nma distribut	ed detected			ay be compu	ited using ga	amma distribu	ıtion on KM e		
58					Minimum						Mean	17.93
59					Maximum						Median	2.735
60					SD						CV	1.796
61					k hat (MLE)					star (bias cor	•	0.233
62					eta hat (MLE)				Theta	star (bias cor		76.99
63					nu hat (MLE)					nu star (bia	as corrected)	23.29
64					gnificance (β)							
65			roximate Ch	-					=	ni Square Valu		13.08
66		95% Gamma	Approximat	e UCL (use	when n>=50	31.37		95% G	amma Adjus	ted UCL (use	when n<50)	31.91
67		Estimates of Gamma Parameters using KM Estimates										
68				E			meters usin	g KM Estim	ates			04.07
69					Mean (KM)						SD (KM)	31.87
70				V	ariance (KM)					SE 0	f Mean (KM)	4.575
71					k hat (KM)						k star (KM)	0.311
72					nu hat (KM)						nu star (KM)	31.08
73					neta hat (KM)						eta star (KM)	57.68
74					rcentile (KM)					% gamma per	, ,	52.64
75			95%	6 gamma pe	rcentile (KM)	81.08			999	% gamma per	centile (KIM)	154.7
76					0	na Kanlan M	latan (IZM) O	A-4 -4				
77		Ann	rovimata Ch	i Cauara Val		na Kaplan-M	Heier (KIVI) S	tausucs	Adjusted Ch	oi Caucro Val	(21.09.0)	19.07
78	050	App Gamma App	proximate Ch	-				050/ 05	ma Adjusted F	ni Square Valu		29.22
79	95%	о Gamma Арр	DIOXIIIIale KI	/i-UCL (use	when n>=50	20.0		95% Gaiiii	ma Aujusteu r	Nivi-OCL (use	when h<50)	29.22
80				1	ognormal G	OF Test on D	etected ∩h	convations (Only			
81			9		Test Statistic			Sei Valions (ilk GOF Test		
82				•	Critical Value		Г	etected Dat	a Not Lognori			vol
83			376 31	·	Test Statistic		L	retected Dat	_	GOF Test	, illicance Le	vei
84			5		Critical Value		Г	etected Dat	a Not Lognori		nificance Le	vel
85						Not Lognorr				mar at 5 % Oly		
86					riccied Data	Not Logilon	ilai at 5 % O	igriiiicarice i	Levei			
87				17	ognormal RC	S Statistics	Usina Impu	ted Non-Det	tects			
88					riginal Scale		mpu	.54 (10)1-06		Mean	in Log Scale	0.292
89					riginal Scale						in Log Scale	
90		95% t l	JCL (assume						95%	Percentile Bo		26
91			•	•	ootstrap UCL						otstrap t UCL	28.65
92					L (Log ROS)					30,0 500		_0.00
93					. , , , , , , ,							
94			Statis	stics usina k	(M estimates	on Loaged	Data and As	ssumina Loc	gnormal Distr	ibution		
95			3.0.11		lean (logged)				J		M Geo Mean	0.696
96					SD (logged)				95%	Critical H Val		6.354
97			KM Standa		lean (logged)						CL (KM -Log)	
98					SD (logged)				95%	Critical H Val		6.354
99			KM Standa		lean (logged)							,,
100			Otaliaal		(ioggod)	0.002						

	Α	В	С	D	E	F	G	Н	I	J	K	L			
101															
102						DL/2 S	tatistics								
103			DL/2 I	Normal					DL/2 Log-1	ransformed					
104				Mean in O	riginal Scale	17.95				Mean i	in Log Scale	-0.116			
105				SD in O	riginal Scale	32.18				SD i	in Log Scale	3.738			
106			95% t l	JCL (Assume	es normality)	25.58				95%	H-Stat UCL	26553			
107		DL/2 is not a recommended method, provided for comparisons and historical reasons													
108															
109					Nonparamo	etric Distribu	tion Free UC	CL Statistics							
110				Detected	Data appea	r Gamma Di	stributed at	5% Significa	nce Level						
111															
112						Suggested	UCL to Use								
113			95% KM A	pproximate (Gamma UCL	28.8									
114															
115	١	Note: Sugge	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	p the user to	select the m	nost appropria	ate 95% UCI				
116			F	Recommenda	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.					
117		These recor	mmendations	are based ι	ipon the resu	ılts of the sim	ulation studi	es summariz	zed in Singh,	Maichle, and	Lee (2006)				
118	Ho	wever, simu	lations result	s will not cov	er all Real V	/orld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.			
119						·									

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	Sets with N	ion-Detects				
2		0.1		I								
3	D-4	e/Time of Co	cted Options	ProUCL 5.15	704/0010 10	.07.10 DM						
4	Date	e/Time of Co				:27:13 PIVI						
5		E.J	From File II Precision	ProUCL Inpu	It VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap (2000								
8	Nullibel o	і вооізпар (Operations	2000								
9	1,3,5-Trimet	thylhenzene	1									
10	1,0,0-1111101	in y ibenzene	<u>'</u>									
11						General	Statistics					
12			Total	Number of O	bservations	47			Numbe	er of Distinct C	bservations	33
13										r of Missing C		2
14 15				Numbe	r of Detects	30				_	Non-Detects	17
16			Nu	umber of Disti	inct Detects	30			Numb	er of Distinct N	Non-Detects	3
17				Minir	num Detect	0.014				Minimum	Non-Detect	0.005
18				Maxir	num Detect	250				Maximum	Non-Detect	0.5
19				Varia	nce Detects	2033				Percent N	Non-Detects	36.17%
20				Me	ean Detects	13.53					SD Detects	45.09
21				Med	lian Detects	3.235					CV Detects	3.333
22				Skewn	ess Detects	5.318				Kurto	osis Detects	28.76
23				Mean of Logo	ged Detects	0.939				SD of Log	ged Detects	1.877
24							1					
25					Norm	al GOF Tes	t on Detects	Only				
26				hapiro Wilk T		0.285			•	ilk GOF Test		
27			5% SI	napiro Wilk C		0.927	I	Detected Da		al at 5% Signi	ficance Level	İ
28					est Statistic	0.411				GOF Test		
29			5'	% Lilliefors C		0.159				al at 5% Signi	ficance Level	1
30				De	etected Data	Not Norma	al at 5% Sign	ificance Lev	rel			
31												
32			Kaplan-l	Meier (KM) S			Critical Value	s and other				
33					KM Mean	8.645			K	M Standard E		5.342
34				050/	KM SD	36.01			050/ 1/84 /5		(BCA) UCL	19.4
35					KM (t) UCL	17.61 17.43			•	Percentile Boo 95% KM Boo	. ,	19.35 62.32
36			C	95% NM Cheb		24.67				95% KM Chel		31.93
37				.5% KM Cheb	•	42				99% KM Chel	-	61.79
38				TAN OHEL	,,0.104 002						-, 0.13¥ 30L	
39				G	amma GOF	Tests on D	etected Obse	ervations Or	niv			
40					est Statistic	1.668				rling GOF Te	est	
41					ritical Value	0.832	Detect			stributed at 5%		Level
43					est Statistic	0.197				-Smirnov GO		
44					ritical Value	0.171	Detect			stributed at 5%		Level
45				Detecte	d Data Not C	Gamma Dis	ributed at 59					
46												
47					Gamma	Statistics o	n Detected D	ata Only				
48					k hat (MLE)	0.396			k	star (bias cor	rected MLE)	0.378
49				Thet	a hat (MLE)	34.19			Theta	star (bias cor	rected MLE)	35.76
50				n	u hat (MLE)	23.74				nu star (bia	s corrected)	22.7
- 55							1					

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51				Me	ean (detects)	13.53						
52												
53					Gamma ROS							
54									servations at			
55		GROS may					-	-	· ·		(e.g., <15-20)	
56			Fo						f UCLs and B	TVs		
57					his is especi	-	-					
58		For gar	mma distribut	ed detected			y be compi	uted using ga	amma distribu	ition on KM (0.000
59					Minimum	0.01					Mean	8.639
60					Maximum	250					Median	
61					SD	36.4			l.		CV	4.213 0.224
62				The	k hat (MLE)	0.224				`	orrected MLE)	38.54
63					ta hat (MLE)	38.52 21.08			rneta	`	orrected MLE)	21.07
64			Λ diustod		nu hat (MLE) nificance (β)	0.0449				nu star (bi	ias corrected)	21.07
65		Λnn	oroximate Ch	_		11.64			Adjusted Ch	i Sauara Va	llue (21.07, β)	11.42
66			Approximate	•	, ,	15.63		05% C		· ·	e when n<50)	15.94
67		95 % Gaillina	а Арргохіпіан	e OCL (use v	viieii ii>=50)	15.05		95 /6 G	iaiiiiia Aujusi	ieu oct (us	e when h	15.94
68				E	stimates of G	amma Dara	matare usir	na KM Estim	atos			
69					Mean (KM)	8.645	illeters usii	ig Kw Lauin	ales		SD (KM)	36.01
70				V:	ariance (KM)	1296				SE	of Mean (KM)	5.342
71					k hat (KM)	0.0576					k star (KM)	0.0681
72					nu hat (KM)	5.418					nu star (KM)	6.406
73				th	eta hat (KM)	150				th	neta star (KM)	126.9
74			80%		centile (KM)	2.907			909		ercentile (KM)	18.26
75					centile (KM)	49.55				- :	ercentile (KM)	164.9
76				- J I	,					- 3 1-	,	
77 78					Gamm	a Kaplan-M	eier (KM) S	Statistics				
79		Ap	proximate C	hi Square Va		1.851	. ,		Adjusted C	Chi Square V	'alue (6.41, β)	1.774
80	95%	Gamma Ap	proximate KN	1-UCL (use v	vhen n>=50)	29.92		95% Gamr	na Adjusted k	KM-UCL (us	e when n<50)	31.21
81				95% G	amma Adjust	ed KM-UCL	(use when	k<=1 and 15	< n < 50)			
82												
83				Lo	ognormal GC	F Test on D	etected Ob	servations (Only			
84			S	hapiro Wilk	Test Statistic	0.972			Shapiro W	ilk GOF Tes	st	
85			5% SI	napiro Wilk C	Critical Value	0.927	De	tected Data	appear Logno	ormal at 5%	Significance L	evel
86				Lilliefors	Test Statistic	0.0977			Lilliefors	GOF Test		
87			5	% Lilliefors C	Critical Value	0.159	De	tected Data	appear Logno	ormal at 5%	Significance L	evel
88				Dete	cted Data ap	pear Logno	rmal at 5%	Significance	Level			
89												
90					gnormal RO		Using Impu	ited Non-Det	tects			
91				Mean in O	riginal Scale	8.658				Mear	n in Log Scale	-0.601
92					riginal Scale	36.39					in Log Scale	
93		95% t l	JCL (assume			17.57			95%		ootstrap UCL	18.87
94					otstrap UCL	24.86				95% Bo	otstrap t UCL	59.54
95				95% H-UC	L (Log ROS)	102.3						
96												
97			Statis				Data and A	ssuming Log	normal Distr			1
98					ean (logged)	-1.212					(M Geo Mean	
99					SD (logged)	3.272			95% (alue (KM-Log)	
100			KM Standa	rd Error of M	ean (logged)	0.494				95% H-U	CL (KM -Log)	871.2

	Α	В	С	D	E	F	G	Н	I	J	K	L
101				KM	SD (logged)	3.272			95% C	Critical H Va	lue (KM-Log)	5.445
102			KM Standar	d Error of M	ean (logged)	0.494						
103						!						
104						DL/2 S	tatistics					
105			DL/2 N	Normal					DL/2 Log-T	ransformed		
106				Mean in O	riginal Scale	8.663				Mean	in Log Scale	-1.019
107				SD in O	riginal Scale	36.39				SD	in Log Scale	3.26
108			95% t L	ICL (Assume	es normality)	17.57				95%	6 H-Stat UCL	996.7
109			DL/2 i	s not a reco	mmended m	ethod, provi	ded for comp	parisons and	d historical re	asons		
110												
111					Nonparame	etric Distribu	tion Free UC	CL Statistics				
112				Detected I	Data appear	Lognormal [Distributed a	t 5% Signific	cance Level			
113												
114						Suggested	UCL to Use					
115			95	% KM (Chel	yshev) UCL	31.93						
116												
117	١	Note: Sugges	tions regard	ing the selec	ction of a 95%	UCL are pr	ovided to he	lp the user to	select the m	ost appropr	iate 95% UCL	
118			R	tecommenda	ations are bas	sed upon da	ta size, data	distribution,	and skewnes	S.		
119		These recon	nmendations	are based ι	ipon the resu	Its of the sin	nulation studi	es summariz	zed in Singh,	Maichle, an	d Lee (2006).	
120	Ho	wever, simul	ations result	s will not cov	er all Real W	orld data se	ts; for addition	onal insight t	he user may	want to cons	sult a statistici	an.
121												

	Α	В	С	D	E LIOL Otation	F	G	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	atad Ontiana									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	124/2019 12:	22:21 DM						
4	Dat	e/Time or C	From File	ProUCL Inpu		23.31 FIVI						
5		Fu	III Precision	OFF	t VOCS.XIS							
6			Coefficient	95%								
7		f Bootstrap		2000								
8	- rambor o	Boototrap	- Срогалогіо	2000								
9	4-Isopropylt	oluene										
10												
11						General	Statistics					
13			Total	Number of Ol	oservations	23			Numbe	r of Distinct C	Observations	13
14				Number	of Detects	11				Number of	Non-Detects	12
15			N	umber of Disti	nct Detects	11			Numbe	er of Distinct	Non-Detects	4
16				Minin	num Detect	0.01				Minimum	Non-Detect	0.005
17				Maxin	num Detect	16				Maximum	Non-Detect	5
18				Variar	ice Detects	23.29				Percent	Non-Detects	52.17%
19				Me	an Detects	3.452					SD Detects	4.826
20				Med	ian Detects	1.6					CV Detects	1.398
21				Skewne	ess Detects	2.133				Kurt	osis Detects	4.582
22				Mean of Logg	jed Detects	-0.1				SD of Log	ged Detects	2.415
23											l.	
24					Norma	al GOF Tes	t on Detects	Only				
25				hapiro Wilk Te		0.719			Shapiro Wi	lk GOF Test		
26			5% SI	napiro Wilk Cr	itical Value	0.85]	Detected Da	ta Not Norma	al at 5% Sign	ificance Level	
27				Lilliefors Te	est Statistic	0.297				GOF Test		
28			5	% Lilliefors Cr		0.251				al at 5% Sign	ificance Level	
29				De	etected Data	Not Norma	l at 5% Sign	ificance Lev	rel			
30												
31			Kaplan-	Meier (KM) S		<u> </u>	ritical Value	s and other	•			
32					KM Mean	1.683			KI		rror of Mean	0.792
33					KM SD	3.615					1 (BCA) UCL	3.001
34					KM (t) UCL	3.044			•		otstrap) UCL	3.047
35					KM (z) UCL	2.986					otstrap t UCL	5.636
36				00% KM Cheb .5% KM Cheb	-	4.06 6.632					byshev UCL	5.137 9.568
37			97	.5 /6 KIVI CHED	youev UCL	0.032			•	99 /0 KIVI CHE	bysilev UCL	J.500
38				G.	amma COF	Tests on Da	etected Obse	ervations On	ılv			
39					est Statistic	0.286	COOLOG ODSC		•	rling GOF Te	est	
40					itical Value	0.785	Detected				5% Significand	e Level
41					est Statistic	0.136	20.00.00			Smirnov GO		
42					itical Value	0.27	Detected				5% Significand	ce Level
44							stributed at 5					
45					• •							
46					Gamma	Statistics or	Detected D	ata Only				
47				ŀ	k hat (MLE)	0.478			k	star (bias cor	rected MLE)	0.408
48				Theta	a hat (MLE)	7.227			Theta	star (bias cor	rected MLE)	8.461
49				nı	u hat (MLE)	10.51				nu star (bia	as corrected)	8.975
50				Mea	n (detects)	3.452						
55							l					

	Α	В	С	D	E		F	G	Н	I	J	K	L
51					0	D00	Otati-#	alma Inc.	-d N 5 :	-4-			
52			0000						ed Non-Dete		le: L DI		
53		0000	-						-		multiple DLs		
54		GRUS may									ize is small (e	.y., < 15-20)	
55			FO	o such situ			-	•	rect values o	f UCLs and B	1 VS		
56		Eor gon	ama distribut	tad dataata		-					ution on KM e	ctimatas	
57		roi gan	iiiia uisiiibu	ied detecte	Minir		0.01	y be comp	uted using ga	amma uisuibu	JUON ON KIVI E	Mean	1.656
58					Maxir		16					Median	
59					IVIGAII	SD	3.698					CV	
60					k hat (N		0.242			k	star (bias cor		
61				Т	heta hat (N		6.853				star (bias cor		
62					nu hat (N		11.12				`	as corrected)	
63			Adjusted	Level of S	•	· '	0.0389				(5.6		
64		App	roximate Ch		•	`` '	4.576			Adjusted Ch	ni Square Vali	ue (11.00, β)	4.279
65		95% Gamma			`		3.981		95% C	•	ted UCL (use		
66 67			11	- (3.0)		,					- (3.30		
68					Estimates	of G	amma Para	meters usi	ng KM Estim	ates			
69					Mean (1.683					SD (KM)	3.615
70					Variance (13.07				SE o	f Mean (KM)	
71					k hat (0.217					k star (KM)	0.217
72					nu hat ((KM)	9.97					nu star (KM)	10
73					theta hat ((KM)	7.766				the	eta star (KM)	7.74
74			80%	6 gamma p	percentile ((KM)	2.31			909	% gamma per	rcentile (KM)	5.086
75			95%	6 gamma p	ercentile ((KM)	8.48			999	% gamma per	rcentile (KM)	17.7
76													
77					G	amm	a Kaplan-M	eier (KM) (Statistics				
78		Арр	roximate Ch	i Square V	alue (10.0	0, α)	3.943			Adjusted Ch	ni Square Vali	ue (10.00, β)	3.671
79	95%	Gamma App	oroximate KN	M-UCL (us	e when n>	=50)	4.269		95% Gamı	ma Adjusted I	KM-UCL (use	when n<50)	4.586
80								l					- !!
81					Lognorma	al GO	F Test on D	etected O	bservations (Only		-	-
82			S	hapiro Wil	k Test Sta	tistic	0.847			Shapiro W	ilk GOF Test		
83			5% S	hapiro Will	Critical V	'alue	0.85		Detected Dat	a Not Lognor	mal at 5% Sig	jnificance Le	vel
84				Lilliefor	s Test Sta	tistic	0.221			Lilliefors	GOF Test		
85			5	% Lilliefors			0.251				ormal at 5% S	ignificance l	_evel
86				Detected	Data app	ear A	.pproximate	Lognorma	l at 5% Signi	ficance Leve) 		
87													
88								Using Imp	uted Non-De	tects			
89					Original S		1.658					in Log Scale	
90					Original S		3.697					in Log Scale	
91		95% t U	ICL (assume				2.982			95%	Percentile Bo		
92			!	95% BCA	•		3.494				95% Boo	otstrap t UCL	5.724
93				95% H-U	ICL (Log R	ROS)	1056						
94					100								
95			Statis					Data and A	ssuming Log	gnormal Distr			
96					Mean (log	- '	-2.68					M Geo Mean	
97			1/14 0: :		M SD (log	- '	3.023			95%	Critical H Val	` ,	
98			KM Standa			· '	0.674					CL (KM -Log)	
99			IZM O:		M SD (log		3.023			95%	Critical H Val	ue (KM-Log)	5.807
100			KM Standa	rd Error of	Mean (log	ged)	0.674						

	Α	В	С	D	E	F	G	Н		J	K	L		
101														
102						DL/2 S	tatistics							
103			DL/2	Normal					DL/2 Log-1	ransformed				
104				Mean in C	Original Scale	1.815				Mean i	in Log Scale	-1.782		
105				SD in C	Original Scale	3.66				SD i	in Log Scale	2.921		
106			95% t l	JCL (Assum	es normality)	3.126				95%	H-Stat UCL	399.2		
107		DL/2 is not a recommended method, provided for comparisons and historical reasons												
108														
109					Nonparamo	etric Distribu	tion Free U	CL Statistics						
110				Detected	d Data appea	ır Gamma Di	stributed at	5% Significa	nce Level					
111														
112						Suggested	UCL to Use	ı						
113	Adjusted KN	M-UCL (use	when k<=1 a	and 15 < n <	50 but k<=1)	4.586								
114														
115	١	Note: Sugge	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCI			
116			F	Recommend	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.				
117		These recor	mmendations	s are based	upon the resu	ılts of the sim	nulation stud	ies summariz	zed in Singh,	Maichle, and	d Lee (2006).			
118	Ho	wever, simu	lations result	ts will not co	ver all Real V	Vorld data se	ts; for addition	onal insight t	ne user may	want to cons	ult a statistic	ian.		
119														

	Α	В	С	D	E	F	G	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options		5/24/2018 12	·10·21 DM						
4	Dat	e/Time of C	From File	ProUCL Inpu		. 19.51 FW						
5		Fu	Il Precision	OFF	ut VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	rtamber o	Воогопар	Орогацопо	2000								
9	Benzene											
10												
12						General	Statistics					
13			Total	Number of C	bservations	48			Numbe	r of Distinct (Observations	37
14				Numbe	er of Detects	34				Number of	Non-Detects	14
15			N	umber of Dist	inct Detects	33			Numbe	er of Distinct	Non-Detects	4
16				Mini	mum Detect	0.0049				Minimum	Non-Detect	0.002
17				Maxi	mum Detect	11.3				Maximum	Non-Detect	2
18				Varia	nce Detects	10.03				Percent	Non-Detects	29.17%
19				М	ean Detects	1.886					SD Detects	3.167
20				Med	dian Detects	0.248					CV Detects	1.679
21				Skewn	ess Detects	1.968				Kurt	osis Detects	2.957
22				Mean of Log	ged Detects	-1.076				SD of Log	ged Detects	2.162
23												
24							t on Detects	Only				
25				hapiro Wilk T		0.643				ik GOF Test		
26			5% SI	napiro Wilk C		0.933	[Detected Da			ificance Leve	<u> </u>
27					est Statistic	0.296				GOF Test		
28			5	% Lilliefors C		0.15				al at 5% Sign	ificance Leve	l
29				D	etected Data	Not Norma	l at 5% Sign	ificance Lev	rel			
30			1/	M-! (IZM) 6	Na - al - al l -	N I G			NI	w. 1101 -		
31			Kapian-	Meier (KM) S	Statistics usir		ritical value	s and other	-		·	0.404
32					KM Mean KM SD	1.35			KI		error of Mean	0.404
33				0E9/	KM (t) UCL	2.757			OEO/ IZM /F	95% KN Percentile Bo	1 (BCA) UCL	2.064
34					KM (z) UCL	2.028			`	95% KM Boo	. ,	2.266
35				95 % 90% KM Chel		2.562					byshev UCL	3.111
36				.5% KM Chel	-	3.873				99% KM Che	-	5.37
37					-,01.0V OOL	3.070					2,001	
38				G	amma GOF	Tests on De	etected Obse	ervations Or	nlv			
39					est Statistic	1.18			•	rling GOF Te	est	
40					ritical Value	0.837	Detect				% Significance	Level
42					est Statistic	0.197				Smirnov GC		
43					critical Value	0.162	Detect				% Significance	Level
44				Detecte	ed Data Not C	amma Dist	ributed at 5%	% Significan	ce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47					k hat (MLE)	0.387			k	star (bias co	rected MLE)	0.372
48				Thet	ta hat (MLE)	4.877			Theta	star (bias co	rected MLE)	5.068
49				n	u hat (MLE)	26.3				nu star (bia	as corrected)	25.31
	1				an (detects)	1.886						-

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52					Gamma RO	S Statistics u	sing Impute	ed Non-Dete	ects			
53			•					•	oservations at	•		
54		GROS may	not be used	when kstar	of detects is	small such a	as <1.0, esp	ecially when	the sample s	ize is small (e	e.g., <15-20)	
55			Fo	r such situa	tions, GROS	method may	yield incorr	ect values o	of UCLs and B	TVs		
56				,	This is espe	cially true wh	en the samp	le size is sm	nall.			
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs m	ay be comp	uted using g	amma distribu	ıtion on KM e	stimates	
58					Minimur	n 0.0049					Mean	1.34
59					Maximur	n 11.3					Median	0.101
60					SI	2.79					CV	2.082
61					k hat (MLE) 0.293			k	star (bias cor	rected MLE)	0.289
62				The	eta hat (MLE) 4.571			Theta	star (bias cor	rected MLE)	4.641
63					nu hat (MLE) 28.14				nu star (bia	s corrected)	27.72
64			Adjusted	Level of Sig	gnificance (β) 0.045						
65		Арр	roximate Ch	i Square Va	lue (27.72, o) 16.71			Adjusted Ch	ni Square Valı	ue (27.72, β)	16.44
66		95% Gamma	Approximat	e UCL (use	when n>=50) 2.223		95% (Gamma Adjus	ted UCL (use	when n<50)	2.259
67						1						<u> </u>
68				Е	stimates of	Gamma Para	meters usir	ng KM Estim	nates			
69					Mean (KM) 1.35					SD (KM)	2.757
70				V	ariance (KM) 7.6				SE o	f Mean (KM)	0.404
71					k hat (KM) 0.24					k star (KM)	0.239
72					nu hat (KM) 23.02					nu star (KM)	22.92
73				tl	neta hat (KM) 5.629				the	eta star (KM)	5.655
74			80%	6 gamma pe	rcentile (KM) 1.927			900	% gamma per	centile (KM)	4.064
75			95%	6 gamma pe	rcentile (KM) 6.624			999	% gamma per	centile (KM)	13.48
76												
77					Gam	ma Kaplan-M	leier (KM) S	Statistics				
78		App	roximate Ch	i Square Va	lue (22.92, o) 13.03			Adjusted Ch	ni Square Valu	ue (22.92, β)	12.8
79	95%	Gamma Ap	oroximate KN	/I-UCL (use	when n>=50) 2.375		95% Gam	ma Adjusted I	KM-UCL (use	when n<50)	2.418
80												
81				L	ognormal G	OF Test on D	Detected Ob	servations	Only			
82			S	hapiro Wilk	Test Statisti	0.955			Shapiro W	ilk GOF Test		
83			5% SI	hapiro Wilk	Critical Valu	e 0.933	De	tected Data	appear Logno	ormal at 5% S	ignificance L	evel
84				Lilliefors	Test Statisti	0.102			Lilliefors	GOF Test		
85			5	% Lilliefors	Critical Valu	e 0.15	De	tected Data	appear Logno	ormal at 5% S	ignificance L	evel
86				Det	ected Data	ppear Logno	rmal at 5%	Significance	e Level			
87												
88				Lo	ognormal Ro	OS Statistics	Using Impu	ted Non-De	tects			
89				Mean in C	Original Scal	e 1.344				Mean	in Log Scale	-2.128
90				SD in C	Original Scal	2.788				SD	in Log Scale	2.605
91		95% t U	JCL (assume	s normality	of ROS data) 2.019			95%	Percentile Bo	otstrap UCL	2.044
92			!	95% BCA B	ootstrap UC	2.166				95% Boo	tstrap t UCL	2.265
93				95% H-UC	L (Log ROS) 19.33						
94						I	1					1
95			Statis	stics using k	(M estimate	s on Logged	Data and A	ssuming Lo	gnormal Distr	ibution		
96				KM N	lean (logged) -2.172				KI	M Geo Mean	0.114
97				KM	SD (logged) 2.667			95%	Critical H Val	ue (KM-Log)	4.559
98			KM Standa	rd Error of M	lean (logged) 0.41				95% H-UC	L (KM -Log)	23.52
99				KM	SD (logged) 2.667			95%	Critical H Val	ue (KM-Log)	4.559
100			KM Standa		lean (logged							
100					, 337		1					

	Α	В	С	D	E	F	G	Н	I	J	K	L		
101														
102						DL/2 S	tatistics							
103			DL/2 I	Normal					DL/2 Log-1	ransformed				
104				Mean in O	riginal Scale	1.372				Mean i	n Log Scale	-1.918		
105				SD in O	riginal Scale	2.778				SD i	n Log Scale	2.581		
106			95% t l	ICL (Assume	es normality)	2.044				95%	H-Stat UCL	21.81		
107		DL/2 is not a recommended method, provided for comparisons and historical reasons												
108		Nonparametric Distribution Free UCL Statistics												
109					Nonparam	etric Distribu	tion Free UC	CL Statistics						
110				Detected I	Data appear	Lognormal [Distributed a	t 5% Signific	ance Level					
111														
112						Suggested	UCL to Use							
113			97.5	% KM (Chel	yshev) UCL	3.873								
114														
115	١	Note: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	p the user to	select the m	nost appropria	ate 95% UCL			
116			F	tecommenda	itions are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.				
117		These recor	mmendations	are based u	ipon the resu	ılts of the sim	ulation studi	es summariz	zed in Singh,	Maichle, and	l Lee (2006).			
118	Ho	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	nal insight th	ne user may	want to cons	ult a statistici	an.		
119						-								

	Α	В	С	D	E LIOL Otation	F	G Octovrith N	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	/24/2019 12:	22.10 DM						
4	Dat	e/Time or C	From File	ProUCL Inpu		.ZZ. 10 FIVI						
5		Fu	Il Precision	OFF	t VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Number o	Boototrap	Орогацопо	2000								
9	Ethylbenzei	ne										
10												
11						General	Statistics					
13			Total	Number of Ob	oservations	49			Numbe	r of Distinct C	Observations	45
14				Number	of Detects	42				Number of	Non-Detects	7
15			N	umber of Disti	nct Detects	42			Numbe	er of Distinct	Non-Detects	3
16				Minin	num Detect	0.0045				Minimum	Non-Detect	0.002
17				Maxin	num Detect	28				Maximum	Non-Detect	0.2
18				Varian	ce Detects	60.33				Percent	Non-Detects	14.29%
19				Me	an Detects	6.485					SD Detects	7.768
20				Medi	ian Detects	2.515					CV Detects	1.198
21				Skewne	ess Detects	1.341				Kurt	osis Detects	0.954
22				Mean of Logg	jed Detects	0.393				SD of Log	ged Detects	2.552
23					I.		<u>I</u>					
24					Norm	al GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Te	est Statistic	0.763			Shapiro Wi	lk GOF Test		
26			5% SI	napiro Wilk Cr	itical Value	0.942	Γ	Detected Da	ta Not Norma	al at 5% Sign	ificance Leve	I
27				Lilliefors Te	est Statistic	0.219				GOF Test		
28			5	% Lilliefors Cr		0.135				al at 5% Sign	ificance Leve	Í
29				De	etected Data	Not Norma	l at 5% Sign	ificance Lev	rel			
30												
31			Kaplan-	Meier (KM) St			ritical Value	s and other	•			
32					KM Mean	5.561			KI		rror of Mean	1.078
33					KM SD	7.457					(BCA) UCL	7.387
34					KM (t) UCL	7.37			`		otstrap) UCL	7.424
35					KM (z) UCL	7.335				95% KM Boo	•	7.817
36				00% KM Cheb	•	8.796					byshev UCL	10.26
37			97	.5% KM Cheb	ysnev UCL	12.29				99% KM Che	bysnev UCL	16.29
38					mme COE	Tacte on Da	etected Obse	nyations O-	alv			
39					est Statistic	0.495	JIGUIGU ODSE		•	rling GOF Te	aet	
40					itical Value	0.495	Detector				5% Significan	re I evel
41					est Statistic	0.027	Defected			Smirnov GO		
42					itical Value	0.145	Detected				5% Significand	ce Level
43							stributed at 5				· · · · · · · · · · · · · · · · · ·	
44					appour							
45					Gamma	Statistics or	Detected D	ata Only				
46				ŀ	k hat (MLE)	0.439			k	star (bias cor	rected MLE)	0.424
47					a hat (MLE)	14.77				,	rected MLE)	15.31
49					ı hat (MLE)	36.87				`	as corrected)	35.57
50					n (detects)	6.485				, -	,	
50					,/							

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52					Gamma RO	S Statistics u	sing Impute	ed Non-Dete	ects			
53			•					•	oservations at	•		
54		GROS may	not be used	when kstar	of detects is	small such a	s <1.0, esp	ecially when	the sample s	ize is small (e	e.g., <15-20)	
55			Fo	r such situa	tions, GROS	method may	yield incorr	ect values o	of UCLs and B	TVs		
56					This is espec	cially true who	en the samp	le size is sm	nall.			
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs ma	ay be compu	uted using ga	amma distribu	ıtion on KM e	stimates	
58					Minimun	0.0045					Mean	5.595
59					Maximun	28					Median	1.9
60					SE	7.51					CV	1.342
61					k hat (MLE	0.41			k	star (bias cor	rected MLE)	0.398
62				The	eta hat (MLE	13.65			Theta	star (bias cor	rected MLE)	14.04
63					nu hat (MLE	40.17				nu star (bia	s corrected)	39.04
64			Adjusted	Level of Sig	gnificance (β	0.0451						
65		Арр	roximate Ch	i Square Va	lue (39.04, α	25.73			Adjusted Ch	ni Square Valu	ue (39.04, β)	25.4
66		95% Gamma	Approximat	e UCL (use	when n>=50	8.489		95% C	Gamma Adjus	ted UCL (use	when n<50)	8.599
67						<u>t</u>	1					I
68				Е	stimates of (Gamma Para	meters usir	ng KM Estim	nates			
69					Mean (KM	5.561					SD (KM)	7.457
70				V	ariance (KM	55.61				SE o	f Mean (KM)	1.078
71					k hat (KM	0.556					k star (KM)	0.536
72					nu hat (KM	54.5					nu star (KM)	52.5
73				tl	neta hat (KM	9.999				the	eta star (KM)	10.38
74			80%	6 gamma pe	ercentile (KM	9.155			900	% gamma per	centile (KM)	14.83
75			95%	6 gamma pe	ercentile (KM	20.84			999	% gamma per	centile (KM)	35.54
76												
77					Gamı	na Kaplan-M	eier (KM) S	Statistics				
78		Арр	roximate Ch	i Square Va	lue (52.50, α	36.86			Adjusted Ch	ni Square Valu	ue (52.50, β)	36.46
79	95%	Gamma App	oroximate KN	Л-UCL (use	when n>=50	7.922		95% Gam	ma Adjusted I	KM-UCL (use	when n<50)	8.008
80												
81				L	ognormal G	OF Test on D	etected Ob	servations (Only			
82			S	hapiro Wilk	Test Statistic	0.822			Shapiro W	ilk GOF Test		
83			5% SI	hapiro Wilk	Critical Value	0.942	Г	Detected Dat	ta Not Lognor	mal at 5% Sig	nificance Le	vel
84				Lilliefors	Test Statistic	0.166			Lilliefors	GOF Test		
85			5	% Lilliefors	Critical Value	0.135		Detected Dat	ta Not Lognor	mal at 5% Sig	nificance Le	vel
86				De	etected Data	Not Lognorr	nal at 5% S	ignificance	Level			
87												
88				Le	ognormal RC	S Statistics	Using Impu	ted Non-De	tects			
89				Mean in C	Original Scale	5.562				Mean	in Log Scale	-0.287
90					Original Scale						in Log Scale	2.932
91		95% t L	JCL (assume	s normality	of ROS data	7.367			95%	Percentile Bo	otstrap UCL	7.463
92			•		ootstrap UCI						tstrap t UCL	7.745
					L (Log ROS						•	
93					, •							
94 95			Statis	stics using k	(M estimates	on Logged	Data and As	ssuming Lo	gnormal Distr	ibution		
					lean (logged			3 – •			M Geo Mean	0.638
96					1 SD (logged				95%	Critical H Val		5.303
97			KM Standa		lean (logged						L (KM -Log)	1040
98					SD (logged				95%	Critical H Val		5.303
99			KM Standa		lean (logged							3.000
100			Otalida	L.101 01 IV	.sa.r (roggou	0.701						

	Α	В	С	D	E	F	G	Н		J	K	L		
101														
102						DL/2 S	tatistics							
103			DL/2	Normal					DL/2 Log-1	ransformed				
104				Mean in C	Original Scale	5.565				Mean i	in Log Scale	-0.354		
105				SD in C	Original Scale	7.531				SD i	in Log Scale	3.113		
106			95% t l	JCL (Assum	es normality)	7.37				95%	H-Stat UCL	937.6		
107		DL/2 is not a recommended method, provided for comparisons and historical reasons												
108														
109					Nonparamo	etric Distribu	tion Free U	CL Statistics						
110				Detected	d Data appea	r Gamma Di	stributed at	5% Significa	nce Level					
111														
112						Suggested	UCL to Use							
113	Adjusted KN	M-UCL (use	when k<=1 a	and 15 < n <	50 but k<=1)	8.008								
114														
115	١	Note: Sugge	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCI			
116			F	Recommend	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.				
117		These recor	mmendations	s are based	upon the resu	ılts of the sim	nulation stud	ies summariz	zed in Singh,	Maichle, and	d Lee (2006).			
118	Hov	wever, simu	lations result	ts will not co	ver all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.		
119														

	Α	В	С	D	E LICI Station	F	G Coto with N	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	(24/2019 12	·22·56 DM						
4	Dat	e/Time of C	From File	ProUCL Inpu		.22.30 F W						
5		Fu	Il Precision	OFF	it VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- rambor o	Boototrap		2000								
9	Isopropylbe	nzene										
10	,											
11						General	Statistics					
13			Total	Number of O	bservations	50			Numbe	r of Distinct C	Observations	40
14				Numbe	r of Detects	38				Number of	Non-Detects	12
15			N	umber of Disti	nct Detects	37			Numbe	er of Distinct	Non-Detects	3
16				Minir	num Detect	0.012				Minimum	n Non-Detect	0.005
17				Maxir	num Detect	13				Maximum	n Non-Detect	5
18				Variar	nce Detects	14.03				Percent	Non-Detects	24%
19				Me	ean Detects	3.659					SD Detects	3.746
20				Med	ian Detects	2.1					CV Detects	1.024
21				Skewne	ess Detects	1.158				Kurt	tosis Detects	0.226
22				Mean of Logg	ged Detects	0.4				SD of Log	gged Detects	1.85
23					I							
24					Norm	al GOF Tes	t on Detects	Only				
25			S	hapiro Wilk T	est Statistic	0.833			Shapiro W	lk GOF Test	i	
26			5% SI	napiro Wilk Cı	ritical Value	0.938	1	Detected Da	ta Not Norma	al at 5% Sign	ificance Level	
27				Lilliefors To	est Statistic	0.208			Lilliefors	GOF Test		
28			5	% Lilliefors Ci		0.142				al at 5% Sign	ificance Level	j
29				De	etected Data	Not Norma	ıl at 5% Sign	ificance Lev	rel			
30												
31			Kaplan-	Meier (KM) S			ritical Value	s and other	<u>-</u>			
32					KM Mean	2.809			KI		rror of Mean	0.512
33					KM SD	3.567					II (BCA) UCL	3.689
34					KM (t) UCL	3.667			`		otstrap) UCL	3.694
35					KM (z) UCL	3.651					otstrap t UCL	3.815
36				00% KM Cheb	•	4.344					ebyshev UCL	5.04
37			9/	.5% KM Cheb	ysnev UCL	6.006			,	99% KIVI Che	ebyshev UCL	7.902
38				<u> </u>	amma COE	Tests on D	etected Obse	nyations O-	nhy			
39					est Statistic	0.531	elected Obse		•	rling GOF Te		
40					ritical Value	0.531	Detector			_	est 5% Significand	na l evel
41					est Statistic	0.796	Detected			Smirnov GO		~ LGAGI
42					ritical Value	0.103	Detected				5% Significand	ce l evel
43							stributed at 5			.c.i.batoa at c	o.griinoand	
44				Delected	aata appeal	admina Di	on balou at t	- 70 Olgilliloa	19461			
45					Gamma s	Statistics or	n Detected D	ata Only				
46					k hat (MLE)	0.677	. 20.00.00		k	star (bias cor	rrected MLE)	0.641
47					a hat (MLE)	5.405				•	rrected MLE)	5.708
48					u hat (MLE)	51.45				•	as corrected)	48.72
49					an (detects)	3.659						
50				11100	(2.0.000)	3.556						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	servations at	•		
54		GROS may							the sample s		e.g., <15-20)	
55			Fo			-	•		f UCLs and B	TVs		
56						cially true who	-					
57		For gar	nma distribut	ed detected			y be compu	uted using ga	amma distribu	ıtion on KM e		
58					Minimun						Mean	2.806
59					Maximun						Median	1.515
60					SI						CV	1.283
61					k hat (MLE					star (bias cor	,	0.389
62					eta hat (MLE				Theta	star (bias cor		7.209
63					nu hat (MLE	•				nu star (bia	s corrected)	38.92
64					gnificance (β							
65			roximate Ch	•	,	^				ni Square Valu		25.31
66		95% Gamma	Approximat	e UCL (use	when n>=50) 4.261		95% 0	Gamma Adjus	ted UCL (use	when n<50)	4.315
67												
68				E		Gamma Para	meters usin	ng KM Estim	nates			
69					Mean (KM	•					SD (KM)	3.567
70				V	'ariance (KM	·				SE o	f Mean (KM)	0.512
71					k hat (KM						k star (KM)	0.596
72					nu hat (KM	<i>'</i>					nu star (KM)	59.6
73					heta hat (KM	<u></u>					eta star (KM)	4.712
74					ercentile (KM	·				% gamma per	` '	7.316
75			95%	6 gamma pe	ercentile (KM) 10.13			999	% gamma per	centile (KM)	16.94
76						16 1 1						
77						ma Kaplan-M	eier (KM) S	statistics	A II . 101		(50.00.0)	10.10
78			roximate Ch			•			-	ni Square Valu		42.43
79	95%	Gamma App	oroximate KN	/I-UCL (use	when n>=50	3.907		95% Gami	ma Adjusted I	KM-UCL (use	when n<50)	3.946
80						OF T4 F) - 4 - 4 - 4 Ob		Oli-			
81						OF Test on D	Petected Ob	servations		ilk GOF Test		
82					Test Statisti			Data ata d Dat	•			al
83			5% SI	•	Critical Value Test Statistie		L	Detected Dat	ta Not Lognori	GOF Test	Inificance Le	vei
84			E		Critical Value			Datastad Dat	ta Not Lognori		mificanas I a	vol
85						Not Lognori				mai at 5% Sig	Inificance Le	vei
86				יט	etected Data	Not Lognon	nai at 5% S	ignificance	Levei			
87				1.	ognormal P/	OS Statistics	l leina Impu	ted Non De	tacte			
88					Original Scal		Janiy illipu	IGU NUIT-DE	いさしい	Moon	in Log Scale	-0.408
89					Original Scal						in Log Scale	
90		95% + 1	JCL (assume						Q5%	Percentile Bo		3.674
91		3J/0 L C	•		ootstrap UC	<i>'</i>			30 /0		tstrap t UCL	3.817
92					CL (Log ROS					9576 1500	ionap i OOL	3.017
93				33 /0 11-00	,_ (Log 1100	, 27.00						
94			Static	tics using b	(M estimate	s on I oaned	Data and A	ssumina I o	gnormal Distr	ibution		
95			Statis		lean (logged		-ata anu A	Journing LO	giloililai Disti		M Geo Mean	0.45
96					1 SD (logged	·			95%	Critical H Val		4.733
97			KM Standa		lean (logged				9570		CL (KM -Log)	134
98	(ALOD (Issued) 0.700								4.733			
99			KM Standa		lean (logged				9570	- Induiti vali	(INVI-LOG)	7.700
100			Tim Otaliua	LI LI OI OI IV	.our (logged	/ 0.700						

	Α	В	С	D	Е	F	G	Н	I	J	K	L	
101													
102						DL/2 S	tatistics						
103			DL/2 I	Normal					DL/2 Log-1	ransformed			
104				Mean in O	riginal Scale	2.851				Mean i	in Log Scale	-0.627	
105				SD in O	riginal Scale	3.58				SD i	in Log Scale	2.759	
106			95% t l	JCL (Assume	es normality)	3.7				95%	H-Stat UCL	154.3	
107		DL/2 is not a recommended method, provided for comparisons and historical reasons											
108													
109					Nonparame	etric Distribu	tion Free UC	CL Statistics					
110				Detected	Data appea	r Gamma Di	stributed at	5% Significa	nce Level				
111													
112						Suggested	UCL to Use						
113			95% KM A	pproximate (Gamma UCL	3.907							
114													
115	١	Note: Sugge:	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	p the user to	select the m	nost appropria	ate 95% UCL		
116			F	Recommenda	itions are ba	sed upon dat	a size, data	distribution, a	and skewnes	SS.			
117		These recor	mmendations	are based ι	pon the resu	ılts of the sim	ulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006).	,	
118	Ho	wever, simu	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.	
119													

\vdash	Α	В	С	D	E LIOL Otation	F	G Octovršti N	H	I	J	K	L
1					UCL Statis	tics for Data	Sets with N	ion-Detects				
2		0.1		I								
3	D-4	e/Time of Co	cted Options	ProUCL 5.15	/04/0010 10	-07-40 DM						
4	Date	e/Time of Co	From File	ProUCL 5.15		:27:49 PIVI						
5		Eul	I Precision	OFF	t VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap (2000								
8	Number o	т Бооізігар (Эрегацопа	2000								
9	m,p-Xylenes	<u> </u>										
10	,p / tylee											
11						General	Statistics					
12			Total	Number of Ob	servations	49			Numbe	er of Distinct C	bservations	34
13 14									Numbe	r of Missing C	bservations	1
15				Number	of Detects	33				_	Non-Detects	16
16			Nu	umber of Distir	nct Detects	32			Numb	er of Distinct I	Non-Detects	3
17				Minim	num Detect	0.003				Minimum	Non-Detect	0.002
18				Maxim	num Detect	210				Maximum	Non-Detect	0.2
19				Varian	ice Detects	1597				Percent I	Non-Detects	32.65%
20				Me	an Detects	19.87					SD Detects	39.97
21				Medi	an Detects	7.29					CV Detects	2.012
22				Skewne	ess Detects	3.777				Kurt	osis Detects	16.5
23				Mean of Logg	ed Detects	1.123				SD of Log	ged Detects	2.54
24					"		1					
25						al GOF Tes	t on Detects	Only				
26				hapiro Wilk Te		0.533			•	ilk GOF Test		
27			5% SI	napiro Wilk Cr		0.931		Detected Da		al at 5% Signi	ificance Leve	I
28				Lilliefors Te		0.31				GOF Test		
29			5	% Lilliefors Cr		0.152				al at 5% Signi	ificance Leve	<u> </u>
30				De	etected Data	Not Norma	al at 5% Sign	ificance Lev	rel			
31			Manlan I	Maia (IZM) O		N	_!\\/_!		NI			
32			Kapian-i	Meier (KM) St			riticai vaiue	s and otner				4.077
33					KM Mean KM SD	13.38 33.62			K	M Standard E		4.877
34				QE0/ I	KM (t) UCL	21.56			Q5% L/M /F	Percentile Boo	I (BCA) UCL	22.21
35					KW (t) UCL	21.30			•	95% KM Boo	. ,	31.85
36			C	95 % N 90% KM Cheb		28.01				95% KM Che		34.64
37				.5% KM Cheb	•	43.84				99% KM Chel	•	61.91
38					- '							
40				Ga	mma GOF	Tests on De	etected Obse	ervations Or	nly			
41					est Statistic	0.433			-	rling GOF Te	 est	
42				5% A-D Cr	itical Value	0.842	Detecte			istributed at 5		ce Level
43				K-S Te	est Statistic	0.134		ŀ	Kolmogorov	-Smirnov GO	F	
44				5% K-S Cr	itical Value	0.165	Detected	d data appea	ar Gamma D	istributed at 5	% Significan	ce Level
45				Detected of	data appear	Gamma Di	stributed at !	5% Significa	nce Level			
46												
47					Gamma	Statistics or	n Detected D	ata Only				
48				k	(hat (MLE)	0.359			k	star (bias cor	rected MLE)	0.346
49					a hat (MLE)	55.38			Theta	star (bias cor	,	57.36
50				nı	ı hat (MLE)	23.68				nu star (bia	s corrected)	22.86

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51				Me	ean (detects)	19.87						
52												
53					Gamma ROS							
54					l when data s					·		
55		GROS ma			of detects is		-	-	-	•	e.g., <15-20)	
56			Fo		tions, GROS		-			TVs		
57					This is especi							
58		For gai	mma distribu	ted detected	data, BTVs a		y be compu	uted using ga	ımma distribu	ıtion on KM e		
59					Minimum						Mean	
60					Maximum	210					Median	
61					SD	33.96					CV	
62					k hat (MLE)	0.217				star (bias co	· · · · · · · · · · · · · · · · · · ·	
63					eta hat (MLE)	61.58			Theta	star (bias co		
64					nu hat (MLE)	21.3				nu star (bia	as corrected)	21.33
65			-		gnificance (β)	0.0451						
66				-	ue (21.33, α)	11.84				ni Square Val		
67		95% Gamma	a Approximat	e UCL (use	when n>=50)	24.12		95% G	amma Adjus	ted UCL (use	when n<50)	24.56
68												
69				E	stimates of G		meters usir	ng KM Estima	ates			
70					Mean (KM)	13.38					SD (KM)	
71				V	ariance (KM)					SE c	of Mean (KM)	
72					k hat (KM)	0.158					k star (KM)	
73					nu hat (KM)	15.53					nu star (KM)	
74					neta hat (KM)	84.44					eta star (KM)	
75				- :	rcentile (KM)	15.49				% gamma pe		
76			95%	% gamma pe	rcentile (KM)	72.47			999	% gamma pe	rcentile (KM)	165.1
77												
78						na Kaplan-M	eier (KM) S	tatistics			(1= 0 1 0)	
79	0.5			-	ue (15.91, α)			050/ 0	-	ni Square Val		
80	95	% Gamma Ap	proximate KI	M-UCL (use	when n>=50)	26.95		95% Gamn	na Adjusted I	KM-UCL (use	when n<50)	27.55
81					1 00	VE T+ D	-44-0		Nl			
82					ognormal GC		etectea Ob	servations C	-	W OOF Too		
83					Test Statistic	0.951 0.931	Do	tastad Data		ilk GOF Test		avel .
84			5% 5		Critical Value		De	lected Data a	•	ormal at 5% S	Significance i	_evei
85			-		Test Statistic		De	tastad Data			Diamifiaanaa I	
86					Critical Value					ormal at 5% S	Significance i	-evei
87				Dete	ected Data ap	hear roguo	ııılaı at 5%	Significance	: Level			
88				1.4	ognormal RO	C Ctatiatias	leina leen	tad Nan Dat	acte			
89					Original Scale		Using impu	teu Non-Det	ecis .	N400-	in Log Cool-	-0.728
90					Original Scale Original Scale						in Log Scale	
91		0E0/ ±1	ICI /accuma		of ROS data)	21.53			0.50/	Percentile Bo		
92		93% [(•		of ROS data) ootstrap UCL				95%		otstrap UCL otstrap t UCL	
93					L (Log ROS)					90% B00	visiiap i UCL	32.93
94				30 % FI-UU	L (LUY KUS)	3010						
95			Charle	ation units 14	'M octimates	on Logged	Coto ond A	nouming I s	normal Dist	ibution		
96			Statis		(M estimates	on Loggea L	Jala ario As	ssummy LOG	nomai Distr		M Geo Mean	0.294
97					lean (logged)				0E0/	Critical H Va		
98			KW Stand-		SD (logged)				95%			
99			Kivi Standa		lean (logged)	0.577			0E0/		CL (KM -Log)	
100				KIVI	SD (logged)	3.96			95%	Critical H Va	iue (r\ivi-L0g)	0.529

	А	В	С	D	Е	F	G	Н	I	J	K	L		
101			KM Standar	rd Error of M	lean (logged)	0.577								
102							•							
103						DL/2 S	tatistics							
104			DL/2 I	Normal					DL/2 Log-1	ransformed				
105				Mean in C	Original Scale	13.39				Mean i	n Log Scale	-0.973		
106				SD in C	Original Scale	33.96				SD i	n Log Scale	3.864		
107			95% t L	JCL (Assum	es normality)	21.53				95%	H-Stat UCL	23209		
108			DL/2 i	s not a reco	mmended m	ethod, provi	ded for com	parisons and	l historical re	easons				
109		DL/2 is not a recommended method, provided for comparisons and historical reasons												
110					Nonparame	etric Distribu	tion Free UC	CL Statistics						
111				Detected	d Data appea	r Gamma D	stributed at	5% Significa	nce Level					
112														
113						Suggested	UCL to Use	ı						
114	Adjusted KI	И-UCL (use	when k<=1 a	nd 15 < n <	50 but k<=1)	27.55								
115														
116	١	Note: Sugge	estions regard	ing the sele	ction of a 95%	UCL are p	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL	•		
117			F	Recommend	ations are bas	sed upon da	ta size, data	distribution,	and skewnes	SS.				
118		These reco	mmendations	are based	upon the resu	Its of the sin	nulation stud	ies summariz	zed in Singh,	Maichle, and	Lee (2006).			
119	Ho	wever, simu	ulations result	s will not co	ver all Real W	orld data se	ts; for addition	onal insight tl	ne user may	want to consu	ult a statistici	an.		
120														

	Α	В	С	D	E LIOL Otation	F	G Octovrith N	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaav Cala	-td Ot									
3	Dot	e/Time of C	cted Options	ProUCL 5.15/	/2//2019 12:	·24·E9 DM						
4	Dati	e/ Time of C	From File	ProUCL Input		.24.JO F W						
5		Fu	Il Precision	OFF	1 1003.813							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Trainbor o	Воогонар	Орогашоно	2000								
9	Naphthalene											
10												
12						General	Statistics					
13			Total	Number of Ob	servations	49			Numbe	r of Distinct C	bservations	43
14									Numbe	r of Missing C	bservations	1
15				Number	of Detects	43				Number of	Non-Detects	6
16			Nı	umber of Distir	nct Detects	39			Numbe	er of Distinct	Non-Detects	4
17				Minim	num Detect	0.0081				Minimum	Non-Detect	0.001
18				Maxim	num Detect	50.7				Maximum	Non-Detect	10
19				Varian	ce Detects	124.1				Percent	Non-Detects	12.24%
20				Me	an Detects	9.623					SD Detects	11.14
21				Medi	an Detects	5.2					CV Detects	1.157
22				Skewne	ss Detects	1.769				Kurt	osis Detects	3.588
23				Mean of Logg	ed Detects	1.106				SD of Log	ged Detects	2.195
24												
25							t on Detects	Only				
26				hapiro Wilk Te		0.808			•	lk GOF Test		
27			5% SI	napiro Wilk Cri		0.943		Detected Dat		_	ificance Leve	l
28				Lilliefors Te		0.219				GOF Test		
29			5	% Lilliefors Cri		0.134				al at 5% Sign	ificance Leve	l
30				De	tected Data	NOT NORMS	l at 5% Sign	iticance Lev	eı			
31			Konlon	Meier (KM) St	otiotico unin	a Normal C	ritical Value	a and other	Nonnoromo	trio LICI o		
32			Napiaii-	Wielei (Kivi) St	KM Mean	8.5	illical value	s and other	=	M Standard E	rror of Moon	1.556
33					KM SD	10.76			Ki		I (BCA) UCL	11.15
34				95% I	KM (t) UCL	11.11			95% KM (F	Percentile Boo		11.17
35					(M (z) UCL	11.06			•	95% KM Boo		11.71
36			Ċ	00% KM Cheb	` '	13.17				95% KM Che	•	15.28
37				.5% KM Cheby		18.22				99% KM Che	-	23.98
38					-		<u> </u>				-	
40				Ga	mma GOF	Tests on De	etected Obse	ervations On	lly			
41				A-D Te	est Statistic	0.469		Α	nderson-Da	rling GOF Te	est	
42				5% A-D Cr	itical Value	0.809	Detected	d data appea	ır Gamma D	istributed at 5	5% Significand	ce Level
43				K-S Te	est Statistic	0.096		ŀ	Kolmogorov-	Smirnov GO	F	
44				5% K-S Cri	itical Value	0.142	Detected	d data appea	ır Gamma D	istributed at 5	5% Significand	ce Level
45				Detected of	lata appear	Gamma Di	stributed at 5	5% Significa	nce Level			
46												
47					Gamma	Statistics or	Detected D	ata Only				
48					hat (MLE)	0.542				star (bias cor	<i>'</i>	0.519
49					hat (MLE)	17.77			Theta	star (bias cor	,	18.53
50				nu	ı hat (MLE)	46.58				nu star (bia	s corrected)	44.66

	Α	В	С	D	E	F	G	Н	I	J	K	L
51				N	Mean (detects)	9.623						
52												
53					Gamma ROS							
54					ed when data s							
55		GROS may			r of detects is			-	· ·	•	e.g., <15-20)	
56			Fo	or such situa	ations, GROS					TVs		
57					This is especi	•						
58		For gar	mma distribu	ted detecte	d data, BTVs a		y be compu	uted using ga	ımma distribu	ıtion on KM e	stimates	
59					Minimum						Mear	
60					Maximum	50.7					Median	
61					SD	10.87					CV	
62					k hat (MLE)	0.404				star (bias cor		
63				Th	neta hat (MLE)				Theta	star (bias cor		
64					nu hat (MLE)	39.61				nu star (bia	as corrected)	38.52
65			•		ignificance (β)	0.0451						
66				-	alue (38.52, α)	25.31				ni Square Val		
67		95% Gamma	a Approximat	e UCL (use	when n>=50)	12.91		95% G	amma Adjus	ted UCL (use	when n<50)	13.08
68												
69				i	Estimates of G		meters usir	ng KM Estima	ates			
70					Mean (KM)						SD (KM)	
71				,	Variance (KM)					SE o	of Mean (KM)	
72					k hat (KM)	0.625					k star (KM)	
73					nu hat (KM)	61.2					nu star (KM)	58.79
74					theta hat (KM)	13.61					eta star (KM)	
75					ercentile (KM)	14.01				% gamma pei		
76			95%	% gamma p	ercentile (KM)	30.59			999	% gamma pei	rcentile (KM)	51.1
77												
78						na Kaplan-M	eier (KM) S	statistics				
79				-	alue (58.79, α)				-	ni Square Val		
80	95%	Gamma Ap	proximate KN	И-UCL (use	when n>=50)	11.85		95% Gamn	na Adjusted ł	KM-UCL (use	when n<50)	11.97
81												
82					Lognormal GC		etected Ob	servations C	-			
83					Test Statistic					ilk GOF Test		
84			5% S		Critical Value			Detected Data		mal at 5% Sig	gnificance Le	vel
85					s Test Statistic					GOF Test		
86			5		Critical Value					mal at 5% Sig	gnificance Le	vel
87					Detected Data	Not Lognorn	nal at 5% S	ignificance L	.evel			
88												
89					ognormal RO		Using Impu	ted Non-Det	ects			
90					Original Scale						in Log Scale	
91					Original Scale	10.88					in Log Scale	
92		95% t l	•		of ROS data)	11.07			95%	Percentile Bo	·	
93					Bootstrap UCL	11.47				95% Boo	otstrap t UCL	. 11.79
94				95% H-U	CL (Log ROS)	179.3						
95							_					
96			Statis		KM estimates		Data and A	ssuming Log	normal Distr			
97					Mean (logged)						M Geo Mear	
98					M SD (logged)				95%	Critical H Val		
99			KM Standa		Mean (logged)	0.465					CL (KM -Log)	
100				KI	M SD (logged)	3.182			95%	Critical H Val	ue (KM-Log)	5.342

	Α	В	С	D	Е	F	G	Н	I	J	K	L	
101			KM Standar	d Error of M	ean (logged)	0.465							
102						•	•						
103						DL/2 S	tatistics						
104			DL/2 N	Normal					DL/2 Log-	Transformed			
105				Mean in O	riginal Scale	8.547				Mean i	n Log Scale	0.34	
106				SD in O	riginal Scale	10.84				SD i	n Log Scale	3.12	
107			95% t L	ICL (Assume	es normality)	11.14				95%	H-Stat UCL	1944	
108	DL/2 is not a recommended method, provided for comparisons and historical reasons												
109	= = - 0												
110					Nonparamo	etric Distribu	tion Free UC	CL Statistics					
111				Detected	Data appea	r Gamma Di	stributed at	5% Significa	nce Level				
112													
113						Suggested	UCL to Use	1					
114	Adjusted KN	Л-UCL (use	when k<=1 a	nd 15 < n <	50 but k<=1)	11.97							
115													
116	N	lote: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	lp the user to	select the r	nost appropria	ate 95% UCL		
117			F	tecommenda	ations are ba	sed upon da	a size, data	distribution,	and skewne	SS.			
118		These recor	mmendations	are based ι	ipon the resu	ılts of the sin	nulation stud	ies summariz	zed in Singh	, Maichle, and	Lee (2006).		
119	Hov	wever, simu	lations result	s will not cov	er all Real V	/orld data se	ts; for addition	onal insight tl	he user may	want to consu	ult a statistici	an.	
120													

	Α	В	С	D	E LIOL Otation	F	G	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	124/2019 12	·20·10 DM						
4	Dat	e/Time of C	From File	ProUCL Inpu		.20.19 F W						
5		Fu	Il Precision	OFF	it VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	rtamber o	Воогопар	Орогацопо	2000								
9	n-Butylbenz	ene										
10												
12						General	Statistics					
13			Total	Number of O	bservations	46			Numbe	r of Distinct C	Observations	29
14				Numbe	r of Detects	19				Number of	Non-Detects	27
15			N	umber of Disti	nct Detects	19			Numbe	er of Distinct	Non-Detects	10
16				Minir	num Detect	0.0011				Minimum	n Non-Detect	0.005
17				Maxir	num Detect	9.4				Maximum	n Non-Detect	5
18				Variar	nce Detects	8.418				Percent	Non-Detects	58.7%
19				Me	ean Detects	2.417					SD Detects	2.901
20				Med	ian Detects	1.7					CV Detects	1.2
21				Skewne	ess Detects	1.512				Kurt	tosis Detects	1.44
22				Mean of Logo	ged Detects	-0.488				SD of Log	gged Detects	2.49
23												
24					Norm		t on Detects	Only				
25				hapiro Wilk T		0.787				lk GOF Test		
26			5% SI	napiro Wilk Cı		0.901	[Detected Da			ificance Level	
27					est Statistic	0.212				GOF Test		
28			5	% Lilliefors Cı		0.197				al at 5% Sign	ificance Level	
29				De	etected Data	Not Norma	ıl at 5% Sign	ificance Lev	rel			
30												
31			Kaplan-	Meier (KM) S			ritical Value	s and other	-			
32					KM Mean	1.012			K		Frror of Mean	0.33
33				050/	KM SD	2.171			OFO/ IZM /F		// (BCA) UCL	1.603 1.54
34					KM (t) UCL	1.565 1.554			`		otstrap) UCL	1.757
35				95% i 90% KM Cheb	KM (z) UCL	2					ebyshev UCL	2.448
36				.5% KM Cheb	•	3.07					byshev UCL	4.291
37					,,,,,,,,	5.07			•		2,0.10V OOL	01
38				G	amma GOF	Tests on De	etected Obse	ervations Or	nly			
39					est Statistic	0.316			•	rling GOF Te	est	
40					ritical Value	0.809	Detected			_	5% Significand	ce Level
42					est Statistic	0.133				Smirnov GO		
43					ritical Value	0.211	Detected				5% Significand	e Level
44				Detected	data appear	Gamma Di	L stributed at 5					
45												
46					Gamma	Statistics or	Detected D	ata Only				
47					k hat (MLE)	0.468			k	star (bias cor	rrected MLE)	0.429
48				Theta	a hat (MLE)	5.162			Theta	star (bias cor	rrected MLE)	5.63
49				nı	u hat (MLE)	17.79				nu star (bia	as corrected)	16.32
50				Mea	an (detects)	2.417						
- 55	I						l					

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			-					-	servations at	•		
54		GROS may							the sample s	•	e.g., <15-20)	
55			Fo				•		f UCLs and B	TVs		
56						cially true who						
57		For gar	nma distribut	ed detected			ay be compu	uted using ga	amma distribu	ıtion on KM e		
58					Minimun						Mean	
59					Maximun						Median	0.01
60					SE						CV	
61					k hat (MLE					star (bias cor	•	0.243
62					eta hat (MLE				Theta	star (bias cor	•	4.125
63					nu hat (MLE					nu star (bia	s corrected)	22.4
64					gnificance (β							
65			roximate Ch	-	•				-	ni Square Valu		12.4
66		95% Gamma	Approximat	e UCL (use	when n>=50	1.78		95% 0	amma Adjus	ted UCL (use	when n<50)	1.814
67								171				
68				E		Gamma Para	meters usir	ng KM Estim	ates			
69					Mean (KM						SD (KM)	2.171
70				V	ariance (KM					SE 0	f Mean (KM)	0.33
71					k hat (KM						k star (KM)	0.218
72					nu hat (KM						nu star (KM)	20.01
73					neta hat (KM						eta star (KM)	4.651
74					ercentile (KM					% gamma per	, ,	3.057
75			95%	6 gamma pe	ercentile (KM	5.096			999	% gamma per	centile (KIVI)	10.64
76					0		(IZAA) O					
77		A	i	: 0 \/-		na Kaplan-M	leler (KM) S ⊤	tatistics	A divisate di Ole	·: O \/ - l-	(00.01.0)	10.04
78	050/		roximate Ch	-	*			050/ 0		ni Square Valu		10.64
79	95%	Gamma App	oroximate Kil	/I-UCL (use	wnen n>=50	1.864		95% Gami	ma Adjusted ł	Nivi-UCL (use	wnen n<50)	1.902
80						OF Tast on F	Nata ata d Ob		Ombr			
81						OF Test on D	Tetected Ob	servations		ilk GOF Test		
82				•	Test Statistic			Data ata d Dat	•			
83			5% 5	•	Critical Value Test Statistic		L	Detected Dat	a Not Lognori	GOF Test	Initicance Le	vei
84			E		Critical Value			Datastad Dat			mificanas I a	val
85						Not Lognori			a Not Lognori	mai at 5% Sig	Inificance Le	vei
86				Di	elected Data	Not Lognori	nai at 5% S	ignificance	Levei			
87				1.	agnormal BC	OS Statistics	Heina Ima	ted Non De	tacte			
88					Original Scale			IGU NUIT-DE	10013	Moon	in Log Scale	-3.454
89					Original Scale						in Log Scale	
90		95% + 1	JCL (assume						Q5%	Percentile Bo		1.577
91		3J /0 L C	•		ootstrap UCI				30 /0		tstrap t UCL	1.855
92					CL (Log ROS					33 /0 1500	ionap i OOL	1.000
93				33 /0 11-00	,_ (LOG 1100	, 30.47						
94			Static	stics using k	(M estimate	on Loaged	Data and A	ssumina I o	gnormal Distr	ibution		
95			Statis		lean (logged		Data anu A	Journing LO	griorinai Disti		M Geo Mean	0.0184
96					SD (logged				95%	Critical H Val		5.676
97			KM Standa		lean (logged				9570		CL (KM -Log)	123.8
98			Tay Otaliua		SD (logged				95%	Critical H Val	,	5.676
99			KM Standa		lean (logged				9570	Chacarri val	as (I tivi-Log)	3.070
100			itivi Otaliudi	a Lilui Ui IV	icari (ioggeu	0.041						

	Α	В	С	D	E	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-1	ransformed		
104				Mean in C	Original Scale	1.069				Mean i	in Log Scale	-2.843
105				SD in C	Original Scale	2.193				SD i	in Log Scale	2.861
106			95% t l	JCL (Assum	es normality)	1.612				95%	H-Stat UCL	27.21
107			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons and	l historical re	easons		
108												
109					Nonparamo	etric Distribu	tion Free UC	CL Statistics				
110				Detected	d Data appea	r Gamma Di	stributed at	5% Significa	nce Level			
111												
112						Suggested	UCL to Use					
113	Adjusted KN	M-UCL (use	when k<=1 a	and 15 < n <	50 but k<=1)	1.902						
114												
115	١	Note: Sugge	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL	
116			F	Recommend	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.		
117		These recor	mmendations	s are based	upon the resu	ılts of the sim	nulation stud	es summariz	zed in Singh,	Maichle, and	d Lee (2006).	
118	Hov	wever, simu	lations result	ts will not co	ver all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.
119												

	Α	В	С	D	E LIOL Otation	F	G	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Lleen Cele	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	=/24/2019 12	25.22 DM						
4	Dat	e/Time of C	From File	ProUCL 5.16		.23.32 FIVI						
5		Fu	Il Precision	OFF	at VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	rtamber o	Воогопар	Орогацопо	2000								
9	n-Propylber	nzene										
10	.,											
12						General	Statistics					
13			Total	Number of O	bservations	50			Numbe	r of Distinct C	Observations	43
14				Numbe	er of Detects	42				Number of	Non-Detects	8
15			Nı	umber of Dist	inct Detects	41			Numbe	er of Distinct	Non-Detects	2
16				Minir	mum Detect	0.021				Minimum	Non-Detect	0.005
17				Maxir	mum Detect	19				Maximum	Non-Detect	0.5
18				Varia	nce Detects	34.05				Percent l	Non-Detects	16%
19				Me	ean Detects	5.55					SD Detects	5.836
20				Med	dian Detects	3.195					CV Detects	1.051
21				Skewn	ess Detects	1.064				Kurt	osis Detects	-0.201
22				Mean of Log	ged Detects	0.794				SD of Log	ged Detects	1.825
23												
24							t on Detects	Only				
25				hapiro Wilk T		0.779			-	ik GOF Test		
26			5% SI	napiro Wilk C		0.942	[Detected Da			ificance Leve	<u> </u>
27					est Statistic	0.213				GOF Test		
28			5	% Lilliefors C		0.135				al at 5% Sign	ificance Leve	i
29				D	etected Data	Not Norma	at 5% Sign	ificance Lev	el			
30			Vanlan	Maior (IZM) C	totiotico voln	a Normal C	ritical Value		Nonnonomo	mia IICI a		
31			Kapian-	Meier (KM) S	KM Mean	4.664	nticai vaiue	s and other			rror of Mean	0.81
32					KM SD	5.661			N		1 (BCA) UCL	5.953
33				95%	KM (t) UCL	6.023			95% KM (F	Percentile Boo	` '	6.003
34					KM (z) UCL	5.997			•	95% KM Boo	• /	6.187
35			C	90% KM Cheb		7.095				95% KM Che	•	8.196
36				.5% KM Chel	-	9.725				99% KM Che	-	12.73
37											,	
38				G	amma GOF	Tests on De	etected Obse	ervations Or	ıly			
40					est Statistic	0.454			•	rling GOF Te	est	
41				5% A-D C	ritical Value	0.798	Detected	d data appea	ır Gamma D	istributed at 5	5% Significand	ce Level
42				K-S T	est Statistic	0.0875		ı	Kolmogorov-	Smirnov GO	F	
43				5% K-S C	ritical Value	0.143	Detected	d data appea	r Gamma D	istributed at 5	5% Significand	ce Level
44				Detected	data appear	Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47					k hat (MLE)	0.662			k	star (bias cor	rected MLE)	0.631
48				Thet	a hat (MLE)	8.383			Theta	star (bias cor	rected MLE)	8.801
49					u hat (MLE)	55.62				nu star (bia	as corrected)	52.98
50				Mea	an (detects)	5.55						

	Α	В	С		D	E		F	G		Н				J		K		L
51						2	DO 0	Otati-ti	almer le		D ·	-4-							
52			CDCC					Statistics u							In Di				
53		0000	-					et has > 50%		-				-			45.00\		
54		GRUS may	not be used										-		rnali (e	.g., <	15-20)		
55			FC	JI SUC				method may ally true who	•				ano B	ıvs					
56		Eor gon	nma distribu	tod de			-	-		-			ictribu	ition on	KM or	stimat			
57		roi gan	IIIIIa uisiiibu	neu ue	elected	Minin		0.01	ly be com	iputea t	using ga	amma u	istribu	illori or	- KIVI ES		Mean		.664
58						Maxin		19								N	Median		2.215
59						IVIGAIII	SD	5.719									CV		.226
60						k hat (N		0.411					k :	star (bi	ias corı	rected			0.4
61					The	eta hat (N		11.34				7		•	ias corı				1.66
62						nu hat (N	-	41.14						•	tar (bia			40	
63 64			Adjusted	d Leve		,	•	0.0452											
		App	roximate Ch		•		,	26.51				Adjust	ed Ch	i Squa	re Valı	ле (40	.00, β)	26	6.18
65 66		95% Gamma				`	. ,	7.038			95% C	amma <i>i</i>				•		7	'.126
67								<u> </u>					-					<u> </u>	
68					Es	stimates	of G	amma Para	meters us	sing KN	M Estim	ates							
69						Mean (KM)	4.664								SI	D (KM)	5	5.661
70					Va	ariance (KM)	32.05							SE of	f Mea	n (KM)	0).81
71						k hat (KM)	0.679								k sta	ar (KM)	0	.651
72						nu hat (KM)	67.87							1	nu sta	ar (KM)	65	5.13
73					th	neta hat (KM)	6.872							the	ta sta	ar (KM)	7	'.161
74			80%	% gan	nma per	rcentile (KM)	7.681					90%	% gamı	ma per	centil	e (KM)	11	1.91
75			95%	% gan	nma per	rcentile (KM)	16.29					99%	% gamı	ma per	centil	e (KM)	26	6.83
76																			
77								a Kaplan-M	eier (KM)	Statis	tics								
78			roximate Ch	-				47.56							re Valu	-			7.12
79	95%	Gamma App	oroximate KN	M-UC	L (use v	when n>=	=50)	6.387		959	% Gamı	ma Adju	sted K	KM-UC	L (use	when	n<50)	6	5.447
80																			
81								F Test on D	etected C	Observ	ations (
82						Test Stat		0.838				•			F Test				
83			5% S			Critical Va		0.942		Detec	ted Dat	a Not Lo		GOF		nifica	nce Le	vei	
84						Critical V		0.157		Dotoo	tad Dat					nifico	noo l o		
85) % LIII				Not Lognorn	act at E%			a Not Lo	ognon	nai at s	J% Sig	Tillica		vei	
86					De	lected D	ala I	Not Logitori	iai at 570	Sigilili	icaric e i	Levei							
87					١n	anormal	I RO	S Statistics	Usina Imi	outed N	Non-De	tects							
88				Me		riginal S		4.673							Mean i	n Loc	Scale	n	.198
89						riginal S		5.711									Scale		2.185
90		95% t U	JCL (assume					6.027					95% I	Percen			p UCL		5.1
91			•		-	ootstrap l		6.186							% Boo		•		5.255
93						L (Log R		44.53								<u> </u>			
94								<u> </u>										<u> </u>	
95			Statis	stics (using K	M estim	ates	on Logged	Data and	Assum	ning Log	gnormal	Distri	ibution					
96					KM Me	ean (logo	ged)	-0.158							KN	/I Gec	Mean	0	.854
97					KM	SD (logg	ged)	2.748					95% (Critical	H Valu	Je (KI	vI-Log)	4	.706
			KM Standa	rd Err	ror of Me	ean (log	ged)	0.394						95%	H-UC	L (KN	1 -Log)	236	6.4
98									+									+	
98 99					KM	SD (logg	ged)	2.748					95% (Critical	H Valu	ıe (KN	M-Log)	4.	.706

	Α	В	С	D	E	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-	Transformed		
104				Mean in C	Original Scale	4.668				Mean	in Log Scale	-0.2
105				SD in C	Original Scale	5.716				SD	in Log Scale	2.908
106			95% t l	JCL (Assum	es normality)	6.023				95%	H-Stat UCL	437.8
107			DL/2	is not a reco	ommended m	ethod, provi	ded for comp	parisons and	d historical r	easons		
108												
109					Nonparame	tric Distribu	tion Free UC	CL Statistics				
110				Detected	d Data appea	r Gamma Di	stributed at	5% Significa	nce Level			
111												
112						Suggested	UCL to Use					
113			95% KM A	pproximate	Gamma UCL	6.387						
114												
115	N	ote: Sugge:	stions regard	ling the sele	ction of a 95%	UCL are pr	ovided to he	p the user to	select the i	most appropri	ate 95% UCI	
116			F	Recommend	ations are bas	sed upon dat	a size, data	distribution,	and skewne	SS.		
117	-	These recor	mmendation	s are based	upon the resu	Its of the sim	nulation studi	es summariz	zed in Singh	, Maichle, and	d Lee (2006).	
118	Hov	vever, simu	lations resul	ts will not co	ver all Real W	orld data se	ts; for addition	nal insight tl	ne user may	want to cons	ult a statistic	an.
119												

	Α	В	С	D	E LIOL Otation	F	G Octovrith N	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Haar Cala	-td Oti									
3	Dot	e/Time of C	cted Options	ProUCL 5.15	(24/2019 12:	·20·24 DM						
4	Date	e/ Time of C	From File	ProUCL Inpu		.20.24 F IVI						
5		Fu	Il Precision	OFF	11 VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- 110111501 0	. Dooloii ap		2000								
9	o-Xylene											
10	•											
12						General	Statistics					
13			Total	Number of O	bservations	48			Numbe	r of Distinct C	Observations	31
14									Numbe	r of Missing C	Observations	2
15				Numbe	r of Detects	27				Number of	Non-Detects	21
16			Nı	umber of Disti	nct Detects	26			Numbe	er of Distinct	Non-Detects	5
17				Minir	num Detect	0.015				Minimum	Non-Detect	0.002
18				Maxir	num Detect	36				Maximum	Non-Detect	2
19				Variar	nce Detects	106.1				Percent	Non-Detects	43.75%
20				Me	ean Detects	5.879					SD Detects	10.3
21				Med	ian Detects	1.4					CV Detects	1.752
22				Skewne	ess Detects	2.327				Kurt	osis Detects	4.564
23				Mean of Logo	ged Detects	0.0948				SD of Log	ged Detects	2.157
24												
25							t on Detects	Only				
26				hapiro Wilk To		0.601			•	lk GOF Test		
27			5% SI	napiro Wilk Cı		0.923		Detected Da		_	ificance Leve	İ
28					est Statistic	0.286	_			GOF Test		
29			5	% Lilliefors Ci		0.167				al at 5% Sign	ificance Leve	l
30				De	etected Data	Not Norma	ıı at 5% Sign	iticance Lev	eı			
31			Konlon	Meier (KM) S	tatiatica usin	a Normal C	ritical Value	a and other	Nonnoromo	trio LICI o		
32			Napiaii-	Wielei (Kivi) S	KM Mean	3.32	illical value	s and other	-	M Standard E	rror of Moon	1.194
33					KM SD	8.119			Ki		I (BCA) UCL	5.618
34				95%	KM (t) UCL	5.323			95% KM (F	Percentile Boo		5.422
35					KM (z) UCL	5.284			•	95% KM Boo		6.597
36			Ċ	00% KM Cheb	` '	6.902				95% KM Che		8.525
37				.5% KM Cheb	•	10.78				99% KM Che	-	15.2
38							<u> </u>					
40				G	amma GOF	Tests on De	etected Obse	ervations Or	ly			
41				A-D T	est Statistic	0.892		Α	nderson-Da	rling GOF Te	est	
42				5% A-D Cı	ritical Value	0.832	Detect	ed Data Not	Gamma Dis	tributed at 5%	6 Significance	Level
43				K-S T	est Statistic	0.187		ŀ	Kolmogorov-	Smirnov GO	F	
44				5% K-S Cı	ritical Value	0.18	Detecto	ed Data Not	Gamma Dis	tributed at 5%	6 Significance	Level
45				Detected	d Data Not G	amma Dist	ributed at 5%	6 Significan	ce Level			
46												
47					Gamma	Statistics or	Detected D	ata Only				
48					k hat (MLE)	0.394				star (bias cor		0.374
49					a hat (MLE)	14.94			Theta	star (bias cor	,	15.7
50				nı	u hat (MLE)	21.25				nu star (bia	s corrected)	20.22

	Α	В	С	D	E	F	G	Н		J	K	L
51				Me	ean (detects)	5.879						
52												
53					Gamma ROS							
54					l when data s					•		
55		GROS may			of detects is		-	=	· ·	•	e.g., <15-20)	
56			Fo		ions, GROS					TVs		
57					This is especi	•						
58		For gar	mma distribu	ted detected	data, BTVs a		y be compu	uted using ga	ımma distribu	ıtion on KM e		
59					Minimum						Mean	
60					Maximum	36					Median	
61					SD	8.208					CV	
62					k hat (MLE)	0.228				star (bias cor		
63					eta hat (MLE)				Theta	star (bias cor		
64					nu hat (MLE)	21.9				nu star (bia	as corrected)	21.87
65			•	-	ınificance (β)	0.045						
66				•	ue (21.87, α)	12.24				ni Square Val		
67		95% Gamma	a Approximat	e UCL (use v	when n>=50)	5.917		95% G	amma Adjus	ted UCL (use	when n<50)	6.027
68												
69				E	stimates of G		meters usir	ng KM Estim	ates ————			
70					Mean (KM)						SD (KM)	
71				V	ariance (KM)					SE 0	of Mean (KM)	
72					k hat (KM)	0.167					k star (KM)	
73					nu hat (KM)						nu star (KM)	
74					eta hat (KM)	19.86					eta star (KM)	
75					rcentile (KM)					% gamma pei		
76			95%	% gamma pe	rcentile (KM)	17.78			999	% gamma pei	rcentile (KM)	39.86
77					0	- 1/1 M	-! (IZNA) C	M - 4! - 4!				
78						na Kaplan-M	eier (KM) S	Statistics	A II		(10.00.0)	
79	050/			-	ue (16.38, α)			050/ 0	-	i Square Val		
80	95%	Gamma Ap	proximate Ki	W-UCL (use	when n>=50)	6.606		95% Gamr	na Adjusted r	KM-UCL (use	wnen n<50)	6.753
81						Toot on D	ata ata d Ob		Sml.			
82					ognormal GC Test Statistic		etected Ob	servations C		ilk GOF Test	•	
83					Critical Value		Do	staated Data	•	ormal at 5% S		Lovel
84			J /0 G	-	Test Statistic		De	stected Data	•	GOF Test	bigillicance	
85			5		Critical Value		Г	Octocted Date		mal at 5% Sig	anificanco Lo	wol
86					oata appear A					`	grillicarice Le	
87				Dolecteu L	ata appeai F	Abiovillare	Logiloilliai	at 0 /0 Olgili		•		
88				Lo	gnormal RO	S Statistice	Usina Impu	ited Non-Det	ects			
89					riginal Scale					Mean	in Log Scale	-2.005
90					riginal Scale						in Log Scale	
91		95%+1	ICI (assume		of ROS data)				95%	Percentile Bo		
92		337011	•		ootstrap UCL	5.863			9576		otstrap t UCL	
93					L (Log ROS)					JO 70 BOC		7.100
94					_ (209 1100)	1.50.5						
95			Statio	stics using K	M estimates	on Logged I	Data and A	ssumina I oa	normal Distr	ibution		
96			Juli		ean (logged)	-2.36	- a.a ana A		,		M Geo Mear	0.0944
97					SD (logged)				95%	Critical H Val		
98			KM Standa		ean (logged)	0.518			33 /6		CL (KM -Log)	
99			Tavi Glarida		SD (logged)				95%	Critical H Val		
100				IXIVI	טט (ioggeu)	0.000			35 /0	ondon i i val	ac (INIVI-LOG)	3.001

	Α	В	С	D	Е	F	G	Н	I	J	K	L
101			KM Standa	rd Error of M	ean (logged)	0.518						
102												
103						DL/2 S	statistics					
104			DL/2	Vormal					DL/2 Log	-Transformed		
105				Mean in O	riginal Scale	3.345				Mean	in Log Scale	-1.985
106				SD in O	riginal Scale	8.195				SD	in Log Scale	3.27
107			95% t l	JCL (Assume	es normality)	5.33				95%	H-Stat UCL	389.5
108			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons and	d historical	reasons		
109												
110					Nonparame	etric Distribu	ition Free UC	CL Statistics	1			
111			Dete	cted Data ap	opear Approx	imate Logn	ormal Distrib	outed at 5%	Significanc	e Level		
112												
113						Suggested	UCL to Use					
114			97.5	5% KM (Chel	oyshev) UCL	10.78						
115												
116	N	ote: Sugge	stions regard	ing the selec	ction of a 95%	UCL are p	ovided to he	lp the user to	select the	most appropri	ate 95% UCL	••
117			F	Recommenda	ations are bas	sed upon da	ta size, data	distribution,	and skewne	ess.		
118	-	These reco	mmendations	are based ι	pon the resu	Its of the sin	nulation stud	ies summari	zed in Singl	h, Maichle, and	d Lee (2006).	
119	Hov	vever, simu	lations result	s will not cov	er all Real W	orld data se	ets; for addition	onal insight t	he user ma	y want to cons	ult a statistici	an.
120												

	Α	В	С	D	E LICI Ctatiat	F	G Coto with N	H an Datasta	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala		<u> </u>								
3	Dot	e/Time of C	ected Options		5/24/2018 12:	·20·E0 DM						
4	Date	e/ Time of C	From File	ProUCL Inpu								
5		Fu	III Precision	OFF	ut VOCS.XIS							
6				95%								
7			Operations	2000								
8	- rambor o	. Bootottap		2000								
9	sec-Butylbe	nzene										
10 11												
12						General	Statistics					
13			Total	Number of O	bservations	50			Numbe	er of Distinct C	Observations	42
14				Numbe	er of Detects	40				Number of	Non-Detects	10
15			Nı	umber of Dist	tinct Detects	39			Numbe	er of Distinct I	Non-Detects	3
16				Mini	mum Detect	0.012				Minimum	Non-Detect	0.005
17				Maxi	mum Detect	11.1				Maximum	Non-Detect	0.5
18				Varia	nce Detects	9.997				Percent	Non-Detects	20%
19				M	ean Detects	3.123					SD Detects	3.162
20				Med	dian Detects	1.8					CV Detects	1.012
21					ess Detects	1.168				Kurt	tosis Detects	0.371
22				Mean of Log	ged Detects	0.326				SD of Log	ged Detects	1.718
23												
24							t on Detects	Only				
25				hapiro Wilk T		0.833			-	ilk GOF Test		
26			5% SI	hapiro Wilk C		0.94		Detected Dat			ificance Level	<u> </u>
27					Test Statistic	0.228				GOF Test		
28			5	% Lilliefors C		0.139				al at 5% Sign	ificance Level	i
29				u	etected Data	Not Norma	at 5% Sign	ificance Lev	el			
30			Vanlan	Majar (IZM) C	Ptatiatias vair	a Normal C	ritical Value		Nonnoromo	trio LICI o		
31			Kapian-i	Meier (KIVI) S	Statistics usin KM Mean	2.501	ntical values	s and other		M Standard E	rror of Moon	0.438
32					KM SD	3.057					(BCA) UCL	3.23
33				95%	KW (t) UCL	3.235			95% KM (E	Percentile Boo	, ,	3.223
34					KM (z) UCL	3.221			,	95% KM Boo	. ,	3.378
35				90% KM Chel		3.814				95% KM Che		4.409
36				.5% KM Chel	-	5.235				99% KM Che	-	6.857
37					,						,	
38				G	amma GOF	Tests on De	tected Obse	ervations Or	ıly			
40					Test Statistic	0.453			•	arling GOF Te	est	
41				5% A-D C	Critical Value	0.79	Detected	d data appea	r Gamma D	istributed at 5	5% Significand	ce Level
42				K-S T	Test Statistic	0.0966		ŀ	Colmogorov-	-Smirnov GO	F	
43				5% K-S C	Critical Value	0.145	Detected	data appea	r Gamma D	istributed at 5	5% Significand	ce Level
44				Detected	data appear	Gamma Dis	stributed at 5	5% Significa	nce Level			
45												
46					Gamma	Statistics on	Detected D	ata Only				
47					k hat (MLE)	0.738			k	star (bias cor	rected MLE)	0.699
48				Thet	ta hat (MLE)	4.231			Theta	star (bias cor	rected MLE)	4.465
49				n	nu hat (MLE)	59.05				nu star (bia	as corrected)	55.96
					ean (detects)	3.123						

	Α	В	С		D	Е	F	G		Н			J	<u> </u>	K		L
51					=		0.00										
52							S Statistics										
53	0.00		-				set has > 50		-				-		15.00		
54	GRO	JS may					s small such							э.g., <1 ———	15-20)		
55			Fo	or such			S method ma					IBIVs					
56	-		برحانيه والمحادد			-	cially true wh		-			مرم لفريطا	I/M -	-4:			
57		or gam	ıma distribu	tea aei	tectea (Minimu	and UCLs m	ay be con	nputea	using ga	ımma distri	ibution	on Kivi e		es Mean	2	.501
58						Maximu									Median		.285
59						S								IV	CV		.235
60						k hat (MLE						k etar	(bias cor	rroctod			.235
61						ta hat (MLE							(bias cor		•		.131
62						u hat (MLE	*						ı star (bia		•).79
63			Adjusted	l I evel		nificance (1						a otal (bio				
64		Annı	roximate Ch		•	,,	1				Adjusted (Chi Sa	ware Val	ue (40	79 B)	26	5.82
65	95% (Approximat			•	′			95% G	amma Adjı			•			.803
66					(400)		3, 3.757								557		
67					Es	timates of	Gamma Par	ameters u	ısina Kl	M Estima	ates						
68						Mean (KN								SE) (KM)	3	.057
69 70					Va	riance (KN	′						SE o	of Mean	` ,		.438
71						k hat (KN									r (KM)	0	.642
72						nu hat (KN								nu star	r (KM)	64	1.22
73					the	eta hat (KN	1) 3.738						the	eta star	r (KM)	3	.894
74			80%	% gamı	ma per	centile (KN	4.119				9	90% ga	ımma pei	rcentile	e (KM)	6	.404
75			95%	% gamı	ma per	centile (KN	1) 8.78				g	99% ga	ımma pei	rcentile	e (KM)	14	1.49
76																	
77						Gan	ma Kaplan-I	Meier (KM	l) Statis	tics							
78		Аррі	roximate Ch	i Squa	re Valu	ie (64.22, d	a) 46.79				Adjusted (Chi Sq	uare Val	ue (64.	.22, β)	46	5.34
79	95% Gam	та Арр	roximate KN	M-UCL	(use w	hen n>=5	0) 3.433		95	% Gamr	na Adjuste	d KM-l	JCL (use	when	n<50)	3.	.465
80							'	- 1									
81					Lo	gnormal C	OF Test on	Detected	Observ	ations C	Only						
82			S	Shapiro	Wilk T	est Statist	ic 0.863				Shapiro '	Wilk G	OF Test	į			
83			5% S			ritical Valu			Detec	cted Data	a Not Logn			gnificar	nce Lev	/el	
84						est Statist					Lilliefo						
85			5	% Lilli		ritical Valu					a Not Logn	ormal	at 5% Sig	gnificar	nce Lev	/el	
86					Det	ected Dat	a Not Lognor	mal at 5%	6 Signif	icance L	_evel						
87																	
88							OS Statistics	Using Im	iputed I	Non-Det	ects						
89						riginal Sca								in Log			357
90)E0/ +!!	Cl (case:			riginal Sca					050	0/ D		in Log			.084
91		95% t U	CL (assume				*	1			959		centile Bo		-		.222
92						otstrap UC		1					95% Boo	Jistrap	i UCL	3.	.39
93				95%	n-UCl	_ (Log ROS	18./1										
94			Ctati	etice	eina V	M petimot	s on Logged	Data ond	ΙΔοουσ	ning Loc	normal Di	etrib: :*	ion				
95			3(d)(8			ean (logge		Pala 8110	ı vəşiili	iiiig Log	nomal Di	อนเมนติ		M Geo	Mean	Λ	.467
96						SD (logge					QE.	% Criti	cal H Val				.588
97			KM Standa	rd Erro							901		5% H-UC	-			.500 I.63
98			KIVI SIGIIUG	iu LIIC		SD (logge					QE.		cal H Val	•	•		.588
99			KM Standa	rd Erro			-				933	70 CIIII	cai 🗆 Väl	ue (NIV	Log)	4.	J00
100			rvivi Otaliud	iu LIIC	וט ועוני	an (logger	0.304										

	Α	В	С	D	Е	F	G	Н	I	J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2 I	Normal					DL/2 Log-1	Transformed		
104				Mean in C	riginal Scale	2.509				Mean	in Log Scale	-0.739
105				SD in C	riginal Scale	3.082				SD	in Log Scale	2.767
106			95% t l	JCL (Assum	es normality)	3.239				95%	H-Stat UCL	142.6
107			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons and	d historical re	easons		I
108												
109					Nonparame	etric Distribu	tion Free UC	CL Statistics				
110				Detected	l Data appea	r Gamma Di	stributed at	5% Significa	nce Level			
111												
112						Suggested	UCL to Use					
113			95% KM A	pproximate	Gamma UCL	3.433						
114												
115	1	Note: Sugges	stions regard	ing the sele	ction of a 95%	UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL	-•
116			F	Recommend	ations are bas	sed upon dat	a size, data	distribution,	and skewnes	SS.		
117		These recor	mmendations	are based	upon the resu	Its of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006).	
118	Но	wever, simu	lations result	s will not co	ver all Real W	orld data se	ts; for addition	onal insight tl	he user may	want to cons	ult a statistic	an.
119												

	Α	В	С	D	E E	F	G Octovrith N	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	ion-Detects				
2		Llaav Cala	cted Options									
3	Det	e/Time of Co		ProUCL 5.15	104/2010 12:	21.25 DM						
4	Dati	e/ Time of Co	From File	ProUCL Inpu		21.33 PW						
5		Ful	I Precision	OFF	it VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap (2000								
8	Trainbor 0	Воогонар		2000								
9	tert-Butylbe	nzene										
10												
11						General	Statistics					
13			Total	Number of Ol	bservations	49			Numbe	er of Distinct C	bservations	27
14									Numbe	r of Missing C	bservations	1
15				Number	r of Detects	22				Number of I	Non-Detects	27
16			Nu	umber of Disti	nct Detects	22			Numb	er of Distinct I	Non-Detects	5
17				Minin	num Detect	0.016				Minimum	Non-Detect	0.005
18				Maxin	num Detect	0.926				Maximum	Non-Detect	5
19				Variar	nce Detects	0.0661				Percent I	Non-Detects	55.1%
20				Me	ean Detects	0.292					SD Detects	0.257
21				Med	ian Detects	0.156					CV Detects	0.882
22				Skewne	ess Detects	0.925				Kurt	osis Detects	-0.147
23				Mean of Logg	ged Detects	-1.678				SD of Log	ged Detects	1.043
24												
25							t on Detects	Only				
26				hapiro Wilk Te		0.849			•	ilk GOF Test		
27			5% SI	napiro Wilk Cr		0.911	[Detected Da			ificance Level	l
28					est Statistic	0.238				GOF Test		
29			5	% Lilliefors Cr		0.184				al at 5% Sign	ificance Level	l
30				De	etected Data	NOT NORM	al at 5% Sign	lificance Lev	/ei			
31			Kanlan-l	Meier (KM) S	tatietice usin	a Normal C	ritical Value	e and other	Nonnarama	trio IICI e		
32			Каріан-	Wielei (Kivi) S	KM Mean	0.161	Tilical Value	s and other		M Standard E	rror of Mean	0.0347
33					KM SD	0.222			10		I (BCA) UCL	0.214
34				95%	KM (t) UCL	0.219			95% KM (F	Percentile Boo		0.218
35					KM (z) UCL	0.218			,	95% KM Boo		0.226
36			g	00% KM Cheb		0.265				95% KM Che		0.312
37				.5% KM Cheb	-	0.377				99% KM Che	·	0.506
39												
40				Ga	amma GOF	Tests on De	etected Obse	ervations Or	nly			
41				A-D Te	est Statistic	0.756		A	nderson-Da	rling GOF Te	est	
42				5% A-D Cr	ritical Value	0.764	Detected	d data appea	ar Gamma D	istributed at 5	5% Significand	ce Level
43				K-S Te	est Statistic	0.162		ŀ	Kolmogorov	-Smirnov GO	F	
44				5% K-S Cr	ritical Value	0.19	Detected	d data appea	ar Gamma D	istributed at 5	5% Significand	ce Level
45				Detected	data appear	Gamma Di	stributed at §	5% Significa	nce Level			
46												
47					Gamma S	Statistics or	n Detected D	ata Only				
48					k hat (MLE)	1.264				star (bias cor		1.122
49					a hat (MLE)	0.231			Theta	star (bias cor	,	0.26
50				nı	u hat (MLE)	55.62				nu star (bia	s corrected)	49.37

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51				Me	ean (detects)	0.292						
52												
53				G	amma ROS	Statistics u	sing Impute	ed Non-Dete	ects			
54			GROS may	not be used	when data s	et has > 50%	NDs with	many tied ob	servations at	multiple DL	S	
55		GROS may					-	-	-		(e.g., <15 - 20)	
56			Fo						f UCLs and B	STVs		
57					his is especi							
58		For gar	nma distribut	ed detected	data, BTVs a	ind UCLs ma	y be comp	uted using ga	amma distribu	ution on KM	estimates	
59					Minimum						Mean	
60					Maximum	0.926					Median	
61					SD	0.217					CV	
62					k hat (MLE)	0.589				•	rrected MLE)	0.567
63					ta hat (MLE)	0.266			Theta	•	rrected MLE)	0.277
64					nu hat (MLE)	57.74				nu star (bi	as corrected)	55.54
65			-	Level of Sig		0.0451						
66			roximate Ch			39.42				·	lue (55.54, β)	39
67		95% Gamma	a Approximate	e UCL (use v	vhen n>=50)	0.221		95% G	amma Adjus	ted UCL (use	e when n<50)	0.223
68												
69				Es	timates of G		meters usir	ng KM Estim	ates			
70					Mean (KM)	0.161					SD (KM)	0.222
71				Va	ariance (KM)	0.0491				SE	of Mean (KM)	0.0347
72					k hat (KM)	0.525					k star (KM)	
73					nu hat (KM)	51.47					nu star (KM)	
74					eta hat (KM)	0.306					eta star (KM)	
75					centile (KM)	0.264				- :	ercentile (KM)	
76			95%	gamma per	centile (KM)	0.614			99	% gamma pe	ercentile (KM)	1.058
77												
78						a Kaplan-M	eier (KM) S	Statistics				
79			proximate Ch								lue (49.65, β)	
80	95%	Gamma App	proximate KN	1-UCL (use v	vhen n>=50)	0.231		95% Gamr	ma Adjusted I	KM-UCL (us	e when n<50)	0.234
81												
82					ognormal GC		etected Ob	servations (
83					Test Statistic				-	ilk GOF Tes		
84			5% SI	•	Critical Value	0.911	De	tected Data			Significance L	_evel
85					Test Statistic		_			GOF Test		
86			5		Critical Value				•	ormal at 5%	Significance L	_evel
87				Dete	cted Data ap	pear Logno	rmal at 5%	Significance	e Level			
88								5				
89					gnormal RO		Using Impu	ited Non-Dei	tects			0.004
90					riginal Scale						in Log Scale	
91		050/	101 /		riginal Scale				050/		in Log Scale	
92		95% t L	JCL (assume		· · · · · · · · · · · · · · · · · · ·	0.209			95%		ootstrap UCL	
93					otstrap UCL					95% Bo	otstrap t UCL	0.221
94				95% H-UCI	L (Log ROS)	0.298						
95				M 1 17	N4 · ·	1						
96			Statis				Jata and A	ssuming Log	gnormal Distr		M O 11	0.0405
97					ean (logged)				250		(M Geo Mean	
98			IZM O:		SD (logged)				95%		lue (KM-Log)	
99			KM Standar		ean (logged)	0.319			0501		CL (KM -Log)	
100				KM	SD (logged)	1.881			95%	Critical H Va	lue (KM-Log)	3.445

	Α	В	С	D	Е	F	G	Н	I	J	K	L	
101			KM Standar	d Error of M	lean (logged)	0.319							
102							•						
103						DL/2 S	tatistics						
104			DL/2 N	Normal					DL/2 Log-1	Transformed			
105	SD in Original Scale 0.404 SD in Log Scale 2.0											-2.607	
106				SD in C	Original Scale	0.404				SD i	n Log Scale	2.097	
107			95% t L	JCL (Assum	es normality)	0.361				95%	H-Stat UCL	2.064	
108			DL/2 i	s not a reco	ommended m	ded for com	parisons and	d historical re	easons	<u> </u>			
109													
110		Nonparametric Distribution Free UCL Statistics											
111				Detected	d Data appea	r Gamma Di	stributed at	5% Significa	nce Level				
112													
113						Suggested	UCL to Use						
114			95% K	M Adjusted	Gamma UCL	0.234			95% GRC	S Adjusted C	amma UCL	0.223	
115													
116	I	Note: Sugge	stions regard	ing the sele	ction of a 95%	UCL are pr	ovided to he	lp the user to	select the n	nost appropria	ate 95% UCL		
117			F	Recommend	ations are bas	sed upon da	a size, data	distribution,	and skewnes	SS.			
118		These reco	mmendations	are based	upon the resu	Its of the sin	nulation studi	ies summariz	zed in Singh,	Maichle, and	Lee (2006).		
119	Ho	wever, simu	llations result	s will not co	ver all Real W	orld data se	ts; for addition	onal insight t	he user may	want to consi	ult a statisticia	an.	
120	·			·	·	·		·	·		·		

	Α	В	С	D	E LIOL Otation	F	G Octovrith N	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		110-1-	-1-10-1									
3	Dot	e/Time of C	cted Options	ProUCL 5.15	(24/2019 12:	-26:05 DM						
4	Dati	e/Time of C	From File	ProUCL 5.15		.20.03 FIVI						
5		Fu	Il Precision	OFF	it VOCS.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Trainbor o	. Dooloii ap		2000								
9	Toluene											
10												
12						General	Statistics					
13			Total	Number of O	bservations	48			Numbe	r of Distinct C	Observations	32
14									Number	r of Missing C	Observations	2
15				Numbe	r of Detects	23				Number of	Non-Detects	25
16			Nı	umber of Disti	nct Detects	23			Numbe	er of Distinct	Non-Detects	9
17				Minir	num Detect	0.0033				Minimum	Non-Detect	0.002
18				Maxir	num Detect	3.9				Maximum	Non-Detect	2
19				Varia	nce Detects	1.04				Percent	Non-Detects	52.08%
20				Me	ean Detects	0.868					SD Detects	1.02
21				Med	ian Detects	0.472					CV Detects	1.175
22				Skewne	ess Detects	2.03				Kurt	osis Detects	3.698
23				Mean of Logo	ged Detects	-0.895				SD of Log	ged Detects	1.667
24												
25							t on Detects	Only				
26				hapiro Wilk T		0.716			•	Ik GOF Test		
27			5% SI	napiro Wilk C		0.914		Detected Da		_	ificance Leve	İ
28					est Statistic	0.268				GOF Test		
29			5	% Lilliefors C		0.18				al at 5% Sign	ificance Leve	l
30				De	etected Data	Not Norma	ıı at 5% Sign	iticance Lev	eı			
31			Kanlan	Meier (KM) S	tatietice usin	a Normal C	ritical Value	e and other	Nonnarama	trio LICI e		
32			Kapiaii-	Wielei (KiVI) S	KM Mean	0.426	Tilicai value	s and other		M Standard E	rror of Mean	0.121
33					KM SD	0.815					I (BCA) UCL	0.65
34				95%	KM (t) UCL	0.628			95% KM (F	Percentile Boo		0.632
35					KM (z) UCL	0.624			,	95% KM Boo	• •	0.762
36			g	00% KM Cheb	` '	0.788				95% KM Che		0.952
37				.5% KM Cheb	1	1.18				99% KM Che	-	1.627
39												
40				G	amma GOF	Tests on De	etected Obse	ervations Or	ıly			
41				A-D T	est Statistic	0.86		Α	nderson-Da	rling GOF Te	est	
42				5% A-D C	ritical Value	0.78	Detect	ed Data Not	Gamma Dis	tributed at 5%	6 Significance	Level
43				K-S T	est Statistic	0.199		ŀ	Colmogorov-	Smirnov GO	F	
44				5% K-S C	ritical Value	0.188	Detect	ed Data Not	Gamma Dis	tributed at 5%	6 Significance	Level
45				Detecte	d Data Not G	amma Dist	ributed at 59	6 Significan	ce Level			
46												
47							Detected D	ata Only				
48					k hat (MLE)	0.789				•	rected MLE)	0.715
49					a hat (MLE)	1.099			Theta	`	rected MLE)	1.213
50				n	u hat (MLE)	36.3				nu star (bia	s corrected)	32.9

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51				Me	an (detects)	0.868						
52												
53				G	amma ROS	Statistics u	sing Impute	ed Non-Dete	cts			
54			GROS may	not be used	when data s	et has > 50%	NDs with	many tied ob	servations at	multiple DL:	S	
55		GROS may					-	-	-		(e.g., <15 - 20)	
56			Fo						f UCLs and B	TVs		
57					his is especi							
58		For gar	mma distribut	ed detected	data, BTVs a	ind UCLs ma	y be comp	uted using ga	amma distribu	ition on KM	estimates	
59					Minimum						Mean	
60					Maximum	3.9					Median	
61					SD	0.821					CV	
62					k hat (MLE)	0.344				,	rrected MLE)	
63					ta hat (MLE)	1.225			Theta	,	rrected MLE)	1.253
64					nu hat (MLE)	32.99				nu star (bi	as corrected)	32.27
65				Level of Sig		0.045						
66			proximate Ch			20.28				· ·	lue (32.27, β)	
67		95% Gamma	a Approximate	e UCL (use v	vhen n>=50)	0.67		95% G	iamma Adjus	ted UCL (us	e when n<50)	0.68
68								101 = 1				
69				Es	timates of G		meters usir	ng KM Estim	ates		00 ((4))	0.045
70					Mean (KM)	0.426				0.5	SD (KM)	
71				Va	ariance (KM)	0.664				SE	of Mean (KM)	
72					k hat (KM)	0.273					k star (KM)	
73					nu hat (KM)	26.23				.1.	nu star (KM)	
74			900		eta hat (KM)	1.559			000		neta star (KM)	
75				gamma per		0.634 2.013					ercentile (KM) ercentile (KM)	
76			957	gamma per	centile (Kivi)	2.013			991	% уапппа ре	ercentile (Kivi)	3.972
77					Gamm	na Kaplan-M	aior (KM) S	Statistics				
78		Δnr	proximate Chi	Square Valu		•		, tausucs	Adjusted Ch	ni Sauare Va	lue (25.92, β)	15.06
79	95%		proximate KN		. ,	0.721		95% Gamr		<u> </u>	e when n<50)	
80		, adminia , tp	proximato rai	1 002 (000 1		0.721		00 % Gaiiii	na rajaotoa i	W 002 (do		0.700
81				Lo	gnormal GC	F Test on D	etected Ob	servations (Only			
82			S		est Statistic					ilk GOF Tes	ıt .	
83				napiro Wilk C		0.914	Г	Detected Dat	· ·		gnificance Le	vel
84					est Statistic					GOF Test		
86			5	% Lilliefors C	ritical Value	0.18		Detected Dat	a Not Lognori	mal at 5% Si	gnificance Le	vel
87				De	tected Data	Not Lognorn	l nal at 5% S	ignificance l	_evel			
88												
89				Lo	gnormal RO	S Statistics	Using Impu	ted Non-De	tects			
90				Mean in O	riginal Scale	0.427				Mear	in Log Scale	-2.63
91				SD in O	riginal Scale	0.818				SD	in Log Scale	2.151
92		95% t l	JCL (assume	s normality o	of ROS data)	0.625			95%	Percentile B	ootstrap UCL	0.639
93			9	95% BCA Bo	otstrap UCL	0.692				95% Bo	otstrap t UCL	0.739
94				95% H-UCI	(Log ROS)	2.41						
95						L	I.					
96			Statis	tics using K	M estimates	on Logged I	Data and A	ssuming Log	normal Distr	ibution		
97				KM Me	ean (logged)	-3.536				K	(M Geo Mean	0.0291
98				KM	SD (logged)	2.858			95%	Critical H Va	lue (KM-Log)	4.842
99			KM Standar	d Error of Me	ean (logged)	0.431				95% H-U	CL (KM -Log)	13.04
100				KM	SD (logged)	2.858			95%	Critical H Va	lue (KM-Log)	4.842
				KM	SD (logged)	2.858			95%	Critical H Va	lue (KM-Log)	4.842

	Α	В	С	D	E	F	G	Н	I	J	K	L	
101			KM Standar	d Error of M	ean (logged)	0.431							
102													
103						DL/2 S	tatistics						
104			DL/2 N	Normal					DL/2 Log-	Transformed			
105				Mean in O	riginal Scale	0.464				Mean i	n Log Scale	-2.763	
106				SD in O	riginal Scale	0.813				SD i	n Log Scale	2.719	
107			95% t L	JCL (Assume	es normality)	0.661				95%	H-Stat UCL	16	
108			DL/2 i	s not a reco	mmended m	ethod, provi	ded for com	parisons and	d historical r	easons	l		
109													
110	Nonparametric Distribution Free UCL Statistics												
111				Data do n	ot follow a D	iscernible D	istribution a	5% Signific	ance Level				
112													
113						Suggested	UCL to Use						
114			95	% KM (Chel	yshev) UCL	0.952							
115													
116	1	Note: Sugges	tions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	lp the user to	select the r	nost appropria	ate 95% UCL		
117			F	Recommenda	itions are ba	sed upon da	a size, data	distribution,	and skewne	SS.			
118		These recon	nmendations	are based u	pon the resu	ılts of the sin	nulation stud	ies summari:	zed in Singh	, Maichle, and	Lee (2006).		
119	Но	wever, simul	ations result	s will not cov	er all Real V	/orld data se	ts; for addition	onal insight t	he user may	want to consu	ult a statistici	an.	
120													

	Α	В	С	D	E LIOL Otation	F	G	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	atad Ontiana									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	10410010 0.1	2.02 DM						
4	Dat	e/Time or C	From File	ProUCL Inpu		2.02 PIVI						
5		Fu	III Precision	OFF	IL FAI 15.XIS							
6			Coefficient	95%								
7		f Bootstrap		2000								
8	- Number o	Воогопар	Ороганопо	2000								
9	Acenaphthe	ene										
10												
11						General	Statistics					
13			Total	Number of O	bservations	29			Numbe	r of Distinct C	Observations	14
14				Numbe	r of Detects	7				Number of	Non-Detects	22
15			N	umber of Disti	nct Detects	7			Numbe	er of Distinct	Non-Detects	7
16				Minir	num Detect	0.033				Minimum	n Non-Detect	0.01
17				Maxir	num Detect	0.794				Maximum	n Non-Detect	5
18				Variar	nce Detects	0.0856				Percent	Non-Detects	75.86%
19				Me	ean Detects	0.304					SD Detects	0.293
20				Med	ian Detects	0.159					CV Detects	0.963
21				Skewne	ess Detects	0.843				Kurt	tosis Detects	-0.691
22				Mean of Logg	ged Detects	-1.736				SD of Log	gged Detects	1.234
23					I		<u>I</u>					
24					Norm	al GOF Tes	t on Detects	Only				-
25			S	hapiro Wilk To	est Statistic	0.879			Shapiro W	lk GOF Test		
26			5% SI	napiro Wilk Cı	ritical Value	0.803	De	etected Data	appear Nori	mal at 5% Sig	gnificance Lev	el
27					est Statistic	0.261			Lilliefors	GOF Test		
28			5	% Lilliefors Cı		0.304				mal at 5% Sig	gnificance Lev	el
29				Dete	ected Data a	ppear Norn	nal at 5% Sig	gnificance Lo	evel			
30												
31			Kaplan-	Meier (KM) S		<u> </u>	ritical Value	s and other	-			
32					KM Mean	0.093			KI		rror of Mean	0.0393
33					KM SD	0.187					I (BCA) UCL	0.157
34					KM (t) UCL	0.16			•		otstrap) UCL	0.153
35					KM (z) UCL	0.158					otstrap t UCL	0.184
36				00% KM Cheb	-	0.211					ebyshev UCL	0.264
37			97	.5% KM Cheb	ysnev UCL	0.338				99% KIVI Che	ebyshev UCL	0.484
38				<u> </u>	amma GOF	Tacto on Da	stacted Oher	nyations O-	nhy			
39					est Statistic	0.285	Flecied Obse		•	rling GOF Te		
40					ritical Value	0.265	Detector			_	5% Significand	حو ا وبروا
41					est Statistic	0.727	Defected			Smirnov GO		~ EGAGI
42					ritical Value	0.173	Detected				5% Significand	ce Level
43					data appear							
44						u Di						
45					Gamma	Statistics or	Detected D	ata Only				
46					k hat (MLE)	1.054		,	k	star (bias cor	rrected MLE)	0.697
48					a hat (MLE)	0.288				•	rrected MLE)	0.435
49					u hat (MLE)	14.75				•	as corrected)	9.765
50					an (detects)	0.304				•	- 1	
50					. ,							

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	servations at	•		
54		GROS may							the sample s		e.g., <15-20)	
55			Fo			-	-		f UCLs and B	TVs		
56						cially true who						
57		For gar	nma distribut	ed detected			ay be compi	uted using g	amma distribu	ution on KM e		
58					Minimur						Mean	
59					Maximur						Median	
60					SI						CV	
61					k hat (MLE	-				star (bias cor	•	
62					eta hat (MLE	1			Theta	star (bias cor	•	
63					nu hat (MLE					nu star (bia	s corrected)	25.91
64					gnificance (β							
65			roximate Ch	-	•	*				ni Square Valu		
66		95% Gamma	Approximat	e UCL (use	when n>=50	0.142		95% (Gamma Adjus	ted UCL (use	when n<50)	0.146
67					-41 1 7	O						
68				Е		Gamma Para	meters usir	ng KM Estim	nates		05 ((4)	0.407
69					Mean (KM	-					SD (KM)	
70				V	ariance (KM	*				SE o	f Mean (KM)	
71					k hat (KM	1					k star (KM)	
72					nu hat (KM	1					nu star (KM)	
73					neta hat (KM						eta star (KM)	
74					ercentile (KM	*				% gamma per	, ,	0.28
75			95%	6 gamma pe	ercentile (KM) 0.453			99	% gamma per	centile (KIVI)	0.915
76					0		I-1 (IZNA) G	Na - 41 - 41				
77		A		: 0 \/-		ma Kaplan-N	leier (KM) S	Statistics	A discrete al Oli	-: O \/-l-	(14.00.0)	C 40
78	050/		oroximate Ch	-	•	*		050/ 0		ni Square Valu		
79	95%	Gamma App	proximate Ki	/I-UCL (use	wnen n>=50	0.197		95% Gam	ma Adjusted I	XIVI-UCL (use	wnen n<50)	0.206
80					agnarmal C	OF Took on F	Datastad Oh	oom rotions r	Ombr			
81					Test Statisti	OF Test on E	Detected Of	servations	-	ilk GOF Test		
82				•	Critical Value		Do	staatad Data	appear Logno			ovol
83			3% 3	•	Test Statisti		De	elected Data		GOF Test	orgrinicance L	_evei
84			5		Critical Value		De	stacted Data	appear Logno		ignificanco I	ovol
85						appear Logno			•	Jillal at 5 % 5	ngrillicarice L	
86				Det	ecteu Data d	ippear Logiic	Jillai at 576	Significance	e reaei			
87				1.	ognormal Dr	OS Statistics	Using Impu	ited Non-Do	tects			
88					Original Scal			11011-06		Mean	in Log Scale	-4.159
89					Original Scal						in Log Scale	
90		95% + 1	JCL (assume						Q5%	Percentile Bo		
91		337010	•		ootstrap UC	1			33 /0		tstrap t UCL	
92					CL (Log ROS					JO 70 DOO	ap : 00L	3.200
93						, 0.202						<u> </u>
94			Statis	stics using k	(M estimate	s on Loaned	Data and A	ssumina I o	gnormal Distr	ibution		
95			Julia		lean (logged		_ ata ana A	- Janning LO			M Geo Mean	0.0258
96					SD (logged	•			95%	Critical H Val		
97		KM Standard Error of Mean (log									CL (KM -Log)	
98			Otalida		SD (logged	*			95%	Critical H Val	,	
99			KM Standa		lean (logged	-					(Log)	3.004
100			Otalida		.sa.i (ioggeo	, 0.527						

	Α	В	С	D	E	F	G	Н		J	K	L	
101													
102						DL/2 S	tatistics						
103			DL/2 I	Normal					DL/2 Log-T	ransformed			
104				Mean in O	riginal Scale	0.221				Mean	in Log Scale	-2.84	
105				SD in O	riginal Scale	0.476				SD	in Log Scale	1.763	
106			95% t l	JCL (Assume	es normality)	0.371				95%	H-Stat UCL	0.901	
107			DL/2	s not a reco	mmended m	ethod, provi	ded for comp	arisons and	d historical re	easons			
108													
109	Nonparametric Distribution Free UCL Statistics												
110		Detected Data appear Normal Distributed at 5% Significance Level											
111													
112						Suggested	UCL to Use						
113				95%	KM (t) UCL	0.16							
114													
115	Ν	lote: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to hel	p the user to	select the m	nost appropri	ate 95% UCL		
116			F	Recommenda	tions are bas	sed upon dat	a size, data d	distribution, a	and skewnes	SS.			
117		These recor	mmendations	are based u	ipon the resu	ılts of the sim	ulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006).		
118	Hov	wever, simu	lations result	s will not cov	er all Real W	/orld data se	ts; for additio	nal insight th	ne user may	want to cons	ult a statistic	ian.	
119													

-	Α	В	С	D	E LIOL Otation	F	G	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	-4-d O-4:									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	124/2019 2:1	2:44 DM						
4	Date	e/ Time of C	From File	ProUCL Inpu		13.44 F IVI						
5		Fu	III Precision	OFF	IL FAI 15.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Trainber o	Вооконар	Орогацопо	2000								
9	Anthracene											
10												
12						General	Statistics					
13			Total	Number of O	bservations	25			Numbe	r of Distinct C	Observations	10
14				Numbe	r of Detects	4				Number of	Non-Detects	21
15			Nı	umber of Disti	nct Detects	4			Numbe	er of Distinct	Non-Detects	6
16				Minir	num Detect	0.114				Minimum	n Non-Detect	0.01
17				Maxir	num Detect	2				Maximum	n Non-Detect	5
18				Variar	nce Detects	0.777				Percent	Non-Detects	84%
19				Me	ean Detects	0.794					SD Detects	0.881
20				Med	ian Detects	0.53					CV Detects	1.111
21					ess Detects	1.159				Kurt	tosis Detects	0.277
22				Mean of Logo	ged Detects	-0.854				SD of Log	gged Detects	1.372
23												
24							t on Detects	Only				
25				hapiro Wilk To		0.866			<u>-</u>	lk GOF Test		
26			5% SI	napiro Wilk Cı		0.748	De	etected Data		•	gnificance Lev	′el
27					est Statistic	0.264				GOF Test		
28			5	% Lilliefors Ci		0.375				mal at 5% Sig	gnificance Lev	'el
29				Dete	ected Data a	ippear Norn	nal at 5% Siç	Jnificance L	evei			
30			Kanlan	Meier (KM) S	tatieties usin	a Normal C	ritical Value	s and other	Nonnarama	trio I ICI e		
31			Napiaii-	Wielei (KiVI) S	KM Mean	0.145	illicai value	s and other	-		rror of Mean	0.101
32					KM SD	0.145			- IXI		I (BCA) UCL	N/A
33				95%	KM (t) UCL	0.317			95% KM (F		otstrap) UCL	N/A
34					KM (z) UCL	0.31			`		otstrap t UCL	N/A
35			g	00% KM Cheb		0.447					ebyshev UCL	0.583
36				.5% KM Cheb	•	0.773					ebyshev UCL	1.146
38							1					
39				G	amma GOF	Tests on De	etected Obse	ervations Or	nly			
40				A-D To	est Statistic	0.359		A	nderson-Da	rling GOF Te	est	
41				5% A-D Cı	ritical Value	0.668	Detected	d data appea	ar Gamma D	istributed at 5	5% Significand	ce Level
42				K-S T	est Statistic	0.303		I	Kolmogorov-	Smirnov GO	F	
43				5% K-S Cı	ritical Value	0.403	Detected	d data appea	ar Gamma D	istributed at 5	5% Significand	ce Level
44				Detected	data appear	Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46							Detected D	ata Only				
47					k hat (MLE)	0.934				`	rrected MLE)	0.4
48					a hat (MLE)	0.849			Theta	•	rrected MLE)	1.982
49					u hat (MLE)	7.475				nu star (bia	as corrected)	3.202
50				Mea	an (detects)	0.794						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	servations at	•		
54		GROS may							the sample s		e.g., <15-20)	
55			Fo			•	•		f UCLs and B	TVs		
56						cially true who						
57		For gar	nma distribut	ed detected			y be compu	uted using ga	amma distribu	ıtion on KM e		
58					Minimun						Mean	
59					Maximun						Median	
60					SI						CV	
61					k hat (MLE					star (bias cor	,	
62					eta hat (MLE				Theta	star (bias cor		
63					nu hat (MLE					nu star (bia	s corrected)	16.18
64					gnificance (β	,						
65			roximate Ch	-	· ·					ni Square Valu		7.699
66		95% Gamma	Approximat	e UCL (use	when n>=50	0.271		95% G	amma Adjus	ted UCL (use	when n<50)	N/A
67												
68				E		Gamma Para	meters usir	ng KM Estim	ates			
69					Mean (KM						SD (KM)	
70				V	ariance (KM	,				SE o	f Mean (KM)	
71					k hat (KM						k star (KM)	
72					nu hat (KM	^					nu star (KM)	
73					neta hat (KM	1					eta star (KM)	
74					rcentile (KM	,				% gamma per	, ,	
75			95%	6 gamma pe	rcentile (KM	0.818			999	% gamma per	centile (KM)	2.025
76												
77						ma Kaplan-M	eier (KM) S	statistics				
78		·	proximate C		•	´				Chi Square Va		
79	95%	ն Gamma App	oroximate KN	Л-UCL (use	when n>=50	0.501		95% Gamı	ma Adjusted ł	KM-UCL (use	when n<50)	0.549
80												
81						OF Test on D	etected Ob	servations (•			
82				•	Test Statistic				•	ilk GOF Test		
83			5% SI	<u>'</u>	Critical Value		De	tected Data	appear Logno		ignificance L	_evel
84					Test Statistic					GOF Test		
85			5		Critical Value				appear Logno	ormal at 5% S	ignificance L	_evel
86				Dete	ected Data a	ppear Logno	ormal at 5%	Significance	e Level			
87												
88						OS Statistics	Using Impu	tea Non-De	TECTS	3.6	- 1 - C '	F 000
89					Original Scale						in Log Scale	
90		050/ : :	101 /		Original Scale						in Log Scale	
91		95% t L	JCL (assume			^			95%	Percentile Bo	•	
92					ootstrap UCI					95% Boo	tstrap t UCL	1.736
93				95% H-UC	L (Log ROS	2.441						<u> </u>
94					.							
95			Statis				Data and A	ssuming Log	gnormal Distr			0.0000
96					lean (logged						M Geo Mean	
97					SD (logged				95%	Critical H Val	,	
98			KM Standa		lean (logged						CL (KM -Log)	
99			1010:		SD (logged				95%	Critical H Val	ue (KM-Log)	3.217
100			KM Standa	rd Error of M	lean (logged	0.376						

	Α	В	С	D	Е	F	G	Н		J	K	L	
101													
102						DL/2 S	tatistics						
103			DL/2	Normal					DL/2 Log-1	ransformed			
104				Mean in C	riginal Scale	0.288				Mean i	in Log Scale	-2.948	
105				SD in C	riginal Scale	0.623				SD i	in Log Scale	1.973	
106			95% t l	JCL (Assum	es normality)	0.501				95%	H-Stat UCL	1.792	
107			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons and	l historical re	easons			
108													
109	Nonparametric Distribution Free UCL Statistics												
110				Detected	d Data appea	ar Normal Di	stributed at	5% Significa	nce Level				
111													
112						Suggested	UCL to Use						
113				95%	6 KM (t) UCL	0.317							
114													
115	١	lote: Sugges	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL		
116			F	Recommend	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.			
117		These recor	mmendations	zed in Singh,	Maichle, and	d Lee (2006).							
118	Hov	wever, simu	lations result	ts will not co	ver all Real W	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.	
119													

	Α	В	С	D	Е	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	Sets with N	on-Detects				
2												
3		User Selec	cted Options									
4	Da	te/Time of Co	omputation	ProUCL 5.15	/24/2018 2:1	14:18 PM						
5			From File	ProUCL Input	t PAHs.xls							
6		Ful	I Precision	OFF								
7		Confidence	Coefficient	95%								
8	Number	of Bootstrap (Operations	2000								
9												
10	Benz(a)ant	hracene										
11												
12						General	Statistics					
13			Total	Number of Ob	oservations	23			Numbe	r of Distinct C	Observations	7
14				Number	of Detects	1				Number of N	Non-Detects	22
15			N	umber of Distir	nct Detects	1			Numbe	er of Distinct N	Non-Detects	6
16												
17	,	Warning: On	ly one distin	ct data value	was detecte	ed! ProUCL	(or any othe	r software) s	hould not be	e used on suc	ch a data set	!
18	It is sugg	ested to use	alternative s	site specific va	alues detern	mined by the	Project Tea	am to estimat	te environm	ental parame	eters (e.g., El	PC, BTV).
19												
20				The data	set for vari	able Benz(a	n)anthracene	was not pro	cessed!			
21												
22												

	Α	В	С	D	E	F	G	H		J	K	L
1					UCL Statist	lics for Data	Sets with N	on-Detects				
2		110-1-	-4104									
3	Det	e/Time of C	ected Options		5/24/2018 2:1	14.E7 DM						
4	Date	e/Time of C				14:57 PIVI						
5		Г.,	From File	ProUCL Inpu	JI PAHS.XIS							
6			Il Precision	95%								
7		f Bootstrap										
8	Number o	г воосятар	Operations	2000								
9	Chrysene											
10	Ciliyselle											
11						General	Statistics					
12			Total	Number of O)hearvations	25			Numbe	er of Distinct C)heervations	9
13					er of Detects	3			Numbe		Non-Detects	22
14			Nı	umber of Dist		3			Numbe	er of Distinct I		6
15					mum Detect	0.688			- Tanib		Non-Detect	0.01
16					mum Detect	1.083					Non-Detect	5
17					nce Detects	0.04	 				Non-Detects	88%
18					ean Detects	0.868					SD Detects	0.2
19					dian Detects	0.832					CV Detects	0.23
20					ess Detects	0.777				Kurt	osis Detects	N/A
21				Mean of Log		-0.159					ged Detects	0.228
22					900 2010010						900 2010010	
23					Warning: D	ata set has	only 3 Detec	ted Values.				
24			TI	his is not end	_		-		and estimat	es.		
25 26												
27												
28					Norm	al GOF Tes	t on Detects	Only				
29			S	hapiro Wilk T	est Statistic	0.976		-	Shapiro W	ilk GOF Test		
30			5% SI	hapiro Wilk C	ritical Value	0.767	De	etected Data	appear Nori	mal at 5% Siç	nificance Lev	/el
31				Lilliefors T	est Statistic	0.237			Lilliefors	GOF Test		
32			5	% Lilliefors C	ritical Value	0.425	De	tected Data	appear Nori	mal at 5% Siç	nificance Lev	/el
33				Def	tected Data a	appear Norn	nal at 5% Sig	nificance Lo	evel			
34												
35			Kaplan-	Meier (KM) S	Statistics usir	ng Normal C	ritical Value	s and other	Nonparame	tric UCLs		
36					KM Mean	0.117			KI	M Standard E	rror of Mean	0.0724
37			-	-	KM SD	0.289	<u> </u>			95% KM	I (BCA) UCL	N/A
38				95%	KM (t) UCL	0.241			95% KM (F	Percentile Boo	otstrap) UCL	N/A
39				95%	KM (z) UCL	0.236				95% KM Boo	tstrap t UCL	N/A
40				90% KM Chel	byshev UCL	0.334			!	95% KM Che	byshev UCL	0.433
41			97	.5% KM Chel	byshev UCL	0.569			!	99% KM Che	byshev UCL	0.837
42												
43				G	amma GOF	Tests on Do	etected Obse	ervations On	lly			
44					Not End	ough Data to	Perform GC	OF Test				
45												
46					Gamma	Statistics or	n Detected D	ata Only				
47					k hat (MLE)	28.84			k	star (bias cor	rected MLE)	N/A
48		Theta hat (N							Theta	star (bias cor	rected MLE)	N/A
				n	nu hat (MLE)	173				nu star (bia	s corrected)	N/A
49					, ,					•	1	

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	servations at	•		
54		GROS may							the sample s		e.g., <15-20)	
55			Fo			-	•		f UCLs and B	TVs		
56						cially true who						
57		For gar	nma distribut	ed detected			ay be compu	uted using ga	amma distribu	ıtion on KM e		1
58					Minimur						Mean	
59					Maximur						Median	
60					SI						CV	
61					k hat (MLE					star (bias cor	•	
62					eta hat (MLE				Theta	star (bias cor	•	
63					nu hat (MLE					nu star (bia	s corrected)	18.78
64					gnificance (β							
65			roximate Ch	-	•					ni Square Valu		9.523
66		95% Gamma	Approximat	e UCL (use	when n>=50) 0.272		95% 0	Gamma Adjus	ted UCL (use	when n<50)	N/A
67												
68				E		Gamma Para	meters usir	ng KM Estim	nates			
69					Mean (KM						SD (KM)	
70				V	ariance (KM	·				SE o	f Mean (KM)	
71					k hat (KM						k star (KM)	
72					nu hat (KM	<i>'</i>					nu star (KM)	
73					neta hat (KM	<u></u>					eta star (KM)	
74					rcentile (KM	·				% gamma per	, ,	0.352
75			95%	6 gamma pe	ercentile (KM	0.628			999	% gamma per	centile (KM)	1.406
76												
77						ma Kaplan-M	eier (KM) S	Statistics				
78			proximate C		·					Chi Square Va		
79	95%	Gamma App	oroximate KN	И-UCL (use	when n>=50	0.328		95% Gamı	ma Adjusted ł	KM-UCL (use	when n<50)	0.353
80												
81						OF Test on D	etected Ob	servations		"		
82				•	Test Statisti				•	ilk GOF Test		
83			5% S	<u>'</u>	Critical Valu		De	tected Data	appear Logno		Significance L	_evel
84					Test Statisti		D-	441 D-4-		GOF Test	· : : :	1
85			5		Critical Value				appear Logno	ormai at 5% S	ignificance L	-evei
86				Det	ected Data a	ppear Logno	rmai at 5%	Significance	e Levei			
87				1.	anormal D	OS Statistics	l leina l	tod Non Da	toote			
88					Original Scal		Jany impu	ILGU NUN-DE	i c cis	Maar	in Log Cool-	-1.439
89					Original Scal						in Log Scale in Log Scale	
90		0E0/ +1	JCL (assume		_				OE0/	Percentile Bo		
91		90% [(•		of ROS data ootstrap UC	<i>'</i>			95%		tstrap t UCL	
92					CL (Log ROS					90% B00	risiiap i UCL	0.43
93				30 /0 M-UC	L (LOU ROS	0.393						<u> </u>
94			Statio	etice ueina k	(M petimete	e on I occod	Data and A	seumina I o	gnormal Distr	ibution		
95			Statis		lean (logged		∪ata anu A	oounniy LO(שוייטווומו טואנר		M Geo Mean	0.0174
96					SD (logged	'			05%	Critical H Val		
97			KM Standay		lean (logged	•			30 /0 (L (KM -Log)	
98			ixivi Oldi ludi		SD (logged	1			05%	95% H-UC	,	
99			KM Standay		lean (logged				30 /0 (Onucai i TVali	ue (INIVI-LUY)	J. 1JZ
100			Nivi Otaliudi	u LIIUI UI IV	ican (logget	, 0.300						

	Α	В	С	D	Е	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-1	ransformed		
104				Mean in C	riginal Scale	0.275				Mean i	in Log Scale	-2.886
105				SD in C	riginal Scale	0.542				SD i	in Log Scale	2.001
106			95% t l	JCL (Assum	es normality)	0.46				95%	H-Stat UCL	2.094
107			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons and	l historical re	easons		
108												
109					Nonparame	etric Distribu	tion Free UC	CL Statistics				
110				Detecte	d Data appea	ar Normal Di	stributed at	5% Significa	nce Level			
111												
112						Suggested	UCL to Use					
113				95%	6 KM (t) UCL	0.241						
114												
115	١	lote: Sugges	stions regard	ling the sele	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCL	
116			F	Recommend	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.		
117		These recor	mmendation	s are based	upon the resu	ılts of the sim	nulation stud	es summariz	zed in Singh,	Maichle, and	d Lee (2006).	
118	Hov	wever, simu	lations resul	ts will not co	ver all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistici	ian.
119												

	Α	В	С	D	E E	F	G	Н	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	atad Ontiana									
3	Dot	e/Time of C	ected Options	ProUCL 5.15	10410010 0.1	E-20 DM						
4	Dat	e/Time or C	From File	ProUCL Inpu		3.20 FIVI						
5		Fu	III Precision	OFF	IL FAI 15.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Number o	Boototrap	Ороганопо	2000								
9	Fluoranthen	ne										
10												
11						General	Statistics					
13			Total	Number of Ol	bservations	27			Numbe	r of Distinct C	Observations	11
14				Number	r of Detects	5				Number of	Non-Detects	22
15			N	umber of Disti	nct Detects	5			Numbe	er of Distinct	Non-Detects	6
16				Minin	num Detect	0.048				Minimum	Non-Detect	0.01
17				Maxin	num Detect	0.57				Maximum	Non-Detect	5
18				Variar	nce Detects	0.0495				Percent	Non-Detects	81.48%
19				Me	ean Detects	0.173					SD Detects	0.223
20				Med	ian Detects	0.089					CV Detects	1.284
21				Skewne	ess Detects	2.192				Kurt	osis Detects	4.845
22				Mean of Logg	ged Detects	-2.223				SD of Log	ged Detects	0.97
23												
24					Norm	al GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Te	est Statistic	0.636			Shapiro Wi	lk GOF Test		
26			5% SI	napiro Wilk Cr	ritical Value	0.762	Ι	Detected Da	ta Not Norma	al at 5% Sign	ificance Leve	Ī
27				Lilliefors Te	est Statistic	0.434			Lilliefors	GOF Test		
28			5	% Lilliefors Cr	ritical Value	0.343	Ι	Detected Da	ta Not Norma	al at 5% Sign	ificance Leve	
29				De	etected Data	Not Norma	l at 5% Sign	ificance Lev	el			
30												
31			Kaplan-	Meier (KM) S			ritical Value	s and other	•			
32					KM Mean	0.0495			KN		rror of Mean	0.0245
33					KM SD	0.108					1 (BCA) UCL	0.0929
34					KM (t) UCL	0.0913			,	ercentile Boo	• /	0.0909
35					KM (z) UCL	0.0898				95% KM Boo	•	0.119
36				00% KM Cheb	-	0.123				95% KM Che	-	0.156
37			97	.5% KM Cheb	ysnev UCL	0.203				99% KM Che	byshev UCL	0.293
38						Toots at D	stanted Ober	mrotion - O	.h.			
39					amma GOF est Statistic	0.772	elected ODS6		•	rling GOF Te	not .	
40					ritical Value	0.772	Detect				6 Significance	Lovel
41					est Statistic	0.689	Detect			Smirnov GO		LEVEI
42					ritical Value	0.403	Detect				иг 6 Significance	l evel
43					d Data Not G					buieu al J	o Organicance	LCVGI
44				Detected	a Data NOLC	adminia Dist	i ibutou at 07	o Organicali	CO LGVGI			
45					Gamma 9	Statistics or	Detected D	ata Only				
46					k hat (MLE)	1.201	. 20.00.00		k	star (bias cor	rected MLE)	0.614
47					a hat (MLE)	0.144				,	rected MLE)	0.283
48					u hat (MLE)	12.01				`	as corrected)	6.137
49					an (detects)	0.173						
50					(= =====)							

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	oservations at	•		
54		GROS may	not be used	l when kstar	of detects is	small such a	s <1.0, esp	ecially when	the sample s	ize is small (e	e.g., <15-20)	
55			Fo			-	-		of UCLs and B	TVs		
56						cially true whe						
57		For gar	nma distribut	ed detected	l data, BTVs		ay be comp	uted using g	amma distribu	ution on KM e	stimates	
58					Minimun						Mean	
59					Maximun						Median	
60					SI						CV	
61					k hat (MLE					star (bias cor	•	
62					eta hat (MLE				Theta	star (bias cor	•	
63					nu hat (MLE					nu star (bia	s corrected)	33.23
64					gnificance (β							
65			roximate Ch		•					ni Square Valu		20.43
66		95% Gamma	Approximat	e UCL (use	when n>=50	0.066		95% (Gamma Adjus	ted UCL (use	when n<50)	0.068
67												
68				E		Gamma Para	meters usir	ng KM Estim	nates			1
69					Mean (KM						SD (KM)	
70				V	ariance (KM	,				SE o	f Mean (KM)	
71					k hat (KM						k star (KM)	
72					nu hat (KM	^					nu star (KM)	
73					neta hat (KM	1					eta star (KM)	
74					ercentile (KM	,				% gamma per	, ,	
75			95%	6 gamma pe	ercentile (KM	0.252			999	% gamma per	centile (KM)	0.531
76												
77						ma Kaplan-M	eier (KM) S	Statistics			((1.00.0)	
78			roximate Ch		-					ni Square Valu		
79	95%	Gamma App	oroximate KN	/I-UCL (use	when n>=50	0.117		95% Gam	ma Adjusted I	KM-UCL (use	when n<50)	0.124
80						OF T4 F			O b -			
81					Test Statisti	OF Test on D	etected Of	servations		ills COF Tool		
82				•			D-	tastad Data	•	ilk GOF Test		
83			5% 5	·	Critical Value Test Statistic		De	etected Data	appear Logno	GOF Test	ignificance L	-evei
84			E					Ostostad Da			mificanas I a	al
85					Critical Value				ta Not Lognor		Inificance Le	vei
86				Detected L	рата арреаг	Approximate	Lognormai	at 5% Sign	ilicance Leve	·I		
87				1.4	ognormal D	OS Statistics	Hoing Impu	tod Non Do	tooto			
88					Original Scale			ited Noil-De	:16013	Moan	in Log Scale	-4.149
89					Original Scale						in Log Scale	
90		95% + 1	JCL (assume		_				Q5%	Percentile Bo		
91		3J /0 L C	•		ootstrap UCI	^			30 /0		tstrap t UCL	
92					CL (Log ROS					9576 1500	ionap i OOL	0.171
93				30 /0 TI-OC	,_ (LOG 1100	, 0.000	<u> </u>					<u> </u>
94			Static	stics using k	(M estimate	s on Loaged	Data and ∆	ssuming Lo	gnormal Distr	ibution		
95			Statis		lean (logged		Jata anu A	Journing LU	giloilliai Disti		M Geo Mean	0.0203
96					SD (logged	,			95%	Critical H Val		
97			KM Standa		lean (logged	^			33 /0		CL (KM -Log)	
98			- Aw Otaliua		SD (logged				95%	Critical H Val	,	
99			KM Standa		lean (logged		1		33 /0	- Induiti vali	as (INVI-LUG)	2.007
100			Tim Otaliua	1 OI OI IV	.our (logged	, 0.0						

	Α	В	С	D	E	F	G	Н	I	J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2 I	Normal					DL/2 Log-1	ransformed		
104				Mean in O	riginal Scale	0.181				Mean i	n Log Scale	-3.211
105				SD in O	riginal Scale	0.48				SD i	n Log Scale	1.758
106			95% t l	JCL (Assume	es normality)	0.339				95%	H-Stat UCL	0.663
107			DL/2	s not a reco	mmended m	ethod, provi	ded for comp	oarisons and	l historical re	easons		
108												
109					Nonparame	etric Distribu	tion Free UC	CL Statistics				
110			Dete	cted Data a	pear Approx	kimate Logno	ormal Distrib	uted at 5%	Significance	Level		
111												
112						Suggested	UCL to Use					
113					KM H-UCL	0.067						
114												
115	١	Note: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	p the user to	select the m	nost appropria	ate 95% UCL	
116			F	Recommenda	itions are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.		
117		These recor	mmendations	are based (pon the resu	ılts of the sim	ulation studi	es summariz	zed in Singh,	Maichle, and	Lee (2006).	
118	Ho	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistici	an.
119												

	Α	В	С	D	E	F	G Octovrith N	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaav Cala	-td Ot									
3	Dot	e/Time of C	cted Options	ProUCL 5.15/	24/2019 2:1	6.06 DM						
4	Date	e/ Time of C	From File	ProUCL Input		0.00 F W						
5		Fu	Il Precision	OFF	. FAI 15.XI5							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Trainboi o	. 20010114p		2000								
9	Fluorene											
10												
12						General	Statistics					
13			Total	Number of Ob	servations	27			Numbe	r of Distinct C	Observations	18
14				Number	of Detects	12				Number of	Non-Detects	15
15			Nı	umber of Distir	nct Detects	12			Numbe	er of Distinct	Non-Detects	6
16				Minim	um Detect	0.018				Minimum	Non-Detect	0.01
17				Maxim	um Detect	4.35				Maximum	Non-Detect	5
18				Varian	ce Detects	2.444				Percent	Non-Detects	55.56%
19				Me	an Detects	1.559					SD Detects	1.563
20				Medi	an Detects	1.105					CV Detects	1.003
21					ss Detects	0.809				Kurt	osis Detects	-0.858
22				Mean of Logg	ed Detects	-0.429				SD of Log	ged Detects	1.761
23												
24							t on Detects	Only				
25				hapiro Wilk Te		0.857			-	lk GOF Test		
26			5% SI	napiro Wilk Cri		0.859	[Detected Da		ŭ	ificance Leve	Í
27				Lilliefors Te		0.207	_			GOF Test		
28			5	% Lilliefors Cri		0.243				mal at 5% Sig	nificance Lev	el
29				Detected D	ata appear	Approximat	e Normal at	5% Significa	ance Level			
30			Vanlan	Major (I/M) Ct	otiotico volm	a Normal C	ritical Value		Nonnoromo	mia IICI a		
31			Napian-	Meier (KM) St	KM Mean	0.727	riucai vaiue	s and other	•		rror of Mean	0.261
32					KM SD	1.276			- Ni		1 (BCA) UCL	1.168
33				95% I	KM (t) UCL	1.173			95% KM (F	Percentile Boo	` '	1.138
34					(M (z) UCL	1.157			`	95% KM Boo	. ,	1.351
35			Ç	00% KM Cheby		1.511				95% KM Che	•	1.866
36				.5% KM Cheby		2.359				99% KM Che	-	3.327
37											-	
39				Ga	mma GOF	Tests on De	etected Obse	ervations Or	ıly			
40				A-D Te	est Statistic	0.272		Α	nderson-Da	rling GOF Te	est	
41				5% A-D Cri	tical Value	0.77	Detected	d data appea	r Gamma D	stributed at 5	5% Significand	e Level
42				K-S Te	est Statistic	0.137		ı	Kolmogorov-	Smirnov GO	F	
43				5% K-S Cri	tical Value	0.256	Detected	d data appea	r Gamma D	stributed at 5	5% Significand	e Level
44				Detected of	lata appear	Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47					hat (MLE)	0.693				,	rected MLE)	0.575
48					hat (MLE)	2.25			Theta	`	rected MLE)	2.71
49					hat (MLE)	16.63				nu star (bia	as corrected)	13.81
50				Mea	n (detects)	1.559						

Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.35 Maximum 4.36 Maximum 4.35 Maximum 4.36 Max	Mean Median CV	0.699
GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <1.55 For such situations, GROS method may yield incorrect values of UCLs and BTVs This is especially true when the sample size is small. For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates Minimum 0.01 Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M Maximum 4.35 M M Maximum 4.35 M M Maximum 4.35 M M Maximum 4.35 M M M M M M M M M M M M M M M M M M M	Mean Median CV	0.01
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <1.55	Mean Median CV	0.01
For such situations, GROS method may yield incorrect values of UCLs and BTVs	Mean Median CV	0.01
This is especially true when the sample size is small.	Mean Median CV	0.01
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates	Mean Median CV	0.01
Maximum Max	Mean Median CV	0.01
Maximum A.35	Median CV d MLE)	0.01
SD	CV d MLE)	
K hat (MLE) 0.29 K star (bias corrected	d MLE)	1 000
Theta hat (MLE) 2.408 Theta star (bias corrected nu hat (MLE) 15.66 nu star (bias corrected nu star (bias corrected nu hat (MLE) 15.66 nu star (bias corrected	Í	1.839
63 nu hat (MLE) 15.66 nu star (bias corrections) 64 Adjusted Level of Significance (β) 0.0401 65 Approximate Chi Square Value (15.26, α) 7.44 Adjusted Chi Square Value (15.26, α) 66 95% Gamma Approximate UCL (use when n>=50) 1.432 95% Gamma Adjusted UCL (use when 67 Estimates of Gamma Parameters using KM Estimates 69 Mean (KM) 0.727 SC 70 Variance (KM) 1.628 SE of Mear 71 k hat (KM) 0.324 k star 72 nu hat (KM) 17.52 nu star 73 theta hat (KM) 2.24 theta star 74 80% gamma percentile (KM) 1.126 90% gamma percentile 75 95% gamma percentile (KM) 3.279 99% gamma percentile 76 Gamma Kaplan-Meier (KM) Statistics	1 V VI 🗀 / I	0.283 2.472
Adjusted Level of Significance (β) 0.0401	1	15.26
Approximate Chi Square Value (15.26, α) 7.44 Adjusted Chi Square Value (15.66 95% Gamma Approximate UCL (use when n>=50) 1.432 95% Gamma Adjusted UCL (use when for severe the for severe to the following severe	ectea)	15.20
66 95% Gamma Approximate UCL (use when n>=50) 1.432 95% Gamma Adjusted UCL (use when n>=67 68 Estimates of Gamma Parameters using KM Estimates 69 Mean (KM) 0.727 SE 70 Variance (KM) 1.628 SE of Mear 71 k hat (KM) 0.324 k sta 72 nu hat (KM) 17.52 nu sta 73 theta hat (KM) 2.24 theta sta 74 80% gamma percentile (KM) 1.126 90% gamma percentile 75 95% gamma percentile (KM) 3.279 99% gamma percentile 76 Gamma Kaplan-Meier (KM) Statistics	26 0)	7.092
Stimates of Gamma Parameters using KM Estimates	,	1.503
68 Estimates of Gamma Parameters using KM Estimates 69 Mean (KM) 0.727 SE 70 Variance (KM) 1.628 SE of Mean 71 k hat (KM) 0.324 k star 72 nu hat (KM) 17.52 nu star 73 theta hat (KM) 2.24 theta star 74 80% gamma percentile (KM) 1.126 90% gamma percentile 75 95% gamma percentile (KM) 3.279 99% gamma percentile 76 Gamma Kaplan-Meier (KM) Statistics	11/50)	1.503
69 Mean (KM) 0.727 SD 70 Variance (KM) 1.628 SE of Mean 71 k hat (KM) 0.324 k star 72 nu hat (KM) 17.52 nu star 73 theta hat (KM) 2.24 theta star 74 80% gamma percentile (KM) 1.126 90% gamma percentile 75 95% gamma percentile (KM) 3.279 99% gamma percentile 76 Gamma Kaplan-Meier (KM) Statistics		
Variance (KM) 1.628 SE of Mear) (KM)	1.276
71 k hat (KM) 0.324 k star 72 nu hat (KM) 17.52 nu star 73 theta hat (KM) 2.24 theta star 74 80% gamma percentile (KM) 1.126 90% gamma percentile 75 95% gamma percentile (KM) 3.279 99% gamma percentile 76 Gamma Kaplan-Meier (KM) Statistics	` ′	0.261
71 nu hat (KM) 17.52 nu star 73 theta hat (KM) 2.24 theta star 74 80% gamma percentile (KM) 1.126 90% gamma percentile 75 95% gamma percentile (KM) 3.279 99% gamma percentile 76 Gamma Kaplan-Meier (KM) Statistics	` ′	0.313
73 theta hat (KM) 2.24 theta statement of the statement o	` ′	16.91
74 80% gamma percentile (KM) 1.126 90% gamma percentile (KM) 3.279 99% gamma percentile (KM) 3.279 99% gamma percentile (KM) 76 Gamma Kaplan-Meier (KM) Statistics		2.321
75 95% gamma percentile (KM) 3.279 99% gamma percentile 76 Gamma Kaplan-Meier (KM) Statistics Approximate Chi Square Value (16.01 g) 8.607 Adjusted Chi Square Value (16.01 g) 8.607	` ′	2.132
76 77 Gamma Kaplan-Meier (KM) Statistics Approximate Chi Square Value (15.01 g) 2.607 Approximate Chi Square Value (15.01 g) 2.607		6.244
Gamma Kaplan-Meier (KM) Statistics Approximate Chi Square Value (16.01 g) 2.607 Adjusted Chi Square Value (16.01 g) 3.607	3 (I (IVI)	
Approximate Chi Square Value (16.01 a) 9.607 Adjusted Chi Square Value (16.01 a)		
	.91. B)	8.229
059/ Commo Approximate VM LICI (upo when page 0) 1 429 059/ Commo Adjusted VM LICI (upo when		1.493
80 Lognormal GOF Test on Detected Observations Only		
81 Shapiro Wilk Test Statistic 0.905 Shapiro Wilk GOF Test		
83 5% Shapiro Wilk Critical Value 0.859 Detected Data appear Lognormal at 5% Signific	ance L	evel
84 Lilliefors Test Statistic 0.166 Lilliefors GOF Test		
85 5% Lilliefors Critical Value 0.243 Detected Data appear Lognormal at 5% Signific	ance L	evel
86 Detected Data appear Lognormal at 5% Significance Level		
87		
Lognormal ROS Statistics Using Imputed Non-Detects		
89 Mean in Original Scale 0.702 Mean in Log	Scale	-2.851
90 SD in Original Scale 1.283 SD in Log	Scale	2.674
91 95% t UCL (assumes normality of ROS data) 1.123 95% Percentile Bootstra	p UCL	1.123
92 95% BCA Bootstrap UCL 1.201 95% Bootstrap	t UCL	1.339
93 95% H-UCL (Log ROS) 31.21		
94		
95 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution		
96 KM Mean (logged) -2.61 KM Geo	Mean	0.0735
97 KM SD (logged) 2.343 95% Critical H Value (KM	√l-Log)	4.612
98 KM Standard Error of Mean (logged) 0.486 95% H-UCL (KM	1 -Log)	9.521
99 KM SD (logged) 2.343 95% Critical H Value (KM	٠,	
100 KM Standard Error of Mean (logged) 0.486	٠,	4.612

	Α	В	С	D	E	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2 I	Normal					DL/2 Log-1	Transformed		
104				Mean in C	riginal Scale	0.801				Mean	in Log Scale	-2.311
105				SD in C	riginal Scale	1.316				SD	in Log Scale	2.433
106			95% t L	JCL (Assum	es normality)	1.233				95%	H-Stat UCL	18.58
107			DL/2 i	s not a reco	mmended m	ethod, provi	ded for comp	parisons and	l historical re	easons		
108												
109					Nonparamo	etric Distribu	tion Free UC	L Statistics				
110			Det	tected Data	appear Appr	oximate Nor	mal Distribu	ted at 5% Si	gnificance L	evel		
111												
112						Suggested	UCL to Use					
113				95%	KM (t) UCL	1.173						
114												
115			When a d	lata set follo	ws an approx	cimate (e.g.,	normal) distri	bution passi	ng one of the	GOF test		
116		When appl	licable, it is s	uggested to	use a UCL b	ased upon a	distribution (e.g., gamma) passing bo	th GOF tests	in ProUCL	
117												
118	Ν	lote: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to hel	p the user to	select the m	nost appropri	ate 95% UCL	
119			F	Recommenda	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.		
120		These recor	mmendations	are based u	ipon the resu	ults of the sin	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006).	
121	Hov	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	nal insight th	ne user may	want to cons	ult a statistici	an.
122												

	Α	В	С	D	E LIOL Otation	F	G Octovršti N	H	I	J	K	L
1					UCL Statist	ics for Data	Sets with N	ion-Detects				
2		Lloor Colo	cted Options									
3	Date	e/Time of Co	·	ProUCL 5.15	5/2//2019 2:1	6:38 DM						
4	Dati		From File	ProUCL Inpu		0.561 W						
5		Ful	Il Precision	OFF	JULI AL 13.A13							
6		Confidence		95%								
7		f Bootstrap (2000								
8												
10	Naphthalene											
11												
12						General	Statistics					
13			Total	Number of O	bservations	32			Numbe	er of Distinct C	bservations	25
14									Numbe	r of Missing C	bservations	1
15				Numbe	er of Detects	22				Number of N	Non-Detects	10
16			Nι	umber of Dist	inct Detects	22			Numb	er of Distinct N	Von-Detects	3
17				Minir	mum Detect	0.067				Minimum	Non-Detect	0.01
18				Maxir	mum Detect	52.9				Maximum	Non-Detect	5
19				Varia	nce Detects	146.5				Percent N	Non-Detects	31.25%
20					ean Detects	7.908					SD Detects	12.1
21					dian Detects	3.165					CV Detects	1.53
22					ess Detects	2.737					osis Detects	8.952
23				Mean of Log	ged Detects	0.918				SD of Log	ged Detects	1.764
24												
25				hapiro Wilk T		0.66	t on Detects	Only	Chanina M	ills COE Toot		
26				napiro Wilk C		0.00		Datastad Da	•	ilk GOF Test al at 5% Signi		
27			3 /0 31	•	est Statistic	0.263		Detected Da		GOF Test	ilicance Level	I
28			5	% Lilliefors C		0.203		Detected Da		al at 5% Signi	ificance Level	
29					etected Data					ai at 5 % Oigin	——————————————————————————————————————	
30												
31			Kaplan-l	Meier (KM) S	statistics usin	g Normal C	ritical Value	s and other	Nonparame	tric UCLs		
33					KM Mean	5.485			K	M Standard E	rror of Mean	1.89
34					KM SD	10.45				95% KM	(BCA) UCL	9.189
35				95%	KM (t) UCL	8.691			95% KM (F	Percentile Boo	otstrap) UCL	8.733
36				95%	KM (z) UCL	8.595				95% KM Boo	tstrap t UCL	11.39
37			g	00% KM Cheb	byshev UCL	11.16				95% KM Chel	byshev UCL	13.73
38			97	.5% KM Cheb	oyshev UCL	17.29				99% KM Chel	byshev UCL	24.29
39												
40					amma GOF		etected Obse		-			
41					est Statistic	0.442				rling GOF Te		
42					ritical Value	0.8	Detecte			istributed at 5		ce Level
43					est Statistic	0.159				-Smirnov GO		
44					ritical Value	0.195				istributed at 5	% Significand	ce Level
45				Detected	data appear	Gamma Di	stributed at \$	o% Significa	nce Level			
46					Comme	Statiatics =:	Dotostad D	lata Onle				
47					k hat (MLE)	0.545	n Detected D	rata Offis	l,	star (bias con	rected MI EV	0.501
48					a hat (MLE)	14.51				star (bias con		15.79
49					u hat (MLE)	23.98			illeta	,	s corrected)	22.04
50				n	u Hat (WILE)	23.30				riu Stat (Dla	a conecteu)	ZZ.U4

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51				Me	ean (detects)	7.908						
52												
53					Gamma ROS							
54									servations at			
55		GROS may					-	-	-		(e.g., <15-20)	
56			Fo						f UCLs and B	TVs		
57					This is especi							
58		For gar	mma distribut	ed detected		,	y be comp	uted using ga	amma distribu	ution on KM	estimates	
59					Minimum						Mean	
60					Maximum	52.9					Median	
61					SD	10.63					CV	
62					k hat (MLE)	0.279				,	rrected MLE)	
63					ta hat (MLE)	19.51			Theta	,	rrected MLE)	19.88
64					nu hat (MLE)	17.85				nu star (bi	as corrected)	17.51
65			-		nificance (β)	0.0416						
66			proximate Ch	-		9.037					lue (17.51, β)	
67		95% Gamma	a Approximate	e UCL (use v	when n>=50)	10.54		95% G	amma Adjus	ted UCL (us	e when n<50)	10.93
68												
69				Es	stimates of G		meters usir	ng KM Estim	ates			
70					Mean (KM)	5.485					SD (KM)	
71				Va	ariance (KM)	109.1				SE	of Mean (KM)	
72					k hat (KM)	0.276					k star (KM)	
73					nu hat (KM)	17.65					nu star (KM)	
74					eta hat (KM)	19.89					eta star (KM)	
75					rcentile (KM)	8.179					ercentile (KM)	
76			95%	gamma pe	rcentile (KM)	25.92			999	% gamma pe	ercentile (KM)	51.09
77							1 ((0.0)					
78						a Kaplan-M	eier (KM) S	Statistics			. (1= 00 0)	0.707
79	050/			<u> </u>	ue (17.33, α)			250/ 0			lue (17.33, β)	
80	95%	Gamma App	proximate KN	1-UCL (use \	when n>=50)	10.67		95% Gamı	ma Adjusted I	KM-UCL (us	e when n<50)	11.07
81				1.	I OC		-44-4-06		D-1-			
82					ognormal GC		etected Of	servations		:::: OOF T		
83					Test Statistic		D-		•	ilk GOF Tes		1
84			5% SI	•	Critical Value Test Statistic	0.911	De	etected Data	•	GOF Test	Significance I	_evei
85					Critical Value		D-	tastad Data			Significance I	- val
86			<u></u>		cted Data ar				•	ormai at 5%	Significance i	_evei
87				Dete	cied Data ap	pear Logilo	illiai at 5%	Significance	e revei			
88				Lo	gnormal RO	S Statistics	leina Impu	ted Non-De	tecte			
89					riginal Scale		Jang impu	iteu Noil-De	lecis	Moor	in Log Scale	-0.195
90					riginal Scale						in Log Scale in Log Scale	
91		05% +1	JCL (assume			8.656			05%		ootstrap UCL	
92		3J /0 L C	•		otstrap UCL				30 /0		otstrap t UCL	
93			•		L (Log ROS)	68.84				95/6 100	ownah i OOL	11.72
94				35 /6 TI-UC	L (LUG NUS)	00.04						1
95			Statio	tice using V	M estimatos	on Logged !	Tata and A	eeumina l oo	normal Distr	ibution		
96			Sidils		ean (logged)	-0.456	zala allu A	oounniy LO(טואנע ומווויוטוון		(M Geo Mean	0.634
97					SD (logged)				05%		ilue (KM-Log)	
98			KM Standar		ean (logged)	0.51			90%		CL (KM -Log)	
99			Vivi Orgungi		SD (logged)	2.639			05%		llue (KM-Log)	
100				K IVI	טט (logged)	2.039			95%	Chilical H Va	iiue (NIVI-LOG)	4.033

	Α	В	С	D	Е	F	G	Н	I	J	K	L
101			KM Standar	d Error of M	ean (logged)	0.51						
102						•	•				•	
103						DL/2 S	tatistics					
104			DL/2 N	Normal					DL/2 Log-	Transformed		
105				Mean in O	riginal Scale	5.544				Mean i	n Log Scale	-0.193
106				SD in O	riginal Scale	10.59				SD i	n Log Scale	2.471
107			95% t L	ICL (Assume	es normality)	8.717				95%	H-Stat UCL	132.6
108			DL/2 i	s not a reco	mmended m	ethod, provi	ded for comp	parisons and	d historical r	easons		
109												
110					Nonparamo	etric Distribu	tion Free UC	CL Statistics				
111				Detected	Data appea	r Gamma D	stributed at	5% Significa	nce Level			
112												
113						Suggested	UCL to Use					
114	Adjusted KN	/I-UCL (use	when k<=1 a	nd 15 < n <	50 but k<=1)	11.07						
115												
116	N	lote: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	lp the user to	select the n	nost appropria	ate 95% UCL	
117			F	ecommenda	ations are ba	sed upon da	ta size, data	distribution,	and skewnes	SS.		
118		These recor	mmendations	are based u	ipon the resu	ılts of the sin	nulation studi	es summariz	zed in Singh	, Maichle, and	Lee (2006).	
119	Hov	wever, simul	lations result	s will not cov	er all Real V	orld data se	ts; for addition	onal insight th	he user may	want to consu	ult a statistici	an.
120												

17 18 Maximum Detect 30.9 Maximum N 19 Variance Detects 91.38 Percent No 20 Mean Detects 5.323 S 21 Median Detects 0.865 C		
3		
4 Date/Time of Computation ProUCL 5.15/24/2018 2:17:13 PM 5 From File ProUCL Input PAHs.xls 6 Full Precision OFF 7 Confidence Coefficient 95% 8 Number of Bootstrap Operations 2000 9 Phenanthrene 10 Phenanthrene 11 12 General Statistics 13 Total Number of Observations 32 Number of Distinct Observations 14 Number of Distinct Observations 15 Number of Missing Observations 16 Number of Distinct Observations 17 Number of Distinct Observations 18 Number of Distinct Observations 19 Number of Distinct		
From File From File From File From File Full Precision OFF		
Full Precision OFF		
Confidence Coefficient 95% Number of Bootstrap Operations 2000		
Number of Bootstrap Operations 2000 Phenanthrene		
Phenanthrene		
Phenanthrene		
11 12 General Statistics		
12 General Statistics		
Total Number of Observations 32 Number of Distinct Observations 14 Number of Distinct Observations 15 Number of Detects 16 Number of Missing Observations 16 Number of Distinct Detects 16 Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Number of Distinct Number of Num		
14 Number of Detects 16 Number of Missing Ob 16 Number of Distinct Detects 16 Number of Distinct Number of Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of Distinct Number of N	servations	20
Number of Detects 16 Number of Number of Number of Number of Distinct Detects 16 Number of Distinct Number o	servations	1
Number of Distinct Detects 16	on-Detects	16
Minimum Detect 0.059 Minimum N Maximum Detect 30.9 Maximum N 19 Variance Detects 91.38 Percent No 20 Mean Detects 5.323 S 21 Median Detects 0.865 C 22 Skewness Detects 2.19 Kurtos 23 Mean of Logged Detects 0.14 SD of Logge 24 25 Normal GOF Test on Detects Only 26 Shapiro Wilk Test Statistic 0.602 Shapiro Wilk GOF Test 27 S% Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Signific 28 Lilliefors Test Statistic 0.323 Lilliefors GOF Test 29 S% Lilliefors Critical Value 0.213 Detected Data Not Normal at 5% Significance Level	on-Detects	6
18Maximum Detect30.9Maximum No19Variance Detects91.38Percent No20Mean Detects5.323S21Median Detects0.865C22Skewness Detects2.19Kurtos23Mean of Logged Detects0.14SD of Logged24Shapiro Wilk Test Statistic0.602Shapiro Wilk GOF Test27Shapiro Wilk Critical Value0.887Detected Data Not Normal at 5% Significance28Lilliefors Test Statistic0.323Lilliefors GOF Test295% Lilliefors Critical Value0.213Detected Data Not Normal at 5% Significance30Detected Data Not Normal at 5% Significance Level	Non-Detect	0.01
Variance Detects 91.38 Percent No.	Von-Detect	5
Median Detects 5.323 Section 1 Median Detects 0.865 Section 2 Median Detects 0.865 Section 2 Median Detects 2.19 Section 2 Mean of Logged Detects 0.14 Section 2 Mean of Logged Detects 0.14 Section 2 Section 2 Mean of Logged Detects 0.14 Section 2 Section 2 Section 2 Mean of Logged Detects 0.14 Section 2 Section 2 Section 2 Mean of Logged Detects 0.14 Section 2 Section 3 Sec	on-Detects	50%
Skewness Detects 2.19 Kurtos Skewness Detects 2.19 Kurtos Mean of Logged Detects 0.14 SD of Logge Normal GOF Test on Detects Only Shapiro Wilk Test Statistic 0.602 Shapiro Wilk GOF Test Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Signific Lilliefors Test Statistic 0.323 Lilliefors GOF Test Shapiro Wilk Critical Value 0.213 Detected Data Not Normal at 5% Signific Detected Data Not Normal at 5% Signific Sig	SD Detects	9.559
Mean of Logged Detects 0.14 SD of Logged Normal GOF Test on Detects Only Shapiro Wilk Test Statistic 0.602 Shapiro Wilk GOF Test Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Significance Level Lilliefors Test Statistic 0.323 Lilliefors GOF Test Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Significance Level	CV Detects	1.796
Normal GOF Test on Detects Only Shapiro Wilk Test Statistic 0.602 Shapiro Wilk GOF Test Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Signific Lilliefors Test Statistic 0.323 Lilliefors GOF Test Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Signific Detected Data Not Normal at 5% Signific Normal at 5% Significance Level	sis Detects	3.869
Normal GOF Test on Detects Only	ed Detects	1.903
Shapiro Wilk Test Statistic 0.602 Shapiro Wilk GOF Test 5% Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Significate Lilliefors Test Statistic 0.323 Lilliefors GOF Test 5% Lilliefors Critical Value 0.213 Detected Data Not Normal at 5% Significate Level Detected Data Not Normal at 5% Significance Level		
27 5% Shapiro Wilk Critical Value 0.887 Detected Data Not Normal at 5% Signific 28 Lilliefors Test Statistic 0.323 Lilliefors GOF Test 29 5% Lilliefors Critical Value 0.213 Detected Data Not Normal at 5% Significance Level		
28 Lilliefors Test Statistic 0.323 Lilliefors GOF Test 29 5% Lilliefors Critical Value 0.213 Detected Data Not Normal at 5% Significance Level		
29 5% Lilliefors Critical Value 0.213 Detected Data Not Normal at 5% Significance Level Detected Data Not Normal at 5% Significance Level	cance Leve	1
30 Detected Data Not Normal at 5% Significance Level		
30	cance Leve	l
31		
32 Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs		
KM Mean 2.685 KM Standard Erro		1.289
34	(BCA) UCL	4.961
35 95% KM (t) UCL 4.87 95% KM (Percentile Boots 36 95% KM (z) UCL 4.805 95% KM Boots		4.771 8.765
000/ KM Chahyahay LICL 6 552 059/ KM Chahy	·	8.303
07 59/ VM Chahyahay LICL 10 72 009/ VM Chahy		15.51
36	, 31.04 00L	
39 Gamma GOF Tests on Detected Observations Only		
A D Took Chatieria 0 920 Anderson Deding COF Too	:t	
41 A-D Test Statistic 0.829 Anderson-Darling GOF Test 42 5% A-D Critical Value 0.812 Detected Data Not Gamma Distributed at 5% 5		Level
42 K-S Test Statistic 0.22 Kolmogorov-Smirnov GOF		
43 5% K-S Critical Value 0.229 Detected data appear Gamma Distributed at 5%		ce Level
45 Detected data follow Appr. Gamma Distribution at 5% Significance Level		
46		
Gamma Statistics on Detected Data Only		
k hat (MLE) 0.425 k star (bias corre	acted MLE)	0.387
Theta hat (MLE) 12.51 Theta star (bias corre	cied WILL)	13.74
50 nu hat (MLE) 13.61 nu star (bias		

	Α	В	С	D	Е	F	G	Н		J	K	L
51				Me	ean (detects)	5.323						
52												
53					Gamma ROS							
54			GROS may	not be used	l when data s	et has > 50%	NDs with n	nany tied obs	ervations at	multiple DLs	3	
55		GROS may	y not be used	l when kstar	of detects is	small such a	s <1.0, espe	cially when t	he sample si	ize is small (e.g., <15-20)	
56			Fo	r such situat	tions, GROS	method may	yield incorre	ect values of	UCLs and B	TVs		
57				-	This is especi	ally true whe	n the sampl	e size is sma	ıll.			
58		For gar	mma distribut	ed detected	data, BTVs a	ind UCLs ma	y be compu	ted using gar	mma distribu	tion on KM e	estimates	
59					Minimum	0.01					Mean	2.666
60					Maximum	30.9					Median	0.0345
61					SD	7.176					CV	2.691
62					k hat (MLE)	0.225			k	star (bias co	rrected MLE)	0.225
63				The	eta hat (MLE)	11.86			Theta	star (bias co	rrected MLE)	11.87
64					nu hat (MLE)	14.39				nu star (bi	as corrected)	14.37
65			Adjusted	Level of Sig	gnificance (β)	0.0416						
66		App	proximate Ch	i Square Val	ue (14.37, α)	6.828			Adjusted Ch	i Square Va	ue (14.37, β)	6.55
67		95% Gamma	a Approximat	e UCL (use	when n>=50)	5.613		95% Ga	amma Adjust	ted UCL (use	when n<50)	5.851
68			•••	`	,				<u> </u>	`	,	
				E	stimates of G	amma Parai	meters usin	a KM Estima	tes			
69					Mean (KM)	2.685		9			SD (KM)	7.059
70				V	ariance (KM)	49.82				SE o	of Mean (KM)	1.289
71					k hat (KM)	0.145					k star (KM)	0.152
72					nu hat (KM)	9.259					nu star (KM)	9.724
73				+1	neta hat (KM)	18.56				th	eta star (KM)	17.67
74			800		rcentile (KM)	2.953			ano		rcentile (KM)	7.975
75					rcentile (KM)	14.74				- :	rcentile (KM)	34.32
76			33 /	o gamma pe	icerille (Rivi)	14.74				o gamma pe	icerille (Kivi)	J4.J2
77					Comm	o Venlen M	nion (IZM) Ce	latiation				
78		Δ		h: 0 \/		na Kaplan-M	eier (KM) Si	ausucs	A -1541 O	N=: 0 \/	-l (0.70.0)	2 572
79	0.57		•		alue (9.72, α)			050/ 0	-	-	alue (9.72, β)	3.573
80	95	% Gamma Ap	proximate Ki	/I-UCL (use	wnen n>=50)	6.925		95% Gamm	a Adjusted r	(M-UCL (use	when n<50)	7.306
81												
82					ognormal GC		etected Obs	servations O				
83				·	Test Statistic				•	ilk GOF Tes		
84			5% S		Critical Value	0.887	Det	ected Data a			Significance L	evel
85					Test Statistic					GOF Test		
86			5		Critical Value					ormal at 5%	Significance L	evel
87				Dete	ected Data ap	pear Logno	rmal at 5% \$	Significance	Level			
88												
89					gnormal RO		Jsing Imput	ed Non-Dete	ects			
90					riginal Scale						in Log Scale	
91					riginal Scale						in Log Scale	2.839
92		95% t l	JCL (assume	s normality	of ROS data)	4.823			95%	Percentile B	ootstrap UCL	5.067
93				95% BCA B	ootstrap UCL	5.76				95% Bo	otstrap t UCL	9.395
94				95% H-UC	L (Log ROS)	90.35						
95						I						
96			Statis	stics using K	(M estimates	on Logged [Data and As	suming Logi	normal Distri	ibution		
97				KM M	lean (logged)	-2.034				K	M Geo Mean	0.131
98					SD (logged)	2.626			95% (Critical H Va	lue (KM-Log)	4.814
99			KM Standa			0.498					CL (KM -Log)	
						2.626			95% (`	4.814
100		(33 /										

	Α	В	С	D	E	F	G	Н	ı	J	K	L			
101			KM Standa	d Error of M	ean (logged)	0.498									
102							•								
103						DL/2 S	tatistics								
104			DL/2 I	Normal					DL/2 Log-T	ransformed					
105				Mean in O	riginal Scale	2.771				Mean	in Log Scale	-1.565			
106				SD in O	riginal Scale	7.15				SD	in Log Scale	2.542			
107			95% t l	JCL (Assume	es normality)	4.914				95%	H-Stat UCL	44.79			
108		DL/2 is not a recommended method, provided for comparisons and historical reasons													
109															
110		Nonparametric Distribution Free UCL Statistics													
111			Det	ected Data	appear Appro	oximate Gar	nma Distribu	ted at 5% Si	gnificance L	.evel					
112															
113						Suggested	UCL to Use								
114	Adjusted KN	Л-UCL (use	when k<=1 a	nd 15 < n <	50 but k<=1)	7.306									
115															
116			When a c	lata set follo	ws an approx	imate (e.g.,	normal) distri	bution passi	ng one of the	GOF test					
117		When app	olicable, it is s	uggested to	use a UCL b	ased upon a	distribution (e.g., gamma) passing bo	th GOF tests	in ProUCL				
118															
119	١	lote: Sugge	estions regard	ing the selec	ction of a 95%	UCL are pr	ovided to hel	p the user to	select the m	nost appropri	ate 95% UCL	·			
120			F	Recommenda	ations are bas	sed upon da	ta size, data	distribution, a	and skewnes	SS.					
121		These reco	mmendations	are based ι	upon the resu	Its of the sin	nulation studi	es summariz	ed in Singh,	Maichle, and	d Lee (2006).				
122	Hov	wever, simu	ulations result	s will not cov	ver all Real W	/orld data se	ts; for addition	nal insight th	ne user may	want to cons	ult a statistici	an.			
123															

	Α	В	С	D	E LIOL Otation	F	G	H		J	K	L
1					UCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/	12412010 2:1	7:46 DM						
4	Dat	e/Time of C	From File	ProUCL Input		7.40 FW						
5		Fu	Il Precision	OFF	1 FAI 15.XIS							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- rambor o	Boototrap		2000								
9	Pyrene											
10	, ,											
11						General	Statistics					
13			Total	Number of Ob	servations	26			Numbe	r of Distinct C	Observations	11
14				Number	of Detects	5				Number of	Non-Detects	21
15			N	umber of Distir	nct Detects	5			Numbe	er of Distinct	Non-Detects	6
16				Minim	num Detect	0.712				Minimum	n Non-Detect	0.01
17				Maxim	num Detect	30.9				Maximum	n Non-Detect	5
18				Varian	ce Detects	167.3				Percent	Non-Detects	80.77%
19				Me	an Detects	8.336					SD Detects	12.93
20				Medi	an Detects	1.24					CV Detects	1.551
21				Skewne	ss Detects	1.988				Kurt	tosis Detects	3.962
22				Mean of Logg	ed Detects	1.104				SD of Log	gged Detects	1.581
23					I							
24					Norm	al GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Te	est Statistic	0.698			Shapiro W	lk GOF Test	i	
26			5% SI	napiro Wilk Cri	itical Value	0.762	1	Detected Da	ta Not Norma	al at 5% Sign	ificance Level	
27				Lilliefors Te	est Statistic	0.322			Lilliefors	GOF Test		
28			5	% Lilliefors Cri		0.343				mal at 5% Sig	gnificance Lev	el
29				Detected D	ata appear	Approximat	e Normal at	5% Significa	ance Level			
30												
31			Kaplan-	Meier (KM) St			ritical Value	s and other	-			
32					KM Mean	1.616			KI		rror of Mean	1.325
33					KM SD	6.041					I (BCA) UCL	3.962
34					KM (t) UCL	3.879			`		otstrap) UCL	3.897
35					(M (z) UCL	3.795					otstrap t UCL	19.88
36				00% KM Cheby		5.59					ebyshev UCL	7.39
37			97	.5% KM Cheby	ysnev UCL	9.889				99% KIVI Che	ebyshev UCL	14.8
38				Co	mme COE	Tests on D	etected Obse	anyations Or	nlv			
39					est Statistic	0.546	siecieu Obst		•	rling GOF Te		
40				5% A-D Cri		0.706	Detector				esi 5% Significand	حو ا وبروا
41					est Statistic	0.700	Delected			Smirnov GO		~ EGAGI
42				5% K-S Cri		0.349	Detected				5% Significand	ce Level
43												
44												
45					Gamma s	Statistics or	Detected D	ata Only				
46				k	hat (MLE)	0.607			k	star (bias cor	rrected MLE)	0.376
47					hat (MLE)	13.74				`	rrected MLE)	22.17
48					ı hat (MLE)	6.068				•	as corrected)	3.761
					n (detects)	8.336				(31-	/	
50					,/							

	A B C D E	F	G H I J K	L
51	0	Ot - 1 - 1	dia dia mandra di Nico Dado da	
52			sing Imputed Non-Detects	
53	-		NDs with many tied observations at multiple DLs	
54			s <1.0, especially when the sample size is small (e.g., <15-20)	
55			yield incorrect values of UCLs and BTVs on the sample size is small.	
56		-	by be computed using gamma distribution on KM estimates	
57	For gariffia distributed detected data, BTVs at	0.01	y be computed using gamma distribution on Kivi estimates Mean	1.611
58	Maximum	30.9	Median	0.01
59	SD	6.161	CV	3.824
60	k hat (MLE)	0.187	k star (bias corrected MLE)	0.191
61	Theta hat (MLE)	8.631	Theta star (bias corrected MLE)	8.445
62	nu hat (MLE)	9.708	nu star (bias corrected)	9.921
63	Adjusted Level of Significance (β)	0.0398	nu stai (bias correcteu)	9.921
64	Adjusted Level of Significance (p) Approximate Chi Square Value (9.92, α)	3.892	Adjusted Chi Square Value (9.92, β)	3.646
65	95% Gamma Approximate UCL (use when n>=50)	4.107	95% Gamma Adjusted UCL (use when n<50)	4.385
66	95 % Gariina Approximate OCL (use when 17-50)	4.107	95 % Gamma Adjusted OCL (use when 11<50)	4.363
67	Estimates of G	ommo Boro	meters using KM Estimates	
68	Mean (KM)	1.616	SD (KM)	6.041
69	Variance (KM)	36.49	SE of Mean (KM)	1.325
70	k hat (KM)	0.0716	k star (KM)	0.089
71	nu hat (KM)	3.724	nu star (KM)	4.627
72	theta hat (KM)	22.57	theta star (KM)	18.17
73	80% gamma percentile (KM)	0.934	90% gamma percentile (KM)	4.074
74	95% gamma percentile (KM)	9.419	99% gamma percentile (KM)	27.2
75	95% gamma percentile (KW)	9.419	99% gamma percentile (KM)	21.2
76	Gamm	a Kanlan-M	eier (KM) Statistics	
77	Approximate Chi Square Value (4.63, α)	0.984	Adjusted Chi Square Value (4.63, β)	0.88
78	95% Gamma Approximate KM-UCL (use when n>=50)	7.601	95% Gamma Adjusted KM-UCL (use when n<50)	8.495
79			(use when k<=1 and 15 < n < 50)	0.400
80	50% Gamma Adjust		(ass when k + 1 and 10 + 11 + 50)	
81	Lognormal GO	F Test on D	etected Observations Only	
82	Shapiro Wilk Test Statistic	0.872	Shapiro Wilk GOF Test	
83	5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Le	evel
84	Lilliefors Test Statistic	0.313	Lilliefors GOF Test	
85	5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Le	vel
86			rmal at 5% Significance Level	
87			•	
88	Lognormal ROS	S Statistics	Using Imputed Non-Detects	
89	Mean in Original Scale	1.62	Mean in Log Scale	-4.049
90	SD in Original Scale	6.159	SD in Log Scale	3.213
91	95% t UCL (assumes normality of ROS data)	3.683	95% Percentile Bootstrap UCL	3.873
92	95% BCA Bootstrap UCL	5.448	95% Bootstrap t UCL	29.46
93	95% H-UCL (Log ROS)	149.8	33.2 2333.34 (302	
94	-370 302 (2331130)			
95	Statistics using KM estimates	on Loaged I	Data and Assuming Lognormal Distribution	
96	KM Mean (logged)	-3.484	KM Geo Mean	0.0307
97	KM SD (logged)	2.346	95% Critical H Value (KM-Log)	4.58
98	KM Standard Error of Mean (logged)	0.519	95% H-UCL (KM -Log)	4.125
99	KM SD (logged)	2.346	95% Critical H Value (KM-Log)	4.58
100	Kiwi SD (logged)	∠.J+U	35 % Chilical II Value (KWI-LOG)	7.00

	А	В	С	D	E	F	G	Н	I	J	K	L			
101			KM Standa	rd Error of M	lean (logged)	0.519									
102															
103						DL/2 S	tatistics								
104			DL/2 I	Normal					DL/2 Log-	Transformed					
105				Mean in C	Original Scale	1.758				Mean	in Log Scale	-2.491			
106				SD in C	Original Scale	6.141				SD	in Log Scale	2.506			
107			95% t l	JCL (Assum	nes normality)	3.815				95%	H-Stat UCL	21.73			
108		DL/2 is not a recommended method, provided for comparisons and historical reasons													
109															
110					Nonparame	etric Distribu	tion Free UC	CL Statistics							
111			De	tected Data	appear Appr	oximate Nor	mal Distribu	ted at 5% Si	gnificance L	.evel					
112															
113						Suggested	UCL to Use								
114				959	% KM (t) UCL	3.879									
115															
116					ws an approx										
117		When app	olicable, it is s	suggested to	use a UCL b	ased upon a	distribution	e.g., gamma	a) passing bo	oth GOF tests	s in ProUCL				
118															
119	١	Note: Sugge			ection of a 95%	•		•			ate 95% UCL				
120					lations are ba	•									
121					upon the resu						. , ,				
122	Ho	wever, simu	ılations result	s will not co	ver all Real V	Vorld data se	ts; for addition	nal insight t	he user may	want to cons	sult a statistici	ian.			
123															

APPENDIX H

ProUCL Statistics Soil Matrix Eastern Parcel

	Α	В	С	D	E LIOL Otatio	F	G Octovrith N	H	I	J	K	L	
1					UCL Statis	stics for Data	Sets with N	on-Detects					
2		Llaav Cala		<u> </u>									
3	Det	e/Time of Co	ected Options	ProUCL 5.15	E/2E/2019 0:	E2:27 AM							
4	Dati	5/ Time or C	<u>'</u>	Soil Vapor In									
5		Fu	III Precision	OFF									
6		Confidence		95%									
7		f Bootstrap		2000									
8	Trainbor 0			2000									
9	1,2,4-TMB												
10 11													
12						General	Statistics						
13			Total	Number of O	bservations	50			Numbe	r of Distinct C	Observations	30	
14				Numbe	er of Detects	15	 			Number of	Non-Detects	35	
15			Nı	umber of Disti	inct Detects	14	 		Numbe	er of Distinct	Non-Detects	16	
16				Minir	mum Detect	550				Minimum	n Non-Detect	9.83	
17				Maxir	mum Detect	580000				Maximum	n Non-Detect	50000	
18				Varia	nce Detects	3.703E+10				Percent	Non-Detects	70%	
19				Me	ean Detects	93193					SD Detects	192438	
20				Med	dian Detects	7770					CV Detects	2.065	
21				Skewn	ess Detects	2.217				Kurt	tosis Detects	3.702	
22				Mean of Logo	ged Detects	9.454				SD of Log	ged Detects	2.029	
23													
24						nal GOF Tes	t on Detects	Only					
25				hapiro Wilk T					-	ilk GOF Test			
26			5% St	hapiro Wilk C				Detected Dat			ificance Leve	!	
27					est Statistic		<u> </u>			GOF Test			
28			5	% Lilliefors C						al at 5% Sign	ificance Leve	!l 	
29				D	etected Data	a Not Norma	l at 5% Sign	ificance Lev	/el				
30			/anlan	Maior (IZM) C	Nastintina	- Normal C	wition I Value		Mannanana	+-i- 1101 -			
31			Kapian-i	Meier (KM) S			ritical values	s and other	<u>-</u>			10150	
32					KM Mean		<u> </u>		KI		rror of Mean		
33				059/	KM (t) UCL	110368			OE9/ KM /F		(BCA) UCL otstrap) UCL		
34					KM (t) UCL				•		otstrap) UCL		
35			c	95% NM Cheb	` '						byshev UCL		
36				.5% KM Cheb	•						byshev UCL		
37											.,		
38 39				G	amma GOF	Tests on De	tected Obse	ervations Or	nly				
					est Statistic					rling GOF Te	 est		
40					ritical Value		Detect				% Significance	e Level	
42				K-S T	est Statistic					-Smirnov GO			
43				5% K-S C	ritical Value	0.239	Detect	ed Data Not	Gamma Dis	tributed at 5%	% Significance	e Level	
44		Detected Data Not Gamma Distributed at 5% Significance Level											
45													
46		Gamma Statistics on Detected Data Only											
47					k hat (MLE)	0.34			k	star (bias cor	rrected MLE)	0.316	
48				Thet	ta hat (MLE)	274291			Theta	star (bias cor	rected MLE)	294679	
					u hat (MLE)					nu star (bia	as corrected)	9.488	
49						93193							

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	servations at	•		
54		GROS may	not be used	when kstar	of detects is	small such a	s <1.0, espe	ecially when	the sample si	ze is small (e	e.g., <15-20)	
55			Fo	r such situat	tions, GROS	method may	yield incorre	ect values of	f UCLs and B	TVs		
56				-	This is espec	cially true whe	en the sampl	le size is sm	all.			
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs ma	y be compu	ited using ga	amma distribu	tion on KM e	stimates	
58					Minimun	0.01					Mean	27958
59					Maximum	580000					Median	0.01
60					SE	111543					CV	3.99
61					k hat (MLE	0.0787			k	star (bias cor	rected MLE)	0.0873
62				The	eta hat (MLE	355455			Theta	star (bias cor	rected MLE)	320368
63				-	nu hat (MLE	7.865				nu star (bia	as corrected)	8.727
64			Adjusted	Level of Sig	gnificance (β	0.0452						
65		Ap	proximate C	hi Square Va	alue (8.73, α	3.163			Adjusted C	hi Square Va	lue (8.73, β)	3.064
66		95% Gamma	Approximate	e UCL (use	when n>=50	77142		95% G	amma Adjust	ed UCL (use	when n<50)	79636
67						<u>II</u>	Ш					L
68				E	stimates of (Gamma Para	meters usin	g KM Estim	ates			
69					Mean (KM	28202					SD (KM)	110368
70				V	ariance (KM	1.218E+10				SE o	f Mean (KM)	16158
71					k hat (KM	0.0653					k star (KM)	0.0747
72					nu hat (KM	6.529					nu star (KM)	7.471
73				th	neta hat (KM	431923				the	eta star (KM)	377488
74			80%	6 gamma pe	rcentile (KM	11675			90%	% gamma per	centile (KM)	63884
75			95%	6 gamma pe	rcentile (KM	163284			999	% gamma per	centile (KM)	515767
76												
77					Gamı	na Kaplan-M	eier (KM) S	tatistics				
78		Ap	proximate C	hi Square Va	alue (7.47, α	2.433			Adjusted C	hi Square Va	lue (7.47, β)	2.348
79	95%	Gamma App	oroximate KN	И-UCL (use v	when n>=50	86613		95% Gamr	ma Adjusted k	(M-UCL (use	when n<50)	89733
80												
81				L	ognormal G	OF Test on D	etected Ob	servations (Only			
82			S	hapiro Wilk	Test Statistic	0.892			Shapiro Wi	lk GOF Test		
83			5% SI	hapiro Wilk (Critical Value	0.881	Def	tected Data	appear Logno	ormal at 5% S	Significance L	evel
84				Lilliefors	Test Statistic	0.209			Lilliefors	GOF Test		
85			5	% Lilliefors (Critical Value	0.22	Def	tected Data	appear Logno	ormal at 5% S	Significance L	evel
86				Dete	ected Data a	ppear Logno	rmal at 5%	Significance	e Level			
87												
88				Lo	gnormal RC	S Statistics	Using Imput	ted Non-Det	tects			
89				Mean in C	Priginal Scale	28034				Mean	in Log Scale	5.466
90				SD in C	Original Scale	111523				SD	in Log Scale	3.15
91		95% t L	JCL (assume	s normality	of ROS data	54477			95%	Percentile Bo	otstrap UCL	54993
92			•		ootstrap UCI						tstrap t UCL	
					L (Log ROS						•	
93					. •							
94 95			Statis	stics using K	(M estimate:	on Logged I	Data and As	ssuming Log	normal Distri	ibution		
	KM Mean (logg							J = 76			M Geo Mean	114.2
96					SD (logged				95% (Critical H Val		5.859
97		KM Standard Error of Mean (log									CL (KM -Log)	
98					SD (logged				95% (Critical H Val		5.859
99			KM Standar		lean (logged				30,0			3.000
100			Tan Otaliual		Jan (1099eu	0.040						

	Α	В	С	D	E	F	G	Н		J	K	L		
101														
102						DL/2 S	tatistics							
103			DL/2	Normal					DL/2 Log-T	ransformed				
104				Mean in C	riginal Scale	30251				Mean	in Log Scale	6.336		
105				SD in C	riginal Scale	111114				SD	in Log Scale	3.441		
106			95% t l	JCL (Assum	es normality)	56596				95%	H-Stat UCL	3556557		
107			DL/2	is not a reco	mmended m	nethod, provi	ded for comp	parisons and	d historical re	easons		1		
108														
109		Nonparametric Distribution Free UCL Statistics												
110				Detected	Data appear	Lognormal I	Distributed a	t 5% Signific	cance Level					
111														
112						Suggested	UCL to Use							
113			95	5% KM (Che	byshev) UCL	98631								
114														
115	N	lote: Sugges	stions regard	ling the sele	ction of a 95°	% UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UC	L.		
116			F	Recommend	ations are ba	sed upon da	ta size, data	distribution,	and skewnes	SS.				
117		These recor	mmendations	s are based	upon the resi	ults of the sin	nulation studi	ies summariz	zed in Singh,	Maichle, and	d Lee (2006)			
118	Hov	wever, simul	lations result	s will not co	ver all Real V	Vorld data se	ts; for addition	onal insight tl	ne user may	want to cons	ult a statistic	ian.		
119														

	Α	В	С	D	Е	F	G	Н	ı	J	K	L
1					UCL Statis	tics for Data	Sets with N	on-Detects				
2												
3		User Selec	cted Options									
4	Da	te/Time of Co	omputation	ProUCL 5.1	5/25/2018 9:4	43:39 AM						
5			From File	Soil Vapor II	nput.xls							
6		Ful	l Precision	OFF								
7		Confidence	Coefficient	95%								
8	Number	of Bootstrap (Operations	2000								
9				1								
10	1,2-DCB											
11												
12						General	Statistics					
13			Total	Number of C	Observations	38			Numbe	r of Distinct O	bservations	17
14				Numbe	er of Detects	1				Number of N	Non-Detects	37
15			N	umber of Dist	tinct Detects	1			Numbe	er of Distinct N	Non-Detects	16
16							•					
17		Warning: On	ly one distin	ct data value	was detecte	ed! ProUCL	(or any other	r software) s	hould not be	e used on suc	ch a data set	!
18	It is sugg	ested to use	alternative	site specific v	/alues deterr	mined by the	Project Tea	ım to estimat	e environm	ental parame	ters (e.g., El	PC, BTV).
19												
20				Th	e data set fo	or variable 1	,2-DCB was	not processe	ed!			
21												
22												

-	Α	В	С	D	E IOL Obstis	F	G Octovrith N	H		J	K	L	
1					JCL Statis	tics for Data	Sets with N	on-Detects					
2		Llaav Cala	-td Oti										
3	Det	e/Time of C	cted Options	ProUCL 5.15/2)E/2019 0.	E2:04 AM							
4	Dati	e/Time or C	From File	Soil Vapor Inpu		03.04 AW							
5		Fu	Il Precision	OFF	ut.xi5								
6		Confidence		95%									
7		f Bootstrap		2000									
8	- Trainbor o	. Bootottap		2000									
9	1,3,5-TMB												
10													
12						General	Statistics						
13			Total	Number of Obs	servations	50			Numbe	r of Distinct C	Observations	26	
14				Number o	of Detects	10				Number of	Non-Detects	40	
15			Nu	umber of Distino	ct Detects	10			Numbe	er of Distinct	Non-Detects	16	
16				Minimu	ım Detect	1720				Minimum	Non-Detect	9.83	
17				Maximu	ım Detect	370000				Maximum	n Non-Detect	50000	
18				Varianc	e Detects	1.900E+10				Percent	Non-Detects	80%	
19				Mea	n Detects	85288					SD Detects	137854	
20				Media	n Detects	13415					CV Detects	1.616	
21				Skewnes	s Detects	1.663				Kurt	tosis Detects	1.319	
22				Mean of Logge	d Detects	9.832				SD of Log	ged Detects	1.963	
23													
24						nal GOF Tes	t on Detects	Only					
25				hapiro Wilk Tes		0.661			-	lk GOF Test			
26			5% SI	napiro Wilk Criti		0.842		Detected Da			ificance Leve	el 	
27				Lilliefors Tes		0.331				GOF Test			
28			5	% Lilliefors Criti		0.262				al at 5% Sign	ificance Leve	el 	
29				Dete	ected Data	a Not Norma	ı at 5% Sign	iticance Lev	el				
30			Kanlan	Meier (KM) Sta	tieties usi	na Normal C	ritical Value	s and other	Nonnarama	trio I ICI e			
31			Napiaii-		KM Mean		illical value	s and other	•		rror of Mean	10093	
32					KM SD				- Ki		(BCA) UCL	35614	
33				95% K	M (t) UCL				95% KM (F		otstrap) UCL	35266	
34					M (z) UCL				`		otstrap t UCL		
35			ç	00% KM Chebys	. ,						byshev UCL		
36				.5% KM Chebys							byshev UCL		
38													
39				Gan	nma GOF	Tests on De	tected Obse	ervations Or	ıly				
40				A-D Tes	st Statistic	0.687		Α	nderson-Da	rling GOF Te	est		
41				5% A-D Criti	ical Value	0.79	Detected	d data appea	ar Gamma D	istributed at 5	5% Significan	ce Level	
42				K-S Tes	st Statistic	0.253		I	Kolmogorov-	Smirnov GO	F		
43				5% K-S Criti	ical Value	0.283	Detected	d data appea	ar Gamma D	stributed at 5	5% Significan	ce Level	
44		Detected data appear Gamma Distributed at 5% Significance Level											
45													
46						Statistics or	Detected D	ata Only					
47					hat (MLE)	0.428				,	rrected MLE)	0.366	
48		Theta hat (N							Theta	`	rrected MLE)		
49		nu hat								nu star (bia	as corrected)	7.321	
50				Mean	(detects)	85288							

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						Statistics u						
53			•					•	servations at	•		
54		GROS may							the sample si		∍.g., <15-20)	
55			Fo			•	•		f UCLs and B	TVs		
56					-	ially true whe	-					
57		For gar	nma distribut	ed detected			y be compu	ited using ga	amma distribu	tion on KM e		
58					Minimum						Mean	
59					Maximum						Median	0.01
60						68396					CV	4.01
61					k hat (MLE)	0.0735				star (bias cor		0.0824
62					eta hat (MLE)				Theta	star (bias cor	·	
63					nu hat (MLE)					nu star (bia	as corrected)	8.24
64			•	-	ınificance (β)							
65		•	proximate C	•	,				=	hi Square Va		2.781
66		95% Gamma	Approximate	e UCL (use v	when n>=50)	48893		95% G	amma Adjust	ed UCL (use	when n<50)	50538
67	Estimates of Gamma Parameters using KM Est											
68				E			meters usin	g KM Estima	ates			
69					Mean (KM)						SD (KM)	
70				V	ariance (KM)					SE o	of Mean (KM)	
71					k hat (KM)						k star (KM)	0.0742
72					nu hat (KM)						nu star (KM)	7.42
73					eta hat (KM)						eta star (KM)	
74					rcentile (KM)					% gamma per	. ,	
75			95%	6 gamma pe	rcentile (KM)	99664			99%	% gamma per	centile (KM)	315996
76							1 ((0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0					
77				10		na Kaplan-M	eier (KM) S	tatistics	A 1'	1:0	(7.40.0)	0.00
78	050/		proximate C					050/ 0		hi Square Va		2.32
79	95%	Gamma App	oroximate KN	/I-UCL (use \	wnen n>=50)	53164		95% Gamn	na Adjusted k	M-UCL (use	wnen n<50)	55088
80				1.		NE Took on D	ata ata d Ob		Nation 1			
81						OF Test on D	etected Ob	servations C		Ur COE Took		
82					Test Statistic		Det	to stard Data	appear Logno	ilk GOF Test		
83			5% SI	•	Critical Value Test Statistic		De	tected Data a		GOF Test	ignificance L	.evei
84			E				Des	tooted Date			Vianificanas I	ovel
85					Critical Value				appear Logno	ormai at 5% S	ignificance L	.evei
86				Dete	ected Data a	ppear Logno	rmai at 5%	Significance	Level			
87					anormal BO	C Ctatiaties	I laina Immu	ted Nen Det	to ata			
88					riginal Scale	S Statistics	osing impu	teu NOII-Det	1 0 019	Maar	in Log Scale	4.198
89					riginal Scale Priginal Scale						in Log Scale	
90		0E9/ +1	JCL (assume		_				OE0/ I	SD Percentile Bo		
91		95% [(•		otstrap UCL				95%		otstrap UCL otstrap t UCL	
92			•		L (Log ROS)					90% B00	rioliap i UCL	<i>3</i> 4031
93				90 /0 F1-UU	L (LUY MUS)	407030						
94			Statio	etice ueina V	M estimates	on Loggod	Data and As	eumina I ca	normal Diatri	ibution		
95	Statistics using KM estimates KM Mean (logg						vata aliu AS	saurilliy LOG	ווטווומו טואנוו		M Geo Mean	51.59
96					SD (logged)				050/ /	Critical H Val		5.388
97			KM Standay		ean (logged)				35 /0 (CL (KM -Log)	
98			ivivi Statitual		SD (logged)				0E0/ /	95% H-UC		5.388
99			KM Standar		:				95% (onucai ri val	ue (NIVI-LOG)	J.368
100			vini orgungai	u ⊏ii0i 0i M	ean (logged)	0.499						

	Α	В	С	D	Е	F	G	Н	I	J	K	L			
101															
102						DL/2 S	tatistics								
103			DL/2	Normal					DL/2 Log-T	ransformed					
104				Mean in C	riginal Scale	19407				Mean i	in Log Scale	6.111			
105				SD in C	riginal Scale	68054				SD i	in Log Scale	3.294			
106			95% t l	JCL (Assum	es normality)	35542				95%	H-Stat UCL	1379461			
107			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons and	d historical re	easons		1			
108															
109		Nonparametric Distribution Free UCL Statistics													
110				Detected	l Data appea	r Gamma Di	istributed at	5% Significa	nce Level						
111															
112						Suggested	UCL to Use								
113			95% KM A	pproximate (Gamma UCL	53164									
114															
115	1	Note: Sugges	stions regard	ing the selec	ction of a 95%	6 UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCI				
116			F	Recommenda	ations are ba	sed upon dat	ta size, data	distribution,	and skewnes	SS.					
117		These recor	mmendations	are based	upon the resu	ılts of the sim	nulation stud	ies summariz	zed in Singh,	Maichle, and	d Lee (2006)				
118	Но	wever, simu	lations result	s will not co	ver all Real V	Vorld data se	ts; for addition	onal insight tl	he user may	want to cons	ult a statistic	ian.			
119															

	Α	В	С	D	Е	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	a Sets with N	on-Detects				
2												
3		User Sele	cted Options									
4	Da	te/Time of C	omputation	ProUCL 5.1	5/25/2018 9:4	44:14 AM						
5			From File	Soil Vapor I	nput.xls							
6		Fu	II Precision	OFF								
7		Confidence	Coefficient	95%								
8	Number	of Bootstrap	Operations	2000								
9				l								
10	1,3-DCB											
11												
12						General	Statistics					
13			Total	Number of C	Observations	38			Numbe	r of Distinct O	bservations	17
14				Numb	er of Detects	1				Number of N	lon-Detects	37
15			N	umber of Dis	tinct Detects	1			Numbe	er of Distinct N	lon-Detects	16
16						1						
17		Warning: Or	nly one distin	ct data value	e was detecte	ed! ProUCL	(or any other	r software) s	hould not be	e used on suc	h a data set	!
18	It is sugg	ested to use	alternative	site specific	values deterr	mined by the	e Project Tea	m to estimat	te environm	ental parame	ters (e.g., El	C, BTV).
19												
20				Tł	ne data set fo	or variable 1	,3-DCB was	not processe	ed!			
21												
22												

	Α	В	С	D	Е	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	a Sets with N	on-Detects				
2												
3		User Sele	cted Options									
4	Da	te/Time of Co	omputation	ProUCL 5.15/	25/2018 9:4	44:45 AM						
5			From File	Soil Vapor Inp	out.xls							
6		Fu	Il Precision	OFF								
7		Confidence	Coefficient	95%								
8	Number	of Bootstrap	Operations	2000								
9												
10	1,4-DCB											
11												
12						General	Statistics					
13			Total	Number of Ob	servations	38			Numb	er of Distinct	t Observations	16
14				Number	of Detects	1				Number o	of Non-Detects	37
15			N	umber of Distin	nct Detects	1			Numl	ber of Distino	ct Non-Detects	16
16							11					
17		Warning: Or	nly one distin	ct data value v	was detecte	ed! ProUCL	(or any other	r software) s	hould not	be used on s	such a data se	t!
18	It is sugg	ested to use	alternative s	ite specific va	lues detern	nined by the	e Project Tea	ım to estima	te environi	mental parar	meters (e.g., E	PC, BTV).
19												
20				The	data set fo	r variable 1	,4-DCB was	not processo	ed!			
21												
22												

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					UCL Statis	tics for Data	Sets with N	ion-Detects				
2		0.1		I								
3	D-4		cted Options	ProUCL 5.15	-/0F/0010 O	E4.E4 ANA						
4	Date	e/Time of Co				DI:DI AW						
5		Eul	From File Il Precision	Soil Vapor In	iput.xis							
6		Confidence		95%								
7		f Bootstrap		2000								
8	Number o	Тообыар	Орегацопъ	2000								
9	2,2,4-TMP											
10	Z,Z, T -11VII											
11						General	Statistics					
12			Total	Number of O	bservations	37			Numbe	er of Distinct C	bservations	19
13									Numbe	er of Missing C	bservations	1
15				Numbe	r of Detects	6					Non-Detects	31
16			Nı	umber of Disti	inct Detects	6			Numb	er of Distinct	Non-Detects	13
17				Minir	num Detect	350				Minimum	Non-Detect	9.34
18				Maxir	num Detect	11000				Maximum	Non-Detect	220000
19				Variar	nce Detects	22505350				Percent	Non-Detects	83.78%
20				Me	ean Detects	4545					SD Detects	4744
21				Med	lian Detects	2750					CV Detects	1.044
22				Skewne	ess Detects	0.774				Kurt	osis Detects	-1.769
23				Mean of Logg	ged Detects	7.708				SD of Log	ged Detects	1.49
24							1					
25					Norm	nal GOF Tes	t on Detects	Only				
26			S	hapiro Wilk T	est Statistic	0.813			Shapiro W	ilk GOF Test		
27			5% SI	napiro Wilk Ci	ritical Value	0.788	De	etected Data	appear Nor	mal at 5% Sig	nificance Lev	vel
28				Lilliefors T	est Statistic	0.302				GOF Test		
29			5	% Lilliefors C		0.325				mal at 5% Sig	nificance Lev	/el
30				Det	ected Data	appear Norr	nal at 5% Sig	gnificance L	evel			
31												
32			Kaplan-	Meier (KM) S			Critical Value	s and other				
33					KM Mean	985.5			K	M Standard E		550.6
34					KM SD	2693					(BCA) UCL	2036
35					KM (t) UCL	1915			95% KM (F	Percentile Boo	. ,	1926
36					KM (z) UCL	1891				95% KM Boo		2985
37				00% KM Cheb .5% KM Cheb	•	2637 4424				95% KM Che 99% KM Che	•	3385 6464
38			97	.5 /0 INIVI CHED	ysiiev UCL	++ ∠+				99 /0 KIVI CITE	Dyanev UCL	U+U4
39				G	amma GOE	Tests on D	etected Obse	arvatione Or	alv			
40					est Statistic	0.408	recied Onse			arling GOF Te	est	
41					ritical Value	0.719	Detected			Distributed at 5		ce Level
42					est Statistic	0.213	2 3.00.00			-Smirnov GO		
43					ritical Value	0.343	Detecte			Distributed at 5		ce Level
44							stributed at				J	
46					••							
47					Gamma	Statistics of	n Detected D	ata Only				
48					k hat (MLE)	0.828		<u>-</u>	k	star (bias cor	rected MLE)	0.525
49					a hat (MLE)	5488				star (bias cor	•	8654
50					u hat (MLE)	9.937				nu star (bia	s corrected)	6.302
50					. ,		1			•	,	

	Α	В	С	D	Е	F	G	Н		J	K	L
51				Me	ean (detects)	4545						
52												
53					Gamma ROS							
54					when data s					•		
55		GROS may			of detects is		-	-	-	-	ə.g., <15 - 20)	
56			Fo		ions, GROS i		-			TVs		
57					This is especi							
58		For gar	nma distribut	ed detected	data, BTVs a	,	y be compu	ited using ga	mma distribu	ition on KM e		
59					Minimum						Mean	737
60					Maximum						Median	0.01
61					SD						CV	
62					k hat (MLE)	0.0894				star (bias co		0.1
63					ta hat (MLE)				Theta	`	rrected MLE)	
64					nu hat (MLE)	6.615				nu star (bia	as corrected)	7.412
65					nificance (β)	0.0431						
66		-	-	-	alue (7.41, α)	2.399			•	•	alue (7.41, β)	2.277
67		95% Gamma	a Approximat	e UCL (use \	when n>=50)	2277		95% G	amma Adjus	ted UCL (use	when n<50)	2399
68												
69				E	stimates of G		meters usin	g KM Estima	ates			T
70	Mean (KM) 985.5 SD (2693
71				Va	ariance (KM)					SE c	of Mean (KM)	550.6
72					k hat (KM)	0.134					k star (KM)	0.141
73					nu hat (KM)	9.909					nu star (KM)	10.44
74					eta hat (KM)						eta star (KM)	6987
75					rcentile (KM)					% gamma pe		2895
76			95%	6 gamma pe	rcentile (KM)	5487			999	% gamma pe	rcentile (KM)	13106
77						17 1 14	1 ((0.0) 0					
78						a Kaplan-M	eier (KM) S	tatistics				T
79				-	ue (10.44, α)				-	-	ue (10.44, β)	4.047
80	95%	Gamma Ap	proximate KN	/I-UCL (use \	when n>=50)	2439		95% Gamn	na Adjusted k	KM-UCL (use	when n<50)	2542
81												
82					ognormal GC		etected Obs	servations C	-			
83					Test Statistic				•	ilk GOF Test		
84			5% S		Critical Value	0.788	Det	tected Data a			Significance L	.evel
85					Test Statistic					GOF Test	<u>c. 1</u>	
86			5		Critical Value					ormai at 5% s	Significance L	.evei
87				Dete	ected Data ap	ppear Logno	ıınaı at 5% 3	oigniticance	Level			
88				1		0.04-4-4	lalaa laaaa	ad Nan Dat				
89					gnormal RO		using imput	tea Non-Det	ects	NA	in I c= 01	2.70
90					riginal Scale						in Log Scale	
91		050/	101 /		riginal Scale				050/		in Log Scale	
92		95% t l	•	•	of ROS data)				95%		ootstrap UCL	
93			!		ootstrap UCL					95% Boo	otstrap t UCL	3012
94				95% H-UC	L (Log ROS)	2949						
95			Ot-21	Alee vels s 1	14 agitus - 1 -	am amm = 2 *	Data and f	annala a 1 -	maum al Diat	ibudic-		
96			Statis		M estimates		Jata and As	ssuming Log	normaı Distr		M O	05.00
97	KM Mean (logg KM SD (logg								0501		M Geo Mean	
98	KM SD (log KM Standard Error of Mean (log								95%		lue (KM-Log)	
99			KM Standa		, ,,	0.522			6=0:		CL (KM -Log)	
100				KM	SD (logged)	2.374			95%	Critical H Val	lue (KM-Log)	4.289

	Α	В	С	D	E	F	G	Н	I	J	K	L		
101			KM Standar	d Error of M	ean (logged)	0.522								
102						•	•							
103						DL/2 S	tatistics							
104			DL/2 N	Normal					DL/2 Log-	Transformed				
105				Mean in O	riginal Scale	6883				Mean i	n Log Scale	5.693		
106				SD in O	riginal Scale	18712				SD i	n Log Scale	3.302		
107			95% t L	ICL (Assume	es normality)	12077				95%	H-Stat UCL	1621583		
108			DL/2 i	s not a reco	mmended m	ethod, provi	ded for com	parisons and	d historical r	easons				
109														
110		Nonparametric Distribution Free UCL Statistics												
111				Detected	l Data appea	ar Normal Di	stributed at	5% Significa	nce Level					
112														
113						Suggested	UCL to Use							
114				95%	KM (t) UCL	1915								
115														
116	١	lote: Sugges	tions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to he	lp the user to	select the r	nost appropria	ate 95% UCI			
117			F	tecommenda	itions are ba	sed upon da	ta size, data	distribution,	and skewne	SS.				
118		These recon	nmendations	are based u	pon the resu	ılts of the sin	of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
119	Ho	wever, simul	ations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight t	he user may	want to consu	ult a statistic	ian.		
120														

	Α	В	С	D	E	F	G	Н	I	J	K	L
1					JCL Statis	tics for Data	Sets with N	ion-Detects				
2		Llaan Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2	0E/2019 0:	4E.E1 ANA						
4	Dat	e/Time of C	From File	Soil Vapor Inpu		45.51 AW						
5		Fu	Il Precision	OFF	ut.xi5							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Number o	Воогопар	Орогацопо	2000								
9	4-Ethyltolue	ene										
10	•											
12						General	Statistics					
13			Total	Number of Obs	servations	39			Numbe	r of Distinct C	Observations	19
14				Number o	of Detects	5				Number of	Non-Detects	34
15			Nı	umber of Disting	ct Detects	5			Numbe	er of Distinct	Non-Detects	14
16				Minimu	um Detect	18000				Minimum	n Non-Detect	9.83
17				Maximu	um Detect	350000				Maximum	n Non-Detect	50000
18				Varianc	e Detects	2.405E+10				Percent	Non-Detects	87.18%
19				Mea	n Detects	156048					SD Detects	155072
20				Media	n Detects	103239					CV Detects	0.994
21				Skewnes	s Detects	0.486				Kurt	tosis Detects	-2.681
22				Mean of Logge	ed Detects	11.31				SD of Log	gged Detects	1.431
23												
24						nal GOF Tes	t on Detects	Only				
25				hapiro Wilk Tes					-	lk GOF Test		
26			5% SI	hapiro Wilk Criti		0.762	De	etected Data	• •	`	gnificance Le	vel
27				Lilliefors Tes						GOF Test		
28			5	% Lilliefors Criti		0.343			• •	mal at 5% Sig	gnificance Le	vel
29				Detec	cted Data	appear Norn	nal at 5% Sig	gnificance L	evel			
30			W	M-! (IZM) Ot-	Al - Al	N10	-111 \ / - 1		NI			
31			Kapian-	Meier (KM) Sta			ritical value	s and otner	•			10004
32					KM Mean				KI		error of Mean	
33				0E9/ I/	KM SD				OEO/ IZM /E		M (BCA) UCL	40265
34					M (z) UCL				•		otstrap) UCL	
35			•	95% Ki 90% KM Cheby	` '						ebyshev UCL	
36				.5% KM Chebys							ebyshev UCL	
37				Tan Onoby	5.15¥ 50£	.0000			•			. 10 100
38				Gar	nma GOF	Tests on De	tected Obse	ervations Or	nly			
39					st Statistic				•	rling GOF Te	est	
40				5% A-D Criti			Detected				5% Significan	ce Level
42				K-S Tes	st Statistic					Smirnov GO		
43				5% K-S Criti	ical Value		Detected				5% Significan	ce Level
44				Detected da	ata appeai	r Gamma Di						
45												
46					Gamma	Statistics or	Detected D	ata Only				
47				k l	hat (MLE)	0.899			k	star (bias cor	rrected MLE)	0.493
48		Theta hat (173544			Theta	star (bias cor	rrected MLE)	316522
49				nu l	hat (MLE)	8.992				nu star (bia	as corrected)	4.93
50				Mean	(detects)	156048						
55												

GROS may not be used when tables of better data set has > 50% NDs with many led observations at multiple DLS		Α	В	С	D	Е	F	G	Н	I	J	K	L
GROS may not be used when data set has > 50% NDs with many lied observations at multiple DLs GROS may not be used when kater of detects is small auch as <1.0, especially when the sample size is small (a.g., <15-20) For such situations, GROS method may yield incorrect values of UCLs and DTVS This is especially true when the sample size is small of TVS For gamma distributed detected data, BTVs and UCL may be computed using gamma distribution on KM estimates Menimum 0.01 may be computed using gamma distribution on KM estimates Menimum 350000 Median 0.001 Median 0.001 K hat (MLE) 0.0881 K star (base corrected MLE) 0.001 K hat (MLE) 0.0881 K star (base corrected MLE) 26229 Theta hat (MLE) 293765 Theta star (bias corrected MLE) 26229 Theta hat (MLE) 293765 Theta star (bias corrected MLE) 26229 Adjusted Levi of Significance (β) 0.0437 Adjusted Levi of Significance (β) 0.0437 Approximate Chi Square Value (24.e, d) 1.762 Adjusted Chi Square Value (6.24.β) 1.67 Approximate Chi Square Value (24.e, d) 1.762 Adjusted Chi Square Value (6.24.β) 1.67 Seamma Approximate UCL (use when n>=50) 70818 95% Gamma Adjusted UCL (use when n>=50) 74707 Variance (640) 5 1846±9 SE of Mean (640) 12884 Man (640) 20188 SD (640) 72003 Variance (640) 5 1846±9 SE of Mean (640) 12894 A hat (640) 0.0765 R star (640) 25055 Approximate Star (640) 5 1846±9 SE of Mean (640) 18884 Approximate Shi Square Value (6.98.e) 2.161 Adjusted Chi Square Value (6.98.p) 2.057 Gemma Kapirovi Mik Critical Value (9.98.e) 2.161 Adjusted Chi Square Value (6.98.p) 2.057 Gemma Adjusted KM-UCL (use when n>=50) 6510 95% Gamma Adjusted VILL (use when n>=50) 6810 Shippin Wilk Critical Value (9.98.e) 2.161 Adjusted Chi Square Value (6.98.p) 2.057 Gemma Kapirovi Mik Critical Value (9.98.e) 2.161 Adjusted Chi Square Value (6.98.p) 2.057 Shippin Wilk Critical Value (9.98.e) 3.044 Shappir Wilk Cof Test Detected Data appear Lognormal at 5% Significance Level 1.11616 Square Value (6.98.e) 2.057 Detected Data appear Lognormal at 5% Significance Level 2.059	51												
GROS may not be used when kater of detects is small such as <1.0. especially when the sample size is small (e.g. <15-20)	52												
For such situations, GROS method may yield incorrect values of UCLs and BTVs	53			•							·		
This is especially true when the sample size is small.	54		GROS may								-	e.g., <15-20)	
For gamma distributed detected data. 8TVs and UCLs may be computed using gamma distribution on KM estimates	55			Fo			•	•			TVs		
Section	56						-						
Maximum 380000 Median 0.01	57		For gan	nma distribut	ted detected			y be comput	ed using gar	nma distribu	ıtion on KM e		
SD 72970 CV 3,647	58												
Section Sect	59											Median	
Theta hat (MLE) 293795 Theta star (bias corrected MLE) 250229	60											CV	
Number Number	61										`		
Adjusted Level of Significance (β) 0.0437 1.762 Adjusted Chi Square Value (6.24, β) 1.67 1.68 95% Gamma Approximate UCL (use when n > 50) 74707	62						293795			Theta	•	•	
Section Sect	63						5.311		as corrected)	6.236			
Section Sect	64			•	J	. ,							
Section Sect	65									-			
Best	66		95% Gamma	Approximat	e UCL (use v	when n>=50)	70818		95% Ga	amma Adjus	ted UCL (use	when n<50)	74707
Mean (KM) 20168 SD (KM) 72003	67												
National Color Nat	68				Es			meters using	ı KM Estima	tes			
Name	69											72003	
12	70											12894	
173	71					k hat (KM)						k star (KM)	0.0895
174	72												
75 95% gamma percentile (KM) 117505 99% gamma percentile (KM) 338392 76	73				th	eta hat (KM)	257065				the	eta star (KM)	225305
76	74			80%	6 gamma pei	rcentile (KM)	11768			90	% gamma pe	rcentile (KM)	50988
Ramma Kaplan-Meier (KM) Statistics Adjusted Chi Square Value (6.98, β) 2.057	75			95%	6 gamma pei	rcentile (KM)	117505			99'	% gamma pe	rcentile (KM)	338392
Approximate Chi Square Value (6.98, a) 2.161	76												
95% Gamma Approximate KM-UCL (use when n>=50) 65170 95% Gamma Adjusted KM-UCL (use when n<50) 68470	77							eier (KM) St	atistics				
80 95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50) 81	78									•	•		
Bat Lognormal GOF Test on Detected Observations Only	79	95%	Gamma App	oroximate KN	•	•				•	KM-UCL (use	when n<50)	68470
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution Statistics Using HValue (D. 3.0.245 Statistics Using HValue (D. 3.43 Detected Data appear Lognormal at 5% Significance Level Statistics Using Imputed Non-Detects Detected Data appear Lognormal at 5% Significance Level Statistics Using Imputed Non-Detects St	80				95% G	amma Adjust	ed KM-UCL	(use when k	<=1 and 15 <	< n < 50)			
Shapiro Wilk Test Statistic 0.844 Shapiro Wilk GOF Test	81												
Shapiro Wilk Critical Value 0.762 Detected Data appear Lognormal at 5% Significance Level	82						F Test on D	etected Obs	ervations O	-			
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution Statistics using KM ean (logged) S. M. S. M. Mean (logged) S. M. S. M. S. M. Mean (logged) S. M. S. M. M. S. M. Mean (logged) S. M. S.	83				•					•			
Shape Shap	84			5% SI				Dete	ected Data a			3ignificance L	_evel
Detected Data appear Lognormal at 5% Significance Level	85												
Real Ros Ros	86			5							ormal at 5% S	Significance L	_evel
Lognormal ROS Statistics Using Imputed Non-Detects 90	87				Dete	ected Data ap	pear Logno	rmal at 5% S	Significance	Level			
Mean in Original Scale 20309 Mean in Log Scale 5.377	88												
SD in Original Scale 72887 SD in Log Scale 2.932	89					-		Using Impute	ed Non-Dete	ects			
92 95% t UCL (assumes normality of ROS data) 39986 95% Percentile Bootstrap UCL 42600 93 95% BCA Bootstrap UCL 49307 95% Bootstrap t UCL 96145 94 95% H-UCL (Log ROS) 188802 95 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 97 KM Mean (logged) 3.505 KM Geo Mean 33.26 98 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468 99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359	90												
93 95% BCA Bootstrap UCL 49307 95% Bootstrap t UCL 96145 94 95% H-UCL (Log ROS) 188802 95 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 97 KM Mean (logged) 3.505 KM Geo Mean 33.26 98 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468 99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359	91												
95 95% H-UCL (Log ROS) 188802 95 96 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 97 KM Mean (logged) 3.505 KM Geo Mean 33.26 98 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468 99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359 64	92		95% t L	`						95%			
95 96 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 97 KM Mean (logged) 3.505 KM Geo Mean 33.26 98 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468 99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359	93					•					95% Boo	otstrap t UCL	96145
96 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 97 KM Mean (logged) 3.505 KM Geo Mean 33.26 98 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468 99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359	94				95% H-UC	L (Log ROS)	188802						
97 KM Mean (logged) 3.505 KM Geo Mean 33.26 98 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468 99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359	95												
98 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468 99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359	96			Statis				Data and Ass	suming Logr	normal Distr			
99 KM Standard Error of Mean (logged) 0.57 95% H-UCL (KM -Log) 64359	97												
KM SD (logged) 2 102 059/ Critical H Value (VM Log) 5 469	98					:	3.103			95%	Critical H Val	lue (KM-Log)	
100 KM SD (logged) 3.103 95% Critical H Value (KM-Log) 5.468	99			KM Standa								, ,,	
	100				KM	SD (logged)	3.103			95%	Critical H Val	ue (KM-Log)	5.468

	Α	В	С	D	E	F	G	Н	I	J	K	L		
101			KM Standar	d Error of M	ean (logged)	0.57								
102						•	•					•		
103						DL/2 S	Statistics							
104			DL/2 N	Normal					DL/2 Log-	Transformed				
105				Mean in O	riginal Scale	22923				Mean i	n Log Scale	5.776		
106				SD in O	riginal Scale	72446				SD i	n Log Scale	3.616		
107			95% t L	ICL (Assume	es normality)	42482				95%	H-Stat UCL	8900974		
108			DL/2 i	s not a reco	mmended m	ided for com	parisons and	d historical r	easons					
109														
110		Nonparametric Distribution Free UCL Statistics												
111				Detected	Data appea	ar Normal D	istributed at	5% Significa	nce Level					
112														
113						Suggested	UCL to Use	•						
114				95%	KM (t) UCL	41907								
115														
116	١	Note: Sugges	stions regard	ing the selec	tion of a 95%	% UCL are p	rovided to he	lp the user to	select the r	nost appropria	ate 95% UC			
117			F	tecommenda	itions are ba	sed upon da	ta size, data	distribution,	and skewne	SS.				
118		These recor	nmendations	are based u	pon the resu	ults of the sir	nulation stud	ies summariz	zed in Singh	, Maichle, and	Lee (2006)	•		
119	Ho	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ets; for addition	onal insight t	he user may	want to consu	ult a statistic	ian.		
120														

	Α	В	С	D	Е	F	G	Н	ı	J	K	L
1					UCL Statis	tics for Data	a Sets with N	on-Detects				
2												
3		User Sele	cted Options									
4	Da	te/Time of Co	omputation	ProUCL 5.1	5/25/2018 9:	48:49 AM						
5			From File	Soil Vapor I	nput.xls							
6		Fu	II Precision	OFF								
7		Confidence	Coefficient	95%								
8	Number	of Bootstrap	Operations	2000								
9												
10	4- Isopropy	Itoluene										
11												
12						General	Statistics					
13			Total	Number of C	Observations	38			Numbe	r of Distinct O	bservations	17
14				Numbe	er of Detects	1				Number of N	Non-Detects	37
15			N	umber of Dis	tinct Detects	1			Numbe	er of Distinct N	Non-Detects	16
16						1	1				<u> </u>	
17		Warning: Or	nly one distin	ct data value	e was detect	ed! ProUCL	(or any other	software) s	hould not be	e used on suc	ch a data set	Į.
18	It is sugg	ested to use	alternative s	site specific v	/alues deteri	mined by the	e Project Tea	m to estimat	te environm	ental parame	ters (e.g., El	C, BTV).
19												
20				The dat	a set for vari	iable 4- Isop	ropyltoluene	was not pro	cessed!			
21												-
22												

	Α	В	С	D	E District	F	G Octovrith N	H		J	K	L
1					JCL Statist	ics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2	DE/2019 0.3	00.49 AM						
4	Dat	e/Time of C	From File	Soil Vapor Inpu		09.40 AIVI						
5		Fu	Il Precision	OFF	ut.xis							
6		Confidence		95%								
7		f Bootstrap		2000								
8	Trainibor o	Boototrap		2000								
9	Acetone											
10												
11						General	Statistics					
13			Total	Number of Obs	servations	38			Numbe	r of Distinct C	Observations	22
14				Number o	of Detects	6				Number of	Non-Detects	32
15			N	umber of Disting	ct Detects	6			Numbe	er of Distinct	Non-Detects	16
16				Minimu	um Detect	11				Minimum	Non-Detect	10
17				Maximu	um Detect	89				Maximum	Non-Detect	300000
18				Varianc	e Detects	919.5				Percent l	Non-Detects	84.21%
19				Mea	n Detects	39.33					SD Detects	30.32
20				Media	n Detects	25					CV Detects	0.771
21				Skewnes	s Detects	1.112				Kurt	osis Detects	-0.219
22				Mean of Logge	d Detects	3.428				SD of Log	ged Detects	0.766
23					l.		ı					
24					Norm	al GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Tes	st Statistic	0.844			Shapiro W	lk GOF Test		
26			5% SI	hapiro Wilk Crit	ical Value	0.788	De	etected Data	appear Nori	mal at 5% Sig	nificance Le	√el
27				Lilliefors Tes		0.325				GOF Test		
28			5	% Lilliefors Crit		0.325				al at 5% Sign	ificance Leve	1
29				Detected Da	ita appear	Approxima	te Normal at	5% Significa	ance Level			
30												
31			Kaplan-	Meier (KM) Sta			ritical Value	s and other	-			
32					KM Mean	23.25			KI	M Standard E		
33				050/ 1/	KM SD	23.03			050/ 1/14 /5		I (BCA) UCL	35.55
34					M (t) UCL	34.7			`	Percentile Boo		34.74
35				95% Ki 90% KM Cheby	M (z) UCL	34.41 43.61				95% KM Boo 95% KM Che	•	47.56 52.83
36				.5% KM Cheby		65.64				95% KM Che 99% KM Che	•	90.78
37			37	.5 /0 TAIVI OHEDYS	SHOV UCL	00.04				JO 70 INIVI CITE	Dydilev UCL	50.76
38				Gar	nma GOF	Tests on De	etected Obse	ervations Or	nlv			
39					st Statistic	0.405			•	rling GOF Te	est	
40				5% A-D Criti		0.704	Detected			istributed at 5		ce Level
41					st Statistic	0.282				Smirnov GO		
42				5% K-S Criti		0.336	Detected			istributed at 5		ce Level
44							stributed at 5				<u> </u>	
45					••							
46					Gamma	Statistics or	n Detected D	ata Only				
47				k l	hat (MLE)	2.2			k	star (bias cor	rected MLE)	1.211
48		Theta hat (17.87			Theta	star (bias cor	rected MLE)	32.47
49		nu h				26.41				nu star (bia	s corrected)	14.54
50				Mean	(detects)	39.33						
55	<u> </u>						1					

	Α	В	С	D	Е		F	G	Н	I	J	K	L
51													
52					Gamma F	ROS	Statistics u	sing Impute	ed Non-Dete	ects			
53			•						•	oservations at	•		
54		GROS may	not be used	when kstar	of detect	s is s	small such a	s <1.0, esp	ecially when	the sample s	ize is small (e	e.g., <15-20)	
55			Fo	r such situa	tions, GR	OS r	method may	yield incorr	ect values o	of UCLs and B	TVs		
56					This is es	pecia	ally true whe	en the samp	le size is sm	nall.			
57		For gar	nma distribut	ed detected	l data, BT	Vs a	nd UCLs ma	y be compu	uted using g	amma distribu	ution on KM e	stimates	
58					Minin	num	0.01					Mean	12.06
59					Maxin	num	89					Median	2.887
60						SD	19.16					CV	1.589
61					k hat (M	LE)	0.251			k	star (bias cor	rected MLE)	0.249
62				Th	eta hat (M	LE)	48.03			Theta	star (bias cor	rected MLE)	48.47
63					nu hat (M	LE)	19.08				nu star (bia	s corrected)	18.9
64			Adjusted	Level of Si	gnificance	(β)	0.0434						
65		Арр	roximate Ch	i Square Va	lue (18.90), α)	10.05			Adjusted Ch	ni Square Valı	ue (18.90, β)	9.778
66		95% Gamma	Approximat	e UCL (use	when n>=	50)	22.68		95% C	Gamma Adjus	ted UCL (use	when n<50)	23.3
67								1					<u> </u>
68				E	stimates	of G	amma Para	meters usir	ng KM Estim	nates			
69					Mean (KM)	23.25					SD (KM)	23.03
70				V	/ariance (KM)	530.3				SE o	f Mean (KM)	6.787
71					k hat (KM)	1.019					k star (KM)	0.956
72					nu hat (KM)	77.48					nu star (KM)	72.69
73				t	heta hat (KM)	22.81				the	eta star (KM)	24.31
74			80%	6 gamma pe	ercentile (KM)	37.55			90	% gamma per	centile (KM)	54.12
75			95%	6 gamma pe	ercentile (KM)	70.76			99	% gamma per	centile (KM)	109.5
76								1					
77					Ga	amm	a Kaplan-M	eier (KM) S	tatistics				
78		Арр	roximate Ch	i Square Va	lue (72.69	θ, α)	54.06			Adjusted Ch	ni Square Valu	ue (72.69, β)	53.39
79	95%	ն Gamma App	oroximate KN	Л-UCL (use	when n>=	50)	31.26		95% Gam	ma Adjusted I	KM-UCL (use	when n<50)	31.65
80													1
81				L	.ognorma	GO	F Test on D	etected Ob	servations	Only			
82			S	hapiro Wilk	Test Stat	istic	0.936			Shapiro W	ilk GOF Test		
83			5% SI	hapiro Wilk	Critical Va	alue	0.788	De	tected Data	appear Logno	ormal at 5% S	Significance L	_evel
84				Lilliefors	Test Stat	istic	0.235			Lilliefors	GOF Test		
85			5	% Lilliefors	Critical Va	alue	0.325	De	tected Data	appear Logno	ormal at 5% S	Significance L	evel
86				Det	ected Dat	a ap	pear Logno	rmal at 5%	Significanc	e Level			
87													
88				L	ognormal	ROS	S Statistics	Using Impu	ted Non-De	tects			
89				Mean in (Original So	cale	15.58				Mean	in Log Scale	2.393
90				SD in 0	Original So	cale	16.79				SD	in Log Scale	0.812
91		95% t L	JCL (assume	s normality	of ROS d	ata)	20.17			95%	Percentile Bo	otstrap UCL	20.23
92			!	95% BCA B	ootstrap l	JCL	21.44				95% Boo	tstrap t UCL	23.72
93				95% H-UC	CL (Log R	OS)	20.39						
94								1					1
95			Statis	stics using l	KM estima	ates	on Logged	Data and A	ssuming Lo	gnormal Distr	ibution		
96				KM N	lean (logg	jed)	2.83				KI	M Geo Mean	16.94
97				KN	1 SD (logg	jed)	0.713			95%	Critical H Val	ue (KM-Log)	2.095
98			KM Standa	rd Error of N	lean (logg	jed)	0.214				95% H-UC	CL (KM -Log)	27.92
99				KN	I SD (logg	jed)	0.713			95%	Critical H Val	ue (KM-Log)	2.095
100			KM Standa	rd Error of N	lean (logg	jed)	0.214						1
100					, 50	,		1					

	Α	В	С	D	Е	F	G	Н	I	J	K	L	
101													
102						DL/2 S	tatistics						
103			DL/2 N	Normal					DL/2 Log-T	ransformed			
104				Mean in C	riginal Scale	10408				Mean i	n Log Scale	5.795	
105				SD in C	riginal Scale	29922				SD i	n Log Scale	3.029	
106			95% t L	ICL (Assum	es normality)	18597				95%	H-Stat UCL	457559	
107			DL/2 i	s not a reco	mmended m	ethod, provi	ded for comp	parisons and	l historical re	easons			
108													
109		Nonparametric Distribution Free UCL Statistics											
110		Detected Data appear Approximate Normal Distributed at 5% Significance Level											
111													
112						Suggested	UCL to Use						
113				95%	6 KM (t) UCL	34.7							
114													
115			When a d	ata set follo	ws an approx	kimate (e.g., i	normal) distri	bution passi	ng one of the	GOF test			
116		When app	licable, it is s	uggested to	use a UCL b	ased upon a	distribution (e.g., gamma) passing bo	th GOF tests	in ProUCL		
117													
118	١	Note: Sugges	stions regard	ing the selec	ction of a 95%	6 UCL are pr	ovided to hel	p the user to	select the m	ost appropria	ate 95% UCI		
119			F	tecommenda	ations are ba	sed upon dat	a size, data	distribution, a	and skewnes	S.			
120		These recor	mmendations	are based (upon the resu	ults of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	Lee (2006)		
121	Ho	wever, simu	lations result	s will not cov	er all Real V	Vorld data se	ts; for additio	nal insight th	ne user may	want to consi	ult a statistic	ian.	
122													

	Α	В	С	D	E IOL Obstic	F	G Octovrith N	H	I	J	K	L
1					JCL Statis	tics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2)E/2019 0.:	2E.00 AM						
4	Dat	e/Time of C	From File	Soil Vapor Inpu		33.00 AIVI						
5		Fu	Il Precision	OFF	ut.xi5							
6		Confidence		95%								
7		f Bootstrap		2000								
8	Trainibor o	Boototrap		2000								
9	Benzene											
10												
12						General	Statistics					
13			Total	Number of Obs	ervations	50			Numbe	r of Distinct C	Observations	30
14				Number of	of Detects	20				Number of	Non-Detects	30
15			Nı	umber of Distino	ct Detects	19			Numbe	er of Distinct	Non-Detects	12
16				Minimu	ım Detect	2500				Minimum	Non-Detect	6.39
17				Maximu	ım Detect	2000000				Maximum	Non-Detect	15000
18				Varianc	e Detects	2.145E+11				Percent	Non-Detects	60%
19				Mea	n Detects	252630					SD Detects	463195
20				Media	n Detects	81000					CV Detects	1.833
21				Skewnes	s Detects	3.187				Kurt	osis Detects	11.31
22				Mean of Logge	d Detects	10.98				SD of Log	ged Detects	2.004
23												
24							t on Detects	Only				
25				hapiro Wilk Tes					-	lk GOF Test		
26			5% SI	napiro Wilk Criti		0.905		Detected Dat			ificance Leve	:l
27				Lilliefors Tes			_			GOF Test		
28			5	% Lilliefors Criti		0.192				al at 5% Sign	ificance Leve	#I
29				Dete	ected Data	a Not Norma	l at 5% Sign	ificance Lev	el			
30			Vanlan	Majar (KM) Cta	tieties usi	na Normal C	wition! \/alus		Nonnoromo	mia IICI a		
31			Kapian-	Meier (KM) Sta	KM Mean	_	ntical value	s and other	•		rror of Mean	1E1E1
32						311184			NI		(BCA) UCL	
33				95% K	M (t) UCL				95% KM (F		otstrap) UCL	
34					M (z) UCL				•		otstrap t UCL	
35			C	90% KM Chebys	` '						byshev UCL	
36				.5% KM Chebys							byshev UCL	
37						<u> </u>	<u> </u>					
38				Gan	nma GOF	Tests on De	etected Obse	ervations On	ıly			
40					st Statistic				•	rling GOF Te	est	
41				5% A-D Criti	ical Value	0.815	Detected	d data appea	r Gamma D	stributed at 5	5% Significan	ce Level
42				K-S Tes	t Statistic	0.146		ŀ	Kolmogorov-	Smirnov GO	F	
43				5% K-S Criti	ical Value	0.206	Detected	d data appea	r Gamma D	istributed at 5	5% Significan	ce Level
44				Detected da	ata appea	r Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47				k l	hat (MLE)	0.443			k	star (bias cor	rected MLE)	0.41
48				Theta I	hat (MLE)	570758			Theta	star (bias cor	rected MLE)	616830
49					hat (MLE)					nu star (bia	as corrected)	16.38
50				Mean	(detects)	252630						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						Statistics u						
53			GROS may	not be used	when data	set has > 50%	NDs with r	nany tied ob	servations at	multiple DLs		
54		GROS may	not be used	when kstar	of detects is	small such a	s <1.0, espe	ecially when	the sample si	ize is small (e	e.g., <15-20)	
55			Fo	r such situat	ions, GROS	method may	yield incorre	ect values of	f UCLs and B	TVs		
56				٦	This is espec	ially true whe	n the sampl	le size is sm	all.			
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs ma	y be compu	ited using ga	amma distribu	ition on KM e	stimates	
58					Minimum	0.01					Mean	101052
59					Maximum	2000000					Median	0.01
60					SE	314360					CV	3.111
61					k hat (MLE)	0.0838			k	star (bias cor	rected MLE)	0.0921
62				The	ta hat (MLE)	1205290			Theta	star (bias cor	rected MLE)	1096683
63				1	nu hat (MLE)	8.384				nu star (bia	s corrected)	9.214
64			Adjusted	Level of Sig	nificance (β)	0.0452						
65		Ap	proximate C	hi Square Va	alue (9.21, α)	3.457			Adjusted C	chi Square Va	lue (9.21, β)	3.353
66		95% Gamma	Approximate	e UCL (use v	when n>=50)	269351		95% G	amma Adjust	ted UCL (use	when n<50)	277740
67						1	<u> </u>					1
68				E	stimates of (Samma Para	meters usin	g KM Estim	ates			
69					Mean (KM)	101105					SD (KM)	311184
70				V	ariance (KM)	9.684E+10				SE o	f Mean (KM)	45151
71					k hat (KM)	0.106					k star (KM)	0.113
72					nu hat (KM)	10.56					nu star (KM)	11.26
73				th	eta hat (KM)	957777				the	eta star (KM)	898218
74			80%	6 gamma pe	rcentile (KM)	82214			90%	% gamma per	centile (KM)	281042
75			95%	6 gamma pe	rcentile (KM)	581216			999	% gamma per	centile (KM)	1512607
76												
77					Gamr	na Kaplan-M	eier (KM) S	tatistics				
78		App	roximate Ch	i Square Val	ue (11.26, α)	4.741			Adjusted Ch	ni Square Valu	ue (11.26, β)	4.616
79	95%	Gamma App	oroximate KN	1-UCL (use v	when n>=50	240031		95% Gamr	na Adjusted k	KM-UCL (use	when n<50)	246565
80												
81				Lo	ognormal Go	OF Test on D	etected Ob	servations (Only			
82			S	hapiro Wilk	Test Statistic	0.946			Shapiro Wi	ilk GOF Test		
83			5% SI	napiro Wilk (Critical Value	0.905	Def	tected Data	appear Logno	ormal at 5% S	Significance L	_evel
84				Lilliefors	Test Statistic	0.162			Lilliefors	GOF Test		
85			5	% Lilliefors (Critical Value	0.192	Def	tected Data	appear Logno	ormal at 5% S	Significance L	_evel
86				Dete	ected Data a	ppear Logno	rmal at 5%	Significance	Level			
87												
88				Lo	gnormal RC	S Statistics	Using Imput	ted Non-Det	tects			
89					riginal Scale					Mean	in Log Scale	7.572
90					riginal Scale						in Log Scale	
		95% t L	JCL (assume						95%	Percentile Bo		
91			•		ootstrap UCL						tstrap t UCL	
					L (Log ROS)					. , , ,		1
93					. 5							<u>l</u>
94			Statis	tics usina K	M estimates	on Loaaed I	Data and As	ssumina Loc	normal Distri	ibution		
95			3.2.110		ean (logged)				,		M Geo Mean	263.8
96					SD (logged)				95% (Critical H Val		
97			KM Standar		ean (logged)						CL (KM -Log)	
98			· ···· Otaliaal		SD (logged)				95% (Critical H Val	,	
99			KM Standar		ean (logged)				33 /0 (-5 (. c.v. Log)	7.000
100			i vivi Otaliudi	4 LITOI OI W	can (logged)	0.079						

	Α	В	С	D	Е	F	G	Н	I	J	K	L		
101														
102						DL/2 S	tatistics							
103			DL/2 I	Normal					DL/2 Log-T	Transformed				
104				Mean in O	riginal Scale	101441				Mean i	in Log Scale	6.878		
105				SD in O	riginal Scale	314235				SD i	in Log Scale	4.095		
106			95% t l	JCL (Assume	es normality)	175946				95%	H-Stat UCL	2.215E+8		
107			DL/2	s not a reco	mmended m	nethod, provi	ded for com	oarisons and	l historical re	easons		"		
108		Nonporametric Distribution Eroc LICI Statistics												
109		Nonparametric Distribution Free UCL Statistics												
110				Detected	Data appea	ar Gamma Di	stributed at	5% Significa	nce Level					
111														
112						Suggested	UCL to Use							
113			95% KM A	pproximate (amma UCL	240031								
114														
115	١	Note: Sugges	stions regard	ing the selec	tion of a 95°	% UCL are pr	ovided to he	p the user to	select the m	nost appropria	ate 95% UCI	L.		
116			F	Recommenda	itions are ba	sed upon dat	a size, data	distribution, a	and skewnes	SS.				
117		These recor	mmendations	are based u	pon the resi	ults of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006)			
118	Ho	wever, simu	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.		
119														

	Α	В	С	D E	F	G	H		J	K	L
1				UCL Sta	tistics for Data	a Sets With N	ion-Detects				
2			-44-04								
3	Det	e/Time of C	ected Options	DrallOl E 15/25/2019	0.41.00 AM						
4	Dat	e/Time of C		ProUCL 5.15/25/2018	9:41:09 AIVI						
5		F.	From File	Soil Vapor Input.xls OFF							
6			Il Precision	95%							
7			Coefficient	2000							
8	Number o	of Bootstrap	Operations	2000							
9	Carbon Dis	ulfido									
10	Carbon Dis	uillue									
11					General	Statistics					
12			Total	Number of Observation		Otationes		Numbe	r of Distinct C)hservations	19
13				Number of Detec				- Tumbo		Non-Detects	35
14			Nı	umber of Distinct Detec				Numbe	er of Distinct		16
15				Minimum Dete						Non-Detect	
16				Maximum Dete						Non-Detect	
17				Variance Detec						Non-Detects	92.11%
18				Mean Detec						SD Detects	3162
19 20				Median Detec						CV Detects	1.406
21				Skewness Detec					Kurt	osis Detects	N/A
22				Mean of Logged Detec	ts 6.912				SD of Log	ged Detects	1.55
23											
24				Warning	Data set has	only 3 Detec	ted Values.				
25			T	nis is not enough to co	mpute meanir	ngful or reliab	le statistics	and estimat	es.		
26											
27											
28				No	rmal GOF Te	st on Detects	Only				
29			S	hapiro Wilk Test Statis	ic 0.776			Shapiro W	ik GOF Test		
30			5% SI	napiro Wilk Critical Valu	ie 0.767	De	etected Data	appear Nori	mal at 5% Sig	nificance Le	vel
31				Lilliefors Test Statis	ic 0.374			Lilliefors	GOF Test		
32			5	% Lilliefors Critical Value	ie 0.425	De	etected Data	appear Nori	mal at 5% Sig	nificance Le	vel
33				Detected Date	a appear Nor	mal at 5% Sig	gnificance L	evel			
34											
35			Kaplan-	Meier (KM) Statistics ι	_	Critical Value	s and other	<u>-</u>			
36				KM Mea				KI	M Standard E		245.2
37				KM S						I (BCA) UCL	N/A
38				95% KM (t) UC				•	Percentile Boo	• • •	N/A
39				95% KM (z) U0					95% KM Boo	•	N/A
40				00% KM Chebyshev UC					95% KM Che	-	1319
41			97	.5% KM Chebyshev UC	L 1782				99% KM Che	byshev UCL	2690
42				0-	VE T	-4-4-4-01		.h.			
43					F Tests on D			niy			
44				Not I	nough Data t	о Репоrm GO	Ur lest				
45					o Ototleti	n Detact: 4 C	hata Ombi				
46					a Statistics o	ii Detected D	vata Uniy	1.	otor (high acco	rooted MI E	NI/A
47				k hat (ML					star (bias cor	•	N/A
48				Theta hat (ML	•			ı neta	star (bias cor	·	N/A
49				nu hat (ML	-				riu star (bia	s corrected)	N/A
50				Mean (detect	s) 2250						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51						<u> </u>						
52					Gamma ROS							
53					when data s			<u> </u>		·		
54		GROS may			of detects is					· · · · · · · · · · · · · · · · · · ·	e.g., <15-20)	
55			Fo		ions, GROS		•			TVs		
56					This is especi	-	-					
57		For gar	nma distribut	ted detected	data, BTVs a		y be comput	ted using gar	mma distribu	ition on KM e		T.
58					Minimum	0.01					Mean	
59					Maximum	5900					Median	
60					SD	958.5					CV	5.396
61					k hat (MLE)	0.0924				•	rrected MLE)	0.103
62					ta hat (MLE)	1923			Theta	•	rrected MLE)	1731
63					nu hat (MLE)	7.022				nu star (bia	as corrected)	7.801
64			-	Level of Sig		0.0434						
65		-	-	-	alue (7.80, α)	2.62			-		alue (7.80, β)	2.497
66		95% Gamma	Approximat	e UCL (use v	when n>=50)	528.8		95% Ga	amma Adjus	ted UCL (use	when n<50)	N/A
67								101 = 1	_			
68				Es	stimates of G		meters using	J KM Estima	ites		OD (((A))	4075
69					Mean (KM)	250.6				05	SD (KM)	1075
70				Vä	ariance (KM)					SEC	of Mean (KM)	245.2
71					k hat (KM)	0.0543					k star (KM)	0.0676
72				414	nu hat (KM)	4.129					nu star (KM)	5.136
73			000		eta hat (KM)	4613			000		eta star (KM)	3708
74					rcentile (KM)	82.59				% gamma pe		525.6
75			907	o gamma per	rcentile (KM)	1435			99	% gamma pe		4798
76					Gamm	a Kanlan M	eier (KM) St	atietice				
77		Δη	nrovimate C	hi Square Va	alue (5.14, α)	1.216		ausucs	Adjusted (`hi Sauare V	alue (5.14, β)	1.14
78	050	Ap Gamma App	•	•		1059		05% Camm	· ·		e when n<50)	1129
79	337	o Gamma App	JIOXIIII die TRI		amma Adjust				•		- WHEH H 300)	1123
80				3070 GI		CO TAN OOL	(doc when k	- runa io	-11 - 00)			
81				Lo	ognormal GC	F Test on D	etected Obs	ervations O	nlv			
82			S		Test Statistic	0.865			•	ilk GOF Test	<u> </u>	
83					Critical Value	0.767	Dete	ected Data a	•		Significance L	evel
84 85				-	Test Statistic	0.331				GOF Test		
86			5	% Lilliefors C	Critical Value	0.425	Dete	ected Data a	ppear Logn	ormal at 5% S	Significance L	evel
87				Dete	ected Data ap	pear Logno						
88												
89				Lo	gnormal RO	S Statistics	Using Impute	ed Non-Dete	ects			
90	<u> </u>			Mean in O	riginal Scale	184				Mean	in Log Scale	1.4
91				SD in O	riginal Scale	957.3				SD	in Log Scale	2.302
92		95% t L	JCL (assume	es normality of	of ROS data)	446			95%	Percentile Bo	ootstrap UCL	493.7
93			!	95% BCA Bo	otstrap UCL	781.7				95% Boo	otstrap t UCL	3249
94				95% H-UC	L (Log ROS)	281.1						
95							1					
96			Statis	stics using K	M estimates	on Logged I	Data and As	suming Logi	normal Distr	ibution		
97				KM M	ean (logged)	2.484				K	M Geo Mean	11.99
98				KM	SD (logged)	1.716			95%	Critical H Va	lue (KM-Log)	3.331
99			KM Standa	rd Error of M	ean (logged)	0.435				95% H-U	CL (KM -Log)	133.6
100				KM	SD (logged)	1.716			95%	Critical H Va	lue (KM-Log)	3.331
							1					

	Α	В	С	D	E	F	G	Н	I	J	K	L	
101			KM Standar	d Error of M	ean (logged)	0.435							
102						•	•					•	
103						DL/2 S	tatistics						
104			DL/2 N	Normal					DL/2 Log-	Transformed			
105				Mean in O	riginal Scale	10060				Mean i	n Log Scale	5.525	
106				SD in O	riginal Scale	29732				SD i	n Log Scale	3.413	
107			95% t L	ICL (Assume	es normality)	18197				95%	H-Stat UCL	2368018	
108			DL/2 i	s not a reco	mmended m	ethod, provi	ded for com	parisons and	d historical r	easons			
109	·												
110					Nonparam	etric Distribu	tion Free UC	CL Statistics	i				
111				Detected	Data appea	ar Normal Di	stributed at	5% Significa	nce Level				
112													
113						Suggested	UCL to Use						
114				95%	KM (t) UCL	664.3							
115													
116	١	Note: Sugges	stions regard	ing the selec	tion of a 95%	% UCL are pr	ovided to he	lp the user to	select the r	nost appropria	ate 95% UC	L.	
117			F	tecommenda	itions are ba	sed upon da	a size, data	distribution,	and skewne	SS.			
118		These recor	nmendations	are based u	pon the resu	ults of the sin	nulation stud	ies summariz	zed in Singh	, Maichle, and	Lee (2006)	•	
119	Ho	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight t	he user may	want to consu	ult a statistic	ian.	
120													

	Α	В	С	D	Е	F	G	Н	L	J	K		L
1				·	JCL Statis	tics for Dat	a Sets with N	Ion-Detects					
2													
3		User Selec	cted Options										
4	Da	te/Time of Co	omputation	ProUCL 5.15/2	25/2018 9:4	41:56 AM							
5			From File	Soil Vapor Inpu	ut.xls								
6		Ful	Il Precision	OFF									
7		Confidence	Coefficient	95%									
8	Number o	of Bootstrap (Operations	2000									
9													
10	Chloroform												
11													
12						General	Statistics						
13			Total	Number of Obs	ervations	38			Numb	er of Distinct	Observation	ns 1	7
14				Number o	of Detects	0				Number of	Non-Detec	ts 3	88
15			N	umber of Distino	ct Detects	0			Num	ber of Distinct	Non-Detec	ts 1	7
16													
17		Warr	ning: All obs	ervations are N	on-Detect	s (NDs), th	erefore all sta	atistics and e	estimates s	should also b	e NDs!		
18		•		e mean, UCLs,									
19	7	The Project T	Team may de	ecide to use alt	ernative si	ite specific	values to est	imate enviro	nmental p	arameters (e.	g., EPC, B	ΓV).	
20													
21				The da	ata set for	variable Cl	nloroform wa	s not proces	sed!				
22													
23													

	Α	В	С	D	E	F	G	Н	l	J	K	L
1					UCL Statis	tics for Data	Sets with No	n-Detects				
2		Hoor Cala	cted Options									
3	Dot	e/Time of Co	-	ProUCL 5.15	5/25/2019 0.	42.24 AM						
4	שמו	or time of CC	From File	Soil Vapor Ir		TL.UT /\IVI						
5		Ful	I Precision	OFF	.pac.Alo							
7	(Confidence		95%								
8		f Bootstrap (2000								
9		•	*									
10	Cyclohexan	е										
11												
12						General	Statistics					
13			Total	Number of O	bservations	38				er of Distinct C		24
14									Numbe	r of Missing C		1
15					r of Detects	15					Non-Detects	23
16			Nı	umber of Dist		14			Numb	er of Distinct		10
17					mum Detect						Non-Detect	
18					mum Detect						Non-Detect Non-Detects	
19					nce Detects ean Detects					Percent	SD Detects	60.53%
20					lian Detects						CV Detects	0.922
21					ess Detects	0.433				Kurt	osis Detects	-0.942
22				Mean of Log		12.23					ged Detects	3.51
23				oan or Log		.2.20				22 3, 206	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	3.51
24 25					Norm	nal GOF Tes	t on Detects (Only				
26			S	hapiro Wilk T		0.903			Shapiro W	ilk GOF Test		
27			5% SI	hapiro Wilk C	ritical Value	0.881	Det	ected Data	appear Nor	mal at 5% Sig	gnificance Le	vel
28				Lilliefors T	est Statistic	0.19			Lilliefors	GOF Test		
29			5	% Lilliefors C		0.22				mal at 5% Sig	gnificance Le	vel
30				Det	ected Data	appear Norn	nal at 5% Sigr	nificance Le	evel			
31												
32			Kaplan-	Meier (KM) S		_	ritical Values	and other				450757
33					KM Mean				K	M Standard E		
34				OE9/	KM (t) UCL	951415			OE9/ KM/F	95% KN Percentile Boo	1 (BCA) UCL	
35					KM (z) UCL				•	95% KM Boo	• ,	
36			Ç	90% KM Chel	` '					95% KM Che		
37				.5% KM Chel	•					99% KM Che	•	
38				5	,						,: .:. oo <u>-</u>	
40				G	amma GOF	Tests on De	etected Obser	vations On	ly			
41					est Statistic					arling GOF Te	est	
42				5% A-D C	ritical Value	0.822	Detecte	d Data Not	Gamma Dis	stributed at 5%	6 Significanc	e Level
43				K-S T	est Statistic	0.251		k	Colmogorov	-Smirnov GO	F	
44				5% K-S C	ritical Value	0.238	Detecte	d Data Not	Gamma Dis	stributed at 5%	6 Significanc	e Level
45				Detecte	d Data Not	Gamma Dist	ributed at 5%	Significand	ce Level			
46												
47							Detected Da	ta Only				1
48					k hat (MLE)					star (bias cor	<u> </u>	
49					a hat (MLE)				Theta	star (bias cor		
50				n	u hat (MLE)	10.92				nu star (bia	as corrected)	10.07

	Α	В	С	D	E	F	G	Тн	1 1		.1	K	
51	A		Ŭ		ean (detects)	-	<u> </u>		<u>'</u>		<u> </u>	<u> </u>	
52													
53				(Gamma ROS	Statistics u	sing Imput	ed Non-Dete	ects				
54			GROS may	not be used	when data s	et has > 50%	NDs with	many tied ol	oservations	at m	ultiple DLs	i	
55		GROS may	y not be used	when kstar	of detects is	small such a	s <1.0, esp	ecially wher	the sample	e size	e is small (e	e.g., <15-20)	
56			Fo	r such situat	ions, GROS	method may	yield incor	rect values o	of UCLs and	BTV	/s		
57				7	This is espec	ially true whe	n the samp	ole size is sn	nall.				
58		For gar	mma distribut	ed detected	data, BTVs a	and UCLs ma	y be comp	uted using g	amma distri	ibutic	on on KM e	stimates	
59					Minimum	0.01						Mean	505437
60					Maximum	3600000						Median	0.01
61					SD	964191						CV	1.908
62					k hat (MLE)	0.0757				k sta	ar (bias co	rected MLE)	0.0872
63				The	ta hat (MLE)	6680199			The	ta sta	ar (bias co	rected MLE)	5794135
64				ı	nu hat (MLE)	5.75					nu star (bia	as corrected)	6.63
65			Adjusted	Level of Sig	ınificance (β)	0.0434							
66		Ap	proximate Cl	hi Square Va	alue (6.63, α)	1.97			Adjusted	d Chi	Square Va	alue (6.63, β)	1.866
67	9	95% Gamma	a Approximate	e UCL (use v	when n>=50)	1701245		95% (Gamma Adjı	usted	d UCL (use	when n<50)	1795315
68													1
69				E	stimates of G	amma Para	meters usi	ng KM Estin	nates				
70					Mean (KM)	505447						SD (KM)	951415
71				V	ariance (KM)	9.052E+11					SE c	of Mean (KM)	159757
72					k hat (KM)	0.282						k star (KM)	0.277
73					nu hat (KM)	21.45						nu star (KM)	21.09
74				th	eta hat (KM)	1790871					the	eta star (KM)	1821448
75			80%	gamma pe	rcentile (KM)	759138			9	90% (gamma pe	rcentile (KM)	1503610
76			95%	gamma pe	rcentile (KM)	2369940			g	99% (gamma pe	rcentile (KM)	4643872
77													
78						na Kaplan-M	eier (KM) S	Statistics					
79			proximate Chi									ue (21.09, β)	
80	95%	Gamma Ap	proximate KN	1-UCL (use \	when n>=50)	914342		95% Gam	ma Adjuste	d KM	1-UCL (use	when n<50)	937765
81													
82					ognormal GC		etected Ob	oservations	-				
83					Test Statistic				•		GOF Test		
84			5% SI	-	Critical Value			Detected Da				gnificance Le	vel
85					Test Statistic						OF Test		
86			5'		Critical Value				·	orma	al at 5% Sig	gnificance Le	vel
87				De	tected Data	Not Lognorn	naı at 5% S	ignificance	Level				
88						0.04-4-4	Halm I						
89					gnormal RO		Using Impl	ited Non-De	etects				7.400
90					riginal Scale							in Log Scale	
91		050/	101 /		riginal Scale				05/	0/ 5		in Log Scale	
92		95% t l	JCL (assume						959	% Pe		ootstrap UCL	
93					ootstrap UCL						95% Boo	otstrap t UCL	851395
94				95% H-UC	L (Log ROS)	2.350E+11							
95			.	Alaa! 11	Massler !		Data -: 11			_4!			
96			Statis		M estimates		∪aτa and A ⊤	ssuming Lo	gnormal Dis	stribi		M O = 14	450.0
97					ean (logged)				25	0/ 0		M Geo Mean	
98			IZNA O:		SD (logged)				959			ue (KM-Log)	
99			KM Standar		ean (logged)				05/			CL (KM -Log)	
100				KM	SD (logged)	5.406			959	% Cr	ıtıcal H Val	ue (KM-Log)	9.169

	Α	В	С	D	Е	F	G	Н	I	J	K	L			
101			KM Standa	rd Error of M	ean (logged)	0.917									
102															
103						DL/2 S	Statistics								
104			DL/2	Vormal					DL/2 Log	-Transformed					
105				Mean in O	riginal Scale	505687				Mean	in Log Scale	7.143			
106				SD in O	riginal Scale	964057				SD	in Log Scale	5.044			
107			95% t l	JCL (Assume	es normality)	769533				95%	H-Stat UCL	5.194E+11			
108			DL/2	is not a reco	mmended m	ethod, provi	ded for com	parisons an	d historical	reasons		П			
109		Nonparametric Distribution Free UCL Statistics													
110					Nonparam	etric Distribu	ition Free U	CL Statistics	3						
111				Detected	l Data appea	ar Normal Di	stributed at	5% Significa	nce Level						
112															
113						Suggested	UCL to Use	ı							
114				95%	KM (t) UCL	774972									
115															
116	Ν	lote: Sugge	estions regard	ing the selec	ction of a 95%	% UCL are pi	rovided to he	lp the user to	select the	most appropri	ate 95% UC	L.			
117			F	Recommenda	ations are ba	sed upon da	ta size, data	distribution,	and skewn	ess.					
118		These reco	mmendations	are based ι	ipon the resi	ults of the sin	nulation stud	ies summari	zed in Sing	h, Maichle, and	d Lee (2006)				
119	Hov	wever, simi	ulations result	s will not cov	er all Real V	Vorld data se	ets; for addition	onal insight t	he user ma	y want to cons	ult a statistic	ian.			
120															

	Α	В	С	D	Е	F	G	Н	ı	J	K	L
1					UCL Statis	tics for Data	a Sets with N	on-Detects				
2												
3		User Sele	cted Options									
4	Da	te/Time of Co	omputation	ProUCL 5.1	5/25/2018 9:	45:18 AM						
5			From File	Soil Vapor I	Input.xls							
6		Fu	II Precision	OFF								
7		Confidence	Coefficient	95%								
8	Number	of Bootstrap	Operations	2000								
9												
10	Ethanol											
11												
12						General	Statistics					
13			Total	Number of 0	Observations	38			Numbe	r of Distinct O	bservations	17
14				Numb	er of Detects	2				Number of N	Ion-Detects	36
15			N	umber of Dis	tinct Detects	1			Numbe	er of Distinct N	Non-Detects	16
16												
17			-							e used on suc		
18	It is sugg	ested to use	alternative	site specific	values deteri	mined by the	e Project Tea	m to estimat	te environm	ental parame	ters (e.g., EF	°C, BTV).
19												
20				Т	he data set f	or variable E	Ethanol was r	not processe	ed!			
21												
22												

	Α	В	С	D	E IOL Otatia	F	G	H		J	K	L
1					JCL Statis	itics for Data	Sets with N	on-Detects				
2		Lleen Cele	atad Ontions									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2)E/2019 0.	27.57 AM						
4	Dat	e/Time of C	From File	Soil Vapor Inp		37.37 AIVI						
5		Fu	III Precision	OFF	ut.xi5							
6		Confidence		95%								
7		f Bootstrap		2000								
8	Trainibor o	Постопар	- Срогалогіо	2000								
9	Ethylbenze	ne										
10												
12						General	Statistics					
13			Total	Number of Obs	servations	50			Numbe	r of Distinct C	Observations	37
14				Number	of Detects	26				Number of	Non-Detects	24
15			N	umber of Distin	ct Detects	26			Numbe	er of Distinct	Non-Detects	11
16				Minimu	ım Detect	13				Minimum	n Non-Detect	8.68
17				Maximu	um Detect	3000000				Maximum	n Non-Detect	50000
18				Varianc	e Detects	5.000E+11				Percent	Non-Detects	48%
19				Mea	n Detects	235455					SD Detects	707117
20				Media	n Detects	23950					CV Detects	3.003
21				Skewnes	s Detects	3.492				Kurt	tosis Detects	11.53
22				Mean of Logge	d Detects	9.636				SD of Log	gged Detects	2.804
23							•					
24							t on Detects	Only				
25				hapiro Wilk Tes						ik GOF Test		
26			5% SI	hapiro Wilk Crit		0.92	Γ	Detected Da			ificance Leve)
27				Lilliefors Tes						GOF Test		
28			5	% Lilliefors Crit		0.17				al at 5% Sign	ificance Leve	
29				Det	ected Data	a Not Norma	l at 5% Sign	ificance Lev	rel			
30			1/	M-! (ICM) Ot-	41-411	N C			NI	w. 1101 -		
31			Kapian-	Meier (KM) Sta			ritical value	s and other	<u>-</u>			74000
32					KM Mean				Ki		rror of Mean	
33				0E9/ I/	M (t) UCL	513544			OEO/ IZM /F		otstrap) UCL	
34					M (z) UCL				•		otstrap t UCL	
35			(95% KI 90% KM Cheby	. ,						ebyshev UCL	
36				.5% KM Cheby							byshev UCL	
37				Tavi Onoby	5.10¥ 00L	30000			•		-, 01.0V OOL	
38				Gar	nma GOF	Tests on De	etected Obse	ervations Or	nly			
39					st Statistic				•	rling GOF Te	est	
40				5% A-D Crit			Detect				% Significance	e Level
42					st Statistic					Smirnov GO		
43				5% K-S Crit	ical Value		Detect				% Significance	e Level
44				Detected	Data Not	⊥ Gamma Dist	l ributed at 5%					
45												
46					Gamma	Statistics or	Detected D	ata Only				
47				k	hat (MLE)	0.258			k	star (bias cor	rrected MLE)	0.254
48				Theta	hat (MLE)	911013			Theta	star (bias cor	rrected MLE)	925991
49				nu	hat (MLE)	13.44				nu star (bia	as corrected)	13.22
50				Mean	(detects)	235455						
55						l	İ.					

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			GROS may	not be used	d when data	set has > 50%	NDs with r	nany tied ob	servations at	multiple DLs		
54		GROS may	not be used	when kstar	of detects is	small such a	s <1.0, espe	ecially when	the sample si	ze is small (e	.g., <15-20)	
55			Fo	r such situat	tions, GROS	method may	yield incorre	ect values of	f UCLs and B	TVs		
56				-	This is espec	cially true whe	en the sampl	le size is sm	all.			
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs ma	y be compu	ited using ga	amma distribu	tion on KM e	stimates	
58					Minimun	0.01					Mean	122436
59					Maximum	3000000					Median	13.5
60					SE	518873					CV	4.238
61					k hat (MLE	0.092			k:	star (bias cor	rected MLE)	0.0998
62				The	eta hat (MLE	1330346			Theta	star (bias cor	rected MLE)	1226267
63				-	nu hat (MLE	9.203				nu star (bia	as corrected)	9.984
64			Adjusted	Level of Sig	gnificance (β	0.0452						
65		Ap	proximate C	hi Square Va	alue (9.98, α	3.932			Adjusted C	hi Square Va	lue (9.98, β)	3.819
66		95% Gamma	Approximate	e UCL (use	when n>=50	310896		95% G	amma Adjust	ed UCL (use	when n<50)	320066
67		95% Gamma Approximate UCL (use when n>=50) 310896 95% Gamma Adjusted UCL (use when n<5										
68				E	stimates of (Gamma Para	meters usin	g KM Estim	ates			
69					Mean (KM	122966					SD (KM)	513544
70				V	ariance (KM	2.637E+11				SE o	f Mean (KM)	74066
71					k hat (KM	0.0573					k star (KM)	0.0672
72					nu hat (KM	5.733					nu star (KM)	6.723
73				th	neta hat (KM	2144722				the	eta star (KM)	1829102
74			80%	6 gamma pe	rcentile (KM	40008			90%	% gamma per	centile (KM)	256764
75			95%	6 gamma pe	rcentile (KM	703521			99%	% gamma per	centile (KM)	2359830
76												
77					Gamı	na Kaplan-M	eier (KM) S	tatistics				
78		Ap	proximate C	hi Square Va	alue (6.72, α	2.02			Adjusted C	hi Square Va	lue (6.72, β)	1.944
79	95%	Gamma App	oroximate KN	/I-UCL (use	when n>=50	409303		95% Gamr	na Adjusted k	(M-UCL (use	when n<50)	425189
80												
81				L	ognormal G	OF Test on D	etected Ob	servations (Only			
82			S	hapiro Wilk	Test Statistic	0.91			Shapiro Wi	lk GOF Test		
83			5% SI	hapiro Wilk (Critical Value	0.92	D	etected Dat	a Not Lognorr	mal at 5% Sig	nificance Le	vel
84				Lilliefors	Test Statistic	0.156			Lilliefors	GOF Test		
85			5	% Lilliefors (Critical Value	0.17	Def	tected Data	appear Logno	ormal at 5% S	Significance L	evel
86				Detected D	ata appear	Approximate	Lognormal	at 5% Signi	ficance Level			
87												
88				Lo	ognormal RC	S Statistics	Using Imput	ted Non-Det	tects			
89					Priginal Scale					Mean	in Log Scale	6.862
90				SD in C	Original Scale	518852				SD	in Log Scale	3.72
91		95% t L	JCL (assume	s normality	of ROS data	245545			95% I	Percentile Bo	otstrap UCL	247643
92			•		ootstrap UCI						otstrap t UCL	
93					L (Log ROS							
94 95			Statis	stics using K	(M estimate:	on Logged	Data and As	ssuming Loc	normal Distri	ibution		
					lean (logged			J - re			M Geo Mean	567
96					SD (logged				95% (Critical H Val		6.882
97			KM Standar		lean (logged						CL (KM -Log)	
98					SD (logged				95% (Critical H Val		6.882
99			KM Standar		lean (logged							3.552
100			. vivi Otaliual		Jan (1099eu	0.024						

	Α	В	С	D	Е	F	G	Н	I	J	K	L			
101															
102						DL/2 S	tatistics								
103			DL/2 I	Normal					DL/2 Log-1	Transformed					
104				Mean in O	riginal Scale	124148				Mean i	in Log Scale	7.199			
105				SD in C	riginal Scale	518492				SD i	in Log Scale	3.914			
106			95% t l	JCL (Assum	es normality)	247082				95%	H-Stat UCL	1.060E+8			
107		DL/2 is not a recommended method, provided for comparisons and historical reasons													
108															
109					Nonparam	etric Distribu	tion Free UC	CL Statistics							
110			Dete	cted Data a	pear Appro	ximate Logno	ormal Distrib	outed at 5%	Significance	Level					
111															
112						Suggested	UCL to Use								
113			97.5	% KM (Chel	yshev) UCL	585506									
114															
115	١	lote: Sugges	stions regard	ing the selec	ction of a 959	% UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCI				
116			F	Recommenda	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.					
117		These recor	nmendations	are based u	ipon the resi	ults of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006)				
118	Ho	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.			
119															

	Α	В	С	D	E	F	G Octovrith N	H	I	J	K	L
1					JCL Statis	tics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2	0E/2019 0:	46.07 AM						
4	Dat	e/Time of C	From File	Soil Vapor Inp		40.27 AW						
5		Fu	Il Precision	OFF	ut.xi5							
6		Confidence		95%								
7		f Bootstrap		2000								
8	Trainibor o	Boototrap		2000								
9	Heptane											
10	•											
12						General	Statistics					
13			Total	Number of Obs	servations	39			Numbe	r of Distinct C	Observations	21
14				Number	of Detects	12				Number of	Non-Detects	27
15			Nı	umber of Distin	ct Detects	10			Numbe	er of Distinct	Non-Detects	11
16				Minim	um Detect	990				Minimum	n Non-Detect	8.2
17				Maxim	um Detect	3900000				Maximum	n Non-Detect	5000
18				Variand	ce Detects	1.176E+12				Percent	Non-Detects	69.23%
19				Mea	an Detects	633931					SD Detects	1084608
20				Media	an Detects	225000					CV Detects	1.711
21				Skewnes	ss Detects	2.913				Kurt	tosis Detects	8.992
22				Mean of Logge	ed Detects	12.23				SD of Log	gged Detects	2.005
23												
24						nal GOF Tes	t on Detects	Only				
25				hapiro Wilk Te					-	lk GOF Test		
26			5% SI	napiro Wilk Crit		0.859		Detected Da			nificance Leve	:l
27				Lilliefors Tes						GOF Test		
28			5	% Lilliefors Crit		0.243				al at 5% Sign	nificance Leve	#I
29				Det	ected Data	a Not Norma	ı at 5% Sign	ificance Lev	el			
30			Kanlan	Meier (KM) Sta	tieties usi	na Normal C	ritical Value	s and other	Nonnarama	trio LICI e		
31			Napiaii-	WIEIEI (KIVI) SIZ	KM Mean		illical value	s and other	•		rror of Mean	102053
32						646063			- Ki		M (BCA) UCL	
33				95% K	(M (t) UCL				95% KM (F		otstrap) UCL	
34					M (z) UCL				,		otstrap t UCL	
35			ç	00% KM Cheby	` '						ebyshev UCL	
36				.5% KM Cheby							ebyshev UCL	
38				<u> </u>								
39				Gai	mma GOF	Tests on De	tected Obse	ervations Or	ıly			
40				A-D Te	st Statistic	0.539		Α	nderson-Da	rling GOF Te	est	
41				5% A-D Crit	tical Value	0.781	Detected	d data appea	ar Gamma D	istributed at 5	5% Significan	ce Level
42				K-S Tes	st Statistic	0.197		I	Kolmogorov-	Smirnov GO	F	
43				5% K-S Crit	tical Value	0.258	Detected	d data appea	ar Gamma D	stributed at 5	5% Significan	ce Level
44				Detected d	ata appea	r Gamma Dis	stributed at 5	5% Significa	nce Level			
45												
46						Statistics or	Detected D	ata Only				
47					hat (MLE)					•	rrected MLE)	
48					hat (MLE)				Theta	•	rrected MLE)	
49					hat (MLE)					nu star (bia	as corrected)	11.31
50				Mear	n (detects)	633931						

	A B C D E	F	G H I J K	L
51				
52			sing Imputed Non-Detects	
53			5 NDs with many tied observations at multiple DLs	
54			s <1.0, especially when the sample size is small (e.g., <15-20)	
55			yield incorrect values of UCLs and BTVs	
56			en the sample size is small.	
57			y be computed using gamma distribution on KM estimates	105050
58	Minimum			195056
59	Maximum		Median	0.01
60		654513	CV	3.356
61	k hat (MLE)		k star (bias corrected MLE)	0.0842
62	Theta hat (MLE)		Theta star (bias corrected MLE)	
63	nu hat (MLE)		nu star (bias corrected)	6.564
64	Adjusted Level of Significance (β)	0.0437	A II	1 000
65	Approximate Chi Square Value (6.56, α)		Adjusted Chi Square Value (6.56, β)	1.838
66	95% Gamma Approximate UCL (use when n>=50)	661/96	95% Gamma Adjusted UCL (use when n<50)	696824
67				
68			meters using KM Estimates	0.40000
69	Mean (KM)		SD (KM)	
70	Variance (KM)		SE of Mean (KM)	
71	k hat (KM)		k star (KM)	0.101
72	nu hat (KM)	7.111	nu star (KM)	7.897
73	theta hat (KM)		theta star (KM)	
74	80% gamma percentile (KM)		90% gamma percentile (KM)	
75	95% gamma percentile (KM)	1131403	99% gamma percentile (KM)	30/9461
76				
77		-	eier (KM) Statistics	0.557
78	Approximate Chi Square Value (7.90, α)		Adjusted Chi Square Value (7.90, β)	2.557
79	95% Gamma Approximate KM-UCL (use when n>=50)		95% Gamma Adjusted KM-UCL (use when n<50)	602472
80	95% Gamma Adjust	ed KM-UCL	(use when k<=1 and 15 < n < 50)	
81				
82	-		etected Observations Only	
83	Shapiro Wilk Test Statistic		Shapiro Wilk GOF Test	
84	5% Shapiro Wilk Critical Value		Detected Data Not Lognormal at 5% Significance Le	vei
85	Lilliefors Test Statistic		Lilliefors GOF Test	
86	5% Lilliefors Critical Value		Detected Data Not Lognormal at 5% Significance Le	vei
87	Detected Data	NOT LOGNOTH	nal at 5% Significance Level	
88	I amazzi I BO	C Ctatlatian	Loing Imputed Non Detects	
89	Lognormal RO: Mean in Original Scale		Using Imputed Non-Detects	0 166
90			Mean in Log Scale	8.166
91	SD in Original Scale		SD in Log Scale	3.235
92	95% t UCL (assumes normality of ROS data)		95% Percentile Bootstrap UCL 95% Bootstrap t UCL	
93	95% BCA Bootstrap UCL		95% BOOISITAP T UCL	0300/U
94	95% H-UCL (Log ROS)	12900490		
95	Otablellar colo a MAA and		Date and Accuming Lagranger Distribution	
96			Data and Assuming Lognormal Distribution	100.0
97	KM Mean (logged)		KM Geo Mean	192.8
98	KM SD (logged)		95% Critical H Value (KM-Log)	8.197
99	KM Standard Error of Mean (logged)	0.805	95% H-UCL (KM -Log)	
100	KM SD (logged)	4.788	95% Critical H Value (KM-Log)	8.197

	Α	В	С	D	Е	F	G	Н	I	J	K	L			
101			KM Standar	d Error of M	ean (logged)	0.805									
102						•	•					•			
103						DL/2 S	tatistics								
104			DL/2 N	Normal					DL/2 Log-	Transformed					
105				Mean in O	riginal Scale	195379				Mean i	n Log Scale	6.494			
106				SD in O	riginal Scale	654414				SD i	n Log Scale	4.516			
107			95% t L	JCL (Assume	es normality)	372051				95%	H-Stat UCL	5.208E+9			
108		DL/2 is not a recommended method, provided for comparisons and historical reasons													
109															
110		Nonparametric Distribution Free UCL Statistics													
111				Detected	Data appea	ır Gamma Di	stributed at	5% Significa	nce Level						
112															
113						Suggested	UCL to Use	ı							
114	Adjusted KN	И-UCL (use	when k<=1 a	nd 15 < n <	50 but k<=1)	602472									
115															
116	N	lote: Sugges	stions regard	ing the selec	tion of a 95%	% UCL are pr	ovided to he	lp the user to	select the n	nost appropria	ate 95% UCI				
117			F	Recommenda	ntions are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.					
118		These recor	mmendations	are based u	ipon the resu	ults of the sim	nulation stud	ies summariz	zed in Singh	, Maichle, and	Lee (2006)				
119	Hov	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight t	he user may	want to consi	ult a statistic	ian.			
120															

	Α	В	С	D	E IOI Otatia	F	G	H	1	J	K	L
1					JUL Statist	ucs for Data	Sets with No	on-Detects				
2		Hear Cala	cted Options									
3	Date	e/Time of Co		ProUCL 5.15/2	25/2018 Q·/	17:36 AM						
4	Date	S. 1 10 01 00	From File	Soil Vapor Inp								
5 6		Ful	I Precision	OFF	-							
7		Confidence		95%								
8	Number o	f Bootstrap (Operations	2000								
9				<u>I</u>								
10	Isopropanol											
11												
12				N			Statistics					40
13			Total	Number of Obs		38			Numbe	er of Distinct C		
14			N1.	Number of Disting	of Detects	2			Niumh	Number of I er of Distinct I	Non-Detects	
15			IN!		ım Detect	12			INUITID		Non-Detects Non-Detect	
16					um Detect	14					Non-Detect	
17					e Detects	2					Non-Detects	
18					n Detects	13					SD Detects	
19 20					n Detects	13					CV Detects	
21				Skewnes	s Detects	N/A				Kurt	osis Detects	
22				Mean of Logge	d Detects	2.562				SD of Log	ged Detects	0.109
23							I .					1
24					_		only 2 Detect					
25			TI	his is not enou	gh to comp	oute meanin	gful or reliabl	e statistics	and estima	tes.		
26												
27					A. 1	-1.005.5		O b				
28							t on Detects					
29					NOT EUC	ougii Data t	Perform GC	r iest				
30			Kanlan-	Meier (KM) Sta	tistics usir	ng Normal (ritical Values	s and other	Nonnarame	etric UCLs		
31			, wpiuii-		KM Mean	10.36		ouioi	•	M Standard E	rror of Mean	0.51
32					KM SD	1.25					I (BCA) UCL	N/A
34				95% K	M (t) UCL	11.22			95% KM (I	Percentile Boo	-	N/A
35				95% KI	M (z) UCL	11.2				95% KM Boo	tstrap t UCL	N/A
36			9	90% KM Cheby	shev UCL	11.89				95% KM Che	byshev UCL	12.58
37			97	.5% KM Cheby	shev UCL	13.55				99% KM Che	byshev UCL	15.44
38												
39				Gar			etected Obse		nly			
40					Not End	ough Data t	Perform GC	OF Test				
41					Gomes	Statistics =	Dotooted D	oto Onle				
42				l,	Gamma hat (MLE)	168.7	n Detected Da	ata Only	b	star (bias cor	rected MI E\	N/A
43					hat (MLE)	0.0771				star (bias cor	•	
44					hat (MLE)	674.7			IIIela	•	s corrected)	N/A
45					(detects)	13				5.61 (516	55/155154)	
46					,/	-						
48				Estin	nates of G	amma Para	meters using	KM Estima	ıtes			
49					lean (KM)	10.36					SD (KM)	1.25
50					ance (KM)	1.562				SE o	f Mean (KM)	
50]				. /		1				. ,	

51	A B B	C D D	E k hat (KM)	F 68.68	G	<u> </u>			J	k star (KM)	63.27
52		nı	u hat (KM)	5219						nu star (KM)	4809
53		theta	a hat (KM)	0.151					1	theta star (KM)	0.164
54		80% gamma perce	entile (KM)	11.44				90%	gamma p	percentile (KM)	12.06
55		95% gamma perce	entile (KM)	12.59				99%	gamma p	percentile (KM)	13.63
56											
57			Gamm	a Kaplan-M	eier (KM)	Statistics					
58							Ad	justed	Level of S	Significance (β)	0.0434
59	Approxi	mate Chi Square Valu	ie (N/A, α)	4648			Adju	sted C	hi Square	Value (N/A, β)	4642
60	95% Gamma Approxim	nate KM-UCL (use wh	en n>=50)	10.72		95% Garr	nma Adju	sted KI	M-UCL (u:	se when n<50)	10.73
61											
62		Logi	normal GC	F Test on D	etected O	bservations	Only				
63			Not En	ough Data to	o Perform (GOF Test					
64											
65		Logn	ormal RO	S Statistics	Using Imp	uted Non-De	etects				
66		Mean in Orig	inal Scale	7.493					Mea	n in Log Scale	1.983
67		SD in Orig	inal Scale	1.964					S	D in Log Scale	0.247
68	95% t UCL (a	assumes normality of F	ROS data)	8.031				95% P	ercentile	Bootstrap UCL	8.047
69		95% BCA Boots	strap UCL	8.083					95% B	ootstrap t UCL	8.123
70		95% H-UCL (Log ROS)	8.048							
71				Į.	1						
72		Statistics using KM	estimates	on Logged	Data and A	ssuming Lo	ognormal	Distrib	oution		
73		KM Mea	n (logged)	2.332						KM Geo Mean	10.29
74		KM SI	O (logged)	0.108				95% C	ritical H V	'alue (KM-Log)	1.7
75	KM S	Standard Error of Mea	n (logged)	0.044					95% H-l	JCL (KM -Log)	10.67
76		KM SI	O (logged)	0.108				95% C	ritical H V	'alue (KM-Log)	1.7
77	KM S	Standard Error of Mea	n (logged)	0.044							
78											
79				DL/2 S	tatistics						
80		DL/2 Normal					DL/2	Log-T	ransforme		
81		Mean in Orig								n in Log Scale	
82		SD in Orig	inal Scale	29782					S	D in Log Scale	3.289
83	ç	95% t UCL (Assumes								5% H-Stat UCL	1200622
84		DL/2 is not a recomm	mended m	ethod, provi	ded for cor	mparisons a	nd histor	ical re	asons		
85											
86				etric Distribu							
87		Data do not	follow a D	iscernible D	istribution	at 5% Signi	ficance L	evel			
88											
89				Suggested	UCL to Us	se					1
90			M (t) UCL	11.22						KM H-UCL	10.67
91		95% KM (E	•	N/A							
92		Warning	g: One or ı	more Recon	nmended L	ICL(s) not a	vailable!				
93											
94	Note: Suggestions	regarding the selection				•				oriate 95% UC	L.
95		Recommendation								11 (6555)	
96		dations are based upo								, ,	
97	However, simulations	s results will not cover	all Real W	orid data se	ts; tor addi	tional insigh	t the user	may v	vant to co	nsult a statistic	ian.
98											

	Α	В	С	D	E L Otatia	F	G Octovrith N	H	I	J	K	L
1				00	L Statis	tics for Data	Sets with N	ion-Detects				
2		Llaan Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/25/	2010 0.	40.11 AM						
4	Dat	e/Time or C	From File	Soil Vapor Input.		40.11 AW						
5		Fu	Il Precision	OFF	AIS .							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- rambor o	Boototrap		2000								
9	Isopropylbe	nzene										
10	1 17											
12						General	Statistics					
13			Total	Number of Obser	vations	38			Numbe	r of Distinct C	Observations	23
14				Number of I	Detects	11				Number of	Non-Detects	27
15			Nı	umber of Distinct I	Detects	11			Numbe	er of Distinct	Non-Detects	12
16				Minimum	Detect	88				Minimum	Non-Detect	10
17				Maximum	Detect	29000				Maximum	Non-Detect	300000
18				Variance I	Detects	83318883				Percent	Non-Detects	71.05%
19				Mean I	Detects	7783					SD Detects	9128
20				Median I	Detects	7000					CV Detects	1.173
21				Skewness I	Detects	1.441				Kurt	osis Detects	1.831
22				Mean of Logged I	Detects	7.857				SD of Log	ged Detects	1.99
23												
24							t on Detects	Only				
25				hapiro Wilk Test S					-	lk GOF Test		
26			5% SI	napiro Wilk Critica		0.85	[Detected Da		ŭ	ificance Leve	ıl .
27				Lilliefors Test S		0.231				GOF Test		
28			5	% Lilliefors Critica		0.251				mal at 5% Sig	gnificance Le	/el
29				Detected Data	appear	Approximat	e Normal at	5% Significa	ance Level			
30			W	M-! (IZM) Ot-ti-	41 1	N			NI			
31			Kapian-	Meier (KM) Statis			riticai vaiue	s and otner	•		·	1000
32					/ Mean				KI		rror of Mean	1208
33					KM SD				OEO/ IZM /E		1 (BCA) UCL	5159 4901
34				95% KM 95% KM (` '				•	Percentile Boo	• •	6705
35			•	95% KW (95% KM Che	•	8089
36				.5% KM Chebysh							byshev UCL	
37				.c /o raw onobysiii		10000			•		, U.I.UV UUL	. 1011
38				Gamm	na GOF	Tests on De	etected Obse	ervations Or	nly			
39				A-D Test S					•	rling GOF Te	est	
40				5% A-D Critica			Detected				5% Significan	ce Level
42				K-S Test S						Smirnov GO		
43				5% K-S Critica	l Value		Detected				5% Significan	ce Level
44				Detected data	appea	r Gamma Di						
45												
46				(amma	Statistics or	Detected D	ata Only				
47				k ha	t (MLE)	0.565			k	star (bias cor	rected MLE)	0.472
48		Theta hat (Theta	star (bias cor	rected MLE)	16505
49				nu ha	t (MLE)	12.43				nu star (bia	as corrected)	10.37
50				Mean (d	letects)	7783						
55							l					

	Α	В	С	D		E	F	G	Н	I	J	K	L
51					_	DO	0.04-41-41	-l ! ·	al Non-Port	-1-			
52			CDCC				Statistics u				manulatira I a IDI		
53		0000	-						-		multiple DLs	45.00	
54		GROS may									ize is small (e	.g., <15-20)	
55			FC	or such sit			-	•		f UCLs and B	IVs		
56			P . 2				ially true whe				1/14		
57		For gan	nma distribu	tea aetec	tea aa	Minimum		y be compu	ited using ga	amma distribu	ution on KM es		2252
58						Maximum						Mean	
59						SD						Median CV	0.01 2.638
60					I.					le le	star (bias con		0.104
61				-		hat (MLE) hat (MLE)					star (bias con		
62						hat (MLE)				IIIela	`	s corrected)	7.905
63			Adjustos	1 Lovel of		ficance (β)					Tiu Stai (bia	s correcteu)	7.905
64		Δn	proximate C		-	,				Adjusted C	Chi Square Va	(۲۰۵۱ هريا	2.556
65		95% Gamma							05% C	•	ted UCL (use	, ,,,	6969
66	;	JJ /v Gaillilla	- Approximal	OCL (u	is e Wi	ion n/=50)	0043		93 /0 G	amma AujuS	iou oor (nse	wileli II>00)	0303
67					Feti	mates of (Samma Para	metere usin	a KM Fetim	ates			
68						Mean (KM)			ig itivi Estilli	a.c.		SD (KM)	6388
69							40803489				SE of	Mean (KM)	
70						k hat (KM)					02.0	k star (KM)	
71						u hat (KM)						nu star (KM)	15
72						ta hat (KM)						ta star (KM)	_
73			800	% namma		entile (KM)				909	% gamma per	, ,	8534
74				-	-	entile (KM)					% gamma per		
75				garrina	. po.o.		11002				70 garrina por		0.000
76						Gamr	na Kaplan-M	eier (KM) S	tatistics				
77		App	roximate Ch	i Sauare	Value		-			Adjusted Ch	ni Square Valu	ıe (15.00. β)	7.035
78	95%	Gamma Apr				,			95% Gamr	-	KM-UCL (use		
79 80				(-						,			
81					Log	normal G	OF Test on D	etected Ob	servations (Only			
82			S	Shapiro W		est Statistic					ilk GOF Test		
83						itical Value		Det	tected Data	appear Logno	ormal at 5% S	ignificance l	_evel
84				Lilliefo	ors Te	st Statistic	0.237			Lilliefors	GOF Test		
85			5	5% Lilliefo	ors Cri	itical Value	0.251	Def	tected Data	appear Logno	ormal at 5% S	ignificance l	_evel
86					Detect	ted Data a	ppear Logno	rmal at 5%	Significance	Level			
87													
88					Logi	normal RC	S Statistics	Using Imput	ted Non-Det	tects			
89				Mean i	in Ori	ginal Scale	2299				Mean i	n Log Scale	4.555
90				SDi	in Orig	ginal Scale	5925				SD i	n Log Scale	2.738
JU					•			1					4073
		95% t L	JCL (assume			ROS data)	3921			95%	Percentile Bo	otstrap UCL	4073
91 92		95% t U	•	es normal	lity of	ROS data) tstrap UCL				95%		otstrap UCL tstrap t UCL	
91		95% t L	•	es normal 95% BCA	lity of		4338			95%		•	
91 92 93		95% t U	•	es normal 95% BCA	lity of	tstrap UCL	4338			95%		•	
91 92		95% t L		es normal 95% BCA 95% H-	lity of A Boo -UCL	tstrap UCL (Log ROS)	4338 36176	Data and As	ssuming Loç	95% Jnormal Distr	95% Boo	•	
91 92 93 94 95		95% t L		es normal 95% BCA 95% H- stics usin	lity of A Boo -UCL	tstrap UCL (Log ROS)	4338 36176 on Logged	Data and As	ssuming Log		95% Boo	•	5299
91 92 93 94		95% t L		es normal 95% BCA 95% H- stics usin	lity of A Boo -UCL mg KM	tstrap UCL (Log ROS)	4338 36176 con Logged 4.427	Data and As	ssuming Log	normal Distr	95% Boo	tstrap t UCL	5299
91 92 93 94 95 96		95% t L		es normal 95% BCA 95% H- stics usin	lity of A Boo -UCL ng KM M Mea	tstrap UCL (Log ROS) estimates an (logged)	4338 36176 on Logged 4.427 2.882	Data and As	ssuming Log	normal Distr	95% Boo ribution KN Critical H Valu	tstrap t UCL	5299 83.7 5.094
91 92 93 94 95 96		95% t L	Statis	95% BCA 95% H- stics usin KM	lity of A Boo -UCL Ing KM M Mea KM S	tstrap UCL (Log ROS) estimates an (logged)	4338 36176 con Logged 4.427 2.882 0.56	Data and As	ssuming Log	gnormal Distr	95% Boo ribution KN Critical H Valu	tstrap t UCL M Geo Mean Je (KM-Log) L (KM -Log)	5299 83.7 5.094

	Α	В	С	D	Е	F	G	Н		J	K	L		
101														
102						DL/2 S	tatistics							
103			DL/2 I	Normal					DL/2 Log-1	Fransformed				
104				Mean in O	riginal Scale	12291				Mean	in Log Scale	6.106		
105				SD in O	riginal Scale	29861				SD	in Log Scale	3.487		
106			95% t L	JCL (Assume	es normality)	20464				95%	H-Stat UCL	6307333		
107			DL/2 i	s not a reco	mmended m	ethod, provi	ded for comp	parisons and	l historical re	easons				
108														
109	Nonparametric Distribution Free UCL Statistics													
110	Detected Data appear Approximate Normal Distributed at 5% Significance Level													
111														
112						Suggested	UCL to Use							
113				95%	KM (t) UCL	4860								
114														
115			When a d	lata set follov	ws an approx	cimate (e.g.,	normal) distri	bution passi	ng one of the	GOF test				
116		When appl	licable, it is s	uggested to	use a UCL b	ased upon a	distribution (e.g., gamma) passing bo	th GOF tests	s in ProUCL			
117														
118	N	lote: Sugges	stions regard	ing the selec	tion of a 95%	6 UCL are pr	ovided to hel	p the user to	select the m	nost appropri	ate 95% UCI			
119			F	Recommenda	ations are ba	sed upon dat	a size, data	distribution, a	and skewnes	SS.				
120		These recor	mmendations	are based ι	ipon the resu	ults of the sin	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006)			
121	Hov	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for additio	nal insight th	ne user may	want to cons	ult a statistic	ian.		
122														

	Α	В	С	D	E IOL Obstic	F	G Octovrith N	H	I	J	K	L
1					JCL Statis	tics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2	0E/2019 0.5	20.22 AM						
4	Dat	e/Time of C	From File	Soil Vapor Inp		36.32 AIVI						
5		Fu	Il Precision	OFF	ut.xi5							
6		Confidence		95%								
7		f Bootstrap		2000								
8	Trainibor o	Boototrap		2000								
9	m,p-Xylene:	s										
10												
12						General	Statistics					
13			Total	Number of Obs	servations	50			Numbe	r of Distinct C	Observations	26
14				Number	of Detects	12				Number of	Non-Detects	38
15			Nı	umber of Distin	ct Detects	12			Numbe	er of Distinct	Non-Detects	15
16				Minimu	um Detect	3000				Minimum	n Non-Detect	10
17				Maximu	um Detect	11000000				Maximum	n Non-Detect	52108
18				Varianc	e Detects	1.400E+13				Percent	Non-Detects	76%
19				Mea	n Detects	1755663					SD Detects	3741497
20				Media	n Detects	132500					CV Detects	2.131
21				Skewnes	s Detects	2.141				Kurt	tosis Detects	3.371
22				Mean of Logge	ed Detects	11.58				SD of Log	gged Detects	2.751
23												
24							t on Detects	Only				
25				hapiro Wilk Tes		0.534				ik GOF Test		
26			5% SI	napiro Wilk Crit		0.859		Detected Da			ificance Leve	
27				Lilliefors Tes		0.418	_			GOF Test		
28			5	% Lilliefors Crit		0.243				al at 5% Sign	nificance Leve	
29				Det	ected Data	a Not Norma	l at 5% Sign	inticance Lev	/ei			
30			Kanlan	Meier (KM) Sta	tieties usi	na Normal C	ritical Value	s and other	Nonnarama	trio I ICI e		
31			Napiaii-	• •	KM Mean		illical value	s and other	<u>-</u>		rror of Mean	201002
32						1908352			- Ki		I (BCA) UCL	
33				95% K	M (t) UCL				95% KM (F		otstrap) UCL	
34					M (z) UCL				•		otstrap t UCL	
35			ç	00% KM Cheby	` '						byshev UCL	
36				.5% KM Cheby							byshev UCL	
38												<u>. </u>
39				Gar	mma GOF	Tests on De	tected Obse	ervations Or	nly			
40				A-D Tes	st Statistic	0.926		A	nderson-Da	rling GOF Te	est	
41				5% A-D Crit	ical Value	0.846	Detect	ed Data Not	Gamma Dis	tributed at 5%	% Significance	e Level
42				K-S Tes	st Statistic	0.273		I	Kolmogorov-	Smirnov GO	F	
43				5% K-S Crit	ical Value	0.268	Detect	ed Data Not	Gamma Dis	tributed at 5%	% Significance	e Level
44				Detected	Data Not (Gamma Dist	ributed at 59	% Significan	ce Level			
45												
46							Detected D	ata Only				
47					hat (MLE)	0.253				`	rrected MLE)	
48					hat (MLE)				Theta	•	rrected MLE)	
49					hat (MLE)	6.072				nu star (bia	as corrected)	5.887
50				Mean	(detects)	1755663						

Section		А	В	С	D		E	F	G	Н		J	K	L	
GROS may not be used when data set has > 50% No. with many tied observations at multiple DLS	51														
GROS may not be used when kastar of detects is small incorrect values of UCLs and BTVs	52														
For such situations, GROS This is especially true when the sample size is small.	53			-						-		-			
This is especially True when the sample size is small.	54		GROS may							-		<u> </u>	∍.g., <15-20) ———		
For gamma distributed detected data, 8TVs and UCLs may be computed using gamma distribution on KM estimates	55			Fo	or such sit			-	•			TVs			
Section	56														
	57		For gan	nma distribut	ted detect				y be compu	ited using ga	ımma distribu	ition on KM e		10105	
SD SD SD SD SD SD SD SD	58														
	59					<u>'</u>									
The table The	60					1. 1.					l.	/b:			
March Mar					7							`			
Adjusted Level of Significance (β) 0.0452	62										rneta	`	<i>'</i>		
Approximate Chi Square Value (7.2, c) 2.293 Adjusted Chi Square Value (7.22, c) 1327082 95% Gamma Adjusted UCL (use when n>50) 137081				A divisto d	l l ovol of		` '					Tiu Stai (Dia		1.2	
Section Sec			Λn	•		•	. ,				Adjusted C	hi Cauara Va	Jun (7.22. 8)	2.2	11
										05% C	-				
Best			95% Gaillina	ТАрргохіпіац	e UCL (us	se whe	II II/-50)	1327062		95% G	amma Aujus	ied OCL (use	when h<50)	137004	+ 1
Mean (KM) 421541 SD (KM) 1908352	67					Eatim	otoo of (Commo Boro	motoro unin	a VM Estim	otoo				
Name									ineters usin	ıy rıvı ⊑suili	ales		SD (KM)	100021	52
No. No.												SE o	, ,		
Total	70											35.0			
1	71						` '						. ,		
1.534													. ,		
Section Sec				800	4 gamma						909		. ,		
Test					_	-									
Ramma Kaplan-Meier (KM) Statistics Approximate Chi Square Value (5.92, α) 1.599 Adjusted Chi Square Value (5.92, β) 1.534					o garriiria	percei	- (TAIVI)	2000-00				70 garrina per	——————————————————————————————————————	000000	
Approximate Chi Square Value (5.92, α) 1.599 Adjusted Chi Square Value (5.92, β) 1.534							Gamr	na Kanlan-M	eier (KM) S	tatistics					
95% Gamma Approximate KM-UCL (use when n>=50) 1560576 95% Gamma Adjusted KM-UCL (use when n<50) 1626915			An	proximate C	hi Sauare	e Value					Adjusted C	Chi Square Va	alue (5.92. ß)	1.5	34
		95%	-	-	-					95% Gamn		·			
Shapiro Wilk Test Statistic 0.932 Shapiro Wilk GOF Test								<u> </u>				•			
Shapiro Wilk Test Statistic 0.932 Shapiro Wilk GOF Test						Logn	ormal G	OF Test on D	etected Ob	servations C	Only				
83 5% Shapiro Wilk Critical Value 0.859 Detected Data appear Lognormal at 5% Significance Level 84 Lilliefors Test Statistic 0.131 Lilliefors GOF Test 85 5% Lilliefors Critical Value 0.243 Detected Data appear Lognormal at 5% Significance Level 86 Detected Data appear Lognormal at 5% Significance Level 87 Lognormal ROS Statistics Using Imputed Non-Detects 89 Mean in Log Scale August Scale August Spin Conjunal Scale August Spin Conjunal Scale August Spin Log Scale August Augus				S	hapiro Wi							ilk GOF Test			
84 Lilliefors Test Statistic 0.131 Lilliefors GOF Test 85 5% Lilliefors Critical Value 0.243 Detected Data appear Lognormal at 5% Significance Level 86 Detected Data appear Lognormal at 5% Significance Level 87 Lognormal ROS Statistics Using Imputed Non-Detects 89 Mean in Original Scale 421402 Mean in Log Scale 4.092 90 SD in Original Scale 1927757 SD in Log Scale 5.051 91 95% t UCL (assumes normality of ROS data) 878473 95% Percentile Bootstrap UCL 890153 92 95% BCA Bootstrap UCL 1172601 95% Bootstrap t UCL 5951742 93 95% H-UCL (Log ROS) 7.972E+9 94 95% Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 96 KM Geo Mean 101.5 97 KM Geo Mean 101.5 98 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 4.240553 98 KM Standard Error of Mean (logged) 4.62 95% Critical H Value (KM-Log) 4.9063 99 KM SD (logged)				5% S	hapiro Wi	ilk Criti	cal Value	0.859	De	tected Data	appear Logno	ormal at 5% S	Significance I	evel	
Section Sect					Lilliefo	rs Tes	t Statistic	0.131			Lilliefors	GOF Test			
Name	_			5	% Lilliefor	rs Criti	cal Value	0.243	De	tected Data	appear Logno	ormal at 5% S	Significance I	_evel	
Residue Resi					D	etecte	d Data a	ppear Logno	rmal at 5%	Significance	Level				
Lognormal ROS Statistics Using Imputed Non-Detects Mean in Criginal Scale 421402 Mean in Log Scale 4.092															
89 Mean in Original Scale 421402 Mean in Log Scale 4.092 90 SD in Original Scale 1927757 SD in Log Scale 5.051 91 95% t UCL (assumes normality of ROS data) 878473 95% Percentile Bootstrap UCL 890153 92 95% BCA Bootstrap UCL (Log ROS) 1172601 95% Bootstrap t UCL 5951742 93 95% H-UCL (Log ROS) 7.972E+9 7.972E+9 7.972E+9 94 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution KM Geo Mean 101.5 96 KM Mean (logged) 4.62 KM Geo Mean 101.5 97 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906						Logno	ormal RC	S Statistics	Using Impu	ted Non-Det	ects				
90 SD in Original Scale 1927757 SD in Log Scale 5.051 91 95% t UCL (assumes normality of ROS data) 878473 95% Percentile Bootstrap UCL 890153 92 95% BCA Bootstrap UCL 1172601 95% Bootstrap t UCL 5951742 93 95% H-UCL (Log ROS) 7.972E+9 7.972E+9 KM Geo Mean 101.5 96 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution KM Geo Mean 101.5 97 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906					Mean ir	n Origi	nal Scale	421402				Mean	in Log Scale	4.0	92
91 95% t UCL (assumes normality of ROS data) 878473 95% Percentile Bootstrap UCL 890153 92 95% BCA Bootstrap UCL (Log ROS) 1172601 95% Bootstrap t UCL 5951742 93 95% H-UCL (Log ROS) 7.972E+9 7.972E+9 7.972E+9 8 95 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution KM Geo Mean 101.5 101.5 96 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906					SD in	n Origi	nal Scale	1927757				SD	in Log Scale	5.0	51
92 95% BCA Bootstrap UCL 95% T42 95% Bootstrap t UCL 95% Bootstrap t			95% t L	JCL (assume	es normali	ity of R	OS data)	878473			95%	Percentile Bo	otstrap UCL	890153	3
93 95% H-UCL (Log ROS) 7.972E+9 94 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 96 KM Mean (logged) 4.62 KM Geo Mean 101.5 97 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906					95% BCA	Boots	trap UCL	1172601				95% Boo	tstrap t UCL	595174	12
94 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 96 KM Mean (logged) 4.62 KM Geo Mean 101.5 97 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906					95% H-I	UCL (L	og ROS	7.972E+9						1	
95 Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution 96 KM Mean (logged) 4.62 KM Geo Mean 101.5 97 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906								_1	Ш					1	
96 KM Mean (logged) 4.62 KM Geo Mean 101.5 97 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906				Statis	stics using	g KM e	stimates	on Logged	Data and As	ssuming Log	normal Distr	ibution			
97 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906 98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906					KN	/ Mean	(logged)	4.62				KI	VI Geo Mean	101.5	5
98 KM Standard Error of Mean (logged) 0.63 95% H-UCL (KM -Log) 41240553 99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906					ŀ	KM SD	(logged)	4.191			95%	Critical H Val	ue (KM-Log)	6.9	06
99 KM SD (logged) 4.191 95% Critical H Value (KM-Log) 6.906				KM Standa	rd Error of	f Mean	(logged)	0.63				95% H-UC	L (KM -Log)	412405	553
100 KM Standard Error of Mean (logged) 0.63					ŀ	KM SD	(logged)	4.191			95%	Critical H Val	ue (KM-Log)	6.9	06
	100			KM Standa	rd Error of	f Mean	(logged)	0.63							-

	Α	В	С	D	Е	F	G	Н	I	J	K	L				
101																
102						DL/2 S	tatistics									
103			DL/2 I	Normal					DL/2 Log-T	Transformed						
104				Mean in C	riginal Scale	423355				Mean i	in Log Scale	6.628				
105				SD in C	riginal Scale	1927331				SD i	in Log Scale	3.919				
106			95% t l	JCL (Assum	es normality)	880326				95%	H-Stat UCL	61713384				
107			DL/2	s not a reco	mmended m	nethod, provi	ded for com	oarisons and	l historical re	easons		"				
108		Nonparametric Distribution Free LICL Statistics														
109		Nonparametric Distribution Free UCL Statistics														
110				Detected	Data appear	Lognormal [Distributed a	t 5% Signific	ance Level							
111																
112						Suggested	UCL to Use									
113			97.5	% KM (Chel	yshev) UCL	2181897										
114																
115	١	lote: Sugges	stions regard	ing the selec	tion of a 95°	% UCL are pr	ovided to he	p the user to	select the m	nost appropria	ate 95% UCI	L.				
116			F	Recommenda	itions are ba	sed upon dat	a size, data	distribution, a	and skewnes	SS.						
117		These recor	nmendations	are based u	ipon the resi	ults of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006)					
118	Ho	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.				
119																

	А	В	С	D	Е	F	G	Н	ı	J	K	L
1					UCL Statis	stics for Data	a Sets with N	on-Detects				
2												
3		User Sele	cted Options									
4	Da	te/Time of C	omputation	ProUCL 5.1	5/25/2018 9:	49:26 AM						
5			From File	Soil Vapor I	nput.xls							
6		Fu	II Precision	OFF								
7		Confidence	Coefficient	95%								
8	Number	of Bootstrap	Operations	2000								
9												
10	Naphthaler	ne										
11												
12						General	Statistics					
13			Total	Number of C	Observations	39			Numbe	r of Distinct O	bservations	18
14				Numb	er of Detects	1				Number of N	Non-Detects	38
15			N	umber of Dis	tinct Detects	1			Numbe	er of Distinct N	Non-Detects	17
16						1						
17		Warning: Or	nly one distin	ct data value	e was detect	ed! ProUCL	(or any other	software) s	hould not be	e used on suc	ch a data set	!
18	It is sugg	ested to use	alternative s	ite specific	values deteri	mined by the	Project Tea	m to estimat	te environm	ental parame	ters (e.g., El	C, BTV).
19												
20				The	data set for	variable Na	ohthalene wa	s not proces	sed!			
21												
22												

	Α	В	С	D	E	F	G Octovrith N	H	I	J	K	L
1				UC	JL Statis	itics for Data	Sets with N	on-Detects				
2		Llaav Cala	-td Ot									
3	Dot	e/Time of C	cted Options	ProUCL 5.15/25	/2019 Ov	47.01 AM						
4	Date	e/ Time of C	From File	Soil Vapor Input		47.01 AW						
5		Fu	Il Precision	OFF								
6		Confidence		95%								
7		f Bootstrap		2000								
8	- 110111501 0	. Bootonap										
9	n-Hexane											
10												
12						General	Statistics					
13			Total	Number of Obse	rvations	39			Numbe	r of Distinct C	Observations	23
14				Number of	Detects	11				Number of	Non-Detects	28
15			Nı	umber of Distinct	Detects	11			Numbe	er of Distinct	Non-Detects	12
16				Minimun	n Detect	1500				Minimum	Non-Detect	7.05
17				Maximun	n Detect	1500000				Maximum	Non-Detect	30000
18				Variance	Detects	2.487E+11				Percent	Non-Detects	71.79%
19				Mean	Detects	458734					SD Detects	498711
20				Median	Detects	450000					CV Detects	1.087
21				Skewness	Detects	1.166				Kurt	osis Detects	0.686
22				Mean of Logged	Detects	11.75				SD of Log	ged Detects	2.328
23												
24							t on Detects	Only				
25				hapiro Wilk Test					-	lk GOF Test		
26			5% SI	napiro Wilk Critic		0.85	Γ	Detected Dat		ŭ	ificance Leve)
27				Lilliefors Test		0.226	_			GOF Test		
28			5	% Lilliefors Critic		0.251				mal at 5% Sig	gnificance Le	vel
29				Detected Data	a appear	Approximat	e Normal at	5% Significa	ance Level			
30			Vanlan	Major (I/M) Stati	otioo uol	na Namal C	witical \/alua		Nonnoromo	mia IICI a		
31			Kapian-	Meier (KM) Stati	M Mean		nticai vaiue	s and other	•		rror of Mean	E 4 7 7 E
32						326149			NI		(BCA) UCL	
33				95% KM					95% KM (E		otstrap) UCL	
34				95% KM	` '				`		otstrap t UCL	
35			C	00% KM Chebysh	` '						byshev UCL	
36				.5% KM Chebysh							byshev UCL	
37				, 0.							,	
38				Gamı	ma GOF	Tests on De	etected Obse	ervations On	nly			
40				A-D Test					•	rling GOF Te	est	
41				5% A-D Critic	al Value	0.782	Detected	d data appea	r Gamma D	stributed at 5	5% Significan	ce Level
42				K-S Test	Statistic	0.224		ŀ	Kolmogorov-	Smirnov GO	F	
43				5% K-S Critic	al Value	0.269	Detected	d data appea	r Gamma D	istributed at 5	5% Significan	ce Level
44				Detected date	a appea	r Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46					Gamma	Statistics or	Detected D	ata Only				
47				k ha	at (MLE)	0.496			k	star (bias cor	rected MLE)	0.422
48				Theta ha	at (MLE)	924422			Theta	star (bias cor	rected MLE)	1088319
49					at (MLE)					nu star (bia	as corrected)	9.273
50				Mean (detects)	458734						

Gamma ROS	Statistics us	sing Imputed	Non-Detec	ts			
	Statistics us	sing Imputed	Non-Detec	ts			
GROS may not be used when data se			-		-		
GROS may not be used when kstar of detects is s					•	.g., <15-20)	
	•	-			ΓVs		
-							
		y be compute	ed using gai	mma distribu	tion on KM es		100000
							0.01
				I.	-t /l-:		2.554
					`	<u> </u>	0.0834
· · ·				ineta	`		
` '					nu star (bia	s corrected)	6.502
, , ,				Adjusted C	hi Sauara Va	lua (6 EO R)	1.805
			05% 0	· ·			
95% Gamma Approximate OCL (use when 172–50)	442422		95% G	amma Aujusi	ed OCL (use	when h<50)	400000
Estimates of G	amma Barai	motore using	KM Estima	toc			
		illeters using	Kivi Esuilla	iles		SD (KW)	326140
					SE of	, ,	
` '					31.0	` ′	0.162
` '							12.67
						, ,	
. ,				QΩ°		. ,	
35% garrina percentile (KW)	700000				o gamma per	certaic (raw)	100000
Gamm	a Kanlan-M	eier (KM) Sta	ntistics				
		olor (rain) olo		Adjusted Ch	i Square Valu	ie (12 67 B)	5.489
30% Gallinia Approximate Nin 33E (ase Wieli III 33)	200120			ia / tajastea /		Wilcir ii 300)	230002
Lognormal GO	F Test on D	etected Obse	ervations O	nlv			
					lk GOF Test		
·	0.85	Dete	cted Data a	•			.evel
Lilliefors Test Statistic	0.275					<u> </u>	
5% Lilliefors Critical Value	0.251	De	tected Data	Not Lognorr	nal at 5% Sig	nificance Le	vel
Detected Data appear A	pproximate	Lognormal a	t 5% Signifi	icance Level			
Lognormal ROS	S Statistics I	Using Impute	d Non-Dete	ects			
Mean in Original Scale	129629	-			Mean i	n Log Scale	6.529
SD in Original Scale	330335				SD i	n Log Scale	3.904
95% t UCL (assumes normality of ROS data)	218809			95% I	Percentile Bo	otstrap UCL	218969
95% BCA Bootstrap UCL	258727				95% Boo	tstrap t UCL	285785
95% H-UCL (Log ROS)	1.008E+8						
		<u>I</u>					<u> </u>
Statistics using KM estimates	on Logged [Data and Ass	uming Logi	normal Distri	bution		
KM Mean (logged)	4.778				KN	I Geo Mean	118.9
KM SD (logged)	4.569			95% (Critical H Valu	ue (KM-Log)	7.84
KM Standard Error of Mean (logged)	0.775				95% H-UC	L (KM -Log)	1.357E+9
		l .					l .
KM SD (logged)	4.569			95% (Critical H Valu	ue (KM-Log)	7.84
	For such situations, GROS in This is especific For gamma distributed detected data, BTVs a Minimum Maximum SD k hat (MLE) Theta hat (MLE) Theta hat (MLE) Adjusted Level of Significance (β) Approximate Chi Square Value (6.50, α) 95% Gamma Approximate UCL (use when n>=50) Estimates of G Mean (KM) Variance (KM) Variance (KM) Nu hat (KM) 10 that (KM) 80% gamma percentile (KM) 95% gamma percentile (KM) 95% gamma Approximate Chi Square Value (12.67, α) 95% Gamma Approximate KM-UCL (use when n>=50) Lognormal GO Shapiro Wilk Test Statistic 5% Shapiro Wilk Critical Value Lilliefors Test Statistic 5% Lilliefors Critical Value Detected Data appear A Lognormal Scale SD in Original Scale SD in Original Scale 95% t UCL (assumes normality of ROS data) 95% BCA Bootstrap UCL 95% H-UCL (Log ROS) Statistics using KM estimates KM Mean (logged) KM SD (logged)	For such situations, GROS method may This is especially true whe For gamma distributed detected data, BTVs and UCLs matching Minimum 0.01	For such situations, GROS method may yield incorrect This is especially true when the sample For gamma distributed detected data, BTVs and UCLs may be compute Minimum 0.01 Maximum 1500000 SD 330432 k hat (MLE) 0.0718 Theta hat (MLE) 1802421 nu hat (MLE) 5.599 Adjusted Level of Significance (β) 0.0437 Approximate Chi Square Value (6.50, c) 1.901 95% Gamma Approximate UCL (use when n>=50) 442422 Estimates of Gamma Parameters using Mean (KM) 129436 Variance (KM) 1.064E+11 k hat (KM) 0.158 nu hat (KM) 12.29 theta hat (KM) 12.29 theta hat (KM) 49884 95% gamma percentile (KM) 700839 Gamma Kaplan-Meier (KM) 55% Gamma Approximate Chi Square Value (12.67, c) 5.674 95% Gamma Approximate KM-UCL (use when n>=50) 289120 Lognormal GOF Test on Detected Obsel Shapiro Wilk Test Statistic 0.275 5% Lilliefors Test Statistic 0.275 5% Lilliefors Critical Value 0.85 Dete Lilliefors Test Statistic 0.275 5% Lilliefors Critical Value 0.251 De Detected Data appear Approximate Lognormal a Lognormal ROS Statistics Using Impute Mean in Original Scale 129629 SD in Original Scale 1	For such situations, GROS method may yield incorrect values of This is especially true when the sample size is small responsibility. The when the sample size is small responsibility. The when the sample size is small responsibility. The when the sample size is small responsibility. The when the sample size is small responsibility. The when the sample size is small responsibility. The whole was a small responsibility. The whole was a small responsibility. The whole was a small responsibility. The whole was a small responsibility. The whole was a small responsibility. The whole was a small responsibility. The was a small responsibil	For such situations, GROS method may yield incorrect values of UCLs and B' This is especially true when the sample size is small. For gamma distributed detected data, BTVs and UCLs may be computed using gamma distributed Minimum 0.01 Maximum 1500000 SD 330432 k hat (MLE) 0.0718 k: Theta hat (MLE) 182421 Theta: nu hat (MLE) 55.599 Adjusted Level of Significance (β) 0.0437 Approximate Chi Square Value (6.50, a) 1.901 Adjusted City 1.901 SS% Gamma Approximate UCL (use when n>=50) 442422 95% Gamma Adjusted Estimates of Gamma Parameters using KM Estimates Mean (KM) 129436 Variance (KM) 1.064E+11 k hat (KM) 0.158 nu hat (KM) 12.29 theta hat (KM) 12.29 theta hat (KM) 12.816 80% gamma percentile (KM) 14984 90% 95% gamma percentile (KM) 14984 90% 95% gamma percentile (KM) 170839 999 Gamma Kaplan-Meler (KM) Statistics Approximate Chi Square Value (12.67, o) 5.674 Adjusted Chi 95% Gamma Approximate KM-UCL (use when n>=50) 289120 95% Gamma Adjusted Ki S% Shapiro Wilk Test Statistic 0.864 Shapiro Wilk Shapiro Wilk Test Statistic 0.275 Lilliefors Shapiro Wilk Test Statistic 0.251 Detected Data Appear Lognomal Collisions S% Shapiro Wilk Test Statistic 0.251 Detected Data Appear Lognomal Post Lognormal ROS Statistics Using Imputed Non-Detects Lognormal ROS Statistics Using Imputed Non-Detects Lognormal ROS Statistics Using Imputed Non-Detects Sitalistics using KM estimates on Logged Data and Assuming Lognormal Districts KM Mean (logged) 4.778 KM SD (logged) 4.768 4.569 95% 600 KM Mean (logged) 4.569 95% 600	For such situations, GROS method may yield incorrect values of UCLs and BTVs This is especially true when the sample size is small. For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM et Minimum 0.01 Maximum 15000000 S	For such situations, GROS method may yield incorrect values of UCLs and BTVs This is especially true when the sample size is small. For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates Minimum

	Α	В	С	D	Е	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2 I	Normal					DL/2 Log-1	Transformed		
104				Mean in O	riginal Scale	130214				Mean	in Log Scale	6.275
105				SD in O	riginal Scale	330110				SD	in Log Scale	4.33
106			95% t L	JCL (Assume	es normality)	219333				95%	H-Stat UCL	1.168E+9
107			DL/2 i	s not a reco	mmended m	nethod, provi	ded for comp	parisons and	l historical re	easons		
108												
109					Nonparam	etric Distribu	tion Free UC	CL Statistics				
110			Det	tected Data	appear Appı	roximate Nor	mal Distribut	ted at 5% Si	gnificance L	.evel		
111												
112						Suggested	UCL to Use					
113				95%	KM (t) UCL	221784						
114												
115			When a d	lata set follo	ws an approx	ximate (e.g., ı	normal) distri	bution passi	ng one of the	e GOF test		
116		When appl	licable, it is s	uggested to	use a UCL b	ased upon a	distribution (e.g., gamma	a) passing bo	oth GOF tests	s in ProUCL	
117												
118	Ν	lote: Sugges	stions regard	ing the selec	ction of a 959	% UCL are pr	ovided to hel	p the user to	select the n	nost appropri	ate 95% UCI	
119			F	Recommenda	ations are ba	sed upon dat	a size, data	distribution,	and skewnes	SS.		
120		These recor	mmendations	are based u	ipon the resi	ults of the sim	nulation studi	es summariz	zed in Singh,	, Maichle, and	d Lee (2006).	
121	Hov	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for additio	nal insight th	ne user may	want to cons	ult a statistic	ian.
122												

	Α	В	С	D	E IOL Otatia	F	G Octovrith N	H	I	J	K	L
1				·	JCL Statis	tics for Data	Sets with N	on-Detects				
2		Llaan Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2	0E/2019 0:	E0.2E AM						
4	Dat	e/Time of C	From File	Soil Vapor Inp		30.33 AW						
5		Fu	Il Precision	OFF	ut.xi5							
6		Confidence		95%								
7		f Bootstrap		2000								
8	- 1101115010	Boototrap		2000								
9	n-Propylber	nzene										
10	.,,											
12						General	Statistics					
13			Total	Number of Obs	servations	38			Numbe	r of Distinct C	Observations	22
14				Number	of Detects	12				Number of	Non-Detects	26
15			Nı	umber of Distin	ct Detects	12			Numbe	er of Distinct	Non-Detects	11
16				Minimu	um Detect	75				Minimum	n Non-Detect	10
17				Maximi	um Detect	300000				Maximum	n Non-Detect	58994
18				Variand	e Detects	1.062E+10				Percent	Non-Detects	68.42%
19				Mea	n Detects	51712					SD Detects	103067
20				Media	n Detects	7350					CV Detects	1.993
21				Skewnes	s Detects	2.099				Kurt	tosis Detects	3.089
22				Mean of Logge	ed Detects	8.829				SD of Log	gged Detects	2.362
23												
24						nal GOF Tes	t on Detects	Only				
25				hapiro Wilk Tes					-	lk GOF Test		
26			5% SI	napiro Wilk Crit		0.859		Detected Da			nificance Leve	:l
27				Lilliefors Tes						GOF Test		
28			5	% Lilliefors Crit		0.243				al at 5% Sign	nificance Leve	#I
29				Det	ected Data	a Not Norma	ı at 5% Sign	ificance Lev	eı			
30			Kanlan	Meier (KM) Sta	tieties usi	na Normal C	ritical Value	s and other	Nonnarama	trio I ICI e		
31			Napiaii-		KM Mean		illical value	s and other	•		rror of Mean	10239
32					KM SD				- Ki		M (BCA) UCL	36024
33				95% K	M (t) UCL				95% KM (F		otstrap) UCL	
34					M (z) UCL				•		otstrap t UCL	
35			ç	00% KM Cheby							ebyshev UCL	
36				.5% KM Cheby							ebyshev UCL	
38												
39				Gar	mma GOF	Tests on De	tected Obse	ervations Or	ıly			
40				A-D Tes	st Statistic	0.782		Α	nderson-Da	rling GOF Te	est	
41				5% A-D Crit	ical Value	0.817	Detected	d data appea	ar Gamma D	istributed at 5	5% Significan	ce Level
42				K-S Tes	st Statistic	0.235		I	Kolmogorov-	Smirnov GO	F	
43				5% K-S Crit	ical Value	0.264	Detected	d data appea	ar Gamma D	stributed at 5	5% Significan	ce Level
44				Detected da	ata appea	r Gamma Dis	stributed at 5	5% Significa	nce Level			
45												
46						Statistics or	Detected D	ata Only				
47					hat (MLE)					•	rrected MLE)	
48					hat (MLE)				Theta	•	rrected MLE)	
49					hat (MLE)					nu star (bia	as corrected)	7.357
50				Mear	(detects)	51712						

	Α	В	С	D	E	F	G	Н	I	J	K	L
51												
52					Gamma ROS							
53			-		d when data			-		•		
54		GROS may			r of detects is			-	-		g., <15-20). ————	
55			Fo	r such situa	ations, GROS	-	-			TVs		
56					This is espec	-	•					
57		For gan	nma distribut	ted detecte	d data, BTVs		y be compu	ted using ga	mma distribu	tion on KM e		10000
58					Minimum						Mean	
59					Maximum						Median	
60						0 61250			1.	-t (l-:	CV	
61				Th	k hat (MLE					star (bias cor star (bias cor		
62				111	neta hat (MLE				rneta	•	· · · · · · · · · · · · · · · · · · ·	
63			Adiustod	LL ovel of C	nu hat (MLE	'				nu star (bia	as corrected)	7.114
64		Λ n	•		/alue (7.11, α	'			Adjusted C	hi Square Va		2.122
65					when n>=50			0E9/ C	•	ed UCL (use	, , ,	
66		95 /6 Gaillilla	Арргохіпіас	e oct (use	when he-50	52015		95 /6 G	amma Aujusi	.eu oct (use	when h	34730
67					Estimates of (Samma Dara	motore usin	a KM Estims	atoe			
68					Mean (KM		ineters using	y Kwi Esuilla	1103		SD (KM)	60381
69				\	Variance (KM					SE o	f Mean (KM)	
70					k hat (KM						k star (KM)	
71					nu hat (KM						nu star (KM)	
72				1	theta hat (KM						eta star (KM)	
73			80%		ercentile (KM				909	% gamma per		
74					ercentile (KM					% gamma per		
75				- g		/				- g		
76					Gamı	na Kaplan-M	eier (KM) St	tatistics				
77 78		Ap	proximate C	hi Square \	/alue (6.70, α				Adjusted C	hi Square Va	 lue (6.70, β)	1.905
79	95%	-		-	when n>=50			95% Gamm		M-UCL (use		
80				95% (Gamma Adjus	ted KM-UCL	use when k	<=1 and 15	< n < 50)			
81												
82				ı	Lognormal G	OF Test on D	etected Obs	servations C	nly			
83			S	hapiro Wilk	Test Statistic	0.956			Shapiro W	lk GOF Test		
84			5% S	hapiro Wilk	Critical Value	0.859	Det	tected Data a	appear Logno	rmal at 5% S	ignificance I	_evel
85				Lilliefors	Test Statistic	0.136			Lilliefors	GOF Test		
86			5	% Lilliefors	Critical Value	0.243	Det	tected Data a	appear Logno	ormal at 5% S	ignificance l	evel
87				De	tected Data a	ppear Logno	rmal at 5% \$	Significance	Level		-	-
88												
89				L	ognormal RC	S Statistics	Using Imput	ed Non-Det	ects			
90					Original Scale					Mean	in Log Scale	4.704
91					Original Scale						in Log Scale	
92		95% t U			of ROS data				95%	Percentile Bo		
93			!	95% BCA E	Bootstrap UCL	41550				95% Boo	otstrap t UCL	189280
94				95% H-U	CL (Log ROS)	1568609						
95												
96			Statis		KM estimates		Data and As	suming Log	normal Distr	ibution		
97					Mean (logged						M Geo Mean	
98					M SD (logged				95%	Critical H Val		
99			KM Standa		Mean (logged						CL (KM -Log)	
100				KI	M SD (logged	3.355			95%	Critical H Val	ue (KM-Log)	5.843

	Α	В	С	D	Е	F	G	Н	I	J	K	L				
101			KM Standar	d Error of M	ean (logged)	0.611										
102						•						•				
103						DL/2 S	tatistics									
104			DL/2 N	Normal					DL/2 Log-	Transformed						
105				Mean in O	riginal Scale	19527				Mean i	n Log Scale	6.08				
106				SD in O	riginal Scale	60869				SD i	n Log Scale	3.574				
107			95% t L	JCL (Assume	es normality)	36185				95%	H-Stat UCL	9868320				
108		DL/2 is not a recommended method, provided for comparisons and historical reasons														
109																
110		Nonparametric Distribution Free UCL Statistics														
111				Detected	Data appea	ır Gamma D	istributed at	5% Significa	ance Level							
112																
113						Suggested	UCL to Use	ı								
114	Adjusted KN	1-UCL (use	when k<=1 a	nd 15 < n <	50 but k<=1)	58856										
115																
116	N	lote: Sugges	stions regard	ing the selec	tion of a 95%	% UCL are pr	ovided to he	lp the user to	select the n	nost appropria	ate 95% UC					
117			F	Recommenda	ntions are ba	sed upon da	ta size, data	distribution,	and skewnes	SS.						
118	-	These recor	mmendations	are based u	ipon the resu	ults of the sin	nulation stud	ies summari:	zed in Singh	, Maichle, and	Lee (2006)					
119	Hov	vever, simu	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight t	he user may	want to consu	ult a statistic	ian.				
120																

	Α	В	С	D	E	F	G	H	I	J	K	L
1					JCL Statis	tics for Data	Sets with N	on-Detects				
2		Llaav Cala	-td Ot									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2)E/2019 0.:	20.12 AM						
4	Date	e/Time of C	From File	Soil Vapor Inpu		39. 13 AIVI						
5		Fu	Il Precision	OFF	ut.xi5							
6			Coefficient	95%								
7		f Bootstrap		2000								
8	- Number o	Воогонар	Орогацопо	2000								
9	o-Xylenes											
10												
11						General	Statistics					
13			Total	Number of Obs	servations	50			Numbe	r of Distinct C	Observations	24
14				Number o	of Detects	8				Number of	Non-Detects	42
15			Nı	umber of Distino	ct Detects	8			Numbe	er of Distinct	Non-Detects	16
16				Minimu	ım Detect	300				Minimum	n Non-Detect	8.68
17				Maximu	ım Detect	3200000				Maximum	n Non-Detect	50000
18				Varianc	e Detects	1.738E+12				Percent	Non-Detects	84%
19				Mea	n Detects	782170					SD Detects	1318519
20				Media	n Detects	111500					CV Detects	1.686
21				Skewnes	s Detects	1.493				Kurt	tosis Detects	0.394
22				Mean of Logge	d Detects	11.1				SD of Log	gged Detects	3.238
23												
24					Norm	nal GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Tes	st Statistic	0.638			Shapiro Wi	lk GOF Test		
26			5% SI	napiro Wilk Criti	ical Value	0.818]	Detected Dat	ta Not Norma	al at 5% Sign	ificance Leve	j
27				Lilliefors Tes		0.423				GOF Test		
28			5	% Lilliefors Criti		0.283				al at 5% Sign	ificance Leve	el .
29				Dete	ected Data	a Not Norma	l at 5% Sign	ificance Lev	rel			
30												
31			Kaplan-	Meier (KM) Sta			ritical Value	s and other	-			T = = = =
32					KM Mean				KI		rror of Mean	
33				050/ 1/		570613			050/ 1/14 /5		// (BCA) UCL	
34					M (t) UCL				•		otstrap) UCL	
35				95% KM 90% KM Chebys	M (z) UCL						otstrap t UCL ebyshev UCL	
36				.5% KM Chebys							ebyshev UCL	
37			97	.o /o raw Onebys	UNIOV UCL	000001			•	JO /O IXIVI CITE	Dydilev UCL	500070
38				Gan	nma GOF	Tests on De	etected Obse	ervations On	nlv			
39					st Statistic	0.387			•	rling GOF Te	est	
40				5% A-D Criti		0.804	Detected				5% Significan	ce Level
41					st Statistic	0.236				Smirnov GO		
43				5% K-S Criti		0.318	Detected				5% Significan	ce Level
44							stributed at 5					
45								-				
46					Gamma	Statistics or	Detected D	ata Only				
47				k l	hat (MLE)	0.282			k	star (bias cor	rrected MLE)	0.26
48				Theta I	hat (MLE)	2768815			Theta	star (bias cor	rrected MLE)	3009605
49				nu l	hat (MLE)	4.52				nu star (bia	as corrected)	4.158
50				Mean	(detects)	782170						
- 55												

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52						S Statistics u						
53			•					•	servations at	•		
54		GROS may							the sample s		e.g., <15-20)	
55			Fo			•	•		f UCLs and B	TVs		
56						cially true whe						
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs ma	y be compu	ited using ga	amma distribu	ition on KM e		
58					Minimum	0.01					Mean	125147
59					Maximum	3200000					Median	0.01
60					SE	576419					CV	4.606
61					k hat (MLE	0.062			k	star (bias cor	rected MLE)	0.0716
62				The	eta hat (MLE	2018611			Theta	star (bias cor	rected MLE)	1747617
63					nu hat (MLE	6.2				nu star (bia	s corrected)	7.161
64			Adjusted	Level of Sig	gnificance (β	0.0452						
65		Ap	proximate C	hi Square Va	alue (7.16, α	2.259			Adjusted C	chi Square Va	lue (7.16, β)	2.178
66		95% Gamma	Approximate	e UCL (use	when n>=50	396656		95% C	Gamma Adjust	ted UCL (use	when n<50)	411376
67						<u>.u</u>	Ш					1
68				E	stimates of (Gamma Para	meters usin	g KM Estim	ates			
69					Mean (KM	125212					SD (KM)	570613
70				V	ariance (KM	3.256E+11				SE o	f Mean (KM)	86269
71					k hat (KM	0.0482					k star (KM)	0.0586
72					nu hat (KM	4.815					nu star (KM)	5.86
73				th	neta hat (KM)	2600373				the	eta star (KM)	2136878
74			80%	6 gamma pe	rcentile (KM	28248			909	% gamma per	centile (KM)	229951
75			95%	6 gamma pe	rcentile (KM	697998			999	% gamma per	centile (KM)	2551784
76												
77					Gamr	na Kaplan-M	eier (KM) S	tatistics				
78		Ap	proximate C	hi Square Va	alue (5.86, α	1.569			Adjusted C	hi Square Va	lue (5.86, β)	1.504
79	95%	Gamma App	oroximate KN	И-UCL (use	when n>=50	467756		95% Gamı	ma Adjusted k	KM-UCL (use	when n<50)	487787
80												
81				L	ognormal G	OF Test on D	etected Ob	servations (Only			
82			S	hapiro Wilk	Test Statistic	0.924			Shapiro W	ilk GOF Test		
83			5% SI	hapiro Wilk (Critical Value	0.818	Def	tected Data	appear Logno	ormal at 5% S	Significance L	evel
84				Lilliefors	Test Statistic	0.192			Lilliefors	GOF Test		
85			5	% Lilliefors (Critical Value	0.283	Def	tected Data	appear Logno	ormal at 5% S	Significance L	evel
86				Dete	ected Data a	ppear Logno	rmal at 5%	Significance	e Level			
87												
88				Lo	ognormal RC	S Statistics	Using Imput	ted Non-De	tects			
89					riginal Scale					Mean	in Log Scale	-0.0291
90					riginal Scale						in Log Scale	
		95% t L	JCL (assume						95%	Percentile Bo		
91			•		ootstrap UCL						tstrap t UCL	
92						1.344E+12					,	
93					, , , , , , , ,							<u> </u>
94			Statis	stics usina K	M estimates	on Loaged	Data and As	ssumina Loc	gnormal Distr	ibution		
95					lean (logged						M Geo Mean	42.15
96					SD (logged				95%	Critical H Val		
97			KM Standa		lean (logged				3370		CL (KM -Log)	
98			Otaliual		SD (logged				Q5% (Critical H Val	,	5.875
99			KM Standar		lean (logged				30 /0 (Ondoor IT vall	ao (INVI-LUG)	3.073
100			ivin orginal	u Liiui 0i W	ean (1099ea	0.557						

	Α	В	С	D	Е	F	G	Н	I	J	K	L		
101														
102						DL/2 S	tatistics							
103			DL/2 I	Normal					DL/2 Log-1	ransformed				
104				Mean in C	riginal Scale	127461				Mean i	n Log Scale	6.137		
105				SD in C	riginal Scale	575936				SD i	n Log Scale	3.588		
106			95% t l	JCL (Assum	es normality)	264016				95%	H-Stat UCL	6199007		
107			DL/2	is not a reco	mmended m	nethod, provi	ded for com	parisons and	l historical re	easons				
108														
109		Nonparametric Distribution Free UCL Statistics												
110				Detected	Data appea	ar Gamma Di	stributed at	5% Significa	nce Level					
111														
112						Suggested	UCL to Use							
113			95% KM A	pproximate (Gamma UCL	467756								
114														
115	١	Note: Sugges	stions regard	ing the selec	tion of a 95°	% UCL are pr	ovided to he	lp the user to	select the m	nost appropria	ate 95% UCI			
116			F	Recommenda	itions are ba	sed upon dat	a size, data	distribution, a	and skewnes	SS.				
117		These recor	mmendations	are based u	ipon the resi	ults of the sim	nulation studi	ies summariz	zed in Singh,	Maichle, and	Lee (2006)			
118	Ho	wever, simu	lations result	s will not cov	er all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.		
119		·						·			·			

	Α	В	С	D E		G G	H Non Datasta	I	J	K	L
1				UCL St	atistics to	r Data Sets with	Non-Detects				
2		110-1-	-4								
3	Det	e/Time of C	cted Options	DrallOl E 15/05/0019	2 0.40.50	A N 4					
4	Dat	e/Time of C		ProUCL 5.15/25/2018	9:49:59	AIVI					
5		Г.,	From File	Soil Vapor Input.xls OFF							
6			Il Precision	95%							
7		Confidence									
8	Number o	f Bootstrap	Operations	2000							
9	PCE										
10	FOE										
11					Ge	neral Statistics					
12			Total	Number of Observation				Numbe	er of Distinct C)hservations	18
13			Total	Number of Dete				Numbe		Non-Detects	35
14			Nı	umber of Distinct Dete				Numbe	er of Distinct I		15
15				Minimum Det				- Turib		Non-Detect	10
16				Maximum Det)				Non-Detect	
17				Variance Dete						Non-Detects	92.11%
18				Mean Dete					- T Groom I	SD Detects	870.2
19				Median Dete						CV Detects	0.777
20				Skewness Dete		103			Kurt	osis Detects	N/A
21				Mean of Logged Dete		722				ged Detects	1.049
22					3.5					900 2010010	
23				Warning	n: Data se	t has only 3 Det	ected Values.				
24			Т	nis is not enough to c				and estimat	tes.		
25 26					•						
27											
28				N	ormal GC	F Test on Detec	cts Only				
29			S	hapiro Wilk Test Statis	stic 1		<u> </u>	Shapiro W	ilk GOF Test		
30			5% SI	napiro Wilk Critical Va	lue 0.	767	Detected Data	appear Nor	mal at 5% Sig	nificance Lev	/el
31				Lilliefors Test Statis	stic 0.	177		Lilliefors	GOF Test		
32			5	% Lilliefors Critical Va	lue 0.	425	Detected Data	appear Nor	mal at 5% Sig	nificance Lev	/el
33				Detected Da	ata appea	r Normal at 5%	Significance L	evel			
34											
35			Kaplan-	Meier (KM) Statistics	using No	rmal Critical Val	ues and other	Nonparame	tric UCLs		
36				KM Me	ean 153	.6		KI	M Standard E	rror of Mean	111.6
37				KM	SD 444	.6			95% KM	(BCA) UCL	N/A
38				95% KM (t) U	CL 341	.9		95% KM (F	Percentile Boo	otstrap) UCL	N/A
39				95% KM (z) U	CL 337	.2			95% KM Boo	tstrap t UCL	N/A
40			g	00% KM Chebyshev U	CL 488	.5		!	95% KM Che	byshev UCL	640.2
41			97	.5% KM Chebyshev U	CL 850	.7		!	99% KM Che	byshev UCL	1264
42						I					
43				Gamma G	OF Tests	on Detected Ob	servations Or	nly			
44				Not	Enough I	Data to Perform	GOF Test				
45											
46				Gam	ma Statis	tics on Detected	Data Only				
47				k hat (MI	LE) 1.	818		k	star (bias cor	rected MLE)	N/A
48				Theta hat (MI	LE) 616			Theta	star (bias cor	rected MLE)	N/A
40	1					0.1					- N1/A
49				nu hat (MI	LE) 10	.91			nu star (bia	s corrected)	N/A

	А	В	С	D	E		F	G	Н	I	J	K	L
51						D 2 2	0						
52									ed Non-Dete				
53		0000	-						-		multiple DLs		
54		GROS may									ize is small (e).g., <15-20) ———	
55			Fo	or such situ			•	•		f UCLs and B	IVs		
56		F	بريانون المسام			-	-		ple size is sm		tion on I/M o		
57		For gan	nma distribu	tea aetecte	ea aata, Bi Minir		0.01	y be comp	outea using ga	amma distribi	ution on KM e	Mean	88.43
58					Maxir		2000					Median	
59					IVIAXII	SD	366.9					CV	
60					k hat (N		0.0992			k	star (bias cor		
61				Т	heta hat (N		891.3				star (bias cor		
62				• • •	nu hat (N		7.541			Triota	`	as corrected)	
63			Adjusted	Level of S	,	,	0.0434						0.270
64		An	proximate C		•	,	2.897			Adjusted C	Chi Square Va	alue (8.28. ß)	2.767
65		95% Gamma					252.7		95% (-	ted UCL (use		
66				(40)		/							
67					Estimates	of G	amma Para	meters usi	ng KM Estim	ates			
68					Mean (SD (KM)	444.6
69 70					Variance (SE o	f Mean (KM)	
71					k hat ((KM)	0.119					k star (KM)	0.127
72					nu hat ((KM)	9.071					nu star (KM)	9.688
73					theta hat ((KM)	1287				the	eta star (KM)	1205
74			80%	6 gamma p	percentile ((KM)	143.8			909	% gamma per	rcentile (KM)	442
75			95%	6 gamma p	ercentile ((KM)	869.3			999	% gamma per	rcentile (KM)	2155
76													
77					G	amm	a Kaplan-M	eier (KM) (Statistics				
78		Ар	proximate C	hi Square '	Value (9.6	9, α)	3.748			Adjusted C	Chi Square Va	lue (9.69, β)	3.595
79	95%	Gamma App	oroximate KN	Л-UCL (use	e when n>	=50)	397.1		95% Gami	ma Adjusted I	KM-UCL (use	when n<50)	413.9
80								l					1
81					Lognorma	al GO	F Test on D	etected O	bservations (Only			
82			S	hapiro Wil	k Test Sta	tistic	0.946			Shapiro W	ilk GOF Test	,	
83			5% S	hapiro Will	Critical V	'alue	0.767	D	etected Data	appear Logno	ormal at 5% S	Significance	_evel
84					s Test Sta		0.272				GOF Test		
85			5	% Lilliefors			0.425			.,	ormal at 5% S	ignificance l	_evel
86				De	etected Da	ıta ap	pear Logno	rmal at 5%	Significance	e Level			
87													
88					_			Using Imp	uted Non-De	tects			
89					Original S		101.6					in Log Scale	
90		050/	101 /		Original S		364			2=2:		in Log Scale	
91		95% t U	JCL (assume			,	201.2			95%	Percentile Bo		
92			!	95% BCA			257.2				95% Boo	otstrap t UCL	. 834.8
93				95% H-U	ICL (Log F	(05)	205.8						
94			Ctatle	ation units	KM action	otos	on Logged	Date and A	Aggumin = 1 = :	anormal Dist	ihution		
95			Statis		Mean (log		2.918	Jala and A	vəsarının FO(gnormal Distr		M Geo Mean	18.51
96					M SD (log		1.536			0E0/	Critical H Val		
97			KM Standa				0.406			95%		ue (KIVI-LOG) CL (KM -Log)	
98			KINI SIGITUA		M SD (log	· .	1.536			0E0/	95% H-UC		
99			KM Standa				0.406			95%	Cilucal H Val	ue (NIVI-LOG)	3.078
100			INIVI SIdillud	iu LIIUI UI	ivi c ali (109	y c u)	0.400						

	Α	В	С	D	E	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-T	Transformed		
104				Mean in C	riginal Scale	10268				Mean	in Log Scale	5.64
105				SD in C	riginal Scale	29794				SD	in Log Scale	3.338
106			95% t l	JCL (Assum	es normality)	18422				95%	H-Stat UCL	1795841
107			DL/2	is not a reco	mmended m	nethod, provi	ded for com	parisons and	d historical re	easons		1
108												
109					Nonparam	etric Distribu	tion Free UC	CL Statistics				
110				Detecte	d Data appe	ar Normal Di	stributed at (5% Significa	nce Level			
111												
112						Suggested	UCL to Use					
113				95%	6 KM (t) UCL	341.9						
114												
115	١	lote: Sugges	stions regard	ling the sele	ction of a 959	% UCL are pr	ovided to he	lp the user to	select the m	nost appropri	ate 95% UC	
116			F	Recommend	ations are ba	sed upon da	ta size, data	distribution,	and skewnes	SS.		
117		These recor	mmendations	s are based	upon the resi	ults of the sin	nulation studi	ies summariz	zed in Singh,	Maichle, and	d Lee (2006)	•
118	Hov	wever, simu	lations result	ts will not co	ver all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	ian.
119												

	Α	В	С	D	E	F	G Octovrith N	H		J	K	L
1				00	JL Statis	tics for Data	Sets with N	on-Detects				
2		Llaav Cala	-td Oti									
3	Det	e/Time of C	cted Options	ProUCL 5.15/25	/2010 0.	E1.10 ANA						
4	Dati	e/ Time of C	From File	Soil Vapor Input		31.12 AIVI						
5		Fu	Il Precision	OFF								
6		Confidence		95%								
7		f Bootstrap		2000								
8	- Trainbor o	. Bootonap										
9	Propylene											
10	.,											
12						General	Statistics					
13			Total	Number of Obse	rvations	38			Numbe	r of Distinct C	Observations	18
14				Number of	Detects	4				Number of I	Non-Detects	34
15			Nu	umber of Distinct	Detects	4			Numbe	er of Distinct I	Non-Detects	15
16				Minimun	n Detect	78				Minimum	Non-Detect	3.44
17				Maximun	n Detect	1000				Maximum	Non-Detect	300000
18				Variance	Detects	158083				Percent I	Non-Detects	89.47%
19				Mean	Detects	522					SD Detects	397.6
20				Median	Detects	505					CV Detects	0.762
21				Skewness		0.204				Kurt	osis Detects	-1.188
22				Mean of Logged	Detects	5.904				SD of Log	ged Detects	1.118
23												
24							t on Detects	Only				
25				hapiro Wilk Test		0.991			<u>-</u>	lk GOF Test		
26			5% SI	napiro Wilk Critica		0.748	De	etected Data		mal at 5% Sig	gnificance Lev	/el
27				Lilliefors Test		0.167				GOF Test		
28			5'	% Lilliefors Critica		0.375				mal at 5% Sig	initicance Lev	/el
29				Detecte	ed Data	appear Norr	nal at 5% Siç	gnificance L	evel			
30			Vanlan	Majar /I/M\ Statis	ation uni	an Namal C	ritical Value		Nonnonomo	hria IICI a		
31			Napian-i	Meier (KM) Statis	M Mean	96.8	nucai vaiue	s and other	-	M Standard E	rror of Moon	58.15
32				- N	KM SD	241.3			- Ni		I (BCA) UCL	N/A
33				95% KM		194.9			95% KM (F	Percentile Boo	` '	N/A
34				95% KM		192.4			`	95% KM Boo	• /	N/A
35			Ç	00% KM Chebysh		271.3				95% KM Che		350.3
36				.5% KM Chebysh		460				99% KM Che	-	675.4
37											-	
39				Gamr	na GOF	Tests on De	etected Obse	ervations Or	nly			
40				A-D Test	Statistic	0.25		Α	nderson-Da	rling GOF Te	est	
41				5% A-D Critica	al Value	0.662	Detected	d data appea	ar Gamma D	istributed at 5	5% Significan	ce Level
42				K-S Test	Statistic	0.216		ı	Kolmogorov-	Smirnov GO	F	
43				5% K-S Critica	al Value	0.399	Detected	d data appea	ar Gamma D	istributed at 5	5% Significan	ce Level
44				Detected data	a appeai	Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46				(Gamma	Statistics or	n Detected D	ata Only				
47					at (MLE)	1.558				star (bias cor	•	0.556
48				Theta ha		335			Theta	star (bias cor	·	938.5
49					at (MLE)	12.47				nu star (bia	s corrected)	4.45
50				Mean (detects)	522						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52				(Gamma ROS	S Statistics u	sing Impute	d Non-Dete	cts			
53			-					-	servations at	•		
54		GROS may	not be used	when kstar	of detects is	small such a	s <1.0, espe	ecially when	the sample si	ize is small (e	e.g., <15-20)	
55			Fo	r such situat	tions, GROS	method may	yield incorre	ect values of	f UCLs and B	TVs		
56				-	This is espec	ially true who	en the samp	le size is sm	all.			
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs ma	y be compu	ited using ga	amma distribu	ition on KM e	stimates	
58					Minimum	0.01					Mean	54.96
59					Maximum	1000					Median	0.01
60					SE	197.9					CV	3.601
61					k hat (MLE	0.107			k	star (bias cor	rected MLE)	0.116
62				The	eta hat (MLE	512.5			Theta	star (bias cor	rected MLE)	472.5
63					nu hat (MLE	8.15				nu star (bia	s corrected)	8.84
64			Adjusted	Level of Sig	gnificance (β	0.0434						
65		Ap	proximate C	hi Square Va	alue (8.84, α	3.231			Adjusted C	chi Square Va	lue (8.84, β)	3.091
66		95% Gamma	Approximat	e UCL (use	when n>=50	150.4		95% G	Samma Adjust	ted UCL (use	when n<50)	N/A
67						1	Ш					1
68				E	stimates of (amma Para	meters usin	g KM Estim	ates			
69					Mean (KM	96.8					SD (KM)	241.3
70				V	ariance (KM	58247				SE o	f Mean (KM)	58.15
71					k hat (KM	0.161					k star (KM)	0.166
72					nu hat (KM	12.23					nu star (KM)	12.59
73				th	neta hat (KM	601.7				the	eta star (KM)	584.2
74			80%	6 gamma pe	rcentile (KM	113.7			909	% gamma per	centile (KM)	290.3
75			95%	6 gamma pe	rcentile (KM	521.9			999	% gamma per	centile (KM)	1181
76												1
77					Gamı	na Kaplan-M	eier (KM) S	tatistics				
78		Арр	roximate Ch	i Square Val	ue (12.59, α	5.62			Adjusted Ch	ni Square Valu	ue (12.59, β)	5.428
79	95%	ն Gamma App	oroximate KN	Л-UCL (use	when n>=50	216.9		95% Gamr	ma Adjusted k	KM-UCL (use	when n<50)	224.6
80												IL
81				L	ognormal G	OF Test on D	etected Ob	servations (Only			
82			S	hapiro Wilk	Test Statistic	0.922			Shapiro W	ilk GOF Test		
83			5% SI	hapiro Wilk (Critical Value	0.748	De	tected Data	appear Logno	ormal at 5% S	Significance L	evel
84				Lilliefors	Test Statistic	0.234			Lilliefors	GOF Test		
85			5	% Lilliefors (Critical Value	0.375	De	tected Data	appear Logno	ormal at 5% S	Significance L	evel
86				Dete	ected Data a	ppear Logno	rmal at 5%	Significance	Level			
87												
88				Lo	gnormal RC	S Statistics	Using Impu	ted Non-Det	tects			
89				Mean in C	riginal Scale	71.85				Mean	in Log Scale	2.841
90				SD in C	riginal Scale	193.8				SD	in Log Scale	1.502
91		95% t L	JCL (assume	s normality	of ROS data	124.9			95%	Percentile Bo	otstrap UCL	130
92			!	95% BCA B	ootstrap UCL	. 155.4				95% Boo	tstrap t UCL	240.7
93				95% H-UC	L (Log ROS	111.8						
94							II.					ı
95			Statis	stics using K	(M estimates	on Logged	Data and As	ssuming Log	normal Distr	ibution		
96				KM M	lean (logged	2.141				KI	M Geo Mean	8.512
97				KM	SD (logged	1.863			95% (Critical H Val	ue (KM-Log)	3.544
98			KM Standa	rd Error of M	lean (logged	0.475				95% H-UC	CL (KM -Log)	143.1
99				KM	SD (logged	1.863			95% (Critical H Val	ue (KM-Log)	3.544
100			KM Standa	rd Error of M	lean (logged	0.475						
100					. 35							

	Α	В	С	D	Е	F	G	Н		J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2	Normal					DL/2 Log-T	Transformed		
104				Mean in C	riginal Scale	9823				Mean	in Log Scale	5.449
105				SD in C	riginal Scale	29771				SD	in Log Scale	3.411
106			95% t l	JCL (Assum	es normality)	17971				95%	H-Stat UCL	2181553
107			DL/2	is not a reco	mmended m	ethod, provi	ded for comp	parisons and	d historical re	easons		
108												
109					Nonparam	etric Distribu	tion Free UC	CL Statistics				
110				Detected	d Data appea	ar Normal Di	stributed at (5% Significa	nce Level			
111												
112						Suggested	UCL to Use					
113				95%	6 KM (t) UCL	194.9						
114												
115	١	lote: Sugges	stions regard	ling the sele	ction of a 959	% UCL are pr	ovided to he	p the user to	select the m	nost appropri	ate 95% UC	L.
116			F	Recommend	ations are ba	sed upon da	a size, data	distribution, a	and skewnes	SS.		
117		These recor	mmendations	are based	upon the resi	ults of the sin	nulation studi	es summariz	zed in Singh,	Maichle, and	d Lee (2006)	
118	Hov	wever, simu	lations result	s will not co	ver all Real V	Vorld data se	ts; for addition	onal insight th	ne user may	want to cons	ult a statistic	cian.
119												

	Α	В	С	D	E	F	G Octovrith N	H		J	K	L
1				UCI	_ Statis	itics for Data	Sets with N	ion-Detects				
2		Llaan Cala	-td Oti									
3	Dot	e/Time of C	ected Options	ProUCL 5.15/25/2	2010 0.	40.20 AM						
4	Dat	e/Time of C	From File	Soil Vapor Input.		40.29 AW						
5		Fu	Il Precision	OFF								
6		Confidence		95%								
7		f Bootstrap		2000								
8	- 144111501 0	Boototrap										
9	sec-Butylbe	nzene										
10												
11						General	Statistics					
13			Total	Number of Observ	ations	38			Numbe	r of Distinct C	Observations	21
14				Number of D	Detects	8				Number of	Non-Detects	30
15			N	umber of Distinct [Detects	8			Numbe	er of Distinct	Non-Detects	13
16				Minimum	Detect	120				Minimum	n Non-Detect	10
17				Maximum	Detect	6400				Maximum	n Non-Detect	300000
18				Variance [Detects	5675370				Percent	Non-Detects	78.95%
19				Mean D	Detects	2006					SD Detects	2382
20				Median [Detects	565					CV Detects	1.187
21				Skewness [etects	1.095				Kurt	tosis Detects	-0.208
22				Mean of Logged D	Detects	6.794				SD of Log	gged Detects	1.448
23												
24					Norm	nal GOF Tes	t on Detects	Only				
25			S	hapiro Wilk Test S	tatistic	0.788			Shapiro W	ilk GOF Test		
26			5% SI	napiro Wilk Critica	l Value	0.818	[Detected Da	ta Not Norma	al at 5% Sign	ificance Leve	;l
27				Lilliefors Test S	tatistic					GOF Test		
28			5	% Lilliefors Critica		0.283				al at 5% Sign	ificance Leve	
29				Detect	ed Data	a Not Norma	ıl at 5% Sign	ificance Lev	rel .			
30												
31			Kaplan-	Meier (KM) Statis			ritical Value	s and other	•			
32					1 Mean				KI		rror of Mean	295.9
33					KM SD				050/ 1/14//		// (BCA) UCL	1106
34				95% KM (. ,				`	Percentile Boo		1093
35				95% KM (:						95% KM Boo	•	1509 1885
36				.5% KM Chebyshe						95% KM Che	ebyshev UCL	3539
37			97	.5 /0 KIVI CHEDYSHE	V UCL	2 44 3				99 /0 KIVI CITE	bysilev UCL	
38				Gamm	a GOF	Tests on De	etected Obse	arvations Or	nlv			
39				A-D Test S			Stocked Obse		•	rling GOF Te		
40				5% A-D Critica			Detected			_	5% Significan	ce Level
41				K-S Test S			2 3.00.00			Smirnov GO		
42				5% K-S Critica			Detect				% Significance	e Level
44				Detected data fol								
45						<u> </u>						
46				G	amma	Statistics or	Detected D	ata Only				
47					(MLE)			-	k	star (bias cor	rrected MLE)	0.546
48				Theta hat					Theta	star (bias cor	rrected MLE)	3673
49				nu hat	(MLE)	11.85				nu star (bia	as corrected)	8.738
50				Mean (d	etects)	2006						
55				•	•	<u>L</u>	<u> </u>					

	Α	В	С	D	Е	F	G	Н	I	J	K	L
51												
52				(Gamma ROS	Statistics u	sing Impute	d Non-Dete	cts			
53			GROS may	not be used	d when data	set has > 50%	NDs with r	nany tied ob	servations at	multiple DLs		
54		GROS may	not be used	when kstar	of detects is	small such a	s <1.0, espe	ecially when	the sample si	ze is small (e	e.g., <15-20)	
55			Fo	r such situat	tions, GROS	method may	yield incorre	ect values of	f UCLs and B	TVs		
56				-	This is espec	ially true whe	en the samp	le size is sm	all.			
57		For gar	nma distribut	ed detected	data, BTVs	and UCLs ma	y be compu	ited using ga	amma distribu	tion on KM e	stimates	
58					Minimum	0.01					Mean	422.4
59					Maximum	6400					Median	0.01
60					SD	1327					CV	3.142
61					k hat (MLE)	0.0986			k	star (bias cor	rected MLE)	0.108
62				The	eta hat (MLE)	4284			Theta	star (bias cor	rected MLE)	3898
63				-	nu hat (MLE)	7.493				nu star (bia	as corrected)	8.235
64			Adjusted	Level of Sig	gnificance (β)	0.0434						
65		Ap	proximate C	hi Square Va	alue (8.24, α)	2.872			Adjusted C	hi Square Va	lue (8.24, β)	2.742
66		95% Gamma	Approximate	e UCL (use	when n>=50)	1211		95% G	Samma Adjust	ed UCL (use	when n<50)	1269
67						1	Ш					L
68				E	stimates of C	amma Para	meters usin	g KM Estim	ates			
69					Mean (KM)	594.8					SD (KM)	1475
70				V	ariance (KM)	2175483				SE o	f Mean (KM)	295.9
71					k hat (KM)	0.163					k star (KM)	0.167
72					nu hat (KM)	12.36					nu star (KM)	12.72
73				th	neta hat (KM)	3657				the	eta star (KM)	3554
74			80%	6 gamma pe	rcentile (KM)	703.4			909	% gamma per	centile (KM)	1785
75			95%	6 gamma pe	rcentile (KM)	3200			999	% gamma per	centile (KM)	7218
76												
77					Gamr	na Kaplan-M	eier (KM) S	tatistics				
78		Арр	roximate Ch	i Square Val	ue (12.72, α)	5.704			Adjusted Ch	i Square Valu	ue (12.72, β)	5.509
79	95%	Gamma App	oroximate KN	И-UCL (use v	when n>=50)	1326		95% Gamr	na Adjusted k	(M-UCL (use	when n<50)	1373
80												
81				L	ognormal Go	OF Test on D	etected Ob	servations (Only			
82			S	hapiro Wilk	Test Statistic	0.913			Shapiro W	lk GOF Test		
83			5% SI	hapiro Wilk (Critical Value	0.818	De	tected Data	appear Logno	ormal at 5% S	Significance L	evel
84				Lilliefors	Test Statistic	0.247			Lilliefors	GOF Test		
85			5	% Lilliefors (Critical Value	0.283	De	tected Data	appear Logno	ormal at 5% S	Significance L	evel
86				Dete	ected Data a	ppear Logno	rmal at 5%	Significance	Level			
87												
88				Lo	ognormal RC	S Statistics	Using Impu	ted Non-Det	tects			
89				Mean in C	riginal Scale	460				Mean	in Log Scale	4.028
90				SD in C	riginal Scale	1315				SD	in Log Scale	1.922
91		95% t L	JCL (assume	s normality	of ROS data)	820			95%	Percentile Bo	otstrap UCL	843.8
92			•		ootstrap UCL						tstrap t UCL	
93					L (Log ROS)						·	
					/							
94 95			Statis	stics using K	(M estimates	on Logged	Data and As	ssuming Loc	normal Distr	ibution		
					lean (logged)			J - re			M Geo Mean	45.02
96					SD (logged)				95% (Critical H Val		4.018
97			KM Standar		lean (logged)						CL (KM -Log)	
98					SD (logged)				95% (Critical H Val		4.018
99			KM Standar		lean (logged)				33,0			
100			Otaliaal	L.1.01 01 IVI	.ca.i (ioggcu)	0.470						

	Α	В	С	D	Е	F	G	Н	I	J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2 N	Normal					DL/2 Log-T	ransformed		
104				Mean in O	riginal Scale	10827				Mean i	n Log Scale	5.894
105				SD in O	riginal Scale	29921				SD i	n Log Scale	3.299
106			95% t L	ICL (Assume	es normality)	19016				95%	H-Stat UCL	1896380
107			DL/2 i	s not a reco	mmended m	ethod, provi	ded for comp	parisons and	l historical re	easons		1
108												
109					Nonparam	etric Distribu	tion Free UC	L Statistics				
110			Det	ected Data	appear Appr	oximate Gan	nma Distribu	ted at 5% Si	ignificance L	.evel		
111												
112						Suggested	UCL to Use					
113	Adjusted KI	M-UCL (use	when k<=1 a	nd 15 < n <	50 but k<=1)	1373						
114												
115			When a d	ata set follo	ws an approx	kimate (e.g., ı	normal) distri	bution passi	ng one of the	GOF test		
116		When appl	licable, it is s	uggested to	use a UCL b	ased upon a	distribution (e.g., gamma	ı) passing bo	th GOF tests	in ProUCL	
117												
118	١	Note: Sugges	stions regard	ing the selec	ction of a 95%	6 UCL are pr	ovided to hel	p the user to	select the m	ost appropria	ate 95% UCI	
119			F	tecommenda	ations are ba	sed upon dat	a size, data	distribution, a	and skewnes	S.		
120		These recor	mmendations	are based (upon the resu	ults of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	Lee (2006).	
121	Ho	wever, simul	lations result	s will not cov	er all Real V	Vorld data se	ts; for additio	nal insight th	ne user may	want to consi	ult a statistic	ian.
122												

-	Α	В	С	D	E IOL Obstis	F	G	H		J	K	L
1					JCL Statis	tics for Data	Sets with N	on-Detects				
2		Llaan Cala										
3	Dot	e/Time of C	ected Options	ProUCL 5.15/2)E/2019 0.	27.16 AM						
4	Dat	e/ Time of C	From File	Soil Vapor Inpu		37. 10 AW						
5		Fu	III Precision	OFF	ut.xi5							
6			Coefficient	95%								
7		f Bootstrap		2000								
8	- rambor o	. Bootottap	- Сроганопо	2000								
9	Toluene											
10												
12						General	Statistics					
13			Total	Number of Obs	servations	50			Numbe	r of Distinct C	Observations	22
14				Number o	of Detects	5				Number of	Non-Detects	45
15			Nı	umber of Distino	ct Detects	5			Numbe	er of Distinct	Non-Detects	17
16				Minimu	ım Detect	19000				Minimum	n Non-Detect	7.54
17				Maximu	ım Detect	13000000				Maximum	n Non-Detect	50000
18				Varianc	e Detects	3.217E+13				Percent	Non-Detects	90%
19				Mea	n Detects	3642160					SD Detects	5672062
20				Media	n Detects	70800					CV Detects	1.557
21					s Detects	1.557				Kurt	tosis Detects	1.878
22				Mean of Logge	d Detects	12.56				SD of Log	ged Detects	3.122
23												
24							t on Detects	Only				
25				hapiro Wilk Tes		0.754				lk GOF Test		
26			5% SI	napiro Wilk Criti		0.762		Detected Dat		ŭ	ificance Leve	:l
27				Lilliefors Tes		0.336				GOF Test		
28			5	% Lilliefors Criti		0.343				mal at 5% Sig	gnificance Le	vel ————
29				Detected Da	ita appear	Approximat	e Normai at	5% Significa	ance Level			
30			Kanlan	Meier (KM) Sta	tieties usi	na Normal C	ritical Value	s and other	Nonnarama	trio I ICI e		
31			Napiaii-	• •	KM Mean		illical value	s and other	<u> </u>		rror of Mean	306003
32						1941024			Ki		(BCA) UCL	
33				95% K	M (t) UCL				95% KM (F		otstrap) UCL	
34					M (z) UCL				`		otstrap t UCL	
35			g	00% KM Chebys	` '						byshev UCL	
36				.5% KM Chebys							byshev UCL	
38												
39				Gar	nma GOF	Tests on De	tected Obse	ervations On	lly			
40				A-D Tes	st Statistic	0.559		Α	nderson-Da	rling GOF Te	est	
41				5% A-D Criti	ical Value	0.748	Detected	d data appea	ır Gamma Di	istributed at 5	5% Significan	ce Level
42				K-S Tes	st Statistic	0.337		ŀ	Kolmogorov-	Smirnov GO	F	
43				5% K-S Criti	ical Value	0.382	Detected	d data appea	ır Gamma Di	stributed at 5	5% Significan	ce Level
44				Detected da	ata appeai	Gamma Di	stributed at 5	5% Significa	nce Level			
45												
46							Detected D	ata Only				
47					hat (MLE)	0.275				,	rected MLE)	
48						13268047			Theta	`	rrected MLE)	
49					hat (MLE)	2.745				nu star (bia	as corrected)	2.431
50				Mean	(detects)	3642160						

	Α	В	С		D	Е		F	G	Н	I		J	K		L	
51																	
52										ed Non-Det							
53			-							-	bservations		-				
54		GROS may	not be used						-	-			small (e	e.g., <1	5-20)		
55			Fc	or suc				•	•		of UCLs and	dBIVs					
56			P . 2							ple size is si			1714				
57		For gan	nma distribu	tea ae	etected				ay be comp	outed using (gamma distr	ribution	on KIVI e			00404	
58						Minim		0.01								364210	
59							um 130 SD 196							IVIE	edian CV	0.0 ⁻	
60						k hat (Ml		0.0552				le otor /	(bias cor	rooted		0.06	
61						ta hat (Ml					The		bias cor				
62						nu hat (MI	-	5.525			1116		star (bia			6.5	
63			Adjustos	1 L OV		nificance	1	0.0452				IIu	Stal (Dic	35 COITE	cieu)	0.5	
64		Δn	proximate C		•		/	1.915			Adjusted	d Chi Sc	nuare Va	6 میاد	23 B)	1.8	2/12
65		95% Gamma								95%	Gamma Adj		•	` `	,		
66	•	33 /0 Gairiina	Түргөхішас		L (use v	viieii ii> –	30) 124	1340		9570	Garrina Auj	justeu O	CL (use	WIICIII	150)	12307	
67					Fe	timates c	of Gamn	na Para	metere uei	ing KM Estir	mates						
68						Mean (K			ineters usi	ing itw Esti	illates			SD	(KM)	194102	24
69					Vs	riance (K	-						SE o	f Mean	` '		
70					V C	k hat (K		0.0352						k star			
71						nu hat (K	,	3.523						nu star	` ′	4.6	
72						eta hat (K								eta star	` '		
73			800	% nan		centile (K	,				(90% dai	mma per		` ′		
74				_	-	centile (K						_	mma per		-		
75				, o guii	iiiia poi		,						Tima poi		(1 (11))	0.0.0	
76						Ga	mma Ka	aplan-M	eier (KM)	Statistics							
77		Ap	proximate C	hi Sa	uare Va			0.992			Adjusted	d Chi So	uare Va	alue (4.6	35. β)	0.9)44
78	95%	Gamma App	-	-		•				95% Gan	nma Adjuste						
79 80													`				
81					Lo	gnormal	GOF To	est on D	etected O	bservations	Only						
82			S	Shapir	o Wilk 1	est Statis	stic (0.823			Shapiro	Wilk G	OF Test	:			
83			5% S	hapiro	o Wilk C	ritical Va	lue (0.762	D	etected Data	a appear Log	gnormal	at 5% S	Significa	ince L	evel	
84				Lil	lliefors 7	est Statis	stic (0.272			Lilliefo	ors GOF	- Test				
85			5	5% Lill	liefors C	ritical Va	lue (0.343	D	etected Data	a appear Log	gnormal	at 5% S	Significa	ince L	evel	
86					Dete	cted Data	a appea	r Logno	rmal at 5%	Significan	ce Level						
87																	
88					Lo	gnormal l	ROS St	atistics	Using Imp	uted Non-D	etects						
89				Ме	an in O	riginal Sc	ale 364	222					Mean	in Log S	Scale	-2.0	7
90					SD in O	riginal Sc	ale 196	0752					SD	in Log S	Scale	6.6	15
91		95% t L	JCL (assume	es nor	mality c	f ROS da	ata) 829	116			95	% Perc	entile Bo	ootstrap	UCL	88239	3
92				95% I	BCA Bo	otstrap U	CL 114	5256				Ç	95% Boo	otstrap t	UCL	714139	971
93				95%	6 H-UCI	_ (Log RC	OS) 9.67	75E+12									
							l		I							L	
94				atlaa .	ueina K	M estima	tes on L	_ogged	Data and A	Assuming Lo	ognormal Di	istributio	on				
94 95			Statis	Sucs (using K											22.6	65
			Statis	Sucs	-	ean (logge	ed)	3.12					KI	M Geo I	Mean	22.0	•
95			Statis	sucs (KM Me			3.12 3.323			95	6% Critic	KI al H Val			5.5	
95 96			Statis KM Standa		KM Me	ean (logge SD (logge	ed)				95			ue (KM	-Log)	5.5	572
95 96 97					KM Me KM ror of Me	ean (logge SD (logge	ed)	3.323				95	al H Val	ue (KM-	-Log) -Log)	5.5	572 3

	Α	В	С	D	Е	F	G	Н	I	J	K	L
101												
102						DL/2 S	tatistics					
103			DL/2 N	Normal					DL/2 Log-T	ransformed		
104				Mean in O	riginal Scale	366956				Mean i	n Log Scale	6.01
105				SD in O	riginal Scale	1960245				SD i	n Log Scale	3.573
106			95% t L	ICL (Assume	es normality)	831730				95%	H-Stat UCL	5027213
107			DL/2 i	s not a reco	mmended m	nethod, provi	ded for comp	parisons and	l historical re	easons		
108												
109					Nonparam	etric Distribu	tion Free UC	CL Statistics				
110			Det	ected Data	appear Appi	roximate Nor	mal Distribu	ted at 5% Si	gnificance L	evel		
111												
112						Suggested	UCL to Use					
113				95%	KM (t) UCL	878878						
114												
115			When a d	ata set follo	ws an approx	ximate (e.g., ı	normal) distri	bution passi	ng one of the	GOF test		
116		When app	licable, it is s	uggested to	use a UCL b	ased upon a	distribution (e.g., gamma) passing bo	th GOF tests	in ProUCL	
117												
118	١	Note: Sugges	stions regard	ing the selec	ction of a 959	% UCL are pr	ovided to hel	p the user to	select the m	ost appropria	ate 95% UCL	
119			F	ecommenda	ations are ba	sed upon dat	a size, data	distribution, a	and skewnes	S.		
120		These recor	mmendations	are based (ipon the resi	ults of the sim	nulation studi	es summariz	zed in Singh,	Maichle, and	Lee (2006).	
121	Ho	wever, simu	lations result	s will not cov	er all Real V	Vorld data se	ts; for additio	nal insight th	ne user may	want to consi	ult a statistic	ian.
122												

APPENDIX I

Johnson & Ettinger Model Results Soil Vapor & Groundwater Residential Western Parcel

Reset to

Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

5.80E+05

Scenario: Residential

Chemical: 1,2,4-Trimethylbenzene

Cancer

Risk

NA

Noncancer

Hazard

2.5E+01

		Soil	Results Sum						
	ENTER	ENTER		ENTER			Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.
		Soil		Soil			(µg/m³)	(unitless)	(µg/m³)
	Chemical	gas	OR	gas			5.80E+05	3.2E-04	1.9E+02
,	CAS No.	conc.,		conc.,					
	(numbers only,	C_g		C_g					
	no dashes)	(μg/m³)		(ppmv)	Chemical			=	
			•			_		_	

1,2,4-Trimethylbenzene

MORE $lack \Psi$

95636

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^z)
15	152	24	S	·]	

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24	0.5
END					(NEW)	(NEW)

> Reset to Defaults

> > MORE **↓**

95501

2.30E+03

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: 1,2-Dichlorobenzene

Soil Gas Concentration Data					Results Summary				
ENTER	ENTER		ENTER		Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
	Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	Hazard
Chemical	gas	OR	gas		2.30E+03	3.0E-04	6.9E-01	NA	3.3E-03
CAS No.	conc.,		conc.,						
(numbers only,	C_g		C_g						
no dashes)	(μg/m³)		(ppmv)	Chemical					

1,2-Dichlorobenzene

ENTER ENTER ENTER ENTER ENTER Depth below grade Soil gas Vadose zone User-defined to bottom sampling Average SCS vadose zone of enclosed depth soil soil type soil vapor (used to estimate OR permeability, space floor, below grade, temperature, T_{S} soil vapor k_{ν} (°C) (15 or 200 cm) (cm²)(cm) permeability) 15 152 24 S

MORE ↓	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Vadose zone soil total porosity, n°	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculat Q _{soil} (L/m)		
	S	1.64	0.392	0.197		5	
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange	
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹	
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)	
END					((11211)	

> Reset to Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: 1,3,5-Trimethylbenzene

	Soil	Gas Concentration	n Data		Results Summary				
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
	Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	Hazard
Chemical	gas	OR	gas		3.70E+05	3.2E-04	1.2E+02	NA	3.2E+00
CAS No.	conc.,		conc.,		MESSAGE: Risk a	and/or hazard quotient is	based on route-to-route	extrapolation	n.
(numbers only,	C_g		C_g						
no dashes)	(μg/m³)	_	(ppmv)	Chemical		_			

1,3,5-Trimethylbenzene 3.70E+05 108678

MORE	
¥	

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
				: 1	
15	152	l 24	l s	1	1

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
L	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
IF14/_>	Decidential 1						
IEW=>		70	26	26	350	24 (NEW)	0.5 (NEW)
	END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: 1,3-Dichlorobenzene

		Soil (Results Summary								
D 11	ENTER	ENTER		ENTER		Soil Gas Conc. A	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	
Reset to		Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard	
Defaults	Chemical	gas	OR	gas		1.10E+03	3.0E-04	3.3E-01	NA	3.0E-03	
	CAS No.	conc.,		conc.,		MESSAGE: Risk and	MESSAGE: Risk and/or hazard quotient is based on route-to-route extrapolation.				
	(numbers only,	C_g		C_g							
	no dashes)	(μg/m³)		(ppmv)	Chemical						

1,3-Dichlorobenzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE

541731

1.10E+03

			· .	and/or toxiony oritoria io	tillo orioriilodi.
ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)	·	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential END	70	26	26	350	24 (NEW)	0.5 (NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential

nical: 1,4-Dichlorobenzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

2.9E-01

Cancer

Risk

1.2E-06

Noncancer

Hazard

3.5E-04

			DATA ENTRY S	SHEET			Chemical:	1,4-Dichlorob
		Soil	Gas Concentration	n Data				Result
Reset to	ENTER	ENTER Soil	ado comominado	ENTER Soil			Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)
Defaults	Chemical	gas	OR	gas			1.00E+03	2.9E-04
	CAS No.	conc.,		conc.,		•		
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			
	106467	1.00E+03	1		1,4-Dichlorobenz	one		
	100407	1.00E+03	1		1,4-DICITIOTODEIIZ	ene		
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Depth below grade	Soil gas		Vadose zone		User-defined		
Ψ	to bottom of enclosed	sampling depth	Average soil	SCS soil type		vadose zone soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F	L _s	T _S	soil vapor		k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm²)		
					1			
	15	152	24	S				
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
Ψ	SCS soil type	soil dry bulk density,	soil total porosity,	soil water-filled porosity,	,	flow rate into bldg. (Leave blank to calcula	ate)	
		Σαικ ασποιτ y ,	γοισσιτή,	ροιοσίτη,	,	Locato bianit to calcult	210)	

MORE ↓	Vandose zone SCS soil type Lookup Soil	Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	Vadose zone soil total porosity, n (unitless)	Vadose zone soil water-filled porosity, θ _w V (cm³/cm³)		Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
	time for	time for	Exposure	Exposure	Exposure	Air Exchange
Lookup Receptor	carcinogens, AT _C	noncarcinogens, AT _{NC}	duration, ED	frequency, EF	Time ET	Rate ACH
Parameters	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
NEW=> Residential	70	26	26	350	24	0.5
		•			(NEW)	(NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: Acetone

Attenuation Factor

(unitless)

5.4E-04

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

4.8E-02

Cancer

Risk

NA

Noncancer

Hazard

1.5E-06

			DATA ENTRY S	SHEET		Chem
		Soil	Gas Concentration	n Data		
	ENTER	ENTER	Gas Concentration	ENTER		Soil Gas
Reset to		Soil		Soil		(μg/m
Defaults	Chemical	gas	OR	gas		8.90E+
	CAS No.	conc.,		conc.,		
	(numbers only,	C_g		C_{g}		
	no dashes)	(μg/m³)	_	(ppmv)	Chemical	
			- 1			
	67641	8.90E+01			Acetone	
	ENTER	ENTER	ENTER	ENTER		ENTER
	Depth					
MORE	below grade	Soil gas		Vadose zone		User-defined
Ψ	to bottom	sampling	Average	SCS		vadose zone
	of enclosed	depth	soil	soil type		soil vapor
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,
	L_{F}	L_s	T _s	soil vapor		k _v
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)
	15	152	24	S		
	15	132		3		
	ENTER	ENTER	ENTER	ENTER		ENTER
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor
Ψ	SCS	soil dry	soil total	soil water-filled		flow rate into bldg.
	soil type	bulk density,	porosity,	porosity,		(Leave blank to calculate)

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	Vadose zone soil total porosity, n (unitless)	Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential END	70	26	26	350	24 (NEW)	0.5 (NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Benzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

8.9E+02

Cancer

Risk

9.2E-03

Noncancer

Hazard

2.8E+02

		Soil (Gas Concentration	n Data				Resul
D 11	ENTER	ENTER		ENTER			Soil Gas Conc. /	Attenuation Factor
Reset to		Soil		Soil			(µg/m³)	(unitless)
Defaults	Chemical	gas	OR	gas			2.00E+06	4.4E-04
	CAS No.	conc.,		conc.,				
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)		(ppmv)	Chemical			
	71432	2.00E+06			Benzene			
	71432	2.00L100		1		KUP table comments on c	hemical properties	
					and/or toxicity criteria fo		•	
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE	below grade	Soil gas		Vadose zone		User-defined		
Ψ	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L_{F}	L_s	T_S	soil vapor		k_v		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		
	15	152	24	S			-	
							•	
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
•	SCS	soil dry	soil total	soil water-filled		flow rate into bldg.		
	soil type	bulk density,	porosity,	porosity,	((Leave blank to calcul	ate)	
	Lookup Soil	$ ho_{b}^{\ A}$	n ^v	$\theta_{\sf w}^{\;\;\sf V}$		Q_{soil}		
		(g/cm ³)	(unitless)	(cm ³ /cm ³)		(L/m)	=	
	S	1.64	0.392	0.197		5]	
MORE								
↓	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER		
	Averaging	Averaging						
	time for	time for	Exposure	Exposure	Exposure	Air Exchange		
	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate		
	•							
Lookup Receptor Parameters	AT _C	AT_NC	ED	EF	ET	ACH (hour) ⁻¹		

350

26

26

70

Residential

END

24

(NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Carbon disulfide

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.0E+00

Cancer

Risk

NA

Noncancer

Hazard

4.1E-03

			DAIALININI	711221				
		Soil	Gas Concentration	n Data				Resul
Reset to	ENTER	ENTER Soil	ado comoniada	ENTER Soil			Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)
Defaults	Chemical	gas	OR	gas			5.90E+03	5.1E-04
	CAS No.	conc.,		conc.,			<u> </u>	
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			=
	75150	5.90E+03]		Carbon disulfide			- -
							_	
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE	below grade	Soil gas		Vadose zone		User-defined		
Ψ	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L_{F}	L_s	Ts	soil vapor		k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)	:	(cm ²)	=	
	15	152	24	S			1	
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
→	SCS	soil dry	soil total	soil water-filled		flow rate into bldg		
	soil type	bulk density,	porosity,	porosity,	(L	eave blank to calcul	late)	
	Lookup Soil	$ ho_{b}^{\;A}$	n ^v	$\theta_{\sf w}^{\;\;\sf V}$		Q_{soil}		
	Econop Con	(g/cm ³)	(unitless)	(cm ³ /cm ³)	1	(L/m)	=	
	S	1.64	0.392	0.197		5]	
ope	I							
MORE ↓	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER		

Lookup Receptor

Residential

END

Averaging

time for

carcinogens,

 AT_C

(yrs)

70

Averaging

time for

noncarcinogens,

 $\mathsf{AT}_{\mathsf{NC}}$

(yrs)

26

Exposure

duration,

ED

(yrs)

26

Exposure

frequency,

EF

(days/yr)

350

Exposure

Time

ΕT

(hrs/day)

24

(NEW)

Air Exchange

Rate

ACH (hour)-1

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Cumene

				DATAENTRYS	HEEI					
			Soil	Gas Concentration	n Data				Result	ts Summary
	_	ENTER	ENTER		ENTER			Soil Gas Conc. A	ttenuation Factor	Indoor Air Conc.
	Reset to		Soil		Soil			(µg/m³)	(unitless)	(µg/m³)
	Defaults	Chemical	gas	OR	gas			2.90E+04	3.2E-04	9.2E+00
		CAS No.	conc.,		conc.,		!	<u> </u>		
		(numbers only,	C_g		C_{g}					
		no dashes)	(μg/m³)		(ppmv)	Chemical				
			i		,					
		98828	2.90E+04			Cumene				
						MESSAGE: See VLOOk and/or toxicity criteria for	KUP table comments on ch	nemical properties		
		ENTER	ENTER	ENTER	ENTER	and/or toxicity criteria ioi	ENTER	I		
		Depth								
	MORE	below grade	Soil gas		Vadose zone		User-defined			
	↓	to bottom	sampling	Average	SCS		vadose zone			
		of enclosed	depth	soil	soil type		soil vapor			
		space floor,	below grade,	temperature,	(used to estimate	OR	permeability,			
		L_{F}	L_s	T _S	soil vapor		k_v			
		(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)			
		15	152	24	S					
	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)			
		S	1.64	0.392	0.197		5]		
						•		•		
	MORE ↓	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER			
		Averaging	Averaging	LINILIX	LINILIX	LIVILIX	LIVILIN			
		time for	time for	Exposure	Exposure	Exposure	Air Exchange			
		carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate			
	Lookup Receptor	AT _C	AT _{NC}	ED	EF	ET	ACH			
	Parameters	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹			
			,				·	•		
NEW=	Residential	70	26	26	350	24	0.5			
						/A 15=1 A /\	(A 1971 A f)			

END

Cancer

Risk

NA

Noncancer

Hazard

2.2E-02

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: Cyclohexane

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.5E+03

Cancer

Risk

NA

Noncancer

Hazard

2.3E-01

December 2014							ocenano.	Nesidential
			DATA ENTRY S	SHEET			Chemical:	Cyclohexane
		Soil	Gas Concentration	n Data				Result
Reset to Defaults	ENTER	ENTER Soil		ENTER Soil			(µg/m³)	Attenuation Factor (unitless)
	Chemical CAS No. (numbers only,	gas conc., C _q	OR	gas conc., C _q			3.60E+06	4.0E-04
	no dashes)	(μg/m³)	:	(ppmv)	Chemical			
	110827	3.60E+06			Cyclohexane			
	ENTER	ENTER	ENTER	ENTER		ENTER	I	
MORE	Depth below grade	Soil gas		Vadose zone		User-defined		
Ψ	to bottom of enclosed	sampling depth	Average soil	SCS soil type		vadose zone soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F (15 or 200 cm)	L _s (cm)	T _s (°C)	soil vapor permeability)		k _v (cm²)		
	15	152	24	S				
							•	
MORE	ENTER Vandose zone	ENTER Vadose zone	ENTER Vadose zone	ENTER Vadose zone		ENTER Average vapor		
₩ V	SCS soil type	soil dry	soil total	soil water-filled		flow rate into bldg.	ate)	

MORE 🔟	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Ethylbenzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.1E+03

Cancer

Risk

9.5E-04

Noncancer

Hazard

1.0E+00

		Soil	Gas Concentration	n Data				Result
Reset to Defaults	ENTER Chemical	ENTER Soil gas	OR	ENTER Soil gas			Soil Gas Conc. (μg/m³) 3.00E+06	Attenuation Factor (unitless) 3.6E-04
	CAS No. (numbers only, no dashes)	conc., C _g (μg/m³)		conc., C _g (ppmv)	Chemical			=
	100414	3.00E+06]		Ethylbenzene			- -
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE ↓	below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)		
	15	152	24	S			=	
MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)	(1	ENTER Average vapor flow rate into bldg Leave blank to calcu Q _{soil} (L/m)		

ENTER

Exposure duration,

ED

(yrs)

26

ENTER

Exposure

frequency,

EF

(days/yr)

350

Last Update: December 2014
DTSC Human and Ecological Risk Office

MORE

Lookup Receptor

Parameters

Residential

END

ENTER

Averaging

time for

carcinogens,

 AT_C

(yrs)

70

ENTER

Averaging

time for

noncarcinogens,

 $\mathsf{AT}_{\mathsf{NC}}$

(yrs)

26

ENTER

Exposure

Time

ΕT

(hrs/day)

24

(NEW)

ENTER

Air Exchange

Rate

ACH

(hour)⁻¹

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: m-Xylene

Soil Gas Conc. Attenuation Factor

(unitless)

3.5E-04

 $(\mu g/m^3)$

1.10E+07

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.9E+03

Cancer

Risk

NA

Noncancer

Hazard

3.7E+01

			DATA ENTRY S	HEET		
		Soil	Gas Concentration	n Data		
Reset to	ENTER	ENTER		ENTER		
Defaults		Soil		Soil		
Delaults	Chemical	gas	OR	gas		
	CAS No.	conc.,		conc.,		
	(numbers only,	C _g		C_{g}		
	no dashes)	(μg/m³)		(ppmv)	Chemical	
	108383	1.10E+07			m-Xylene	
	ENTER Depth	ENTER	ENTER	ENTER		ENTER
MORE	below grade	Soil gas		Vadose zone		User-defined
•	to bottom	sampling	Average	SCS		vadose zone
	of enclosed	depth	soil	soil type		soil vapor
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability
	L_{F}	L _s	T _s	soil vapor		k_{v}
		((°C\	permeability)		
	(15 or 200 cm)	(cm)	(°C)	Т реппеавініу)		(cm ²)

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197]	5
MORE 🗸	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens,	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential END	70	26	26	350	24 (NEW)	0.5 (NEW)

> Reset to Defaults

> > MORE **↓**

(numbers only,

91203

1.30E+03

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: **Naphthalene**

	Soil Gas Concentration Data				Results Summary					
ENTER	ENTER		ENTER			Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
	Soil		Soil			(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard
Chemical	gas	OR	gas			1.30E+03	3.2E-04	4.2E-01	5.1E-06	1.3E-01
CAS No.	conc.,		conc.,							
numbers only,	C_g		C_g							
no dashes)	(μg/m³)		(ppmv)	Chemical						

Naphthalene

ENTER ENTER ENTER ENTER ENTER Depth below grade Soil gas Vadose zone User-defined to bottom sampling Average SCS vadose zone of enclosed depth soil soil type soil vapor (used to estimate OR permeability, space floor, below grade, temperature, T_{S} soil vapor k_{ν} (°C) (15 or 200 cm) (cm²)(cm) permeability) 152 24 15 S

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE 🗸	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
Lookup Receptor Parameters	AT_C	AT_{NC}	ED	EF	ET	ACH
raidifieters	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: Hexane

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

5.6E+02

Cancer

Risk

NA

Noncancer

Hazard

7.7E-01

			DATA ENTRY S	SHEET			Chemical:	Hexane
		Soil	Gas Concentration	n Data				Res
Reset to Defaults	ENTER Chemical CAS No.	ENTER Soil gas conc.,	OR	ENTER Soil gas conc.,			Soil Gas Conc. (μg/m³) 1.50E+06	Attenuation Factor (unitless) 3.8E-04
	(numbers only, no dashes)	C _g (μg/m³)	=	C _g (ppmv)	Chemical			
	110543	1.50E+06	1		Hexane			
MODE	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE ↓		Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm²)		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW:		70	26	26	350	24 (NEW)	0.5 (NEW)
	END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

3.00E+05

103651

Scenario: Residential
Chemical: n-Propylbenzene

	Soil Gas Concentration Data						Results Summary				
D 11	ENTER	ENTER		ENTER		Soil Gas Cor	c. Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	
Reset to		Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	Hazard	
Defaults	Chemical	gas	OR	gas		3.00E+05	3.2E-04	9.5E+01	NA	9.1E-02	
	CAS No.	conc.,		conc.,							
	(numbers only,	C_g		C_g							
	no dashes)	(μg/m³)		(ppmv)	Chemical						

n-Propylbenzene

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW	=> Residential	70	26	26	350	24	0.5
	END					(NEW)	(NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential o-Xylene Chemical:

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.1E+03

Cancer

Risk

NA

Noncancer

Hazard

1.1E+01

			DATA ENTRY S	SHEET			Cnemical:	o-Xylene
		Soil	Gas Concentration	n Data				Result
Reset to	ENTER	ENTER Soil		ENTER Soil			Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)
Defaults	Chemical	gas	OR	gas			3.20E+06	3.6E-04
	CAS No. (numbers only,	conc., C _g (μg/m³)		conc., C _g	Chamiaal			
	no dashes)	(μg/III)	=	(ppmv)	Chemical			1
	95476	3.20E+06]		o-Xylene			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE	below grade	Soil gas		Vadose zone		User-defined		
—	to bottom	sampling	Average 	SCS		vadose zone		
	of enclosed	depth	soil	soil type	OR	soil vapor		
	space floor, L _F	below grade,	temperature, T_S	(used to estimate soil vapor	UR	permeability, k _v		
	(15 or 200 cm)	L _s (cm)	(°C)	permeability)		(cm ²)		
	15	152	24	S]	
							_	
MORE	ENTER Vandasa zana	ENTER	ENTER	ENTER Vadasa zana		ENTER Average vapor		
WORE	Vandose zone SCS	Vadose zone soil dry	Vadose zone soil total	Vadose zone soil water-filled		Average vapor flow rate into bldg		

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: sec-Butylbenzene

	Results Summary							
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer				
(µg/m³)	(unitless)	$(\mu g/m^3)$	Risk	Hazard				
6.40E+03	2.8E-04	1.8E+00	NA	4.3E-03				

Reset to	
Defaults	

	Soil (Gas Concentration	on Data		
ENTER	ENTER		ENTER	7	Soil Gas Conc.
	Soil		Soil		(µg/m³)
Chemical	gas	OR	gas		6.40E+03
CAS No.	conc.,		conc.,		
(numbers only,	C_g		C_g		
no dashes)	(μg/m³)		(ppmv)	Chemical	
105000	0.40= 00			B . II	
135988	6.40E+03		1	sec-Butylbenzene	

MORE **↓**

Soil gas sampling	Average	Vadose zone SCS		User-defined
depth below grade, L _s (cm)	soil temperature, T _S (°C)	soil type (used to estimate soil vapor permeability)	OR	vadose zone soil vapor permeability, k _v (cm ^z)
b	elow grade, L _s	elow grade, temperature, L_s T_S (cm) (°C)	elow grade, temperature, L_s T_S (used to estimate soil vapor (cm) $(^{\circ}C)$ permeability)	elow grade, temperature, (used to estimate OR L _s T _S soil vapor (cm) (°C) permeability)

MORE	
¥	

ENTER	ENTER	ENTER	ENTER
Vandose zone	Vadose zone	Vadose zone	Vadose zone
SCS	soil dry	soil total	soil water-filled
soil type	bulk density,	porosity,	porosity,
Lookup Soil	$ ho_{b}^{\;A}$	n ^v	$\theta_{\sf w}^{\;\;\sf V}$
	(g/cm ³)	(unitless)	(cm ³ /cm ³)
-	-	-	
S	1.64	0.392	0.197



flow rate into bldg.

(Leave blank to calculate)

Q_{soil}

(L/m)

MORE **↓**

Lookup Receptor Parameters	`
	_

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Averaging	Averaging				
time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
AT_C	AT_NC	ED	EF	ET	ACH
(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
70	26	26	350	24	0.5

NEW=> Residential

END

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: Tetrachloroethylene

		Soil	Gas Concentration	n Data			Result	ts Summary	
Reset to	ENTER	ENTER		ENTER	7	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer
		Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk
Defaults	Chemical	gas	OR	gas		2.00E+03	2.7E-04	5.4E-01	1.1E-06
	CAS No.	conc.,		conc.,		, 			
	(numbers only,	C_g		C_g					
	no dashes)	(µg/m³)	_	(ppmv)	Chemical		_		
			_				_		
	127184	2.00E+03			Tetrachloroethylene		<u>-</u>		

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C	noncarcinogens, AT _{NC}	duration, ED	frequency, EF	Time ET	Rate ACH
	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)
END					()	(11211)

Noncancer

Hazard **1.5E-02**

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Toluene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

5.1E+03

Cancer

Risk

NA

Noncancer

Hazard

1.6E+01

		Soil	Gas Concentration	n Data				Resul
Reset to Defaults	ENTER Chemical	ENTER Soil gas	OR	ENTER Soil gas			Soil Gas Conc. (µg/m³) 1.30E+07	Attenuation Factor (unitless) 4.0E-04
	CAS No. (numbers only, no dashes)	conc., C _g (μg/m³)	<u>.</u>	conc., C _g (ppmv)	Chemical			=
	108883	1.30E+07	1		Toluene			- -
	ENTER Depth	ENTER	ENTER	ENTER		ENTER	1	
MORE ↓	below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)		
	15	152	24	S			-	
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)	(1	ENTER Average vapor flow rate into bldg Leave blank to calcu Q _{soil} (L/m)		

ENTER

Exposure

duration,

ED

(yrs)

26

ENTER

Exposure

frequency,

EF

(days/yr)

350

MORE

Lookup Receptor

Residential

END

ENTER

Averaging

time for

carcinogens,

 AT_C

(yrs)

70

ENTER

Averaging

time for

noncarcinogens,

 $\mathsf{AT}_{\mathsf{NC}}$

(yrs)

26

ENTER

Exposure

Time

ΕT

(hrs/day)

24

(NEW)

ENTER

Air Exchange

Rate

ACH (hour)-1

Reset to

Defaults

MORE **↓**

95636

9.86E+04

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: 1,2,4-Trimethylbenzene

Soil Gas Concentration Data				_		Result	ts Summary		
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
	Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard
Chemical	gas	OR	gas		9.86E+04	3.2E-04	3.2E+01	NA	4.3E+00
CAS No.	conc.,		conc.,						
(numbers only,	C_g		C_g						
no dashes)	(μg/m³)		(ppmv)	Chemical					

1,2,4-Trimethylbenzene

ENTER ENTER ENTER ENTER ENTER Depth Soil gas Vadose zone User-defined below grade to bottom sampling Average SCS vadose zone of enclosed depth soil soil type soil vapor (used to estimate OR permeability, space floor, below grade, temperature, T_{S} soil vapor k_v (°C) (15 or 200 cm) (cm²)(cm) permeability) 15 152 24 S

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
		carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
L	ookup Receptor	AT _C	AT _{NC}	ED	EF	ET	ACH
	Parameters	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
_							
NEW=>	Residential	70	26	26	350	24	0.5
ı						(NEW)	(NEW)
	END						

> Reset to Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: 1,3,5-Trimethylbenzene

Soil Gas Concentration Data						Results Summary				
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	
	Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	Hazard	
Chemical	gas	OR	gas		5.32E+04	3.2E-04	1.7E+01	NA	4.6E-01	
CAS No.	conc.,		conc.,		MESSAGE: Risk a	and/or hazard quotient is	based on route-to-route	extrapolatio	n.	
(numbers only,	C_g		C_g							
no dashes)	(μg/m³)	_	(ppmv)	Chemical		_				

1,3,5-Trimethylbenzene 5.32E+04 108678

MORE
ullet

ENTER Depth			ENTER	ENTER		
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)	
15	152	24	S			

	MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
		time for	time for	Exposure	Exposure	Exposure	Air Exchange
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
((3.5)	().0/	(3.0)	(44) 5, 3.)	(morady)	(/
NEW	=> Residential	70	26	26	350	24	0.5
			•			(NEW)	(NEW)
	END					•	

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: Acetone

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.9E-02

Cancer

Risk

NA

Noncancer

Hazard

5.8E-07

	DATA ENTRY SHEET Soil Gas Concentration Data							Acetone
								Resul
Reset to Defaults	ENTER Chemical	ENTER Soil	OR	ENTER Soil			(µg/m³)	Attenuation Factor (unitless)
/	CAS No. (numbers only, no dashes)	gas conc., C _g (μg/m³)	- OR	gas conc., C _g (ppmv)	Chemical		3.47E+01	5.4E-04
	67641	3.47E+01]		Acetone			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE ↓	below grade to bottom of enclosed	Soil gas sampling	Average soil	Vadose zone SCS		User-defined vadose zone		
	space floor, L_{F} (15 or 200 cm)	depth below grade, L _s (cm)	temperature, T _S (°C)	soil type (used to estimate soil vapor permeability)	OR	soil vapor permeability, k _v (cm ²)		
	15	152	24	S		. ,	= -	

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24	0.5
END					(NEW)	(NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Benzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.1E+02

Cancer

Risk

1.1E-03

Noncancer

Hazard

3.4E+01

		Soil (Gas Concentration	n Data				Result
	ENTER	ENTER	das concentration	ENTER			Soil Gas Conc. A	Attenuation Factor
Reset to		Soil		Soil			(μg/m ³)	(unitless)
Defaults	Chemical	gas	OR	gas			2.40E+05	4.4E-04
	CAS No.	conc.,		conc.,		l		
	(numbers only,	C _g		C_g				
	no dashes)	(μg/m³)		(ppmv)	Chemical			
		1 ""		(PP)				
	71432	2.40E+05			Benzene			
						KUP table comments on ch	nemical properties	
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE	below grade	Soil gas		Vadose zone		User-defined		
₩	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L_{F}	L_s	T_S	soil vapor		k_v		
	(15 or 200 cm)	(cm)	(°C)	permeability)	:	(cm ²)		
	15	152	24	S				
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, pb (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	·	ENTER Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)	ate)	
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange		
Lookup Receptor	carcinogens,	noncarcinogens,	duration, ED	frequency, EF	Time ET	Rate ACH		
Parameters	AT _C	AT _{NC}				(hour) ⁻¹		
,	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(Hour)		

Residential

END

70

26

26

350

24

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: Carbon disulfide

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.4E-01

Cancer

Risk

NA

Noncancer

Hazard

4.7E-04

			DATA ENTRY S	SHEET			Chemical:	Carbon disulf
	_		Gas Concentratio					Result
Reset to Defaults	Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C _g (μg/m³)	OR	ENTER Soil gas conc., C _g (ppmv)	Chemical		Soil Gas Conc. (μg/m³) 6.64E+02	Attenuation Factor (unitless) 5.1E-04
	75150	6.64E+02	1		Carbon disulfide			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE 🗸	below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)	_	
	15	152	24	S			_	

MORE 🗸	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Cumene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.5E+00

Cancer

Risk

NA

Noncancer

Hazard

3.7E-03

		Soil	Gas Concentration	n Data				Result
Reset to	ENTER	ENTER Soil		ENTER Soil			Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)
Defaults	Chemical	gas	OR	gas			4.86E+03	3.2E-04
	CAS No.	conc.,	011	conc.,			4.002103	5.22 61
	(numbers only,	C_{g}		C_{g}				
	no dashes)	(μg/m³)		(ppmv)	Chemical			
								=
	98828	4.86E+03			Cumene			-
					MESSAGE: See VLOOK and/or toxicity criteria for		hemical properties	
	ENTER	ENTER	ENTER	ENTER	anaror toxicity oriona for	ENTER	1	
	Depth	0.11		l ., .				
MORE	below grade	Soil gas	A	Vadose zone		User-defined		
—	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type	OD	soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F	L _s	T _S	soil vapor		k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)	•	(cm ²)	<u> </u>	
	15	152	24	S			_	
				•		•	_	
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	(ENTER Average vapor flow rate into bldg. Leave blank to calcul Q _{soil} (L/m)		
	Vandose zone SCS soil type	Vadose zone soil dry bulk density, ρ _b ^A	Vadose zone soil total porosity, n ^v	Vadose zone soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ }$	· ·	Average vapor flow rate into bldg. Leave blank to calcul Q _{soil}		
	Vandose zone SCS soil type Lookup Soil	Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	Vadose zone soil total porosity, n ^v (unitless)	Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)	ENTER Exposure	Average vapor flow rate into bldg. Leave blank to calcul Q _{soil} (L/m)		
₩ MORE ₩	Vandose zone SCS soil type Lookup Soil S ENTER Averaging	Vadose zone soil dry bulk density, pb (g/cm³) 1.64 ENTER Averaging	Vadose zone soil total porosity, n° (unitless) 0.392	Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³) 0.197	ENTER	Average vapor flow rate into bldg. Leave blank to calcul Q _{soil} (L/m) 5		
₩ORE	Vandose zone SCS soil type Lookup Soil S ENTER Averaging time for	Vadose zone soil dry bulk density, pbA (g/cm³) 1.64 ENTER Averaging time for	Vadose zone soil total porosity, n (unitless) 0.392 ENTER Exposure	Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³) 0.197 ENTER Exposure	ENTER Exposure	Average vapor flow rate into bldg. Leave blank to calcul Q _{soil} (L/m) 5 ENTER Air Exchange		

Residential

END

70

26

26

350

24

0.5

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Cyclohexane

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.1E+02

Cancer

Risk

NA

Noncancer

Hazard

5.0E-02

			Soil	Gas Concentration	n Data				Result
		ENTER	ENTER		ENTER			Soil Gas Conc. A	ttenuation Factor
	Reset to		Soil		Soil			(µg/m³)	(unitless)
	Defaults	Chemical	gas	OR	gas			7.75E+05	4.0E-04
		CAS No.	conc.,		conc.,		!	<u> </u>	
		(numbers only,	C_g		C_g				
		no dashes)	(µg/m³)		(ppmv)	Chemical			
			(10)	:	(PPIIIV)	Onomical			
		110827	7.75E+05	1		Cyclohoveno			
		110027	7.73E+03			Cyclohexane			
		ENTER	ENTER	ENTER	ENTER		ENTER		
		Depth	ENTER	LIVILIV	Livien		LIVILIV		
	MORE	below grade	Soil gas		Vadose zone		User-defined		
	₩ ¥	to bottom	sampling	Average	SCS		vadose zone		
	·	of enclosed	depth	soil	soil type		soil vapor		
		space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
		L _F	L _s	T _S	soil vapor	0	k _v		
		(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		
		(13 01 200 CIII)	(CIII)	(0)	permeability)		(CIII)		
		15	152	24	S				
		15	102	24	<u> </u>				
	MORE 🔟	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)	ate)	
			(9 - 7	(41111000)	((2)	ł	
		S	1.64	0.392	0.197		5		
	MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER		
		time for	time for	Exposure	Exposure	Exposure	Air Exchange		
		carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate		
	Lookup Receptor Parameters	AT_C	AT_{NC}	ED	EF	ET	ACH		
	raiaiiieleis	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹		
NEW=	Residential	70	26	26	350	24	0.5		
						(2.1-1.2	(2.1-1.2		

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Ethylbenzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

2.1E+02

Cancer

Risk

1.9E-04

Noncancer

Hazard

2.0E-01

			Soil	Gas Concentration	n Data				Result
		ENTER	ENTER		ENTER			Soil Gas Conc.	Attenuation Factor
	Reset to		Soil		Soil			(µg/m³)	(unitless)
	Defaults	Chemical	gas	OR	gas			5.86E+05	3.6E-04
		CAS No.	conc.,		conc.,		<u>r</u>		
		(numbers only,	C_{g}		C_g				
		no dashes)	(µg/m³)		(ppmv)	Chemical			
			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		(PP)	0.101111041			
		100414	5.86E+05			Ethylbenzene			
						•			
		ENTER	ENTER	ENTER	ENTER		ENTER		
		Depth	LIVILIN	LIVILIX	LNIER		LNIER		
	MORE	below grade	Soil gas		Vadose zone		User-defined		
	↓	to bottom	sampling	Average	SCS		vadose zone		
		of enclosed	depth	soil	soil type		soil vapor		
		space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
		L_{F}	L_s	T_{S}	soil vapor		k_v		
		(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		
					. , , , ,				
		15	152	24	S				
	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)	ite)	
		S	1.64	0.392	0.197		5		
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange		
	ookun Desenter	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate		
	Lookup Receptor Parameters	AT_C	AT_{NC}	ED	EF	ET	ACH		
		(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹		
NEW=>	Residential	70	26	26	350	24	0.5		
IAL AA->	i vesiuei iliai	/0	20	20	330	24	0.5		

END

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: m-Xylene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

7.7E+02

Cancer

Risk

NA

Noncancer

Hazard

7.4E+00

			DATA ENTRY S	SHEET			Onemica.	III-Xylelle
		Soil	Gas Concentration	n Data				Resul
Reset to	ENTER	ENTER Soil		ENTER Soil			Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)
Defaults	Chemical	gas	OR	gas			2.18E+06	3.5E-04
	CAS No.	conc.,		conc.,			L	
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			=
	108383	2.18E+06	1		m-Xylene			<u>-</u> -
	ENTER	ENTER	ENTER	ENTER		ENTER	7	
	Depth							
MORE ↓	below grade to bottom	Soil gas sampling	Average	Vadose zone SCS		User-defined vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F	L _s	T _S	soil vapor	0.1	k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		
	15	152	24	S				
	10	102				·		
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
↓	SCS	soil dry	soil total	soil water-filled		flow rate into bldg		
	soil type	bulk density,	porosity, n ^v	porosity,		(Leave blank to calcu		
	Lookup Soil	$ ho_{b}^{\;A}$	n ^v	porosity, $\theta_w^{\ \ V}$		Q_{soil}		
	Ecokup Soli	(g/cm ³)	(unitless)	(cm ³ /cm ³)	:	(L/m)	=	
	S	1.64	0.392	0.197	1	5	٦	

	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
Lookup Receptor Parameters	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)
END						Ì

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Hexane

Attenuation Factor

(unitless)

3.8E-04

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

8.3E+01

Cancer

Risk

NA

Noncancer

Hazard

1.1E-01

		Soil	Gas Concentration	n Data		
Reset to	ENTER	ENTER		ENTER		Soil Gas Conc.
Defaults		Soil	0.0	Soil		(µg/m³)
Doradito	Chemical	gas	OR	gas		2.22E+05
	CAS No.	conc.,		conc.,		
	(numbers only,	C_g		C_g		
	no dashes)	(μg/m³)		(ppmv)	Chemical	
			•			
	110543	2.22E+05			Hexane	
	ENTER	ENTER	ENTER	ENTER		ENTER

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm²)
15	152	24	S		

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	-	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197]	5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
	time for	time for	Exposure	Exposure	Exposure	Air Exchange
	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
Lookup Receptor Parameters	AT_C	AT_NC	ED	EF	ET	ACH
1 diameters	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
W=> Residential	70	26	26	J 250	I 24	0.5
Kesidential	70	26	26	350	24 (NEW)	0.5
					(NEW)	(NEW)

(15 or 200 cm)

15

(cm)

152

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: n-Propylbenzene

 k_{ν}

(cm²)

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.9E+01

Cancer

Risk

NA

Noncancer

Hazard

1.8E-02

		Soil	Gas Concentration	n Data				Result
Reset to Defaults	Chemical CAS No. (numbers only,	ENTER Soil gas conc., C _g	OR	ENTER Soil gas conc., C _g			Soil Gas Conc. (μg/m³) 5.89E+04	Attenuation Factor (unitless) 3.2E-04
	no dashes)	(µg/m³)	<u>-</u>	(ppmv)	Chemical			_
	103651	5.89E+04]		n-Propylbenzene			- -
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE ↓	below grade to bottom of enclosed space floor,	Soil gas sampling depth below grade,	Average soil temperature,	Vadose zone SCS soil type (used to estimate	OR	User-defined vadose zone soil vapor permeability,		

soil vapor

permeability)

S

temperature, T_{S}

(°C)

24

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3) 0.197		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
Lookup Receptor Parameters	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
/=> Residential	70	26	26	350	24	0.5

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: o-Xylene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.7E+02

Cancer

Risk

NA

Noncancer

Hazard

1.6E+00

								Result
			Gas Concentration		i			
Reset to	ENTER	ENTER		ENTER				Attenuation Factor
Defaults	Chemical	Soil	OR	Soil			(μg/m³)	(unitless)
		gas	UR	gas			4.68E+05	3.6E-04
	CAS No.	conc.,		conc.,				
	(numbers only,	C _g		C_g	01			
	no dashes)	(μg/m³)	:	(ppmv)	Chemical			=
	95476	4.68E+05			o-Xylene			_ _
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE	below grade	Soil gas		Vadose zone		User-defined		
₩ —	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F	L _s	T _s	soil vapor		k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		
	15	152	24	S				
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ $(\text{cm}^3/\text{cm}^3)$		ENTER Average vapor flow rate into bldg. (Leave blank to calcul Q _{soil} (L/m)	ate)	
	S	1.64	0.392	0.197		5		
MORE ↓	ENTER Averaging time for carcinogens,	ENTER Averaging time for noncarcinogens,	ENTER Exposure duration,	ENTER Exposure frequency,	ENTER Exposure Time	ENTER Air Exchange Rate		
Lookup Receptor	AT _C	AT _{NC}	ED	EF	ET	ACH		
Parameters						(1		

Residential

END

(yrs)

70

(yrs)

26

(yrs)

26

(days/yr)

350

(hrs/day)

24

(NEW)

(hour)-1

0.5

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: sec-Butylbenzene

Results Summary							
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer			
(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard			
1.37E+03	2.8E-04	3.9E-01	NA	9.3E-04			
<u> </u>							

Reset to	
Defaults	

	Soil (Gas Concentration	on Data		
ENTER	ENTER		ENTER]	Soil Gas Conc.
	Soil		Soil		(µg/m³)
Chemical	gas	OR	gas		1.37E+03
CAS No.	conc.,		conc.,		
(numbers only,	C_g		C_g		
no dashes)	(μg/m³)		(ppmv)	Chemical	
135988	1.37E+03			sec-Butylbenzene	_

MORE

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S	· 	

MORE	
$oldsymbol{\Psi}$	

ENTER	ENTER	ENTER	ENTER
Vandose zone	Vadose zone	Vadose zone	Vadose zone
SCS	soil dry	soil total	soil water-filled
soil type	bulk density,	porosity,	porosity,
ookup Soil	$ ho_{b}^{\;A}$	n ^v	$\theta_{\sf w}^{\;\;\sf V}$
Ookup Ooii	(g/cm ³)	(unitless)	(cm ³ /cm ³)
-	-	-	-
S	1.64	0.392	0.197



Average vapor flow rate into bldg. (Leave blank to calculate) $\mathsf{Q}_{\mathsf{soil}}$ (L/m)



—	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
Lookup Receptor Parameters	time for carcinogens, AT _C	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
'=> Residential	70	26	26	350	24	0.5

Residentia

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: Tetrachloroethylene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

9.3E-02

Cancer

Risk

2.0E-07

Noncancer

Hazard

2.5E-03

		Soil	Gas Concentration	Data				Result
Reset to Defaults	Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C _g (μg/m³)	OR	ENTER Soil gas conc., C _g (ppmv)	Chemical		Soil Gas Conc. A (μg/m³) 3.42E+02	Attenuation Factor (unitless) 2.7E-04
	127184	3.42E+02			Tetrachloroethylene			
	ENTER	ENTER	ENTER	ENTER		ENTER	1	

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
	time for	time for	Exposure	Exposure	Exposure	Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
	,	,		`		
NEW=> Residential	70	26	26	350	24	0.5
<u></u>					(NEW)	(NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

8.79E+05

108883

Scenario: Residential Chemical: Toluene

		0-:14	00	- D-4-			Resul	ts Summary		
	ENTER	ENTER	Gas Concentratio	n Data ENTER		Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
Reset to		Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	Hazard
Defaults	Chemical	gas	OR	gas		8.79E+05	4.0E-04	3.5E+02	NA	1.1E+00
	CAS No.	conc.,		conc.,						
	(numbers only,	C_g		C_g						
	no dashes)	(μg/m³)		(ppmv)	Chemical		_			
							_			

Toluene

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

MORE 🔟	Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults YES

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

95636 6.80E+02 **1,2,4-Trimethylbenzene**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Scenario: Residential

Cancer

Risk

NA

Noncancer

Hazard

8.4E-01

Results Summary

 (C_{building})

(µg/m³)

6.1E+00

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

3.8E-05

Chemical: 1,2,4-Trimethylbenzene

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

MORE •

ENTER Depth	ENTER	ENTER	ENTER
below grade	D		Average
to bottom of enclosed	Depth below grade	SCS	soil/ groundwater
space floor,	to water table,	soil type	temperature,
L_F	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

5

 (C_{source})

(μg/m³) 1.61E+05

MORE **↓**

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

Used to calculate risk-based groundwater concentration.

NEW=> Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

Chemical

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

	ILS		
ENTER	ENTER		
	Initial		
Chemical	groundwater		
CAS No.	conc.,		
(numbers only,	C_W		

107062 3.80E+01 1,2-Dichloroethane

(μg/L)

	Results	Summary				Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.75E+03	5.4E-05	9.4E-02	8.7E-07	1.3E-02	NA	NA

Scenario: Residential

Chemical: 1,2-Dichloroethane

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

no dashes)

Used to calculate risk-based groundwater concentration.

ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_F	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> X YES

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

108678 2.20E+02 1,3,5-Trimethylbenzene

Results Summary						Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
7.41E+04	3.8E-05	2.8E+00	NA	7.7E-02	NA	NA

Scenario: Residential

Chemical: 1,3,5-Trimethylbenzene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
_			
15	1259.84	S	24

ENTER

Average vapor flow rate into bldg. (Leave blank to calculate)

> Q_{soil} (L/m)

5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

groundwater concentration.

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Lised to calcula	ate rick-hased					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> YES X

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

78933	1.80E+01	Methylethylketone (2-butanone)

MORE

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER

 (C_{source})

(µg/m³) 4.01E+01

Scenario: Residential

Cancer

Risk

NA

Results Summary

 (C_{building})

(µg/m³)

2.4E-03

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

6.1E-05

Chemical: Methylethylketone (2-butanone)

Noncancer

Hazard

4.7E-07

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Average vapor flow rate into bldg. (Leave blank to calculate) (L/m)

5

MORE

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Used to calculate risk-based groundwater concentration.

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) - '
1.0E-06	1	70	26	26	350	24	0.5

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х
. 20	/ \

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical
83329	1.70E+01	Acenaphthene

	Results			Groundwater ntration		
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.17E+02	3.3E-05	3.9E-03	NA	1.8E-05	NA	NA

Scenario: Residential

Chemical: Acenaphthene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.



ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5

ENTER

ENTER

ENTER



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

ENTER

Averaging

MORE

Lookup Receptor

Residential

ENTER

Target

groundwater concentration.

ENTER

Target hazard

ENTER

Averaging

risk for carcinogens, TR (unitless)	quotient for noncarcinogens, THQ (unitless)	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹	
	•	·	•					_
1.0E-06	1	70	26	26	350	24	0.5]
Used to calcula	ate risk-hased					(NFW)	(NEW)	I

END

ENTER

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

Reset to Defaults YES

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

	YES	X	
ENTER	ENTER Initial		
Chemical	groundwater		
CAS No.	conc.,		
(numbers only,	C_W		
no dashes)	(μg/L)		Chemical

Acetone

1.60E+02

MADE	
MORE	
IVIOI (L	
N4	
•	

67641

groundwater concentration.

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1250.94	9	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5

 (C_{source})

(µg/m³) 2.20E+02

Scenario: Residential

Cancer Noncancer

Hazard

4.9E-07

Risk

NA

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: Acetone

Results Summary

 (C_{building})

(µg/m³)

1.6E-02

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

7.3E-05



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE	
•	

Lookup Receptor

Residential

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based		_	·	_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Χ
	<u> </u>

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chem

71432

groundwater concentration.

6.30E+03 Benzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m)

5

 (C_{source})

(μg/m³) 1.37E+06

Scenario: Residential

Cancer

Risk

7.9E-04

Noncancer

Hazard

2.4E+01

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: Benzene

Results Summary

 (C_{building})

(µg/m³)

7.6E+01

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

5.6E-05



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · '
1.0E-06	1	70	26	26	350	24	0.5
Used to calcul	ate risk-based	_			_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial		
Chemical	groundwater		
CAS No.	conc.,		
(numbers only,	C_W		
no dashes)	(μg/L)	Chemical	
156592	1.50E+02	cis-1,2-Dichloroethylene	

	Results	Risk-Based Groundwater Concentration				
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
2.40E+04	5.5E-05	1.3E+00	NA	1.8E-01	NA	NA

Scenario: Residential

Chemical: cis-1,2-Dichloroethylene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.



ENTER Depth	ENTER	ENTER	ENTER
below grade to bottom	Depth		Average soil/
of enclosed	below grade	SCS	groundwater
space floor, L _F	to water table, L _{WT}	soil type directly above	temperature, T _S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
c			9	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

groundwater concentration.

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-hased					(NFW)	(NFW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

MESSAGE: See VLOOKUP table comments on chemical properties

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

	YES	X	
ENTER	ENTER		
	Initial		
Chemical	groundwater		
CAS No.	conc.,		
(numbers only,	C_W		
no dashes)	(μg/L)		Chemical
98828	7.10E+02	Cumene	

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

3.8E-05

Results Summary

 (C_{building})

(µg/m³)

1.2E+01

Scenario: Residential

Cancer

Risk

NA

Noncancer

Hazard

2.8E-02

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: Cumene

MORE

		and/or toxicity criteria for this chemical.				
ENTER	ENTER	ENTER	ENTER			
Depth						
below grade			Average			
to bottom	Depth		soil/			
of enclosed	below grade	SCS	groundwater			
space floor,	to water table,	soil type	temperature,			
L_{F}	L_WT	directly above	T_S			
(15 or 200 cm)	(cm)	water table	(°C)			
15	1259.84	S	24			

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5

 (C_{source})

(μg/m³) 3.12E+05



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197



Lookup Receptor

groundwater concentration.

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens,	quotient for noncarcinogens,	time for carcinogens,	time for noncarcinogens,	Exposure duration,	Exposure frequency,	Exposure Time	Air Exchange Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based				_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

	TES		
ENTER	ENTER		
	Initial		
Chemical	groundwater		
CAS No.	conc.,		
(numbers only,	C_W		
no dashes)	(μg/L)	Chemical	

100414 1.20E+03 **Ethylbenzene**

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
3.66E+05	4.3E-05	1.6E+01	1.4E-05	1.5E-02	NA	NA

Scenario: Residential

Chemical: **Ethylbenzene**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE •

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

MORE **↓**

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

groundwater concentration.

NEW=> Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> X YES

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

86737 2.80E+01 Fluorene

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.01E+02	3.0E-05	3.0E-03	NA	2.0E-05	NA	NA

Scenario: Residential

Chemical: Fluorene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

ENTER

Exposure

Time

ΕT

(hrs/day)

ENTER

Air Exchange

Rate

ACH (hour)⁻¹



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

ENTER ENTER ENTER ENTER ENTER ENTER Target Target hazard Averaging Averaging Exposure risk for quotient for time for time for Exposure carcinogens, noncarcinogens, carcinogens, noncarcinogens, duration, frequency, TR THQ AT_C AT_NC ED EF (unitless) (unitless) (yrs) (yrs) (yrs) (days/yr)

Residential

1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based					(NEW)	(NEW)
groundwater c	oncentration						

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

ILO	
ENTER	
Initial	
groundwater	
conc.,	
C···	

 $(\mu g/L)$ Chemical no dashes) 108383 1.40E+03 m-Xylene

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
3.89E+05	4.3E-05	1.7E+01	NA	1.6E-01	NA	NA

Scenario: Residential

Chemical: m-Xylene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER

Chemical CAS No. (numbers only,

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_F	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT _C (yrs)	ENTER Averaging time for noncarcinogens, AT _{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure Time ET (hrs/day)	ENTER Air Exchange Rate ACH (hour) ⁻¹
(unitiess)	(unitiess)	(yrs)	(yrs)	(yrs)	(days/yr)	(nrs/day)	(Hour)
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based				_	(NEW)	(NEW)

END

groundwater concentration.

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

	120	Λ
ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

Naphthalene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

3.8E-05

Results Summary

 (C_{building})

(µg/m³)

1.0E+00

Scenario: Residential

Chemical: Naphthalene

Cancer Noncancer

Hazard

3.3E-01

Risk

1.3E-05

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA



91203

groundwater concentration.

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L _F	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

1.60E+03

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

 (C_{source})

(µg/m³) 2.69E+04



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197



Lookup Receptor

Residential

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based		_	·	_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

104518 3.70E+02 **n-Butylbenzene**

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
2.26E+05	3.3E-05	7.5E+00	NA	4.1E-02	NA	NA

Scenario: Residential

Chemical: **n-Butylbenzene**

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE •

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

5

MORE **↓**

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

groundwater concentration.

NEW=> Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-hased					(NFW)	(NFW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> X YES

Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C _W (μg/L)	Chemical
·		
103651	8.50E+02	n-Propylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

3.8E-05

Results Summary

 (C_{building})

(µg/m³)

1.3E+01

Scenario: Residential

Chemical: **n-Propylbenzene**

Cancer

Risk

NA

Noncancer

Hazard

1.2E-02

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA



ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_{S}
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

 (C_{source})

(µg/m³) 3.43E+05



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter X III 1ES DOX)

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

	YES	X	
ENTER	ENTER Initial		
Chemical	groundwater		
CAS No.	conc.,		
(numbers only,	C_W		
no dashes)	(μg/L)		Chemical
95476	2.40E+01	o-Xylene	

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

4.3E-05

Results Summary

 (C_{building})

(µg/m³)

2.1E-01

Scenario: Residential

Cancer

Risk

NA

Noncancer

Hazard

2.0E-03

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: o-Xylene



ENTER Depth	ENTER	ENTER	ENTER
below grade	5		Average
to bottom of enclosed	Depth below grade	SCS	soil/ groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

 (C_{source})

(µg/m³) 4.81E+03



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197



Lookup Receptor Parameters

groundwater concentration.

NEW=> Residential

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based		_	·	_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Χ
· ·	

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

135988 4.20E+02 sec-Butylbenzene

Results Summary						Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.65E+05	3.3E-05	5.5E+00	NA	1.3E-02	NA	NA

Scenario: Residential

Chemical: sec-Butylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

ENTER

Exposure

frequency,

EF

(days/yr)

ENTER

Exposure

Time

ΕT

(hrs/day)

ENTER

Air Exchange

Rate

ACH

(hour)⁻¹



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

ENTER

Averaging

time for

noncarcinogens,

 AT_{NC}

(yrs)

MORE

Lookup Receptor Parameters

	1	_
		=
	_	
3		
JUI		

1	(unitless)	(unitless)			
	1.0E-06	1			
	Used to calculate risk-based				

ENTER

Target hazard

quotient for

noncarcinogens,

THQ

ENTER

Averaging

time for

carcinogens,

 AT_C

(yrs)

ENTER

Target

risk for

carcinogens,

TR

Residential

1.0E-06	1	70	26	26	350	24	0.5
Used to calculate risk-based						(NEW)	(NEW)
groundwater concentration.							

END

ENTER

Exposure

duration,

ED

(yrs)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

tert-Butylbenzene 98066 4.80E+01

Results Summary					Risk-Based Groundwate Concentration		
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer	
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1	
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)	
2.46E+04	3.3E-05	8.2E-01	NA	2.0E-03	NA	NA	

Scenario: Residential

Chemical: tert-Butylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER Depth	ENTER	ENTER	ENTER
below grade	. .		Average
to bottom of enclosed	Depth below grade	SCS	soil/ groundwater
space floor,	to water table,	soil type	temperature,
L _F	L _{WT}	directly above	T _S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential	

groundwater concentration.

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcu	late risk-based	_				(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> YES Χ

ENTER	ENTER	
Ola	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

Tetrachloroethylene 127184 8.00E+00

	Results	Summary				Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
5.50E+03	3.2E-05	1.7E-01	3.7E-07	4.8E-03	NA	NA

Scenario: Residential

Chemical: **Tetrachloroethylene**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based					(NEW)	(NEW)

END

groundwater concentration.

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

108883 1.30E+01 Toluene

	Results	Summary				Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
3.36E+03	4.9E-05	1.6E-01	NA	5.2E-04	NA	NA

Scenario: Residential

Chemical: Toluene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure duration,	Exposure	Exposure Time	Air Exchange Rate
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	•	frequency,		
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based					(NEW)	(NEW)

APPENDIX J

Johnson & Ettinger Model Results Soil Vapor & Groundwater Commercial Western Parcel

Reset to

Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial

Chemical: 1,2,4-Trimethylbenzene

	Soil (Gas Concentration	ı Data			Result	s Summary	
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer
	Soil		Soil		(µg/m³)	(unitless)	$(\mu g/m^3)$	Risk
Chemical	gas	OR	gas		5.80E+05	1.6E-04	9.3E+01	NA
CAS No.	conc.,		conc.,		<u></u>			
(numbers only,	C_g		C_g					
no dashes)	(μg/m³)		(ppmv)	Chemical		_		

1,2,4-Trimethylbenzene

MORE **↓** 95636

5.80E+05

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

MORE 🗸	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m))
	S	1.64	0.392	0.197		5	
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange	
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹	
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)	
END							

Noncancer

Hazard

3.0E+00

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

2.30E+03

95501

Scenario: Commercial

Chemical: 1,2-Dichlorobenzene

		Gas Concentratio	Results Summary							
D 4 4 .	ENTER	ENTER		ENTER		Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
Reset to		Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard
Defaults	Chemical	gas	OR	gas		2.30E+03	1.5E-04	3.4E-01	NA	3.9E-04
	CAS No.	conc.,		conc.,		<u>, </u>				
	(numbers only,	C_g		C_g						
	no dashes)	(μg/m³)		(ppmv)	Chemical					

1,2-Dichlorobenzene

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S	· 	

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

3.70E+05

108678

Scenario: Commercial

Chemical: 1,3,5-Trimethylbenzene

Noncancer

Hazard

3.8E-01

		Soil (Gas Concentratio	n Data			Result	s Summary		
D 4 4 -	ENTER	ENTER		ENTER		Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	N
Reset to		Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	
Defaults	Chemical	gas	OR	gas		3.70E+05	1.6E-04	5.9E+01	NA	
	CAS No.	conc.,		conc.,		MESSAGE: Risk a	nd/or hazard quotient is	based on route-to-route	extrapolation	n.
	(numbers only,	C_g		C_g						
	no dashes)	(μg/m³)		(ppmv)	Chemical		_			
							-			

1,3,5-Trimethylbenzene

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^z)
15	152	24	S	· [

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial END	70	25	25	250	8 (NEW)	(NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial

Chemical: 1,3-Dichlorobenzene

		Soil (Gas Concentration	n Data	Result	s Summary		
D 11	ENTER	ENTER		ENTER	Soil Gas Conc. Attenuation Factor	Indoor Air Conc.	Cancer	Nor
Reset to		Soil		Soil	(µg/m³) (unitless)	(µg/m³)	Risk	H
Defaults	Chemical	gas	OR	gas	1.10E+03 1.5E-04	1.6E-01	NA	3
	CAS No.	conc.,		conc.,	MESSAGE: Risk and/or hazard quotient is	pased on route-to-route	e extrapolatio	n.
	(numbers only,	C_g		C_g				

Chemical

1,3-Dichlorobenzene

MESSAGE: See VLOOKUP table comments on chemical properties

MORE **↓** no dashes)

541731

 $(\mu g/m^3)$

1.10E+03

				and/or toxicity criteria for	tnis chemicai.
ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ^z)
15	152	24	S		

(ppmv)

MORE 🔟	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
END					(IAEAA)	(IAEAA)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial

Chemical: 1,4-Dichlorobenzene

		Soil	Gas Concentration	n Data			Result	s Summary		
D 11	ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
Reset to		Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	Hazard
Defaults	Chemical	gas	OR	gas		1.00E+03	1.5E-04	1.5E-01	1.3E-07	4.2E-05
	CAS No.	conc.,		conc.,						
	(numbers only,	C_g		C_g						
	no dashes)	(µg/m³)		(ppmv)	Chemical		_			
			•				_			
	106467	1.00E+03			1,4-Dichlorobenzene		_			

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S	· 	

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER	ENTER	ENTER	ENTER Air Eychanga
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
NEW	=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
	END					, ,	

> Reset to Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Acetone

	Soil	Gas Concentration	n Data			Result	s Summary		
ENTER	ENTER		ENTER		Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
	Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard
Chemical	gas	OR	gas		8.90E+01	2.7E-04	2.4E-02	NA	1.8E-07
CAS No.	conc.,		conc.,		, 				
(numbers only,	C_g		C_g						
no dashes)	(μg/m³)		(ppmv)	Chemical					

MORE **↓**

67641

8.90E+01

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

Acetone

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θw (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial END	70	25	25	250	8 (NEW)	1 (NEW)

Reset to Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

 $(\mu g/m^3)$

no dashes)

Scenario: Commercial Chemical: Benzene

	Soil Gas Concentration Data					Results Summary					
ENTER	ENTER		ENTER]	Soil Gas Conc. A	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer		
	Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard		
Chemical	gas	OR	gas		2.00E+06	2.2E-04	4.4E+02	1.1E-03	3.4E+01		
CAS No.	conc.,		conc.,						·		
(numbers only,	C_g		C_g								

Chemical

71432 2.00E+06 Benzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

(ppmv)

MORE **↓**

				and/or toxicity criteria for	this chemical.
ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade	Soil gas		Vadose zone		User-defined
to bottom	sampling	Average	SCS		vadose zone
of enclosed	depth	soil	soil type		soil vapor
space floor,	below grade,	temperature,	(used to estimate	OR	permeability,
L_{F}	L_s	T_S	soil vapor		k_v
(15 or 200 cm)	(cm)	(°C)	permeability)	_	(cm ²)
				•	
15	152	24	S	1	

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8 (NEW)	l 1 (NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Carbon disulfide

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.5E+00

Cancer

Risk

NA

Noncancer

Hazard

4.9E-04

		Soil	Gas Concentratio	n Data				Result
Reset to Defaults	ENTER Chemical	ENTER Soil gas	OR	ENTER Soil gas			Soil Gas Conc. (μg/m³) 5.90E+03	Attenuation Factor (unitless) 2.6E-04
	CAS No. (numbers only, no dashes)	conc., C _g (μg/m³)		conc., C _g (ppmv)	Chemical			=
	75150	5.90E+03			Carbon disulfide			- -
- WORE	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
				•	
15	152	24	S		

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
	time for	time for	Exposure	Exposure	Exposure	Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Cumene

			DATA ENTRY S	SHEET					
		Soil	Gas Concentration	n Data				Resul	ts Summar
	ENTER	ENTER	das concentration	ENTER			Soil Gas Conc. A	Attenuation Factor	Indoor Air Co
Reset to		Soil		Soil			(µg/m³)	(unitless)	(µg/m ³)
Defaults	Chemical	gas	OR	gas			2.90E+04	1.6E-04	4.6E+00
	CAS No.	conc.,		conc.,					
	(numbers only,	C _g		C_g					
	no dashes)	(μg/m³)			Chemical				
		Ι (μ9)		(ppmv)	Cileilicai				
	98828	2.90E+04			Cumene				
				•		OKUP table comments on cl	hemical properties		
					and/or toxicity criteria f	or this chemical.	-		
	ENTER	ENTER	ENTER	ENTER		ENTER			
	Depth								
MORE	below grade	Soil gas		Vadose zone		User-defined			
•	to bottom	sampling	Average	SCS		vadose zone			
	of enclosed	depth	soil	soil type		soil vapor			
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,			
	L_{F}	L_s	T _S	soil vapor		k_{v}			
	(15 or 200 cm)	(cm)	(°C)	permeability)	•	(cm ²)			
	15	150	24	0	1				
	15	152	24	S]		
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calcul Q _{soil} (L/m)			
	S	1.64	0.392	0.197		5]		
MORE									
I WORE	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER			
			ENTER	ENTER	ENTER	ENTER			
	Averaging	Averaging	Evnoouro	Evneeure	Evnoouro	Air Evahanga			
	time for	time for	Exposure duration,	Exposure	Exposure Time	Air Exchange Rate			
Lookup Receptor	carcinogens,	noncarcinogens,	ED	frequency, EF	ET	ACH			
Parameters	AT _C	AT _{NC}							
	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹	=		
W=> Commercial	70	25	25	250	8	1 1	1		
Commercial			20		(A 1514 A	() (5)	Ţ		

END

Cancer

Risk NA Noncancer Hazard

2.6E-03

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Cyclohexane

		Soil	Gas Concentratio	n Data			Resul	ts Summary	
Reset to	ENTER	ENTER Soil		ENTER Soil	7	Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m³)	Cance Ris
Defaults	Chemical	gas	OR	gas		3.60E+06	2.0E-04	7.3E+02	NA
	CAS No. (numbers only,	conc.,		conc., C_g					
	no dashes)	(μg/m³)	<u>-</u>	(ppmv)	Chemical		<u>=</u>		
			_				_		
	110827	3.60E+06]		Cyclohexane		=		
							_		

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L_s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm²)
15	152	24	S		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER	ENTER	ENTER	ENTER Air Eychanga
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
NEW	=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
	END					, ,	

Noncancer Hazard 2.8E-02

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Ethylbenzene

Attenuation Factor

(unitless)

1.8E-04

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

5.3E+02

Cancer

Risk

1.1E-04

Noncancer

Hazard

1.2E-01

(µg
Soil Ga (µg/ 3.00
(µg
٦
]
_
g.
ulate)
_
٦
_
9

Exposure

frequency,

EF

(days/yr)

250

Last Update: December 2014

Lookup Receptor

Commercial

END

DTSC Human and Ecological Risk Office

time for

carcinogens,

 AT_C

(yrs)

70

time for

noncarcinogens,

 $\mathsf{AT}_{\mathsf{NC}}$

(yrs)

25

Exposure

duration,

ED

(yrs)

25

Exposure

Time

ΕT

(hrs/day)

(NEW)

Air Exchange

Rate

ACH (hour)⁻¹

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial hemical: m-Xylene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

2.0E+03

Cancer

Risk

NA

Noncancer

Hazard

4.5E+00

			DATA ENTRY S	SHEET			Chemical:	m-Xylene
		Soil	Gas Concentratio	n Data				Result
Reset to Defaults	ENTER Chemical	ENTER Soil gas	OR	ENTER Soil gas			Soil Gas Conc. (μg/m³) 1.10E+07	Attenuation Factor (unitless) 1.8E-04
	CAS No. (numbers only, no dashes)	conc., C _g (μg/m³)	:	conc., C _g (ppmv)	Chemical			
	108383	1.10E+07	1		m-Xylene			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE ↓	below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)		
	15	152	24	S				
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)	ate)	

	•	SCS soil type	soil type bulk density,		soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
		time for	time for	Exposure	Exposure	Exposure	Air Exchange
	p Receptor	carcinogens, AT _C	noncarcinogens, AT _{NC}	duration, ED	frequency, EF	Time ET	Rate ACH
Par	rameters	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
NEW=> Co	ommercial	70	25	25	250	8 (NEW)	(NEW)
	END					,	,

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Naphthalene

		Soil C	Gas Concentration	on Data			Resul	ts Summary		
Reset to	ENTER	ENTER Soil		ENTER Soil		Soil Gas Conc. <i>A</i> (µg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m³)	Cancer Risk	Noncanc Hazard
Defaults	Chemical	gas	OR	gas		1.30E+03	1.6E-04	2.1E-01	5.8E-07	1.6E-0
	CAS No.	conc.,		conc.,						
	(numbers only,	C_g		C_g						
	no dashes)	(μg/m³)		(ppmv)	Chemical					
	91203	1.30E+03			Naphthalene					

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER	ENTER	ENTER	ENTER Air Eychanga
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
NEW	=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
	END					, ,	

> Reset to Defaults

> > MORE **↓**

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

 $(\mu g/m^3)$

1.50E+06

no dashes)

110543

Scenario: Commercial Chemical: Hexane

	Soil (Gas Concentration	Data		Results Summary					
ENTER	ENTER		ENTER	Soil Gas Cor	nc. Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer		
	Soil		Soil	(μg/m³)	(unitless)	(µg/m³)	Risk	Hazard		
Chemical	gas	OR	gas	1.50E+06	1.9E-04	2.8E+02	NA	9.2E-02		
CAS No.	conc.,		conc.,	<u></u>						
(numbers only,	C_g		C_g							

Chemical

Hexane

ENTER ENTER ENTER ENTER ENTER Depth Soil gas Vadose zone User-defined below grade to bottom sampling Average SCS vadose zone of enclosed depth soil soil type soil vapor (used to estimate OR permeability, space floor, below grade, temperature, T_{S} soil vapor k_{ν} (°C) (15 or 200 cm) (cm²)(cm) permeability) 15 152 24 S

(ppmv)

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm ³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
	time for	time for	Exposure	Exposure	Exposure Time	Air Exchange Rate
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	ET (hrs/day)	ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8	1 1
			<u> </u>		(NEW)	(NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: n-Propylbenzene

Results Summary								
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer				
(µg/m³)	(unitless)	$(\mu g/m^3)$	Risk	Hazard				
3.00E+05	1.6E-04	4.8E+01	NA	1.1E-02				

Reset to	
Defaults	

	Soil	Gas Concentration	on Data		
ENTER	ENTER		ENTER	7	Soil Gas Conc.
	Soil		Soil		(µg/m³)
Chemical	gas	OR	gas		3.00E+05
CAS No.	conc.,		conc.,		<u></u>
(numbers only,	C_g		C_g		
no dashes)	(μg/m³)	=	(ppmv)	Chemical	
		_			
103651	3.00E+05			n-Propylbenzene	

MORE **↓**

Soil gas sampling	Average	Vadose zone SCS		User-defined
depth below grade, L _s (cm)	soil temperature, T _S (°C)	soil type (used to estimate soil vapor permeability)	OR	vadose zone soil vapor permeability, k _v (cm ^z)
b	elow grade, L _s	elow grade, temperature, L_s T_S (cm) (°C)	elow grade, temperature, L_s T_S (used to estimate soil vapor (cm) $(^{\circ}C)$ permeability)	elow grade, temperature, (used to estimate OR L _s T _S soil vapor (cm) (°C) permeability)

MORE	
$oldsymbol{\Psi}$	

ENTER	ENTER	ENTER	ENTER	
Vandose zone	Vadose zone	Vadose zone	Vadose zone	
SCS	soil dry	soil total	soil water-filled	
soil type	bulk density,	porosity,	porosity,	
ookup Soil	$ ho_{b}^{\;A}$	n ^v	$\theta_{\sf w}^{\;\;\sf V}$	
J J	(g/cm ³)	(unitless)	(cm ³ /cm ³)	
S	1.64	0.392	0.197	



Average vapor flow rate into bldg. (Leave blank to calculate)

Q_{soil}
(L/m)

5



Lookup Receptor Parameters		
	_	=

ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
time for carcinogens,	time for noncarcinogens,	Exposure duration,	Exposure frequency,	Exposure Time	Air Exchange Rate
AT _C	AT _{NC}	ED	EF	ET	ACH
(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
70	25	25	250	8	1

END

END

Commercial

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial Chemical: o-Xylene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

5.7E+02

Cancer

Risk

NA

Noncancer

Hazard

1.3E+00

	DATA ENTRY SHEET							o-Xylene
		Soil	Gas Concentration	n Data				Resu
Reset to Defaults	Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C _g (µg/m³)	OR	ENTER Soil gas conc., C _g (ppmv)	Chemical		Soil Gas Conc. (µg/m³) 3.20E+06	Attenuation Factor (unitless) 1.8E-04
	95476	3.20E+06	:]	(ррініч)	o-Xylene			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE ↓	below grade to bottom of enclosed space floor,	Soil gas sampling depth below grade, L _s	Average soil temperature, T_{S}	Vadose zone SCS soil type (used to estimate soil vapor	OR	User-defined vadose zone soil vapor permeability, k _v		
	L _F (15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
I	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=>	Commercial	70	25	25	250	8 (NEW)	1 (NEW)
	END					(IAEAA)	(INCAA)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: sec-Butylbenzene

 k_{v}

(cm²)

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

9.1E-01

Cancer

Risk

NA

Noncancer

Hazard

5.2E-04

		Soil	Gas Concentration	n Data				Result
Reset to Defaults	ENTER Chemical CAS No.	ENTER Soil gas conc.,	OR	ENTER Soil gas conc.,			Soil Gas Conc. (μg/m³) 6.40E+03	Attenuation Factor (unitless) 1.4E-04
	(numbers only, no dashes)	C _g (μg/m³)	<u>.</u>	C _g (ppmv)	Chemical			=
	135988	6.40E+03	1		sec-Butylbenzene			_ -
	ENTER Depth	ENTER	ENTER	ENTER		ENTER	7	
MORE ↓	below grade to bottom of enclosed space floor,	Soil gas sampling depth below grade,	Average soil temperature,	Vadose zone SCS soil type (used to estimate	OR	User-defined vadose zone soil vapor permeability,		

soil vapor

permeability)

S

250

 T_{S}

(°C)

24

(cm)

152

25

(15 or 200 cm)

15

70

MORE 🗸	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm ³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER Air Evaluates
	time for carcinogens,	time for noncarcinogens,	Exposure duration,	Exposure frequency,	Exposure Time	Air Exchange Rate
Lookup Receptor	AT _C	AT _{NC}	ED	EF	ET	ACH
Parameters	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹

25

Commercial

Reset to

Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Commercial Scenario:

Tetrachloroethylene Chemical:

	Soil (Gas Concentration	n Data	_	Results Summary				
ENTER	ENTER		ENTER]	Soil Gas Conc.	. Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
	Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard
Chemical	gas	OR	gas		2.00E+03	1.4E-04	2.7E-01	1.3E-07	1.8E-03
CAS No.	conc.,		conc.,						
(numbers only,	C_g		C_g						
no dashes)	(μg/m³)		(ppmv)	Chemical					

ENTER

 \mathbf{Q}_{soil}

(L/m)

Tetrachloroethylene

MORE $\mathbf{\Psi}$

127184

2.00E+03

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S	· [

ENTER ENTER ENTER ENTER Vadose zone Vandose zone Vadose zone Vadose zone Average vapor SCS soil dry flow rate into bldg. soil water-filled soil total soil type bulk density, porosity, porosity, (Leave blank to calculate) $\theta_{\mathsf{w}}^{\mathsf{V}}$ ${\rho_b}^{\text{A}}$ Lookup Soil (g/cm^3) (cm³/cm³) (unitless) 0.392 S 1.64 0.197

MORE

MORE

 $\mathbf{\Psi}$

ENTER ENTER ENTER ENTER ENTER ENTER Averaging Averaging Air Exchange time for time for Exposure Exposure Exposure carcinogens, noncarcinogens, duration, frequency, Time Rate AT_C AT_{NC} ED EF ΕT ACH (hour)-1 (hrs/day) (yrs) (yrs) (yrs) (days/yr) 25 25 250 70

Commercial

END

Lookup Receptor

Parameters

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Toluene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

2.6E+03

Cancer

Risk

NA

Noncancer

Hazard

2.0E+00

		Soil	Gas Concentratio	n Data				Result
	ENTER	ENTER		ENTER]		Soil Gas Conc. A	Attenuation Factor
Reset to		Soil		Soil			(µg/m ³)	(unitless)
Defaults	Chemical	gas	OR	gas			1.30E+07	2.0E-04
	CAS No.	conc.,		conc.,			<u>L</u>	
	(numbers only,	C_{g}		C_{g}				
	no dashes)	(μg/m³)	_	(ppmv)	Chemical			
			-					
	108883	1.30E+07			Toluene			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER	7	
MORE	below grade	Soil gas		Vadose zone		User-defined		
₩	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	denth	soil	soil type		soil vanor		

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

	MORE 🗸	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=	-> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
	END					(IAFAA)	(1411)

> Reset to Defaults

> > MORE **↓**

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

 $(\mu g/m^3)$

9.86E+04

no dashes)

95636

Scenario: Commercial

Chemical: 1,2,4-Trimethylbenzene

	Soil Gas Concentration Data					Results Summary					
ENTER	ENTER		ENTER		Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer		
	Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard		
Chemical	gas	OR	gas		9.86E+04	1.6E-04	1.6E+01	NA	5.1E-01		
CAS No.	conc.,		conc.,	_							
(numbers only,	C_g		C_g								

Chemical

1,2,4-Trimethylbenzene

ENTER ENTER ENTER ENTER ENTER Depth below grade Soil gas Vadose zone User-defined to bottom sampling Average SCS vadose zone of enclosed depth soil soil type soil vapor (used to estimate OR permeability, space floor, below grade, temperature, T_{S} soil vapor k_v (°C) (15 or 200 cm) (cm²)(cm) permeability) 15 152 24 S

(ppmv)

MORE ¥	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)		
	S	1.64	0.392	0.197		5		
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange		
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT_{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹		
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)		
END					, ,	,		

> Reset to Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial

Chemical: 1,3,5-Trimethylbenzene

	Soil	Gas Concentration	n Data		Results Summary				
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer
	Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard
Chemical	gas	OR	gas		5.32E+04	1.6E-04	8.5E+00	NA	5.5E-02
CAS No.	conc.,		conc.,		MESSAGE: Risk a	and/or hazard quotient is	based on route-to-route	extrapolation	า.
(numbers only,	C_g		C_g						
no dashes)	(μg/m³)	_	(ppmv)	Chemical		_			

1,3,5-Trimethylbenzene 5.32E+04 108678

MORE	1
Ψ	

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S	· [

MORE ↓	Lo	ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)	·	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
MORE ↓		ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Recep Parameters		carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercia		70	25	25	250	8 (NEW)	(NEW)

> Reset to Defaults

> > MORE

 $oldsymbol{\Psi}$

(numbers only, no dashes)

15

70

 $(\mu g/m^3)$

152

25

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Acetone

	Soil Gas Concentration Data					Results Summary					
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer		
	Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk	Hazard		
Chemical	gas	OR	gas		3.47E+01	2.7E-04	9.4E-03	NA	6.9E-08		
CAS No.	conc.,		conc.,								
(numbers only,	C_g		C_g								

Chemical

3.47E+01 67641 Acetone **ENTER ENTER ENTER ENTER ENTER** Depth Vadose zone User-defined below grade Soil gas to bottom sampling Average SCS vadose zone of enclosed depth soil type soil vapor soil OR permeability, space floor, below grade, temperature, (used to estimate T_{S} soil vapor k_v (°C) (cm²)(15 or 200 cm) (cm) permeability)

(ppmv)

S

250

MORE 🗸	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
Lookup Receptor Parameters	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹

25

24

Commercial

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

25

Scenario: Commercial Chemical: Benzene

		Soil (Gas Concentration	n Data				Resul	ts Summar
5	ENTER	ENTER		ENTER			Soil Gas Conc. /	Attenuation Factor	Indoor Air Co
Reset to		Soil		Soil			(µg/m ³)	(unitless)	(µg/m³)
Defaults	Chemical	gas	OR	gas			2.40E+05	2.2E-04	5.3E+01
	CAS No.	conc.,		conc.,					
	(numbers only,	C_g		C_g					
	no dashes)	(μg/m³)		(ppmv)	Chemical				
	71422	2.405.105			Ponzono				
	71432	2.40E+05		<u> </u>	Benzene				
					MESSAGE: See VLOC and/or toxicity criteria f	OKUP table comments on coor this chemical	hemical properties		
	ENTER	ENTER	ENTER	ENTER	ararer textolog enteria i	ENTER	1		
	Depth								
MORE	below grade	Soil gas		Vadose zone		User-defined			
•	to bottom	sampling	Average	SCS		vadose zone			
	of enclosed	depth	soil	soil type		soil vapor			
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,			
	L_{F}	L_s	T _s	soil vapor		k _v			
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)			
	(10 01 =00 011)								
		1 450 1	0.4				_		
	15	152	24	S			}		
MORE ↓		ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calcul Q _{soil} (L/m)			
	ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ _b ^A	ENTER Vadose zone soil total porosity, n ^v	$\begin{array}{c} \textbf{ENTER} \\ \textbf{Vadose zone} \\ \textbf{soil water-filled} \\ \textbf{porosity,} \\ \theta_{\textbf{w}}^{\textbf{V}} \end{array}$		Average vapor flow rate into bldg. (Leave blank to calcul \mathbf{Q}_{soil}			
	ENTER Vandose zone SCS soil type Lookup Soil S ENTER Averaging	ENTER Vadose zone soil dry bulk density, pb (g/cm³) 1.64 ENTER Averaging	ENTER Vadose zone soil total porosity, n (unitless) 0.392 ENTER	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3) 0.197	ENTER Exposure	Average vapor flow rate into bldg. (Leave blank to calcul Q _{soil} (L/m)			
₩ORE	ENTER Vandose zone SCS soil type Lookup Soil S ENTER Averaging time for	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity,	ENTER Exposure Time	Average vapor flow rate into bldg. (Leave blank to calcul Q _{soil} (L/m)			
₩ORE	ENTER Vandose zone SCS soil type Lookup Soil S ENTER Averaging	ENTER Vadose zone soil dry bulk density, pb (g/cm³) 1.64 ENTER Averaging	ENTER Vadose zone soil total porosity, n (unitless) 0.392 ENTER Exposure	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3) 0.197	Exposure	Average vapor flow rate into bldg. (Leave blank to calcul Q _{soil} (L/m) 5 ENTER Air Exchange			

250

Commercial

END

70

25

Cancer

Risk

1.3E-04

Noncancer

Hazard

4.1E+00

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Carbon disulfide

(unitless)

2.6E-04

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.7E-01

Cancer

Risk

NA

Noncancer

Hazard

5.5E-05

	_	Soil	Gas Concentration	Data		
Reset to	ENTER	ENTER		ENTER		Soil Gas Conc. Atte
Defaults		Soil		Soil		(μg/m³)
Delaults	Chemical	gas	OR	gas		6.64E+02
	CAS No.	conc.,		conc.,		
	(numbers only,	C_g		C_g		
	no dashes)	(μg/m³)	<u>-</u>	(ppmv)	Chemical	
			_			
	75150	6.64E+02			Carbon disulfide	
	ENTER	FNTFR	FNTFR	FNTFR		ENTER

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k_v (cm^2)
				•	
15	152	24	S		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
,		time for	time for	Exposure duration,	Exposure	Exposure Time	Air Exchange Rate
	Lookup Receptor Parameters	carcinogens, AT _C	noncarcinogens, AT _{NC}	ED	frequency, EF	ET	ACH
		(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
NEW:	=> Commercial	70	25	25	250	8	1
			•			(NEW)	(NEW)
	END					,	. ,

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Cumene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

7.7E-01

Cancer

Risk

NA

Noncancer

Hazard

4.4E-04

		Soil (Gas Concentratio	n Nata				Resul
	ENTER	ENTER	das concentratio	ENTER			Soil Gas Conc	Attenuation Factor
Reset to		Soil		Soil			(μg/m³)	(unitless)
Defaults	Chemical	gas	OR	gas			4.86E+03	1.6E-04
	CAS No.	conc.,		conc.,				
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)		(ppmv)	Chemical			
				,				=
	98828	4.86E+03			Cumene			- -
					MESSAGE: See VLOOk and/or toxicity criteria for	(UP table comments on c	hemical properties	
	ENTER Depth	ENTER	ENTER	ENTER	and/or toxicity criteria for	ENTER]	
MORE	below grade	Soil gas		Vadose zone		User-defined		
↓	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L_{F}	L_s	T_S	soil vapor		k_v		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)	_	
]	
	15	152	24	S				
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)	(ENTER Average vapor flow rate into bldg Leave blank to calcul Q _{soil} (L/m)		
	S	1.64	0.392	0.197		5	7	
		1.04	0.392	0.197			J	
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER		
	time for	time for	Exposure	Exposure	Exposure	Air Exchange		
	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate		
Lookup Receptor	AT _C	AT _{NC}	ED	EF	ET	ACH		
Parameters	(vrs)	(vrs)	(vrs)	(days/yr)	(hrs/day)	(hour)⁻¹		

(days/yr)

250

(yrs)

25

(yrs)

25

(yrs)

70

Commercial

END

(hrs/day)

(NEW)

> Reset to Defaults

> > MORE **↓**

110827

7.75E+05

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Cyclohexane

	Soil Gas Concentration Data						Results Summary				
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer		
	Soil		Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard		
Chemical	gas	OR	gas		7.75E+05	2.0E-04	1.6E+02	NA	6.0E-03		
CAS No.	conc.,		conc.,								
(numbers only,	C_g		C_g								
no dashes)	(μg/m³)	_	(ppmv)	Chemical		_					

Cyclohexane

ENTER ENTER ENTER ENTER ENTER Depth below grade Soil gas Vadose zone User-defined to bottom sampling Average SCS vadose zone of enclosed depth soil soil type soil vapor (used to estimate OR permeability, space floor, below grade, temperature, T_{S} soil vapor k_{ν} (°C) (15 or 200 cm) (cm²)(cm) permeability) 152 15 24 S

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
Lookup Receptor	time for carcinogens,	time for noncarcinogens,	Exposure duration,	Exposure frequency,	Exposure Time	Air Exchange Rate
Parameters	AT _C (yrs)	AT _{NC} (yrs)	ED (yrs)	EF (days/yr)	ET (hrs/day)	ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8 (NEW)	(NEW)
END					(IATAA)	(IALAA)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Ethylbenzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.0E+02

Cancer

Risk

2.1E-05

Noncancer

Hazard

2.4E-02

		Soil	Gas Concentration	n Data				Result
D 11	ENTER	ENTER		ENTER			Soil Gas Conc.	Attenuation Factor
Reset to		Soil		Soil			(µg/m³)	(unitless)
Defaults	Chemical	gas	OR	gas			5.86E+05	1.8E-04
	CAS No.	conc.,		conc.,				
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)		(ppmv)	Chemical			=
	100414	5.86E+05			Ethylbenzene			_
	100 111							_
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE	below grade	Soil gas		Vadose zone		User-defined		
Ψ	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type	0.5	soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F	L _s	T _S	soil vapor		k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		
	15	152	24	S				
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
Ψ	SCS	soil dry	soil total	soil water-filled		flow rate into bldg.		
_	soil type	bulk density,	porosity,	porosity,		(Leave blank to calcul	ate)	
	Lookup Soil	$ ho_{b}^{\ A}$	n ^v	θ_{w}^{V}		Q_{soil}		
		(g/cm ³)	(unitless)	(cm ³ /cm ³)		(L/m)	=	
	S	1.64	0.392	0.197		5]	
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange		
a alous Darrite	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate		
ookup Receptor Parameters	AT_C	AT_{NC}	ED	EF	ET	ACH		
Falailleleis								

END

Commercial

(yrs)

70

(yrs)

25

(yrs)

25

(days/yr)

250

(hrs/day)

(NEW)

(hour)-1

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: m-Xylene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.9E+02

Cancer

Risk

NA

Noncancer

Hazard

8.8E-01

			DAIALININI						
		Soil	Gas Concentration	n Data				Resul	t
Reset to	ENTER	ENTER Soil	ado comocinadao.	ENTER Soil			Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)	
Defaults	Chemical	gas	OR	gas			2.18E+06	1.8E-04	•
	CAS No.	conc.,		conc.,			<u> </u>		•
	(numbers only,	C_g		C_g					
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			=	
	108383	2.18E+06]		m-Xylene			<u>.</u>	
	ENTER	ENTED	ENTED	ENTED		ENTED	1		
	Depth	ENTER	ENTER	ENTER		ENTER			
MORE	below grade	Soil gas		Vadose zone		User-defined			
Ψ	to bottom	sampling	Average	SCS		vadose zone			
	of enclosed	depth	soil	soil type		soil vapor			
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,			
	L_{F}	L_s	Ts	soil vapor		k_{v}			
	(15 or 200 cm)	(cm)	(°C)	permeability)	:	(cm ²)			
	15	152	24	S]		
	ENTER	ENTER	ENTER	ENTER		ENTER			
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor			
ullet	SCS	soil dry	soil total	soil water-filled		flow rate into bldg.			
	soil type	bulk density,	porosity,	porosity,		(Leave blank to calcul	ate)		
	Lookup Soil	$ ho_{b}^{\;A}$	n ^v	θ_{w}^{V}		Q_{soil}			
	Econop Con	(g/cm ³)	(unitless)	(cm ³ /cm ³)	:	(L/m)	=		
	S	1.64	0.392	0.197		5]		
MORE		-	_,						
Ψ	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER			

L	ookup Receptor Parameters
NEW=>	Commercial

ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
AT_C	AT_NC	ED	EF	ET	ACH
(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
70	25	25	250	8	1
				(NEW)	(NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

2.22E+05

110543

Scenario: Commercial Chemical: Hexane

		Soil	Gas Concentration	n Data		Results Summary					
Reset to Defaults	ENTER	ENTER		ENTER		Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	
		Soil		Soil		(µg/m³)	(unitless)	$(\mu g/m^3)$	Risk	Hazard	
	Chemical	gas	OR	gas		2.22E+05	1.9E-04	4.2E+01	NA	1.4E-02	
	CAS No.	conc.,		conc.,		<u></u>					
	(numbers only,	C_g		C_g							
	no dashes)	(μg/m³)		(ppmv)	Chemical		_				

Hexane

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm ³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial END	70	25	25	250	8 (NEW)	1 (NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: n-Propylbenzene

(unitless)

1.6E-04

Soil Gas Conc. Attenuation Factor

 $(\mu g/m^3)$

5.89E+04

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

9.3E+00

Cancer

Risk

NA

Noncancer

Hazard

2.1E-03

			DATA ENTRY S	HEET		
		Soil	Gas Concentration	n Data		
Reset to	ENTER	ENTER		ENTER		
Defaults		Soil		Soil		
Delaulis	Chemical	gas	OR	gas		
	CAS No.	conc.,		conc.,		
	(numbers only,	C_g		C_g		
	no dashes)	(μg/m³)	<u>.</u>	(ppmv)	Chemical	
			_			
	103651	5.89E+04			n-Propylbenzene	
	ENTED	ENTED	ENTED	ENTED		ENTED
	ENTER Depth	ENTER	ENTER	ENTER		ENTER
MORE	below grade	Soil gas		Vadose zone		User-defined
₩ V	to bottom	sampling	Average	SCS		vadose zone
	of enclosed	depth	soil	soil type		soil vapor
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,
	L _F	L _s	T _S	soil vapor		k _v
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)
		\ /	, ,	1		
	15	152	24	S		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW:	=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
	END					(,	()

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: o-Xylene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

8.4E+01

Cancer

Risk

NA

Noncancer

Hazard

1.9E-01

		Soil	Gas Concentration	n Data				Result
Desette	ENTER	ENTER		ENTER			Soil Gas Conc.	Attenuation Factor
Reset to		Soil		Soil			(µg/m³)	(unitless)
Defaults	Chemical	gas	OR	gas			4.68E+05	1.8E-04
	CAS No.	conc.,		conc.,				
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)		(ppmv)	Chemical			=
	95476	4.68E+05			o-Xylene			_
					•			-
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE	below grade	Soil gas		Vadose zone		User-defined		
Ψ	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F	L _s	T _S	soil vapor		k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)		
	15	152	24	S				
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
Ψ	SCS	soil dry	soil total	soil water-filled		flow rate into bldg.		
	soil type	bulk density,	porosity,	porosity,		(Leave blank to calcul	ate)	
	Lookup Soil	$ ho_{b}^{\ A}$	n ^v	θ_{w}^{V}		Q_{soil}		
		(g/cm ³)	(unitless)	(cm ³ /cm ³)		(L/m)	=	
	S	1.64	0.392	0.197		5]	
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange		
	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate		
ookup Receptor	AT _C	AT _{NC}	ED	EF	ET	ACH		
Parameters						/l \ -]		

Commercial

END

(yrs)

70

(yrs)

25

(yrs)

25

(days/yr)

250

(hrs/day)

(NEW)

(hour)⁻¹

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: sec-Butylbenzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.9E-01

Cancer

Risk

NA

Noncancer

Hazard

1.1E-04

		Soil	Gas Concentration	on Data			Res
Donat to	ENTER	ENTER		ENTER	7	Soil Gas Conc.	Attenuation Facto
Reset to		Soil		Soil		(µg/m³)	(unitless)
Defaults	Chemical	gas	OR	gas		1.37E+03	1.4E-04
	CAS No.	conc.,		conc.,		<u></u>	
	(numbers only,	C_g		C_g			
	no dashes)	(μg/m³)	_	(ppmv)	Chemical		=
			-				-
	135988	1.37E+03			sec-Butylbenzene		_

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)
15	152	24	S		

	MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE Ψ	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, $AT_{\mathbb{C}}$ (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW	/=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
	END					,	

Reset to

Defaults

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

3.42E+02

127184

Scenario: Commercial

Chemical: Tetrachloroethylene

	Soil (Gas Concentratio		Results Summary				
ENTER	ENTER		ENTER]	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer
	Soil		Soil		(µg/m ³)	(unitless)	(µg/m³)	Risk
Chemical	gas	OR	gas		3.42E+02	1.4E-04	4.7E-02	2.2E-08
CAS No.	conc.,		conc.,					
(numbers only,	C_g		C_g					
no dashes)	(μg/m³)		(ppmv)	Chemical		_		

Tetrachloroethylene

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ^z)
	450			1	
15	152	24	S	:]	

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	(1	ENTER Average vapor flow rate into bldg. Leave blank to calculate) Q _{soil} (L/m)
	S	1.64	0.392	0.197		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
Lookup Receptor Parameters	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8	1
END					(NEW)	(NEW)

Noncancer

Hazard

3.0E-04

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial Chemical: Toluene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.7E+02

Cancer

Risk

NA

Noncancer

Hazard

1.3E-01

			DATA ENTRY S	SHEET			Chemical:	Toluelle
		Soil	Gas Concentration	n Data				Resul
Reset to Defaults	Chemical CAS No. (numbers only,	ENTER Soil gas conc., Cg	OR	ENTER Soil gas conc., C _g			Soil Gas Conc. (μg/m³) 8.79E+05	Attenuation Factor (unitless) 2.0E-04
	no dashes) 108883	(μg/m³) 8.79E+05	<u>.</u>]	(ppmv)	Chemical			
MORE ↓	ENTER Depth below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L _s (cm)	ENTER Average soil temperature, T _S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)		

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.64	0.392	0.197		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW		70	25	25	250	8 (NEW)	1 (NEW)
	END						

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (EILER X III TES BOX)

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

95636 6.80E+02 **1,2,4-Trimethylbenzene**

	Results	Summary				Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.61E+05	1.9E-05	3.1E+00	NA	1.0E-01	NA	NA

Scenario: Commercial

Chemical: 1,2,4-Trimethylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_F	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

groundwater concentration.

NEW=> Commercial

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens,	quotient for noncarcinogens,	time for carcinogens,	time for noncarcinogens,	Exposure duration,	Exposure frequency,	Exposure Time	Air Exchange Rate
TR	THQ	AT _C	AT _{NC}	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

Χ YES **ENTER** Initial groundwater conc., (numbers only, C_W (μg/L) Chemical

107062 3.80E+01 1,2-Dichloroethane

	Results	Summary				Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.75E+03	2.7E-05	4.7E-02	1.0E-07	1.5E-03	NA	NA

Scenario: Commercial

Chemical: 1,2-Dichloroethane

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER

Chemical

CAS No.

no dashes)

groundwater concentration.

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Commercial

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target risk for carcinogens, TR	Target hazard quotient for noncarcinogens, THQ	Averaging time for carcinogens, AT _C	Averaging time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ·
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

es OR

Reset to Defaults YES YES

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemic

108678 2.20E+02 **1,3,5-Trimethylbenzene**

Risk-Based Groundwater Results Summary Concentration Soil Gas Conc. Attenuation Factor Indoor Air Conc. Cancer Noncancer Cancer Risk Noncancer Risk (C_{source}) (alpha) Hazard $= 10^{-6}$ $(C_{building})$ HQ = 1 (μg/m³) 7.41E+04 (unitless) (µg/L) $(\mu g/m^3)$ (µg/L) 1.9E-05 9.1E-03 1.4E+00 NA NA NA

Scenario: Commercial

Chemical: 1,3,5-Trimethylbenzene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}

(L/m) 5

ENTER

Exposure

frequency,

EF

(days/yr)

ENTER

Exposure

Time

ΕT

(hrs/day)

ENTER

Air Exchange

Rate

ACH (hour)

MORE **↓**

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, $\rho_b^{\ \ \ \ \ \ }$ (g/cm^3)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S	1		S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

ENTER ENTER ENTER ENTER ENTER Target Target hazard Averaging Averaging risk for quotient for time for time for Exposure carcinogens, noncarcinogens, carcinogens, noncarcinogens, duration, TR THQ AT_C AT_NC ED (unitless) (unitless) (yrs) (yrs) (yrs)

NEW=> Commercial

1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)
groundwater c	oncentration						

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> YES X

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

78933 1.80E+01 Methylethylketone (2-butanone)

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
4.01E+01	3.0E-05	1.2E-03	NA	5.6E-08	NA	NA

Scenario: Commercial

Chemical: Methylethylketone (2-butanone)

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_F	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Commercial

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · '
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based				_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

83329 1.70E+01 Acenaphthene

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.17E+02	1.6E-05	1.9E-03	NA	2.1E-06	NA	NA

Scenario: Commercial

Chemical: Acenaphthene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.



ENTER Depth	ENTER	ENTER	ENTER
below grade to bottom	Depth		Average soil/
of enclosed	below grade	SCS	groundwater
space floor, L _F	to water table, L _{WT}	soil type directly above	temperature, T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER Average vapor

flow rate into bldg. (Leave blank to calculate)

(L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

END

groundwater concentration.

Commercial

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calcul	late risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES OR

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> YES Χ

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

67641 1.60E+02 Acetone

	Results	Risk-Based Groundwate Concentration				
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
2.20E+02	3.6E-05	8.0E-03	NA	5.9E-08	NA	NA

Scenario: Commercial

Chemical: Acetone

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Commercial

groundwater concentration.

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calcul	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

VE0	V
YES	^

ENTER Chemical	ENTER Initial groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical
71432	6.30E+03	Benzene

6.30E+03 Benzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_{S}
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER

 (C_{source})

(μg/m³) 1.37E+06

Scenario: Commercial

Cancer

Risk

9.0E-05

Noncancer

Hazard

2.9E+00

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: Benzene

Results Summary

 (C_{building})

(µg/m³)

3.8E+01

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

2.8E-05

Average vapor flow rate into bldg. (Leave blank to calculate) (L/m)

5

ENTER

ENTER

ENTER

MORE

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, $\rho_b^{\ \ \ \ \ \ }$ (g/cm^3)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S	1		S	1.64	0.392	0.197

ENTER

MORE

ENTER

ENTER

ENTER

Lookup Receptor

Commercial

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, AT _C (yrs)	Averaging time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based	_				(NEW)	(NEW)
groundwater o	concentration.						

END

ENTER

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

|--|

ENTER	ENTER Initial		
Chemical	groundwater		
CAS No.	conc.,		
(numbers only,	C_W		
no dashes)	(μg/L)	Chemical	
156592	1.50E+02	cis-1,2-Dichloroethylene	

(C_{source}) (alpha) $(C_{building})$ Risk Hazard = 10^{-6} HQ $(\mu g/m^3)$ (unitless) $(\mu g/m^3)$ ($\mu g/L$) (μg		Results	Summary			Risk-Based Conce	Groundwateı ntration
(µg/m³) (unitless) (µg/m³) (µg/L) (µg	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
2.405.04	(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
2.40F+04 2.9F.0F 6.6F.01 NA 2.2F.02 NA N	(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
2.40E-05 0.0E-01 NA 2.2E-02 NA NA	2.40E+04	2.8E-05	6.6E-01	NA	2.2E-02	NA	NA

Scenario: Commercial

Chemical: cis-1,2-Dichloroethylene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.



ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Commercial

groundwater concentration.

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · '
1.0E-06	1	70	25	25	250	8	1
Used to calcu	late risk-based				_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	

groundwater concentration.

98828

7.10E+02 **Cumene**

MESSAGE: See VI OOKLIP table comp

Chemical

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE J

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_{S}
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER

 (C_{source})

(μg/m³) 3.12E+05 Scenario: Commercial

Cancer

Risk

NA

Noncancer

Hazard

3.4E-03

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: Cumene

Results Summary

 (C_{building})

(µg/m³)

5.9E+00

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

1.9E-05

Average vapor flow rate into bldg. (Leave blank to calculate)

(L/m)



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

NEW=> Commercial

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target risk for carcinogens, TR	Target hazard quotient for noncarcinogens, THQ	Averaging time for carcinogens, AT _C	Averaging time for noncarcinogens, AT _{NC}	Exposure duration,	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
IK	THQ	AIC	AINC	ED	EF	EI	
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · '
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

100414 1.20E+03 Ethylbenzene

Results Summary						Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
3.66E+05	2.1E-05	7.9E+00	1.6E-06	1.8E-03	NA	NA

Scenario: Commercial

Chemical: **Ethylbenzene**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Commercial

groundwater concentration.

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calcul	ate risk-based	_				(NEW)	(NEW)

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Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> YES Χ

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

86737 2.80E+01 Fluorene

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.01E+02	1.5E-05	1.5E-03	NA	2.4E-06	NA	NA

Scenario: Commercial

Chemical: Fluorene

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation.

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m)

5

MORE

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Commercial

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour)
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-hased					(NFW)	(NEW)

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Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

108383 1.40E+03 **m-Xylene**

MESSAGE: Attenuation factor < 6E-05 is ur	reasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

2.1E-05

Results Summary

 (C_{building})

(µg/m³)

8.3E+00

Scenario: Commercial

Cancer

Risk

NA

Noncancer

Hazard

1.9E-02

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: m-Xylene



ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

 (C_{source})

(µg/m³) 3.89E+05



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

groundwater concentration.

NEW=> Commercial

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · '
1.0E-06	1	70	25	25	250	8	1
Used to calcul	ate risk-based					(NEW)	(NEW)

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Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical	ENTER Initial groundwater		
CAS No.	conc.,		
(numbers only,	C_W		
no dashes)	(μg/L)		Chemical
91203	1.60E+03	Naphthalene	

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

1.9E-05

Results Summary

 (C_{building})

(µg/m³)

5.2E-01

Scenario: Commercial

Chemical: Naphthalene

Cancer

Risk

1.4E-06

Noncancer

Hazard

3.9E-02

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

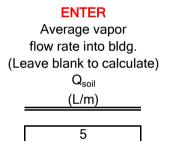
 $= 10^{-6}$

(µg/L)

NA



ENTER Depth	ENTER	ENTER	ENTER
below grade to bottom	Donth		Average soil/
of enclosed	Depth below grade	SCS	groundwater
space floor,	to water table, L _{WT}	soil type directly above	temperature, T _S
L _F (15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24



 (C_{source})

(µg/m³) 2.69E+04



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197



Lookup Receptor Parameters

groundwater concentration.

NFW=>	Commercial	

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	25	25	250	8	1
Used to calcul	ate risk-based					(NEW)	(NEW)

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Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> YES Χ

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

104518 3.70E+02 n-Butylbenzene

ENTER

ENTER

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
2.26E+05	1.7E-05	3.7E+00	NA	4.9E-03	NA	NA

Scenario: Commercial

Chemical: **n-Butylbenzene**

MESSAGE: Risk and/or HQ (or risk-based groundwater concentration) is based on route-to-route extrapolation. MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5

ENTER

ENTER

ENTER



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
c			S	1.64	0.392	0.197

ENTER

MORE

Lookup Receptor

	Parameters		
NFW=>	Commercial	l	

ENTER

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, AT _C (yrs)	Averaging time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calcula						(NEW)	(NEW)

END

ENTER

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Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults VES

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

ENTER		
Initial		
groundwater		
conc.,		
C_W		
(μg/L)		Chemical
	Initial groundwater conc., C _W	Initial groundwater conc., C _W

		_
103651	8.50E+02	n-Propylbenzene

Results Summary						Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
3.43E+05	1.9E-05	6.5E+00	NA	1.5E-03	NA	NA

Scenario: Commercial

Chemical: **n-Propylbenzene**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE **J**

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

Used to calculate risk-based groundwater concentration.

NEW=> Commercial

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) - '
1.0E-06	1	70	25	25	250	8	1

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Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

95476 2.40E+01 o-Xylene

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
4.81E+03	2.2E-05	1.0E-01	NA	2.4E-04	NA	NA

Scenario: Commercial

Chemical: o-Xylene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5

ENTER

ENTER

ENTER



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

ENTER

MORE

Lookup Receptor

ENTER

ENTER

ENTER

NEW=>	Commercial

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, AT _C (yrs)	Averaging time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour)
1.0E-06	1 1	70	25	25	250	8	1 1
Used to calcula		,,			200	(NEW)	(NEW)

END

ENTER

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

(enter "X" in "YES" box and initial groundwater conc. below)

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION

YES	Х

Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C _W (μg/L)	Chemical
135988	4.20E+02	sec-Butylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

1.7E-05

Results Summary

 (C_{building})

(µg/m³)

2.7E+00

Scenario: Commercial

Chemical: sec-Butylbenzene

Cancer

Risk

NA

Noncancer

Hazard

1.6E-03

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA



ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

 (C_{source})

(µg/m³) 1.65E+05



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197



Lookup Receptor Parameters

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0F-06	1	70	25	25	250	8	1

NEW=> Commercial

1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)
groundwater c	oncentration.						

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

(enter "X" in "YES" box and initial groundwater conc. below)

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION

YES X

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

98066 4.80E+01 tert-Butylbenzene

	Results	Risk-Based Groundwater Concentration				
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
2.46E+04	1.7E-05	4.1E-01	NA	2.3E-04	NA	NA

Scenario: Commercial

Chemical: tert-Butylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE **J**

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, $\rho_b^{\ \ \ \ \ \ }$ (g/cm^3)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S	1		S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

Commercial

groundwater concentration.

Parameters

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · '
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based	•				(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> Χ YES

ENTER Chemical	ENTER Initial groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical
127184	8.00E+00	Tetrachloroethylene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

1.6E-05

Results Summary

 (C_{building})

(µg/m³)

8.7E-02

Scenario: Commercial

Chemical: Tetrachloroethylene

Cancer

Risk

4.2E-08

Noncancer

Hazard

5.7E-04

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA



ENTER	ENTER	ENTER	ENTER
Depth below grade	Danath		Average
to bottom of enclosed	Depth below grade	SCS	soil/ groundwater
space floor, L _F	to water table, L _{WT}	soil type directly above	temperature, T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

 (C_{source})

(µg/m³) 5.50E+03



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Commercial

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target risk for carcinogens, TR	Target hazard quotient for noncarcinogens, THQ	Averaging time for carcinogens, AT _C	Averaging time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ·
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)

END

groundwater concentration.

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

108883 1.30E+01 **Toluene**

ENTER

ENTER

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	$(C_{building})$	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
3.36E+03	2.4E-05	8.2E-02	NA	6.2E-05	NA	NA

Scenario: Commercial

Chemical: Toluene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)

5

ENTER

ENTER

ENTER



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)
S			S	1.64	0.392	0.197

ENTER

MORE **↓**

Lookup Receptor Parameters

ptor s **ENTER**

NEW=>	Commercial

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, AT _C (yrs)	Averaging time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour)
1.0E-06	1 1	70	25	25	250	8	1 1
Used to calcula		,,			200	(NEW)	(NEW)

END

ENTER

APPENDIX K

Johnson & Ettinger Model Results Soil Vapor & Groundwater Residential Eastern Parcel

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Acetone

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.7E-02

Cancer

Risk

NA

Noncancer

Hazard

1.1E-06

		Soil	Gas Concentration	n Data				Resu
Reset to Defaults	ENTER Chemical	ENTER Soil gas	OR	ENTER Soil gas			Soil Gas Conc. A (μg/m³) 4.00E+01	(unitless) 9.2E-04
	CAS No. (numbers only, no dashes)	conc., C _g (μg/m³)	=	conc., C _g (ppmv)	Chemical			
	67641	4.00E+01	1		Acetone			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER	7	
MORE ↓	below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T_S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm²)	_	
	15	152	24	S			-	
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg Leave blank to calcu Q _{soil} (L/m)		
	S	1.72	0.358	0.122		5	7	

_	
NEW=>	Residential
_	
	END

MORE

Lookup Receptor

Parameters

ENTER

Averaging

ENTER

Averaging

time for time for Exposure Air Exchange Exposure Exposure duration, carcinogens, noncarcinogens, frequency, Time Rate AT_C $\mathsf{AT}_{\mathsf{NC}}$ ED EF ΕT ACH (hour)-1 (days/yr) (hrs/day) (yrs) (yrs) (yrs) 70 26 26 350 24 0.5 (NEW)

ENTER

ENTER

ENTER

ENTER

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Chloroform

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.5E-02

Cancer

Risk

1.2E-07

Noncancer

Hazard

1.4E-04

		5011	Gas Concentration	n Data			ll .	Res
5	ENTER	ENTER		ENTER			Soil Gas Conc.	Attenuation Facto
Reset to		Soil		Soil			(µg/m³)	(unitless)
Defaults	Chemical	gas	OR	gas			2.00E+01	7.4E-04
	CAS No.	conc.,		conc.,		·		
	(numbers only,	C_g		C_{g}				
	no dashes)	(μg/m³)		(ppmv)	Chemical			
	-		I					
	67663	2.00E+01			Chloroform			
	ENTER	ENTER	ENTER	ENTER		ENTER]	
MORE	Depth below grade	Soil gas		Vadose zone		User-defined		
₩ V	to bottom	sampling	Average	SCS		vadose zone		
•	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F	1	T _S	soil vapor	ON			
		L _S				k _v (cm²)		
	(15 or 200 cm)	(cm)	(°C)	permeability)		(СПТ)	-	
	15	152	24	S			1	
	15	102	21	, 5		1	1	
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate Q _{soil} (L/m)		
	ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ _b ^A	ENTER Vadose zone soil total porosity, n ^v	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ }$		Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil}		
	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)	ENTER	Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)		
₩	ENTER Vandose zone SCS soil type Lookup Soil S	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³) 1.72 ENTER	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3) 0.122		Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)		
₩ MORE ₩	ENTER Vandose zone SCS soil type Lookup Soil S ENTER Averaging	ENTER Vadose zone soil dry bulk density, pb (g/cm³) 1.72 ENTER Averaging	ENTER Vadose zone soil total porosity, n (unitless) 0.358	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3) 0.122 ENTER	ENTER	Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m) 5		
₩ORE Ψ	ENTER Vandose zone SCS soil type Lookup Soil S ENTER Averaging time for	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless) 0.358 ENTER Exposure	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3) 0.122 ENTER Exposure	ENTER Exposure	Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m) 5 ENTER Air Exchange		
₩ MORE ₩	ENTER Vandose zone SCS soil type Lookup Soil S ENTER Averaging time for carcinogens,	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³) 1.72 ENTER Averaging time for noncarcinogens,	ENTER Vadose zone soil total porosity, n (unitless) 0.358 ENTER Exposure duration,	ENTER Vadose zone soil water-filled porosity,	ENTER Exposure Time	Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m) 5 ENTER Air Exchange Rate		
₩ORE Ψ	ENTER Vandose zone SCS soil type Lookup Soil S ENTER Averaging time for carcinogens, AT _C	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³) 1.72 ENTER Averaging time for noncarcinogens, AT_{NC}	ENTER Vadose zone soil total porosity, n (unitless) 0.358 ENTER Exposure duration, ED	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³) 0.122 ENTER Exposure frequency, EF	ENTER Exposure Time ET	Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m) 5 ENTER Air Exchange Rate ACH		

Reset to

Defaults

MORE **↓** **ENTER**

Chemical

CAS No.

(numbers only, no dashes)

74873

ENTER

Soil

gas

 $\begin{array}{c} \text{conc.,} \\ C_g \end{array}$

 $(\mu g/m^3)$

4.30E+01

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential

Chemical: Methyl chloride (chloromethane)

ation	Data		Result	s Summary			
	ENTER	Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	
Soil		(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard	
gas		4.30E+01	1.0E-03	4.3E-02	NA	4.6E-04	
conc		•					

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical

Methyl chloride (chloromethane)

Chemical

				and/or toxicity criteria for th	iis chemical.
ENTER	ENTER	ENTER	ENTER		ENTER
Depth	Cail man		\/adaaa ====		Heer defined
below grade	Soil gas		Vadose zone		User-defined
to bottom	sampling	Average	SCS		vadose zone
of enclosed	depth	soil	soil type		soil vapor
space floor,	below grade,	temperature,	(used to estimate	OR	permeability,
L_{F}	L_s	T_S	soil vapor		k_v
(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)
				•	
15	152	24	S		

 C_g

(ppmv)

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate Q _{soil} (L/m))
	S	1.72	0.358	0.122		5	
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange	
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹	
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)	
END							

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Cyclohexane

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

2.1E+02

Cancer

Risk

NA

Noncancer

Hazard

3.4E-02

		Soil	Gas Concentration	n Data				Result
Reset to Defaults	ENTER	ENTER Soil		ENTER Soil			(µg/m³)	Attenuation Factor (unitless)
Delaulis	Chemical CAS No. (numbers only, no dashes)	gas conc., C _g (μg/m³)	OR	gas conc., C _g (ppmv)	Chemical		2.80E+05	7.6E-04
	110827	2.80E+05			Cyclohexane			
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE ↓	Depth below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)		
	15	152	24	S				
MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	ENTER Vadose zone soil total porosity, n° (unitless)	ENTER Vadose zone soil water-filled porosity, θ _w (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calcula Q _{soil} (L/m)	ate)	
	S	1.72	0.358	0.122		5		
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER		
Lookup Receptor Parameters	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹		
Residential					24		· [
> Residential	70	26	26	350	24	0.5		

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential Chemical: Ethylbenzene

		Soil	Gas Concentration	n Data				Result	s Summary
Reset to	ENTER	ENTER		ENTER	7	ll ll	•	Attenuation Factor	Indoor Air Conc.
		Soil		Soil			(µg/m³)	(unitless)	(µg/m³)
Defaults	Chemical	gas	OR	gas		1	.08E+04	6.8E-04	7.3E+00
	CAS No.	conc.,		conc.,					
	(numbers only,	C_g		C_g					
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			<u>.</u>	
			=					_	
	100414	1.08E+04			Ethylbenzene			_	

MORE **↓**

ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm²)
15	152	24	S		

MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.72	0.358	0.122		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)

Cancer

Risk

6.5E-06

Noncancer

Hazard

7.0E-03

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: Hexane

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

5.9E+01

Cancer

Risk

NA

Noncancer

Hazard

8.1E-02

		Chemical.	пехапе					
		Soil	Gas Concentratio	n Data				Resul
Reset to Defaults	ENTER Chemical CAS No. (numbers only,	ENTER Soil gas conc., C _g	OR	ENTER Soil gas conc., C _g			Soil Gas Conc. (µg/m³) 8.30E+04	Attenuation Factor (unitless) 7.1E-04
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			
	110543	8.30E+04]		Hexane			
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE ↓	below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T_s (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm²)	=	
	15	152	24	S				
							_	

	MORE ↓	Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.72	0.358	0.122		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, $AT_{\mathbb{C}}$ (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW	=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)
	END					,	,

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential Chemical: Toluene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

6.5E-02

Cancer

Risk

NA

Noncancer

Hazard

2.1E-04

	Chemical:	roiuene					
	Soil	Gas Concentration	n Data				Resu
ENTER Chemical	ENTER Soil gas	OR	ENTER Soil gas			Soil Gas Conc. (µg/m³) 8.80E+01	Attenuation Factor (unitless) 7.4E-04
CAS No. (numbers only, no dashes)	conc., C _g (μg/m³)	=	conc., C _g (ppmv)	Chemical			
108883	8.80E+01]		Toluene			
ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
below grade to bottom	Soil gas sampling depth	Average soil	Vadose zone SCS soil type		User-defined vadose zone soil vapor		
space floor, L _F	below grade, L _s	temperature, T_S	(used to estimate soil vapor permeability)	OR	permeability, k _v (cm ²)		
(15 or 200 cm)	(cm)	(°C)					
	Chemical CAS No. (numbers only, no dashes) 108883 ENTER Depth below grade to bottom of enclosed	ENTER Soil Ghemical CAS No. (numbers only, no dashes) Cy (µg/m³) 108883 ENTER Depth below grade to bottom of enclosed ENTER Soil gas (µg/m³) ENTER ENTER Soil gas sampling depth	ENTER Soil Chemical gas OR CAS No. conc., (numbers only, no dashes) (μg/m³) 108883 8.80E+01 ENTER ENTER ENTER Depth below grade Soil gas to bottom sampling Average of enclosed depth soil	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ENTER Soil Soil Soil Soil Soil Soil Soil Soil

	MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
		S	1.72	0.358	0.122		5
	MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
	Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
<mark>VEW</mark> =	=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)
	END						

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

i i	
YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

111444 1.50E+03 Bis(2-chloroethyl)ether

	Results	Summary				Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
9.69E+02	4.6E-05	4.5E-02	1.1E-05	NA	NA	NA

Scenario: Residential

Chemical: **Bis(2-chloroethyl)ether**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Residential

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based		_	·	_	(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (eitlet X III TES box)

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х
YES	Χ
120	/ \

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

1.33E+01 Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE

98828

groundwater concentration.

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER

 (C_{source})

(µg/m³) 5.84E+03 Scenario: Residential

Cancer

Risk

NA

Noncancer

Hazard

5.3E-04

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: Cumene

Results Summary

 (C_{building})

(µg/m³)

2.2E-01

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

3.8E-05

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)

5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n° (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
C	1		Q	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

NEW=> Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Lised to calcula	ate rick-hased					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

91203 6.47E+01 **Naphthalene**

groundwater concentration.

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
1.09E+03	3.8E-05	4.2E-02	5.1E-07	1.3E-02	NA	NA

Scenario: Residential

Chemical: Naphthalene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER Depth	ENTER	ENTER	ENTER
below grade to bottom	Depth		Average soil/
of enclosed	below grade	SCS	groundwater
space floor, L _F	to water table, L _{WT}	soil type directly above	temperature, T _S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER
Average vapor
flow rate into bldg.
(Leave blank to calculate)
Q_{soil}
(L/m)



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE **↓**

Lookup Receptor Parameters

NEW=> Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Used to calculate risk-based						(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

103651 1.32E+01 n-Propylbenzene

	Results Summary					Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
5.33E+03	3.8E-05	2.0E-01	NA	1.9E-04	NA	NA

Scenario: Residential

Chemical: **n-Propylbenzene**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.



ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based	_				(NEW)	(NEW)

END

groundwater concentration.

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	X	
		•
ENTER		

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

95476	3.00E+00	o-Xylene

Results Summary						Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
6.01E+02	4.3E-05	2.6E-02	NA	2.5E-04	NA	NA

Scenario: Residential

Chemical: o-Xylene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_F	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Residential

groundwater concentration.

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	26	26	350	24	0.5
Used to calcula	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

135988 1.70E+00 sec-Butylbenzene

	Results	Summary				Groundwater ntration
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
6.70E+02	3.3E-05	2.2E-02	NA	5.3E-05	NA	NA

Scenario: Residential

Chemical: sec-Butylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Residential

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	26	26	350	24	0.5
Lised to calcula	ate rick-hased					(NEW)	(NEW)

APPENDIX L

Johnson & Ettinger Model Results Soil Vapor & Groundwater Commercial Western Parcel

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Acetone

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.8E-02

Cancer

Risk

NA

Noncancer

Hazard

1.4E-07

			DATA ENTRY S	HEET				
		Soil	Gas Concentration	n Data				Result
Reset to Defaults	Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C _g (μg/m³)	OR	ENTER Soil gas conc., C _g (ppmv)	Chemical		Soil Gas Conc. A (µg/m³) 4.00E+01	Attenuation Factor (unitless) 4.6E-04
	67641	4.00E+01			Acetone			
MORE	ENTER Depth below grade	ENTER Soil gas	ENTER	ENTER Vadose zone		ENTER User-defined		
WIORE ₩	to bottom of enclosed space floor, L _F (15 or 200 cm)	sampling depth below grade, L _s (cm)	Average soil temperature, T _S (°C)	SCS soil type (used to estimate soil vapor permeability)	OR	vadose zone soil vapor permeability, k _v (cm ²)		
	15	152	24	S			_	

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.72	0.358	0.122		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
	time for	time for	Exposure	Exposure	Exposure Time	Air Exchange Rate
Lookup Receptor Parameters	carcinogens, AT _C	noncarcinogens, AT _{NC}	duration, ED	frequency, EF	ET	ACH
	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)
END						

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Chloroform

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

7.4E-03

Cancer

Risk

1.4E-08

Noncancer

Hazard

1.7E-05

			DATA ENTRY S	SHEET			Oncinical.	Omorororm
		Soil	Gas Concentration	n Data				Result
Desette	ENTER	ENTER		ENTER			Soil Gas Conc.	Attenuation Factor
Reset to		Soil		Soil			(µg/m³)	(unitless)
Defaults	Chemical	gas	OR	gas			2.00E+01	3.7E-04
	CAS No.	conc.,		conc.,				
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			<u>.</u>
			7					-
	67663	2.00E+01	<u> </u>		Chloroform			-
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE	below grade	Soil gas		Vadose zone		User-defined		
•	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type		soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L_{F}	L _s	T _S	soil vapor		k _v		
	(15 or 200 cm)	(cm)	(°C)	permeability)	:	(cm ²)		
	15	152	24	S	1		-	
	13	132				I	1	
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
Ψ	SCS	soil dry	soil total	soil water-filled		flow rate into bldg.		
	soil type	bulk density,	porosity,	porosity,		(Leave blank to calcul		

MORE ↓	Vandose zone SCS soil type	Vadose zone soil dry bulk density, ρ _b ^A (g/cm³)	Vadose zone soil total porosity, n' (unitless)	Vadose zone soil water-filled porosity, θ _w (cm ³ /cm ³)		Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.72	0.358	0.122		5
MORE ↓	ENTER Averaging time for	ENTER Averaging time for	ENTER Exposure	ENTER Exposure	ENTER Exposure	ENTER Air Exchange
Lookup Receptor Parameters	carcinogens, AT _C (yrs)	noncarcinogens, AT _{NC} (yrs)	duration, ED (yrs)	frequency, EF (days/yr)	Time ET (hrs/day)	Rate ACH (hour) ⁻¹
NEW=> Commercial END	70	25	25	250	8 (NEW)	1 (NEW)

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial

Chemical: Methyl chloride (chloromethane)

Results Summary										
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer						
(µg/m³)	(unitless)	(µg/m³)	Risk	Hazard						
4.30E+01	5.0E-04	2.2E-02	NA	5.5E-05						

Reset to
Defaults

	Soil	Gas Concentratio			
ENTER	ENTER		ENTER		Soil Gas Conc.
	Soil		Soil		(µg/m³)
Chemical	gas	OR	gas		4.30E+01
CAS No.	conc.,		conc.,		
(numbers only,	C_g		C_g		
no dashes)	(μg/m³)	=	(ppmv)	Chemical	
		_			
74873	4.30E+01			Methyl chloride (chloromethane)	

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.



				and/or toxicity criteria for the	ilo cricifiicai.
ENTER Depth	ENTER	ENTER	ENTER		ENTER
below grade to bottom	Soil gas sampling	Average	Vadose zone SCS		User-defined vadose zone
of enclosed space floor,	depth below grade,	soil temperature,	soil type (used to estimate	OR	soil vapor permeability,
L _F (15 or 200 cm)	L _s (cm)	T _s (°C)	soil vapor permeability)		k _v (cm²)
	. ,		реппеавшку)	:	(CIII)
15	152	24	S		

MORE	
Ψ	

1	ENTER	ENTER	ENTER	ENTER	ENTER
Van	dose zone	Vadose zone	Vadose zone	Vadose zone	Average vapor
	SCS	soil dry	soil total	soil water-filled	flow rate into bldg.
5	soil type	bulk density,	porosity,	porosity,	(Leave blank to calculate)
Lookup	Soil	$ ho_{b}^{\;A}$	n ^v	$\theta_{\sf w}^{\;\;\sf V}$	Q_{soil}
Соокир		(g/cm ³)	(unitless)	(cm ³ /cm ³)	(L/m)
					<u></u>
	S	1.72	0.358	0.122	5



Lookup Receptor Parameters

ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
AT_C	AT_NC	ED	EF	ET	ACH
(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
70	25	25	250	8	1
_	_	_	_	(NEW)	(NEW)

NEW=> Commercial

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial Chemical: Cyclohexane

Attenuation Factor

(unitless)

3.8E-04

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

1.1E+02

Cancer

Risk

NA

Noncancer

Hazard

4.0E-03

		Soil	Gas Concentration	n Data			
Desette	ENTER	ENTER		ENTER			Soil Gas Conc.
Reset to Defaults		Soil		Soil			(µg/m³)
Delauits	Chemical	gas	OR	gas			2.80E+05
	CAS No.	conc.,		conc.,		-	
	(numbers only,	C_g		C_g			
	no dashes)	(μg/m³)		(ppmv)	Chemical		
	110827	2.80E+05			Cyclohexane		
	ENTER Depth	ENTER	ENTER	ENTER		ENTER	
MORE	below grade	Soil gas		Vadose zone		User-defined	
↓	to bottom	sampling	Average	SCS		vadose zone	
	of enclosed	depth	soil	soil type		soil vapor	
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,	
	L_{F}	L_s	T_{S}	soil vapor		k_{v}	
	(15 or 200 cm)	(cm)	(°C)	permeability)		(cm ²)	
					:		
	15	152	24	S			
MORE	ENTER Vandose zone	ENTER Vadose zone	ENTER Vadose zone	ENTER Vadose zone		ENTER Average vapor	
↓	SCS	soil dry	soil total	soil water-filled		flow rate into bldg.	
	soil type	bulk density,	porosity,	porosity,		(Leave blank to calcula	ate)
	Lookup Soil	$ ho_{b}^{\;A}$	n ^v	$\theta_{\sf w}^{\;\;\sf V}$		Q_{soil}	
	LOOKUP SOII	(g/cm ³)	(unitless)	(cm ³ /cm ³)		(L/m)	
					i		
	S	1.72	0.358	0.122		5	
MORE							
₩	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	
	Averaging	Averaging	_	_	_		
	time for	time for	Exposure	Exposure	Exposure	Air Exchange	
Lookun Boonton	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate	
Lookup Receptor Parameters	AT _C	AT _{NC}	ED	EF	ET	ACH	
. Gramotoro	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹	

25

70

25

250

Commercial

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Commercial Scenario: Chemical: Ethylbenzene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.7E+00

Cancer

Risk

7.5E-07

Noncancer

Hazard

8.4E-04

		DATA ENTRY S	SHEET			Chemical:	Ethylbenzene
	Soil	Gas Concentration	n Data				Result
ENTER	ENTER		ENTER			II .	Attenuation Factor (unitless)
Chemical	gas	OR	gas			1.08E+04	3.4E-04
CAS No.	conc.,		conc.,				
(numbers only,							
no dashes)	(μg/m³)	=	(ppmv)	Chemical			
100414	1.08E+04]		Ethylbenzene			
ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
below grade	Soil gas		Vadose zone		User-defined		
to bottom	sampling	Average			vadose zone		
	-		• • • • • • • • • • • • • • • • • • • •		•		
•		_	•	OR			
			1				
(15 or 200 cm)	(cm)	(°C)	permeability)		(cm²)		
						4	
15	152	24	S				
ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ^A (α/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm³/cm³)		ENTER Average vapor flow rate into bldg. (Leave blank to calcul Q _{soil}		
Vandose zone SCS soil type	Vadose zone soil dry bulk density,	Vadose zone soil total	Vadose zone soil water-filled		Average vapor flow rate into bldg. (Leave blank to calcul		
	Chemical CAS No. (numbers only, no dashes) 100414 ENTER Depth below grade	ENTER Chemical CAS No. (numbers only, no dashes) ENTER Depth below grade to bottom of enclosed space floor, L _F (15 or 200 cm) Conc., Cq (µg/m³) ENTER Soil gas CAS No. Conc., Cq (µg/m³) ENTER Soil gas sampling depth below grade, L _s (15 or 200 cm) ENTER Conc. Cq (µg/m³)	Soil Gas Concentration ENTER Soil Chemical gas OR CAS No. conc., (numbers only, no dashes) 100414 1.08E+04 ENTER Depth below grade to bottom sampling Average of enclosed space floor, L _F L _F L _S (15 or 200 cm) ENTER Soil Gas Concentration ENTER Soil gas Average Average temperature, T _S (°C)	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Soil Gas Concentration Data ENTER Soil Soil Chemical gas OR gas CAS No. conc., conc., (numbers only, no dashes) (μg/m³) (ppmv) Chemical ENTER ENTER ENTER ENTER Depth below grade Soil gas to below grade to bottom sampling Average of enclosed depth soil space floor, below grade, temperature, L _F L _S T _S soil vapor space floor) LF L _S T _S soil vapor k _V (cm²) (cm²) ENTER ENTER ENTER ENTER ENTER ENTER ENTER OR permeability) ENTER ENTER ENTER ENTER COR User-defined vadose zone soil vapor permeability, k _V (cm²)	Soil Gas Concentration Data ENTER

ENTER

Exposure

Time

ΕT

(hrs/day)

(NEW)

ENTER

Air Exchange

Rate

ACH (hour)-1

MORE

Lookup Receptor

Commercial

END

ENTER

Averaging

time for

carcinogens,

 AT_C

(yrs)

70

ENTER

Averaging

time for

noncarcinogens,

 $\mathsf{AT}_{\mathsf{NC}}$

(yrs)

25

ENTER

Exposure

duration,

ED

(yrs)

25

ENTER

Exposure

frequency,

EF

(days/yr)

250

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial Chemical: Hexane

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.0E+01

Cancer

Risk

NA

Noncancer

Hazard

9.6E-03

		Chemical.	пехапе					
		Soil	Gas Concentration	n Data				Result
Reset to Defaults	Chemical CAS No. (numbers only,	ENTER Soil gas conc., C _q	OR	ENTER Soil gas conc., C _g			Soil Gas Conc. (µg/m³) 8.30E+04	Attenuation Factor (unitless) 3.6E-04
	no dashes)	(μg/m³)	:	(ppmv)	Chemical			=
	110543	8.30E+04			Hexane			- -
	ENTER Depth	ENTER	ENTER	ENTER		ENTER]	
MORE 🔟	below grade to bottom of enclosed space floor, L _F (15 or 200 cm)	Soil gas sampling depth below grade, L _s (cm)	Average soil temperature, T _s (°C)	Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	User-defined vadose zone soil vapor permeability, k _v (cm ²)	=	
	15	152	24	S			1	

MORE ↓	ENTER Vandose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q _{soil} (L/m)
	S	1.72	0.358	0.122		5
MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
Lookup Receptor Parameters	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)
END						•

Department of Toxic Substances Control Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial Chemical: Toluene

Results Summary

Indoor Air Conc.

 $(\mu g/m^3)$

3.3E-02

Cancer

Risk

NA

Noncancer

Hazard

2.5E-05

			DATA ENTRY S	HEET			Cnemical:	Toluene
		Soil	Gas Concentration	n Data				Result
Reset to	ENTER	ENTER Soil	ado concentration	ENTER Soil			Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)
Defaults	Chemical	gas	OR	gas			8.80E+01	3.7E-04
	CAS No.	conc.,		conc.,				
	(numbers only,	C_g		C_g				
	no dashes)	(μg/m³)	=	(ppmv)	Chemical			:
	108883	8.80E+01]		Toluene			
	EV. T.E.D.	EVITED	EVEED	ENTER		ENTED	7	
	ENTER Depth	ENTER	ENTER	ENTER		ENTER		
MORE	below grade	Soil gas	_	Vadose zone		User-defined		
Ψ	to bottom	sampling	Average	SCS		vadose zone		
	of enclosed	depth	soil	soil type	OD	soil vapor		
	space floor,	below grade,	temperature,	(used to estimate	OR	permeability,		
	L _F (15 or 200 cm)	L _s (cm)	T _S (°C)	soil vapor permeability)		k _v (cm²)		
	(13 01 200 cm)	(CIII)	(0)	permeability)		(6)		
	15	152	24	S]	
	ENTER	ENTER	ENTER	ENTER		ENTER		
MORE	Vandose zone	Vadose zone	Vadose zone	Vadose zone		Average vapor		
₩ ₩	SCS	soil dry	soil total	soil water-filled		flow rate into bldg	_	
	soil type	bulk density,	porosity,	porosity,		(Leave blank to calcul		
		ρ_b^A	n ^v	θ_{w}^{v}		Q_{soil}	,	
	Lookup Soil	(g/cm³)	(unitless)	(cm ³ /cm ³)		(L/m)	=	
		4.70	0.050	0.400	l		7	

		Lookup Soil	(g/cm ³)	(unitless)	(cm ³ /cm ³)		(L/m)
		S	1.72	0.358	0.122		5
	MORE ↓	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
		time for carcinogens,	time for noncarcinogens,	Exposure duration,	Exposure frequency,	Exposure Time	Air Exchange Rate
Lookup Recepto Parameters		AT _C (yrs)	AT _{NC} (yrs)	ED (yrs)	EF (days/yr)	ET (hrs/day)	ACH (hour) ⁻¹
NEW=>	Commercial	70	25	25	250	8	1
	END					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES OR

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> YES Χ

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

Bis(2-chloroethyl)ether 111444 1.50E+03

		Groundwater ntration				
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	$= 10^{-6}$	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
9.69E+02	2.3E-05	2.2E-02	1.3E-06	NA	NA	NA

Scenario: Commercial

Chemical: **Bis(2-chloroethyl)ether**

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			A
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_F	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m) 5

MORE

ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Commercial

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target risk for	Target hazard quotient for	Averaging time for	Averaging time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calculate risk-based						(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

1.33E+01 Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE

98828

groundwater concentration.

ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259 84	S	24

ENTER

 (C_{source})

(µg/m³) 5.84E+03

Scenario: Commercial

Cancer

Risk

NA

Noncancer

Hazard

6.3E-05

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA

Chemical: Cumene

Results Summary

 (C_{building})

(µg/m³)

1.1E-01

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

1.9E-05

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Average vapor flow rate into bldg. (Leave blank to calculate) (L/m)

5



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

Commercial

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR	quotient for noncarcinogens, THQ	time for carcinogens,	time for noncarcinogens, AT _{NC}	Exposure duration, ED	Exposure frequency, EF	Exposure Time ET	Air Exchange Rate ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> Χ YES

Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C _W (μg/L)		Chemical
91203	6.47E+01	Naphthalene	

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

1.9E-05

Results Summary

 (C_{building})

(µg/m³)

2.1E-02

Scenario: Commercial

Chemical: Naphthalene

Cancer

Risk

5.8E-08

Noncancer

Hazard

1.6E-03

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA



ENTER Depth	ENTER	ENTER	ENTER
below grade	. .		Average
to bottom of enclosed	Depth below grade	SCS	soil/ groundwater
space floor,	to water table,	soil type	temperature,
L _F	L _{WT}	directly above	T _S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

 (C_{source})

(µg/m³) 1.09E+03



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w^{\ V}$ (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

	_
Commercial	

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) · ·
1.0E-06	1	70	25	25	250	8	1
Used to calcul	ate risk-based	_				(NEW)	(NEW)
groundwater o	concentration.						

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

YES OR

Reset to Defaults CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box) Chemical: **n-Propylbenzene**

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

	. 20	, , , , , , , , , , , , , , , , , , ,
ENTER	ENTER	
	Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical
103651	8.13E+02	n-Propylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

1.9E-05

Results Summary

 (C_{building})

(µg/m³)

6.2E+00

Scenario: Commercial

Cancer

Risk

NA

Noncancer

Hazard

1.4E-03

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA



ENTER	ENTER	ENTER	ENTER
Depth below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

 (C_{source})

(µg/m³) 3.29E+05



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density,	ENTER Vadose zone soil total porosity, n° (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
C	1		Q	1.64	0.392	0.197



Lookup Receptor

Commercial

ENTER Target	ENTER Target hazard	ENTER Averaging	ENTER Averaging	ENTER	ENTER	ENTER	ENTER
risk for carcinogens, TR (unitless)	quotient for noncarcinogens, THQ (unitless)	time for carcinogens, AT _C (yrs)	time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calcula	ate risk-based					(NEW)	(NEW)
groundwater c	concentration.						

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES OR

Reset to Defaults

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES	Х

ENTER	ENTER Initial	
Chemical	groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical

95476 3.00E+00 o-Xylene

	Results		Groundwater ntration			
Soil Gas Conc.	Attenuation Factor	Indoor Air Conc.	Cancer	Noncancer	Cancer Risk	Noncancer
(C_{source})	(alpha)	(C_{building})	Risk	Hazard	= 10 ⁻⁶	HQ = 1
(µg/m³)	(unitless)	(µg/m³)			(µg/L)	(µg/L)
6.01E+02	2.2E-05	1.3E-02	NA	3.0E-05	NA	NA

Scenario: Commercial

Chemical: o-Xylene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE

ENTER	ENTER	ENTER	ENTER
Depth			
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_{WT}	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

ENTER

ENTER

ENTER



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm ²)	ENTER Vadose zone SCS Soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _ν (g/cm³)	ENTER Vadose zone soil total porosity, n ^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

ENTER

MORE

Lookup Red

	$\overline{}$	
tor		
	1	

ENTER

ENTER

ENTER

	Lookup Receptor Parameters	
		•
ſ	Commercial	ſ

Target risk for carcinogens, TR (unitless)	Target hazard quotient for noncarcinogens, THQ (unitless)	Averaging time for carcinogens, AT _C (yrs)	Averaging time for noncarcinogens, AT _{NC} (yrs)	Exposure duration, ED (yrs)	Exposure frequency, EF (days/yr)	Exposure Time ET (hrs/day)	Air Exchange Rate ACH (hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calculate risk-based						(NEW)	(NEW)
groundwater concentration.							

END

ENTER

DTSC Modification December 2014

Department of Toxic Substances Control Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to Defaults

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

> Χ YES

ENTER Chemical	ENTER Initial groundwater	
CAS No.	conc.,	
(numbers only,	C_W	
no dashes)	(μg/L)	Chemical
135988	1.70E+00	sec-Butylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

Scenario: Commercial

Results Summary

 (C_{building})

(µg/m³)

1.1E-02

Soil Gas Conc. Attenuation Factor Indoor Air Conc.

(alpha)

(unitless)

1.7E-05

Chemical: sec-Butylbenzene

Cancer

Risk

NA

Noncancer

Hazard

6.3E-06

Risk-Based Groundwater

Concentration

Noncancer

HQ = 1

(µg/L)

NA

Cancer Risk

 $= 10^{-6}$

(µg/L)

NA



ENTER Depth	ENTER	ENTER	ENTER
below grade			Average
to bottom	Depth		soil/
of enclosed	below grade	SCS	groundwater
space floor,	to water table,	soil type	temperature,
L_{F}	L_WT	directly above	T_S
(15 or 200 cm)	(cm)	water table	(°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) (L/m) 5

 (C_{source})

(µg/m³) 6.70E+02



ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vandose zone soil vapor permeability, k _v (cm²)	ENTER Vadose zone SCS soil type Lookup Soil	ENTER Vadose zone soil dry bulk density, ρ _b ν (g/cm³)	ENTER Vadose zone soil total porosity, n' (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm³/cm³)
S			S	1.64	0.392	0.197

MORE

Lookup Receptor

groundwater concentration.

Commercial

ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER	ENTER
Target	Target hazard	Averaging	Averaging				
risk for	quotient for	time for	time for	Exposure	Exposure	Exposure	Air Exchange
carcinogens,	noncarcinogens,	carcinogens,	noncarcinogens,	duration,	frequency,	Time	Rate
TR	THQ	AT_C	AT_NC	ED	EF	ET	ACH
(unitless)	(unitless)	(yrs)	(yrs)	(yrs)	(days/yr)	(hrs/day)	(hour) ⁻¹
1.0E-06	1	70	25	25	250	8	1
Used to calculate risk-based		_		·	_	(NEW)	(NEW)