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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:

Mearns Consulting LLC
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May 31, 2018

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 ¾ 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.

Mearns Consulting LLC

TABLE OF CONTENTS

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.

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 ¾ 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 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.

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.

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).

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, 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 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.”

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.

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.

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.

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, 1,3,5-trimethylbenzene, 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, 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

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.

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.

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., 90^{th} or 95^{th} 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).

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).

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

$$+ \frac{SF_o \times C_s \times SA_{adult} \times AF \times ABS \times EF \times ED_{adult} \times 10^{-6}\ kg/mg}{BW_{adult} \times AT \times EF}$$

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

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

$$Hazard_{soil} = \frac{(1/RfD_o) \times C_s \times IR_{s,child} \times EF \times ED_{child} \times 10^{-6}\ kg/mg}{BW_{child} \times AT}$$

$$+ \frac{(1/RfD_o) \times C_s \times SA_{child} \times AF \times ABS \times EF_{child} \times ED_{child} \times 10^{-6}\ kg/mg}{BW_{child} \times AT}$$

$$+ \frac{(1/RfD_o) \times C_s \times IR_{s,adult} \times EF \times ED_{adult} \times 10^{-6}\ kg/mg}{BW_{adult} \times AT}$$

$$+ \frac{(1/RfD_o) \times C_s \times SA_{adult} \times AF \times ABS \times EF_{adult} \times ED_{adult} \times 10^{-6}\ kg/mg}{BW_{adult} \times AT}$$

Where:

SF_o = 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 (cm^2/event)
AF = soil to skin adherence factor (mg/cm^2)
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 (m^3/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/m^3 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).

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

Where:

C_a = concentration in air, mg/m^3
C_s = concentration in soil, mg/kg
PEF = particulate emission factor

$$Risk_{air} = IUR \times C_a \times \frac{ET \times EF \times ED}{AT}$$

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

Where:

IUR = inhalation unit risk factor ($\mu g/m^3)^{-1}$
RfC = reference concentration (mg/m^3)
C_a = contaminant concentration in air (mg/m^3)
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 1×10^{-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).

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

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

Where: URF = unit risk factor µg/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/m^3) per µg/kg soil; calculated by the model
AT_c = averaging time for carcinogens; default value = 70

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

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/m^3) 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/cm^3, 0.392 and 0.197cm^3/cm^3 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/cm^3, 0.358 and 0.122cm^3/cm^3 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 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:

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

Where: URF = unit risk factor µg/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/m^3) per µg/kg soil; calculated by the model
AT_c = averaging time for carcinogens; default value = 70

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

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/m^3) 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 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:

$$\text{Total Risk} = \sum_{p=1}^{m} \sum_{i=1}^{n} CR_{i,p}$$

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

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.

Hazard Quotients Inhalation **-** The estimated hazard quotients due to exposure to constituents detected in the soil matrix via the inhalation exposure route is 8 x 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 x 10^{-8}, less than the target threshold 1 x 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 x 10^{-7} less than the target threshold 1 x 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 x 10^{-3} greater than the target threshold 1 x 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 x 10^{-3}, greater than the target threshold 1 x 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 x 10^{-8} is less than the target threshold 1 x 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 x 10^{-5} greater than the target threshold 1 x 10^{-6} and is attributable to ethylbenzene in soil vapor and bis(2-chloroethyl)ether 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 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 x 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 x 10^{-9} less than the target threshold 1 x 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 x 10^{-11} less than the target threshold 1 x 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 x 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 x 10^{-9}, less than the target threshold 1 x 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 x 10^{-8} less than the target threshold 1 x 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 x 10^{-7} less than the target threshold 1 x 10^{-5}.

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.

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 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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TABLES

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)
NORTHWEST 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
	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	1	4/16/2018	<10	6.3	130	<1.0	<1.0	22	9.5	7.6	5.3	<5.0	16	<0.50	<1.0	<5.0	43	38	0.028	<0.040
	5	4/16/2018	<10	9.9	150	<1.0	<1.0	30	12	14	7.0	<5.0	22	<0.50	<1.0	<5.0	61	41	0.038	<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
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	4/16/2018	<10	8.2	140	<1.0	<1.0	32	12	12	6.3	<5.0	22	<0.50	<1.0	<5.0	82	48	0.065	<0.040
	10	4/16/2018	<10	4.5	150	<1.0	<1.0	16	6.6	6.2	3.7	<5.0	13	<0.50	<1.0	<5.0	29	25	0.024	<0.040
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 (feet bgs)	Sample Date	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg	Thallium mg/kg	Vanadium mg/kg	Zinc mg/kg	Mercury (mg/kg)	Hexavalent Chromium (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
SOUTHWEST PARCEL																				
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
	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
	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	30	24	<0.020	<0.040
	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
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
	5	3/16/2018	<10	3.4	110	<1.0	<1.0	21	8.4	<3.0	8.1	<5.0	15	<0.50	<1.0	<5.0	39	37	0.080	<0.040
	10	4/18/2018	<10	8.7	120	<1.0	<1.0	30	12	14	9.5	<5.0	22	<0.50	<1.0	<5.0	59	46	0.17	<0.040
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									
AN-13	9	1/9/2017									5.1									
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	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg	Thallium mg/kg	Vanadium mg/kg	Zinc mg/kg	Mercury (mg/kg)	Hexavalent Chromium (mg/kg)
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	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Berylium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg	Thallium mg/kg	Vanadium mg/kg	Zinc mg/kg	Mercury (μg/m^3)	Hexavalent Chromium (μg/m^3)
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.

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

Sample ID	Consultant	Date Sampled	TRPH	TPH-g	TPH-d	TPH-o	HC	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	NA	NA	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	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-7-10	EEI	1988	NA	68	ND	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-9-10	EEI	1988	NA	ND	**6100**	NA	<100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-10-10	EEI	1988	NA	ND	**2100**	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	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	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-12-10	EEI	1988	NA	**780**	300	NA	ND	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	NA	NA	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
S-14-10	EEI	1988	NA	ND	ND	NA	4300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-15-10	EEI	1988	NA	ND	ND	NA	320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-16-10	EEI	1988	NA	ND	100	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-17-10	EEI	1988	NA	ND	ND	ND	290	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
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
S-19-10	EEI	1988	NA	ND	**1000**	NA	220	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-20-2	EEI	1988	45000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-20-10	EEI	1988	NA	ND	**1200**	NA	420	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-21-2	EEI	1988	NA	ND	ND	NA	<100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-21-10	EEI	1988	NA	**500**	460	NA	<100	NA	NA	NA	NA	NA	NA	NA	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	2600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-23-2	EEI	1988	15000	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	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-24-2	EEI	1988	48000	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	ND	29	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-25-2	EEI	1988	19000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-25-10	EEI	1988	NA	ND	ND	NA	520	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-26-2	EEI	1988	48000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-26-10	EEI	1988	NA	ND	**1900**	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
S-28-2	EEI	1988	40000	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	ND	ND	NA	3400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8-1.5	EEI	1988	861	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
B-1-10	TEC	1999	705	23	**652**	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	229	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
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
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
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
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

Sample ID	Consultant	Date Sampled	TRPH	TPH-g	TPH-d	TPH-o	HC	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	5/16/2006	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	5/16/2006	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	5/16/2006	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	5/16/2006	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	5/16/2006	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	5/16/2006	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
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

Sample ID	Consultant	Date Sampled	TRPH	TPH-g	TPH-d	TPH-o	HC	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
RSL*r Aromatic*				82	110	2500		82	82	82	110	110	110	110	110	110	2500	2500	2500	2500	2500	2500	2500
RSL*r 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
RSL*i 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
RSL*i 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 SL*r Aliphatic*						8,400											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

Sample ID	Consultant	Date Sampled	TRPH	TPH-g	TPH-d	TPH-o	HC	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
RSL*r Aromatic*				82	110	2500		82	82	82	110	110	110	110	110	110	2500	2500	2500	2500	2500	2500	2500
RSL*r 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
RSL*i 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
RSL*i 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 SL*r 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.

RSL*r* = USEPA Regional Screening Level for residential soils, RSL*i* for industrial soils (November 2017)

DTSC SL*r* = CalEPA DTSC Screening Level for residential soils (January 2018)

BOLD = Detected concentration exceeds the RSL*i* aromatic threshold

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
RSL*r*			1.2	3900	7800	7800	5.8	1900	NA	47	3.8	3800	4900	58	780	550	650
RSL*i*			5.1	58,000	120,000	120,000	25	9900	NA	210	17	24,000	47,000	240	12,000	2400	2800
DTSC-SL*r*			0.33	1200	2200	2200	NA	NA	NA	NA	NA	NA	1100	NA	210	NA	NA
DTSC-SL*i*			1.4	64,000	12,000	12,000	NA	NA	NA	NA	NA	NA	5400	NA	170	NA	NA
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	1	0.9	<0.5	2	1	<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	2.6	<0.50	2.2	4.3	<0.005	13	4.6	15	5
AN-20-15	TSG	1/18/2017	0.26	2.3	1.5	<0.50	3.9	1.9	2.2	<0.50	1.6	3	<0.0039	10	3.5	7.4	1.3
AN-20-20	TSG	1/18/2017	<0.20	1.8	1.1	<0.50	1.9	0.79	1.6	<0.50	1.2	1.9	<0.0044	2.4	2	2.7	0.43
SB1-4	TSG	5/16/2006	0.0486	<0.025	1.3	0.104	1.31	0.528	ND	ND	16.8	1	0.263	2.77	0.0261J	0.2	0.218
SB1-10	TSG	5/16/2006	0.076	<0.005	0.012	<0.005	0.182	0.037	ND	ND	0.124	0.037	0.003J	0.012	0.0050J	0.0067J	0.0048J
SB1-15	TSG	5/16/2006	0.121	<0.050	2.07	0.121	2.5	2.45	ND	ND	9.96	3.39	0.467	7.71	1.7	0.89	0.229
SB1-20	TSG	5/16/2006	0.142	<0.030	1.27	0.073	1.27	1.65	ND	ND	6.04	2.26	0.297	4.38	0.957	0.518	0.136
SB1-25	TSG	5/16/2006	0.202	<0.025	1.33	0.079	2.53	1.84	ND	ND	6.19	2.43	0.308	3.85	0.8	0.56	0.149
SB1-30	TSG	5/16/2006	0.236	<0.020	1.05	0.066	1.78	1.55	ND	ND	5.14	2	0.23	3.53	0.775	0.513	0.134
SB1-35	TSG	5/16/2006	0.11	<0.055	1.04	0.0692J	1.15	1.98	ND	ND	4.06	2.3	0.566	1.25	0.211	0.279	0.0915J
SB2-5	TSG	5/15/2006	**11.3**	<0.025	0.533	0.068	9.97	1.48	ND	ND	0.431	1.26	0.472	1.02	0.29	0.64	0.184
SB2-10	TSG	5/15/2006	0.173	<0.005	<0.005	<0.005	0.024	<0.005	ND	ND	<0.005	<0.005	0.002J	<0.005	<0.005	<0.002	<0.002
SB2-15	TSG	5/15/2006	0.0084J	<0.005	<0.005	<0.005	0.0079J	<0.005	ND	ND	<0.005	<0.005	<0.002	<0.005	<0.005	<0.002	<0.002

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
RSL*r*			1.2	3900	7800	7800	5.8	1900	NA	47	3.8	3800	4900	58	780	550	650
RSL*i*			5.1	58,000	120,000	120,000	25	9900	NA	210	17	24,000	47,000	240	12,000	2400	2800
DTSC-SL*r*			0.33	1200	2200	2200	NA	NA	NA	NA	NA	NA	1100	NA	210	NA	NA
DTSC-SL*i*			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.

RSL*r* = USEPA Regional Screening Level for residential soils, RSL*i* 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
RSL*r*			1.2	3900	7800	7800	5.8	1900	NA	47	3.8	3800	4900	58	780	550	650
RSL*i*			5.1	58,000	120,000	120,000	25	9900	NA	210	17	24,000	47,000	240	12,000	2400	2800
DTSC-SL*r*			0.33	1200	2200	2200	NA	NA	NA	NA	NA	NA	1100	NA	210	NA	NA
DTSC-SL*i*			1.4	64,000	12,000	12,000	NA	NA	NA	NA	NA	NA	5400	NA	170	NA	NA

DTSC SL*r* = CalEPA DTSC Screening Level for residential soils, SL*i* for industrial soils (January 2018)

BOLD = Detected concentration exceeds the RSL*i* 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

Sample ID	Consultant	Date Sampled	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Chrysene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
RSL*r*			3600	NA	18000	1.1	110	2400	2400	3.8	NA	1800
RSL*i*			45000	NA	230000	21	2100	30000	30000	17	NA	23000
DTSC-SL*r*			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DTSC-SL*i*			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	0.114	ND	ND	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
SB1-15	TSG	5/16/2006	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
SB1-25	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB1-30	TSG	5/16/2006	0.033	ND	ND	ND	ND	ND	0.104	0.226	0.424	ND
SB1-35	TSG	5/16/2006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB2-5	TSG	5/15/2006	0.122	ND	0.16	ND	1.083	0.063	1.34	ND	4.05	0.712
SB2-10	TSG	5/15/2006	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
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

Sample ID	Consultant	Date Sampled	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Chrysene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
RSL*r*			3600	NA	18000	1.1	110	2400	2400	3.8	NA	1800
RSL*i*			45000	NA	230000	21	2100	30000	30000	17	NA	23000
DTSC-SL*r*			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DTSC-SL*i*			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:

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.

RSL*r* = USEPA Regional Screening Level for residential soils, RSL*i* for industrial soils (November 2017)

DTSC SL*r* = CalEPA DTSC Screening Level for residential soils, SL*i* 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
RSL*r*			3600	NA	18000	1.1	110	2400	2400	3.8	NA	1800
RSL*i*			45000	NA	230000	21	2100	30000	30000	17	NA	23000
DTSC-SL*r*			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DTSC-SL*i*			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

BOLD = Detected concentration exceeds the RSL*i* 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

Sample Location	Sample Depth (feet bgs)	Sample Date	Benzene (µg/m^3)	Toluene (µg/m^3)	Ethylbenzene (µg/m^3)	m,p-Xylenes (µg/m^3)	o-Xylenes (µg/m^3)	Acetone (µg/m^3)	sec-Butylbenzene (µg/m^3)	Carbon Disulfide (µg/m^3)	Chloroform (µg/m^3)	Chloromethane (µg/m^3)	Cyclohexane (µg/m^3)	1,2-DCB (µg/m^3)	1,3-DCB (µg/m^3)	1,4-DCB (µg/m^3)	Ethanol (µg/m^3)	4-Ethyltoluene (µg/m^3)	Heptane (µg/m^3)	n-Hexane (µg/m^3)	Isopropanol (µg/m^3)	Isopropylbenzene (µg/m^3)	4- Isopropyltoluene (µg/m^3)	Naphthalene (µg/m^3)	PCE (µg/m^3)	n-Propylbenzene (µg/m^3)	Propylene (µg/m^3)	2,2,4-TMP (µg/m^3)	1,2,4-TMB (µg/m^3)	1,3,5-TMB (µg/m^3)
NORTHWEST PARCEL																														
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	5	4/13/18	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)			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	5	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
		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	4/13/18	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)	ND<500 (3)
TP-6	5	4/13/18	**12,000**	**19,000**	**11,000**	**230,000**	**130,000**	ND<500	**4,300**	**5,900**	ND<500	ND<500	**180,000 E**	ND<500	ND<500	ND<500	ND<500	**19,000**	**83,000**	**12,000**	ND<500	**7,700**	**9,800**	**1,300**	ND<500	**5,700**	ND<500	ND<500	**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	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	5	4/12/18	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)			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	ND<50,000
VP-2	5	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	ND<50,000	ND<50,000
AN-06	5	1/17/17	**271,548.06**	ND<22,611.04	**28,255.15**	ND<52,107.98	ND<26,053.99	ND<57,011.04	ND<65,874.85	ND<18,684.66	ND<29,295.71	ND<12,390.18	**2,099,697.34**	ND<36,073.62	ND<36,073.62	ND<36,073.62	ND<11,305.52	ND<29,496.93	**393,462.58**	**634,453.99**	ND<29,496.93	ND<58,993.87	ND<65,874.85	ND<31,452.76	ND<40,711.66	ND<58,993.87	ND<10,326.38	ND<28,031.90	ND<29,496.93	ND<29,494.48
		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 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	5	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
		4/25/18	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
TP-18		4/12/18	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	ND<1,000	ND<1,000	ND<1,000	**2,900**	ND<1,000	ND<1,000
	5	4/25/18	**46,000**	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	**130,000**	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	5	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
		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

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

Sample Location	Sample Depth (feet bgs)	Sample Date	Benzene (μg/m^3)	Toluene (μg/m^3)	Ethylbenzene (μg/m^3)	m,p-Xylenes (μg/m^3)	o-Xylenes (μg/m^3)	Acetone (μg/m^3)	sec-Butylbenzene (μg/m^3)	Carbon Disulfide (μg/m^3)	Chloroform (μg/m^3)	Chloromethane (μg/m^3)	Cyclohexane (μg/m^3)	1,2-DCB (μg/m^3)	1,3-DCB (μg/m^3)	1,4-DCB (μg/m^3)	Ethanol (μg/m^3)	4-Ethyltoluene (μg/m^3)	Heptane (μg/m^3)	n-Hexane (μg/m^3)	Isopropanol (μg/m^3)	Isopropylbenzene (μg/m^3)	4- Isopropyltoluene (μg/m^3)	Naphthalene (μg/m^3)	PCE (μg/m^3)	n-Propylbenzene (μg/m^3)	Propylene (μg/m^3)	2,2,4-TMP (μg/m^3)	1,2,4-TMB (μg/m^3)	1,3,5-TMB (μg/m^3)
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

Notes:

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/m^3 = Microgram per cubic meter.

ND<100 = Analyte not detected at or above the laboratory reporting limit of 100 μg/m^3.

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 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] (%)
NORTHWEST PARCEL					
TP-1	5	4/13/18	ND<0.20	22	--
TP-2	5	4/13/18	ND<0.20	25	--
TP-3	5	4/13/18	ND<0.20	24	--
(DUP)			ND<0.20		--
TP-4	5	4/13/18	**7.8**	23	33.43%
		4/25/18	ND<0.20	25	--
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	5	4/12/18	**2.6**	25	10.54%
(DUP)			**2.9**		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	ND<0.20	21	--
		4/25/18	**2.0**	27	7.41%
AN-08	5	1/17/17	ND<0.20	21	--
(DUP)		1/17/17	ND<0.20	21	--
		4/13/18	**0.69**	25	2.76%
VP-1	5	12/28/17	ND<0.20	23	--
VP-2	5	12/28/17	ND<0.20	23	--
SOUTHWEST 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	**3.2**	23	13.91%
		4/25/18	**3.2**	22	14.55%
TP-18	5	4/12/18	**16**	23	68.57%
		4/25/18	ND<0.20	24	--
(DUP)		4/25/18	ND<0.20		--

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

Sample Location	Date Sampled	Sample Depth	Moisture Content		Density		Porosity		
					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.
cm^3/cm^3 = 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 Location	Date Sampled	Sample Depth feet bgs	Mean Grain Size Description[1]	Median Grain Size mm	Particle Size Distribution (% weight)				Silt & Clay
					Gravel	Sand Size			
						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 feet bgs	Total Organic Carbon mg/kg	Fraction Organic Carbon 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 (µg/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

Exposure Parameter	Notation	Receptor Populations				Units	Reference
		Commercial Worker	Construction Worker	Residential User			
				Adult	Child		
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	OEHHA
Soil-to-Skin Adherence factor	AF	0.2	0.8	0.07	0.2	mg/cm^2	OEHHA
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

∑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

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INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	70.8
Respirable Dust (ug/m^3)	1.5

OUTPUT						
Percentile Estimate of Blood Pb (ug/dl)						PRG-90
	50th	90th	95th	98th	99th	(ug/g)
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 PARAMETERS		
	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	typical			with pica		
	Pathway contribution			Pathway contribution		
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%

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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_t, assuming lognormal distributio**	**%**	**0.0%**

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CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

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INPUT	
MEDIUM	LEVEL
Lead in Soil/Dust (ug/g)	570.0
Respirable Dust (ug/m^3)	1.5

OUTPUT						
Percentile Estimate of Blood Pb (ug/dl)						PRG-90
	50th	90th	95th	98th	99th	(ug/g)
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 PARAMETERS		
	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	typical			with pica		
	Pathway contribution			Pathway contribution		
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%

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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%**

PRG90 **318**

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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	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg	Thallium mg/kg	Vanadium mg/kg	Zinc mg/kg	Mercury (mg/kg)	Hexavalent Chromium (mg/kg)
EAST PARCEL																				
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	--
	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	--
	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	--
	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	Antimony mg/kg	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg	Lead mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium mg/kg	Silver mg/kg	Thallium mg/kg	Vanadium mg/kg	Zinc mg/kg	Mercury (mg/kg)	Hexavalent Chromium (mg/kg)
	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.

Table 19
Summary of Soil Vapor Monitoring Point Analytical Data - VOCs - Eastern Parcel
Former ChemOil Refinery
Signal Hill, California

Sample Location	Sample Depth (feet bgs)	Sample Date	Benzene ($\mu g/m^3$)	Toluene ($\mu g/m^3$)	Ethylbenzene ($\mu g/m^3$)	m,p-Xylenes ($\mu g/m^3$)	o-Xylenes ($\mu g/m^3$)	Acetone ($\mu g/m^3$)	sec-Butylbenzene ($\mu g/m^3$)	Carbon Disulfide ($\mu g/m^3$)	Chloroform ($\mu g/m^3$)	Chloromethane ($\mu g/m^3$)	Cyclohexane ($\mu g/m^3$)	1,2-DCB ($\mu g/m^3$)	1,3-DCB ($\mu g/m^3$)	1,4-DCB ($\mu g/m^3$)	Ethanol ($\mu g/m^3$)	4-Ethyltoluene ($\mu g/m^3$)	Heptane ($\mu g/m^3$)	n-Hexane ($\mu g/m^3$)	Isopropanol ($\mu g/m^3$)	Isopropylbenzene ($\mu g/m^3$)	4- Isopropyltoluene ($\mu g/m^3$)	Naphthalene ($\mu g/m^3$)	PCE ($\mu g/m^3$)	n-Propylbenzene ($\mu g/m^3$)	Propylene ($\mu g/m^3$)	2,2,4-TMP ($\mu g/m^3$)	1,2,4-TMB ($\mu g/m^3$)	1,3,5-TMB ($\mu g/m^3$)
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	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-35 (DUP)			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
E1	15	6/2/06	<796	<796	10,800	<1592	<796																						<1194	<1194

Notes:
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.
$\mu g/m^3$ = Microgram per cubic meter.
ND<100 = Analyte not detected at or above the laboratory reporting limit of 100 $\mu g/m^3$.
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** feet bgs	**Date Sampled**	**Helium in Sample** (%)	**Average Helium Under Shroud** (%)	**Leak Ratio**[1] (%)
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	5	4/24/18	ND<0.20	25	--
(DUP)		4/24/18	ND<0.20		--

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 Location	Date Sampled	Sample Depth	Moisture Content		Density		Porosity		
					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 PARCEL									
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.
cm^3/cm^3 = 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 Location	Date Sampled	Sample Depth feet bgs	Mean Grain Size Description[1]	Median Grain Size mm	Particle Size Distribution (% weight)				Silt & Clay
					Gravel	Sand Size			
						Coarse	Medium	Fine	
EAST PARCEL									
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 PARCEL				
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/m³**	**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/m^3	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 (µg/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	Residential
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
∑Risk Residential & Commercial = J&E model results + estimated risks due to inhalation, ingestion and dermal contact of constituents in soil

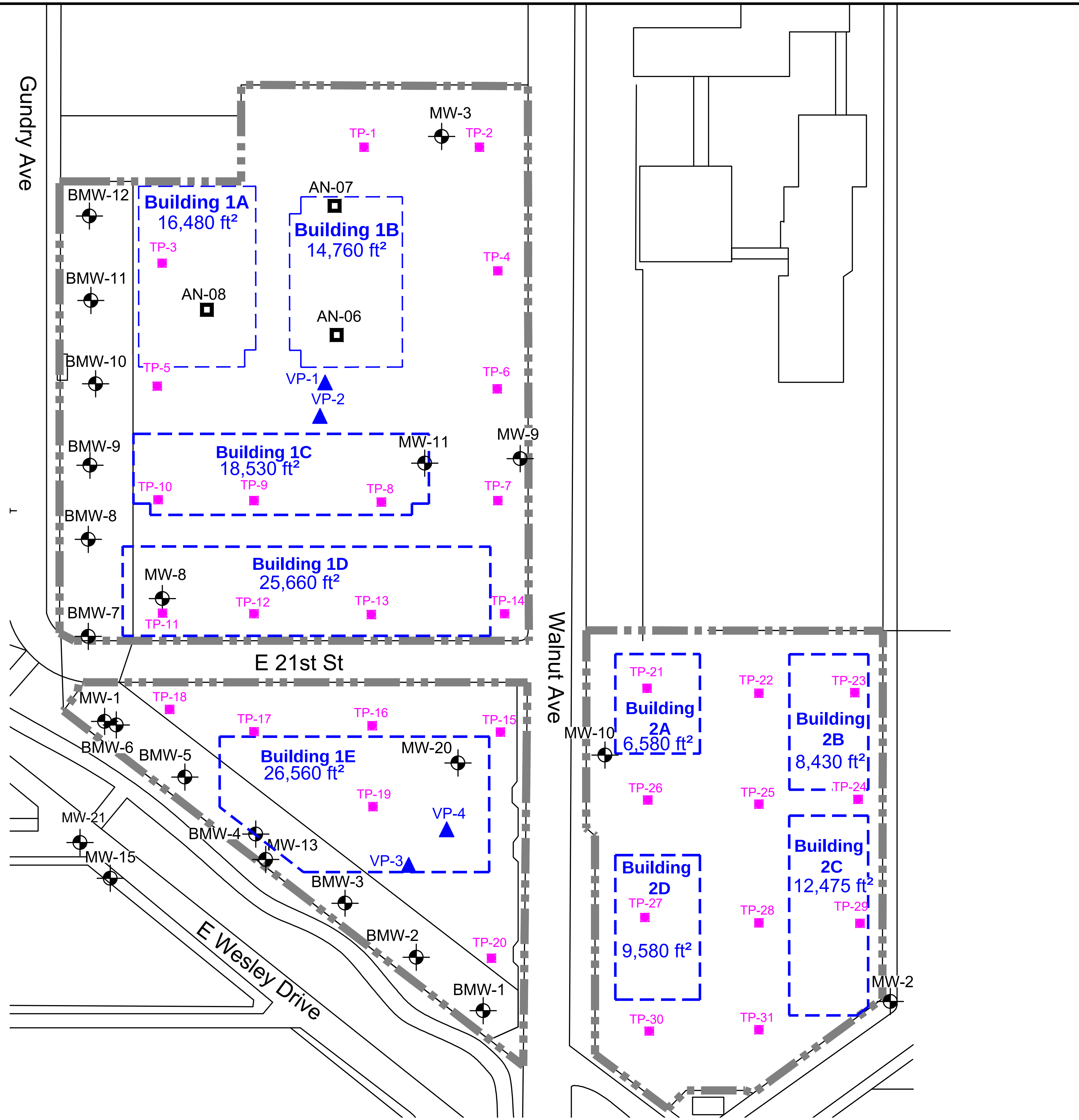
FIGURES

SGI environmental / APEX	FORMER CHEMOIL REFINERY 2020 WALNUT AVENUE SIGNAL HILL, CA				SITE LOCATION MAP
299 WEST HILLCREST DR. SUITE 220 THOUSAND OAKS, CA 91360	PROJECT NO. 093-CHEMOIL-001	DATE 05/30/17	DR.BY: ZA	APP. BY: KD	0 2500 5000 HORIZONTAL SCALE IN FEET

N

FIGURE 1

S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\Figures\Fig.1-1-Site Location Map.dwg, 6/12/2017 5:30:52 PM



LEGEND

Site Boundary

MW-16 Groundwater Monitoring Well Location

VP-1 Existing Nested Soil Vapor Monitoring Point

AN-08 Existing Shallow Soil Vapor Monitoring Point (5 Foot Below Ground Surface)

TP-1 New Shallow Temporary Vapor Monitoring Point (Approximate Locations; 5 Foot Below Ground Surface)Note[1]

ft² Square Feet

Note[1] TP-21 and TP-23 Were Set at 4' to 4.5' Due To Subsurface Conditions Encountered During Air Knife Activities

SITE PLAN

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	03/21/18	ZA	KD

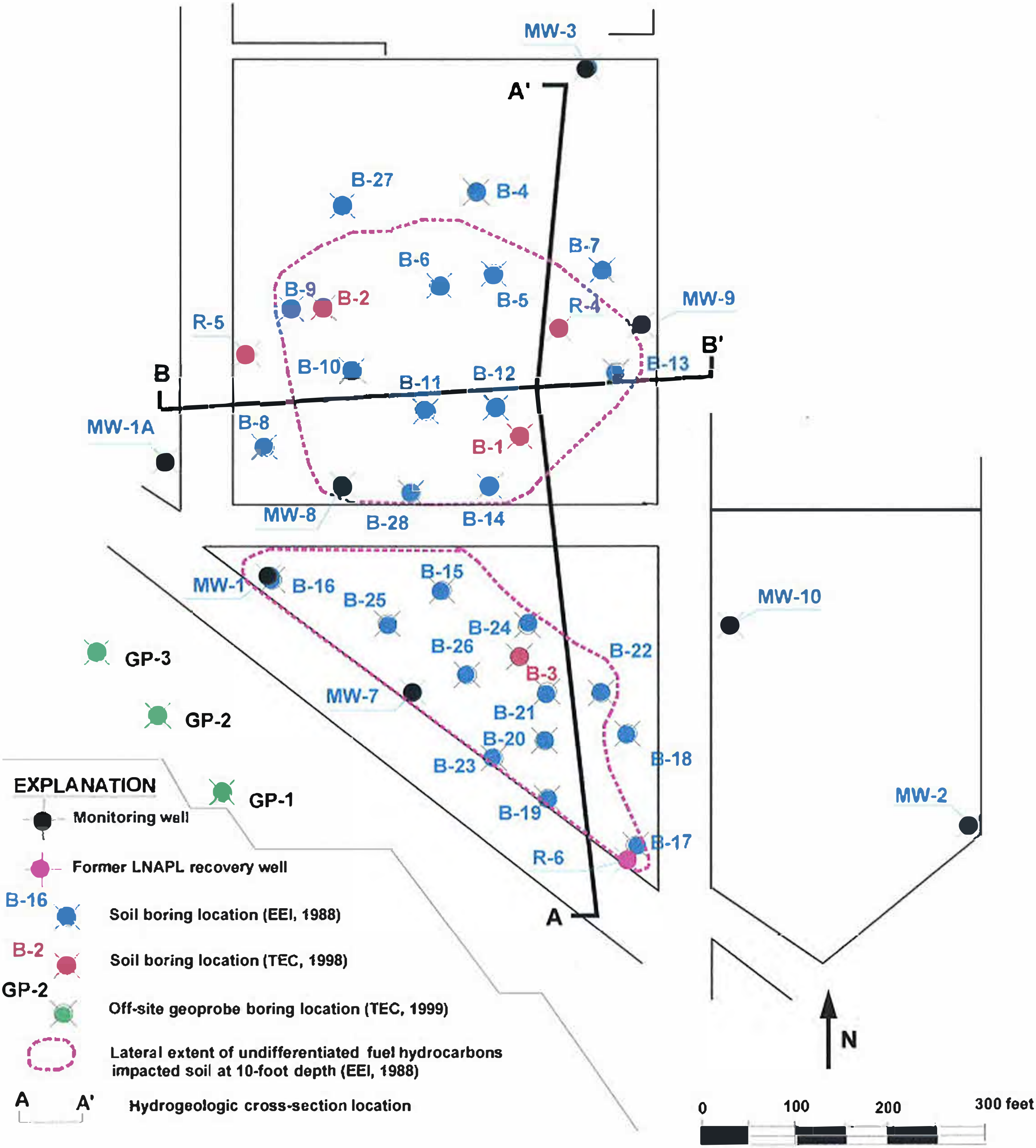
0 100 200
HORIZONTAL SCALE IN FEET

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

N

FIGURE
2

S:\Clients A - F\ChemOil Refinery\Correspondence\Outgoing\City Of Signal Hill\Site Investigation\Revised Work Plan-03-21-18\Fig.1-Site Plan.dwg, 3/21/2018 5:11:16 PM

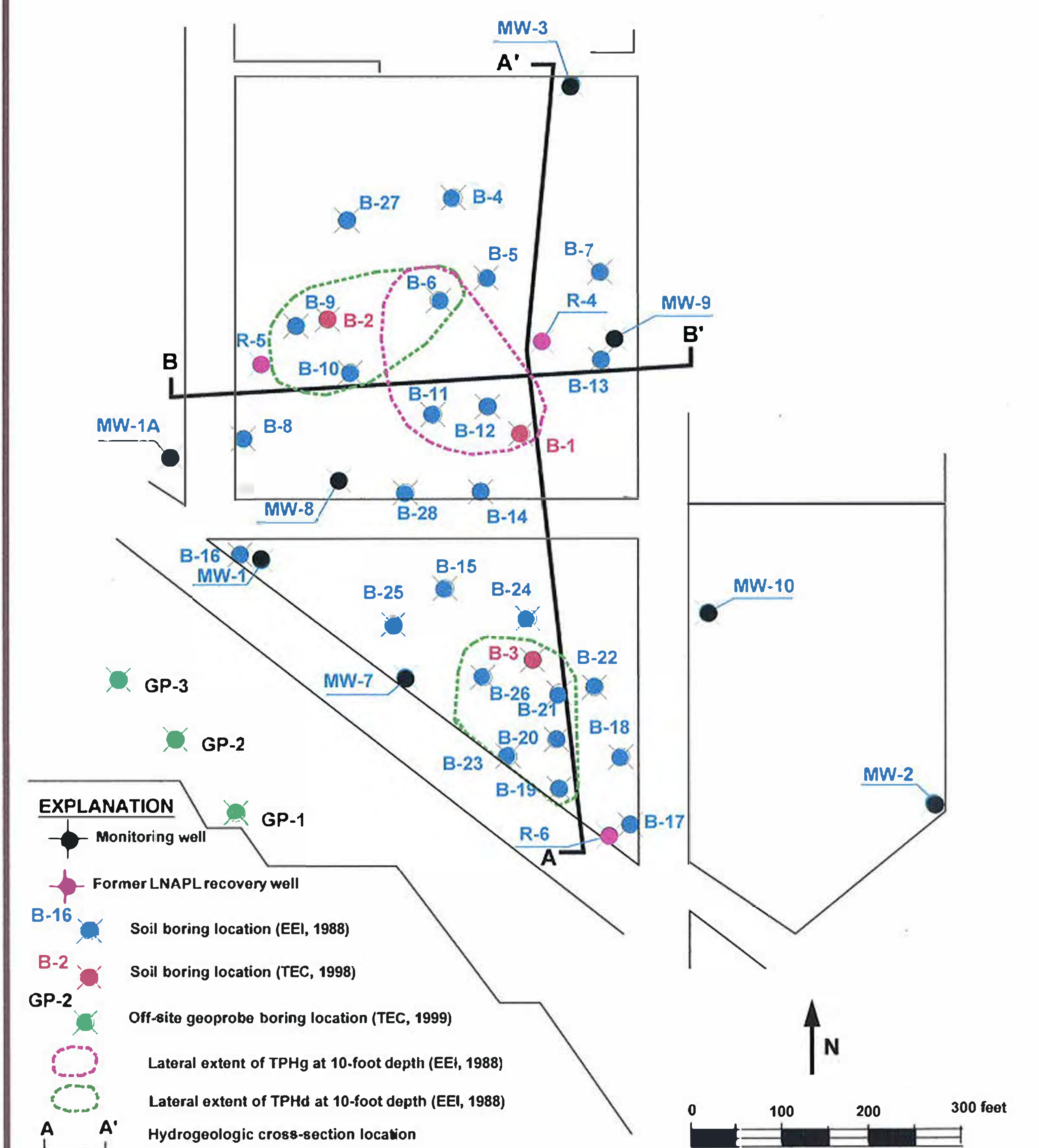


LATERAL EXTENT OF FUEL HYDROCARBONS IMPACTED SOIL AT 10-FOOT DEPTH
WESTERN PARCEL
FORMER CHEMOIL REFINERY
SIGNAL HILL, CALIFORNIA

Testa Environmental Corporation

Earth Sciences & Environmental Specialists

PROJECT NO: 94-11-1008	FILE: .74	FIGURE NO. 3
DATE: June 2011	DRAWN BY:	

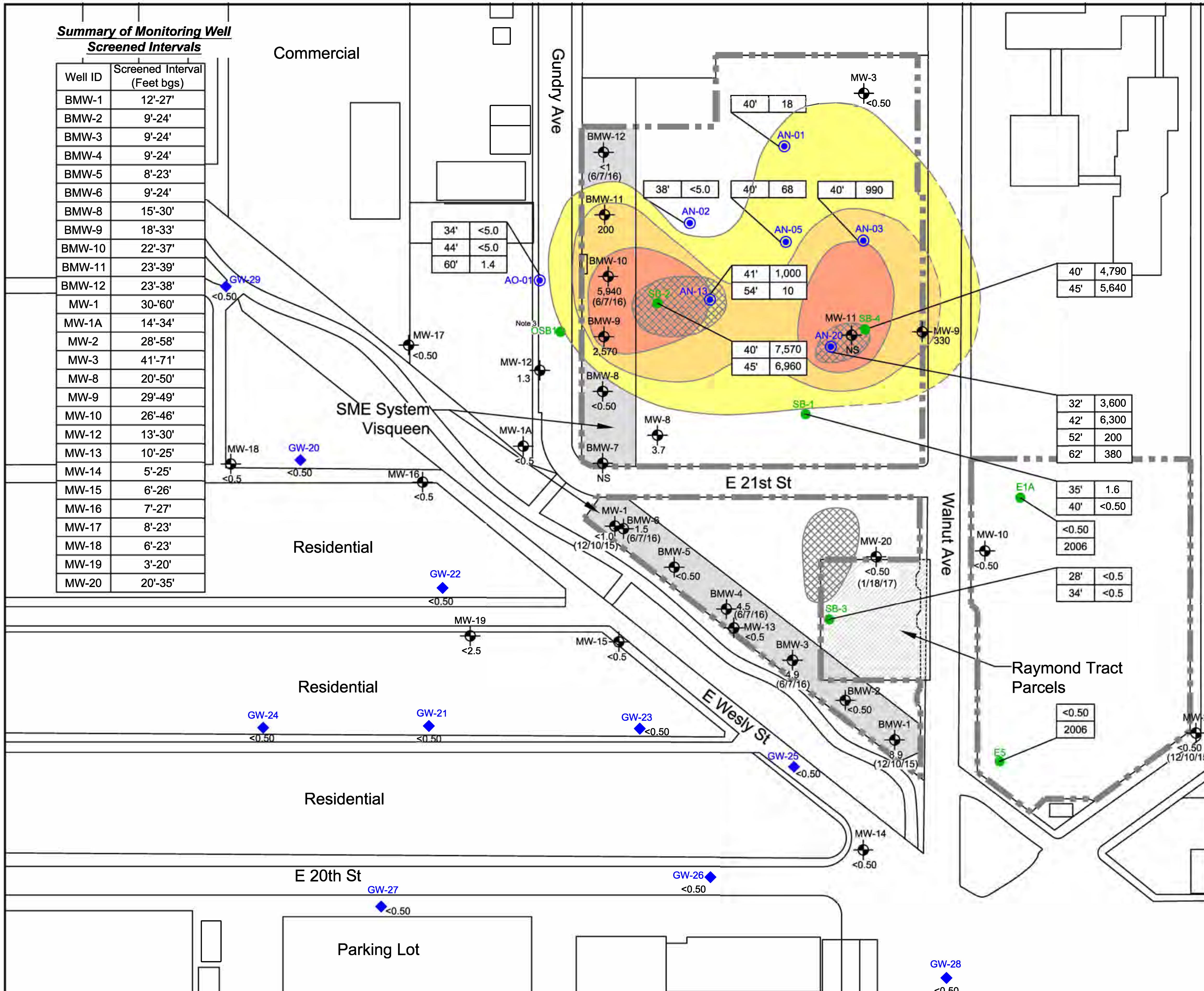


LATERAL EXTENT OF TPHg AND TPHd IMPACTED SOIL AT 10-FOOT DEPTH
WESTERN PARCEL
FORMER CHEMOIL REFINERY
SIGNAL HILL, CALIFORNIA

Testa Environmental Corporation

Earth Sciences & Environmental Specialists

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



Summary of Monitoring Well Screened Intervals

Well ID	Screened Interval (Feet bgs)
BMW-1	12'-27'
BMW-2	9'-24'
BMW-3	9'-24'
BMW-4	9'-24'
BMW-5	8'-23'
BMW-6	9'-24'
BMW-8	15'-30'
BMW-9	18'-33'
BMW-10	22'-37'
BMW-11	23'-39'
BMW-12	23'-38'
MW-1	30'-60'
MW-1A	14'-34'
MW-2	28'-58'
MW-3	41'-71'
MW-8	20'-50'
MW-9	29'-49'
MW-10	26'-46'
MW-12	13'-30'
MW-13	10'-25'
MW-14	5'-25'
MW-15	6'-26'
MW-16	7'-27'
MW-17	8'-23'
MW-18	6'-23'
MW-19	3'-20'
MW-20	20'-35'

LEGEND

- Site Boundary
- MW-16 Groundwater Monitoring Well Locations
- AN-01 Grab Groundwater Sample Locations, APEX, 2017
- SB-2 Grab Groundwater Sample Locations, Geosyntec, 2012. Samples Collected for First Encountered Groundwater.
- GW-29 Grab Groundwater Sample Locations, Geosyntec, 2012
- 40' | 18 — Depth in feet bgs; Benzene Concentration in µg/L
- bgs Below Ground Surface
- µg/L Micrograms per Liter
- <0.50 Indicated Compound Not Detected at Concentration at or Above the Laboratory Reporting Limit Shown
- NS Not Sampled
- SME Subsurface Metabolism Enhancement
- Isoconcentration Contour, Dashed Where Inferred
- Area of Observed or Suspected LNAPL
- Concentrations > 10 µg/L
- Concentrations > 100 µg/L
- Concentrations > 1,000 µg/L

Note:
1. Locations sampled during Quarter 4, 2016 unless otherwise indicated.
2. With the exception of MW-20, monitoring wells were sampled by Ami Adini & Associates.
3. OSBI was advanced and sampled prior to installation of the SME barrier. Results no longer representative are not shown.

SUMMARY OF BENZENE CONCENTRATIONS IN GROUNDWATER

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	01/23/17	ZA	KD

0 120 240
HORIZONTAL SCALE IN FEET

SGI environmental APEX
3478 BUSKIRK AVENUE, SUITE 100
PLEASANT HILL, CA 94523

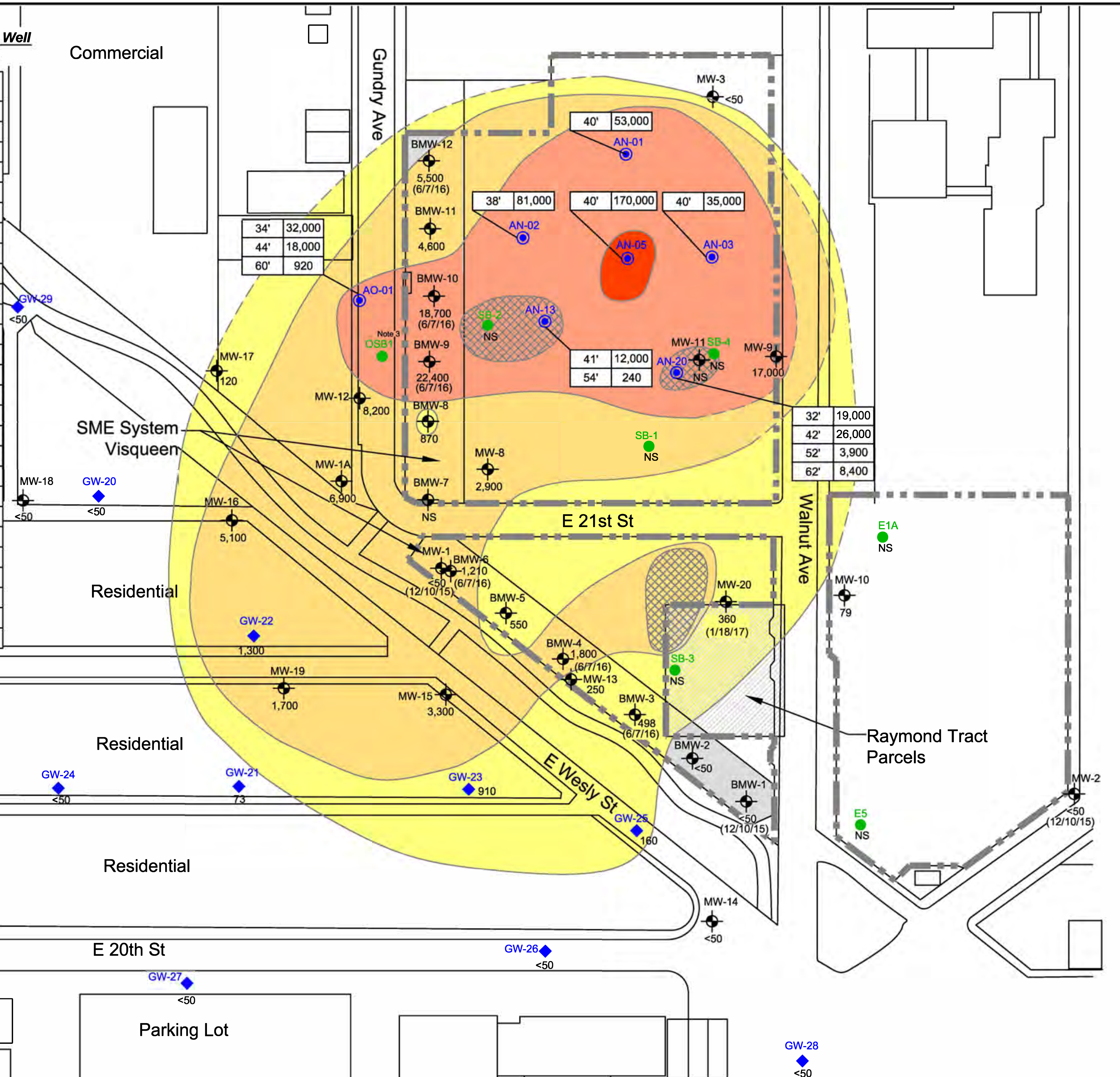
N

FIGURE 5

S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\App\MNA Plan\Fig.x-3-Summari of Benzene Concentrations in GW.dwg, 5/30/2017 2:44:15 PM

Summary of Monitoring Well Screened Intervals

Well ID	Screened Interval (Feet bgs)
BMW-1	12'-27'
BMW-2	9'-24'
BMW-3	9'-24'
BMW-4	9'-24'
BMW-5	8'-23'
BMW-6	9'-24'
BMW-8	15'-30'
BMW-9	18'-33'
BMW-10	22'-37'
BMW-11	24'-39'
BMW-12	23'-38'
MW-1	30-'60'
MW-1A	14'-34'
MW-2	28'-58'
MW-3	41'-71'
MW-8	20'-50'
MW-9	29'-49'
MW-10	26'-46'
MW-12	13'-30'
MW-13	10'-25'
MW-14	5'-25'
MW-15	6'-26'
MW-16	7'-27'
MW-17	8'-23'
MW-18	6'-23'
MW-19	3'-20'
MW-20	20'-35'



LEGEND

- Site Boundary
- MW-16 — Groundwater Monitoring Well Locations
- AN-01 — Grab Groundwater Sample Locations, APEX, 2017
- SB-2 — Grab Groundwater Sample Locations, Tetratech, 2006
- GW-29 — Grab Groundwater Sample Locations, Geosyntec, 2012. Samples Collected for First Encountered Groundwater.
- 40' | 35,000 — Depth in feet bgs; TPHg Concentration in µg/L
- bgs — Below Ground Surface
- µg/L — Micrograms per Liter
- <50 — Indicated Compound Not Detected at Concentration at or Above the Laboratory Reporting Limit Shown
- NS — Not Sampled
- SME — Subsurface Metabolism Enhancement
- Isoconcentration Contour, Dashed Where Inferred
- Area of Observed or Suspected LNAPL
- Concentrations > 100 µg/L
- Concentrations > 1,000 µg/L
- Concentrations > 10,000 µg/L
- Concentrations > 100,000 µg/L

Note:
1. Locations sampled during Quarter 4, 2016 unless otherwise indicated.
2. With the exception of MW-20, monitoring wells were sampled by Ami Adini & Associates.
3. OSBI was advanced and sampled prior to installation of the SME barrier. Results no longer representative are not shown.

SUMMARY OF TPHg (C4-C12) CONCENTRATIONS IN GROUNDWATER

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	01/23/17	ZA	KD

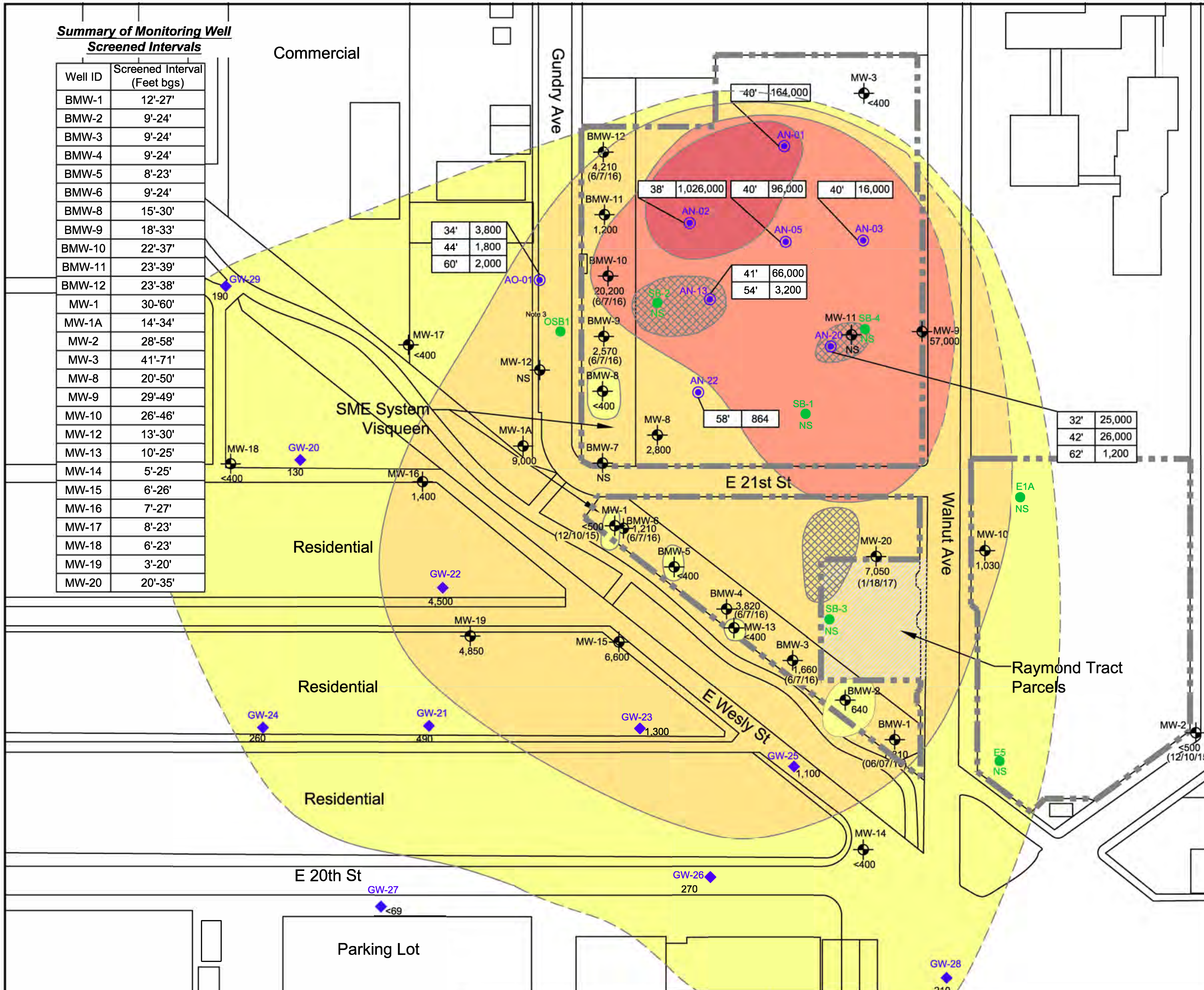
0 120 240
HORIZONTAL SCALE IN FEET

SGI environmental APEX
3478 BUSKIRK AVENUE, SUITE 100
PLEASANT HILL, CA 94523

N

FIGURE 6

S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\App\MNA Plan\Fig.x-4-Summary of TPHg (C4-C12) in GW.dwg, 6/1/2017 11:37:26 AM



Summary of Monitoring Well Screened Intervals

Well ID	Screened Interval (Feet bgs)
BMW-1	12'-27'
BMW-2	9'-24'
BMW-3	9'-24'
BMW-4	9'-24'
BMW-5	8'-23'
BMW-6	9'-24'
BMW-8	15'-30'
BMW-9	18'-33'
BMW-10	22'-37'
BMW-11	23'-39'
BMW-12	23'-38'
MW-1	30-'60'
MW-1A	14'-34'
MW-2	28'-58'
MW-3	41'-71'
MW-8	20'-50'
MW-9	29'-49'
MW-10	26'-46'
MW-12	13'-30'
MW-13	10'-25'
MW-14	5'-25'
MW-15	6'-26'
MW-16	7'-27'
MW-17	8'-23'
MW-18	6'-23'
MW-19	3'-20'
MW-20	20'-35'

LEGEND

Site Boundary

MW-16 Groundwater Monitoring Well Locations

AN-01 Grab Groundwater Sample Locations, APEX, 2017

SB-2 Grab Groundwater Sample Locations, Tetra Tek, 2006. Samples Collected for First Encountered Groundwater.

GW-29 Grab Groundwater Sample Locations, Geosyntec, 2012

40' 18 — Depth in feet bgs; TPHd Concentration in µg/L

bgs Below Ground Surface

µg/L Micrograms per Liter

<0.50 Indicated Compound Not Detected at Concentration at or Above the Laboratory Reporting Limit Shown

NS Not Sampled

SME Subsurface Metabolism Enhancement

Isoconcentration Contour, Dashed Where Inferred

Area of Observed or Suspected LNAPL

Concentrations > 100 µg/L

Concentrations > 1,000 µg/L

Concentrations > 10,000 µg/L

Concentrations > 100,000 µg/L

Note:
1. Locations sampled during Quarter 4, 2016 unless otherwise indicated.
2. With the exception of MW-20, monitoring wells were sampled by Ami Adini & Associates.
3. OSBI was advanced and sampled prior to installation of the SME barrier. Results no longer representative are not shown.

SUMMARY OF TPHd (C13-C22) CONCENTRATIONS IN GROUNDWATER

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	05/30/17	ZA	KD

0 120 240
HORIZONTAL SCALE IN FEET

SGI environmental APEX

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

N

FIGURE 7

LEGEND

Site Boundary

Wnt-4 — Soil Vapor Sampling Locations, (TEC, 2009/2010)

AN-06 — Soil Vapor Sample Locations, (APEX, 2017)

E1 — Soil Vapor Sample Locations, (Tetratech, 2006)

SV-20 — Soil Gas Sampling Locations, (Geosyntec, 2012)

<50 — 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

bgs — Below Ground Surface

ND — Not Detected

NS — Not Sampled

Isoconcentration Contour, Dashed Where Inferred

Concentrations > 909 µg/m³

Concentrations > 10,000 µg/m³

µg/m³ — Micrograms per Cubic Meter

Note:
1. Concentration of benzene in micrograms per cubic meter (µg/m³)
2. 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

0 150 300
HORIZONTAL SCALE IN FEET

SGI environmental APEX

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

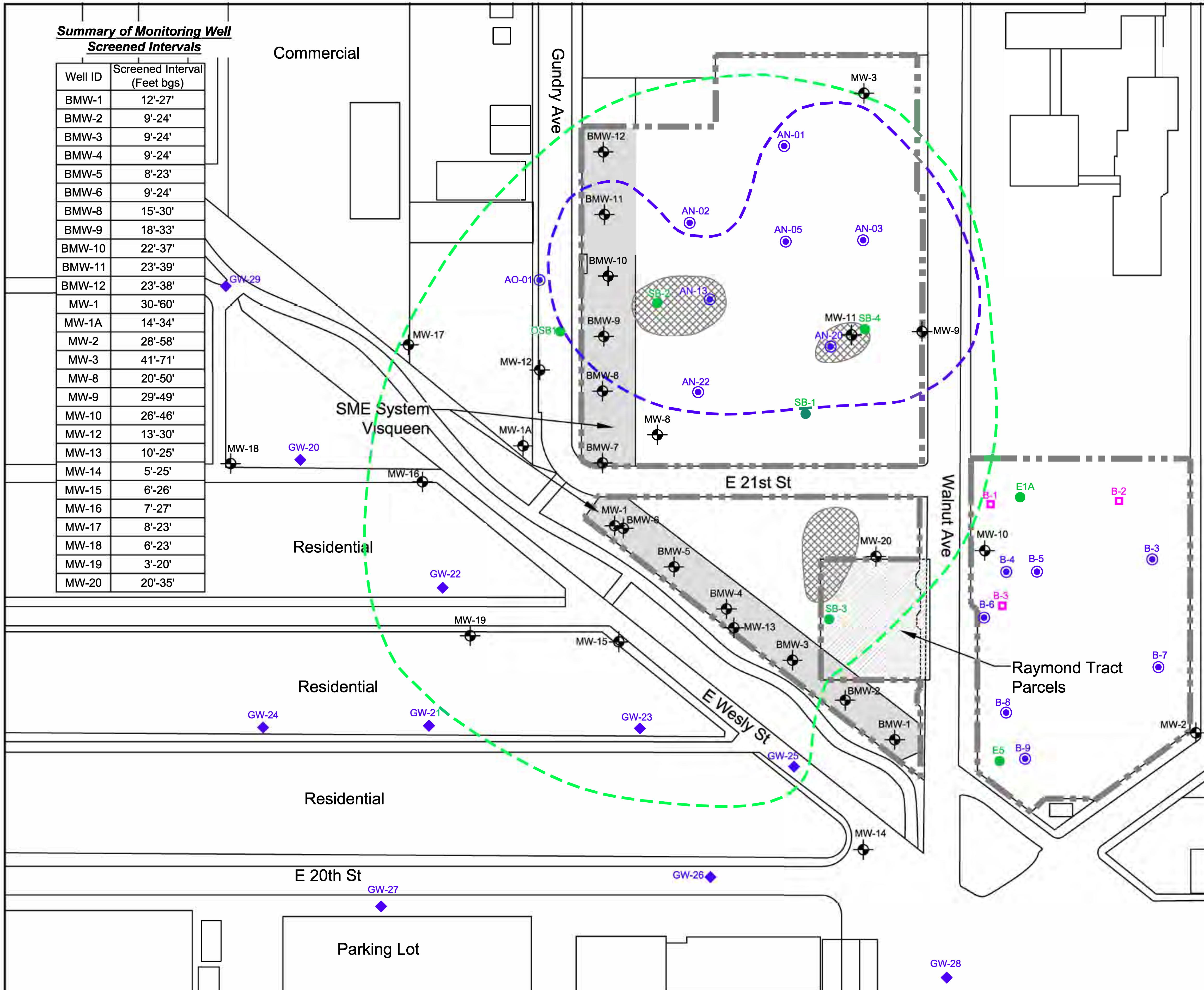
N

FIGURE 8

S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\Figures\Fig.2-6-Summary of Benzene Concentratiosn in Soil Vapor-5 ft BGS.dwg, 7/14/2017 9:56:31 AM

Summary of Monitoring Well Screened Intervals

Well ID	Screened Interval (Feet bgs)
BMW-1	12'-27'
BMW-2	9'-24'
BMW-3	9'-24'
BMW-4	9'-24'
BMW-5	8'-23'
BMW-6	9'-24'
BMW-8	15'-30'
BMW-9	18'-33'
BMW-10	22'-37'
BMW-11	23'-39'
BMW-12	23'-38'
MW-1	30'-60'
MW-1A	14'-34'
MW-2	28'-58'
MW-3	41'-71'
MW-8	20'-50'
MW-9	29'-49'
MW-10	26'-46'
MW-12	13'-30'
MW-13	10'-25'
MW-14	5'-25'
MW-15	6'-26'
MW-16	7'-27'
MW-17	8'-23'
MW-18	6'-23'
MW-19	3'-20'
MW-20	20'-35'



S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\Figures\Fig 2-7-TPHg, Benzene & LNAPL Extents in GW.dwg, 7/11/2017 2:54:55 PM

LEGEND

- Site Boundary
- MW-16 — Groundwater Monitoring Well Locations
- AN-01 — Grab Groundwater Sample Locations, APEX, 2017
- SB-2 — Grab Groundwater Sample Locations, Tetra Tech, 2006. Samples Collected for First Encountered Groundwater.
- GW-29 — Grab Groundwater Sample Locations, Geosyntec, 2012
- B-3 — Former EEI (1988) Soil Boring (TEC, 2001)
- bgs — Below Ground Surface
- µg/L — Micrograms per Liter
- SME — Subsurface Metabolism Enhancement
- Area of Observed or Suspected LNAPL
- LNAPL — Light Non-Aqueous Phase Liquid
- TPHg (C4-C12) — Total Petroleum Hydrocarbons As Gasoline, Carbon Chain Range C4-C-12
- Approximate Extent of TPHg(C4-C12) Plume With Concentrations >100 µg/L in Groundwater
- Approximate Extent of Benzene Plume With Concentrations >10 µg/L in Groundwater

TPHg (C4-C12), BENZENE, AND LNAPL EXTENTS IN GROUNDWATER

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	05/18/17	ZA	KD

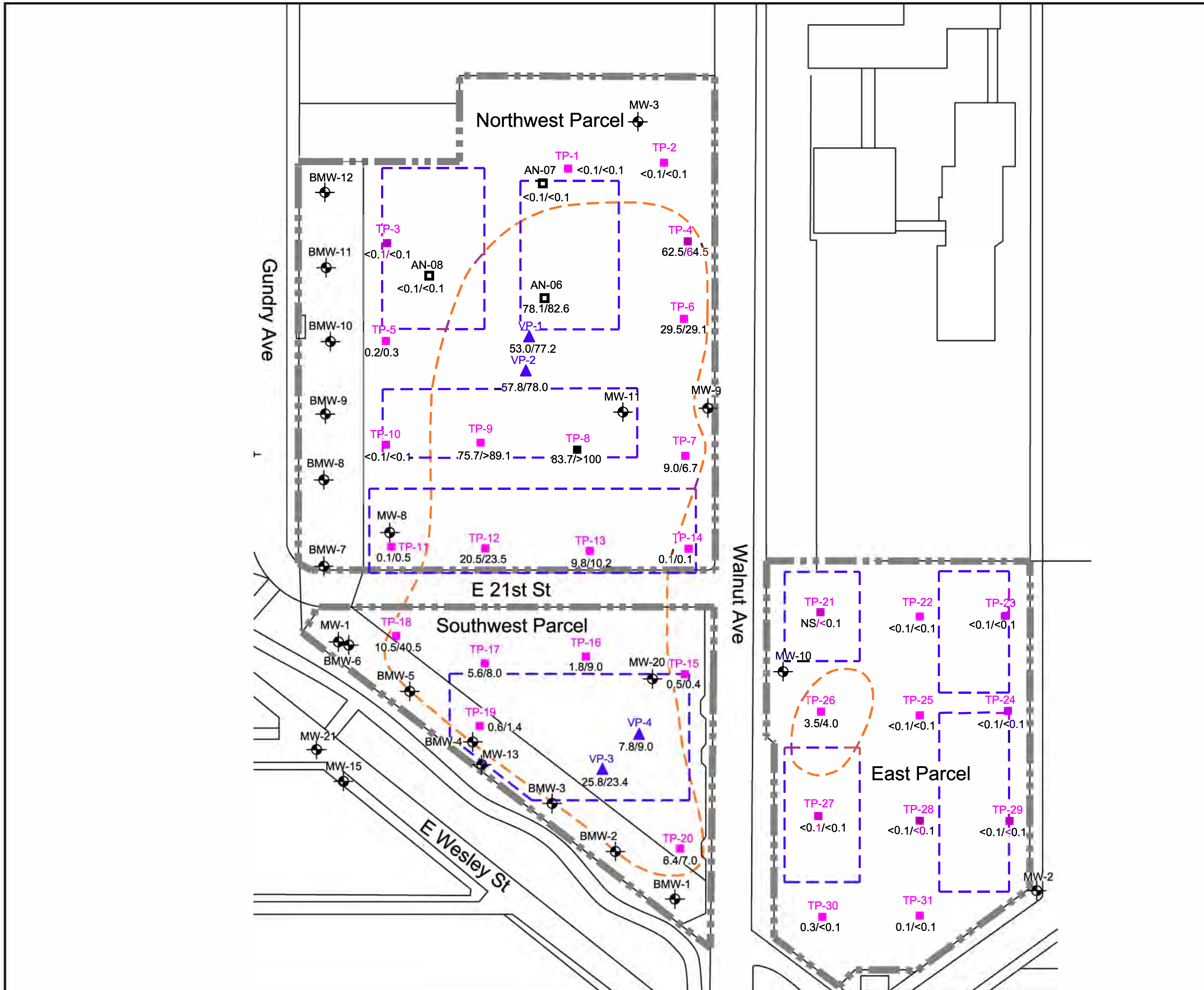
0 120 240
HORIZONTAL SCALE IN FEET

SGI environmental APEX

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

N

FIGURE 9



LEGEND

Site Boundary

MW-11 Groundwater Monitoring Well Locations

VP-1 Existing Nested Soil Vapor Monitoring Point (Sampled at 5 foot bgs)

AN-06 Existing Shallow Soil Vapor Monitoring Point (5 foot bgs)

TP-1 New Shallow Temporary Vapor Monitoring Point (Approximate Locations; 5 foot bgs)Notes 1,2

Note 1 New Shallow Temporary Vapor Monitoring Points Were Installed From March 16-20, 2018 in a 100'x100' Grid

Note 2 TP-21 and TP-23 Were Set at 4' to 4.5' Due To Subsurface Conditions Encountered During Air Knife Activities

Note 3 Methane Concentration Measured in %

Note 4 Methane Concentration Was Measured in the Field Using a Landtec GEM-2000. Concentration May Be High Due to False Positives Associated With Elevated Petroleum Concentrations.

78.1/82.6
Methane Concentration Sampled on 3/30/18Note 3,4
Methane Concentration Sampled on 3/29/18Note 3,4

Suspected Area With Elevated Methane Concentrations (greater than 0.5%) at 4 to 5 Feet BGS

BGS Below Ground Surface

% Percent by Volume

NS Not Sampled

<0.1 Not detected at 0.1%

> Over Instrument Calibration Range

SUMMARY OF METHANE 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-003	04/02/18	ZA	KD

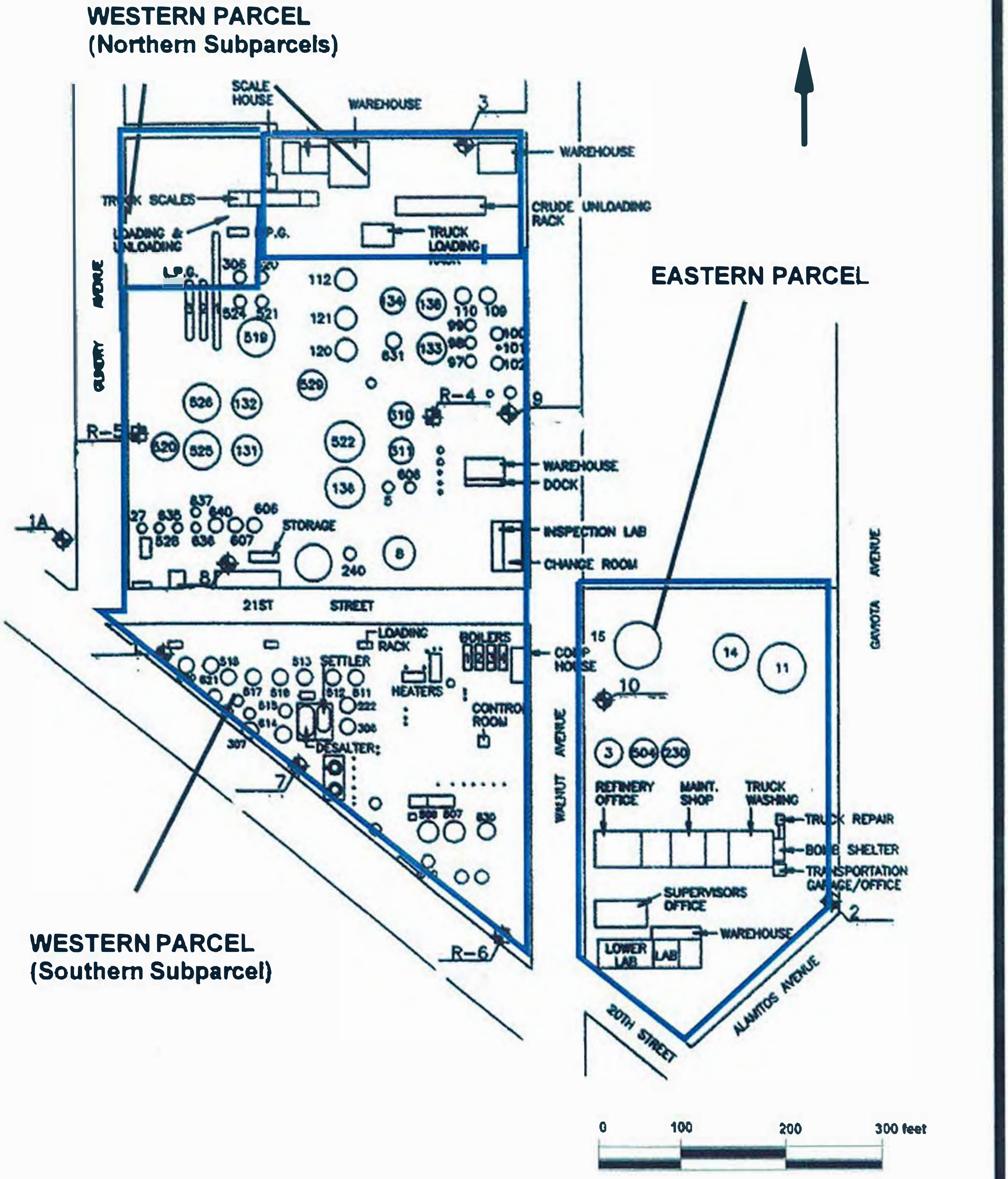
0 100 200
HORIZONTAL SCALE IN FEET

N

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

FIGURE 11

S:\Clients A - F\ChemOil Refinery\Reports\Methane Study\Fig.2-Methane Concentration in Soil Vapor.dwg, 4/3/2018 3:29:39 PM

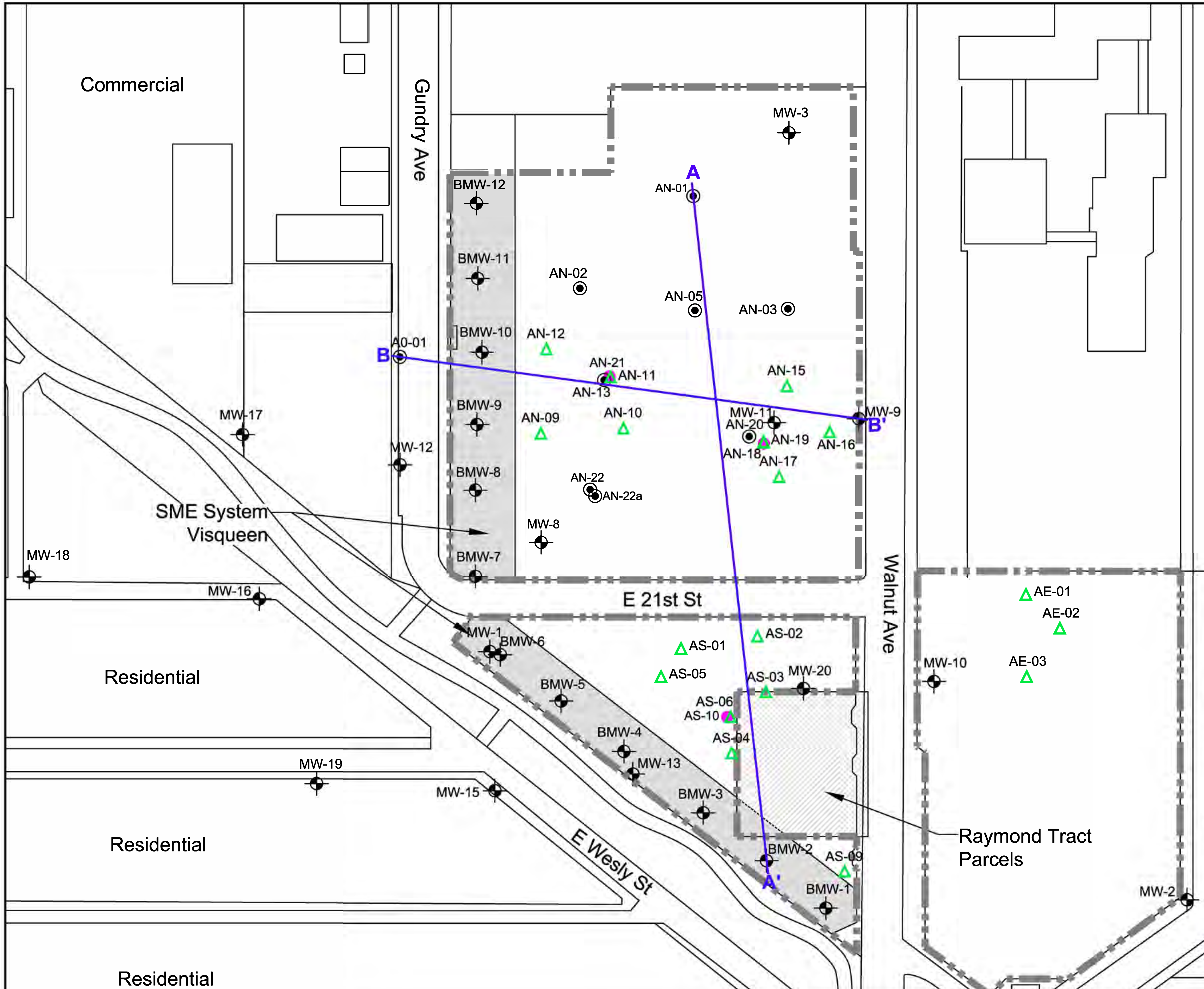


SITE LAYOUT MAP
FORMER CHEMOIL REFINERY SITE
SIGNAL HILL, CALIFORNIA

Testa Environmental Corporation

Earth Sciences & Environmental Specialists

PROJECT NO.	94-11-1008	FILE:	.6.2	FIGURE
DATE:	January 2009	DRAWN BY:		11



S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\Figures\Fig.2-2,2-3,2-4-Cross Section Locations &Cross sections A-A' & B-B'.dwg, 7/14/2017 2:47:54 PM

CROSS-SECTION LOCATION MAP

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

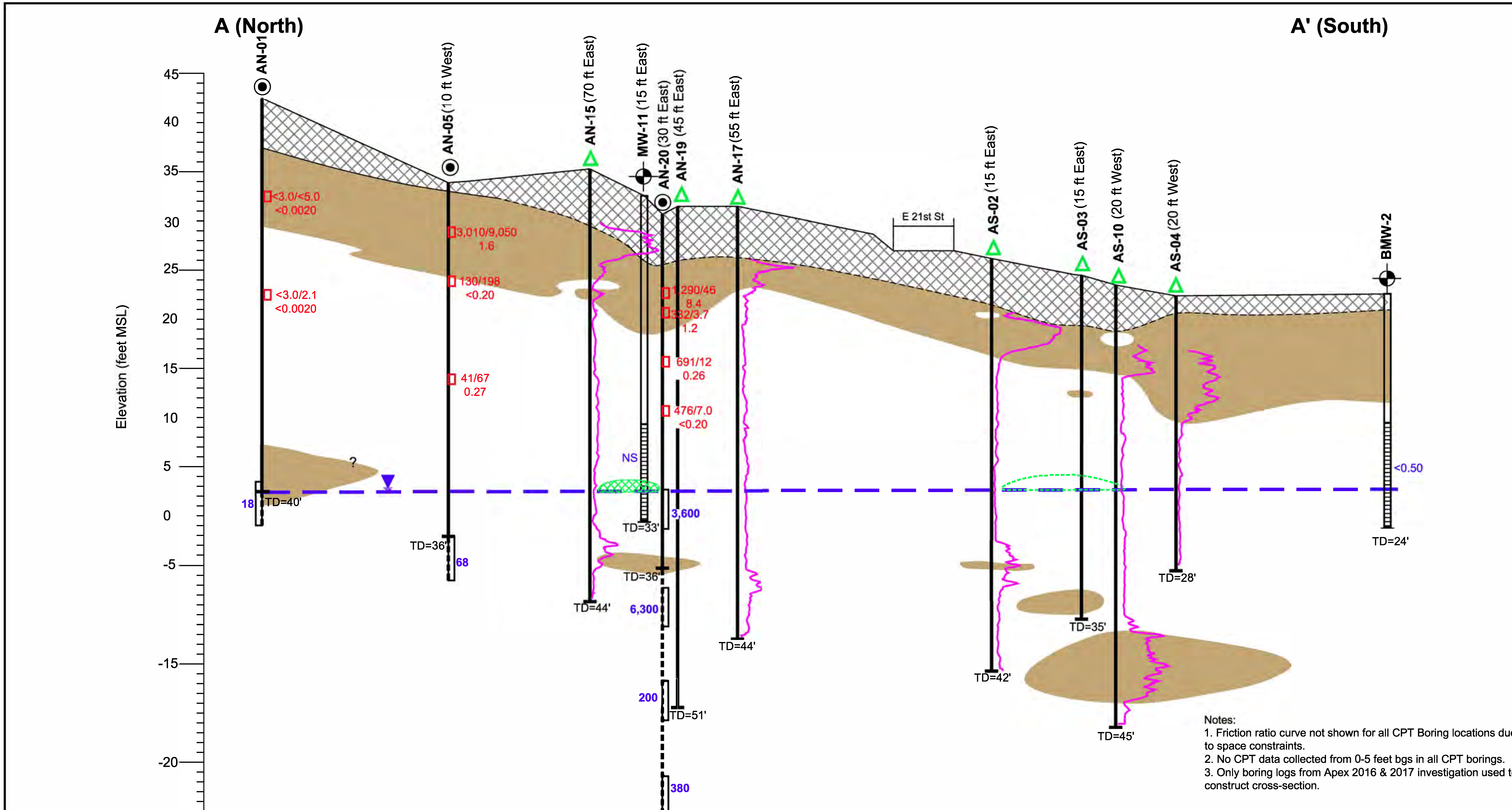
PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	06/12/17	ZA	KD

0 100 200
HORIZONTAL SCALE IN FEET

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

N

FIGURE 12



LEGEND

- Fill
- Fine Grained Material
- Coarse Grained Material
- Lithologic Contact (Dashed Where Inferred)
- MSL Mean Sea Level
- TD Total Depth of Logged Boring In Feet
- Grab Groundwater Sample
- 68 Benzene Concentration in Groundwater (micrograms per Liter)
- <0.50 Not Detected Above Indicated Reporting Limit
- NS Not Sampled
- Soil Not Logged. Boring Advanced For Grab Groundwater Sample Only
- Screened Interval, Monitoring Well Sample
- Potentiometric Surface
- CPT Boring (Apex, 2016)
- Soil Boring and Grab Groundwater Location (Apex, 2017)
- Monitoring Well Location
- 41/67 TPH(C5-C12) Concentration in Soil (milligrams per kilogram) / TPH(C13-C22) Concentration in Soil (milligrams per kilogram)
- 0.27 Benzene Concentration in Soil (milligrams per kilogram)
- Soil Sample
- Approximate Groundwater Elevation Measured in December 2016 Monitoring event by (AA&AI, 2016b)
- Friction Ratio From CPT Report (Apex, 2016)
- Free Product Observed
- Suspected Area of Free Product

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	06/12/17	ZA	KD

0 60 120
HORIZONTAL SCALE IN FEET

CROSS-SECTION A-A'

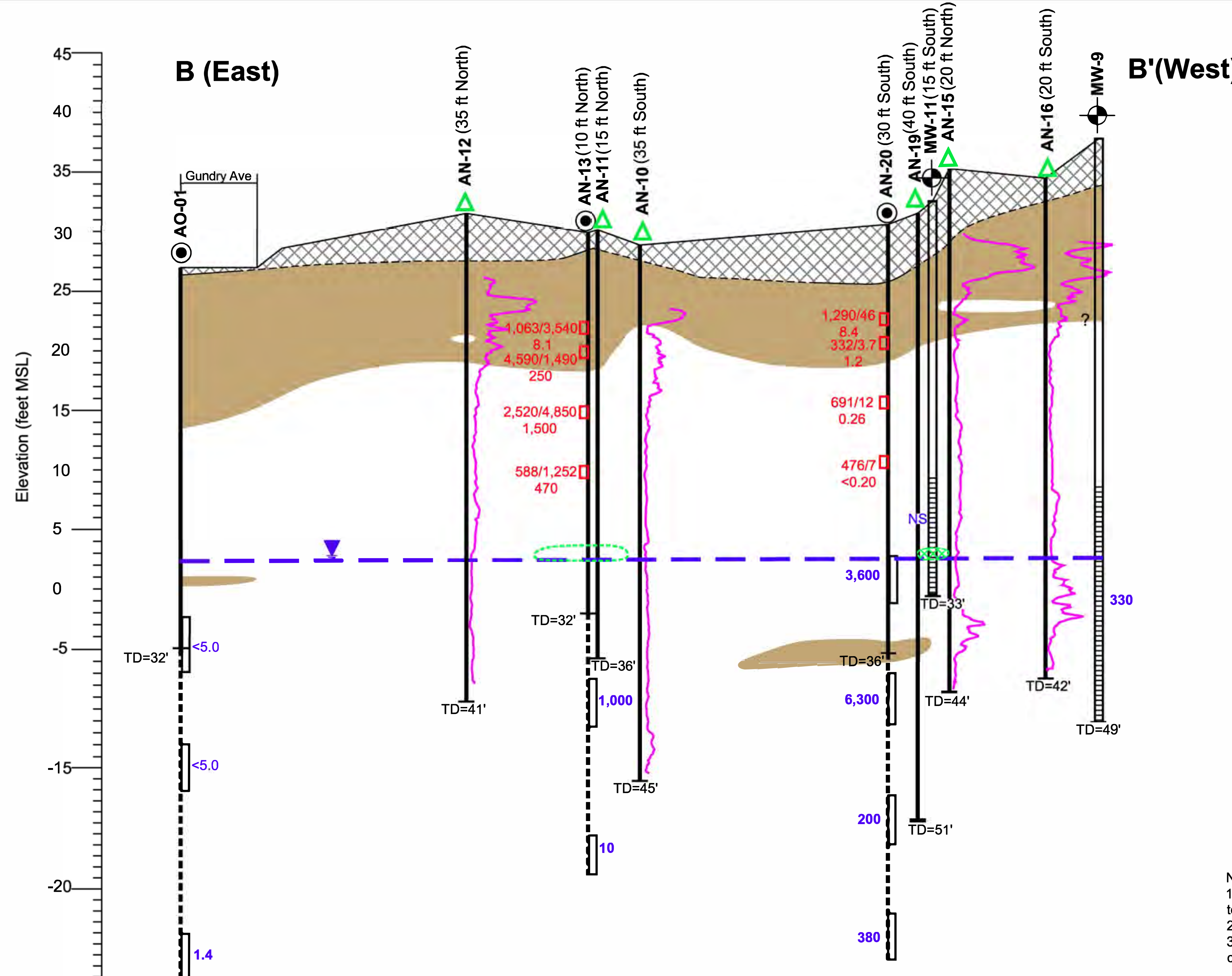
SGI environmental APEX

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

N

FIGURE 13

S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\Figures\Fig.2-2,2-3,2-4-Cross Section Locations &Cross sections A-A' & B-B'.dwg, 6/12/2017 5:55:02 PM



Notes:
1. Friction ratio curve not shown for all CPT Boring locations due to space constraints.
2. No CPT data collected from 0-5 feet bgs in all CPT borings.
3. Only boring logs from Apex 2016 & 2017 investigation used to construct cross-section.

LEGEND

- Fill
- Fine Grained Material
- Coarse Grained Material
- Lithologic Contact (Dashed Where Inferred)
- MSL Mean Sea Level
- TD Total Depth of Logged Boring
- Grab Groundwater Sample
- 200 Benzene Concentration in Groundwater (micrograms per Liter)
- Not Detected Above Indicated Reporting Limit
- NS Not Sampled
- Soil Not Logged. Boring Advanced For Grab Groundwater Sample Only
- Screened Interval, Monitoring Well Sample
- Potentiometric Surface
- CPT Boring (Apex, 2016)
- Soil Boring and Grab Groundwater Location (Apex, 2017)
- Monitoring Well Location
- 2,520/4,850 — TPH(C5-C12) Concentration in Soil (milligrams per kilogram) / TPH(C13-C22) Concentration in Soil (milligrams per kilogram)
- 1,500 — Benzene Concentration in Soil (milligrams per kilogram)
- Soil Sample
- Approximate Groundwater Elevation Measured in December 2016 Monitoring event by (AA&AI, 2016b)
- Friction Ratio From CPT Report (Apex, 2016)
- Free Product Observed
- Suspected Area of Free Product

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

CROSS-SECTION B-B'

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-001	06/13/17	ZA	KD

0 60 120
HORIZONTAL SCALE IN FEET

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

N

FIGURE 14

S:\Clients A - F\ChemOil Refinery\Reports\Response Plan\Figures\Fig.2-2,2-3,2-4-Cross Section Locations &Cross sections A-A' & B-B'.dwg, 6/12/2017 5:53:11 PM

SOIL SAMPLE LOCATIONS - METALS AND SOIL PHYSICAL PARAMETERS

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-003	05/01/18	ZA	KD

0 100 200
HORIZONTAL SCALE IN FEET

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

N

FIGURE 15

S:\Clients A - F\ChemOil Refinery\Reports\Supplemental Report\Figures\Fig.1-Soil Sample Locations -Metal & Soil Physical Parametrs.dwg, 5/2/2018 3:43:35 PM

LEGEND

Site Boundary

MW-16 Groundwater Monitoring Well Location

VP-1 Existing Nested Soil Vapor Monitoring Point With Shallow Point at 5 Feet Below Ground Surface (Apex, 2017)

AN-06 Existing Shallow Soil Vapor Monitoring Point at 5 Feet Below Ground Surface (Apex, 2017)

TP-1 New Shallow Temporary Vapor Monitoring Point at 5 Feet Below Ground Surface (Apex, 2018)[Notes 1,2]

New Nested Temporary Soil Vapor Monitoring Point (Apex, 2018)

Shallow Temporary Vapor Monitoring Point Sample Location

VOC Volatile Organic Compound

Note 1 New Shallow Temporary Vapor Monitoring Points Were Installed an Approximately 100'x100' Grid

Note 2 TP-21 and TP-23 Were Set at 4' to 4.5' Due To Subsurface Conditions Encountered During Air Knife Activities

SOIL VAPOR SAMPLE LOCATIONS

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
093-CHEMOIL-003	05/01/18	ZA	KD

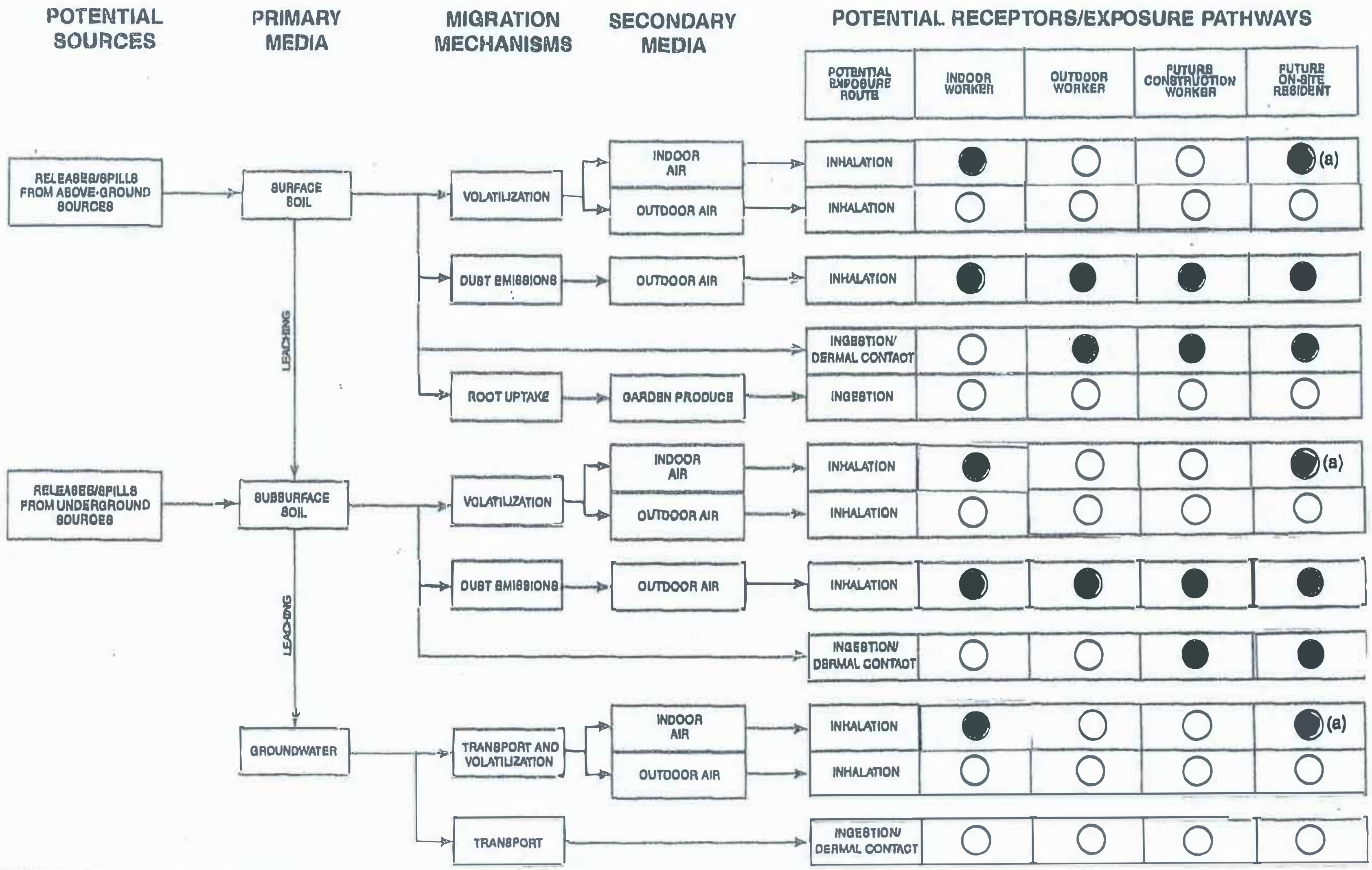
0 100 200
HORIZONTAL SCALE IN FEET

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

N

FIGURE 16

S:\Clients A - F\ChemOil Refinery\Reports\Supplemental Report\Figures\Fig.2- Soil Vapor Sample Locations.dwg, 5/2/2018 3:42:23 PM



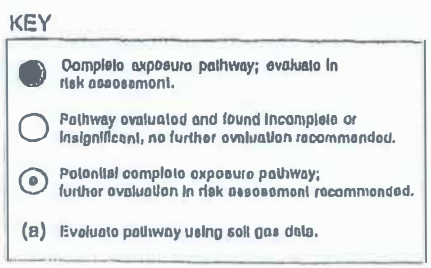
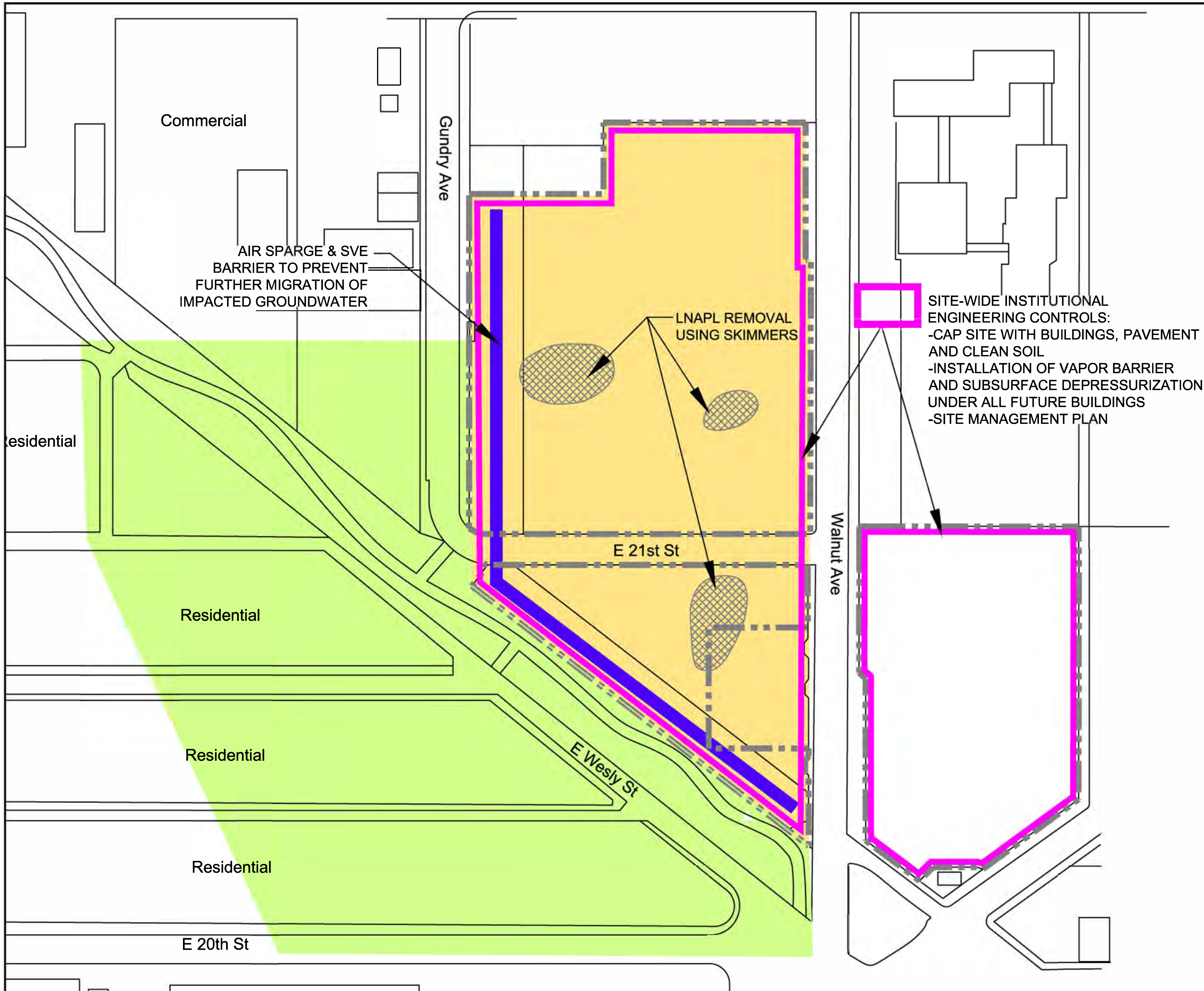


Figure 7
Risk Assessment Conceptual Site Model



CONCEPTUAL REMEDIAL APPROACH

FORMER CHEMOIL REFINERY
2020 WALNUT AVENUE
SIGNAL HILL, CA

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-CHEMOIL-001	02/08/17	ZA	KD

SGI environmental APEX

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

FIGURE 18

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

Sample ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	TPHg	TPHd	U. S. EPA Method 8015 - TPH																	Total TPH[1]		
							C06-C08	C08-C10	C10-C12	C12-C14	C14-C16	C16-C18	C18-C20	C20-C22	C22-C24	C24-C26	C26-C28	C28-C32	C32-C34	C34-C38	C38-C40	C40-C44	Total	C5-C12 (Note 2)	C13-C22 (Note 3)	C23-C44 (Note 4)
				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
Depth Range: 0 to 10 feet bgs																										
B-1	EEI	(a) (b) (c)	1988	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-1	EEI	(a) (b) (c) (d)	1988	10	--	ND<10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-2	EEI	(a) (b) (c)	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<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	ND<1	14	ND<1	ND<1	ND<1	3.0	4.8	22	ND<1	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	1	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<1	6.3	3.0	ND<1	ND<1	3.5	3.9	1.8	1.2	ND<1	7.1	ND<1	1.1	ND<1	ND<1	ND<1	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)	1999	1	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
70-70-5	TSG	(a) (b) (c) (d) (e)	1999	5	7.2	--	ND<10	ND<10	ND<10	50	310	270	170	59	76	53	56	110	85	52	74	22	1,387	ND<10	834	490
70-70-10	TSG	(a) (b) (c) (d) (e)	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	1	ND<1	--	ND<1	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
75-195-5	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
75-195-10	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)	2001	1	--	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-6-10	TEC	(a) (b) (c)	2001	10	--	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-8-1	TEC	(a) (b) (c)	2001	1	--	46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B-9-1	TEC	(a) (b) (c)	2001	1	--	220	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
E1B	Tetra Tech		06/01/06	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48
E1C	Tetra Tech		06/01/06	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	94	201	92
E3A	Tetra Tech		06/01/06	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48
E5	Tetra Tech		06/01/06	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48
E5	Tetra Tech		06/01/06	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48
Depth Range: Greater than 10 feet bgs																										
70-70-15	TSG	(a) (b) (c) (d) (e)	1999	15	370	--	66	980	2,200	3,300	2,900	2,400	1,700	860	1,200	910	720	740	120	350	88	78	18,612	4896	9,510	3,606
70-70-20	TSG	(a) (b) (c) (d) (e)	1999	20	760	--	ND<5	1,800	3,300	8,100	4,300	3,400	2,700	1,400	1,800	1,100	1,300	960	210	480	93	120	31,063	9150	15,850	5,163
70-70-25	TSG	(a) (b) (c) (d) (e)	1999	25	ND<1	--	ND<1	1.2	4.7	11	10	9.1	12	11	16	11	12	8.6	3.7	5.4	2.5	ND<1	118	11.4	47.6	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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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
E5	Tetra Tech		06/01/06	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ND<4.5	ND<25	ND<48
E5	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.
[2] TPH (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 ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	U.S. EPA Method 8260B - VOCs								
					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
Depth Range: 0 to 10 feet bgs													
B-1	EEI	(a) (b) (c)	1988	2	--	--	--	--	--	--	--	--	--
B-1	EEI	(a) (b) (c)	1988	10	--	--	--	--	--	--	--	--	--
B-2	EEI	(a) (b) (c)	1988	2	--	--	--	--	--	--	--	--	--
B-2	EEI	(a) (b) (c)	1988	10	--	--	--	--	--	--	--	--	--
B-3	EEI	(a) (b) (c)	1988	2	--	--	--	--	--	--	--	--	--
B-3	EEI	(a) (b) (c)	1988	10	--	--	--	--	--	--	--	--	--
B-3	EEI	(a) (b) (c)	1988	10	--	--	--	--	--	--	--	--	--
110-95-1	TSG	(a) (b) (c)	1999	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
110-95-5	TSG	(a) (b) (c)	1999	5	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
110-95-10	TSG	(a) (b) (c)	1999	10	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
125-310-1	TSG	(a) (b) (c)	1999	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
125-310-5	TSG	(a) (b) (c)	1999	5	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
125-310-10	TSG	(a) (b) (c)	1999	10	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
180-75-1	TSG	(a) (b) (c)	1999	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
180-75-5	TSG	(a) (b) (c)	1999	5	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
180-75-10	TSG	(a) (b) (c)	1999	10	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
200-310-1	TSG	(a) (b) (c)	1999	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
200-310-5	TSG	(a) (b) (c)	1999	5	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
200-310-10	TSG	(a) (b) (c)	1999	10	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
204-95-1	TSG	(a) (b) (c)	1999	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
204-95-5	TSG	(a) (b) (c)	1999	5	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
204-95-10	TSG	(a) (b) (c)	1999	10	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
30-195-1	TSG	(a) (b) (c) (e)	1999	1	ND<0.005	--	--	--	**0.017**	--	--	ND<0.005	**0.014**
30-195-5	TSG	(a) (b) (c) (e)	1999	5	ND<0.005	--	--	--	**0.52**	--	--	**0.0068**	**0.13**
30-195-10	TSG	(a) (b) (c) (e)	1999	10	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
70-70-1	TSG	(a) (b) (c)	1999	1	ND<0.005	--	--	--	**0.024**	--	--	ND<0.005	**0.045**
70-70-5	TSG	(a) (b) (c)	1999	5	ND<0.005	--	--	--	**0.013**	--	--	ND<0.005	**0.058**
70-70-10	TSG	(a) (b) (c)	1999	10	**0.057**	--	--	--	**0.82**	--	--	**0.29**	**3.4**
75-195-1	TSG	(a) (b) (c)	1999	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
75-195-5	TSG	(a) (b) (c)	1999	5	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<0.005	--	--	ND<0.005	ND<0.01
B-6-1	TEC	(a) (b) (c)	2001	1	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<0.005	--	--	ND<0.005	ND<0.01
B-8-1	TEC	(a) (b) (c)	2001	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
B-9-1	TEC	(a) (b) (c)	2001	1	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
Depth Range: Greater than 10 feet bgs													
E1B	Tetra Tech		06/01/06	5	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	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	ND<0.002
E3A	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<0.005	ND<0.002	ND<0.002
E5	Tetra Tech		06/01/06	5	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	10	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
70-70-15	TSG	(a) (b) (c)	1999	15	ND<0.005	--	--	--	**0.33**	--	--	**0.33**	**4.2**
70-70-20	TSG	(a) (b) (c)	1999	20	ND<0.005	--	--	--	**0.25**	--	--	**0.80**	**8.1**
70-70-25	TSG	(a) (b) (c)	1999	25	ND<0.005	--	--	--	ND<0.005	--	--	ND<0.005	ND<0.01
B-2-40	TEC	(a) (b) (c) (d)	2001	40	ND<0.005	**5.1**	**10**	--	ND<0.005	--	--	ND<0.005	**7.2**
B-9-15	TEC	(a) (b) (c)	2001	15	ND<0.005	--	--	--	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

Sample ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	U.S. EPA Method 8260B - VOCs								
					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

Boring	Sample Date	Sample Depth	U.S. EPA Method 8270C - PAHs															
			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	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
E5	6/1/2006	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
E5	6/1/2006	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
E5	6/1/2006	15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
E5	6/1/2006	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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

Sample ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	U.S. EPA Method 6010B - Metals																
					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
Depth Range: 0 to 10 feet bgs																					
B-1-1	TEC	(a) (b) (c) (d)	2001	1	**0.50**	**4.5**	**50**	ND<0.15	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	ND<0.15	**20**	**11**	**21**	**4.0**	ND<0.10	**0.36**	**17**	ND<0.25	ND<0.15	**0.50**	**46**	**46**
B-1-10	TEC	(a) (b) (c) (d)	2001	10	**0.50**	**12**	**86**	ND<0.15	ND<0.15	**20**	**10**	**19**	ND<0.25	**3.0**	ND<0.25	**17**	ND<0.25	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	ND<0.15	**40**	**7.0**	**48**	**100**	--	**0.50**	**64**	ND<0.25	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	ND<0.15	**8.5**	**4.5**	**9.0**	**1.5**	ND<0.10	ND<0.25	**7.5**	ND<0.25	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	ND<0.15	**9.5**	**4.5**	**8.0**	1.5	ND<0.10	**0.33**	**6.0**	ND<0.25	ND<0.15	**0.50**	**18**	**22**
B-3-5	TEC	(a) (b) (c) (d)	2001	5	**0.50**	**12**	**100**	ND<0.15	ND<0.15	**19**	**10**	**16**	**3.0**	ND<0.10	**0.41**	**14**	ND<0.25	ND<0.15	**1.0**	**41**	**41**
B-3-10	TEC	(a) (b) (c) (d)	2001	10	**1.0**	**16**	**150**	ND<0.15	ND<0.15	**25**	**12**	**26**	**4.5**	ND<0.10	**0.50**	**20**	ND<0.25	ND<0.15	**1.5**	**48**	**48**
B-4-1	TEC	(a) (b) (c) (d)	2001	1	**0.50**	**10**	**76**	ND<0.15	ND<0.15	**18**	**8.0**	**16**	**3.0**	ND<0.10	**0.36**	**12**	ND<0.25	ND<0.15	**1.0**	**36**	**41**
B-4-5	TEC	(a) (b) (c) (d)	2001	5	**0.50**	**18**	**90**	ND<0.15	ND<0.15	**28**	**13**	**31**	**4.5**	ND<0.10	**0.50**	**22**	ND<0.25	ND<0.15	**2.0**	**53**	**56**
B-4-10	TEC	(a) (b) (c) (d)	2001	10	ND<0.25	**4.5**	**44**	ND<0.15	ND<0.15	**8.0**	**4.0**	**7.5**	**1.0**	ND<0.10	**0.26**	**6.5**	ND<0.25	ND<0.15	ND<0.25	**16**	**23**
B-5-1	TEC	(a) (b) (c) (d)	2001	1	**0.50**	**4.5**	**54**	ND<0.15	ND<0.15	**10**	**4.5**	**7.0**	**2.0**	ND<0.10	**0.42**	**6.0**	ND<0.25	ND<0.15	**1.0**	**17**	**24**
B-5-5	TEC	(a) (b) (c) (d)	2001	5	**0.50**	**9.0**	**73**	ND<0.15	ND<0.15	**15**	**8.0**	**12**	**2.5**	ND<0.10	**0.50**	**12**	ND<0.25	ND<0.15	**1.0**	**30**	**38**
B-5-10	TEC	(a) (b) (c) (d)	2001	10	**0.50**	**18**	**140**	ND<0.15	ND<0.15	**32**	**13**	**31**	**5.5**	**0.12**	**0.50**	**23**	ND<0.25	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	ND<0.15	**7.5**	**3.5**	**3.0**	**0.50**	ND<0.10	**0.35**	**5.5**	ND<0.25	ND<0.15	**0.50**	**15**	**22**
B-6-5	TEC	(a) (b) (c) (d)	2001	5	**0.50**	**10**	**68**	ND<0.15	ND<0.15	**16**	**8.0**	**14**	**3.0**	ND<0.10	**0.42**	**12**	ND<0.25	ND<0.15	**1.0**	**32**	**45**
B-6-10	TEC	(a) (b) (c) (d)	2001	10	**0.50**	**17**	**310**	ND<0.15	ND<0.15	**25**	**12**	**26**	**5.0**	ND<0.10	**0.50**	**20**	ND<0.25	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	ND<0.15	**9.0**	**4.5**	**7.5**	**3.0**	ND<0.10	**0.35**	**5.5**	ND<0.25	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	ND<0.15	**16**	**6.5**	**12**	**3.0**	ND<0.10	**0.49**	**10**	ND<0.25	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<0.25	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	ND<0.15	**9.5**	**4.5**	**6.5**	**1.5**	ND<0.10	**0.49**	**4.5**	ND<0.25	ND<0.15	**0.50**	**17**	**22**
B-8-5	TEC	(a) (b) (c) (d)	2001	5	**0.50**	**12**	**73**	ND<0.15	ND<0.15	**22**	**10**	**17**	**3.5**	ND<0.10	**0.42**	**15**	ND<0.25	ND<0.15	**1.5**	**40**	**50**
B-8-10	TEC	(a) (b) (c) (d)	2001	10	**1.0**	**16**	**76**	ND<0.15	ND<0.15	**25**	**12**	**28**	**4.5**	ND<0.10	**0.50**	**20**	ND<0.25	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	ND<0.15	**12**	**6.0**	**12**	**5.5**	ND<0.10	**0.47**	**8.0**	ND<0.25	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	ND<0.15	**16**	**7.5**	**12**	**3.0**	ND<0.10	**0.46**	**11**	ND<0.25	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	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**
Depth Range: Greater than 10 feet bgs																					
B-1-15	TEC	(a) (b) (c) (d)	2001	15	**0.41**	**5.0**	**54**	ND<0.15	ND<0.15	**5.5**	**3.6**	**6.0**	**1.0**	ND<0.10	ND<0.25	**5.0**	ND<0.25	ND<0.15	ND<0.25	**12**	**18**
B-1-20	TEC	(a) (b) (c) (d)	2001	20	ND<0.25	**3.0**	**15**	ND<0.15	ND<0.15	**5.0**	**1.5**	**1.5**	**0.50**	ND<0.10	ND<0.25	**2.5**	ND<0.25	ND<0.15	ND<0.25	**9.5**	**10**
B-1-25	TEC	(a) (b) (c) (d)	2001	25	ND<0.25	**5.0**	**22**	ND<0.15	ND<0.15	**7.0**	**3.5**	**3.0**	**0.50**	ND<0.10	**0.50**	**4.5**	ND<0.25	**5.0**	**0.50**	**15**	**18**
B-1-30	TEC	(a) (b) (c) (d)	2001	30	ND<0.25	**5.0**	**24**	ND<0.15	ND<0.15	**8.0**	**3.0**	**3.5**	**0.50**	ND<0.10	**0.37**	**4.5**	ND<0.25	ND<0.15	**0.48**	**16**	**18**
B-1-35	TEC	(a) (b) (c) (d)	2001	35	**0.42**	**10**	**26**	ND<0.15	ND<0.15	**7.0**	**3.5**	**6.5**	**1.0**	ND<0.10	**0.50**	**5.0**	ND<0.25	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	ND<0.15	**16**	**8.0**	**12**	**2.0**	ND<0.10	**0.50**	**12**	ND<0.25	**0.50**	**1.0**	**32**	**36**
B-2-20	TEC	(a) (b) (c) (d)	2001	20	**0.38**	**6.0**	**50**	ND<0.15	ND<0.15	**10**	**6.0**	**10**	**1.5**	ND<0.10	**0.44**	**8.0**	ND<0.25	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	ND<0.15	**6.5**	**3.0**	**5.5**	**1.0**	ND<0.10	**0.29**	**4.5**	ND<0.25	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**	**1.0**	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	ND<0.15	**8.0**	**4.5**	**4.0**	**0.50**	ND<0.10	**0.34**	**5.0**	ND<0.25	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	ND<0.15	**9.0**	**5.5**	**5.0**	**0.50**	ND<0.10	**0.31**	**6.0**	ND<0.25	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	ND<0.15	**6.5**	**3.5**	**6.0**	**1.0**	ND<0.10	**0.27**	**5.5**	ND<0.25	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	ND<0.15	**10**	**5.5**	**10**	**1.5**	ND<0.10	ND<0.25	**8.0**	ND<0.25	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	ND<0.15	**9.5**	**4.5**	**3.5**	**1.0**	ND<0.10	**0.50**	**6.0**	ND<0.25	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	ND<0.15	**8.0**	**5.0**	**5.0**	**0.50**	ND<0.10	ND<0.25	**5.5**	ND<0.25	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	ND<0.15	**9.0**	**4.5**	**7.0**	**3.0**	ND<0.10	**0.46**	**5.0**	ND<0.25	ND<0.15	**0.50**	**18**	**21**
B-4-20	TEC	(a) (b) (c) (d)	2001	20	**0.34**	**3.5**	**33**	ND<0.15	ND<0.15	**6.0**	**2.5**	**5.5**	**1.0**	ND<0.10	**0.29**	**4.0**	ND<0.25	ND<0.15	ND<0.25	**13**	**14**
B-4-25	TEC	(a) (b) (c) (d)	2001	25	**0.38**	**4.0**	**36**	ND<0.15	ND<0.15	**7.0**	**3.5**	**3.0**	**2.0**	ND<0.10	ND<0.25	**5.0**	ND<0.25	ND<0.15	**0.50**	**14**	**20**
B-5-15	TEC	(a) (b) (c) (d)	2001	15	**0.45**	**6.0**	**82**	ND<0.15	ND<0.15	**10**	**6.0**	**11**	**1.5**	ND<0.10	ND<0.25	**8.5**	ND<0.25	ND<0.15	**0.50**	**21**	**29**
B-5-20	TEC	(a) (b) (c) (d)	2001	20	ND<0.25	**3.0**	**20**	ND<0.15	ND<0.15	**5.0**	**2.0**	**4.0**	**1.0**	ND<0.10	**0.30**	**3.5**	ND<0.25	ND<0.15	**0.28**	**10**	**12**

Table A-7
Summary of Analytical Results for Metals in Soil, East Parcel
Former ChemOil Refinery
Signal Hill, California

Sample ID	Consultant	Data Qualifiers	Sample Date	Sample Depth	U.S. EPA Method 6010B - Metals																
					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

Boring	Sample Date	Depth feet bgs	Benzene µg/m³	Cyclohexane µg/m³	Ethylbenzene µg/m³	4-Ethyltoluene[2] µg/m³	Heptane[3] µg/m³	n-Hexane µg/m³	Methyl tert-Butyl Ether µg/m³	Naphthalene µg/m³	Toluene µg/m³	1,2,4-Trimethylbenzene µg/m³	1,3,5-Trimethylbenzene µg/m³	m,p-Xylenes µg/m³	o-Xylene µg/m³	Xylenes µg/m³
Site-Specific, Risk-Based Screening Level [1] Soil Vapor Commerical/Industrial			**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**
NORTHWEST 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
AN-08	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 (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
	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
	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**
	5/30/2006	16.5	**802,000**	--	**159,000**	--	--	--	<800	--	**70,800**	**7,770**	**5,830**	**221,000**	**41,100**	**262,100**
SOUTHWEST PARCEL																
SB3	5/18/2006	15	**3,400**	--	**31,900**	--	--	--	<800	--	<800	**2,490**	**1,720**	<1,600	<800	<2,400
	5/18/2006	15	**2,500**	--	**22,300**	--	--	--	<800	--	<800	**3,460**	**3,370**	<1,600	<800	<2,400
	5/18/2006	15	**2,940**	--	**48,400**	--	--	--	<800	--	<820	**3,500**	**3,070**	<1,600	<800	<2,400
	5/30/2006	5	**12,100**	--	**25,600**	--	--	--	<820	--	<820	<1,230	<1,230	<1,640	<800	<2,440
	5/30/2006	15	**7,140**	--	**60,600**	--	--	--	<800	--	<800	<1,200	<1,200	<1,600	<800	<2,400
EAST PARCEL																
E1	6/2/2006	15	<796	--	**10,800**	--	--	--	<796	--	<796	<1,194	<1,194	<1,592	<796	<2,388

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.

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).

[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:

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.

Table A-12
Summary of Analytical Results for Volatile Organic Compounds (VOCs) in Groundwater, East Parcel
Former ChemOil Refinery
Signal Hill, California

Sample ID	Consultant	Sample Date	U.S. EPA Method 8015B		U.S. EPA Method 8020B	U.S EPA Method 8260B - VOCs														
			TPHg mg/L	TPHd mg/L	Bis (2-chloroethyl) ether µg/L	Benzene µg/L	tert-Butyl Alcohol µg/L	n-Butylbenzene µg/L	sec-Butylbenzene µg/L	cis-1,2-Dichloroethene µg/L	Ethylbenzene µg/L	Isopropylbenzene µg/L	4-Isopropyltoluene µg/L	Naphthalene µg/L	n-Propylbenzene µg/L	Toluene µg/L	1,2,4-Trimethylbenzene µg/L	1,3,5-Trimethylbenzene µg/L	m,p-Xylene µg/L	o-Xylene µg/L
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	--	--
MW-10	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	12/7/2014	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	12/10/2015	ND<0.050	**0.911**	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	12/15/2016	**0.079**	**1.03**	ND<9.5	ND<0.50	**15**	ND<1.0	ND<1.0	ND<0.50	ND<0.50	**0.65**	ND<0.50	**1.5**	ND<0.50	ND<0.50	ND<0.50	ND<0.50	ND<1.0	ND<0.50
B-1	TEC	2001	ND<0.20	--	**1,500**	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**
B-2	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-3	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-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<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-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.
µg/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

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Linda S. Adams
Acting Secretary for Environmental Protection

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

RECEIVED
2011 JAN 26 PM 2 45
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD LOS ANGELES REGION

DATE: January 21, 2011

SUBJECT: Review of "Updated Soil Vapor Intrusion Evaluation for Southern 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.

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 off-site 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 C_4-C_{12} 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 / Health Impact	Maximum Soil-Gas Concentrations at 5 ft bgs	Maximum Soil-Gas Concentrations at 10 ft bgs	Maximum Groundwater 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 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 C_4-C_{12} 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 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

ToxStrategies

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),[1] and results of an updated evaluation were reported in a letter dated May 5, 2010 (Exponent 2010).[2] 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.

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1 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).[6] 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 ($\mu g/m^3$) in undiluted samples and from <53 to <2600 $\mu g/m^3$ in diluted samples. For purposes of this assessment, one-half the maximum detection limit from undiluted samples (<32 $\mu g/m^3$) 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 from10 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

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10 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.

11 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.

12 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.

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

14 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).[15] 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),[16] 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

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[15] 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.

[16] 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 one-half 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 ≥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/m^3) and ethylbenzene (1000 μg/m^3) in soil vapor are more than three orders of magnitude below the criteria specified in Scenario 4 (85,000 and 1,100,000 μg/m^3, respectively). Naphthalene was not detected in any soil vapor samples; however, even the maximum detection limit in a diluted sample (2,600 μg/m^3) is well below the criterion specified in Scenario 4 (93,000 μg/m^3). Based on this evaluation, the residential area south and southwest of the former Chemoil Refinery

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17 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.

18 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 (µg/m^3) using EPA Method TO-15 (unless otherwise noted)

Sample Location	Sample Depth (ft bgs)	Sample Date	Acetone	Benzene	Bromo-dichloro-methane	2-Butanone	tert-Butyl alcohol (TBA)	n-Butyl-benzene	sec-Butyl-benzene	tert-Butyl-benzene	Carbon Disulfide	Chloro-benzene	Chloroform	Chloro-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:

* = Analyzed by EPA Method 8260B

Abbreviations:

µg/m^3 = 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	n-Propyl-benzene	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:

$\mu g/m^3$ = 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

Notes:

* = Analyzed by EPA Method 8260B

Abbreviations:

$\mu g/m^3$ = micrograms per cubic meter

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	<10
MW-18	2/23/12	<0.5	<10	<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	65	<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	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
GW/SV-22	6/1/12	<0.5	38	<1.0	4.1	<1.0	<10	<1.0	<1.0	<1.0	17	<1.0	NA
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
GW/SV-24	6/4/12	<0.5	<10	<1.0	<1.0	<1.0	<10	<1.0	1.0	<1.0	<1.0	<1.0	NA
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
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
GW/SV-26	5/31/12	<0.5	<10	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	NA
GW/SV-27	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-28	5/30/12	<0.5	<10	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	NA
GW/SV-29	6/1/12	<0.5	<10	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	NA

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 Location	Date Collected	Naph-thalene (8260/8270)	n-Propyl-benzene	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,2,4-Trimethyl-benzene	o-Xylene
MW-1	9/13/11	14/<100	8.6	<5	<5	<5	<5
MW-1	12/13/11	<5/<100	<5	<5	<5	<5	<5
MW-1	2/24/12	<0.5/<10	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
MW-13	9/13/11	220/<100	37	<5	<5	<5	<5
MW-13	12/13/11	180/100	28	<5	<5	<5	<5
MW-13	2/24/12	150/35	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	<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

Chemical	Maximum Detected Concentration South, Southwest, or West of Western Parcel		
	Soil Vapor (μg/m³)		
	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
tert-Butyl alcohol	2500*	1500	250
n-Butylbenzene	25*	25*	1.4
sec-Butylbenzene	250*	1500	30
tert-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
Isopropylbenzene	250*	4900	110
2-Methylnaphthalene	N/A	N/A	110
4-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
1,2,4-Trimethylbenzene	30	42*	2.8
1,3,5-Trimethylbenzene	8.6	25*	N/A
Vinyl Chloride	7*	2.9	N/A
m,p-Xylenes	130	50*	N/A
o-Xylene	43	240	0.55

Notes:
N/A = Not applicable
* = Detected in groundwater or the corresponding soil gas sample at another depth; half the detection limit used (see text)

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

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

Chemical	Inhalation IUR ($\mu g/m^3)^{-1}$		Inhalation RfC (mg/m^3)	
Acetone	N/A		3.10E+01	d
Benzene	2.90E-05	o	3.00E-02	i
Bromodichloromethane	3.70E-05	o	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	o
Chloroform	5.30E-06	o	3.00E-01	o
Chloromethane	1.80E-06	d	9.00E-02	i
Dibromochloromethane	2.70E-05	o	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	o	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	o	3.00E+00	i
Naphthalene	3.40E-05	o	3.00E-03	i
n-Propylbenzene	N/A		1.40E-01	d
1,1,2,2-Tetrachloroethane	5.80E-05	o	1.40E-02	d
Tetrachloroethene	5.90E-06	o	3.50E-02	d
Toluene	N/A		3.00E-01	o
1,1,1-Trichloroethane	N/A		5.00E+00	i
1,1,2-Trichloroethane	1.60E-05	o	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	o	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)
EPA - U.S. Environmental Protection Agency
i - EPA Integrated Risk Information System (IRIS) database
IUR - inhalation unit risk
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
s - surrogate [sec-butyl alcohol (NDEP, 2012)]

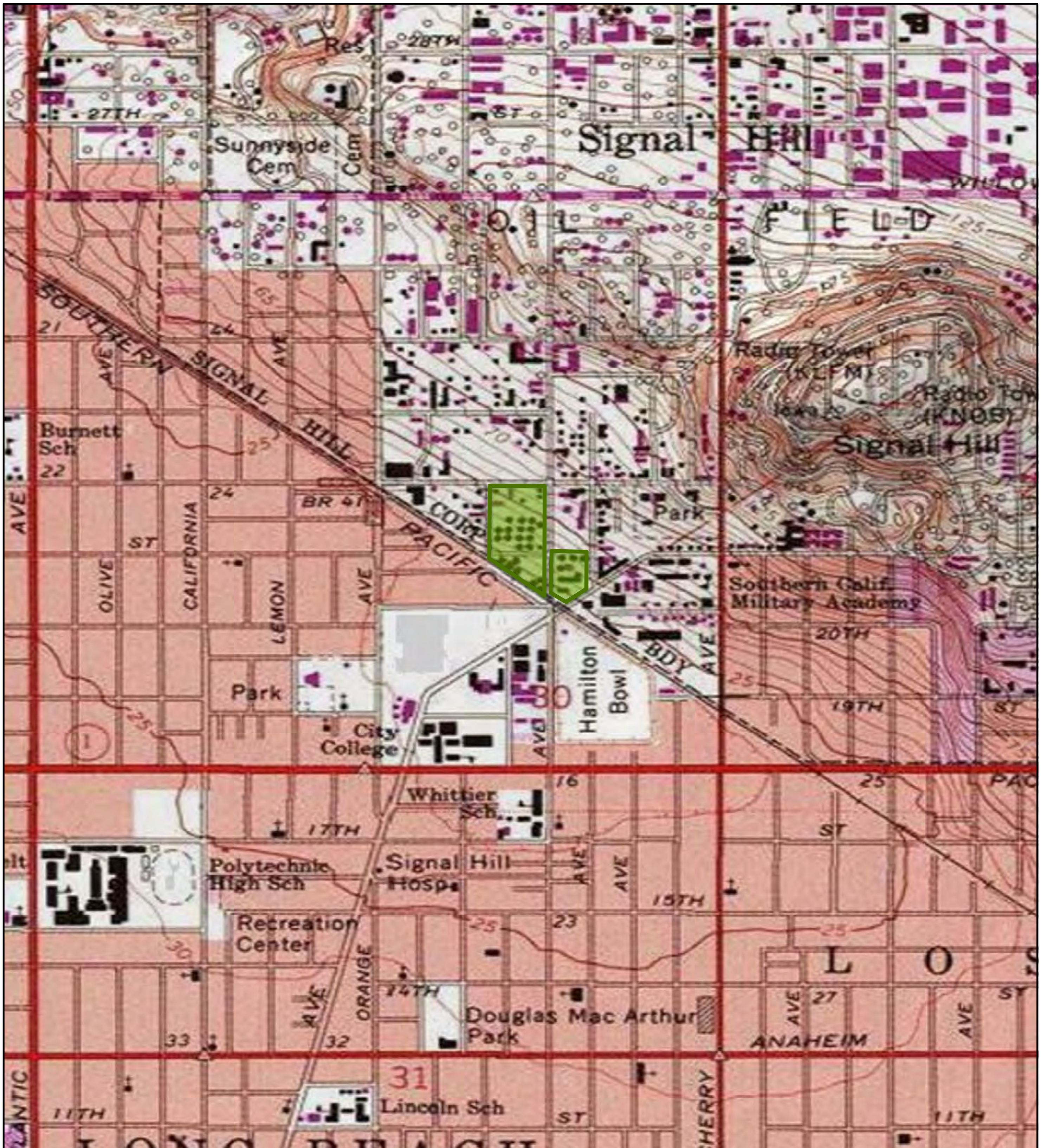
Table 5. Results for resident using data south of southern property boundary

Chemical	Exposure to Indoor Air Using Maximum Soil Vapor Concentrations at 5 ft		Exposure to Indoor Air Using Maximum Soil Vapor Concentrations at 10 ft		Exposure to Indoor Air Using Maxiumum Groundwater Concentrations	
	Estimated Excess Cancer Risk	Non-Cancer Hazard Quotient	Estimated Excess Cancer Risk	Estimated Non-Cancer Hazard Quotient	Estimated Excess Cancer Risk	Estimated Non-Cancer Hazard Quotient
Acetone	N/A	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
TOTAL	**2E-06**	**2E-02**	**2E-06**	**2E-02**	**6E-06**	**5E-01**

Note: N/A - Not Applicable

Attachment A

Figures from Geosyntec (2012)



Legend

Site Boundary

N

0 1,250 2,500 Feet

Site Location Map
Former Chemoil Refinery
2020 Walnut Avenue, Signal Hill, CA

Geosyntec consultants

WA 1617	July 2012	Figure 1

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Legend

- ○ Monitoring Well
- △ Soil Gas Probe (TEC, 2009 and 2010)
- ✢ Soil, Soil Gas, and Grab Groundwater 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

0 300 600 Feet

Soil, Soil Gas, and Grab Groundwater Sampling Locations

Former Chemoil Refinery
2020 Walnut Avenue, Signal Hill, CA

Geosyntec consultants

Figure 2

WA 1617 | July 2012

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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.[1] 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.

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

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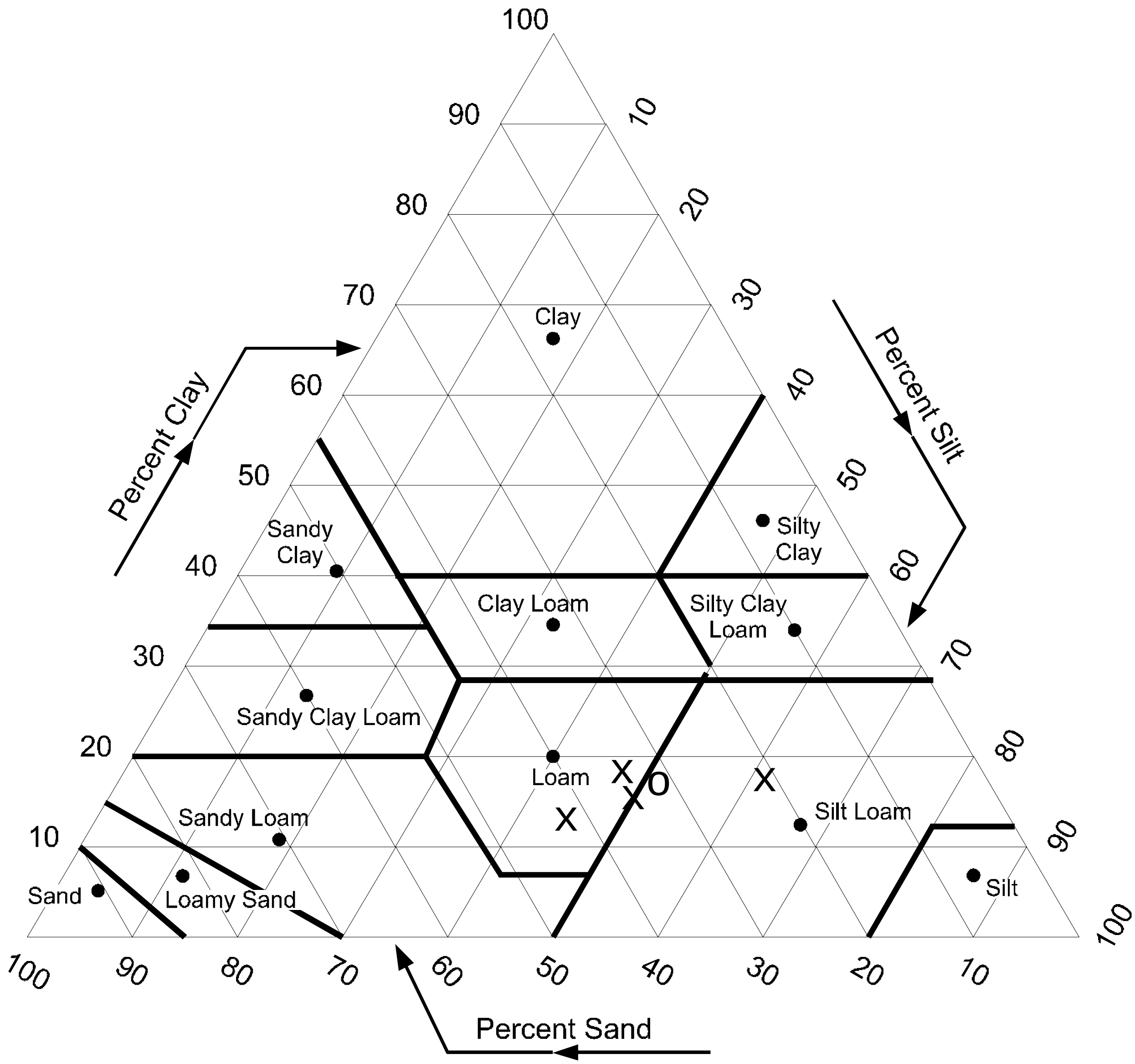
Testa, S. 2009. E-mail letter from Stephen Testa of Testa Environmental Corporation to Greg Brorby of Exponent. Re: Additional questions. November 1.

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			Moisture Content (% weight) API RP 40/ASTM D2216	Dry Bulk Density (g/cm^3) API RP40	Water-Filled Porosity (calculated)	Total Porosity (% bulk vol.) API RP 40
		Sand	Silt	Clay				
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/cm^3 = 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

Reset to Defaults

Program modified to accommodate multiple chemicals

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	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	
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	
98828	2.50E+02			Cumene	Note: Same as isopropylbenzene
108101	7.70E+01			Methylisobutylketone (4-methyl-2-pentanone)	
1634044	4.10E+01			MTBE	
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	
95636	3.00E+01			1,2,4-Trimethylbenzene	
108678	8.60E+00			1,3,5-Trimethylbenzene	
75014	7.00E+00			Vinyl chloride (chloroethene)	
106423	1.30E+02			p-Xylene	Note: results reported as "m,p-xylenes"; p-xylene has the most conservative physical constants
95476	4.30E+01			o-Xylene	

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
15	152	19	152	0	0	SIL		

Totals must add up to value of Ls (cell F24)

MORE ↓

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

Lookup Soil Parameters | Lookup Soil Parameters | Lookup Soil Parameters

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	244	0.1	0.5	5

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)
70	30	30	350

END

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

	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Molecular weight, MW (g/mol)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (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 5 ft. soil vapor data south, southwest, and west of the Western Parcel

	Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	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 vapo permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
Acetone	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.70E+02	3.39E+04
Benzene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	7.10E+01	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	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+02	3.39E+04
tert-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
Carbon disulfide	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.30E+01	3.39E+04
Chlorobenzene	9.46E+08	137	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	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.80E+00	3.39E+04
Dichlorodifluoromethane	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	3.30E+00	3.39E+04
cis-1,2-Dichloroethylene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.20E+00	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	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.10E+01	3.39E+04
Naphthalene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.60E+01	3.39E+04
n-Propylbenzene	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
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	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
Trichlorofluoromethane	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	6.80E+01	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	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.30E+02	3.39E+04
o-Xylene	9.46E+08	137	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.30E+01	3.39E+04

	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	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)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
Acetone	1.00E+06	5.00E-03	15	7,447	2.99E-05	1.25E-03	1.78E-04	7.31E-03	0.00E+00	0.00E+00	7.31E-03	137
Benzene	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	5.08E-03	137
Bromodichloromethane	1.00E+06	5.00E-03	15	8,576	1.19E-03	4.95E-02	1.78E-04	1.72E-03	0.00E+00	0.00E+00	1.72E-03	137
Methylethylketone (2-butar	1.00E+06	5.00E-03	15	8,307	4.18E-05	1.74E-03	1.78E-04	4.76E-03	0.00E+00	0.00E+00	4.76E-03	137
tert-Butyl alcohol	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	6.44E-03	137
n-Butylbenzene	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	3.29E-03	137
sec-Butylbenzene	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	3.30E-03	137
tert-Butylbenzene	1.00E+06	5.00E-03	15	9,468	8.55E-03	3.57E-01	1.78E-04	3.26E-03	0.00E+00	0.00E+00	3.26E-03	137
Carbon disulfide	1.00E+06	5.00E-03	15	6,612	2.40E-02	1.00E+00	1.78E-04	6.00E-03	0.00E+00	0.00E+00	6.00E-03	137
Chlorobenzene	1.00E+06	5.00E-03	15	9,712	2.64E-03	1.10E-01	1.78E-04	4.22E-03	0.00E+00	0.00E+00	4.22E-03	137
Chloroform	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	6.00E-03	137
Methyl chloride (chlorometh	1.00E+06	5.00E-03	15	4,640	7.49E-03	3.12E-01	1.78E-04	7.27E-03	0.00E+00	0.00E+00	7.27E-03	137
Chlorodibromomethane	1.00E+06	5.00E-03	15	6,726	6.19E-04	2.58E-02	1.78E-04	1.14E-03	0.00E+00	0.00E+00	1.14E-03	137
Dichlorodifluoromethane	1.00E+06	5.00E-03	15	8,118	2.58E-01	1.08E+01	1.78E-04	3.84E-03	0.00E+00	0.00E+00	3.84E-03	137
cis-1,2-Dichloroethylene	1.00E+06	5.00E-03	15	7,643	3.12E-03	1.30E-01	1.78E-04	4.25E-03	0.00E+00	0.00E+00	4.25E-03	137
Ethylbenzene	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	4.33E-03	137
Cumene	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	3.75E-03	137
Methylisobutylketone (4-me	1.00E+06	5.00E-03	15	9,741	9.82E-05	4.10E-03	1.78E-04	4.36E-03	0.00E+00	0.00E+00	4.36E-03	137
MTBE	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	5.92E-03	137
Naphthalene	1.00E+06	5.00E-03	15	12,820	3.09E-04	1.29E-02	1.78E-04	3.42E-03	0.00E+00	0.00E+00	3.42E-03	137
n-Propylbenzene	1.00E+06	5.00E-03	15	11,251	7.21E-03	3.01E-01	1.78E-04	3.47E-03	0.00E+00	0.00E+00	3.47E-03	137
1,1,2,2-Tetrachloroethane	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	4.11E-03	137
Tetrachloroethylene	1.00E+06	5.00E-03	15	9,462	1.32E-02	5.52E-01	1.78E-04	4.16E-03	0.00E+00	0.00E+00	4.16E-03	137
Toluene	1.00E+06	5.00E-03	15	9,056	4.84E-03	2.02E-01	1.78E-04	5.02E-03	0.00E+00	0.00E+00	5.02E-03	137
1,1,1-Trichloroethane	1.00E+06	5.00E-03	15	7,787	1.31E-02	5.46E-01	1.78E-04	4.50E-03	0.00E+00	0.00E+00	4.50E-03	137
1,1,2-Trichloroethane	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	4.51E-03	137
Trichlorofluoromethane	1.00E+06	5.00E-03	15	6,053	7.84E-02	3.27E+00	1.78E-04	5.02E-03	0.00E+00	0.00E+00	5.02E-03	137
1,2,4-Trimethylbenzene	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	3.50E-03	137
1,3,5-Trimethylbenzene	1.00E+06	5.00E-03	15	11,561	3.93E-03	1.64E-01	1.78E-04	3.48E-03	0.00E+00	0.00E+00	3.48E-03	137
Vinyl chloride (chloroethene	1.00E+06	5.00E-03	15	4,898	2.27E-02	9.48E-01	1.78E-04	6.12E-03	0.00E+00	0.00E+00	6.12E-03	137
p-Xylene	1.00E+06	5.00E-03	15	10,143	5.38E-03	2.24E-01	1.78E-04	4.44E-03	0.00E+00	0.00E+00	4.44E-03	137
o-Xylene	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	5.02E-03	137

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

	Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	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/m^3)	Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
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	7.50E+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	15	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-Butyl 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	3.0E+01
n-Butylbenzene	15	2.50E+01	1.25	8.33E+01	3.29E-03	5.00E+03	9.87E+32	5.50E-04	1.38E-02	NA	1.4E-01
sec-Butylbenzene	15	2.50E+02	1.25	8.33E+01	3.30E-03	5.00E+03	7.93E+32	5.51E-04	1.38E-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	5.46E-04	1.37E-02	NA	1.4E-01
Carbon disulfide	15	1.30E+01	1.25	8.33E+01	6.00E-03	5.00E+03	1.22E+18	8.47E-04	1.10E-02	NA	7.0E-01
Chlorobenzene	15	1.80E+02	1.25	8.33E+01	4.22E-03	5.00E+03	5.72E+25	6.63E-04	1.19E-01	NA	1.0E+00
Chloroform	15	2.00E+02	1.25	8.33E+01	6.00E-03	5.00E+03	1.21E+18	8.48E-04	1.70E-01	5.3E-06	3.0E-01
Methyl chloride (chlorometh	15	1.20E+00	1.25	8.33E+01	7.27E-03	5.00E+03	8.45E+14	9.57E-04	1.15E-03	1.8E-06	9.0E-02
Chlorodibromomethane	15	4.80E+00	1.25	8.33E+01	1.14E-03	5.00E+03	2.37E+95	2.23E-04	1.07E-03	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-me	15	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	15	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

END

RESULTS SHEET

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

INCREMENTAL RISK CALCULATIONS:

	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
Acetone	NA	8.0E-06
Benzene	6.4E-07	1.7E-03
Bromodichloromethane	3.7E-08	8.9E-06
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	3.1E-04
	2E-06	2E-02

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

SCROLL
DOWN
TO "END"

END

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

SG-ADV
Version 3.1; 02/04

Reset to Defaults

Program modified to accommodate multiple chemicals

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical	
67641	1.80E+03			Acetone	
71432	5.30E+01			Benzene	
75274	2.50E+01			Bromodichloromethane	
78933	4.00E+01			Methylethylketone (2-butanone)	
75650	1.50E+03			tert-Butyl alcohol	
104518	2.50E+01			n-Butylbenzene	
135988	1.50E+03			sec-Butylbenzene	
98066	2.50E+01			tert-Butylbenzene	
75150	7.10E+01			Carbon disulfide	
108907	2.50E+03			Chlorobenzene	
67663	3.10E+02			Chloroform	
74873	5.00E+01			Methyl chloride (chloromethane)	
124481	2.50E+01			Chlorodibromomethane	Note: Same as Dibromochloromethane
75718	2.90E+00			Dichlorodifluoromethane	
156592	3.30E+00			cis-1,2-Dichloroethylene	
100414	1.00E+03			Ethylbenzene	
98828	4.90E+03			Cumene	Note: Same as isopropylbenzene
108101	2.50E+02			Methylisobutylketone (4-methyl-2-pentanone)	
1634044	1.50E+02			MTBE	
91203	1.60E+01			Naphthalene	
103651	2.50E+01			n-Propylbenzene	
79345	5.00E+01			1,1,2,2-Tetrachloroethane	
127184	1.50E+02			Tetrachloroethylene	
108883	5.30E+02			Toluene	
71556	1.70E+02			1,1,1-Trichloroethane	
79005	2.50E+01			1,1,2-Trichloroethane	
75694	6.90E+01			Trichlorofluoromethane	
95636	4.20E+01			1,2,4-Trimethylbenzene	
108678	2.50E+01			1,3,5-Trimethylbenzene	
75014	2.90E+00			Vinyl 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-Xylene	

MORE ↓

Totals must add up to value of Ls (cell F24)

ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
15	305	19	305	0	0	SIL		

MORE ↓

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

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	244	0.1	0.5	5

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)
70	30	30	350

END

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

	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Molecular weight, MW (g/mol)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (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 (chloromethar	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

	Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	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)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (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	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	5.30E+01	3.39E+04
Bromodichloromethane	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
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	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
sec-Butylbenzene	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
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	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	7.10E+01	3.39E+04
Chlorobenzene	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+03	3.39E+04
Chloroform	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	3.10E+02	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	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
Dichlorodifluoromethane	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
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	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.90E+03	3.39E+04
Methylisobutylketone (4-me	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.50E+02	3.39E+04
MTBE	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	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.60E+01	3.39E+04
n-Propylbenzene	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
1,1,2,2-Tetrachloroethane	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
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	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	5.30E+02	3.39E+04
1,1,1-Trichloroethane	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	1.70E+02	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	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	4.20E+01	3.39E+04
1,3,5-Trimethylbenzene	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
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	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
o-Xylene	9.46E+08	290	0.259	ERROR	ERROR	0.307	2.86E-09	0.798	2.28E-09	4,000	2.40E+02	3.39E+04

	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	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)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
Acetone	1.00E+06	5.00E-03	15	7,447	2.99E-05	1.25E-03	1.78E-04	7.31E-03	0.00E+00	0.00E+00	7.31E-03	290
Benzene	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	5.08E-03	290
Bromodichloromethane	1.00E+06	5.00E-03	15	8,576	1.19E-03	4.95E-02	1.78E-04	1.72E-03	0.00E+00	0.00E+00	1.72E-03	290
Methylethylketone (2-butar	1.00E+06	5.00E-03	15	8,307	4.18E-05	1.74E-03	1.78E-04	4.76E-03	0.00E+00	0.00E+00	4.76E-03	290
tert-Butyl alcohol	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	6.44E-03	290
n-Butylbenzene	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	3.29E-03	290
sec-Butylbenzene	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	3.30E-03	290
tert-Butylbenzene	1.00E+06	5.00E-03	15	9,468	8.55E-03	3.57E-01	1.78E-04	3.26E-03	0.00E+00	0.00E+00	3.26E-03	290
Carbon disulfide	1.00E+06	5.00E-03	15	6,612	2.40E-02	1.00E+00	1.78E-04	6.00E-03	0.00E+00	0.00E+00	6.00E-03	290
Chlorobenzene	1.00E+06	5.00E-03	15	9,712	2.64E-03	1.10E-01	1.78E-04	4.22E-03	0.00E+00	0.00E+00	4.22E-03	290
Chloroform	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	6.00E-03	290
Methyl chloride (chlorometh	1.00E+06	5.00E-03	15	4,640	7.49E-03	3.12E-01	1.78E-04	7.27E-03	0.00E+00	0.00E+00	7.27E-03	290
Chlorodibromomethane	1.00E+06	5.00E-03	15	6,726	6.19E-04	2.58E-02	1.78E-04	1.14E-03	0.00E+00	0.00E+00	1.14E-03	290
Dichlorodifluoromethane	1.00E+06	5.00E-03	15	8,118	2.58E-01	1.08E+01	1.78E-04	3.84E-03	0.00E+00	0.00E+00	3.84E-03	290
cis-1,2-Dichloroethylene	1.00E+06	5.00E-03	15	7,643	3.12E-03	1.30E-01	1.78E-04	4.25E-03	0.00E+00	0.00E+00	4.25E-03	290
Ethylbenzene	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	4.33E-03	290
Cumene	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	3.75E-03	290
Methylisobutylketone (4-me	1.00E+06	5.00E-03	15	9,741	9.82E-05	4.10E-03	1.78E-04	4.36E-03	0.00E+00	0.00E+00	4.36E-03	290
MTBE	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	5.92E-03	290
Naphthalene	1.00E+06	5.00E-03	15	12,820	3.09E-04	1.29E-02	1.78E-04	3.42E-03	0.00E+00	0.00E+00	3.42E-03	290
n-Propylbenzene	1.00E+06	5.00E-03	15	11,251	7.21E-03	3.01E-01	1.78E-04	3.47E-03	0.00E+00	0.00E+00	3.47E-03	290
1,1,2,2-Tetrachloroethane	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	4.11E-03	290
Tetrachloroethylene	1.00E+06	5.00E-03	15	9,462	1.32E-02	5.52E-01	1.78E-04	4.16E-03	0.00E+00	0.00E+00	4.16E-03	290
Toluene	1.00E+06	5.00E-03	15	9,056	4.84E-03	2.02E-01	1.78E-04	5.02E-03	0.00E+00	0.00E+00	5.02E-03	290
1,1,1-Trichloroethane	1.00E+06	5.00E-03	15	7,787	1.31E-02	5.46E-01	1.78E-04	4.50E-03	0.00E+00	0.00E+00	4.50E-03	290
1,1,2-Trichloroethane	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	4.51E-03	290
Trichlorofluoromethane	1.00E+06	5.00E-03	15	6,053	7.84E-02	3.27E+00	1.78E-04	5.02E-03	0.00E+00	0.00E+00	5.02E-03	290
1,2,4-Trimethylbenzene	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	3.50E-03	290
1,3,5-Trimethylbenzene	1.00E+06	5.00E-03	15	11,561	3.93E-03	1.64E-01	1.78E-04	3.48E-03	0.00E+00	0.00E+00	3.48E-03	290
Vinyl chloride (chloroethene	1.00E+06	5.00E-03	15	4,898	2.27E-02	9.48E-01	1.78E-04	6.12E-03	0.00E+00	0.00E+00	6.12E-03	290
p-Xylene	1.00E+06	5.00E-03	15	10,143	5.38E-03	2.24E-01	1.78E-04	4.44E-03	0.00E+00	0.00E+00	4.44E-03	290
o-Xylene	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	5.02E-03	290

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

	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	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., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (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	15	4.00E+01	1.25	8.33E+01	4.76E-03	5.00E+03	6.40E+22	4.05E-04	1.62E-02	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	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	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	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	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	15	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	15	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

END

RESULTS SHEET

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

INCREMENTAL RISK CALCULATIONS:

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

END

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

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Program modified to accommodate multiple chemicals

#REF!

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
71432	1.70E+01	Benzene
75650	2.50E+02	tert-Butyl alcohol
104518	1.40E+00	n-Butylbenzene
135988	3.00E+01	sec-Butylbenzene
98066	3.30E+00	tert-Butylbenzene
75150	3.10E+00	Carbon disulfide
108907	2.00E+00	Chlorobenzene
67663	1.00E+00	Chloroform
100414	3.60E+00	Ethylbenzene
98828	1.10E+02	Cumene
91576	1.10E+02	2-Methylnaphthalene
1634044	1.80E+02	MTBE
91203	3.30E+02	Naphthalene
103651	7.60E+01	n-Propylbenzene
79345	2.20E+00	1,1,2,2-Tetrachloroethane
79005	5.40E+00	1,1,2-Trichloroethane
95636	2.80E+00	1,2,4-Trimethylbenzene
95476	5.50E-01	o-Xylene

Note: same as isopropylbenzene (Cumene)

MORE ↓

Totals must add up to value of L_{WT} (cell G28)

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
19	15	360	360	0	0	A	SIL	SIL		

MORE ↓

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

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1000	1000	244	0.1	0.5	5

MORE ↓

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 Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

CHEMICAL PROPERTIES SHEET

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

	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (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

END

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

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	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} (cm^3/cm^3)	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)
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, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ıve. groundwate temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	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, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (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	3.39E+04	1.00E+06	5.00E-03	15	9,468	8.55E-03	3.57E-01	1.78E-04	3.26E-03	0.00E+00	0.00E+00	1.01E-04	4.55E-04	345
Carbon disulfide	3.39E+04	1.00E+06	5.00E-03	15	6,612	2.40E-02	1.00E+00	1.78E-04	6.00E-03	0.00E+00	0.00E+00	1.81E-04	8.17E-04	345
Chlorobenzene	3.39E+04	1.00E+06	5.00E-03	15	9,712	2.64E-03	1.10E-01	1.78E-04	4.22E-03	0.00E+00	0.00E+00	1.38E-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	3.39E+04	1.00E+06	5.00E-03	15	12,820	3.09E-04	1.29E-02	1.78E-04	3.42E-03	0.00E+00	0.00E+00	1.92E-04	7.92E-04	345
n-Propylbenzene	3.39E+04	1.00E+06	5.00E-03	15	11,251	7.21E-03	3.01E-01	1.78E-04	3.47E-03	0.00E+00	0.00E+00	1.08E-04	4.85E-04	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, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	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., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
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
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	15	3.11E+03	1.25	8.33E+01	6.00E-03	5.00E+03	1.22E+18	6.80E-05	2.11E-01	NA	7.0E-01
Chlorobenzene	15	2.20E+02	1.25	8.33E+01	4.22E-03	5.00E+03	5.72E+25	5.18E-05	1.14E-02	NA	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	15	4.25E+03	1.25	8.33E+01	3.42E-03	5.00E+03	6.11E+31	6.60E-05	2.80E-01	3.4E-05	3.0E-03
n-Propylbenzene	15	2.29E+04	1.25	8.33E+01	3.47E-03	5.00E+03	1.96E+31	4.08E-05	9.33E-01	NA	1.4E-01
1,1,2,2-Tetrachloroethane	15	2.20E+01	1.25	8.33E+01	4.11E-03	5.00E+03	2.54E+26	8.27E-05	1.82E-03	5.8E-05	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	7.0E-03
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

END

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		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"

END

Attachment C

Soil Vapor Summary Table from Exponent (2009)

Table 1. Analytical data for chemicals detected in soil vapor ($\mu g/m^3$) 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

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Cations by Ion Chromatography

AA Project No: A596127
Date Received: 02/06/18
Date Reported: 02/26/18

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavalent 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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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
Method:	Total Metals CAM 17	**Units:**	mg/kg

Date Sampled:	02/06/18	02/06/18	02/06/18	02/06/18	
Date Prepared:	02/08/18	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 Less Hg 6000/7000 (EPA 6010B/7000)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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
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	
Matrix:	Soil	Soil	Soil	Soil	
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8B0910 - NO PREP										
Blank (B8B0910-BLK1)				Prepared & Analyzed: 02/09/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8B0910-BS1)				Prepared & Analyzed: 02/09/18						
Chromium (VI)	**0.193**	0.040	mg/kg	0.20		96.4	80-120			
LCS Dup (B8B0910-BSD1)				Prepared & Analyzed: 02/09/18						
Chromium (VI)	**0.201**	0.040	mg/kg	0.20		101	80-120	4.36	20	
Matrix Spike (B8B0910-MS1)		**Source: 8B06013-04**		Prepared & Analyzed: 02/09/18						
Chromium (VI)	**0.186**	0.040	mg/kg	0.20	<0.040	93.2	70-130			
Matrix Spike Dup (B8B0910-MSD1)		**Source: 8B06013-04**		Prepared & Analyzed: 02/09/18						
Chromium (VI)	**0.230**	0.040	mg/kg	0.20	<0.040	115	70-130	20.9	40	
Total Metals CAM 17 - Quality Control										
Batch B8B0822 - EPA 3050B										
Blank (B8B0822-BLK1)				Prepared: 02/08/18 Analyzed: 02/09/18						
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)				Prepared: 02/08/18 Analyzed: 02/09/18						
Antimony	**54.8**	10	mg/kg	50		110	80-120			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8B0822 - EPA 3050B										
LCS (B8B0822-BS1) Continued				Prepared: 02/08/18	Analyzed: 02/09/18					
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)				Prepared: 02/08/18	Analyzed: 02/09/18					
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8B0822 - EPA 3050B										
LCS Dup (B8B0822-BSD1) Continued				Prepared: 02/08/18	Analyzed: 02/09/18					
Zinc	**58.0**	3.0	mg/kg	50		116	80-120	2.60	20	
Duplicate (B8B0822-DUP1)		**Source: 8B06013-04**		Prepared: 02/08/18	Analyzed: 02/09/18					
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: 8B07021-04**		Prepared: 02/08/18	Analyzed: 02/09/18					
Antimony	**17.1**	10	mg/kg	50		34.1	75-125			QM-07
Arsenic	**43.9**	0.50	mg/kg	50	3.12	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	16.6	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			

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8B0822 - EPA 3050B										
Matrix Spike (B8B0822-MS1) Continued	**Source: 8B07021-04**			Prepared: 02/08/18 Analyzed: 02/09/18						
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-MSD1)	**Source: 8B07021-04**			Prepared: 02/08/18 Analyzed: 02/09/18						
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	16.6	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	90.4	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	101	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 Control										
Batch B8B0720 - EPA 7471A Prep										
Blank (B8B0720-BLK1)				Prepared & Analyzed: 02/07/18						
Mercury	<0.020	0.020	mg/kg							
LCS (B8B0720-BS1)				Prepared & Analyzed: 02/07/18						
Mercury	**0.490**	0.020	mg/kg	0.50		98.1	80-120			
LCS Dup (B8B0720-BSD1)				Prepared & Analyzed: 02/07/18						
Mercury	**0.514**	0.020	mg/kg	0.50		103	80-120	4.78	25	
Duplicate (B8B0720-DUP1)	**Source: 8B06013-04**			Prepared & Analyzed: 02/07/18						

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8B0720 - EPA 7471A Prep										
Duplicate (B8B0720-DUP1) Continued	**Source: 8B06013-04**	Prepared & Analyzed: 02/07/18								
Mercury	**0.0490**	0.020	mg/kg		0.0435			11.9	25	
Matrix Spike (B8B0720-MS1)	**Source: 8B06012-02**	Prepared & Analyzed: 02/07/18								
Mercury	**0.570**	0.020	mg/kg	0.50	0.0330	107	75-125			
Matrix Spike Dup (B8B0720-MSD1)	**Source: 8B06012-02**	Prepared & Analyzed: 02/07/18								
Mercury	**0.562**	0.020	mg/kg	0.50	0.0330	106	75-125	1.41	25	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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.

Viorel Vasile
Operations Manager

American Analytics Ÿ 9765 Eton Avenue, Chatsworth, California 91311
Tel: (818) 998-5547 Ÿ Fax: (818) 998-7258

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: H594
70050066
Page 1 of 1

Client: Apex Companies	Project Name / No.: Chemoil	Sampler's Name: Kevin Nguyen	
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave, Suite 100	Sampler's Signature:	
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:	
Fax:	State & Zip: CA 94523	Quote No.:	

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name) — Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17	7199								Special Instructions
MW-22a-1ft	8B06013-01	2/5/18	12:00	Soil	1	X	X								
MW-22a-2ft	-02	↓	12:05	↓	1	X	X								
MW-22a-5ft	-03	↓	12:10	↓	1	X	X								
MW-22a-10ft	-04	↓	12:10	↓	1	X	X								

For Laboratory Use
REVIEWED
Date 2/6/18 Time 1645
TAT N Days Sign:

A.A. Project No.: A596127/8B06013

Relinquished by	Date	Time	Received by
	2/5/17	14:05	
	2/6/18	16:17	

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

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

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596128
Date Received: 02/13/18
Date Reported: 02/26/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596128
Project No:	093-Chemoil-003	**Date Received:**	02/13/18
Project Name:	Former Chemoil Refinery	**Date 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 Hexavalent 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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596128
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:	02/16/18	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 Less 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
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Total Metals CAM 17

AA Project No: A596128
Date Received: 02/13/18
Date Reported: 02/26/18
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	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	<0.020	<0.020	<0.020	**0.036**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596128
Date Received: 02/13/18
Date Reported: 02/26/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8B2037 - NO PREP										
Blank (B8B2037-BLK1)				Prepared & Analyzed: 02/20/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8B2037-BS1)				Prepared & Analyzed: 02/20/18						
Chromium (VI)	**0.184**	0.040	mg/kg	0.20		92.0	80-120			
LCS Dup (B8B2037-BSD1)				Prepared & Analyzed: 02/20/18						
Chromium (VI)	**0.194**	0.040	mg/kg	0.20		96.8	80-120	4.98	20	
Matrix Spike (B8B2037-MS1)	**Source: 8B13017-04**			Prepared & Analyzed: 02/20/18						
Chromium (VI)	**0.194**	0.040	mg/kg	0.20	<0.040	96.8	70-130			
Matrix Spike Dup (B8B2037-MSD1)	**Source: 8B13017-04**			Prepared & Analyzed: 02/20/18						
Chromium (VI)	**0.189**	0.040	mg/kg	0.20	<0.040	94.5	70-130	2.40	40	
Total Metals CAM 17 - Quality Control										
Batch B8B1519 - EPA 3050B										
Blank (B8B1519-BLK1)				Prepared & Analyzed: 02/15/18						
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)				Prepared & Analyzed: 02/15/18						
Antimony	**57.4**	10	mg/kg	50		115	80-120			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596128
Date Received: 02/13/18
Date Reported: 02/26/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8B1519 - EPA 3050B										
LCS (B8B1519-BS1) Continued				Prepared & Analyzed: 02/15/18						
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)				Prepared & Analyzed: 02/15/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596128
Date Received: 02/13/18
Date Reported: 02/26/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8B1519 - EPA 3050B										
LCS Dup (B8B1519-BSD1) Continued				Prepared & Analyzed: 02/15/18						
Zinc	**49.6**	3.0	mg/kg	50		99.3	80-120	4.32	20	
Duplicate (B8B1519-DUP1)		**Source: 8B13014-09**		Prepared: 02/15/18 Analyzed: 02/16/18						
Antimony	**<10**	10	mg/kg						40	
Arsenic	**7.27**	0.50	mg/kg		9.02			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 Control										
Batch B8B1524 - EPA 7471A Prep										
Blank (B8B1524-BLK1)				Prepared & Analyzed: 02/15/18						
Mercury	<0.020	0.020	mg/kg							
LCS (B8B1524-BS1)				Prepared & Analyzed: 02/15/18						
Mercury	**0.456**	0.020	mg/kg	0.50		91.2	80-120			
LCS Dup (B8B1524-BSD1)				Prepared & Analyzed: 02/15/18						
Mercury	**0.460**	0.020	mg/kg	0.50		91.9	80-120	0.765	25	
Duplicate (B8B1524-DUP1)		**Source: 8B13014-09**		Prepared & Analyzed: 02/15/18						
Mercury	**<0.020**	0.020	mg/kg						25	
Matrix Spike (B8B1524-MS1)		**Source: 8B13017-04**		Prepared & Analyzed: 02/15/18						
Mercury	**0.497**	0.020	mg/kg	0.50	0.0365	92.1	75-125			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596128
Date Received: 02/13/18
Date Reported: 02/26/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596128
Project No:	093-Chemoil-003	**Date Received:**	02/13/18
Project Name:	Former Chemoil Refinery	**Date 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.

Viorel Vasile
Operations Manager

14662

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: ~~14661~~ 70049078
Page ____ of ____

Client: Apex Companies	Project Name / No.: C93-Chemoil-003	Sampler's Name: Kevin Nguyen
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave, Suite 100	Sampler's Signature:
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:
Fax:	State & Zip: CA 94523	Quote No.:

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17	7199								Special Instructions
MW-21-1ft	8B13017-01	2/12/18	9:00	Soil	1	X	X								
MW-21-2ft	-02		9:05		1	X	X								
MW-21-5ft	-03		9:10		1	X	X								
MW-21-10ft	-04		9:15		1	X	X								

REVIEWED
Date 2/13/18 Time 1530
TAT N Days Sign:

For Laboratory Use

A596128/8B13017
JM

A.A. Project No.: ~~A553263~~

Relinquished by	Date	Time	Received by
	2/12/17	14:30	2/13/18
Relinquished by	Date 2/13/18	Time 1416	Received by
Relinquished by	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 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

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date Reported: 04/02/18

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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date Reported: 04/02/18

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

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Cations by Ion Chromatography

AA Project No: A596137
Date Received: 03/16/18
Date Reported: 04/02/18

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavalent Chromium by IC - Low Level (EPA 7199)								
8C16001-01	TP-8-1'	03/14/18	03/21/18	03/21/18	1	**0.057**	mg/kg	0.04
8C16001-03	TP-8-5'	03/14/18	03/21/18	03/21/18	1	<0.040	mg/kg	0.04
8C16001-04	TP-5-1'	03/14/18	03/21/18	03/21/18	1	<0.040	mg/kg	0.04
8C16001-06	TP-5-5'	03/14/18	03/21/18	03/21/18	1	<0.040	mg/kg	0.04
8C16001-07	TP-13-1'	03/14/18	03/21/18	03/21/18	1	<0.040	mg/kg	0.04
8C16001-09	TP-13-5'	03/14/18	03/21/18	03/21/18	1	<0.040	mg/kg	0.04
8C16001-10	TP-2-1'	03/15/18	03/21/18	03/21/18	1	<0.040	mg/kg	0.04
8C16001-12	TP-2-5'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04
8C16001-13	TP-6-1'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04
8C16001-15	TP-6-5'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04
8C16001-16	TP-19-1'	03/15/18	03/28/18	03/28/18	1	<0.040	mg/kg	0.04
8C16001-18	TP-19-5'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04
8C16001-19	TP-16-1'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04
8C16001-21	TP-16-5'	03/15/18	03/22/18	03/22/18	1	<0.040	mg/kg	0.04

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

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	MRL
CAM Metals Less Hg 6000/7000 (EPA 6010B/7000)					
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
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

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 Less Hg 6000/7000 (EPA 6010B/7000)					
Antimony	<10	<10	<10	<10	10
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

Date Sampled:	03/15/18	03/15/18	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:	8C16001-13	8C16001-15	8C16001-16	8C16001-18	
Client ID No:	TP-6-1'	TP-6-5'	TP-19-1'	TP-19-5'	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
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**	**7.4**	**5.6**	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	**18**	**17**	**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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

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'	
Matrix:	Soil	Soil	
Dilution Factor:	1	1	MRL
CAM Metals Less Hg 6000/7000 (EPA 6010B/7000)			
Antimony	<10	<10	10
Arsenic	**8.7**	**4.0**	0.50
Barium	**170**	**110**	10
Beryllium	<1.0	<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
Molybdenum	<5.0	<5.0	5.0
Nickel	**20**	**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	**43**	**43**	10
Zinc	**85**	**34**	3.0

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Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

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'	
Matrix:	Soil	Soil	Soil	Soil	
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

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Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

Date Sampled:	03/14/18	03/14/18	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:	8C16001-07	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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.54**	**0.15**	**0.082**	**0.058**	0.020

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LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

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	
Client ID No:	TP-6-1'	TP-6-5'	TP-19-1'	TP-19-5'	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	2	1	1	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**1.5**	**0.032**	**0.039**	<0.020	0.020

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LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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

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'	
Matrix:	Soil	Soil	
Dilution Factor:	1	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)			
Mercury	**0.50**	**0.050**	0.020

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LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8C2123 - NO PREP										
Blank (B8C2123-BLK1)				Prepared & Analyzed: 03/21/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8C2123-BS1)				Prepared & Analyzed: 03/21/18						
Chromium (VI)	**0.189**	0.040	mg/kg	0.20		94.6	80-120			
LCS Dup (B8C2123-BSD1)				Prepared & Analyzed: 03/21/18						
Chromium (VI)	**0.207**	0.040	mg/kg	0.20		103	80-120	8.89	20	
Matrix Spike (B8C2123-MS1)		**Source: 8C20013-08**		Prepared & Analyzed: 03/21/18						
Chromium (VI)	**2.70**	0.040	mg/kg	0.20	2.46	121	70-130			
Matrix Spike Dup (B8C2123-MSD1)		**Source: 8C20013-08**		Prepared & Analyzed: 03/21/18						
Chromium (VI)	**2.70**	0.040	mg/kg	0.20	2.46	121	70-130	0.00	40	
Batch B8C2206 - NO PREP										
Blank (B8C2206-BLK1)				Prepared & Analyzed: 03/22/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8C2206-BS1)				Prepared & Analyzed: 03/22/18						
Chromium (VI)	**0.188**	0.040	mg/kg	0.20		94.2	80-120			
LCS Dup (B8C2206-BSD1)				Prepared & Analyzed: 03/22/18						
Chromium (VI)	**0.196**	0.040	mg/kg	0.20		98.0	80-120	3.90	20	
Duplicate (B8C2206-DUP1)		**Source: 8C16001-21**		Prepared & Analyzed: 03/22/18						
Chromium (VI)	**<0.040**	0.040	mg/kg		<0.040				40	
Batch B8C2845 - NO PREP										
Blank (B8C2845-BLK1)				Prepared & Analyzed: 03/28/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8C2845-BS1)				Prepared & Analyzed: 03/28/18						
Chromium (VI)	**0.194**	0.040	mg/kg	0.20		96.8	80-120			
LCS Dup (B8C2845-BSD1)				Prepared & Analyzed: 03/28/18						
Chromium (VI)	**0.194**	0.040	mg/kg	0.20		96.8	80-120	0.00	20	
Duplicate (B8C2845-DUP1)		**Source: 8C16001-16**		Prepared & Analyzed: 03/28/18						
Chromium (VI)	**<0.040**	0.040	mg/kg		<0.040				40	
Total Metals CAM 17 - Quality Control										
Batch B8C2024 - EPA 3050B										

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date 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 Control										
Batch B8C2024 - EPA 3050B										
Blank (B8C2024-BLK1)				Prepared: 03/19/18 Analyzed: 03/22/18						
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)				Prepared: 03/19/18 Analyzed: 03/22/18						
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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Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date 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 Control										
Batch B8C2024 - EPA 3050B										
Blank (B8C2024-BLK2) Continued				Prepared: 03/19/18 Analyzed: 03/22/18						
Vanadium	<10	10	mg/kg							
Zinc	<3.0	3.0	mg/kg							
LCS (B8C2024-BS1)				Prepared: 03/19/18 Analyzed: 03/22/18						
Antimony	**52.2**	10	mg/kg	50		104	80-120			
Arsenic	**51.8**	0.50	mg/kg	50		104	80-120			
Barium	**51.1**	10	mg/kg	50		102	80-120			
Beryllium	**54.8**	1.0	mg/kg	50		110	80-120			
Cadmium	**56.2**	1.0	mg/kg	50		112	80-120			
Chromium	**52.7**	3.0	mg/kg	50		105	80-120			
Cobalt	**54.0**	3.0	mg/kg	50		108	80-120			
Copper	**48.7**	3.0	mg/kg	50		97.4	80-120			
Lead	**52.2**	3.0	mg/kg	50		104	80-120			
Molybdenum	**53.6**	5.0	mg/kg	50		107	80-120			
Nickel	**55.1**	3.0	mg/kg	50		110	80-120			
Selenium	**54.3**	0.50	mg/kg	50		109	80-120			
Silver	**50.2**	1.0	mg/kg	50		100	80-120			
Thallium	**56.3**	5.0	mg/kg	50		113	80-120			
Vanadium	**52.8**	10	mg/kg	50		106	80-120			
Zinc	**56.7**	3.0	mg/kg	50		113	80-120			
LCS (B8C2024-BS2)				Prepared: 03/19/18 Analyzed: 03/22/18						
Antimony	**55.5**	10	mg/kg	50		111	80-120			
Arsenic	**51.9**	0.50	mg/kg	50		104	80-120			
Barium	**54.7**	10	mg/kg	50		109	80-120			
Beryllium	**54.8**	1.0	mg/kg	50		110	80-120			
Cadmium	**54.1**	1.0	mg/kg	50		108	80-120			
Chromium	**53.3**	3.0	mg/kg	50		107	80-120			
Cobalt	**54.4**	3.0	mg/kg	50		109	80-120			
Copper	**53.1**	3.0	mg/kg	50		106	80-120			
Lead	**53.4**	3.0	mg/kg	50		107	80-120			
Molybdenum	**54.1**	5.0	mg/kg	50		108	80-120			
Nickel	**54.8**	3.0	mg/kg	50		110	80-120			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596137
Project No:	093-Chemoil-003	**Date Received:**	03/16/18
Project Name:	Former Chemoil Refinery	**Date 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 Control										
Batch B8C2024 - EPA 3050B										
LCS (B8C2024-BS2) Continued				Prepared: 03/19/18 Analyzed: 03/22/18						
Selenium	**53.0**	0.50	mg/kg	50		106	80-120			
Silver	**53.4**	1.0	mg/kg	50		107	80-120			
Thallium	**56.0**	5.0	mg/kg	50		112	80-120			
Vanadium	**54.0**	10	mg/kg	50		108	80-120			
Zinc	**53.8**	3.0	mg/kg	50		108	80-120			
LCS Dup (B8C2024-BSD1)				Prepared: 03/19/18 Analyzed: 03/22/18						
Antimony	**51.0**	10	mg/kg	50		102	80-120	2.35	20	
Arsenic	**50.5**	0.50	mg/kg	50		101	80-120	2.68	20	
Barium	**49.8**	10	mg/kg	50		99.6	80-120	2.62	20	
Beryllium	**53.8**	1.0	mg/kg	50		108	80-120	1.84	20	
Cadmium	**55.4**	1.0	mg/kg	50		111	80-120	1.49	20	
Chromium	**51.4**	3.0	mg/kg	50		103	80-120	2.48	20	
Cobalt	**52.6**	3.0	mg/kg	50		105	80-120	2.57	20	
Copper	**47.3**	3.0	mg/kg	50		94.6	80-120	2.90	20	
Lead	**50.8**	3.0	mg/kg	50		102	80-120	2.81	20	
Molybdenum	**51.6**	5.0	mg/kg	50		103	80-120	3.95	20	
Nickel	**54.1**	3.0	mg/kg	50		108	80-120	1.92	20	
Selenium	**52.5**	0.50	mg/kg	50		105	80-120	3.41	20	
Silver	**49.2**	1.0	mg/kg	50		98.5	80-120	1.81	20	
Thallium	**55.3**	5.0	mg/kg	50		111	80-120	1.76	20	
Vanadium	**51.4**	10	mg/kg	50		103	80-120	2.78	20	
Zinc	**56.2**	3.0	mg/kg	50		112	80-120	0.726	20	
LCS Dup (B8C2024-BSD2)				Prepared: 03/19/18 Analyzed: 03/22/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date 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 Control										
Batch B8C2024 - EPA 3050B										
LCS Dup (B8C2024-BSD2) Continued				Prepared: 03/19/18	Analyzed: 03/22/18					
Lead	**51.5**	3.0	mg/kg	50		103	80-120	3.57	20	
Molybdenum	**52.3**	5.0	mg/kg	50		105	80-120	3.33	20	
Nickel	**52.0**	3.0	mg/kg	50		104	80-120	5.41	20	
Selenium	**52.6**	0.50	mg/kg	50		105	80-120	0.719	20	
Silver	**53.0**	1.0	mg/kg	50		106	80-120	0.921	20	
Thallium	**54.5**	5.0	mg/kg	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: 8C16001-07**		Prepared: 03/19/18	Analyzed: 03/22/18					
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: 8C16001-19**		Prepared: 03/19/18	Analyzed: 03/22/18					
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date 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 Control										
Batch B8C2024 - EPA 3050B										
Duplicate (B8C2024-DUP2) Continued	**Source: 8C16001-19**	Prepared: 03/19/18	Analyzed: 03/22/18							
Chromium	**35.3**	3.0	mg/kg		35.3			0.227	40	
Cobalt	**8.96**	3.0	mg/kg		9.10			1.55	40	
Copper	**43.8**	3.0	mg/kg		44.4			1.47	40	
Lead	**46.4**	3.0	mg/kg		45.6			1.67	40	
Molybdenum	**<5.0**	5.0	mg/kg		<5.0				40	
Nickel	**19.6**	3.0	mg/kg		20.1			2.12	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	**43.3**	10	mg/kg		42.8			1.21	40	
Zinc	**80.4**	3.0	mg/kg		84.6			5.10	40	
Matrix Spike (B8C2024-MS1)	**Source: 8C16001-04**	Prepared: 03/19/18	Analyzed: 03/22/18							
Antimony	**12.6**	10	mg/kg	50	<10	25.2	75-125			QM-07
Arsenic	**47.4**	0.50	mg/kg	50	7.30	80.3	75-125			
Barium	**206**	10	mg/kg	50	164	84.8	75-125			
Beryllium	**41.6**	1.0	mg/kg	50	<1.0	83.2	75-125			
Cadmium	**40.0**	1.0	mg/kg	50	<1.0	80.0	75-125			
Chromium	**66.4**	3.0	mg/kg	50	23.1	86.6	75-125			
Cobalt	**49.6**	3.0	mg/kg	50	9.94	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	86.1	75-125			
Molybdenum	**44.4**	5.0	mg/kg	50	<5.0	88.8	75-125			
Nickel	**59.0**	3.0	mg/kg	50	19.4	79.1	75-125			
Selenium	**30.4**	0.50	mg/kg	50	<0.50	60.8	75-125			QM-07
Silver	**45.5**	1.0	mg/kg	50	<1.0	90.9	75-125			
Thallium	**30.8**	5.0	mg/kg	50	<5.0	61.7	60-140			
Vanadium	**88.4**	10	mg/kg	50	41.9	92.9	75-125			
Zinc	**111**	3.0	mg/kg	50	72.9	75.6	75-125			
Matrix Spike Dup (B8C2024-MSD1)	**Source: 8C16001-04**	Prepared: 03/19/18	Analyzed: 03/22/18							
Antimony	**13.3**	10	mg/kg	50	<10	26.6	75-125	5.49	40	QM-07
Arsenic	**48.4**	0.50	mg/kg	50	7.30	82.2	75-125	2.02	40	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date 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 Control										
Batch B8C2024 - EPA 3050B										
Matrix Spike Dup (B8C2024-MSD1) Continued	**Source: 8C16001-04**	Prepared: 03/19/18 Analyzed: 03/22/18								
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	90.2	75-125	1.59	40	
Nickel	**59.1**	3.0	mg/kg	50	19.4	79.4	75-125	0.237	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	0.0879	40	
Thallium	**40.0**	5.0	mg/kg	50	<5.0	80.0	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 Control										
Batch B8C2041 - EPA 7471A Prep										
Blank (B8C2041-BLK1)				Prepared & Analyzed: 03/20/18						
Mercury	<0.020	0.020	mg/kg							
LCS (B8C2041-BS1)				Prepared & Analyzed: 03/20/18						
Mercury	**0.480**	0.020	mg/kg	0.50		96.1	80-120			
LCS Dup (B8C2041-BSD1)				Prepared & Analyzed: 03/20/18						
Mercury	**0.482**	0.020	mg/kg	0.50		96.5	80-120	0.415	25	
Duplicate (B8C2041-DUP1)	**Source: 8C16001-07**	Prepared & Analyzed: 03/20/18								
Mercury	**0.452**	0.020	mg/kg		0.535			16.7	25	
Duplicate (B8C2041-DUP2)	**Source: 8C16001-19**	Prepared & Analyzed: 03/20/18								
Mercury	**0.631**	0.020	mg/kg		0.499			23.4	25	
Matrix Spike (B8C2041-MS1)	**Source: 8C16001-04**	Prepared & Analyzed: 03/20/18								
Mercury	**0.640**	0.020	mg/kg	0.50	0.104	107	75-125			
Matrix Spike Dup (B8C2041-MSD1)	**Source: 8C16001-04**	Prepared & Analyzed: 03/20/18								

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596137
Date Received: 03/16/18
Date 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 Control										
Batch B8C2041 - EPA 7471A Prep										
Matrix Spike Dup (B8C2041-MSD1) Continued	**Source: 8C16001-04** Prepared & Analyzed: 03/20/18									
Mercury	**0.578**	0.020	mg/kg	0.50	0.104	94.6	75-125	10.3	25	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 14928
70050067
Page 1 of 2

Client: Apex Companies		**Project Name / No.:** Chemoil 093-Chemoil-003		**Sampler's Name:** Kevin Nguyen	
Project Manager: Kirsten Duey		**Site Address:** 3478 Buskirk Ave, Suite 100		**Sampler's Signature:**	
Phone: 925-951-6376		**City:** Pleasant Hill		**P.O. No.:**	
Fax:		**State & Zip:** CA 94523		**Quote No.:**	

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17, EPA 6010B 7000	Hexchrome EPA 7199	Mercury EPA 7471A/7471A	Special Instructions
TP-8-1'	8C16001-01	3/14/18	13:11	Soil	1	X	X	X	Hold all 2' samples, as per K. Duey on 3/21/18
TP-8-2'	-02	3/14/18	13:20	Soil	1				HOLD
TP-8-5'	-03	3/14/18	13:31	Soil	1				
TP-5-1'	-04	3/14/18	8:50	Soil	1				
TP-5-2'	-05	3/14/18	8:55	Soil	1				HOLD
TP-5-5'	-06	3/14/18	9:26	Soil	1				
TP-13-1'	-07	3/14/18	12:55	Soil	1				
TP-13-2'	-08	3/14/18	13:05	Soil	1				HOLD
TP-13-5'	-09	3/14/18	13:10	Soil	1				
TP-2-1'	-10	3/15/18	8:00	Soil	1				
TP-2-2'	-11	3/15/18	8:15	Soil	1				HOLD
TP-2-5'	-12	3/15/18	8:30	Soil	1				
TP-6-1'	-13	3/15/18	10:00	Soil	1				
TP-6-2'	-14	3/15/18	10:15	Soil	1				HOLD
TP-6-5'	-15	3/15/18	10:23	Soil	1				3-16-18 7:50

Relinquished by	Date	Time	Received by
	3/15/18	17:40	
	3-16-18	11:00	

For Laboratory Use
REVIEWED
Date 3/16/18 Time 1145
TAT N Days Sign:

A.A. Project No.: A596137/8C16001

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.: 14929

70050068

Client: APEX Companies	Project Name / No.: Chemoil -093 -Chemoil-003	Sampler's Name: Kevin Nguyen	
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave, Suite 100	Sampler's Signature:	
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:	
Fax:	State & Zip: CA 94523	Quote No.:	

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17, EPA6010B/7000	Hexavalent Chromium EPA 7199	Mercury EPA 7470A/7471A	Special Instructions
TP-19-1'	8C16001-16	3/15/18	13:00	soil	1	X	X	X	
TP-19-2'	-17	3/15/18	13:19	Soil	1	↓	↓	↓	HOLD
TP-19-5'	-18	3/15/18	13:32	Soil	1	↓	↓	↓	
TP-16-1'	-19	3/15/18	14:03	soil	1	↓	↓	↓	
TP-16-2'	-20	3/15/18	14:10	Soil	1	↓	↓	↓	HOLD
TP-16-5'	-21	3/15/18	14:22	Soil	1	↓	↓	↓	

3-16-18 - 7:50

For Laboratory Use	Relinquished by	Date	Time	Received by
REVIEWED Date 3/16/18 Time 1145	[signature]	3/15/18	17:46	[signature]
TAT N Days Sign: [signature]	[signature]	3-16-18	1100	[signature]

A.A. Project No.: A596137/8C16001

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

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Cations by Ion Chromatography

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

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavalent 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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596138
Project No:	093-Chemoil-003	**Date Received:**	03/19/18
Project Name:	Former Chemoil Refinery	**Date Reported:**	04/02/18
Method:	Total Metals CAM 17	**Units:**	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'	
Matrix:	Soil	Soil	
Dilution Factor:	1	1	MRL
CAM Metals Less Hg 6000/7000 (EPA 6010B/7000)			
Antimony	<10	<10	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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596138
Project No:	093-Chemoil-003	**Date Received:**	03/19/18
Project Name:	Former Chemoil Refinery	**Date Reported:**	04/02/18
Method:	Total Metals CAM 17	**Units:**	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'	
Matrix:	Soil	Soil	
Dilution Factor:	2	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)			
Mercury	**1.7**	**0.080**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8C2123 - NO PREP										
Blank (B8C2123-BLK1)				Prepared & Analyzed: 03/21/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8C2123-BS1)				Prepared & Analyzed: 03/21/18						
Chromium (VI)	**0.189**	0.040	mg/kg	0.20		94.6	80-120			
LCS Dup (B8C2123-BSD1)				Prepared & Analyzed: 03/21/18						
Chromium (VI)	**0.207**	0.040	mg/kg	0.20		103	80-120	8.89	20	
Matrix Spike (B8C2123-MS1)		**Source: 8C20013-08**		Prepared & Analyzed: 03/21/18						
Chromium (VI)	**2.70**	0.040	mg/kg	0.20	2.46	121	70-130			
Matrix Spike Dup (B8C2123-MSD1)		**Source: 8C20013-08**		Prepared & Analyzed: 03/21/18						
Chromium (VI)	**2.70**	0.040	mg/kg	0.20	2.46	121	70-130	0.00	40	
Total Metals CAM 17 - Quality Control										
Batch B8C2616 - EPA 3050B										
Blank (B8C2616-BLK1)				Prepared & Analyzed: 03/26/18						
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 (B8C2616-BS1)				Prepared & Analyzed: 03/26/18						
Antimony	**57.0**	10	mg/kg	50		114	80-120			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8C2616 - EPA 3050B										
LCS (B8C2616-BS1) Continued				Prepared & Analyzed: 03/26/18						
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)				Prepared & Analyzed: 03/26/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8C2616 - EPA 3050B										
LCS Dup (B8C2616-BSD1) Continued				Prepared & Analyzed: 03/26/18						
Zinc	**55.6**	3.0	mg/kg	50		111	80-120	7.59	20	
Duplicate (B8C2616-DUP1)		**Source: 8C19011-21**		Prepared & Analyzed: 03/26/18						
Antimony	**<10**	10	mg/kg						40	
Arsenic	**4.26**	0.50	mg/kg		3.48			20.2	40	
Barium	**162**	10	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**	10	mg/kg		47.3			9.87	40	
Zinc	**42.2**	3.0	mg/kg		37.1			12.7	40	
Total Metals CAM 17 - Quality Control										
Batch B8C2622 - EPA 7471A Prep										
Blank (B8C2622-BLK1)				Prepared & Analyzed: 03/26/18						
Mercury	<0.020	0.020	mg/kg							
LCS (B8C2622-BS1)				Prepared & Analyzed: 03/26/18						
Mercury	**0.496**	0.020	mg/kg	0.50		99.1	80-120			
LCS Dup (B8C2622-BSD1)				Prepared & Analyzed: 03/26/18						
Mercury	**0.482**	0.020	mg/kg	0.50		96.5	80-120	2.66	25	
Duplicate (B8C2622-DUP1)		**Source: 8C19011-21**		Prepared & Analyzed: 03/26/18						
Mercury	**0.0235**	0.020	mg/kg		0.0225			4.35	25	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596138
Project No:	093-Chemoil-003	**Date Received:**	03/19/18
Project Name:	Former Chemoil Refinery	**Date Reported:**	04/02/18

Special Notes

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 14950

70049081
Page 1 of 1

Client:	Apex Companies	Project Name / No.:	Chemoil	Sampler's Name:	Kevin Nguyen
Project Manager:	Kirsten Duey	Site Address:	3478 Buskirk Ave, Suite 100	Sampler's Signature:	
Phone:	925-951-6376	City:	Pleasant Hill	P.O. No.:	
Fax:		State & Zip:	CA 94523	Quote No.:	

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17 EPA 6010B/7000	Hexavalent Chrome EPA 7199	Mercury EPA 7470A/7471A								Special Instructions
TP-20-1'	8C19010-01	3/16/18	7:59	Soil	1	X	X	X								
TP-20-2'	-02	↓	8:10	↓	1	↓	↓	↓								HOLD
TP-20-5'	-03	↓	8:30	↓	1	↓	↓	↓								

For Laboratory Use

REVIEWED
Date 3/20/18 Time 0700
TAT N Days Sign:

A.A. Project No.: A596/38/8C19010

Relinquished by	Date	Time	Received by
	3/16/18	15:38	
	3-19-18	17:04	

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 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

LABORATORY ANALYSIS RESULTS

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

7199 Hexavalent Chromium by IC - Low Level

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Mercury Total EPA 7470A/7471A

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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		

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavalent Chromium by IC - Low Level (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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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:	8D12002-01	8D12002-02	8D12002-03	8D12002-04	
Client ID No:	TP-34-1	TP-34-5	TP-34-10	TP-35-1	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
CAM Metals Less Hg 6000/7000 (EPA 6010B/7000)					
Antimony	<10	<10	<10	<10	10
Arsenic	**3.3**	**3.0**	**8.3**	**2.3**	0.50
Barium	**110**	**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	**18**	**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	**37**	**3.9**	**6.0**	**11**	3.0
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
Nickel	**13**	**12**	**19**	**7.1**	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	**30**	**28**	**53**	**22**	10
Zinc	**56**	**24**	**33**	**44**	3.0

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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:	8D12002-05	8D12002-06	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 Less Hg 6000/7000 (EPA 6010B/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	**33**	**55**	**47**	**32**	10
Zinc	**38**	**34**	**61**	**28**	3.0

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	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	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 Less Hg 6000/7000 (EPA 6010B/7000)					
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
Zinc	**29**	**29**	**39**	**50**	3.0

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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:	8D12002-13	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 Less Hg 6000/7000 (EPA 6010B/7000)					
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
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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:	Total Metals CAM 17	**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	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
Chromium	**23**	**26**	3.0
Cobalt	**10**	**11**	3.0
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	**52**	**50**	10
Zinc	**47**	**43**	3.0

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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	
Matrix:	Soil	Soil	Soil	Soil	
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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	
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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	<0.020	**0.055**	**0.076**	**0.024**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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	
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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.076**	<0.020	**0.025**	**0.062**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	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:	8D12002-13	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	50	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.052**	**0.051**	**0.061**	**25**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8D1625 - NO PREP										
Blank (B8D1625-BLK1)				Prepared & Analyzed: 04/16/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8D1625-BS1)				Prepared & Analyzed: 04/16/18						
Chromium (VI)	**0.216**	0.040	mg/kg	0.20		108	80-120			
LCS Dup (B8D1625-BSD1)				Prepared & Analyzed: 04/16/18						
Chromium (VI)	**0.216**	0.040	mg/kg	0.20		108	80-120	0.0464	20	
Duplicate (B8D1625-DUP1)		**Source: 8D12002-01**		Prepared & Analyzed: 04/16/18						
Chromium (VI)	**<0.040**	0.040	mg/kg		<0.040				40	
Batch B8D1727 - NO PREP										
Blank (B8D1727-BLK1)				Prepared & Analyzed: 04/17/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8D1727-BS1)				Prepared & Analyzed: 04/17/18						
Chromium (VI)	**0.182**	0.040	mg/kg	0.20		91.0	80-120			
LCS Dup (B8D1727-BSD1)				Prepared & Analyzed: 04/17/18						
Chromium (VI)	**0.195**	0.040	mg/kg	0.20		97.3	80-120	6.75	20	
Duplicate (B8D1727-DUP1)		**Source: 8D12002-17**		Prepared & Analyzed: 04/17/18						
Chromium (VI)	**<0.040**	0.040	mg/kg		0.00920				40	
Matrix Spike (B8D1727-MS1)		**Source: 8D12002-18**		Prepared & Analyzed: 04/17/18						
Chromium (VI)	**0.195**	0.040	mg/kg	0.20	<0.040	97.6	70-130			
Matrix Spike Dup (B8D1727-MSD1)		**Source: 8D12002-18**		Prepared & Analyzed: 04/17/18						
Chromium (VI)	**0.203**	0.040	mg/kg	0.20	<0.040	101	70-130	3.87	40	
Total Metals CAM 17 - Quality Control										
Batch B8D1309 - EPA 3050B										
Blank (B8D1309-BLK1)				Prepared: 04/13/18 Analyzed: 04/17/18						
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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D1309 - EPA 3050B										
Blank (B8D1309-BLK1) Continued				Prepared: 04/13/18 Analyzed: 04/17/18						
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 (B8D1309-BS1)				Prepared: 04/13/18 Analyzed: 04/17/18						
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)				Prepared: 04/13/18 Analyzed: 04/17/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D1309 - EPA 3050B										
LCS Dup (B8D1309-BSD1) Continued				Prepared: 04/13/18 Analyzed: 04/17/18						
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: 8D12002-16**		Prepared: 04/13/18 Analyzed: 04/17/18						
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)		**Source: 8D12002-04**		Prepared: 04/13/18 Analyzed: 04/17/18						

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D1309 - EPA 3050B										
Matrix Spike (B8D1309-MS1) Continued Source: 8D12002-04 Prepared: 04/13/18 Analyzed: 04/17/18										
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	87.6	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	87.9	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-MSD1) Source: 8D12002-04 Prepared: 04/13/18 Analyzed: 04/17/18										
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	
Thallium	**45.6**	5.0	mg/kg	50	<5.0	91.3	60-140	3.82	40	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D1309 - EPA 3050B										
Matrix Spike Dup (B8D1309-MSD1) Continued	**Source: 8D12002-04**	Prepared: 04/13/18 Analyzed: 04/17/18								
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)		Prepared & Analyzed: 04/16/18								
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)	**Source: 8D12002-04**	Prepared & Analyzed: 04/16/18								
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

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.

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15156
70051178
Page 1 of 2

Client: Apex Companies	Project Name / No.: Chemoil	Sampler's Name: Kevin Nguyen & Sean McDowell	
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave, Suite 100	Sampler's Signature:	
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:	
Fax:	State & Zip: CA 94523	Quote No.:	

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name) — Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM-17, EPA 6010B/7000	Hexavalent chrome EPA 7199	Mercury EPA-7470A/7471A	Special Instructions
TP-34-1	8D12002-01	4/10/18	7:45	Soil	1	X	X	X	
TP-34-5	-02		8:05		1				
TP-34-10	-03		8:40		1				
TP-35-1	-04		9:05		1				
TP-35-5	-05		9:15		1				
TP-35-10	-06		9:30		1				
AE-04-1	-07		11:00		1				
AE-04-5	-08		11:05		1				
AE-04-10	-09		11:25		1				
AN-24-1'	-10		7:55		1				
AN-24-5'	-11		7:55		1				
AN-24-10'	-12		8:11		1				
AN-26-1'	-13		13:19		1				
AN-26-5'	-14		13:23		1				
AN-26-10'	-15		13:27		1				

For Laboratory Use

REVIEWED
Date 4/13/18 Time 0800
TAT N Days Sign:

A.A. Project No.: A596141/8D12002

Relinquished by	Date	Time	Received by
	4/10/18	17:36	
	4-13-18	~~2:58~~	
		15:38	

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

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15157

70051180

Client: Apex Companies	Project Name / No.: Chemoil	Sampler's Name: Kevin Nguyen & Sean McRowe	
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave, Suite 100	Sampler's Signature: [signature]	
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:	
Fax:	State & Zip: 94523	Quote No.:	

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name) — Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM-17 EPA 6010B/7000	Hexavalent chrome EPA 7199	Mercury EPA-7470A/7471A								Special Instructions
AS-14-1'	8DI2002-16	4/10/18	15:05	soil	1	X	X	X								
AS-14-5'	-17	↓	15:08	↓	1	↓	↓	↓								
AS-14-10'	-18	↓	15:14	↓	1	↓	↓	↓								

For Laboratory Use

REVIEWED
Date 4/13/18 Time 0800
TAT N Days Sign: [signature]

A.A. Project No.: A5961 41/8DI2002

Relinquished by	Date	Time	Received by
[signature]	4/10/18	17:36	[signature]
[signature]	4-12-18	15:38	[signature]

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

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596144
Date Received: 04/17/18
Date Reported: 04/24/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596144
Project No:	093-Chemoil-003	**Date Received:**	04/17/18
Project Name:	Former Chemoil Refinery	**Date Reported:**	04/24/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596144
Date Received: 04/17/18
Date 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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Cations by Ion Chromatography

AA Project No: A596144
Date Received: 04/17/18
Date Reported: 04/24/18

7199 Hexavalent Chromium by IC - Low Level (EPA 7199)

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	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 Less Hg 6000/7000 (EPA 6010B/7000)					
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
Nickel	**16**	**22**	**14**	**17**	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	**43**	**61**	**33**	**40**	10
Zinc	**38**	**41**	**30**	**27**	3.0

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	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:	8D17014-05	8D17014-06	8D17014-07	8D17014-08	
Client ID No:	TP-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 Less Hg 6000/7000 (EPA 6010B/7000)					
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
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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	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 Less Hg 6000/7000 (EPA 6010B/7000)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	MRL
CAM Metals Less Hg 6000/7000 (EPA 6010B/7000)				
Antimony	<10	<10	<10	10
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
Lead	**6.0**	**5.6**	**7.1**	3.0
Molybdenum	<5.0	<5.0	<5.0	5.0
Nickel	**19**	**17**	**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	**42**	**38**	**55**	10
Zinc	**35**	**33**	**39**	3.0

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	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	
Matrix:	Soil	Soil	Soil	Soil	
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	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	
Client ID No:	TP-12-5	TP-12-10	TP-13-10	TP-14-1	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.065**	**0.024**	**0.029**	**0.030**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	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	
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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.036**	**0.030**	**0.049**	**0.039**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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:	8D17014-13	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	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)				
Mercury	**0.066**	**0.082**	**0.052**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596144
Date Received: 04/17/18
Date Reported: 04/24/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8D1910 - NO PREP										
Blank (B8D1910-BLK1)				Prepared & Analyzed: 04/19/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8D1910-BS1)				Prepared & Analyzed: 04/19/18						
Chromium (VI)	**0.214**	0.040	mg/kg	0.20		107	80-120			
LCS Dup (B8D1910-BSD1)				Prepared & Analyzed: 04/19/18						
Chromium (VI)	**0.231**	0.040	mg/kg	0.20		116	80-120	7.82	20	
Duplicate (B8D1910-DUP1)		**Source: 8D17014-01**		Prepared & Analyzed: 04/19/18						
Chromium (VI)	**<0.040**	0.040	mg/kg		0.0242			18.0	40	
Matrix Spike (B8D1910-MS1)		**Source: 8D17014-15**		Prepared & Analyzed: 04/19/18						
Chromium (VI)	**0.106**	0.040	mg/kg	0.20	<0.040	53.0	70-130			QM-07
Matrix Spike Dup (B8D1910-MSD1)		**Source: 8D17014-15**		Prepared & Analyzed: 04/19/18						
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 Control										
Batch B8D1908 - EPA 3050B										
Blank (B8D1908-BLK1)				Prepared: 04/19/18 Analyzed: 04/20/18						
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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596144
Project No:	093-Chemoil-003	**Date Received:**	04/17/18
Project Name:	Former Chemoil Refinery	**Date 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 Control										
Batch B8D1908 - EPA 3050B										
LCS (B8D1908-BS1)				Prepared: 04/19/18 Analyzed: 04/20/18						
Antimony	**54.4**	10	mg/kg	50		109	80-120			
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)				Prepared: 04/19/18 Analyzed: 04/20/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596144
Project No:	093-Chemoil-003	**Date Received:**	04/17/18
Project Name:	Former Chemoil Refinery	**Date 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 Control										
Batch B8D1908 - EPA 3050B										
LCS Dup (B8D1908-BSD1) Continued				Prepared: 04/19/18	Analyzed: 04/20/18					
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: 8D17014-10**		Prepared: 04/19/18	Analyzed: 04/20/18					
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	
Total Metals CAM 17 - Quality Control										
Batch B8D1913 - EPA 7471A Prep										
Blank (B8D1913-BLK1)				Prepared & Analyzed: 04/19/18						
Mercury	<0.020	0.020	mg/kg							
LCS (B8D1913-BS1)				Prepared & Analyzed: 04/19/18						
Mercury	**0.514**	0.020	mg/kg	0.50		103	80-120			
LCS Dup (B8D1913-BSD1)				Prepared & Analyzed: 04/19/18						
Mercury	**0.584**	0.020	mg/kg	0.50		117	80-120	12.8	25	
Duplicate (B8D1913-DUP1)		**Source: 8D17014-10**		Prepared & Analyzed: 04/19/18						
Mercury	**0.0260**	0.020	mg/kg		0.0305			15.9	25	
Matrix Spike (B8D1913-MS1)		**Source: 8D17014-08**		Prepared & Analyzed: 04/19/18						

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596144
Date Received: 04/17/18
Date 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 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

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596144
Project No:	093-Chemoil-003	**Date Received:**	04/17/18
Project Name:	Former Chemoil Refinery	**Date 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.

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15196
70049084

Client: Apex Companies	Project Name / No.: Chemeil 093-Chemeil-003	Sampler's Name: Kevin Nguyen	
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave, Suit 100	Sampler's Signature:	
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:	
Fax:	State & Zip: CA 94523	Quote No.:	

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17 - EPA 6010B/7000	Hexavalent Chrom EPA 7199	Mercury EPA 7470/7471A								Special Instructions
TP-11-1	8D17014-01	4/16/18	7:48	Soil	1	X	X	X								
TP-11-5	-02		7:53													
TP-11-10	-03		8:10													
TP-12-1	-04		8:35													
TP-12-5	-05		8:47													
TP-12-10	-06		8:54													
TP-13-10	-07		9:30													
TP-14-1	-08		9:48													
TP-14-5	-09		9:52													
TP-14-10	-10		10:03													
TP-7-1	-11		10:45													
TP-7-5	-12		11:09													
TP-10	-13		11:14													
TP-5-10	-14		14:26													
TP-8-10	-15		13:16													

For Laboratory Use

REVIEWED
Date 4/17/18 Time 1630
TAT N Days Sign:

A.A. Project No.: A596144/8D17014

Relinquished by	Date	Time	Received by
	15:42	12:40	
	4-17-18	15:06	

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

LABORATORY ANALYSIS RESULTS

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

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
7199 Hexavalent Chromium 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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
CAM Metals Less Hg 6000/7000					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Mercury Total EPA 7470A/7471A

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Cations by Ion Chromatography

AA Project No: A596145
Date Received: 04/18/18
Date Reported: 04/24/18

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
7199 Hexavalent 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

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Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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:	8D18011-01	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	MRL
CAM Metals Less Hg 6000/7000 (EPA 6010B/7000)					
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

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Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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:	8D18011-05	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 Less Hg 6000/7000 (EPA 6010B/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
Molybdenum	<5.0	<5.0	<5.0	<5.0	5.0
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	**40**	**38**	**69**	**40**	10
Zinc	**38**	**72**	**50**	**36**	3.0

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Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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:	8D18011-09	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 Hg 6000/7000 (EPA 6010B/7000)					
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

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LABORATORY ANALYSIS RESULTS

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:	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:	8D18011-13	8D18011-14	8D18011-15	8D18011-16	
Client ID No:	TP-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 Less Hg 6000/7000 (EPA 6010B/7000)					
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

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AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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:	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	MRL
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
Chromium	**34**	**19**	**26**	3.0
Cobalt	**13**	**7.7**	**11**	3.0
Copper	**18**	**4.0**	**8.4**	3.0
Lead	**7.8**	**6.0**	**10**	3.0
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

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Operations Manager

LABORATORY ANALYSIS RESULTS

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:	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	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	20	1	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.084**	**11**	**0.062**	**0.054**	0.020

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LABORATORY ANALYSIS RESULTS

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:	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	
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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.15**	**0.045**	**0.052**	**0.041**	0.020

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LABORATORY ANALYSIS RESULTS

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:	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	
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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.57**	**0.024**	**0.61**	**0.088**	0.020

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LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Total Metals CAM 17

AA Project No: A596145
Date Received: 04/18/18
Date Reported: 04/24/18
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	
Matrix:	Soil	Soil	Soil	Soil	
Dilution Factor:	1	1	1	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.038**	**0.12**	**0.13**	**0.13**	0.020

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LABORATORY ANALYSIS RESULTS

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:	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

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Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8D2004 - NO PREP										
Blank (B8D2004-BLK1)				Prepared & Analyzed: 04/20/18						
Chromium (VI)	<0.040	0.040	mg/kg							
Blank (B8D2004-BLK2)				Prepared & Analyzed: 04/24/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8D2004-BS1)				Prepared & Analyzed: 04/20/18						
Chromium (VI)	**0.193**	0.040	mg/kg	0.20		96.7	80-120			
LCS (B8D2004-BS2)				Prepared & Analyzed: 04/24/18						
Chromium (VI)	**0.188**	0.040	mg/kg	0.20		93.8	80-120			
LCS Dup (B8D2004-BSD1)				Prepared & Analyzed: 04/20/18						
Chromium (VI)	**0.230**	0.040	mg/kg	0.20		115	80-120	17.3	20	
LCS Dup (B8D2004-BSD2)				Prepared & Analyzed: 04/24/18						
Chromium (VI)	**0.198**	0.040	mg/kg	0.20		99.1	80-120	5.44	20	
Duplicate (B8D2004-DUP1)		**Source: 8D18011-01**		Prepared & Analyzed: 04/20/18						
Chromium (VI)	**<0.040**	0.040	mg/kg		<0.040				40	
Matrix Spike (B8D2004-MS1)		**Source: 8D18011-19**		Prepared: 04/20/18 Analyzed: 04/24/18						
Chromium (VI)	**ND**	0.040	mg/kg	0.20	<0.040		70-130			QM-01
Matrix Spike (B8D2004-MS2)		**Source: 8D18011-01**		Prepared & Analyzed: 04/24/18						
Chromium (VI)	**0.158**	0.040	mg/kg	0.20	<0.040	79.0	70-130			
Matrix Spike (B8D2004-MS3)		**Source: 8D18011-07**		Prepared & Analyzed: 04/24/18						
Chromium (VI)	**0.200**	0.040	mg/kg	0.20	<0.040	100	70-130			
Matrix Spike (B8D2004-MS4)		**Source: 8D18011-12**		Prepared & Analyzed: 04/24/18						
Chromium (VI)	**0.225**	0.040	mg/kg	0.20	<0.040	112	70-130			
Matrix Spike Dup (B8D2004-MSD1)		**Source: 8D18011-19**		Prepared: 04/20/18 Analyzed: 04/24/18						
Chromium (VI)	**ND**	0.040	mg/kg	0.20	<0.040		70-130		40	QM-01
Matrix Spike Dup (B8D2004-MSD2)		**Source: 8D18011-01**		Prepared & Analyzed: 04/24/18						
Chromium (VI)	**0.151**	0.040	mg/kg	0.20	<0.040	75.6	70-130	4.46	40	
Total Metals CAM 17 - Quality Control										
Batch B8D2007 - EPA 3050B										
Blank (B8D2007-BLK1)				Prepared: 04/20/18 Analyzed: 04/23/18						
Antimony	<10	10	mg/kg							

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Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2007 - EPA 3050B										
Blank (B8D2007-BLK1) Continued				Prepared: 04/20/18 Analyzed: 04/23/18						
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 (B8D2007-BS1)				Prepared: 04/20/18 Analyzed: 04/23/18						
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			

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Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2007 - EPA 3050B										
LCS (B8D2007-BS1) Continued				Prepared: 04/20/18	Analyzed: 04/23/18					
Zinc	**57.8**	3.0	mg/kg	50		116	80-120			
LCS Dup (B8D2007-BSD1)				Prepared: 04/20/18	Analyzed: 04/23/18					
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	0.947	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)		**Source: 8D18011-10**		Prepared: 04/20/18	Analyzed: 04/23/18					
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	

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2007 - EPA 3050B										
Duplicate (B8D2007-DUP1) Continued	**Source: 8D18011-10** Prepared: 04/20/18 Analyzed: 04/23/18									
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)	**Source: 8D18011-04** Prepared: 04/20/18 Analyzed: 04/23/18									
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	97.4	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-MSD1)	**Source: 8D18011-04** Prepared: 04/20/18 Analyzed: 04/23/18									
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2007 - EPA 3050B										
Matrix Spike Dup (B8D2007-MSD1) Continued		**Source: 8D18011-04**		Prepared: 04/20/18 Analyzed: 04/23/18						
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	92.4	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 Control										
Batch B8D2319 - EPA 7471A Prep										
Blank (B8D2319-BLK1)				Prepared & Analyzed: 04/23/18						
Mercury	<0.020	0.020	mg/kg							
LCS (B8D2319-BS1)				Prepared & Analyzed: 04/23/18						
Mercury	**0.478**	0.020	mg/kg	0.50		95.6	80-120			
LCS Dup (B8D2319-BSD1)				Prepared & Analyzed: 04/23/18						
Mercury	**0.480**	0.020	mg/kg	0.50		96.1	80-120	0.522	25	
Duplicate (B8D2319-DUP1)		**Source: 8D18011-10**		Prepared & Analyzed: 04/23/18						
Mercury	**0.0270**	0.020	mg/kg		0.0240			11.8	25	
Matrix Spike (B8D2319-MS1)		**Source: 8D18011-04**		Prepared & Analyzed: 04/23/18						
Mercury	**0.559**	0.020	mg/kg	0.50	0.0545	101	75-125			
Matrix Spike Dup (B8D2319-MSD1)		**Source: 8D18011-04**		Prepared & Analyzed: 04/23/18						
Mercury	**0.574**	0.020	mg/kg	0.50	0.0545	104	75-125	2.65	25	

Viorel Vasile
Operations Manager

American Analytics Ÿ 9765 Eton Avenue, Chatsworth, California 91311
Tel: (818) 998-5547 Ÿ Fax: (818) 998-7258

LABORATORY ANALYSIS RESULTS

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

Special Notes

[1] = **QM-01** : The spike recovery for this QC sample is outside of established control limits due to sample matrix interference.

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15262
70049085
Page 1 of 2

Client: Apex Companies **Project Name / No.:** chemoil 093-chemoil-003 **Sampler's Name:** Sean McDowell/Kevin Nguyen
Project Manager: Kirsten Duey **Site Address:** 3478 Buskirk Ave **Sampler's Signature:** Sean McDowell
Phone: 925-951-6376 **City:** Pleasant Hill **P.O. No.:**
Fax: **State & Zip:** CA 94523 **Quote No.:**

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name) — Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17-EPA 6010B/7000	Hexavalent chrom EPA 7199	Mercury EPA 7470/7471A	Special Instructions
TP-6-10'	8D18011-01	4/17/18	8:00	Soil	1	X	X	X	
TP-4-1'	-02		8:10						
TP-4-5'	-03		8:15						
TP-4-10'	-04		8:50						
TP-2-10'	-05		9:20						
TP-1-1'	-06		9:40						
TP-1-5'	-07		9:45						
TP-1-10'	-08		10:00						
TP-18-1'	-09		10:50						
TP-18-5'	-10		10:55						
TP-18-10'	-11		11:10						
TP-17-1'	-12		13:10						
TP-17-5'	-13		13:45						
TP-17-10'	-14		14:20						
TP-16-10'	-15		15:25						

For Laboratory Use
REVIEWED
Date 4/18/18 Time 1600
TAT N Days Sign:

A.A. Project No.: A596145/8D18011

Relinquished by	Date	Time	Received by
Sean McDowell	4/17/18	13:12	[signature]
[signature]	4-18-18	13:48	[signature]

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15203
70049088
Page 2 of 2

Client: Apex Companies	Project Name / No.: chemoil 093-chemoil-003	Sampler's Name: Sean McDowell / Kevin Nguyen
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave	Sampler's Signature:
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:
Fax:	State & Zip: CA 94523	Quote No.:

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17-EPA 6010B/7000	Hexavalent chrom EPA 7199	Mercury EPA 7470/7471A								Special Instructions
DUP-1-041718	8D18011-16	4/17/18		Soil	1	X	X	X								
DUP-2-041718	-17	↓		↓	↓	↓	↓	↓								
DUP-3-041718	-18	↓		↓	↓	↓	↓	↓								
DUP-4-041718	-19	↓		↓	↓	↓	↓	↓								

For Laboratory Use
REVIEWED
Date 4/18/18 Time 1630
TAT N Days Sign:

A.A. Project No.: A596145/8D18011

Relinquished by	Date	Time	Received by
[signature]	4/17/18	18:12	[signature]
[signature]	4-18-18	13:48	[signature]

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

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596146
Date Received: 04/19/18
Date 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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596146
Project No:	093-Chemoil-003	**Date Received:**	04/19/18
Project Name:	Former Chemoil Refinery	**Date 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

Sample ID	Laboratory ID	Matrix	TAT	Date Sampled	Date Received
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Cations by Ion Chromatography

AA Project No: A596146
Date Received: 04/19/18
Date Reported: 04/25/18

7199 Hexavalent Chromium by IC - Low Level (EPA 7199)

AA I.D. No.	Client I.D. No.	Sampled	Prepared	Analyzed	Dilution	Result	Units	MRL
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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:	04/25/18	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 Less Hg 6000/7000 (EPA 6010B/7000)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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:	04/25/18	04/25/18	04/25/18	04/25/18	
AA ID No:	8D19011-05	8D19011-06	8D19011-07	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 Less Hg 6000/7000 (EPA 6010B/7000)					
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
Nickel	**10**	**12**	**21**	**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	**30**	**35**	**39**	**54**	10
Zinc	**33**	**40**	**110**	**39**	3.0

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	MRL
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	**9.8**	**12**	**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
Zinc	**36**	**46**	**45**	3.0

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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:	8D19011-01	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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	**0.090**	**0.028**	**0.098**	**0.033**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**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	
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
Mercury Total EPA 7470A/7471A (EPA 7471A)					
Mercury	<0.020	**0.043**	**0.078**	**0.047**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: 093-Chemoil-003
Project Name: Former Chemoil Refinery
Method: Total Metals CAM 17

AA Project No: A596146
Date Received: 04/19/18
Date Reported: 04/25/18
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	
Client ID No:	TP-15-10	TP-20-10	TP-19-10	
Matrix:	Soil	Soil	Soil	
Dilution Factor:	1	1	1	MRL
Mercury Total EPA 7470A/7471A (EPA 7471A)				
Mercury	**0.060**	**0.17**	**0.13**	0.020

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596146
Date Received: 04/19/18
Date Reported: 04/25/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Cations by Ion Chromatography - Quality Control										
Batch B8D2320 - NO PREP										
Blank (B8D2320-BLK1)				Prepared & Analyzed: 04/23/18						
Chromium (VI)	<0.040	0.040	mg/kg							
LCS (B8D2320-BS1)				Prepared & Analyzed: 04/23/18						
Chromium (VI)	**0.230**	0.040	mg/kg	0.20		115	80-120			
LCS Dup (B8D2320-BSD1)				Prepared & Analyzed: 04/23/18						
Chromium (VI)	**0.220**	0.040	mg/kg	0.20		110	80-120	4.44	20	
Duplicate (B8D2320-DUP1)		**Source: 8D19011-01**		Prepared & Analyzed: 04/23/18						
Chromium (VI)	**<0.040**	0.040	mg/kg		<0.040				40	
Matrix Spike (B8D2320-MS1)		**Source: 8D19011-11**		Prepared & Analyzed: 04/23/18						
Chromium (VI)	**0.200**	0.040	mg/kg	0.20	<0.040	99.9	70-130			
Matrix Spike Dup (B8D2320-MSD1)		**Source: 8D19011-11**		Prepared & Analyzed: 04/23/18						
Chromium (VI)	**0.180**	0.040	mg/kg	0.20	<0.040	90.0	70-130	10.4	40	
Total Metals CAM 17 - Quality Control										
Batch B8D2423 - EPA 3050B										
Blank (B8D2423-BLK1)				Prepared: 04/24/18 Analyzed: 04/25/18						
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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596146
Project No:	093-Chemoil-003	**Date Received:**	04/19/18
Project Name:	Former Chemoil Refinery	**Date Reported:**	04/25/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2423 - EPA 3050B										
LCS (B8D2423-BS1)				Prepared: 04/24/18 Analyzed: 04/25/18						
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)				Prepared: 04/24/18 Analyzed: 04/25/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596146
Date Received: 04/19/18
Date Reported: 04/25/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2423 - EPA 3050B										
LCS Dup (B8D2423-BSD1) Continued				Prepared: 04/24/18	Analyzed: 04/25/18					
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)		**Source: 8D19004-02**		Prepared: 04/24/18	Analyzed: 04/25/18					
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: 8D19011-06**		Prepared: 04/24/18	Analyzed: 04/25/18					
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	113	75-125			
Beryllium	**50.8**	1.0	mg/kg	50	<1.0	102	75-125			
Cadmium	**43.0**	1.0	mg/kg	50	<1.0	86.1	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	95.7	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	96.5	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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596146
Date Received: 04/19/18
Date Reported: 04/25/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2423 - EPA 3050B										
Matrix Spike (B8D2423-MS1) Continued Source: 8D19011-06 Prepared: 04/24/18 Analyzed: 04/25/18										
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-MSD1) Source: 8D19011-06 Prepared: 04/24/18 Analyzed: 04/25/18										
Antimony	**15.7**	10	mg/kg	50	<10	31.4	75-125	4.16	40	QM-07
Arsenic	**50.9**	0.50	mg/kg	50	3.75	94.4	75-125	2.33	40	
Barium	**142**	10	mg/kg	50	92.5	98.1	75-125	5.03	40	
Beryllium	**49.5**	1.0	mg/kg	50	<1.0	99.0	75-125	2.59	40	
Cadmium	**41.8**	1.0	mg/kg	50	<1.0	83.7	75-125	2.83	40	
Chromium	**67.0**	3.0	mg/kg	50	16.9	100	75-125	3.49	40	
Cobalt	**54.1**	3.0	mg/kg	50	7.85	92.5	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	92.3	75-125	4.00	40	
Molybdenum	**50.5**	5.0	mg/kg	50	<5.0	101	75-125	2.29	40	
Nickel	**57.6**	3.0	mg/kg	50	12.4	90.5	75-125	4.01	40	
Selenium	**38.4**	0.50	mg/kg	50	<0.50	76.7	75-125	0.520	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	77.1	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 Control										
Batch B8D2418 - EPA 7471A Prep										
Blank (B8D2418-BLK1) Prepared & Analyzed: 04/24/18										
Mercury	<0.020	0.020	mg/kg							
LCS (B8D2418-BS1) Prepared & Analyzed: 04/24/18										
Mercury	**0.486**	0.020	mg/kg	0.50		97.2	80-120			
LCS Dup (B8D2418-BSD1) Prepared & Analyzed: 04/24/18										
Mercury	**0.490**	0.020	mg/kg	0.50		97.9	80-120	0.718	25	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

AA Project No: A596146
Date Received: 04/19/18
Date Reported: 04/25/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Total Metals CAM 17 - Quality Control										
Batch B8D2418 - EPA 7471A Prep										
Duplicate (B8D2418-DUP1)		**Source: 8D19004-02**	Prepared & Analyzed: 04/24/18							
Mercury	**<0.020**	0.020	mg/kg						25	
Matrix Spike (B8D2418-MS1)		**Source: 8D19011-06**	Prepared & Analyzed: 04/24/18							
Mercury	**0.586**	0.020	mg/kg	0.50	0.0430	108	75-125			
Matrix Spike Dup (B8D2418-MSD1)		**Source: 8D19011-06**	Prepared & Analyzed: 04/24/18							
Mercury	**0.543**	0.020	mg/kg	0.50	0.0430	100	75-125	7.53	25	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	A596146
Project No:	093-Chemoil-003	**Date Received:**	04/19/18
Project Name:	Former Chemoil Refinery	**Date 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.

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15224
70049096
Page 1 of 1

Client: Apex Companies	Project Name / No.: chemoil 093-chemoil-003	Sampler's Name: Sean McDowell / Kevin Nguyen
Project Manager: Kirsten Duey	Site Address: 3478 Buskirk Ave, Suite 100	Sampler's Signature: Sean McDowell
Phone: 925-951-6376	City: Pleasant Hill	P.O. No.:
Fax:	State & Zip: CA 94523	Quote No.:

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	CAM17 - EPA 6010B/7000	Hexavalent Chrom EPA 7199	Mercury EPA 7470/7471A								Special Instructions
TP-36-1'	8D19011-01	4/18/18	8:20	soil	1	X	X	X								
TP-36-5'	-02		8:30													
TP-36-10'	-03		12:00													
TP-30-1'	-04		8:55													
TP-30-5'	-05		9:05													
TP-30-10'	-06		10:00													
TP-15-1'	-07		10:44													
TP-15-5'	-08		10:55													
TP-15-10'	-09		11:30													
TP-20-10'	-10		13:40													
TP-19-10'	-11		15:05													
																4-19-18 1220

For Laboratory Use

REVIEWED
Date 4/19/18 Time 1700
TAT N Days Sign:

A.A. Project No.: A596146/8D19011

Relinquished by	Date	Time	Received by
Sean McDowell	4/18/18	16:50	
	4-19-18	16:41	

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.

PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

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**	**PTS File No:**	**47257**
Project Number:	**093-Chemoil-001 Task 6**	**Client:**	**The Source Group, Inc.**

TEST PROGRAM - 20170518

CORE ID	Depth ft.	Core Recovery ft.	CAL-EPA DTSC Vapor Intrusion					Comments
		Plugs:	Various					
Date Received: 20170518								
AN-22-5	**4.75-5.25**	**0.5**	**X**					
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.

PTS Laboratories

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/ASTM D2216		API RP 40		API RP 40		
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	ANALYSIS DATE	MOISTURE CONTENT,		DENSITY		POROSITY, (2)		
				% weight	cm^3/cm^3	DRY BULK, g/cm^3	GRAIN, g/cm^3	TOTAL, cm^3/cm^3	AIR-FILLED, cm^3/cm^3	WATER-FILLED, 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

PTS Laboratories, Inc.

The Source Group, Inc.
PTS File No: 47257

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Former Chemoil Refinery
PROJECT NO: 093-Chemoil-001 Task 6

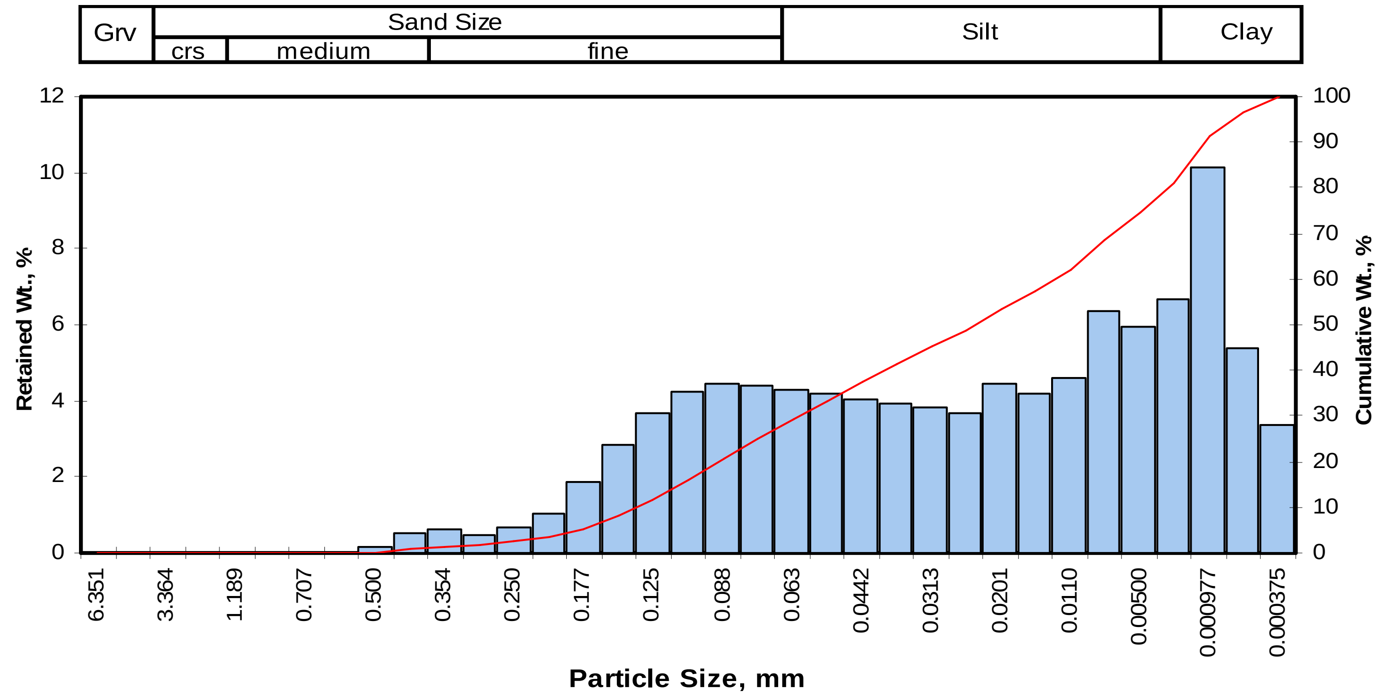
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size: Coarse	Sand Size: Medium	Sand Size: Fine	Silt	Clay	
AN-22-5	4.75-5.25	Silt	0.024	0.00	0.00	0.66	24.25	49.55	25.55	75.10

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	The Source Group, Inc.	**PTS File No:**	47257
Project:	Former Chemoil Refinery	**Sample ID:**	AN-22-5
Project No:	093-Chemoil-001 Task 6	**Depth, ft:**	4.75-5.25



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, 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**

Cumulative Weight Percent greater than			
Weight percent	**Phi Value**	**Particle Size Inches**	**Particle Size 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
Grain Size Description (ASTM-USCS Scale)	Silt (based on Mean from Trask)		

Description	Retained on Sieve #	Weight 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	**PTS** Laboratories
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

SRM ID/Lot No.	REC (%)	Control Limits	Certified Concentration mg/kg	QC Performance Acceptance Limits, mg/kg Lower	QC Performance Acceptance Limits, mg/kg Upper
SRM D093-542	106	75-125	5590	4193	6988

ND = Not Detected

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

COMPANY: The Source Group

ADDRESS / CITY / ZIP CODE: 3478 Buskirk Ave, Suite 100, Pleasant Hill, CA 94523

PROJECT MANAGER: Kirsten Duey

PROJECT NAME: Former Chemoil Refinery

PHONE NUMBER: 925-951-6376

FAX NUMBER:

PROJECT NUMBER: 093-Chemoil-001 Task 6

SITE LOCATION: 2020 Walnut Avenue, Signal Hill, CA

SAMPLER SIGNATURE:

PO#:

TURNAROUND TIME: 24 HOURS ☐ 48 HOURS ☐ 72 HOURS ☒ 5 DAYS ☐ NORMAL ☐

OTHER: ____

SAMPLE INTEGRITY (CHECK): INTACT ____ ON ICE 65°F

PTS QUOTE NO.:

PTS FILE: 47257

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	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: TOTAL, API RP40	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	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	Vapor Instrusion Package (Cal DTSC)				COMMENTS
AN-22-5	5/18/17	814	4.75-5.25	1																		X				Size: 2"x6"

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
COMPANY: TSGI	COMPANY: PTS LABS	COMPANY:	COMPANY:
DATE: 05-18-17 TIME: 1215	DATE: 05-18-17 TIME: 12:15	DATE: TIME:	DATE: TIME:

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.

PTS Laboratories

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**	**X**					2" x 6" Statinless Steel Sleeve
TP-27	**5.5**	**0.5**	**X**					2" x 6" Statinless Steel Sleeve
TP-29	**5**	**0.5**	**X**					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 File No: 48057
Client: APEX Companies, LLC
Report Date: 04/02/18

PTS Laboratories

PHYSICAL PROPERTIES DATA - CAL-EPA DTSC Vapor Intrusion Package

Project Name: Chemoil Refinery
Project No: 093-Chemoil-003

			METHODS:	API RP40/ASTM D2216		API RP 40		API RP 40		
		SAMPLE		MOISTURE CONTENT,		DENSITY		POROSITY, (2)		
SAMPLE ID.	DEPTH, ft.	ORIENTATION (1)	ANALYSIS DATE	% weight	cm^3/cm^3	DRY BULK, g/cm^3	GRAIN, g/cm^3	TOTAL, cm^3/cm^3	AIR-FILLED, cm^3/cm^3	WATER-FILLED, 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.
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS Laboratories, Inc.

PTS File No: 48057
APEX Companies, LLC

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

PROJECT NAME: Chemoil Refinery
PROJECT NO: 093-Chemoil-003

Report Date: April 2, 2018

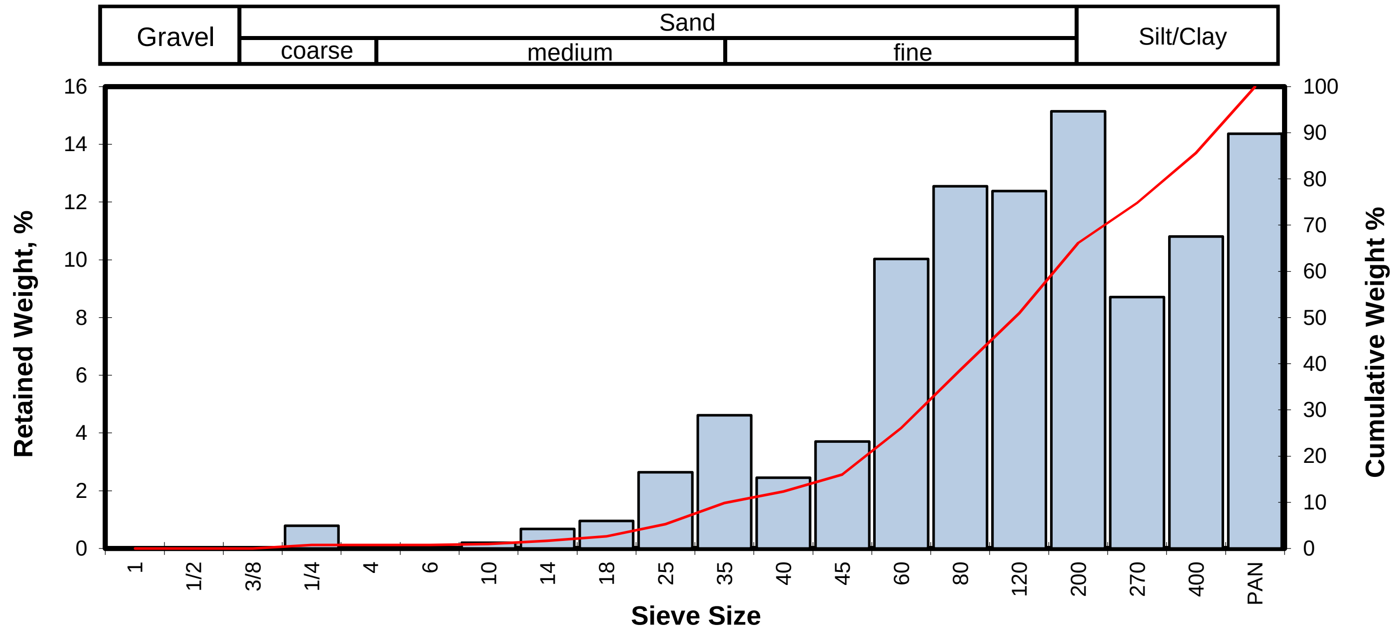
Sample ID	Depth, ft.	Mean Grain Size Description USCS/ASTM (1)	Median Grain Size, mm	Particle Size Distribution, wt. percent				
				Gravel	Sand Size			Silt/Clay
					Coarse	Medium	Fine	
TP-25	5.20	Fine sand	0.129	0.79	0.20	11.34	53.79	33.87
TP-27	5.65	Fine sand	0.135	0.21	0.47	14.59	52.15	32.57
TP-29	5.10	Fine sand	0.143	4.68	1.06	12.65	52.51	29.11

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Sieve Analysis Results - ASTM D422

Client:	APEX Companies, LLC	**PTS File No:**	48057
Project:	Chemoil Refinery	**Sample ID:**	TP-25
Project No:	093-Chemoil-003	**Depth, ft:**	5.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, 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
TOTALS				117.97	100.00	100.00

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size 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 Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)		

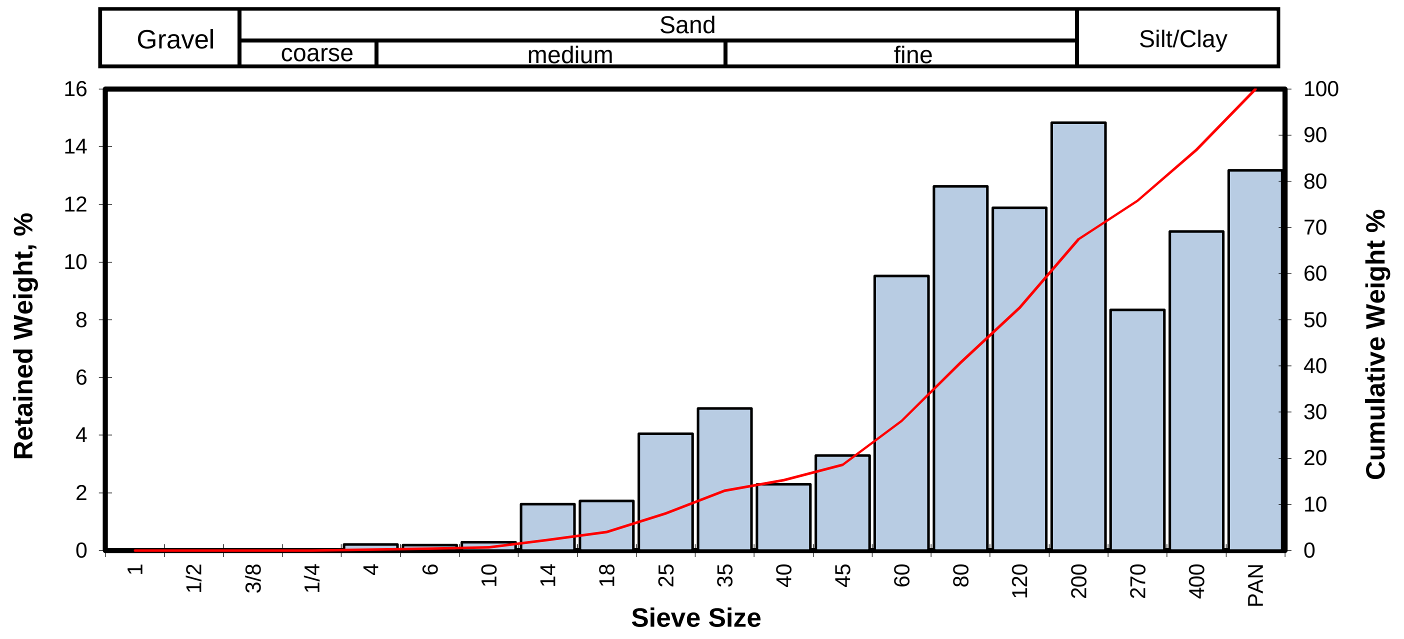
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.79
Coarse Sand	10	0.20
Medium Sand	40	11.34
Fine Sand	200	53.79
Silt/Clay	<200	33.87
	Total	100

Phone: (713) 316-1800

PTS Laboratories, Inc.

Sieve Analysis Results - ASTM D422

Client:	APEX Companies, LLC	**PTS File No:**	48057
Project:	Chemoil Refinery	**Sample ID:**	TP-27
Project No:	093-Chemoil-003	**Depth, ft:**	5.65



Opening		Phi of	U.S. Sieve	Sample Weight	Incremental Weight,	Cumulative 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
TOTALS				147.89	100.00	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 Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

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

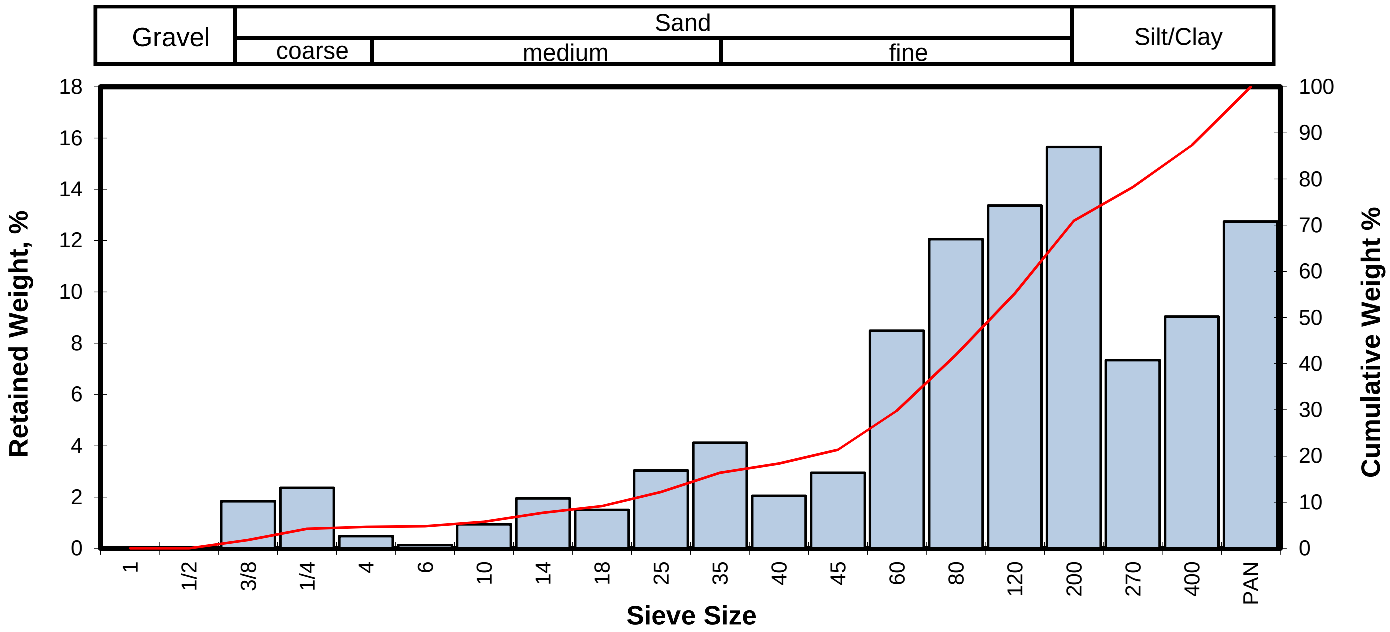
Phone: (713) 316-1800

PTS Laboratories, Inc.

Sieve Analysis Results - ASTM D422

Client: APEX Companies, LLC
Project: Chemoil Refinery
Project No: 093-Chemoil-003

PTS File No: 48057
Sample ID: TP-29
Depth, ft: 5.10



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, 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
TOTALS				117.95	100.00	100.00

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size 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	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 Description (ASTM-USCS Scale)		Fine sand (based on Mean from Trask)	

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

PTS Laboratories

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 mg/kg	QC Performance Acceptance Limits, mg/kg	
				Lower	Upper
SRM D096-542	109	75-125	3890	2918	4863

ND = Not Detected

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY: Apex Companies, LLC
ADDRESS: 3478 Buskirk Ave CITY: Pleasant Hill ZIP CODE: 94523
PROJECT MANAGER: Kirsten Pucy PHONE NUMBER: (925)944-2856
PROJECT NAME: ØChemoil Refinery
PROJECT NUMBER: 043-Chemoil-003. FAX NUMBER:
SITE LOCATION: 2020 Walnut Ave, Signal Hill 90755
SAMPLER SIGNATURE:

PO#:
TURNAROUND TIME: 24 HOURS ☐ 48 HOURS ☐ 72 HOURS ☐ 5 DAYS ☐ NORMAL ☑
OTHER:
SAMPLE INTEGRITY (CHECK): INTACT ____ ON ICE ✓ 34.9°F
PTS QUOTE NO.
PTS FILE: 48057

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	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: TOTAL, API RP40	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	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	Cal DTSC Vapor Intrusion Pckge			COMMENTS
TP-25	3/13/18	9:07	5.0ft																			✓			
TP-27	↓	11:39	5.5ft																			✓			
TP-29	↓	13:01	5.0ft																			✓			

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Kevin Nguyen			
COMPANY: Apex Companies	COMPANY: PTS Laboratories, Inc	COMPANY:	COMPANY:
DATE: 03/13/18 TIME: 15:43	DATE: 3/14/18 TIME: 9:43	DATE: TIME:	DATE: TIME:

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5730 Centralcrest St. • Houston, TX 77092
Telephone (713) 316-1800 • Fax (877) 225-9953

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.

PTS Laboratories

Project Name: **Former Chemoil Refinery**
Project Number: **093-Chemoil-003**

PTS File No: **48061**
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**	**X**						2" x 6" SS sleeves
TP-19	**5.0-5.5**	**0.5**	**X**						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 File No: 48061
Client: APEX Companies, LLC
Report Date: 04/06/18

PTS Laboratories

PHYSICAL PROPERTIES DATA - CAL-EPA DTSC Vapor Intrusion Package

Project Name: Former Chemoil Refinery
Project No: 093-Chemoil-003

			METHODS:	API RP40/ASTM D2216		API RP 40		API RP 40		
				MOISTURE CONTENT,		DENSITY		POROSITY, (2)		
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	ANALYSIS DATE	% weight	cm^3/cm^3	DRY BULK, g/cm^3	GRAIN, g/cm^3	TOTAL, cm^3/cm^3	AIR-FILLED, cm^3/cm^3	WATER-FILLED, 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.
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS Laboratories, Inc.

APEX Companies, LLC

PTS File No: 48061
Report Date: 4/6/18

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

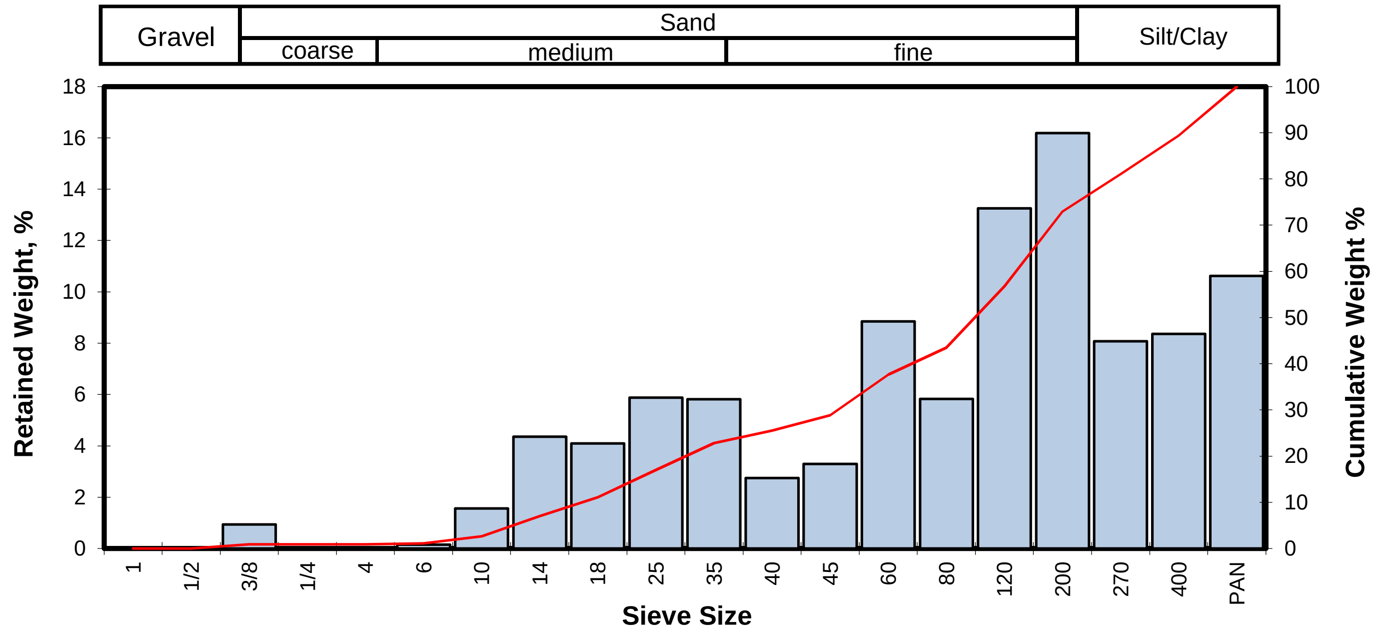
PROJECT NAME: Former Chemoil Refinery
PROJECT NO: 093-Chemoil-003

Sample ID	Depth, ft.	Mean Grain Size Description USCS/ASTM (1)	Median Grain Size, mm	Particle Size Distribution, wt. percent				
				Gravel	Sand Size			Silt/Clay
					Coarse	Medium	Fine	
TP-3	5.1-5.2	Fine sand	0.149	0.94	1.71	22.88	47.41	27.06

(1) Based on Mean from Trask

PTS Laboratories, Inc. **Sieve Analysis Results - ASTM D422**

Client:	APEX Companies, LLC	**PTS File No:**	48061
Project:	Former Chemoil Refinery	**Sample ID:**	TP-3
Project No:	093-Chemoil-003	**Depth, ft:**	5.1-5.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. Sieve No.	Sample Weight grams	Incremental Weight, percent	Cumulative Weight, 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
TOTALS				96.87	100.00	100.00

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size 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 Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)		

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

 Phone: (713) 316-1800

PTS Laboratories, Inc.

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

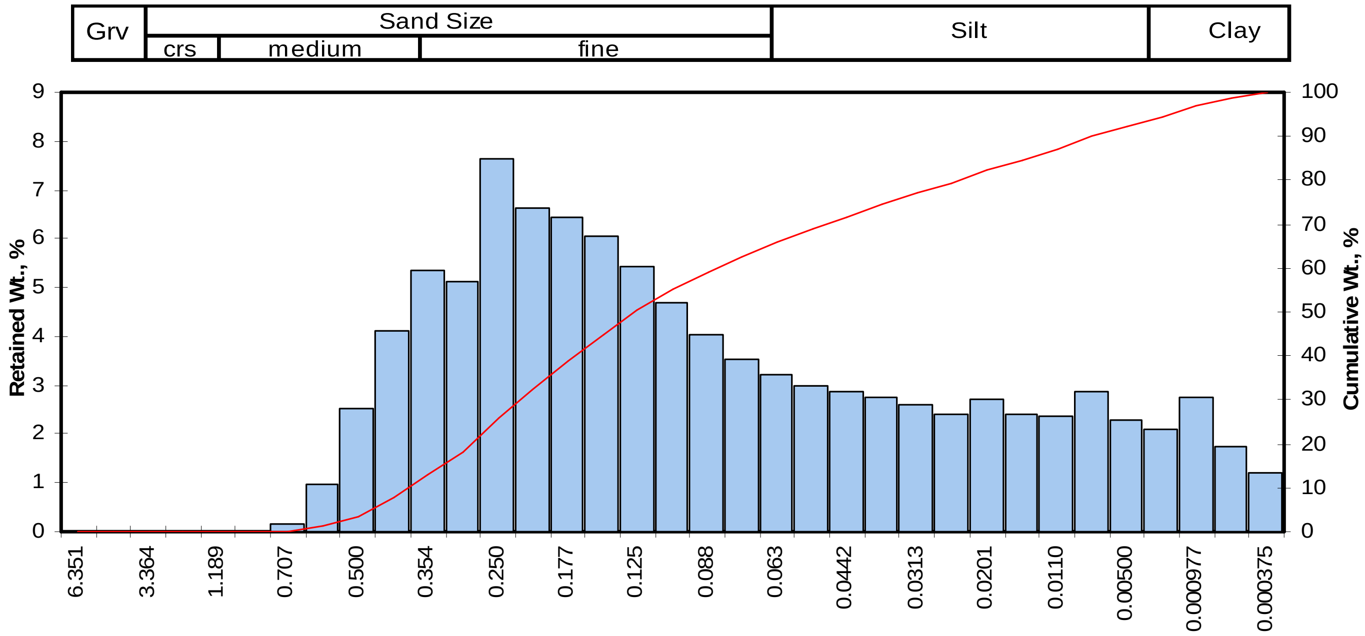
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
TP-19	5.1-5.2	Fine sand	0.127	0.00	0.00	7.71	54.96	29.50	7.83	37.33

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: APEX Companies, LLC
Project: Former Chemoil Refinery
Project No: 093-Chemoil-003
PTS File No: 48061
Sample ID: TP-19
Depth, ft: 5.1-5.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, 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

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size 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 Size Description (ASTM-USCS Scale)	Fine sand (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

Phone: (713) 316-1800

PTS Laboratories

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 mg/kg	QC Performance Acceptance Limits, mg/kg Lower	Upper
SRM D096-542	109	75-125	3890	2918	4863

ND = Not Detected

PTS Laboratories, Inc.

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

COMPANY: Apex Companies, LLC

ADDRESS / CITY / ZIP CODE: 3478 Buskirk Avenue Suite 100, Pleasant Hill

PROJECT MANAGER: Kirsten Duey

PROJECT NAME: Former Chemoil Refinery

PHONE NUMBER: (925) 444-2856

PROJECT NUMBER: 093-Chemoil-003

FAX NUMBER: (925) 944-2859

SITE LOCATION: 2020 Walnut Ave, Signal Hill CA 90755

SAMPLER SIGNATURE:

PO#:

TURNAROUND TIME

- 24 HOURS ☐
- 48 HOURS ☐
- 72 HOURS ☐
- 5 DAYS ☐
- NORMAL ☒
- OTHER:

SAMPLE INTEGRITY (CHECK): INTACT ____ ON ICE ✓ 37.8°F

PTS QUOTE NO.

PTS FILE: 48061

ANALYSIS REQUEST

SAMPLE ID NUMBER	DATE	TIME	DEPTH, FT	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: TOTAL, API RP40	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	GRAIN SIZE DISTRIBUTION, ASTM D422/4464M	TOC: WALKLEY-BLACK	ATTERBERG LIMITS, ASTM D4318	Cal DTSC Vapor Intrusion Pckg	COMMENTS
TP-3	3/14/18	8:30	5.0-5.5 ft																			X	
TP-19	3/15/18	13:35	5.0-5.5 ft																			X	

1. RELINQUISHED BY	2. RECEIVED BY	3. RELINQUISHED BY	4. RECEIVED BY
Kevin Nguyen			
COMPANY: Apex Companies	COMPANY: PTS Laboratories, Inc	COMPANY:	COMPANY:
DATE: 3/15/18 TIME: 16:24	DATE: 3/16/18 TIME: 9:30	DATE: TIME:	DATE: TIME:

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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

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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) (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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) (continued)					
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-trifluoroethane (R113)	<1.0	<0.20	<0.20	<0.040	0.010
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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
<u>TO-15 (Mid Level) (TO-15)</u> (continued)					
1,1-Dichloroethylene	<0.20	<2.5	<0.040	<0.50	0.010
trans-1,2-Dichloroethylene	<0.20	<2.5	<0.040	<0.50	0.010
1,2-Dichloropropane	<0.20	<2.5	<0.040	<0.50	0.010
trans-1,3-Dichloropropylene	<0.20	<2.5	<0.040	<0.50	0.010
cis-1,3-Dichloropropylene	<0.20	<2.5	<0.040	<0.50	0.010
Dichlorotetrafluoroethane	<0.20	<2.5	<0.040	<0.50	0.010
Diisopropyl ether (DIPE)	<0.20	<2.5	<0.040	<0.50	0.010
1,4-Dioxane	<0.20	<2.5	<0.040	<0.50	0.010
Ethanol	<0.20	<2.5	<0.040	<0.50	0.010
Ethyl Acetate	<0.20	<2.5	<0.040	<0.50	0.010
Ethylbenzene	<0.20	<2.5	<0.040	<0.50	0.010
Ethyl-tert-Butyl Ether (ETBE)	<0.20	<2.5	<0.040	<0.50	0.010
4-Ethyltoluene	<0.20	<2.5	<0.040	<0.50	0.010
Heptane	<0.20	<2.5	<0.040	<0.50	0.010
Hexachlorobutadiene	<0.20	<2.5	<0.040	<0.50	0.010
n-Hexane	<0.20	<2.5	<0.040	<0.50	0.010
2-Hexanone (MBK)	<0.20	<2.5	<0.040	<0.50	0.010
Isopropanol (IPA)	<0.20	<2.5	<0.040	<0.50	0.010
Methyl-tert-Butyl Ether (MTBE)	<0.20	<2.5	<0.040	<0.50	0.010
Methylene Chloride	<0.20	<2.5	<0.040	<0.50	0.010
4-Methyl-2-pentanone (MIBK)	<0.20	<2.5	<0.040	<0.50	0.010
Naphthalene	<0.20	<2.5	<0.040	<0.50	0.010
Propylene	<0.20	<2.5	<0.040	<0.50	0.010
Styrene	<0.20	<2.5	<0.040	<0.50	0.010
1,1,2,2-Tetrachloroethane	<0.20	<2.5	<0.040	<0.50	0.010
Tetrachloroethylene (PCE)	**0.26**	<2.5	<0.040	<0.50	0.010
Tetrahydrofuran (THF)	<0.20	<2.5	<0.040	<0.50	0.010

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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
<u>TO-15 (Mid Level) (TO-15)</u> (continued)					
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-trifluoroethane (R113)	<0.20	<2.5	<0.040	<0.50	0.010
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>					**<u>%REC Limits</u>**
4-Bromofluorobenzene	110%	113%	102%	86%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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) (continued)					
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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	VOCs by GCMS EPA TO-15 (Mid Level)	**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
<u>TO-15 (Mid Level) (TO-15)</u> (continued)					
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-trifluoroethane (R113)	<3.0	<3.0	<0.010	<0.010	0.010
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>					**<u>%REC Limits</u>**
4-Bromofluorobenzene	110%	118%	102%	108%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Fixed Gases by TCD	**Units:**	% by Volume

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	04/17/18	
Date Analyzed:	04/17/18	04/17/18	04/17/18	04/17/18	
AA ID No:	8D12006-01	8D12006-02	8D12006-05	8D12006-08	
Client ID No:	TP-18	TP-17	VP-4-5	TP-19	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL
Fixed Gases (EPA 3CM)					
Methane	**0.58**	**0.78**	**6.0**	**2.1**	0.10
Oxygen	**15**	**16**	**2.4**	**2.5**	0.10
Carbon Dioxide	**0.71**	**3.9**	**12**	**9.9**	0.10
Carbon Monoxide	<0.20	<0.20	<0.20	<0.20	0.10

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date 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**	0.10
Oxygen	**2.0**	0.10
Carbon Dioxide	**11**	0.10
Carbon Monoxide	<0.20	0.10

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Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Helium by GC/TCD	**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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Helium by GC/TCD	**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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Helium by GC/TCD	**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	04/13/18	
Date Analyzed:	04/13/18	04/16/18	04/13/18	04/13/18	
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:	2	2	10	10	MRL
<u>Helium ASTM D1946M (ASTM D1946M)</u>					
Helium	<0.20	**0.50**	**2.6**	**2.9**	0.10

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1904 - *** DEFAULT PREP ****										
Blank (B8D1904-BLK1)				Prepared & Analyzed: 04/16/18						
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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8D1904 - *** DEFAULT PREP ****

Blank (B8D1904-BLK1) Continued Prepared & Analyzed: 04/16/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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-trifluoroethane (R113)	<0.010	0.010	ug/L							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1904 - *** DEFAULT PREP ****										
Blank (B8D1904-BLK1) Continued				Prepared & Analyzed: 04/16/18						
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)				Prepared & Analyzed: 04/16/18						
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			

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1904 - *** DEFAULT PREP ****										
LCS (B8D1904-BS1) Continued				Prepared & Analyzed: 04/16/18						
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 (R113)	**0.333**	0.010	ug/L	0.31		109	70-130			
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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: NA
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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 Level) - Quality Control										
*Batch B8D1904 - *** DEFAULT PREP ****										
LCS (B8D1904-BS1) Continued				Prepared & Analyzed: 04/16/18						
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)				Prepared: 04/16/18 Analyzed: 04/17/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH)
Project No: NA
Project Name: Chemoil - SV Sampling

AA Project No: MB596142
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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 Level) - Quality Control										
*Batch B8D1904 - *** DEFAULT PREP ****										
LCS Dup (B8D1904-BSD1) Continued				Prepared: 04/16/18 Analyzed: 04/17/18						
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)	**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	

Viorel Vasile
Operations Manager

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D1904 - *** DEFAULT PREP ****										
LCS Dup (B8D1904-BSD1) Continued				Prepared: 04/16/18 Analyzed: 04/17/18						
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	*0.142*		*ug/L*	*0.14*		*99.1*	*70-130*			
*Batch B8D1906 - *** DEFAULT PREP ****										
Blank (B8D1906-BLK1)				Prepared & Analyzed: 04/17/18						
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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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Project No: NA
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VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8D1906 - *** DEFAULT PREP ****

Blank (B8D1906-BLK1) Continued Prepared & Analyzed: 04/17/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D1906 - *** DEFAULT PREP ****										
Blank (B8D1906-BLK1) Continued				Prepared & Analyzed: 04/17/18						
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-trifluoroethane (R113)	<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-Bromofluorobenzene	*0.125*		*ug/L*	*0.14*		*87.3*	*70-130*			
LCS (B8D1906-BS1)				Prepared & Analyzed: 04/17/18						
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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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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 Level) - Quality Control										
*Batch B8D1906 - *** DEFAULT PREP ****										
LCS (B8D1906-BS1) Continued				Prepared & Analyzed: 04/17/18						
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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**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 Level) - Quality Control										
*Batch B8D1906 - *** DEFAULT PREP ****										
LCS (B8D1906-BS1) Continued				Prepared & Analyzed: 04/17/18						
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 (R113)	**0.285**	0.010	ug/L	0.31		92.9	70-130			
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)				Prepared: 04/17/18 Analyzed: 04/18/18						
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	

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1906 - *** DEFAULT PREP ****										
LCS Dup (B8D1906-BSD1) Continued				Prepared: 04/17/18 Analyzed: 04/18/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1906 - *** DEFAULT PREP ****										
LCS Dup (B8D1906-BSD1) Continued				Prepared: 04/17/18 Analyzed: 04/18/18						
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	*0.140*		*ug/L*	*0.14*		*97.7*	*70-130*			
*Batch B8D1912 - *** DEFAULT PREP ****										
Blank (B8D1912-BLK1)				Prepared & Analyzed: 04/18/18						
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							

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
Blank (B8D1912-BLK1) Continued				Prepared & Analyzed: 04/18/18						
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							
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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
Blank (B8D1912-BLK1) Continued				Prepared & Analyzed: 04/18/18						
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-trifluoroethane (R113)	<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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
Blank (B8D1912-BLK1) Continued				Prepared & Analyzed: 04/18/18						
n-Butylbenzene	<0.010	0.010	ug/L							
Surrogate: 4-Bromofluorobenzene	*0.131*		*ug/L*	*0.14*		*91.4*	*70-130*			
LCS (B8D1912-BS1)				Prepared: 04/18/18 Analyzed: 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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
LCS (B8D1912-BS1) Continued				Prepared: 04/18/18 Analyzed: 04/19/18						
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)				Prepared: 04/18/18 Analyzed: 04/19/18						

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
LCS Dup (B8D1912-BSD1) Continued				Prepared: 04/18/18 Analyzed: 04/19/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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 Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
LCS Dup (B8D1912-BSD1) Continued				Prepared: 04/18/18 Analyzed: 04/19/18						
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	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**	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						

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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
Fixed Gases by TCD - Quality Control										
*Batch B8D1726 - *** DEFAULT PREP ****										
Blank (B8D1726-BLK1) Continued				Prepared & Analyzed: 04/17/18						
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)				Prepared & Analyzed: 04/17/18						
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)				Prepared & Analyzed: 04/17/18						
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: 8D13013-02**		Prepared & Analyzed: 04/17/18						
Methane	**3.50**	0.20	% by Volume		3.57			2.21	30	
Oxygen	**5.08**	0.20	% by Volume		4.78			6.08	30	

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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
Fixed Gases by TCD - Quality Control										
*Batch B8D1726 - *** DEFAULT PREP ****										
Duplicate (B8D1726-DUP1) Continued	**Source: 8D13013-02**			Prepared & Analyzed: 04/17/18						
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 Control										
*Batch B8D1303 - *** DEFAULT PREP ****										
Blank (B8D1303-BLK1)				Prepared & Analyzed: 04/13/18						
Helium	<0.10	0.10	% by Volume							
LCS (B8D1303-BS1)				Prepared & Analyzed: 04/13/18						
Helium	**0.370**	0.10	% by Volume	0.50		74.0	70-130			
LCS Dup (B8D1303-BSD1)				Prepared & Analyzed: 04/13/18						
Helium	**0.367**	0.10	% by Volume	0.50		73.4	70-130	0.760	30	
Duplicate (B8D1303-DUP1)	**Source: 8D12006-03**			Prepared & Analyzed: 04/13/18						
Helium	**1.41**	0.20	% by Volume		1.50			6.09	30	
*Batch B8D1626 - *** DEFAULT PREP ****										
Blank (B8D1626-BLK1)				Prepared & Analyzed: 04/16/18						
Helium	<0.10	0.10	% by Volume							
LCS (B8D1626-BS1)				Prepared & Analyzed: 04/16/18						
Helium	**0.381**	0.10	% by Volume	0.50		76.3	70-130			
LCS Dup (B8D1626-BSD1)				Prepared & Analyzed: 04/16/18						
Helium	**0.400**	0.10	% by Volume	0.50		80.0	70-130	4.81	30	
Duplicate (B8D1626-DUP1)	**Source: 8D12006-02**			Prepared & Analyzed: 04/16/18						

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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
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 Volume		3.18			1.62	30	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596142
Project No:	NA	**Date Received:**	04/12/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18

Special Notes

[1] = **** : Exceeds upper control limit.

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15168
70050044
Page 1 of 1

Client: APEX	Project Name / No.: Chemoil	Sampler's Name: Juan Rodriguez	
Project Manager: Kirsten Duey	Site Address: 2021 Walnut Ave	Sampler's Signature:	
Phone:	City: Signal hill	P.O. No.:	
Fax:	State & Zip: 90755	Quote No.:	

TAT Turnaround Codes **

- ① = Same Day Rush
- ② = 24 Hour Rush
- ③ = 48 Hour Rush
- ④ = 72 Hour Rush
- ⑤ = 5 Day Rush
- X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	Helium (*)	~~Fixed gases~~ TO15	~~METHANE~~ Fixed Gases (*)	Special Instructions
TP-18	8D12006-01	4/12/18	815	Summa	1	X	X	X	(*): as per K. Duey on 4/13/18
TP-17	-02		922		1	X	X	X	
TP-16	-03		1013		1	X	X		
TP-15	-04		1043		1	X	X		
VP-4-5	-05		1132		1	X	X	X	
VP3-5	-06		1224		1	X	X	X	HOLD, as per K. Nguyen on 4/13/18
TP-20	-07		1318		1	X	X		
TP-19	-08		1420		1	X	X	X	
TP-11	-09		1507		1	X	X		
TP-12	-10		1544		1	X	X	X	
TP-13	-11		1628		1	X	X		
TP-14	-12		1704		1	X	X		
TP-14Dup	-13		1704		1	X	X		

For Laboratory Use

REVIEWED
Date 4/13/18 Time 0700
TAT N Days. Sign:

A.A. Project No.: MBS96142/8D12006

Relinquished by	Date	Time	Received by
	4/12/18	1721	
	4/12/18	1930	

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

LABORATORY ANALYSIS RESULTS

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
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client: The Source Group, Inc. (PH) **AA Project No:** MB596143
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

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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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) (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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) (continued)					
Toluene	<0.010	**13000 [4]**	**5100**	<0.50	0.010
1,2,4-Trichlorobenzene	<0.010	<300	<220	<0.50	0.010
1,1,2-Trichloroethane	<0.010	<300	<220	<0.50	0.010
1,1,1-Trichloroethane	<0.010	<300	<220	<0.50	0.010
Trichloroethylene (TCE)	<0.010	<300	<220	<0.50	0.010
Trichlorofluoromethane (R11)	<0.010	<300	<220	<0.50	0.010
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	<0.010	<300	<220	<0.50	0.010
1,3,5-Trimethylbenzene	<0.010	**370**	**310**	<0.50	0.010
1,2,4-Trimethylbenzene	<0.010	**580**	**530**	<0.50	0.010
2,2,4-Trimethylpentane	<0.010	**15000 [4]**	<220	<0.50	0.010
Vinyl acetate	<0.010	<300	<220	<0.50	0.010
Vinyl bromide	<0.010	<300	<220	<0.50	0.010
Vinyl chloride	<0.010	<300	<220	<0.50	0.010
o-Xylene	<0.010	**3200**	**2600**	<0.50	0.010
m,p-Xylenes	<0.010	**11000**	**8300**	<0.50	0.010
1,2,3-Trichloropropane	<0.010	<300	<220	<0.50	0.010
sec-Butylbenzene	<0.010	<300	<220	<0.50	0.010
Isopropylbenzene	<0.010	<300	<220	<0.50	0.010
n-Propylbenzene	<0.010	**300**	**240**	<0.50	0.010
4-Isopropyltoluene	<0.010	<300	<220	<0.50	0.010
n-Butylbenzene	<0.010	<300	<220	<0.50	0.010
Surrogates					**%REC Limits**
4-Bromofluorobenzene	96%	101%	94%	94%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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) (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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) (continued)					
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-trifluoroethane (R113)	<0.50	<0.50	<0.010	<0.010	0.010
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

Surrogates					**%REC Limits**
4-Bromofluorobenzene	99%	99%	93%	86%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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)

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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) (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
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

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) (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	<0.010	<0.50 [3]	<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-trifluoroethane (R113)	<0.010	<0.010	<0.50 [3]	<0.010	0.010
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	<0.010	<0.010	<0.50 [3]	<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	<0.010	<0.010	<0.50 [3]	<0.010	0.010
n-Butylbenzene	<0.010	<0.010	<0.50 [3]	<0.010	0.010
Surrogates					**%REC Limits**
4-Bromofluorobenzene	90%	93%	94% [3]	96%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
Project No:	NA	**Date Received:**	04/13/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Fixed Gases by TCD	**Units:**	% by Volume

Date Sampled:	04/13/18	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/17/18	04/17/18	04/17/18	04/17/18	
Date Analyzed:	04/17/18	04/17/18	04/17/18	04/17/18	
AA ID No:	8D13013-02	8D13013-03	8D13013-05	8D13013-07	
Client ID No:	TP-9	TP-8	TP-6	TP-2	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL
Fixed Gases (EPA 3CM)					
Methane	**3.6**	**3.2**	**1.2**	<0.20	0.10
Oxygen	**4.8**	**1.9**	**3.0**	**5.5**	0.10
Carbon Dioxide	**9.1**	**7.3**	**9.9**	**10**	0.10
Carbon Monoxide	<0.20	<0.20	<0.20	<0.20	0.10

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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

Date Sampled:	04/13/18	04/13/18	04/13/18	
Date Prepared:	04/17/18	04/17/18	04/17/18	
Date Analyzed:	04/17/18	04/17/18	04/17/18	
AA ID No:	8D13013-09	8D13013-10	8D13013-12	
Client ID No:	TP-3	TP-3 DUP	AN-8	
Matrix:	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	MRL
Fixed Gases (EPA 3CM)				
Methane	<0.20	<0.20	<0.20	0.10
Oxygen	**4.7**	**4.1**	**15**	0.10
Carbon Dioxide	**11**	**10**	**2.6**	0.10
Carbon Monoxide	<0.20	<0.20	<0.20	0.10

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
Project No:	NA	**Date Received:**	04/13/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Helium by GC/TCD	**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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
Project No:	NA	**Date Received:**	04/13/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Helium by GC/TCD	**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:	8D13013-05	8D13013-06	8D13013-07	8D13013-08	
Client ID No:	TP-6	TP-4	TP-2	TP-1	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	10	2	2	MRL
Helium ASTM D1946M (ASTM D1946M)					
Helium	<0.20	**7.8**	<0.20	<0.20	0.10

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
Project No:	NA	**Date Received:**	04/13/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18
Method:	Helium by GC/TCD	**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	
Client ID No:	TP-3	TP-3 DUP	TP-5	AN-8	
Matrix:	Vapor	Vapor	Vapor	Vapor	
Dilution Factor:	2	2	2	2	MRL
Helium ASTM D1946M (ASTM D1946M)					
Helium	<0.20	<0.20	<0.20	**0.69**	0.10

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
Blank (B8D1912-BLK1)				Prepared & Analyzed: 04/18/18						
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							
trans-1,3-Dichloropropylene	<0.010	0.010	ug/L							

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
Blank (B8D1912-BLK1) Continued				Prepared & Analyzed: 04/18/18						
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	<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-trifluoroethane (R113)	<0.010	0.010	ug/L							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
Blank (B8D1912-BLK1) Continued				Prepared & Analyzed: 04/18/18						
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	*0.131*		*ug/L*	*0.14*		*91.4*	*70-130*			
LCS (B8D1912-BS1)				Prepared: 04/18/18 Analyzed: 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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
Project No:	NA	**Date Received:**	04/13/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/20/18

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8D1912 - *** DEFAULT PREP ****

LCS (B8D1912-BS1) Continued Prepared: 04/18/18 Analyzed: 04/19/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
LCS (B8D1912-BS1) Continued				Prepared: 04/18/18 Analyzed: 04/19/18						
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)				Prepared: 04/18/18 Analyzed: 04/19/18						
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	

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
Project No:	NA	**Date Received:**	04/13/18
Project Name:	Chemoil - SV Sampling	**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 Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
LCS Dup (B8D1912-BSD1) Continued				Prepared: 04/18/18 Analyzed: 04/19/18						
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 (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	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**	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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D1912 - *** DEFAULT PREP ****										
LCS Dup (B8D1912-BSD1) Continued				Prepared: 04/18/18 Analyzed: 04/19/18						
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-Bromofluorobenzene	*0.141*		*ug/L*	*0.14*		*98.5*	*70-130*			
*Batch B8D2010 - *** DEFAULT PREP ****										
Blank (B8D2010-BLK1)				Prepared & Analyzed: 04/19/18						
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							
1,4-Dichlorobenzene	<0.010	0.010	ug/L							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8D2010 - *** DEFAULT PREP ****

Blank (B8D2010-BLK1) Continued Prepared & Analyzed: 04/19/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2010 - *** DEFAULT PREP ****										
Blank (B8D2010-BLK1) Continued				Prepared & Analyzed: 04/19/18						
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-trifluoroethane (R113)	<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-Bromofluorobenzene	*0.131*		*ug/L*	*0.14*		*91.2*	*70-130*			
LCS (B8D2010-BS1)				Prepared & Analyzed: 04/19/18						
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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8D2010 - *** DEFAULT PREP ****

LCS (B8D2010-BS1) Continued Prepared & Analyzed: 04/19/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2010 - *** DEFAULT PREP ****										
LCS (B8D2010-BS1) Continued				Prepared & Analyzed: 04/19/18						
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 (R113)	**0.288**	0.010	ug/L	0.31		94.0	70-130			
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)				Prepared: 04/19/18 Analyzed: 04/20/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8D2010 - *** DEFAULT PREP ****

LCS Dup (B8D2010-BSD1) Continued Prepared: 04/19/18 Analyzed: 04/20/18

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2010 - *** DEFAULT PREP ****										
LCS Dup (B8D2010-BSD1) Continued				Prepared: 04/19/18 Analyzed: 04/20/18						
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 Control										
*Batch B8D1726 - *** DEFAULT PREP ****										
Blank (B8D1726-BLK1)				Prepared & Analyzed: 04/17/18						
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)				Prepared & Analyzed: 04/17/18						
Methane	**4.19**	0.20	% by Volume	4.5		93.2	75-125			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Fixed Gases by TCD - Quality Control										
*Batch B8D1726 - *** DEFAULT PREP ****										
LCS (B8D1726-BS1) Continued				Prepared & Analyzed: 04/17/18						
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)				Prepared & Analyzed: 04/17/18						
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: 8D13013-02**		Prepared & Analyzed: 04/17/18						
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 Control										
*Batch B8D1626 - *** DEFAULT PREP ****										
Blank (B8D1626-BLK1)				Prepared & Analyzed: 04/16/18						
Helium	<0.10	0.10	% by Volume							
LCS (B8D1626-BS1)				Prepared & Analyzed: 04/16/18						

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Helium by GC/TCD - Quality Control										
*Batch B8D1626 - *** DEFAULT PREP ****										
LCS (B8D1626-BS1) Continued				Prepared & Analyzed: 04/16/18						
Helium	**0.381**	0.10	% by Volume	0.50		76.3	70-130			
LCS Dup (B8D1626-BSD1)				Prepared & Analyzed: 04/16/18						
Helium	**0.400**	0.10	% by Volume	0.50		80.0	70-130	4.81	30	
Duplicate (B8D1626-DUP1)		**Source: 8D12006-02**		Prepared & Analyzed: 04/16/18						
Helium	**3.13**	0.20	% by Volume		3.18			1.62	30	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596143
Project No:	NA	**Date Received:**	04/13/18
Project Name:	Chemoil - SV Sampling	**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).

Viorel Vasile
Operations Manager

American Analytics Ÿ 9765 Eton Avenue, Chatsworth, California 91311
Tel: (818) 998-5547 Ÿ Fax: (818) 998-7258

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15180
70048466
Page 1 of 1

Client: APEX	Project Name / No.: chemoil	Sampler's Name: Juan Rodriguez
Project Manager: Kirsten Duey	Site Address: 2020 Walnut AVE	Sampler's Signature:
Phone:	City: Signal hill	P.O. No.:
Fax:	State & Zip: 90755	Quote No.:

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name) — Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	Helium	TO15	Fixed gases								Special Instructions
TP-10	8D13013-01	4/3/18	803	Vapor Sumo	1	X	X									
TP-9	-02		846		1	X	X	X								
TP-8	-03		934		1	X	X	X								
TP-7	-04		1022		1	X	X									
TP-6	-05		1106		1	X	X	X								
TP-4	-06		1244		1	X	X									
TP-2	-07		1322		1	X	X	X								
TP-1	-08		1407		1	X	X									
TP-3	-09		1454		1	X	X	X								
TP-3 Dup	-10		1454		1	X	X	X								
TP-5	-11		1536		1	X	X									
AN-8	-12		1612		1	X	X	X								

For Laboratory Use
REVIEWED
Date 4/16/18 Time 0800
TAT N Days Sign:

A.A. Project No.: M8S96143/8D13013

Relinquished by	Date	Time	Received by
Relinquished by	4/13/18	1630	Received by
Relinquished by	4/13/18	1845	Received by
Relinquished by	Date	Time	Received by

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

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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) (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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
<u>TO-15 (Mid Level) (TO-15)</u> (continued)					
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-trifluoroethane (R113)	<0.010	<0.010	<0.010	<0.010	0.010
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>					**<u>%REC Limits</u>**
4-Bromofluorobenzene	103%	96%	100%	93%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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:	8D24011-05	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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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:	8D24011-05	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) (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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:	8D24011-05	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) (continued)					
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-trifluoroethane (R113)	<0.010	<0.010	<0.010	<0.010	0.010
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
Surrogates					**%REC Limits**
4-Bromofluorobenzene	103%	100%	101%	99%	70-130

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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	
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	MRL

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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	
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	MRL

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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
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	
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	MRL
TO-15 (Mid Level) (TO-15) (continued)			
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-trifluoroethane (R113)	<60	<0.010	0.010
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

Surrogates			**%REC Limits**
4-Bromofluorobenzene	91%	94%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
Project No:	NA	**Date Received:**	04/24/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/30/18
Method:	Helium by GC/TCD	**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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
Project No:	NA	**Date Received:**	04/24/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/30/18
Method:	Helium by GC/TCD	**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:	8D24011-05	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:	2	2	2	2	MRL
Helium ASTM D1946M (ASTM D1946M)					
Helium	<0.20	<0.20	<0.20	<0.20	0.10

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
Project No:	NA	**Date Received:**	04/24/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/30/18
Method:	Helium by GC/TCD	**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	
Client ID No:	TP-26	TP-25	
Matrix:	Vapor	Vapor	
Dilution Factor:	2	2	MRL
<u>Helium ASTM D1946M (ASTM D1946M)</u>			
Helium	<0.20	<0.20	0.10

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	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)				Prepared & Analyzed: 04/25/18						
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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	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				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-trifluoroethane (R113)	<0.010	0.010	ug/L							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	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				Prepared & Analyzed: 04/25/18						
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)				Prepared & Analyzed: 04/25/18						
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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2608 - *** DEFAULT PREP ****										
LCS (B8D2608-BS1) Continued				Prepared & Analyzed: 04/25/18						
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-trifluoroethane (R113)	**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			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2608 - *** DEFAULT PREP ****										
LCS (B8D2608-BS1) Continued				Prepared & Analyzed: 04/25/18						
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)				Prepared: 04/25/18 Analyzed: 04/26/18						
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	

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2608 - *** DEFAULT PREP ****										
LCS Dup (B8D2608-BSD1) Continued				Prepared: 04/25/18 Analyzed: 04/26/18						
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 (R113)	**0.318**	0.010	ug/L	0.31		104	70-130	7.50	30	
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8D2608 - *** DEFAULT PREP ****

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS Dup (B8D2608-BSD1) Continued				Prepared: 04/25/18 Analyzed: 04/26/18						
1,2,3-Trichloropropane	**0.235**	0.010	ug/L	0.24		97.4	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)		**Source: 8D24011-01**		Prepared: 04/25/18 Analyzed: 04/26/18						
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2608 - *** DEFAULT PREP ****										
Duplicate (B8D2608-DUP1) Continued **Source: 8D24011-01** Prepared: 04/25/18 Analyzed: 04/26/18										
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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D2608 - *** DEFAULT PREP ****										
Duplicate (B8D2608-DUP1) Continued	**Source: 8D24011-01**			Prepared: 04/25/18 Analyzed: 04/26/18						
1,2,4-Trichlorobenzene	**<0.010**	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-trifluoroethane (R113)	**<0.010**	0.010	ug/L		<0.010				30	
1,3,5-Trimethylbenzene	**<0.010**	0.010	ug/L		<0.010				30	
1,2,4-Trimethylbenzene	**<0.010**	0.010	ug/L		<0.010				30	
2,2,4-Trimethylpentane	**<0.010**	0.010	ug/L		<0.010				30	
Vinyl acetate	**<0.010**	0.010	ug/L		<0.010				30	
Vinyl bromide	**<0.010**	0.010	ug/L		<0.010				30	
Vinyl chloride	**<0.010**	0.010	ug/L		<0.010				30	
o-Xylene	**<0.010**	0.010	ug/L		<0.010				30	
m,p-Xylenes	**<0.010**	0.010	ug/L		<0.010				30	
1,2,3-Trichloropropane	**<0.010**	0.010	ug/L		<0.010				30	
sec-Butylbenzene	**<0.010**	0.010	ug/L		<0.010				30	
Isopropylbenzene	**<0.010**	0.010	ug/L		<0.010				30	
n-Propylbenzene	**<0.010**	0.010	ug/L		<0.010				30	
4-Isopropyltoluene	**<0.010**	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										
*Batch B8D2422 - *** DEFAULT PREP ****										
Blank (B8D2422-BLK1)				Prepared: 04/24/18 Analyzed: 04/25/18						
Helium	<0.10	0.10	% by Volume							
LCS (B8D2422-BS1)				Prepared: 04/24/18 Analyzed: 04/25/18						
Helium	**0.418**	0.10	% by Volume	0.50		83.7	70-130			

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

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	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Helium by GC/TCD - Quality Control										
*Batch B8D2422 - *** DEFAULT PREP ****										
LCS Dup (B8D2422-BSD1)				Prepared: 04/24/18	Analyzed: 04/25/18					
Helium	**0.421**	0.10	% by Volume	0.50		84.2	70-130	0.643	30	
Duplicate (B8D2422-DUP1)			**Source: 8D24011-10**	Prepared: 04/24/18	Analyzed: 04/25/18					
Helium	**<0.20**	0.20	% by Volume		<0.20				30	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596147
Project No:	NA	**Date Received:**	04/24/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	04/30/18

Special Notes

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311

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

A.A. COC No.: 15261

70051329

Page 1 of 1

Client: APEX	Project Name / No.: Chemoil		Sampler's Name: Juan Rodriguez
Project Manager: Kristen Duey	Site Address: 2020 Walnut AVE		Sampler's Signature:
Phone: 925-683-8177	City: Signal hill		P.O. No.:
Fax:	State & Zip: CA 90755		Quote No.:

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	TO15	~~Fixed gases~~	Helium							Special Instructions
TP-30	8D24011-01	4/24/18	831	VAPOR	1	X	X	X							
TP-31	-02		910		1	X	X	X							
TP-29	-03		1000		1	X	X	X							
TP-35	-04		1043		1	X	X	X							
TP-35 Dup	-05		1043		1	X	X	X							
TP-28	-06		1126		1	X	X	X							
TP-34	-07		1211		1	X	X	X							
TP-27	-08		1253		1	X	X	X							
TP-26	-09		1346		1	X	X	X							
TP-25	-10		1430		1	X	X	X							

V.N. per K.N. on 4/24/18

For Laboratory Use

Normal PRIORITY ~~Rush~~ ~~48~~ Hrs V.N. SH

per C.F. 5-day on 4/25/18

Date 4/25/18 Time 0700 Sign

A.A. Project No.: MB 596147 / 8D24011

Relinquished by	Date	Time	Received by
	4/24/18	1445	
	4-24-18	17:00	

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

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

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

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

Viorel Vasile
Operations Manager

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

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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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	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
<u>TO-15 (Mid Level) (TO-15)</u>					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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	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) (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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	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) (continued)					
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-trifluoroethane (R113)	<0.010	<0.010	<0.010	<0.010	0.010
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
Surrogates					**%REC Limits**
4-Bromofluorobenzene	122%	119%	120%	126%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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	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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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	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
<u>TO-15 (Mid Level) (TO-15)</u> (continued)					
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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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	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) (continued)					
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-trifluoroethane (R113)	<0.010	<0.010	<30	<30	0.010
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
Surrogates					**%REC Limits**
4-Bromofluorobenzene	120%	128%	99%	96%	70-130

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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:	04/30/18	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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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:	04/30/18	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) (continued)					
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

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**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:	04/30/18	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
<u>TO-15 (Mid Level) (TO-15)</u> (continued)					
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-trifluoroethane (R113)	<0.75	<15	<15	<0.010	0.010
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>					**<u>%REC Limits</u>**
4-Bromofluorobenzene	113%	100%	111%	121%	70-130

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18
Method:	Helium by GC/TCD	**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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18
Method:	Helium by GC/TCD	**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:	8D25030-05	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

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18
Method:	Helium by GC/TCD	**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

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D3026 - *** DEFAULT PREP ****										
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							

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D3026 - *** DEFAULT PREP ****										
Blank (B8D3026-BLK1) Continued				Prepared & Analyzed: 04/27/18						
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-trifluoroethane (R113)	<0.010	0.010	ug/L							
1,3,5-Trimethylbenzene	<0.010	0.010	ug/L							

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D3026 - *** DEFAULT PREP ****										
Blank (B8D3026-BLK1) Continued				Prepared & Analyzed: 04/27/18						
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)				Prepared & Analyzed: 04/27/18						
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	

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D3026 - *** DEFAULT PREP ****										
LCS (B8D3026-BS1) Continued				Prepared & Analyzed: 04/27/18						
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)	**0.294**	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	

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D3026 - *** DEFAULT PREP ****										
LCS (B8D3026-BS1) Continued				Prepared & Analyzed: 04/27/18						
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)				Prepared: 04/27/18 Analyzed: 04/28/18						
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	

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D3026 - *** DEFAULT PREP ****										
LCS Dup (B8D3026-BSD1) Continued				Prepared: 04/27/18 Analyzed: 04/28/18						
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**	0.010	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**	0.010	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**	0.010	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 (R113)	**0.287**	0.010	ug/L	0.31		93.6	70-130	2.32	30	
1,3,5-Trimethylbenzene	**0.218**	0.010	ug/L	0.20		111	70-130	0.338	30	
1,2,4-Trimethylbenzene	**0.218**	0.010	ug/L	0.20		111	70-130	1.57	30	
Vinyl acetate	**0.135**	0.010	ug/L	0.14		96.0	70-130	1.31	30	
Vinyl chloride	**0.0940**	0.010	ug/L	0.10		91.9	70-130	3.24	30	
o-Xylene	**0.182**	0.010	ug/L	0.17		105	70-130	0.455	30	
m,p-Xylenes	**0.380**	0.010	ug/L	0.35		109	70-130	0.0685	30	

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8D3026 - *** DEFAULT PREP ****										
LCS Dup (B8D3026-BSD1) Continued				Prepared: 04/27/18 Analyzed: 04/28/18						
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 ****										
Blank (B8E0117-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							

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8E0117 - *** DEFAULT PREP ****										
Blank (B8E0117-BLK1) Continued				Prepared & Analyzed: 04/27/18						
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							
Tetrahydrofuran (THF)	<0.010	0.010	ug/L							

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8E0117 - *** DEFAULT PREP ****										
Blank (B8E0117-BLK1) Continued				Prepared & Analyzed: 04/27/18						
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-trifluoroethane (R113)	<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-Bromofluorobenzene	*0.130*		*ug/L*	*0.14*		*90.8*	*70-130*			
LCS (B8E0117-BS1)				Prepared: 04/27/18 Analyzed: 04/28/18						
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	

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	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				Prepared: 04/27/18 Analyzed: 04/28/18						
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	

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	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				Prepared: 04/27/18 Analyzed: 04/28/18						
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 (R113)	**0.315**	0.010	ug/L	0.31		103	70-130		30	
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)				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	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18

Analyte	Result	Reporting Limit	Units	Spike Level	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	

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS

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

Analyte	Result	Reporting Limit	Units	Spike Level	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						
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 PREP ****										
Blank (B8E0119-BLK1)				Prepared & Analyzed: 04/30/18						
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	<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							

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8E0119 - *** DEFAULT PREP ****										
Blank (B8E0119-BLK1) Continued				Prepared & Analyzed: 04/30/18						
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							
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							

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8E0119 - *** DEFAULT PREP ****										
Blank (B8E0119-BLK1) Continued				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-trifluoroethane (R113)	<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							

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8E0119 - *** DEFAULT PREP ****										
Blank (B8E0119-BLK1) Continued				Prepared & Analyzed: 04/30/18						
n-Butylbenzene	<0.010	0.010	ug/L							
Surrogate: 4-Bromofluorobenzene	*0.130*		*ug/L*	*0.14*		*90.6*	*70-130*			
LCS (B8E0119-BS1)				Prepared & Analyzed: 04/30/18						
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	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	

Viorel Vasile
Operations Manager

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

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8E0119 - *** DEFAULT PREP ****

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (B8E0119-BS1) Continued				Prepared & Analyzed: 04/30/18						
Ethylbenzene	**0.167**	0.010	ug/L	0.17		96.3	70-130		30	
4-Ethyltoluene	**0.195**	0.010	ug/L	0.20		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	0.16		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	**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)				Prepared & Analyzed: 04/30/18						

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18

VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control

*Batch B8E0119 - *** DEFAULT PREP ****

LCS Dup (B8E0119-BSD1) Continued Prepared & Analyzed: 04/30/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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	0.0193	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	**

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
VOCs by GCMS EPA TO-15 (Mid Level) - Quality Control										
*Batch B8E0119 - *** DEFAULT PREP ****										
LCS Dup (B8E0119-BSD1) Continued				Prepared & Analyzed: 04/30/18						
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-trifluoroethane (R113)	**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	*0.142*		*ug/L*	*0.14*		*99.5*	*70-130*			
Duplicate (B8E0119-DUP1)		**Source: 8D23008-03**		Prepared & Analyzed: 04/30/18						
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	

Viorel Vasile
Operations Manager

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

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

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

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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	ug/L						30	
Ethanol	**<0.010**	0.010	ug/L						30	
Ethyl Acetate	**<0.010**	0.010	ug/L						30	
Ethylbenzene	**<0.010**	0.010	ug/L						30	
Ethyl-tert-Butyl Ether (ETBE)	**<0.010**	0.010	ug/L						30	
4-Ethyltoluene	**<0.010**	0.010	ug/L						30	
Heptane	**<0.010**	0.010	ug/L						30	
Hexachlorobutadiene	**<0.010**	0.010	ug/L						30	
n-Hexane	**<0.010**	0.010	ug/L						30	
2-Hexanone (MBK)	**<0.010**	0.010	ug/L						30	
Isopropanol (IPA)	**<0.010**	0.010	ug/L						30	
Methyl-tert-Butyl Ether (MTBE)	**<0.010**	0.010	ug/L						30	
Methylene Chloride	**<0.010**	0.010	ug/L						30	
4-Methyl-2-pentanone (MIBK)	**<0.010**	0.010	ug/L						30	
Naphthalene	**<0.010**	0.010	ug/L						30	
Propylene	**<0.010**	0.010	ug/L						30	
Styrene	**<0.010**	0.010	ug/L						30	
1,1,2,2-Tetrachloroethane	**<0.010**	0.010	ug/L						30	
Tetrachloroethylene (PCE)	**<0.010**	0.010	ug/L						30	
Tetrahydrofuran (THF)	**<0.010**	0.010	ug/L						30	
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	
1,1,1-Trichloroethane	**<0.010**	0.010	ug/L						30	
Trichloroethylene (TCE)	**<0.010**	0.010	ug/L						30	
Trichlorofluoromethane (R11)	**<0.010**	0.010	ug/L						30	
1,1,2-Trichloro-1,2,2-trifluoroethane (R113)	**<0.010**	0.010	ug/L						30	
1,3,5-Trimethylbenzene	**<0.010**	0.010	ug/L						30	
1,2,4-Trimethylbenzene	**<0.010**	0.010	ug/L						30	
2,2,4-Trimethylpentane	**<0.010**	0.010	ug/L						30	
Vinyl acetate	**<0.010**	0.010	ug/L						30	

Viorel Vasile
Operations Manager

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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						
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 & Analyzed: 04/25/18						
Helium	<0.10	0.10	% by Volume							
LCS (B8D2521-BS1)				Prepared & Analyzed: 04/25/18						
Helium	**0.417**	0.10	% by Volume	0.50		83.3	70-130			
LCS Dup (B8D2521-BSD1)				Prepared & Analyzed: 04/25/18						
Helium	**0.428**	0.10	% by Volume	0.50		85.6	70-130	2.75	30	
Duplicate (B8D2521-DUP1)		**Source: 8D25030-09**		Prepared & Analyzed: 04/25/18						
Helium	**2.99**	0.20	% by Volume		3.22			7.33	30	

Viorel Vasile
Operations Manager

LABORATORY ANALYSIS RESULTS

Client:	The Source Group, Inc. (PH)	**AA Project No:**	MB596148
Project No:	NA	**Date Received:**	04/25/18
Project Name:	Chemoil - SV Sampling	**Date Reported:**	05/01/18

Special Notes

[1] = ** : Exceeds upper control limit.

[2] = *** : Exceeds lower control limit.

Viorel Vasile
Operations Manager

AMERICAN ANALYTICS CHAIN-OF-CUSTODY RECORD

9765 ETON AVE., CHATSWORTH, CA 91311
Tel: 818-998-5547 FAX: 818-998-7258

A.A. COC No.: 15277
70051330
Page 1 of 1

Client: APex
Project Name / No.: Chemoil
Sampler's Name: Juan Rodryuez
Project Manager: Kristen Diey
Site Address: 2020 walnut ave
Sampler's Signature:
Phone:
City: Signal hill
P.O. No.:
Fax:
State & Zip: CA 90755
Quote No.:

TAT Turnaround Codes **

1 = Same Day Rush
2 = 24 Hour Rush
3 = 48 Hour Rush
4 = 72 Hour Rush
5 = 5 Day Rush
X = 10 Working Days (Standard TAT)

ANALYSIS REQUESTED (Test Name)

Please enter the TAT Turnaround Codes ** below

Client I.D.	A.A. I.D.	Date	Time	Sample Matrix	No. of Cont	TO15	Helium								Special Instructions
TP-24	8D25030-01	4/25/18	709	VAPOR	1	X	X								
TP-23	-02		750			X	X								
TP-33	-03		847			X	X								
TP-22	-04		935			X	X								
TP-32	-05		1016			X	X								
TP-21	-06		1058			X	X								
TP-18	-07		1147			X	X								
TP-18Dup	-08		1147			X	X								
TP-17	-09		1226			X	X								
AN-6	-10		1310			X	X								
TP-4	-11		1400			X	X								
AN-7	-12		1445			X	X								

For Laboratory Use

REVIEWED
Date 4/26/18 Time 0730
TAT N Days Sign:

A.A. Project No.: MB596148/8D25030

Relinquished by	Date	Time	Received by
	4/25/18	1500	
	4/25/18	1715	

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.

APPENDIX E

Metals Statistics Onsite to Background
Western Parcel

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 1:50:21 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Arsenic

Sample 2 Data: Background Arsenic

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	1.6	2.1
Maximum Detect	18	11
Mean of Detects	6.881	5.6
Median of Detects	6.4	5
SD of Detects	2.749	2.739
KM Mean	6.881	5.6
KM SD	2.749	2.739

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.362
Critical z (0.05)	1.645
P-Value	0.0866

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 1:51:37 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Arsenic

Sample 2 Data: Background Arsenic

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detects	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	1.6	2.1
Maximum Detect	18	11
Mean of Detects	6.881	5.6
Median of Detects	6.4	5
SD of Detects	2.749	2.739
KM Mean	6.881	5.6
KM SD	2.749	2.739

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.411
TW Critical Value (0.05)	1.645
P-Value	0.0791

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 1:52:24 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Arsenic

Sample 2 Data: Background Arsenic

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	1.6	2.1
Maximum Detect	18	11
Mean of Detects	6.881	5.6
Median of Detects	6.4	5
SD of Detects	2.749	2.739

Wilcoxon-Mann-Whitney (WMW) Test

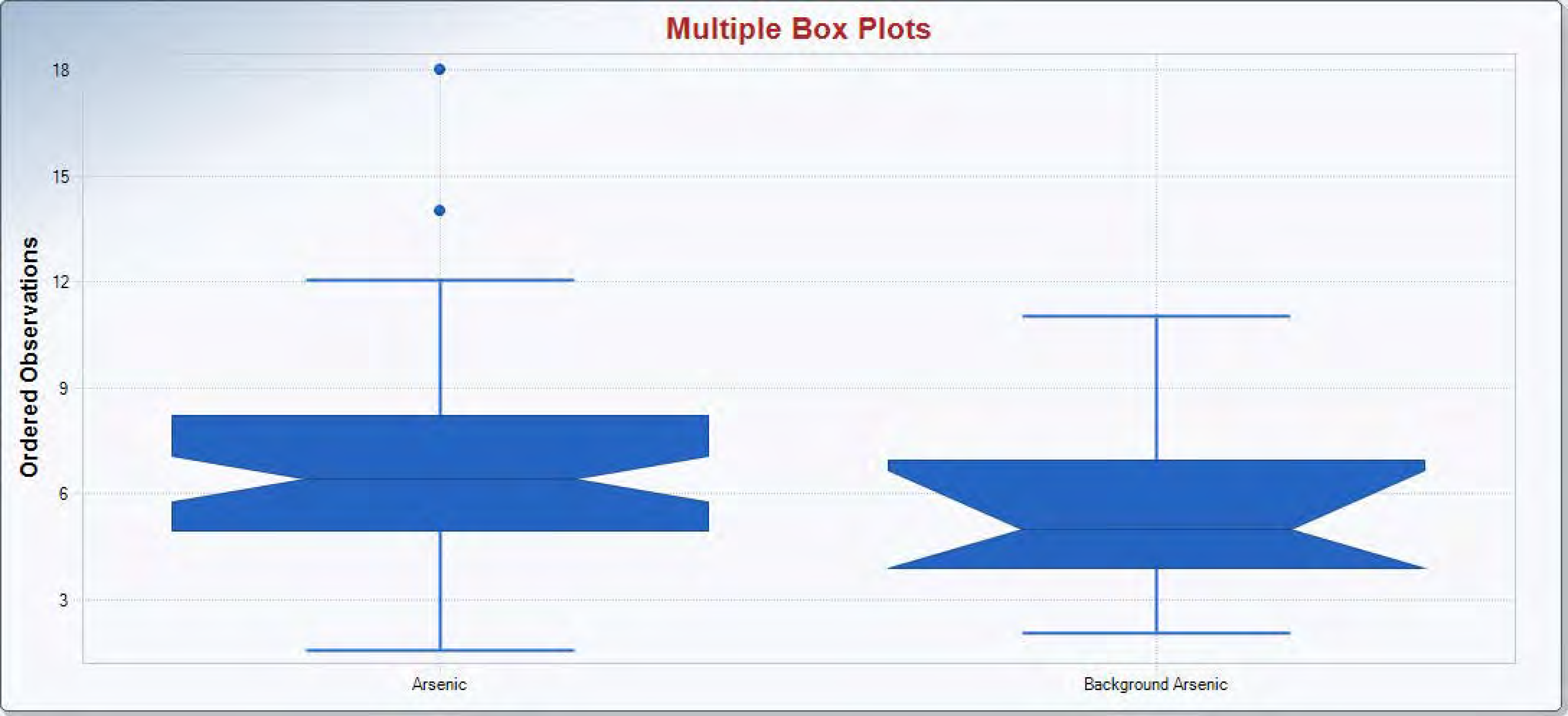
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2416
Standardized WMW U-Stat	1.416
Mean (U)	256
SD(U) - Adj ties	55.79
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0784

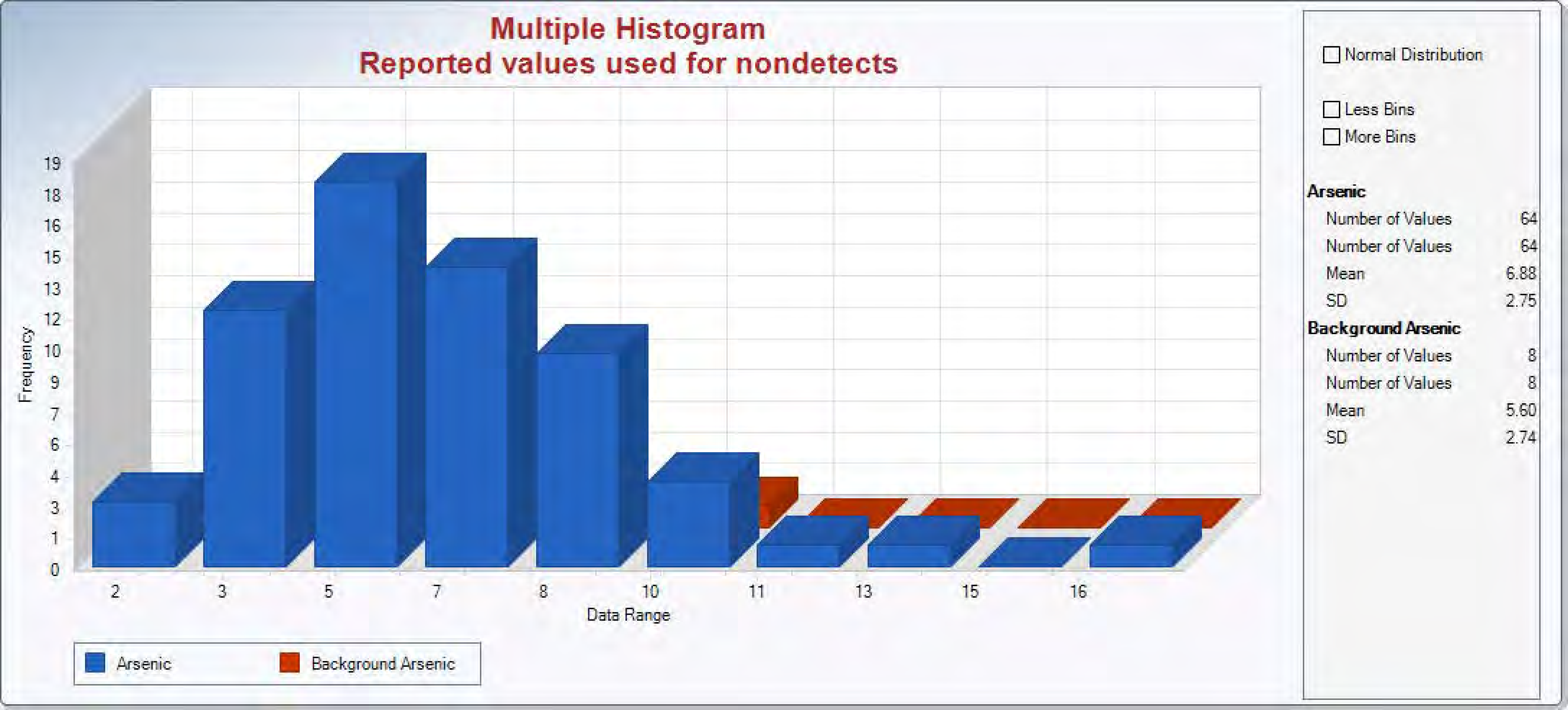
Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

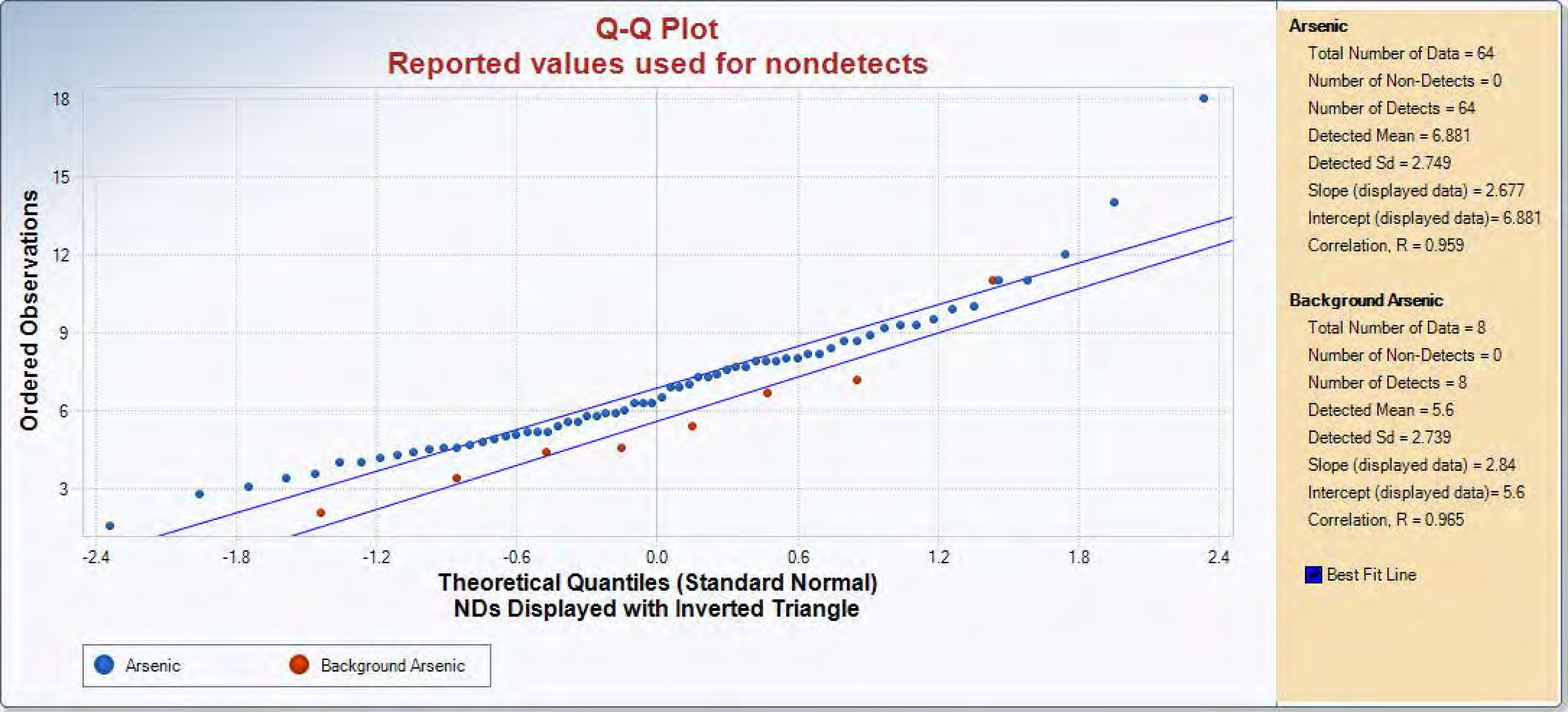
P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
18
15
12
9
6
3
Arsenic
Background Arsenic



Multiple Histogram
Reported values used for nondetects
19
18
16
15
13
12
10
9
7
6
4
3
1
0
Frequency
2
3
5
7
8
10
11
13
15
16
Data Range
Arsenic
Background Arsenic
Normal Distribution
Less Bins
More Bins
Arsenic
Number of Values 64
Number of Values 64
Mean 6.88
SD 2.75
Background Arsenic
Number of Values 8
Number of Values 8
Mean 5.60
SD 2.74


Q-Q Plot
Reported values used for nondetects
Ordered Observations
18
15
12
9
6
3
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Arsenic
Background Arsenic
Arsenic
Total Number of Data = 64
Number of Non-Detects = 0
Number of Detects = 64
Detected Mean = 6.881
Detected Sd = 2.749
Slope (displayed data) = 2.677
Intercept (displayed data)= 6.881
Correlation, R = 0.959
Background Arsenic
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 5.6
Detected Sd = 2.739
Slope (displayed data) = 2.84
Intercept (displayed data)= 5.6
Correlation, R = 0.965
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 1:59:14 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium
Sample 2 Data: Background Barium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	87	83
Maximum Detect	310	230
Mean of Detects	151.7	134.3
Median of Detects	140	110
SD of Detects	38.97	54.23
KM Mean	151.7	134.3
KM SD	38.97	54.23

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.451
Critical z (0.05)	1.645
P-Value	0.0733

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:00:04 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium

Sample 2 Data: Background Barium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detects	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	87	83
Maximum Detect	310	230
Mean of Detects	151.7	134.3
Median of Detects	140	110
SD of Detects	38.97	54.23
KM Mean	151.7	134.3
KM SD	38.97	54.23

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.119
TW Critical Value (0.05)	1.645
P-Value	0.017

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:00:49 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium

Sample 2 Data: Background Barium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	87	83
Maximum Detect	310	230
Mean of Detects	151.7	134.3
Median of Detects	140	110
SD of Detects	38.97	54.23

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

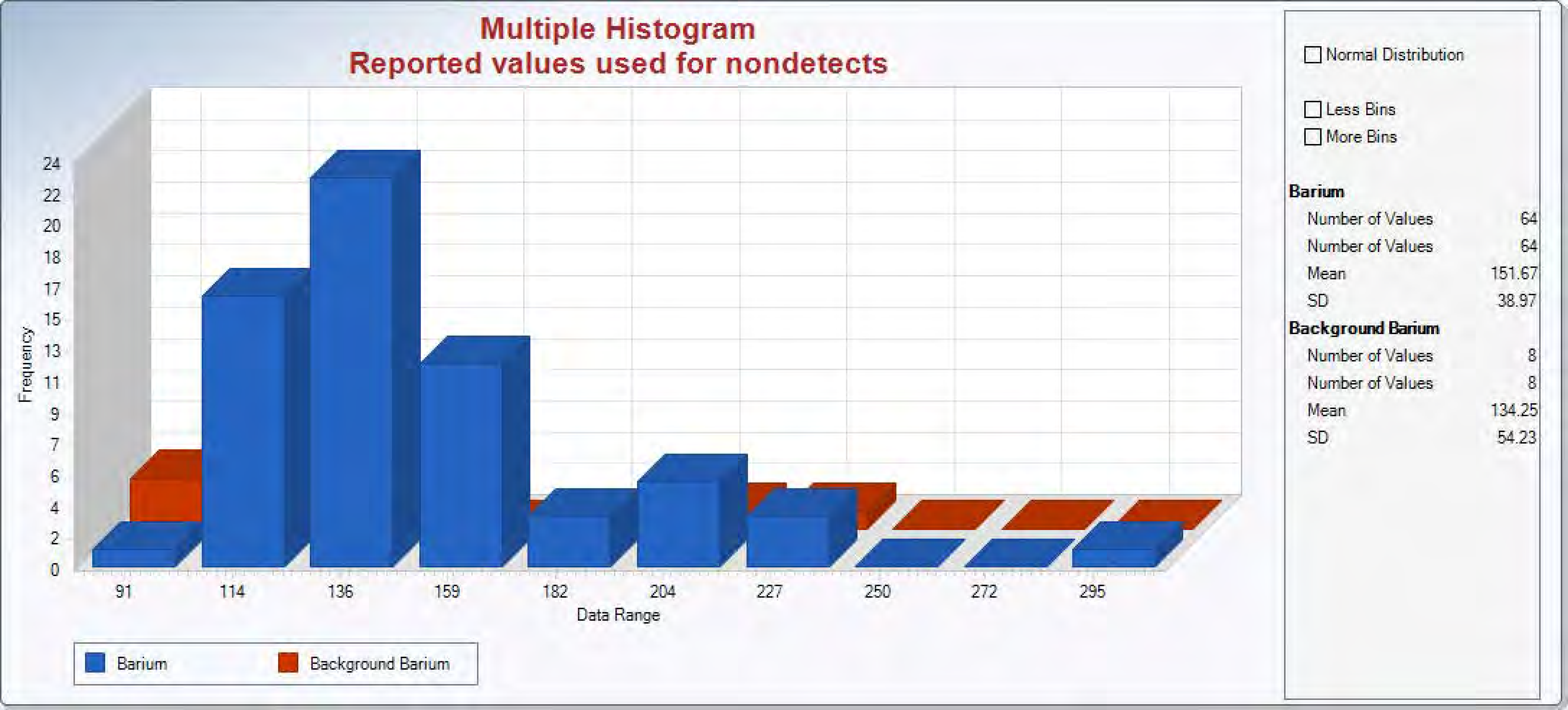
Sample 1 Rank Sum W-Stat	2429
Standardized WMW U-Stat	1.656
Mean (U)	256
SD(U) - Adj ties	55.58
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0488

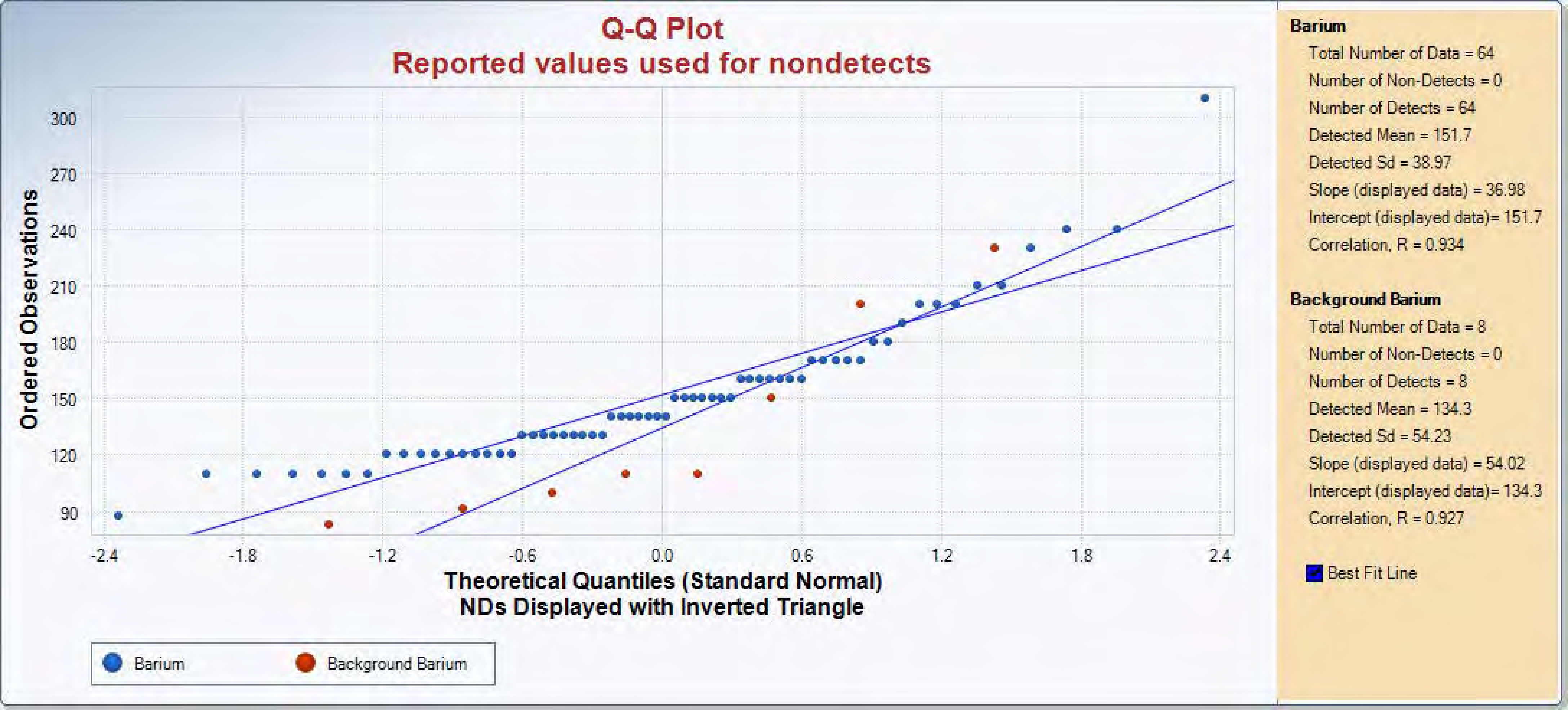
Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Multiple Box Plots
Ordered Observations
300
270
240
210
180
150
120
90
Barium
Background Barium


Multiple Histogram
Reported values used for nondetects
Frequency
0
2
4
6
7
9
11
13
15
17
18
20
22
24
91
114
136
159
182
204
227
250
272
295
Data Range
Barium
Background Barium
Normal Distribution
Less Bins
More Bins
Barium
Number of Values 64
Number of Values 64
Mean 151.67
SD 38.97
Background Barium
Number of Values 8
Number of Values 8
Mean 134.25
SD 54.23



Q-Q Plot
Reported values used for nondetects
Ordered Observations
300
270
240
210
180
150
120
90
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Barium
Background Barium
Barium
Total Number of Data = 64
Number of Non-Detects = 0
Number of Detects = 64
Detected Mean = 151.7
Detected Sd = 38.97
Slope (displayed data) = 36.98
Intercept (displayed data)= 151.7
Correlation, R = 0.934
Background Barium
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 134.3
Detected Sd = 54.23
Slope (displayed data) = 54.02
Intercept (displayed data)= 134.3
Correlation, R = 0.927
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:04:55 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Chromium

Sample 2 Data: Background Chromium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	14	15
Maximum Detect	38	30
Mean of Detects	24.5	22.5
Median of Detects	24	22.5
SD of Detects	5.413	4.957
KM Mean	24.5	22.5
KM SD	5.413	4.957

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.609
Critical z (0.05)	1.645
P-Value	0.271

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:05:47 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Chromium

Sample 2 Data: Background Chromium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detects	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	14	15
Maximum Detect	38	30
Mean of Detects	24.5	22.5
Median of Detects	24	22.5
SD of Detects	5.413	4.957
KM Mean	24.5	22.5
KM SD	5.413	4.957

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.862
TW Critical Value (0.05)	1.645
P-Value	0.194

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:06:38 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Chromium

Sample 2 Data: Background Chromium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	14	15
Maximum Detect	38	30
Mean of Detects	24.5	22.5
Median of Detects	24	22.5
SD of Detects	5.413	4.957

Wilcoxon-Mann-Whitney (WMW) Test

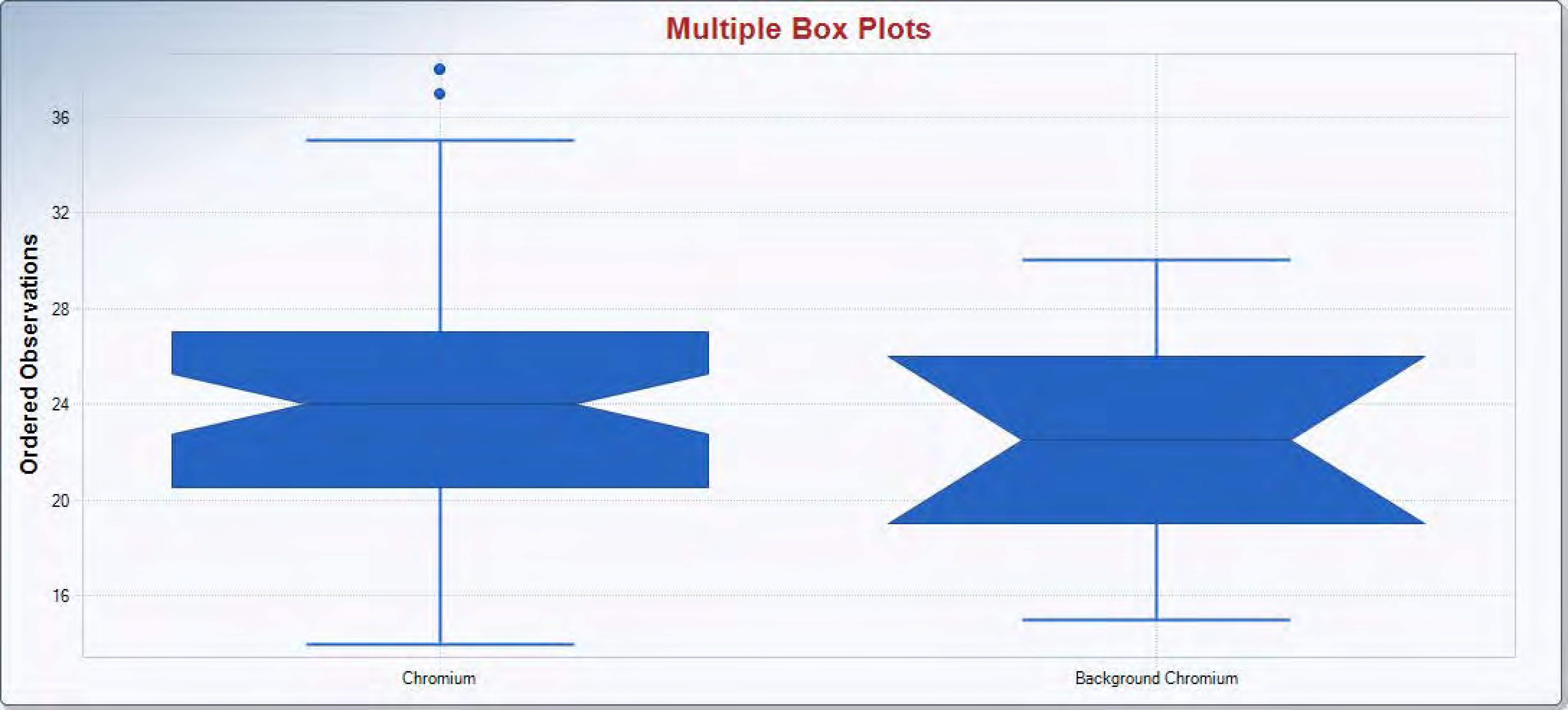
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2384
Standardized WMW U-Stat	0.853
Mean (U)	256
SD(U) - Adj ties	55.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.197

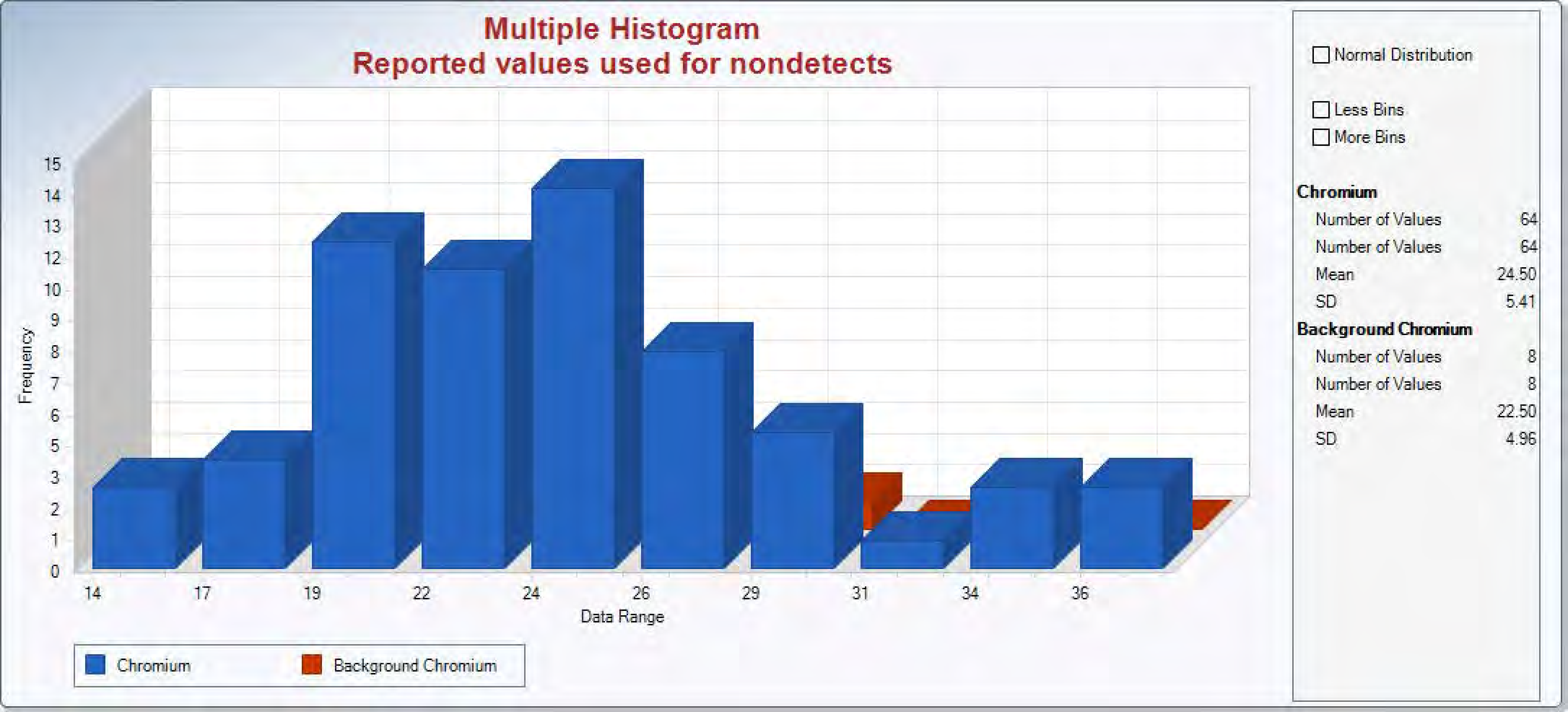
Conclusion with Alpha = 0.05

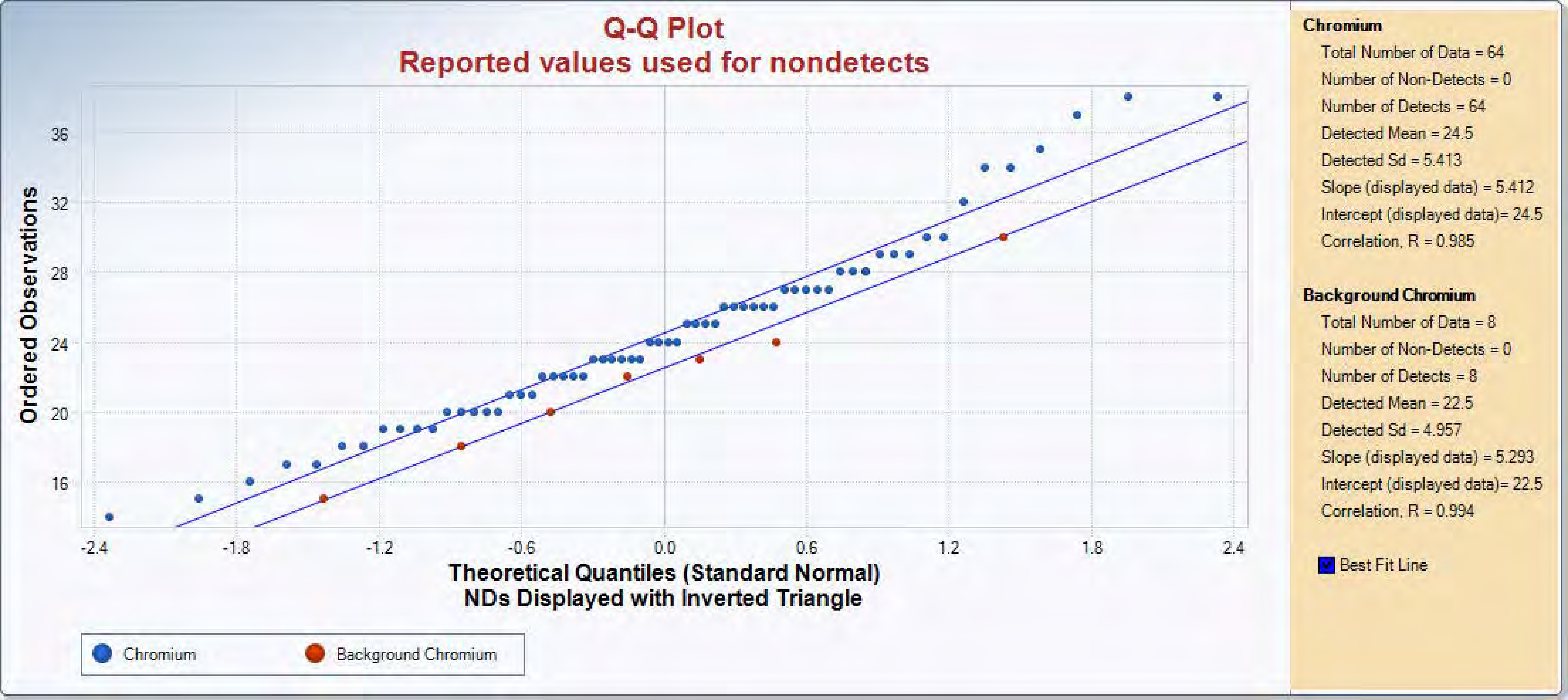
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
36
32
28
24
20
16
Chromium
Background Chromium


Multiple Histogram
Reported values used for nondetects
Frequency
15
14
13
12
10
9
8
7
6
5
3
2
1
0
14
17
19
22
24
26
29
31
34
36
Data Range
Chromium
Background Chromium
Normal Distribution
Less Bins
More Bins
Chromium
Number of Values 64
Number of Values 64
Mean 24.50
SD 5.41
Background Chromium
Number of Values 8
Number of Values 8
Mean 22.50
SD 4.96



Q-Q Plot
Reported values used for nondetects
Ordered Observations
16
20
24
28
32
36
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Chromium
Background Chromium
Chromium
Total Number of Data = 64
Number of Non-Detects = 0
Number of Detects = 64
Detected Mean = 24.5
Detected Sd = 5.413
Slope (displayed data) = 5.412
Intercept (displayed data)= 24.5
Correlation, R = 0.985
Background Chromium
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 22.5
Detected Sd = 4.957
Slope (displayed data) = 5.293
Intercept (displayed data)= 22.5
Correlation, R = 0.994
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:11:15 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt
Sample 2 Data: Background Cobalt

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.9	5.9
Maximum Detect	14	13
Mean of Detects	9.447	9.713
Median of Detects	9.4	10.15
SD of Detects	1.838	2.495
KM Mean	9.447	9.713
KM SD	1.838	2.495

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.663
Critical z (0.05)	1.645
P-Value	0.746

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Sample 1 <= Sample 2
P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:12:32 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt

Sample 2 Data: Background Cobalt

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detects	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.9	5.9
Maximum Detect	14	13
Mean of Detects	9.447	9.713
Median of Detects	9.4	10.15
SD of Detects	1.838	2.495
KM Mean	9.447	9.713
KM SD	1.838	2.495

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.142
TW Critical Value (0.05)	1.645
P-Value	0.557

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:13:14 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt

Sample 2 Data: Background Cobalt

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.9	5.9
Maximum Detect	14	13
Mean of Detects	9.447	9.713
Median of Detects	9.4	10.15
SD of Detects	1.838	2.495

Wilcoxon-Mann-Whitney (WMW) Test

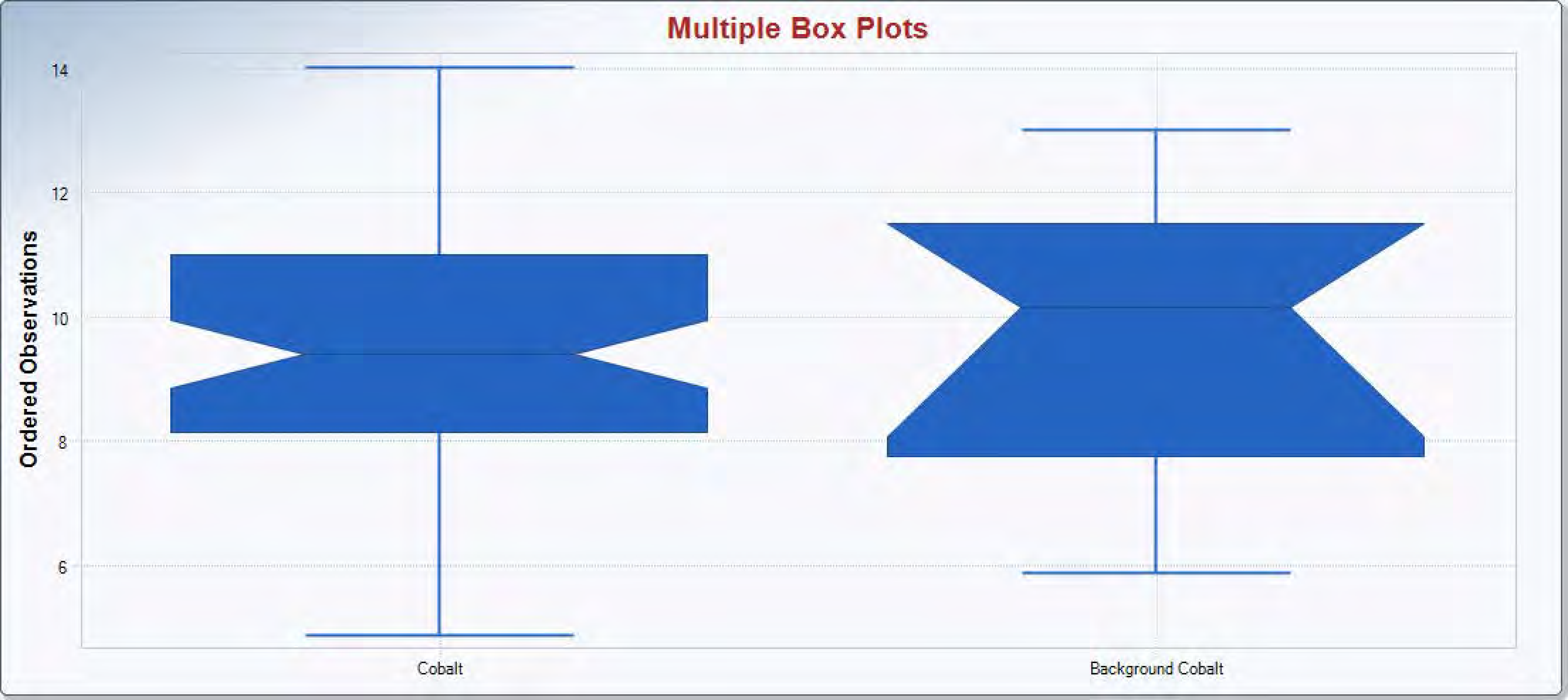
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2311
Standardized WMW U-Stat	-0.458
Mean (U)	256
SD(U) - Adj ties	55.66
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.677

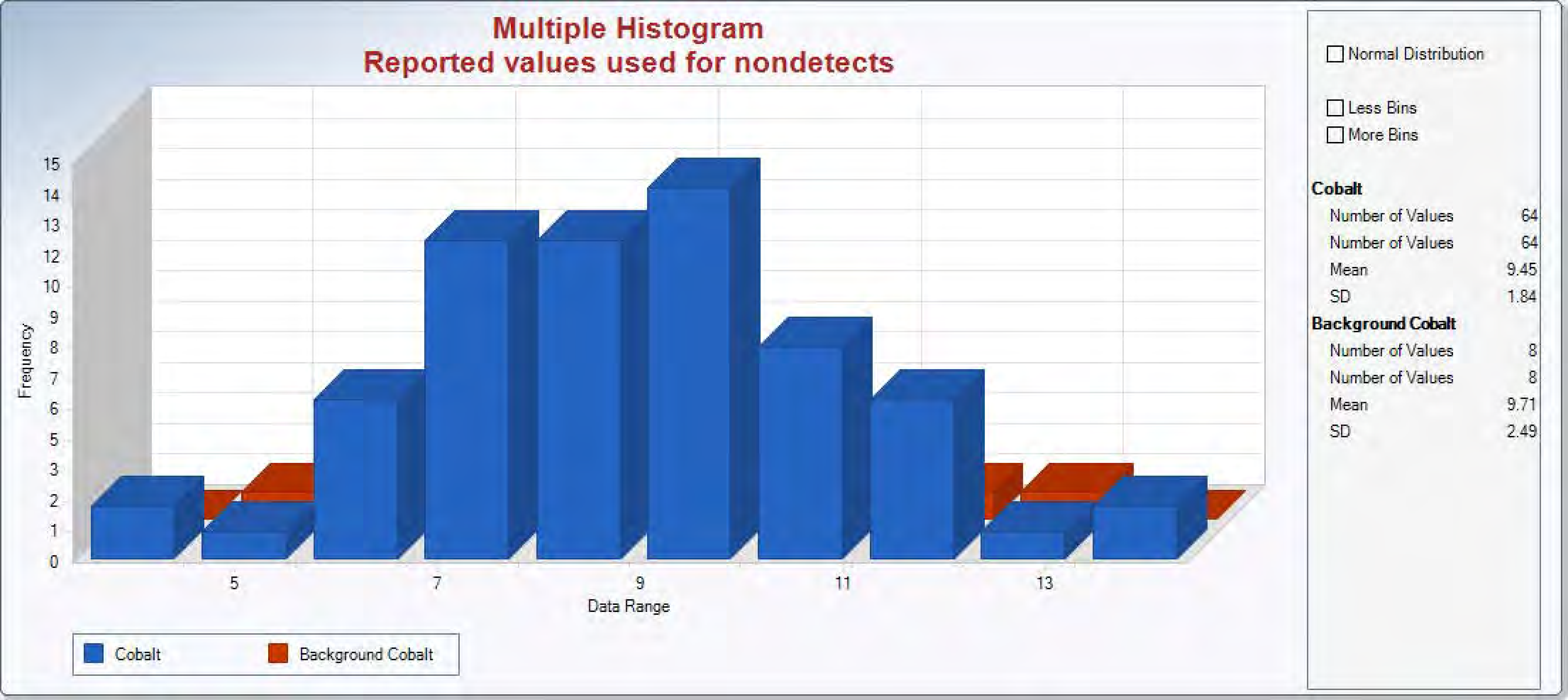
Conclusion with Alpha = 0.05

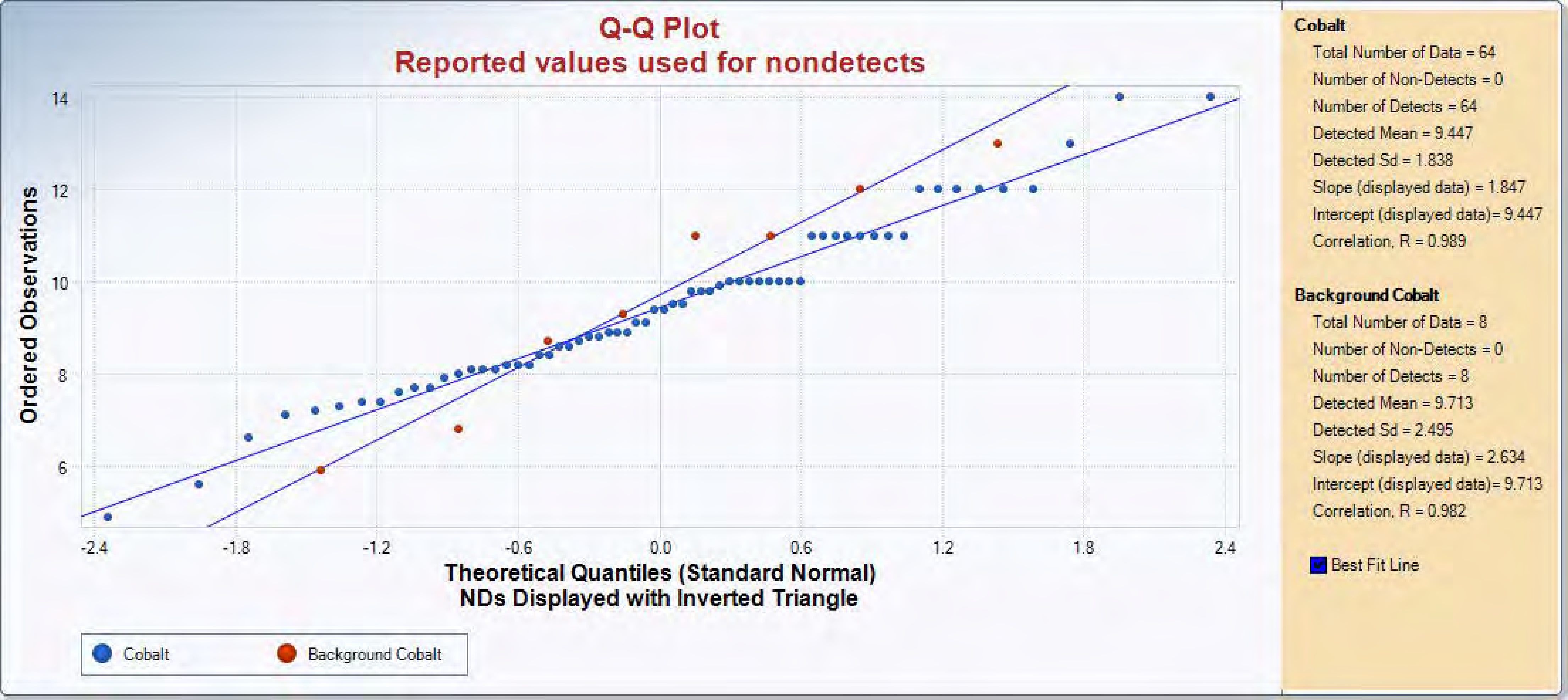
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)



Multiple Box Plots
14
12
10
8
6
Ordered Observations
Cobalt
Background Cobalt


Multiple Histogram
Reported values used for nondetects
Frequency
0
1
2
3
5
6
7
8
9
10
12
13
14
15
5
7
9
11
13
Data Range
Cobalt
Background Cobalt
Normal Distribution
Less Bins
More Bins
Cobalt
Number of Values 64
Number of Values 64
Mean 9.45
SD 1.84
Background Cobalt
Number of Values 8
Number of Values 8
Mean 9.71
SD 2.49


Q-Q Plot
Reported values used for nondetects
Ordered Observations
14
12
10
8
6
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Cobalt
Background Cobalt
Cobalt
Total Number of Data = 64
Number of Non-Detects = 0
Number of Detects = 64
Detected Mean = 9.447
Detected Sd = 1.838
Slope (displayed data) = 1.847
Intercept (displayed data)= 9.447
Correlation, R = 0.989
Background Cobalt
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 9.713
Detected Sd = 2.495
Slope (displayed data) = 2.634
Intercept (displayed data)= 9.713
Correlation, R = 0.982
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:18:18 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Copper

Sample 2 Data: Background Copper

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	1	0
Number of Detect Data	63	8
Minimum Non-Detect	3	N/A
Maximum Non-Detect	3	N/A
Percent Non-detects	1.56%	0.00%
Minimum Detect	3.8	6.5
Maximum Detect	100	16
Mean of Detects	13.84	10.7
Median of Detects	11	10.4
SD of Detects	13.47	3.181
KM Mean	13.67	10.7
KM SD	13.32	3.181

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.0179
Critical z (0.05)	1.645
P-Value	0.507

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:19:09 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Copper

Sample 2 Data: Background Copper

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	1	0
Number of Detects	63	8
Minimum Non-Detect	3	N/A
Maximum Non-Detect	3	N/A
Percent Non-detects	1.56%	0.00%
Minimum Detect	3.8	6.5
Maximum Detect	100	16
Mean of Detects	13.84	10.7
Median of Detects	11	10.4
SD of Detects	13.47	3.181
KM Mean	13.67	10.7
KM SD	13.32	3.181

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.191
TW Critical Value (0.05)	1.645
P-Value	0.576

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:19:54 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Copper

Sample 2 Data: Background Copper

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	1	0
Number of Detect Data	63	8
Minimum Non-Detect	3	N/A
Maximum Non-Detect	3	N/A
Percent Non-detects	1.56%	0.00%
Minimum Detect	3.8	6.5
Maximum Detect	100	16
Mean of Detects	13.84	10.7
Median of Detects	11	10.4
SD of Detects	13.47	3.181

Wilcoxon-Mann-Whitney (WMW) Test

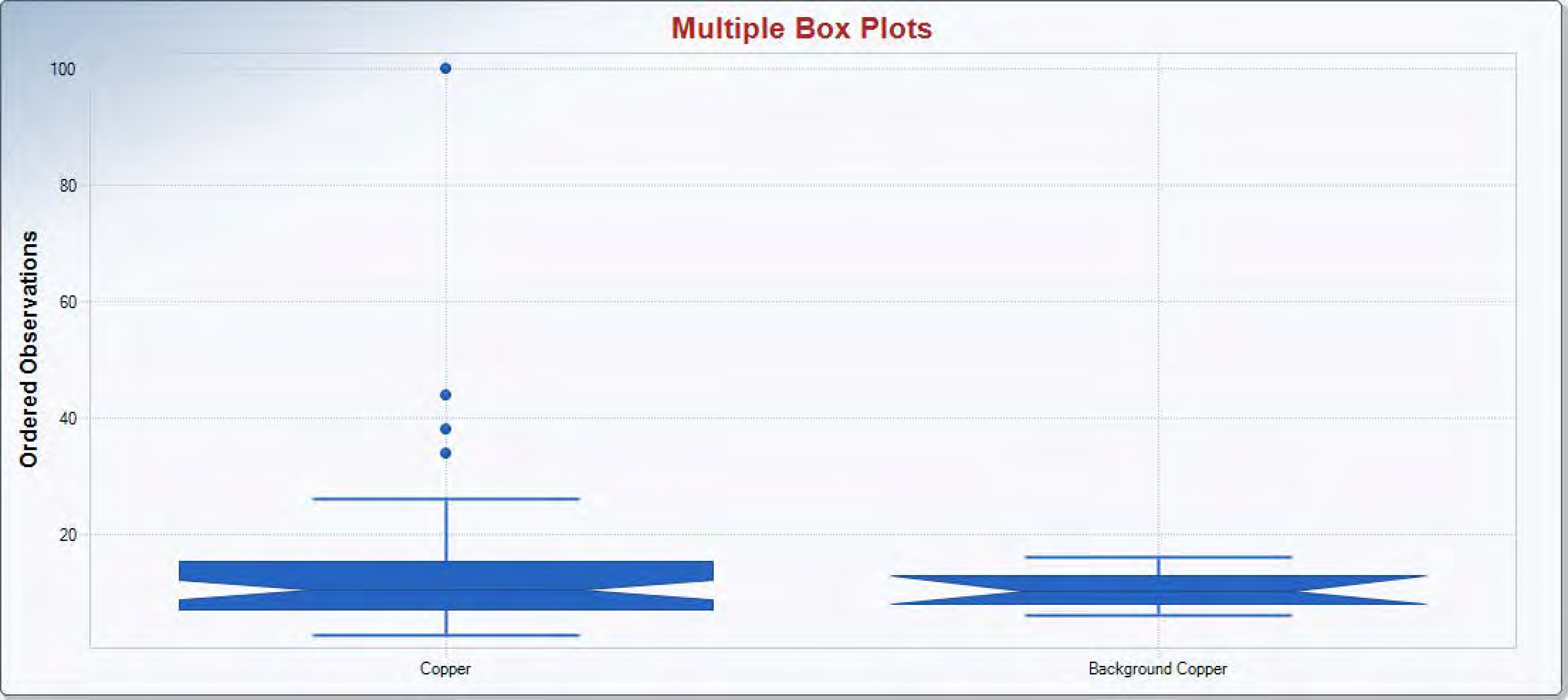
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2342
Standardized WMW U-Stat	0.0986
Mean (U)	256
SD(U) - Adj ties	55.76
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.461

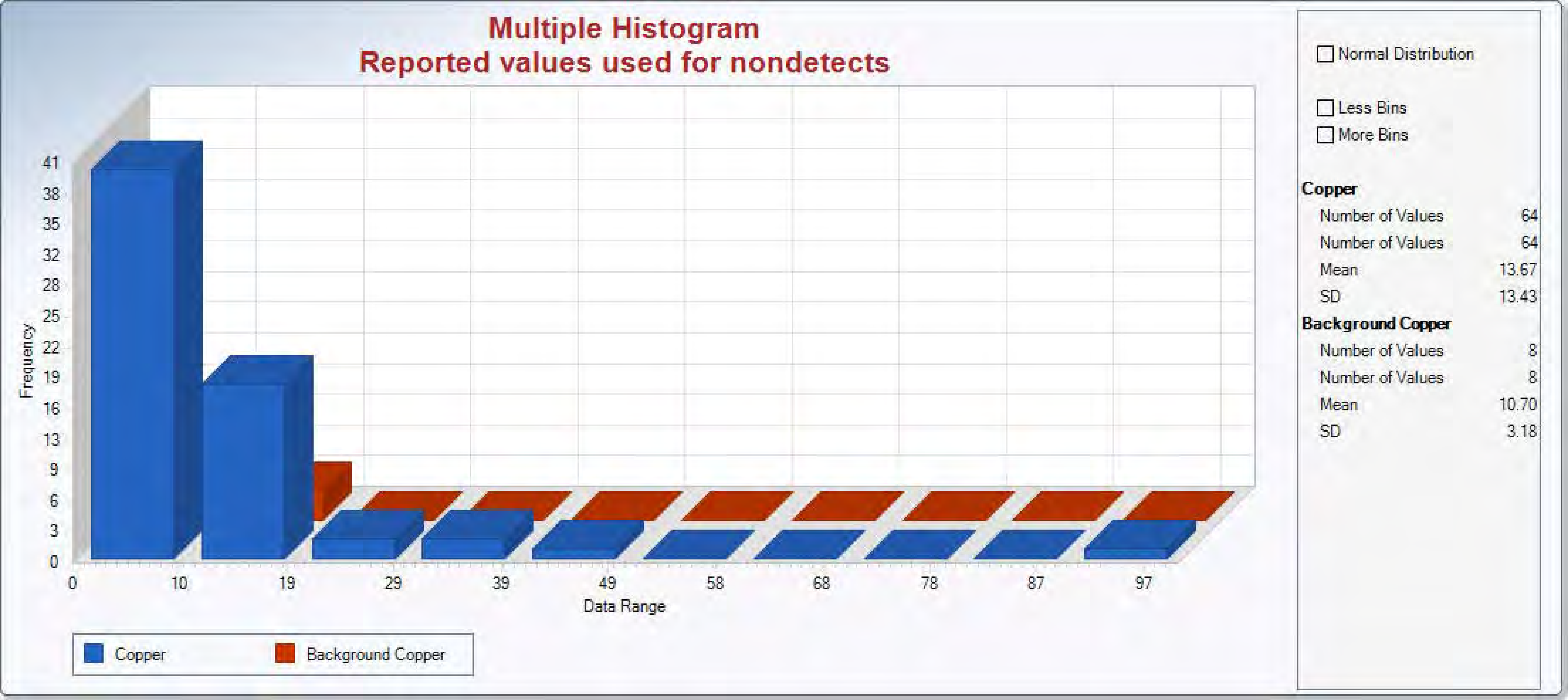
Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

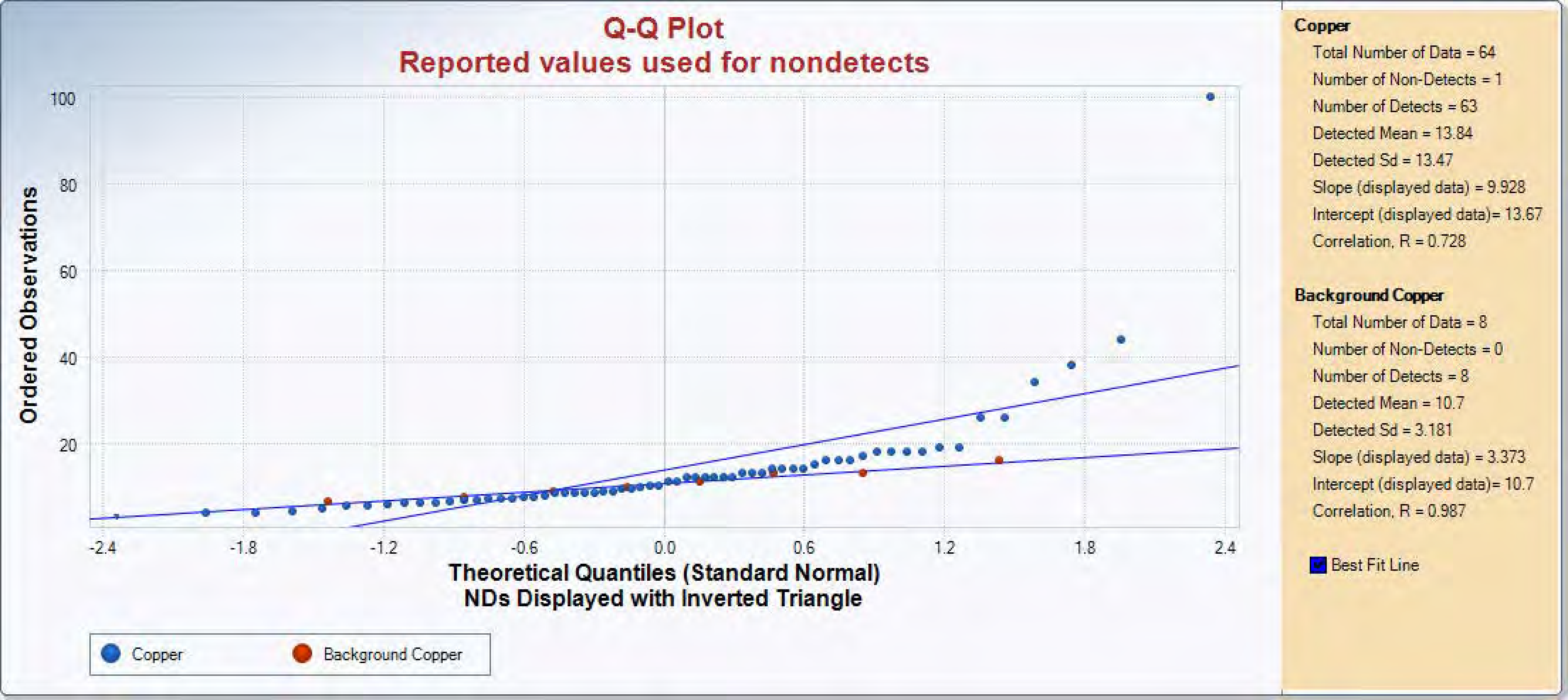
P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
100
80
60
40
20
Copper
Background Copper



Multiple Histogram
Reported values used for nondetects
Frequency
41
38
35
32
28
25
22
19
16
13
9
6
3
0
0
10
19
29
39
49
58
68
78
87
97
Data Range
Copper
Background Copper
Normal Distribution
Less Bins
More Bins
Copper
Number of Values 64
Number of Values 64
Mean 13.67
SD 13.43
Background Copper
Number of Values 8
Number of Values 8
Mean 10.70
SD 3.18



Q-Q Plot
Reported values used for nondetects
Ordered Observations
100
80
60
40
20
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Copper
Background Copper
Copper
Total Number of Data = 64
Number of Non-Detects = 1
Number of Detects = 63
Detected Mean = 13.84
Detected Sd = 13.47
Slope (displayed data) = 9.928
Intercept (displayed data)= 13.67
Correlation, R = 0.728
Background Copper
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 10.7
Detected Sd = 3.181
Slope (displayed data) = 3.373
Intercept (displayed data)= 10.7
Correlation, R = 0.987
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:24:29 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead

Sample 2 Data: Background Lead

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	77	8
Number of Non-Detects	2	0
Number of Detect Data	75	8
Minimum Non-Detect	0.1	N/A
Maximum Non-Detect	0.2	N/A
Percent Non-detects	2.60%	0.00%
Minimum Detect	0.522	3.8
Maximum Detect	570	16
Mean of Detects	30.93	7.15
Median of Detects	7.6	6.4
SD of Detects	82.77	3.688
KM Mean	30.13	7.15
KM SD	81.29	3.688

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.023
Critical z (0.05)	1.645
P-Value	0.153

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:25:18 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead

Sample 2 Data: Background Lead

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	77	8
Number of Non-Detects	2	0
Number of Detects	75	8
Minimum Non-Detect	0.1	N/A
Maximum Non-Detect	0.2	N/A
Percent Non-detects	2.60%	0.00%
Minimum Detect	0.522	3.8
Maximum Detect	570	16
Mean of Detects	30.93	7.15
Median of Detects	7.6	6.4
SD of Detects	82.77	3.688
KM Mean	30.13	7.15
KM SD	81.29	3.688

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

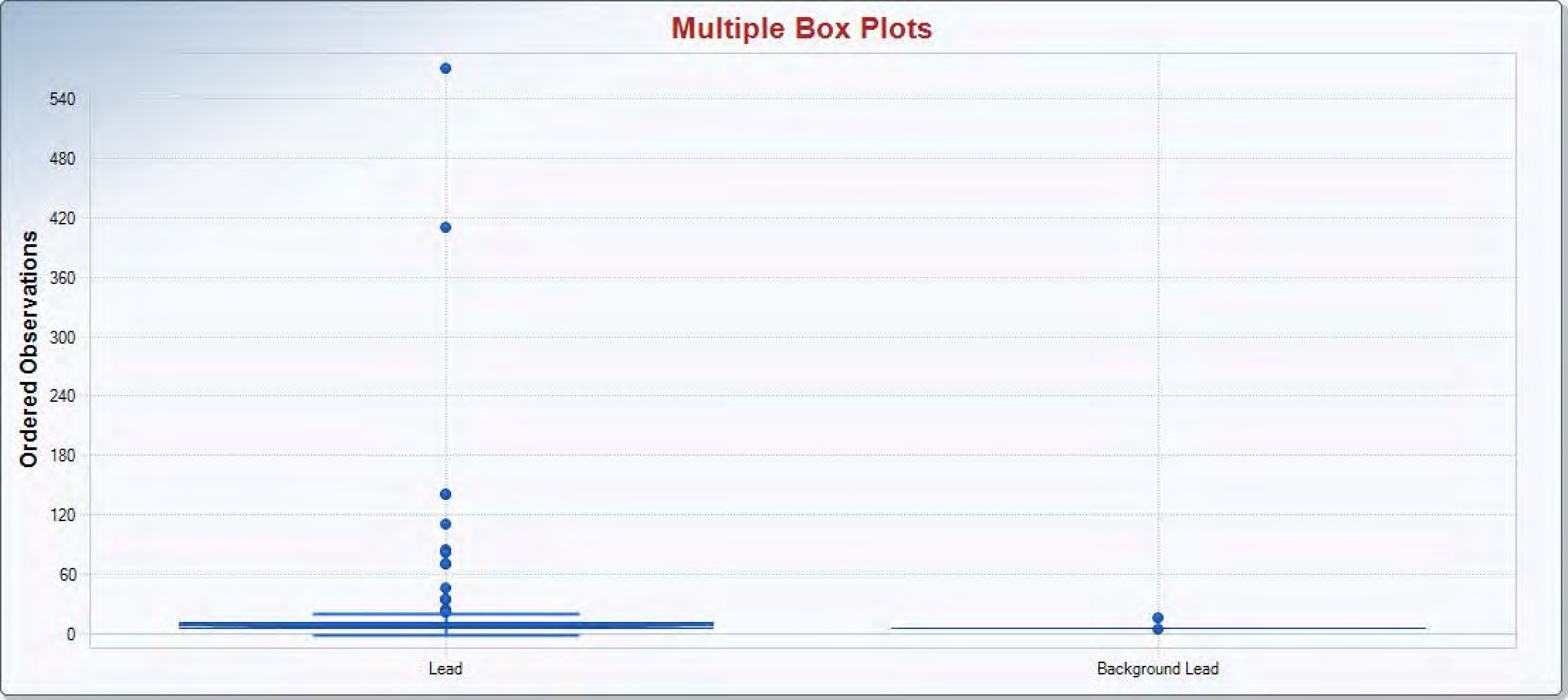
TW Statistic	0.694
TW Critical Value (0.05)	1.645
P-Value	0.244

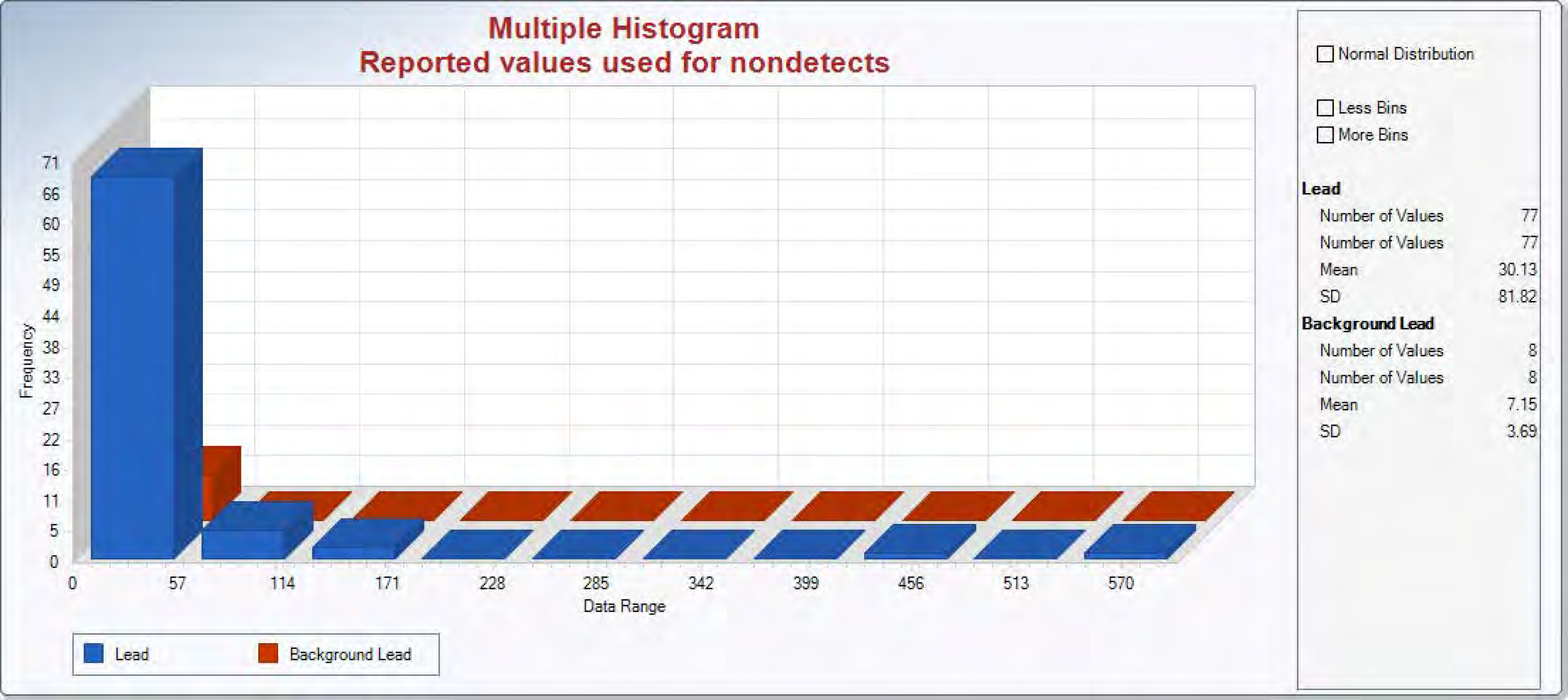
Conclusion with Alpha = 0.05

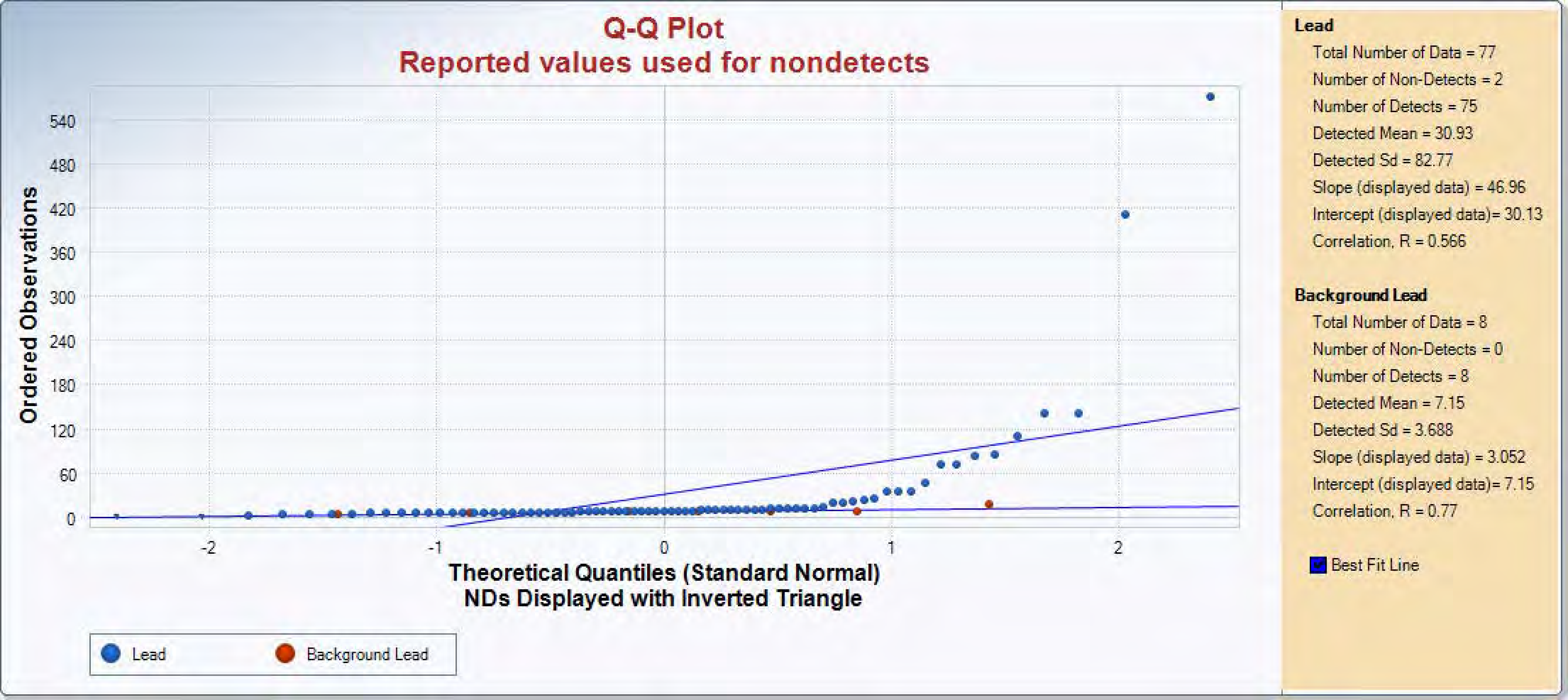
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

	A	B	C	D	E	F	G	H	I	J	K	L
1	Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects											
2												
3			User Selected Options									
4			Date/Time of Computation	ProUCL 5.15/23/2018 2:25:57 PM								
5			From File	Onsite Metals Input w Background.xls								
6			Full Precision	OFF								
7			Confidence Coefficient	95%								
8			Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)								
9			Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median								
10												
11												
12	**Sample 1 Data: Lead**											
13	**Sample 2 Data: Background Lead**											
14												
15				**Raw Statistics**								
16					Sample 1	Sample 2						
17				Number of Valid Data	77	8						
18				Number of Non-Detects	2	0						
19				Number of Detect Data	75	8						
20				Minimum Non-Detect	0.1	N/A						
21				Maximum Non-Detect	0.2	N/A						
22				Percent Non-detects	2.60%	0.00%						
23				Minimum Detect	0.522	3.8						
24				Maximum 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-Mann-Whitney (WMW) Test**								
30												
31	**H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2**											
32												
33				Sample 1 Rank Sum W-Stat	3382							
34				Standardized WMW U-Stat	1.054							
35				Mean (U)	308							
36				SD(U) - Adj ties	66.42							
37				Approximate U-Stat Critical Value (0.05)	1.645							
38				P-Value (Adjusted for Ties)	0.146							
39												
40	**Conclusion with Alpha = 0.05**											
41	**Do Not Reject H0, Conclude Sample 1 <= Sample 2**											
42	**P-Value >= alpha (0.05)**											
43												


Multiple Box Plots
Ordered Observations
540
480
420
360
300
240
180
120
60
0
Lead
Background Lead


Multiple Histogram
Reported values used for nondetects
Frequency
71
66
60
55
49
44
38
33
27
22
16
11
5
0
0
57
114
171
228
285
342
399
456
513
570
Data Range
Lead
Background Lead
Normal Distribution
Less Bins
More Bins
Lead
Number of Values 77
Number of Values 77
Mean 30.13
SD 81.82
Background Lead
Number of Values 8
Number of Values 8
Mean 7.15
SD 3.69


Q-Q Plot
Reported values used for nondetects
Ordered Observations
540
480
420
360
300
240
180
120
60
0
-2
-1
0
1
2
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Lead
Background Lead
Lead
Total Number of Data = 77
Number of Non-Detects = 2
Number of Detects = 75
Detected Mean = 30.93
Detected Sd = 82.77
Slope (displayed data) = 46.96
Intercept (displayed data)= 30.13
Correlation, R = 0.566
Background Lead
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 7.15
Detected Sd = 3.688
Slope (displayed data) = 3.052
Intercept (displayed data)= 7.15
Correlation, R = 0.77
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:46:57 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury
Sample 2 Data: Background Mercury

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	3	3
Number of Detect Data	61	5
Minimum Non-Detect	0.02	0.02
Maximum Non-Detect	0.02	0.02
Percent Non-detects	4.69%	37.50%
Minimum Detect	0.024	0.024
Maximum Detect	25	0.074
Mean of Detects	0.75	0.0464
Median of Detects	0.061	0.044
SD of Detects	3.461	0.0189
KM Mean	0.716	0.0365
KM SD	3.355	0.0185

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	2.554
Critical z (0.05)	1.645
P-Value	0.00532

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:47:39 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury

Sample 2 Data: Background Mercury

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	3	3
Number of Detects	61	5
Minimum Non-Detect	0.02	0.02
Maximum Non-Detect	0.02	0.02
Percent Non-detects	4.69%	37.50%
Minimum Detect	0.024	0.024
Maximum Detect	25	0.074
Mean of Detects	0.75	0.0464
Median of Detects	0.061	0.044
SD of Detects	3.461	0.0189
KM Mean	0.716	0.0365
KM SD	3.355	0.0185

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	2.465
TW Critical Value (0.05)	1.645
P-Value	0.00686

Conclusion with Alpha = 0.05

Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:48:20 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury

Sample 2 Data: Background Mercury

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	3	3
Number of Detect Data	61	5
Minimum Non-Detect	0.02	0.02
Maximum Non-Detect	0.02	0.02
Percent Non-detects	4.69%	37.50%
Minimum Detect	0.024	0.024
Maximum Detect	25	0.074
Mean of Detects	0.75	0.0464
Median of Detects	0.061	0.044
SD of Detects	3.461	0.0189

Wilcoxon-Mann-Whitney (WMW) Test

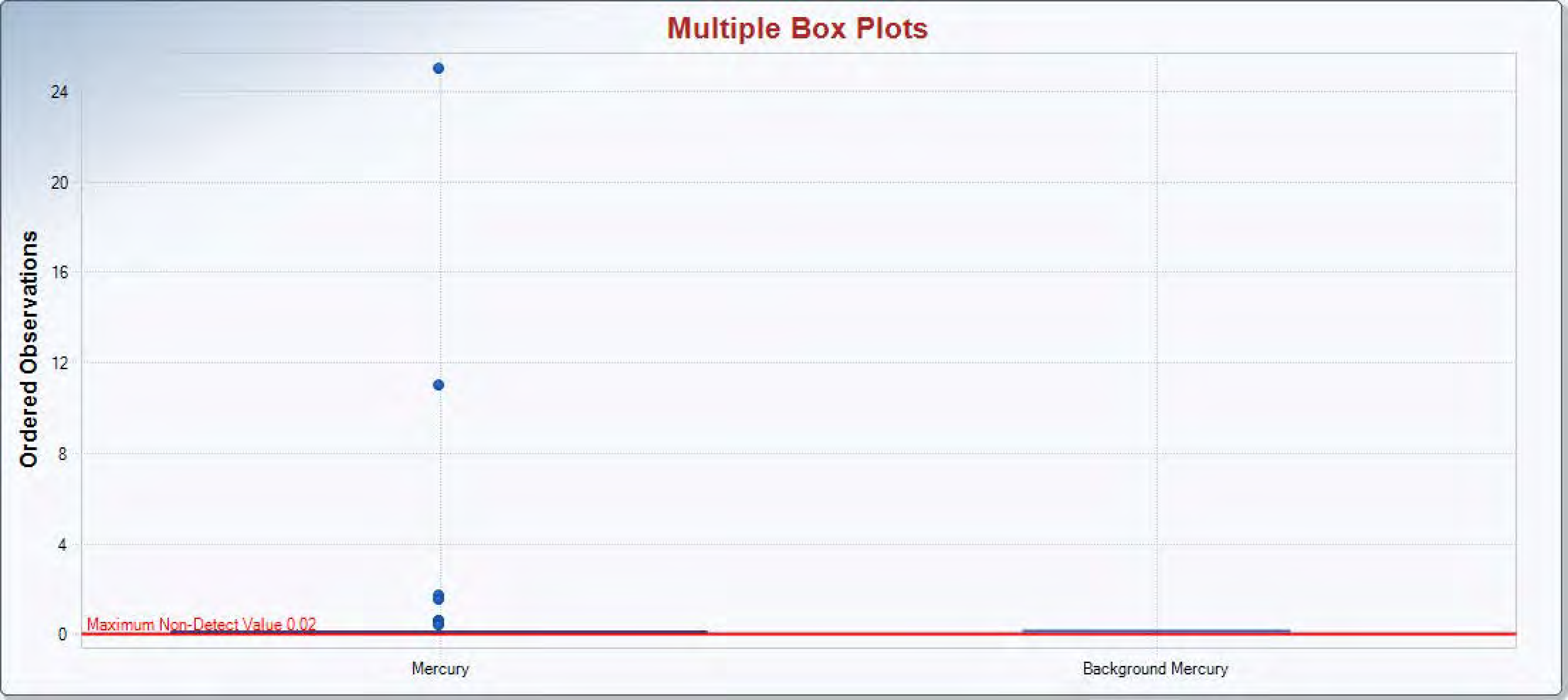
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2481
Standardized WMW U-Stat	2.591
Mean (U)	256
SD(U) - Adj ties	55.79
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.00479

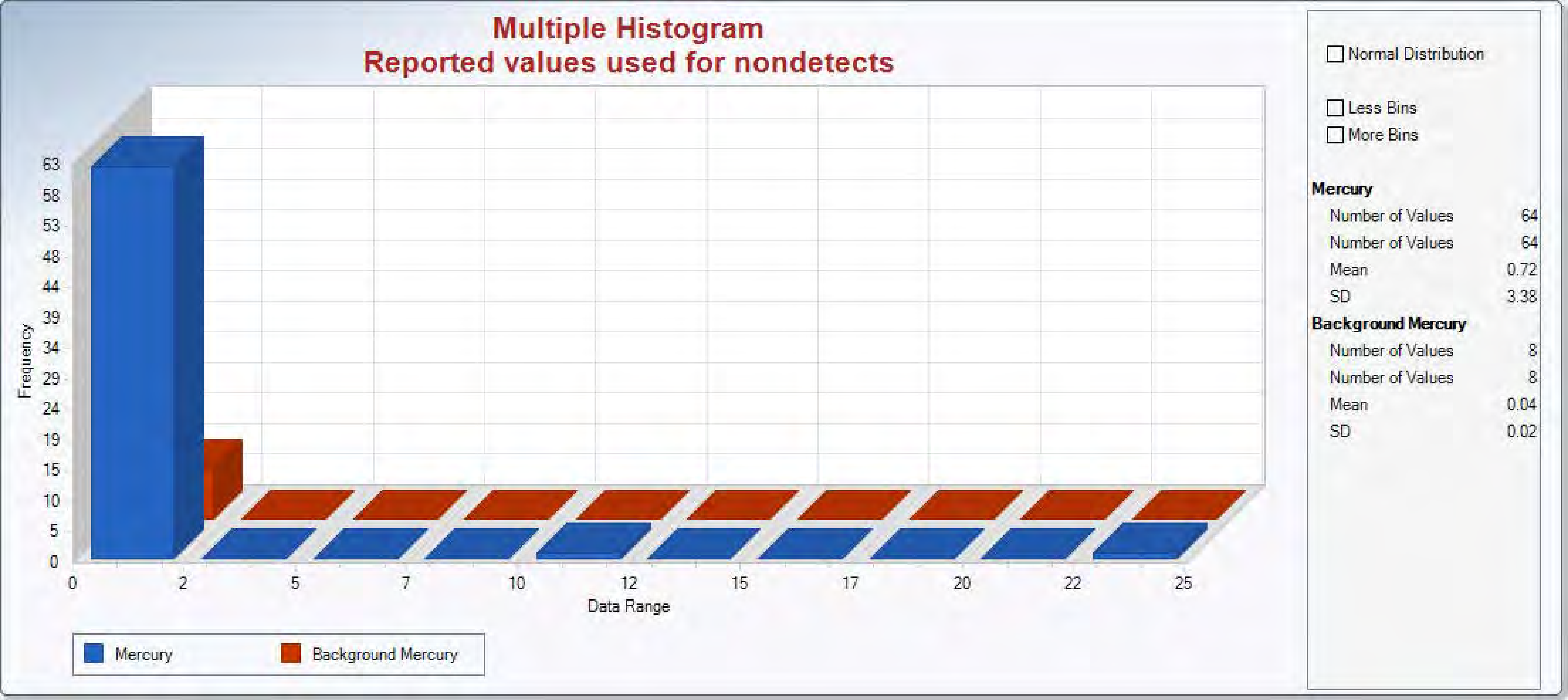
Conclusion with Alpha = 0.05

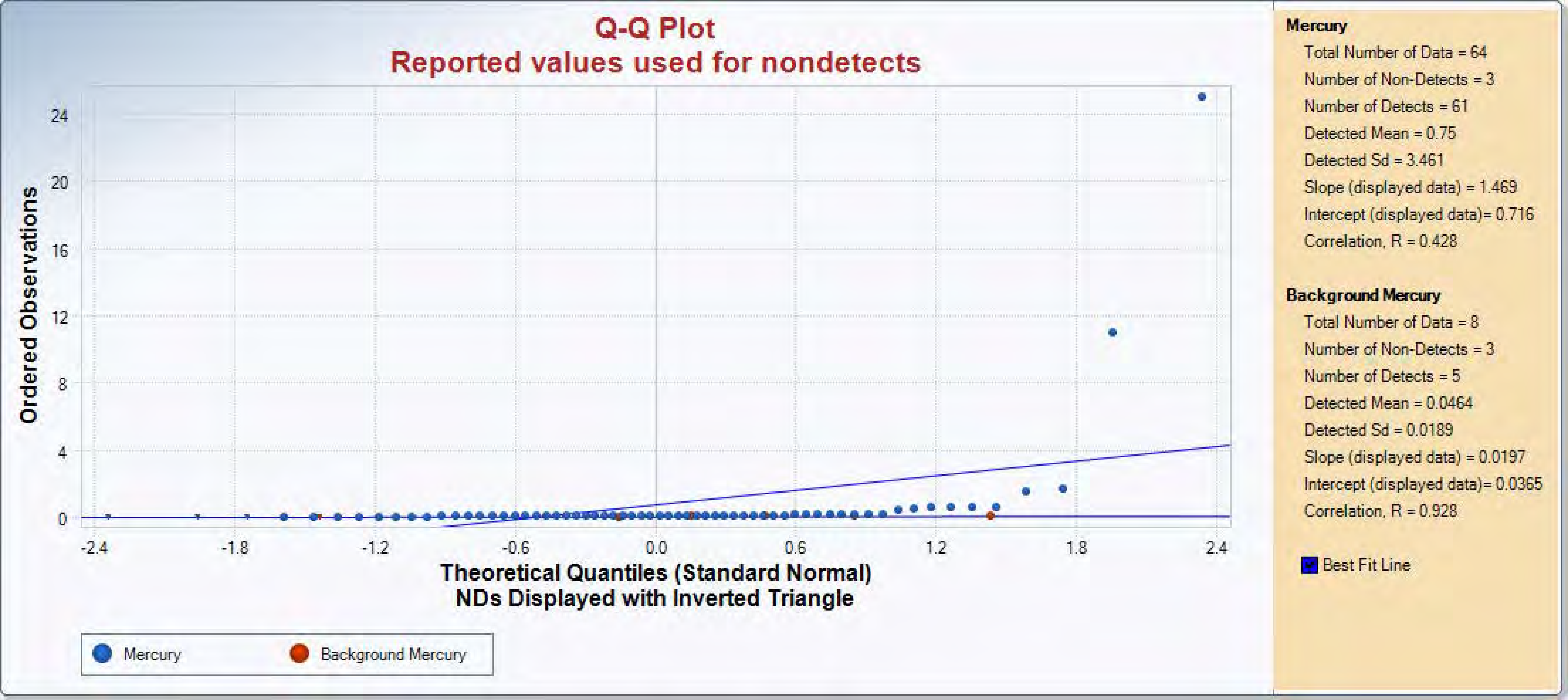
Reject H0, Conclude Sample 1 > Sample 2

P-Value < alpha (0.05)



Multiple Box Plots
Ordered Observations
24
20
16
12
8
4
0
Maximum Non-Detect Value 0.02
Mercury
Background Mercury


Multiple Histogram
Reported values used for nondetects
Frequency
63
58
53
48
44
39
34
29
24
19
15
10
5
0
0
2
5
7
10
12
15
17
20
22
25
Data Range
Mercury
Background Mercury
Normal Distribution
Less Bins
More Bins
Mercury
Number of Values 64
Number of Values 64
Mean 0.72
SD 3.38
Background Mercury
Number of Values 8
Number of Values 8
Mean 0.04
SD 0.02



Q-Q Plot
Reported values used for nondetects
Ordered Observations
24
20
16
12
8
4
0
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Mercury
Background Mercury
Mercury
Total Number of Data = 64
Number of Non-Detects = 3
Number of Detects = 61
Detected Mean = 0.75
Detected Sd = 3.461
Slope (displayed data) = 1.469
Intercept (displayed data)= 0.716
Correlation, R = 0.428
Background Mercury
Total Number of Data = 8
Number of Non-Detects = 3
Number of Detects = 5
Detected Mean = 0.0464
Detected Sd = 0.0189
Slope (displayed data) = 0.0197
Intercept (displayed data)= 0.0365
Correlation, R = 0.928
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:30:22 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Nickel

Sample 2 Data: Background Nickel

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	9.3	8.8
Maximum Detect	66	23
Mean of Detects	19.41	15.85
Median of Detects	19	16
SD of Detects	7	4.806
KM Mean	19.41	15.85
KM SD	7	4.806

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.326
Critical z (0.05)	1.645
P-Value	0.0924

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

	A	B	C	D	E	F	G	H	I	J	K	L
1	Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/23/2018 2:31:14 PM								
5	From File			Onsite Metals Input w Background.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Selected Null Hypothesis			Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)								
9	Alternative Hypothesis			Sample 1 Mean/Median > Sample 2 Mean/Median								
10												
11												
12	**Sample 1 Data: Nickel**											
13	**Sample 2 Data: Background Nickel**											
14												
15				**Raw Statistics**								
16					Sample 1	Sample 2						
17	Number of Valid Data				64	8						
18	Number of Non-Detects				0	0						
19	Number of Detects				64	8						
20	Minimum Non-Detect				N/A	N/A						
21	Maximum Non-Detect				N/A	N/A						
22	Percent Non-detects				0.00%	0.00%						
23	Minimum Detect				9.3	8.8						
24	Maximum 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			**Sample 1 vs Sample 2 Tarone-Ware Test**									
32												
33	**H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2**											
34												
35	TW Statistic				1.766							
36	TW Critical Value (0.05)				1.645							
37	P-Value				0.0387							
38												
39	**Conclusion with Alpha = 0.05**											
40	**Reject H0, Conclude Sample 1 > Sample 2**											
41	**P-Value < alpha (0.05)**											
42												

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:31:58 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Nickel

Sample 2 Data: Background Nickel

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	9.3	8.8
Maximum Detect	66	23
Mean of Detects	19.41	15.85
Median of Detects	19	16
SD of Detects	7	4.806

Wilcoxon-Mann-Whitney (WMW) Test

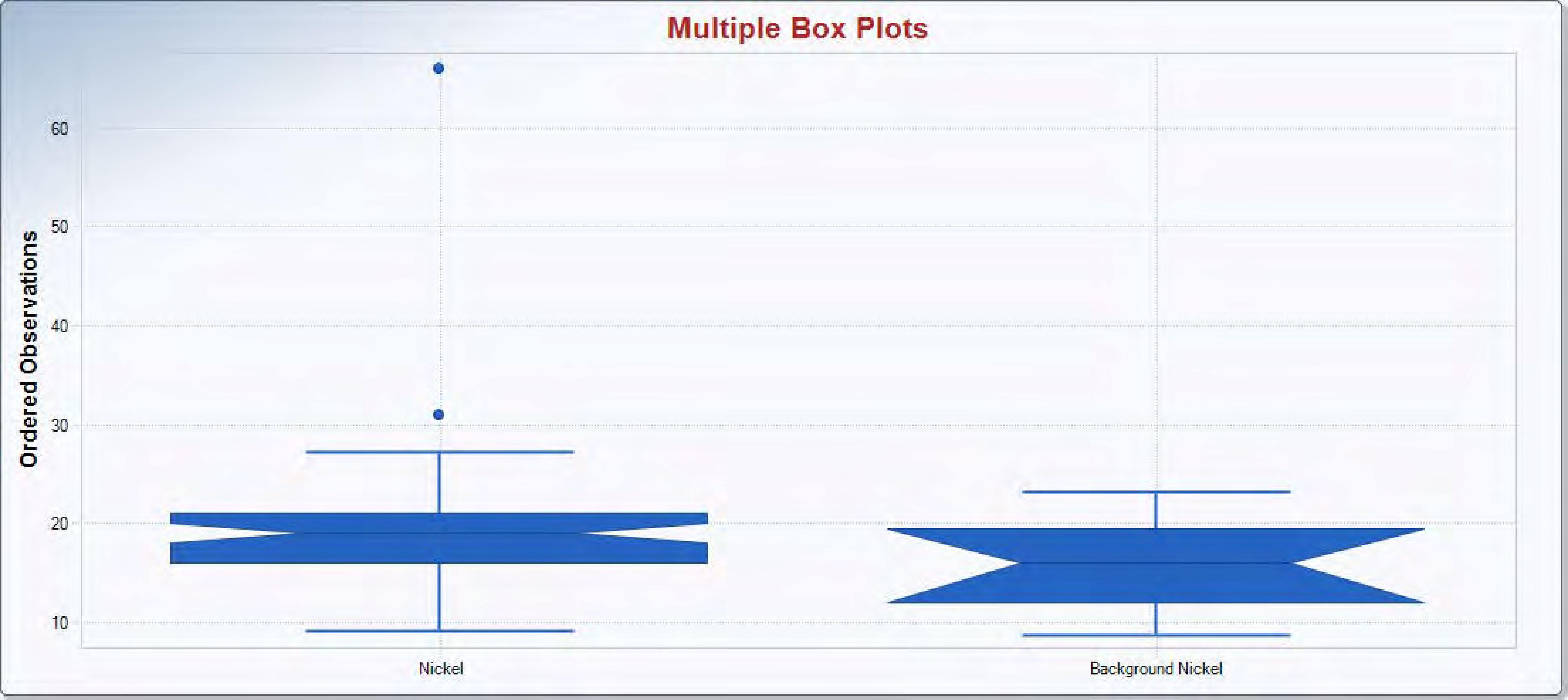
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	2423
Standardized WMW U-Stat	1.556
Mean (U)	256
SD(U) - Adj ties	55.61
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.0599

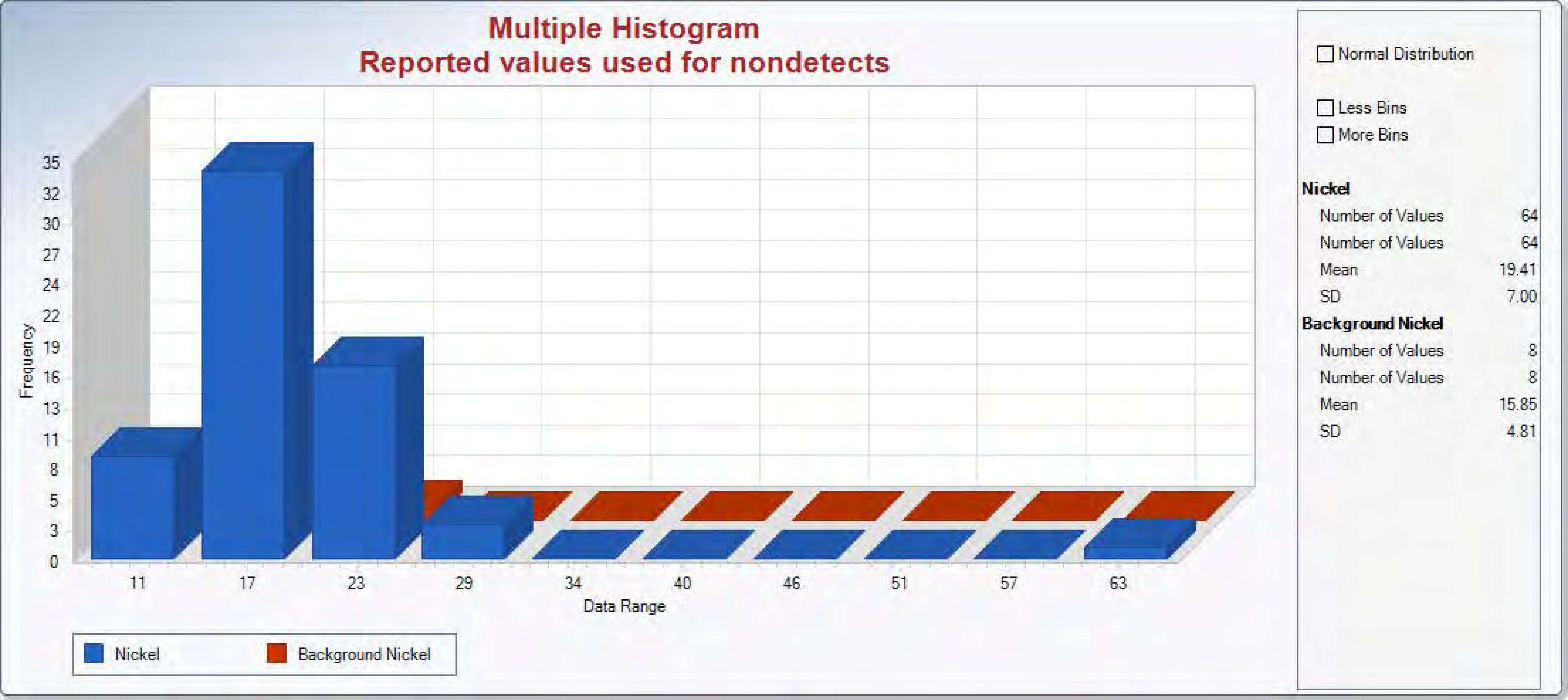
Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

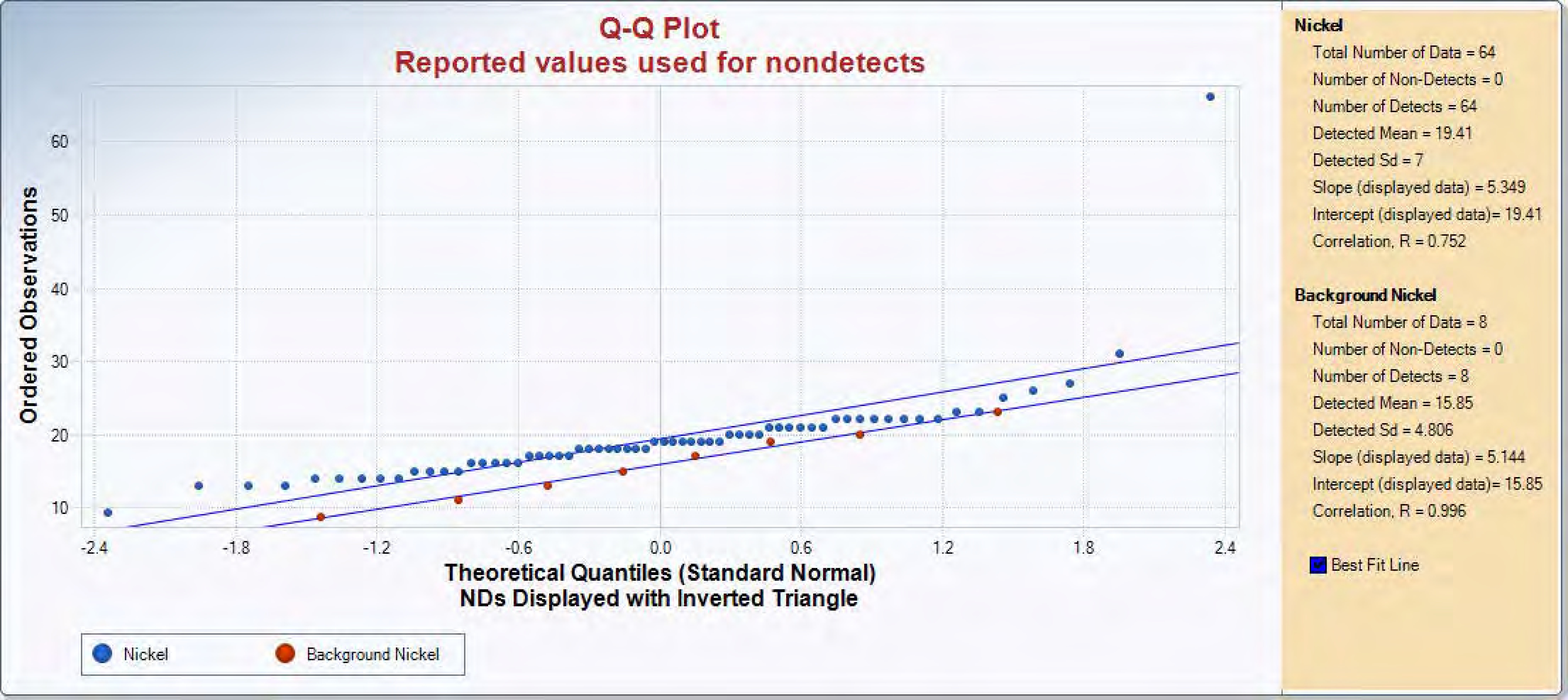
P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
60
50
40
30
20
10
Nickel
Background Nickel



Multiple Histogram
Reported values used for nondetects
Frequency
0
3
5
8
11
13
16
19
22
24
27
30
32
35
11
17
23
29
34
40
46
51
57
63
Data Range
Nickel
Background Nickel
Normal Distribution
Less Bins
More Bins
Nickel
Number of Values 64
Number of Values 64
Mean 19.41
SD 7.00
Background Nickel
Number of Values 8
Number of Values 8
Mean 15.85
SD 4.81


Q-Q Plot
Reported values used for nondetects
Ordered Observations
10
20
30
40
50
60
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Nickel
Background Nickel
Nickel
Total Number of Data = 64
Number of Non-Detects = 0
Number of Detects = 64
Detected Mean = 19.41
Detected Sd = 7
Slope (displayed data) = 5.349
Intercept (displayed data)= 19.41
Correlation, R = 0.752
Background Nickel
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 15.85
Detected Sd = 4.806
Slope (displayed data) = 5.144
Intercept (displayed data)= 15.85
Correlation, R = 0.996
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:35:57 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Vanadium

Sample 2 Data: Background Vanadium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	29	32
Maximum Detect	94	61
Mean of Detects	45.92	46
Median of Detects	42.5	49
SD of Detects	11.83	10.45
KM Mean	45.92	46
KM SD	11.83	10.45

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-0.251
Critical z (0.05)	1.645
P-Value	0.599

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:36:49 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Vanadium

Sample 2 Data: Background Vanadium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detects	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	29	32
Maximum Detect	94	61
Mean of Detects	45.92	46
Median of Detects	42.5	49
SD of Detects	11.83	10.45
KM Mean	45.92	46
KM SD	11.83	10.45

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.0502
TW Critical Value (0.05)	1.645
P-Value	0.52

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:37:31 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Vanadium

Sample 2 Data: Background Vanadium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	29	32
Maximum Detect	94	61
Mean of Detects	45.92	46
Median of Detects	42.5	49
SD of Detects	11.83	10.45

Wilcoxon-Mann-Whitney (WMW) Test

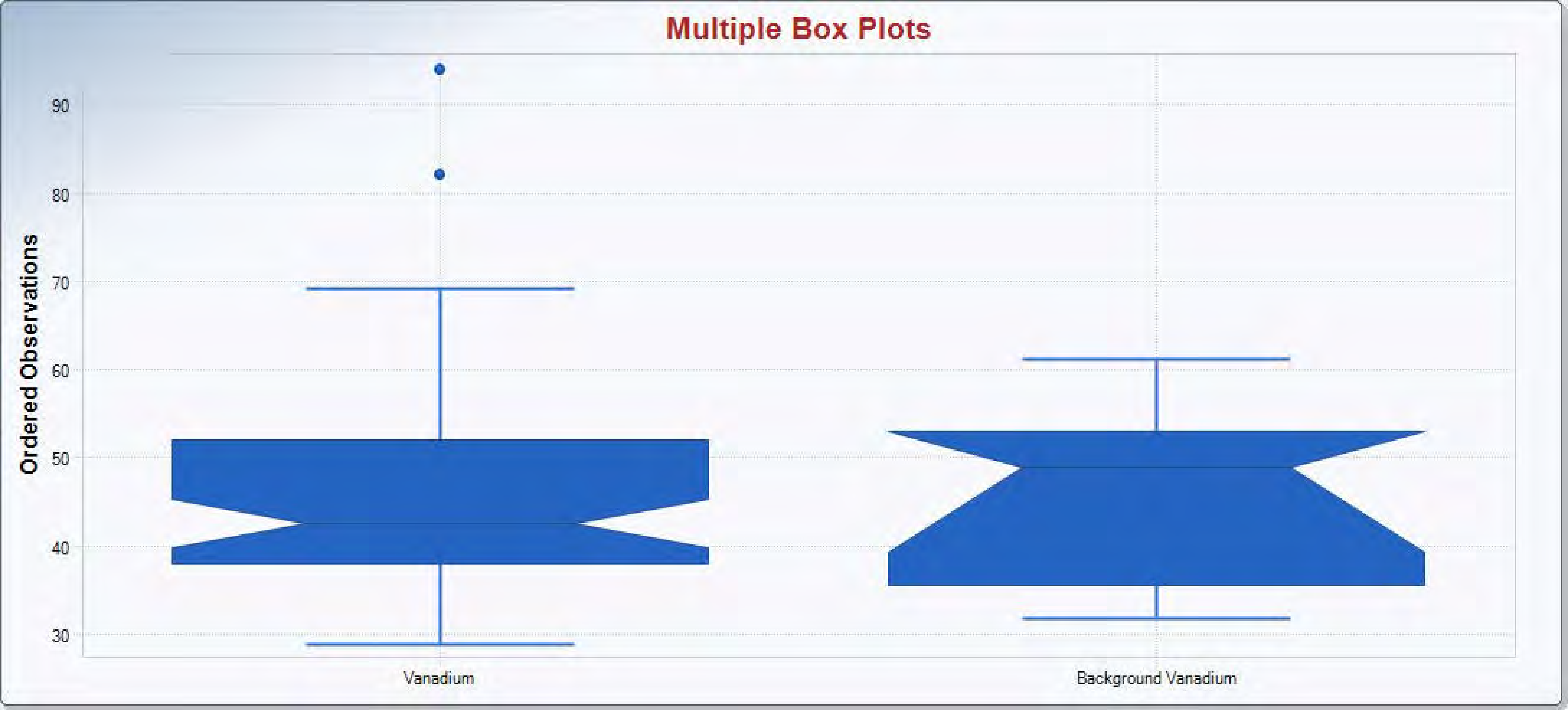
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

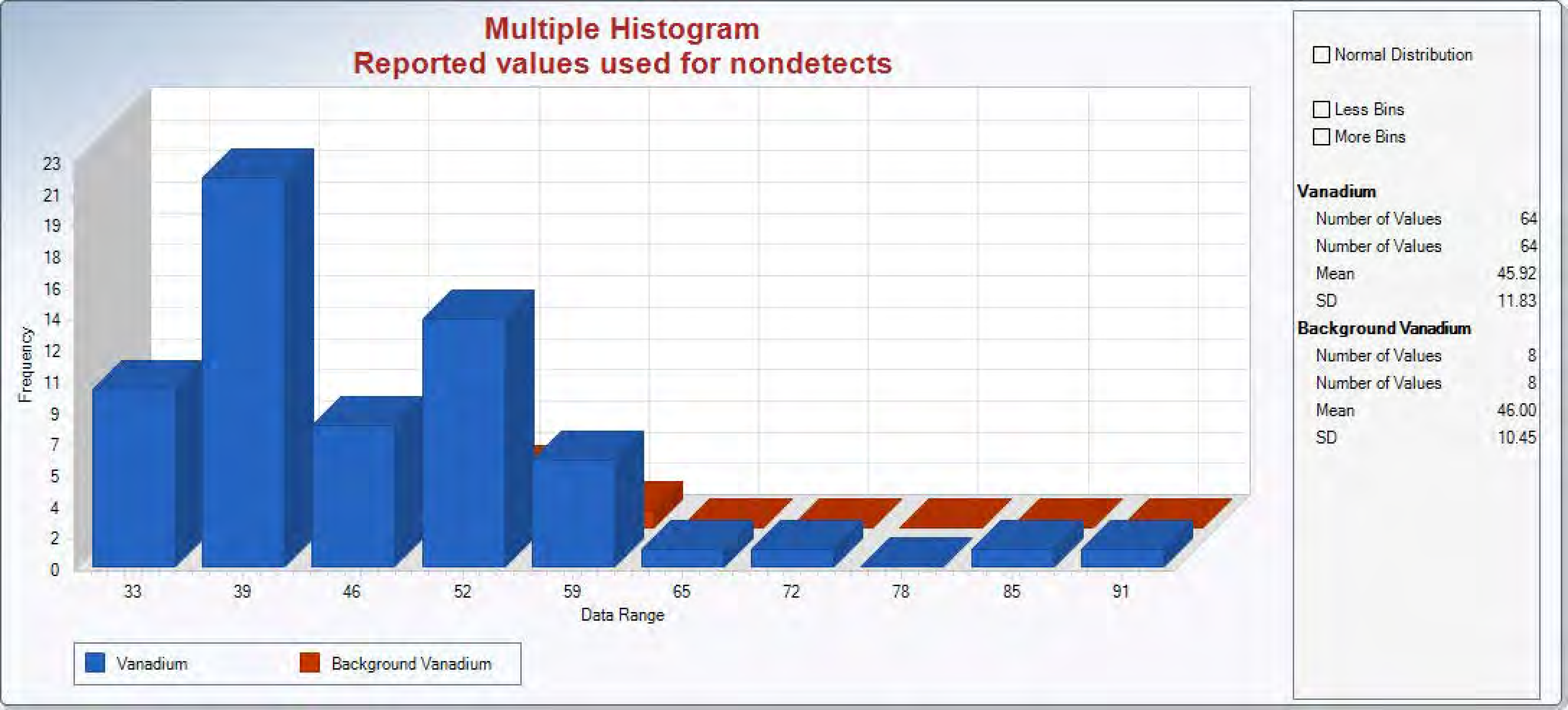
Sample 1 Rank Sum W-Stat	2328
Standardized WMW U-Stat	-0.161
Mean (U)	256
SD(U) - Adj ties	55.76
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.564

Conclusion with Alpha = 0.05

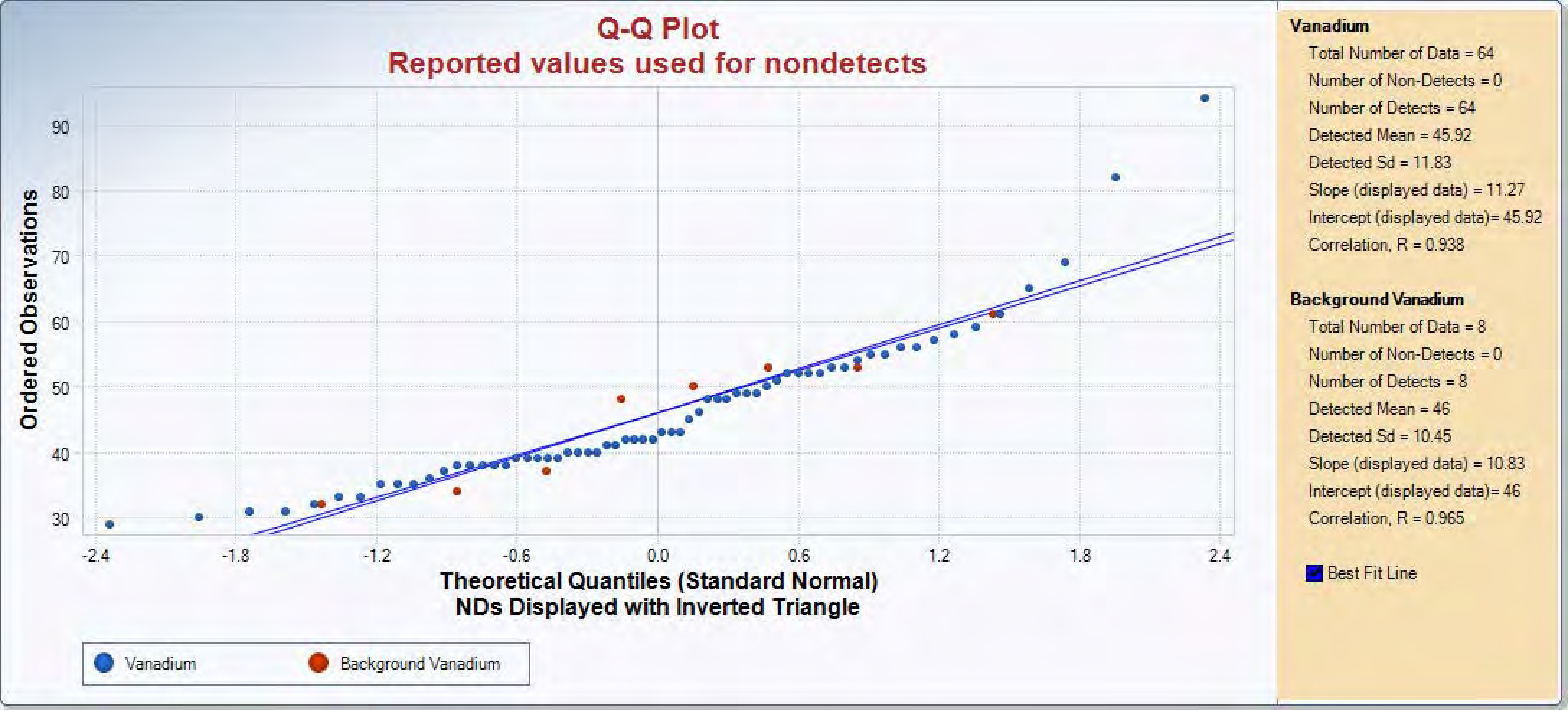
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)


Multiple Box Plots
Ordered Observations
90
80
70
60
50
40
30
Vanadium
Background Vanadium



Multiple Histogram
Reported values used for nondetects
Frequency
23
21
19
18
16
14
12
11
9
7
5
4
2
0
33
39
46
52
59
65
72
78
85
91
Data Range
Vanadium
Background Vanadium
Normal Distribution
Less Bins
More Bins
Vanadium
Number of Values 64
Number of Values 64
Mean 45.92
SD 11.83
Background Vanadium
Number of Values 8
Number of Values 8
Mean 46.00
SD 10.45


Q-Q Plot
Reported values used for nondetects
Ordered Observations
90
80
70
60
50
40
30
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Vanadium
Background Vanadium
Vanadium
Total Number of Data = 64
Number of Non-Detects = 0
Number of Detects = 64
Detected Mean = 45.92
Detected Sd = 11.83
Slope (displayed data) = 11.27
Intercept (displayed data)= 45.92
Correlation, R = 0.938
Background Vanadium
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 46
Detected Sd = 10.45
Slope (displayed data) = 10.83
Intercept (displayed data)= 46
Correlation, R = 0.965
Best Fit Line

	A	B	C	D	E	F	G	H	I	J	K	L
1	Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/23/2018 2:41:24 PM								
5	From File			Onsite Metals Input w Background.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Selected Null Hypothesis			Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)								
9	Alternative Hypothesis			Sample 1 Mean/Median > Sample 2 Mean/Median								
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 Valid Data				64	8						
18	Number of Non-Detects				0	0						
19	Number of Detect Data				64	8						
20	Minimum Non-Detect				N/A	N/A						
21	Maximum Non-Detect				N/A	N/A						
22	Percent Non-detects				0.00%	0.00%						
23	Minimum Detect				24	26						
24	Maximum Detect				290	48						
25	Mean of Detects				54.31	38.75						
26	Median 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 vs Sample 2 Gehan Test									
32												
33	H0: Mean/Median of Sample 1 <= Mean/Median of background											
34												
35	Gehan z Test Value				0.538							
36	Critical z (0.05)				1.645							
37	P-Value				0.295							
38												
39	Conclusion with Alpha = 0.05											
40	Do Not Reject H0, Conclude Sample 1 <= Sample 2											
41	P-Value >= alpha (0.05)											
42												

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:42:08 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Zinc

Sample 2 Data: Background Zinc

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detects	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	24	26
Maximum Detect	290	48
Mean of Detects	54.31	38.75
Median of Detects	39	39.5
SD of Detects	42.21	7.126
KM Mean	54.31	38.75
KM SD	42.21	7.126

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.544
TW Critical Value (0.05)	1.645
P-Value	0.293

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 2:42:47 PM
From File	Onsite Metals Input w Background.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Zinc

Sample 2 Data: Background Zinc

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	64	8
Number of Non-Detects	0	0
Number of Detect Data	64	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	24	26
Maximum Detect	290	48
Mean of Detects	54.31	38.75
Median of Detects	39	39.5
SD of Detects	42.21	7.126

Wilcoxon-Mann-Whitney (WMW) Test

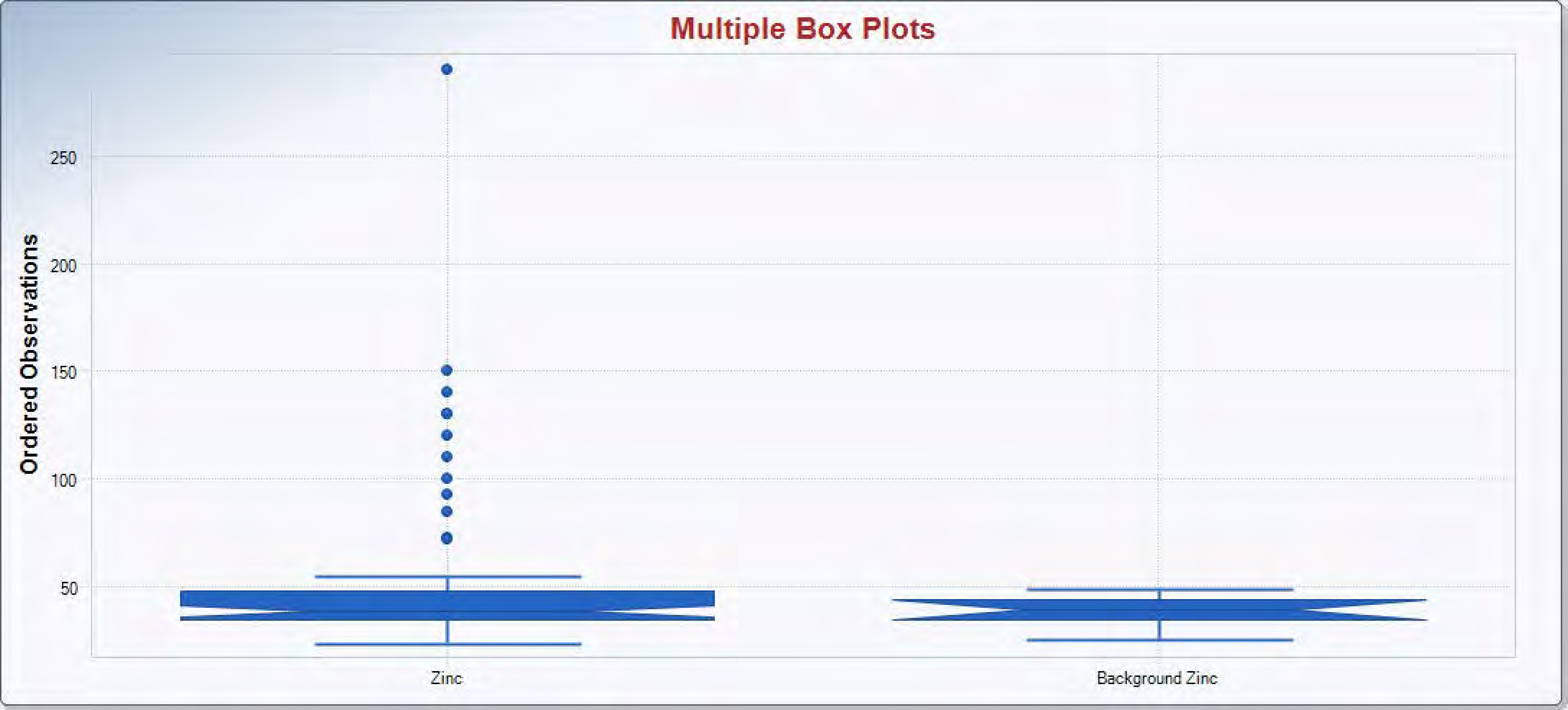
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

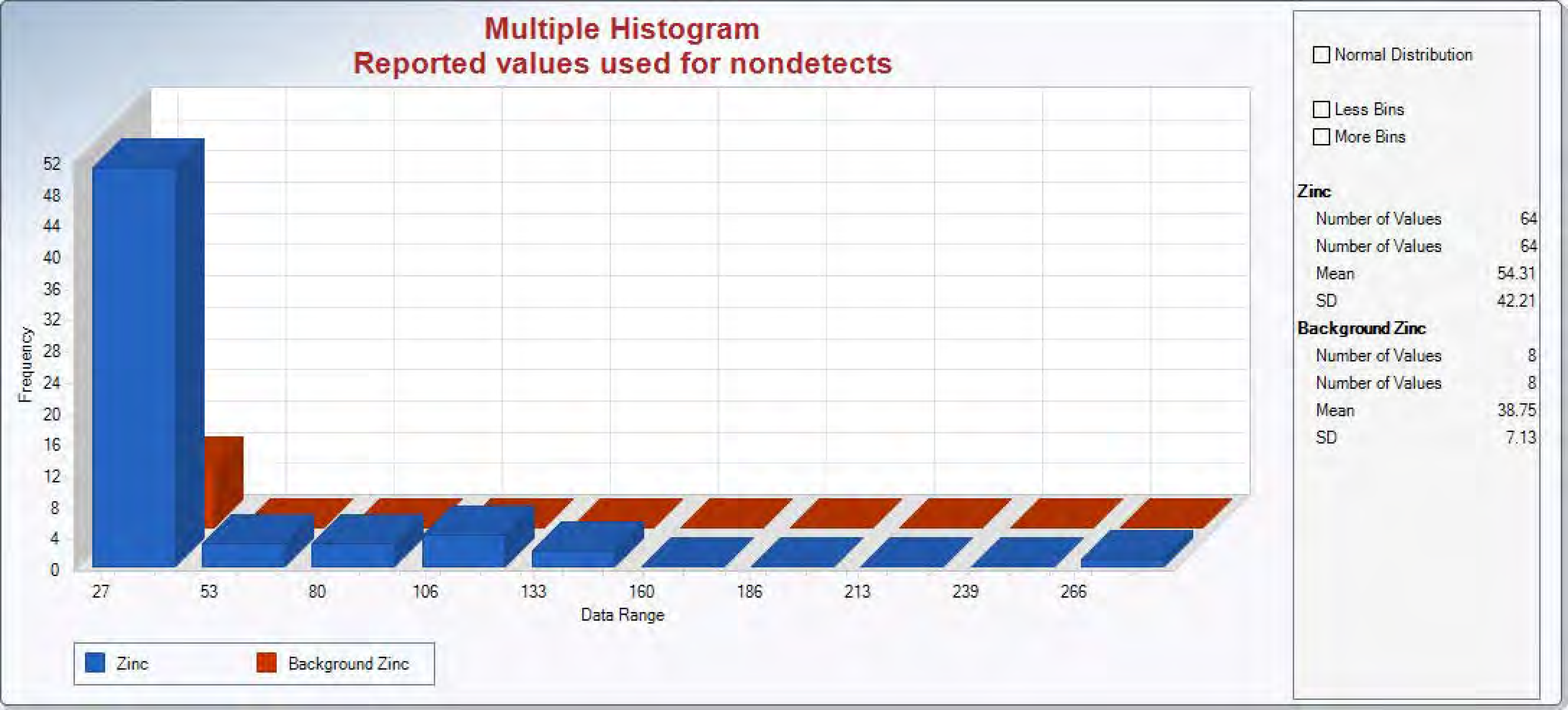
Sample 1 Rank Sum W-Stat	2374
Standardized WMW U-Stat	0.673
Mean (U)	256
SD(U) - Adj ties	55.75
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.251

Conclusion with Alpha = 0.05

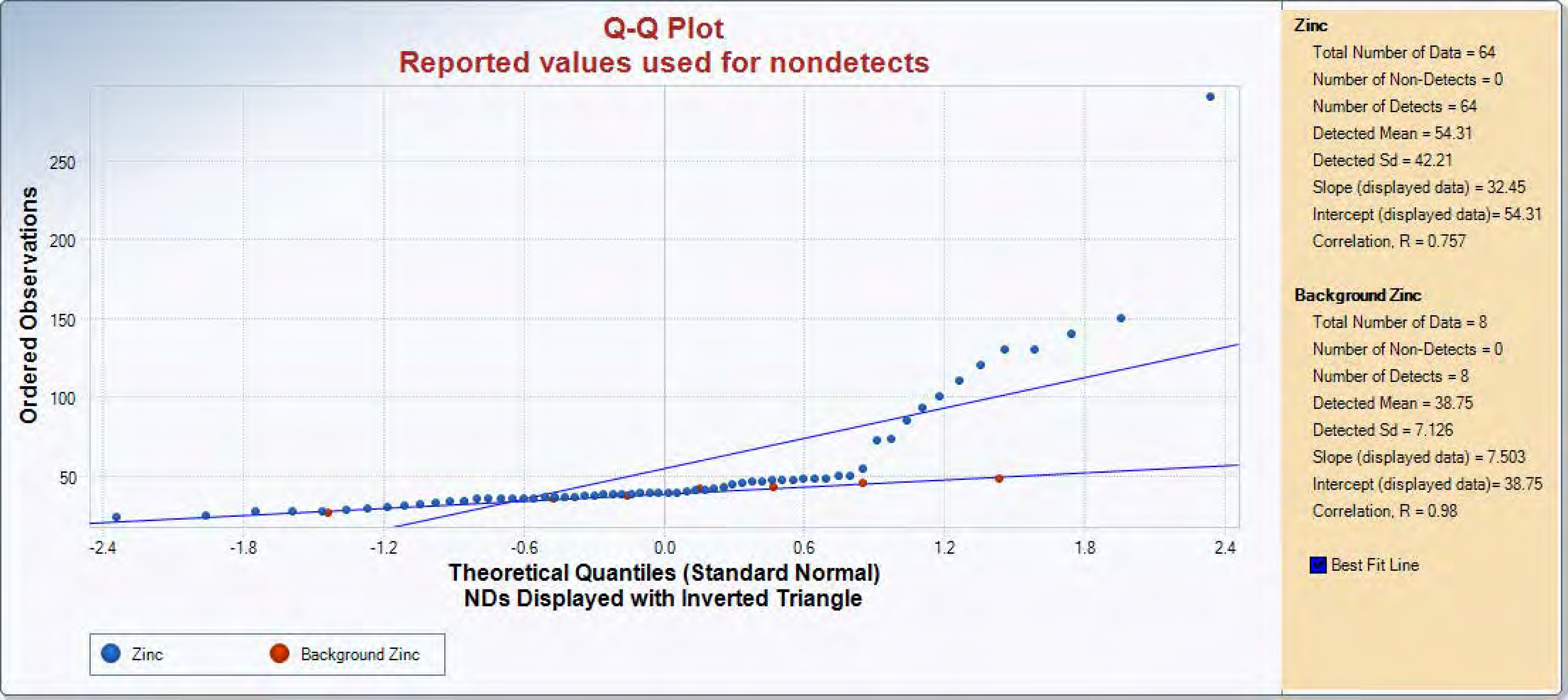
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)


Multiple Box Plots
Ordered Observations
250
200
150
100
50
Zinc
Background Zinc



Multiple Histogram
Reported values used for nondetects
Frequency
0
4
8
12
16
20
24
28
32
36
40
44
48
52
27
53
80
106
133
160
186
213
239
266
Data Range
Zinc
Background Zinc
Normal Distribution
Less Bins
More Bins
Zinc
Number of Values 64
Number of Values 64
Mean 54.31
SD 42.21
Background Zinc
Number of Values 8
Number of Values 8
Mean 38.75
SD 7.13



Q-Q Plot
Reported values used for nondetects
Ordered Observations
250
200
150
100
50
-2.4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
2.4
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Zinc
Background Zinc
Zinc
Total Number of Data = 64
Number of Non-Detects = 0
Number of Detects = 64
Detected Mean = 54.31
Detected Sd = 42.21
Slope (displayed data) = 32.45
Intercept (displayed data)= 54.31
Correlation, R = 0.757
Background Zinc
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 38.75
Detected Sd = 7.126
Slope (displayed data) = 7.503
Intercept (displayed data)= 38.75
Correlation, R = 0.98
Best Fit Line

APPENDIX F

Metals Statistics Onsite to Background
Eastern Parcel

	A	B	C	D	E	F	G	H	I	J	K	L
1	Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/28/2018 3:53:47 PM								
5	From File			Metals with Background Metals Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Selected Null Hypothesis			Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)								
9	Alternative Hypothesis			Sample 1 Mean/Median > Sample 2 Mean/Median								
10												
11												
12	**Sample 1 Data: Arsenic**											
13	**Sample 2 Data: Background Arsenic**											
14												
15				**Raw Statistics**								
16					Sample 1	Sample 2						
17	Number of Valid Data				42	8						
18	Number of Non-Detects				0	0						
19	Number of Detect Data				42	8						
20	Minimum Non-Detect				N/A	N/A						
21	Maximum Non-Detect				N/A	N/A						
22	Percent Non-detects				0.00%	0.00%						
23	Minimum Detect				1.9	2.1						
24	Maximum 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				**Sample 1 vs Sample 2 Gehan Test**								
32												
33	**H0: Mean/Median of Sample 1 <= Mean/Median of background**											
34												
35	Gehan z Test Value				1.217							
36	Critical z (0.05)				1.645							
37	P-Value				0.112							
38												
39	**Conclusion with Alpha = 0.05**											
40	**Do Not Reject H0, Conclude Sample 1 <= Sample 2**											
41	**P-Value >= alpha (0.05)**											
42												

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 3:54:58 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Arsenic

Sample 2 Data: Background Arsenic

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detects	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	1.9	2.1
Maximum Detect	18	11
Mean of Detects	8.076	5.6
Median of Detects	7.55	5
SD of Detects	4.811	2.739
KM Mean	8.076	5.6
KM SD	4.811	2.739

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	0.939
TW Critical Value (0.05)	1.645
P-Value	0.174

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:05:29 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Arsenic

Sample 2 Data: Background Arsenic

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	1.9	2.1
Maximum Detect	18	11
Mean of Detects	8.076	5.6
Median of Detects	7.55	5
SD of Detects	4.811	2.739

Wilcoxon-Mann-Whitney (WMW) Test

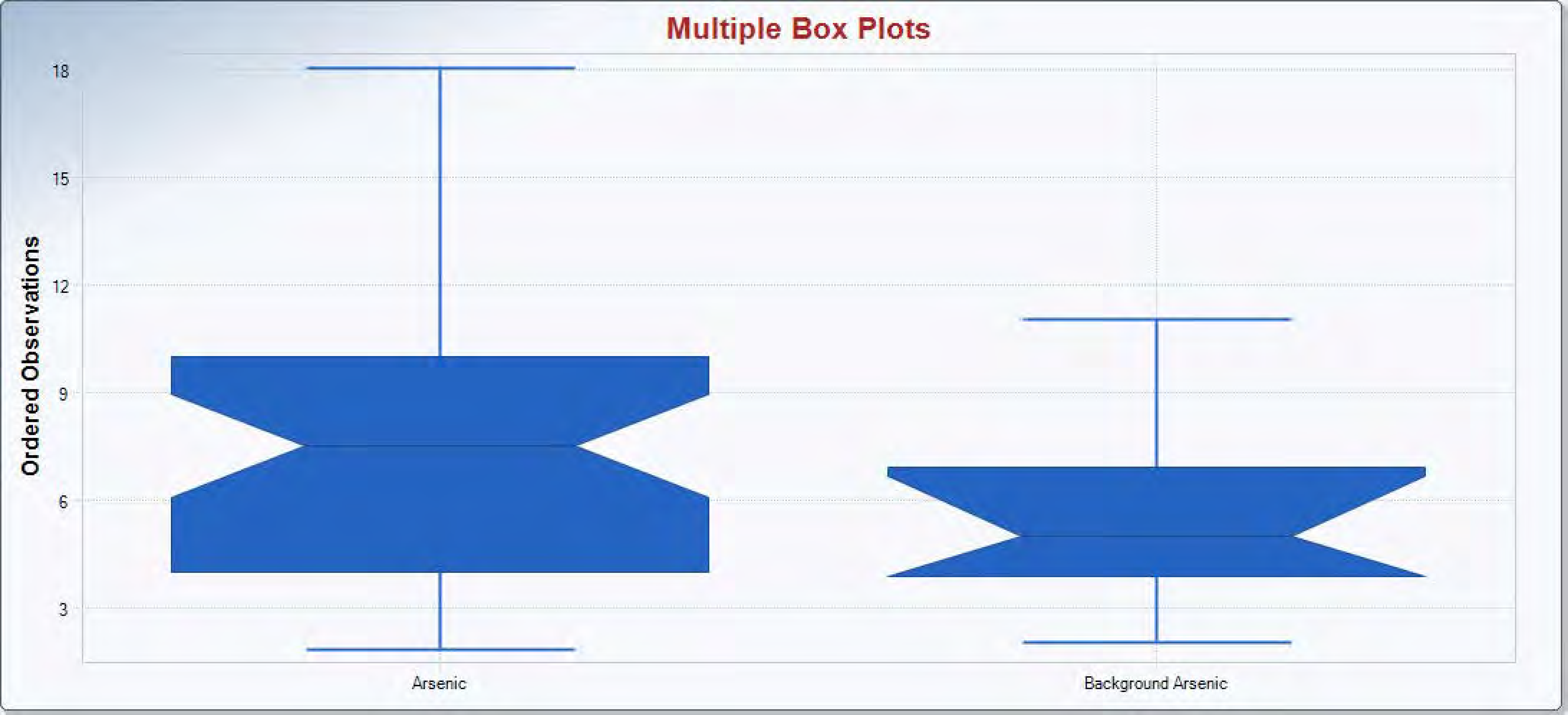
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1117
Standardized WMW U-Stat	1.205
Mean (U)	168
SD(U) - Adj ties	37.76
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.114

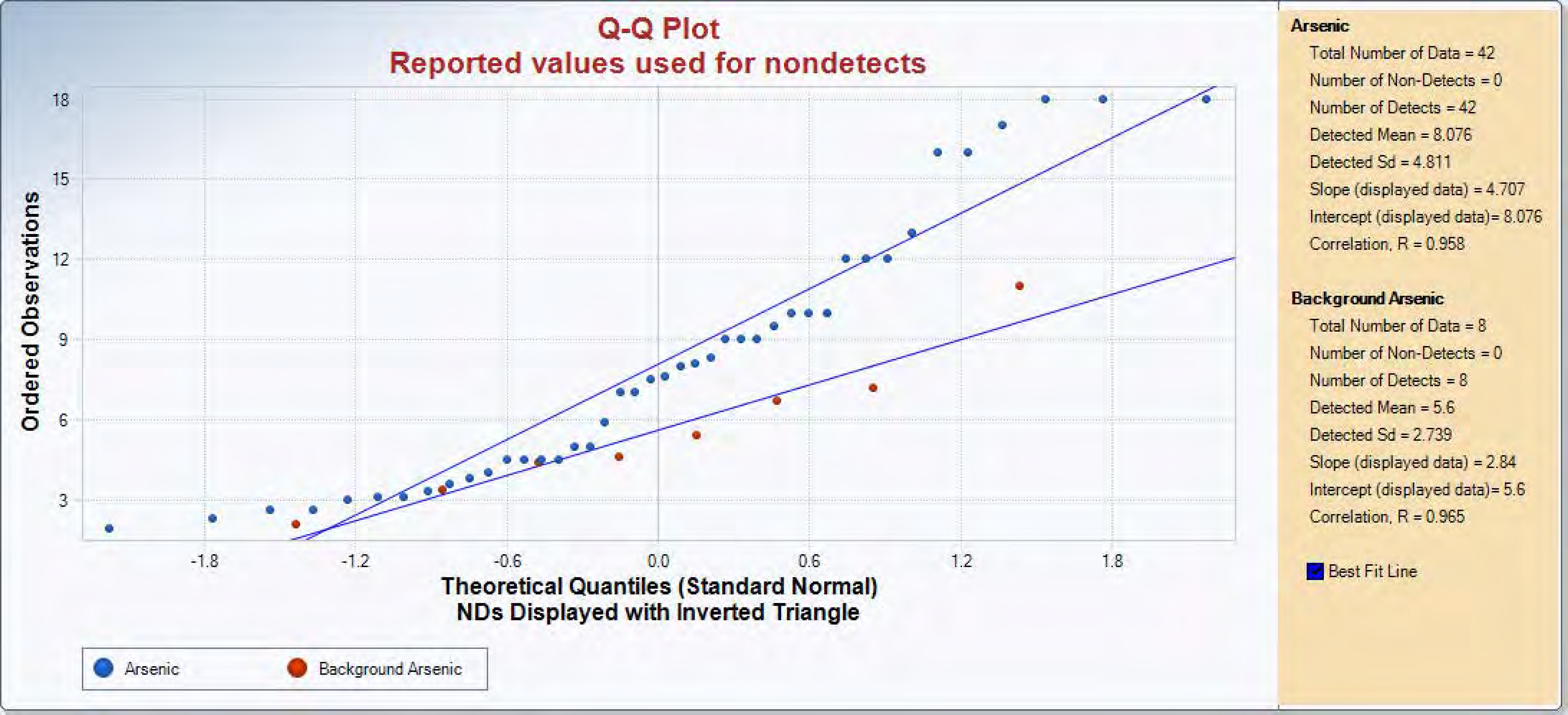
Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)


Multiple Box Plots
Ordered Observations
18
15
12
9
6
3
Arsenic
Background Arsenic

Multiple Histogram
Reported values used for nondetects
Frequency
10
9
8
8
7
6
5
5
4
3
2
2
1
0
2
3
5
6
8
10
11
13
14
16
18
Data Range
Arsenic
Background Arsenic
Normal Distribution
Less Bins
More Bins
Arsenic
Number of Values 42
Number of Values 42
Mean 8.08
SD 4.81
Background Arsenic
Number of Values 8
Number of Values 8
Mean 5.60
SD 2.74


Q-Q Plot
Reported values used for nondetects
Ordered Observations
18
15
12
9
6
3
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Arsenic
Background Arsenic
Arsenic
Total Number of Data = 42
Number of Non-Detects = 0
Number of Detects = 42
Detected Mean = 8.076
Detected Sd = 4.811
Slope (displayed data) = 4.707
Intercept (displayed data)= 8.076
Correlation, R = 0.958
Background Arsenic
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 5.6
Detected Sd = 2.739
Slope (displayed data) = 2.84
Intercept (displayed data)= 5.6
Correlation, R = 0.965
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:09:16 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium

Sample 2 Data: Background Barium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	30	83
Maximum Detect	450	230
Mean of Detects	102.2	134.3
Median of Detects	87	110
SD of Detects	71.9	54.23
KM Mean	102.2	134.3
KM SD	71.9	54.23

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.355
Critical z (0.05)	1.645
P-Value	0.991

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:10:09 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium

Sample 2 Data: Background Barium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detects	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	30	83
Maximum Detect	450	230
Mean of Detects	102.2	134.3
Median of Detects	87	110
SD of Detects	71.9	54.23
KM Mean	102.2	134.3
KM SD	71.9	54.23

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.769
TW Critical Value (0.05)	1.645
P-Value	0.997

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:10:50 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Barium

Sample 2 Data: Background Barium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	30	83
Maximum Detect	450	230
Mean of Detects	102.2	134.3
Median of Detects	87	110
SD of Detects	71.9	54.23

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

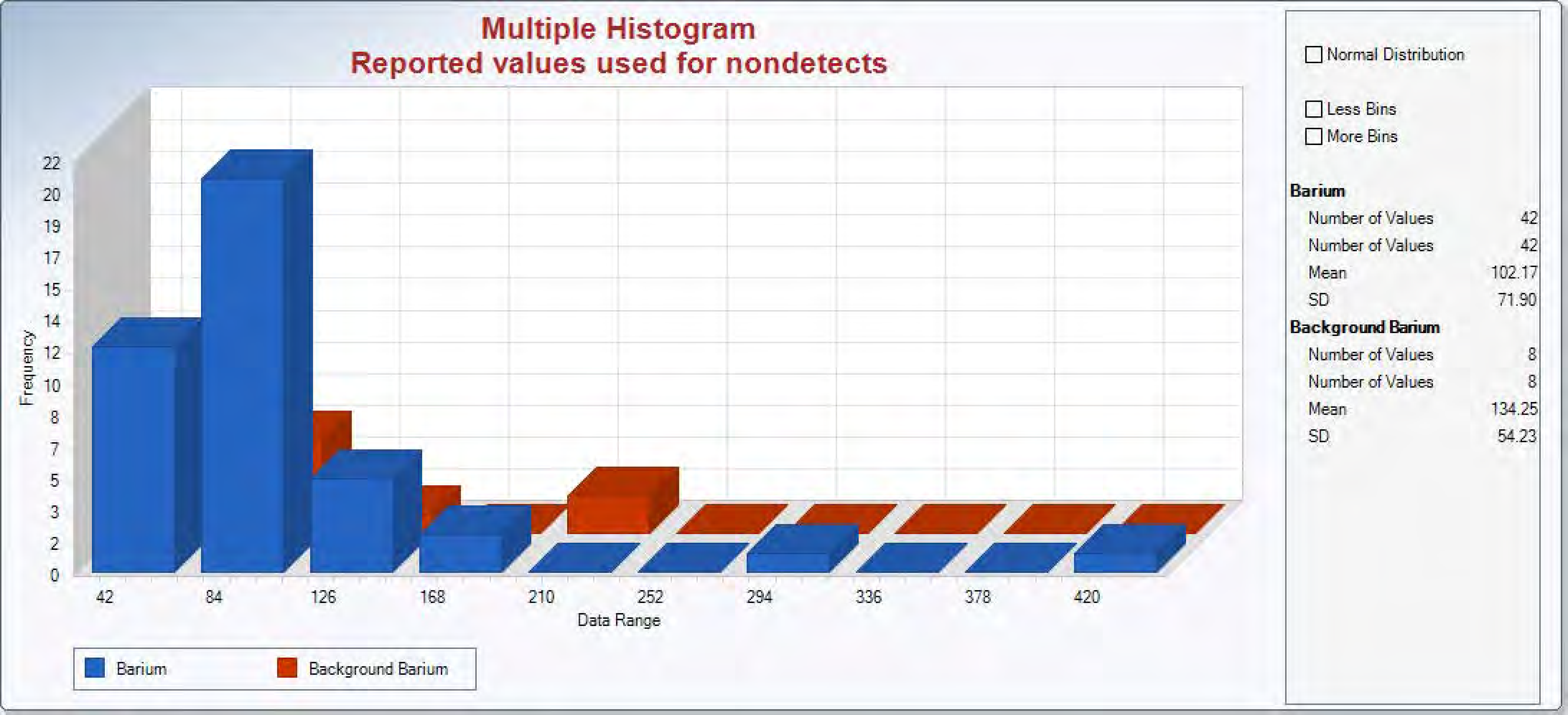
Sample 1 Rank Sum W-Stat	985.5
Standardized WMW U-Stat	-2.277
Mean (U)	168
SD(U) - Adj ties	37.77
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.989

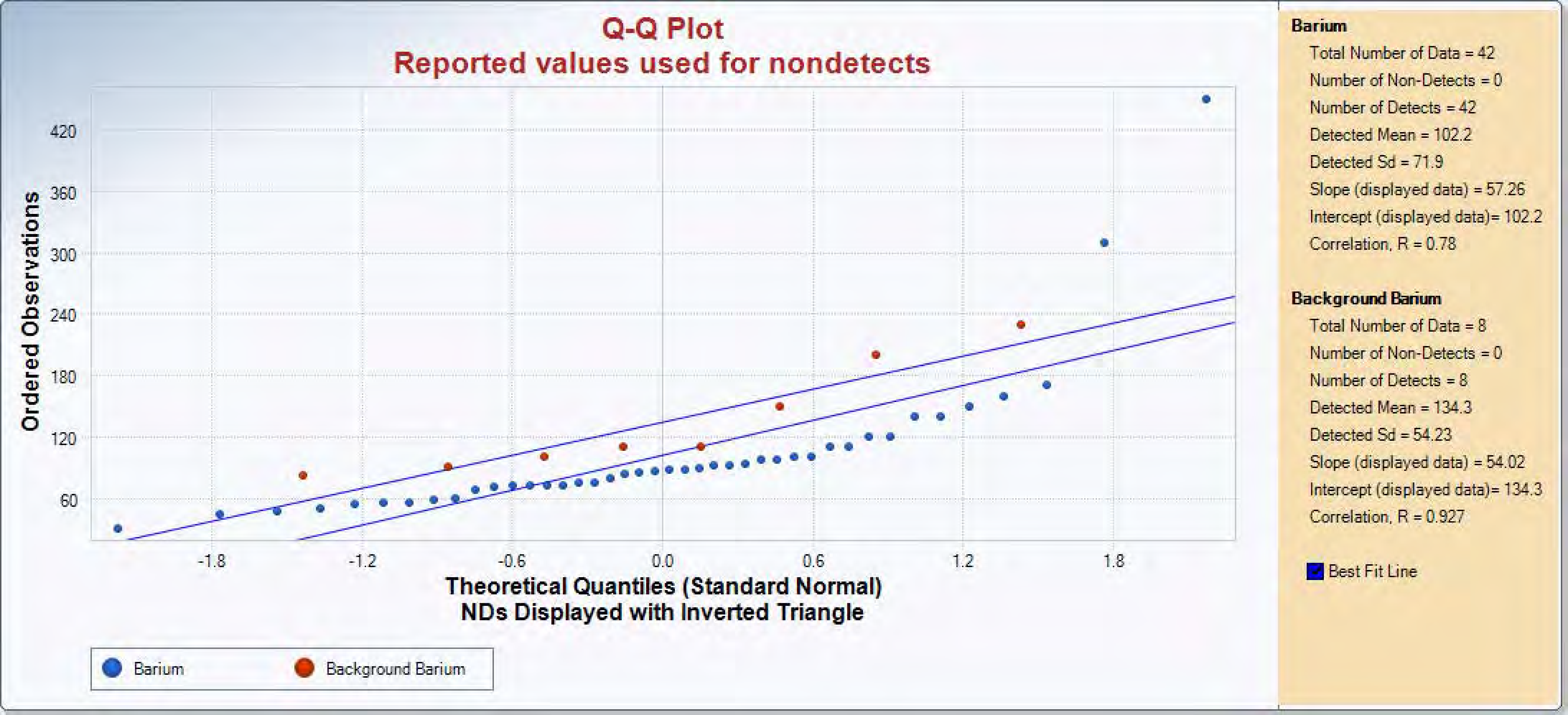
Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Multiple Box Plots
Ordered Observations
420
360
300
240
180
120
60
Barium
Background Barium


Multiple Histogram
Reported values used for nondetects
Frequency
22
20
19
17
15
14
12
10
8
7
5
3
2
0
42
84
126
168
210
252
294
336
378
420
Data Range
Barium
Background Barium
Normal Distribution
Less Bins
More Bins
Barium
Number of Values 42
Number of Values 42
Mean 102.17
SD 71.90
Background Barium
Number of Values 8
Number of Values 8
Mean 134.25
SD 54.23


Q-Q Plot
Reported values used for nondetects
Ordered Observations
420
360
300
240
180
120
60
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Barium
Background Barium
Barium
Total Number of Data = 42
Number of Non-Detects = 0
Number of Detects = 42
Detected Mean = 102.2
Detected Sd = 71.9
Slope (displayed data) = 57.26
Intercept (displayed data)= 102.2
Correlation, R = 0.78
Background Barium
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 134.3
Detected Sd = 54.23
Slope (displayed data) = 54.02
Intercept (displayed data)= 134.3
Correlation, R = 0.927
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:14:14 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Chromium

Sample 2 Data: Background Chromium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	7.5	15
Maximum Detect	40	30
Mean of Detects	18.36	22.5
Median of Detects	17.5	22.5
SD of Detects	7.557	4.957
KM Mean	18.36	22.5
KM SD	7.557	4.957

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.852
Critical z (0.05)	1.645
P-Value	0.968

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:15:09 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Chromium

Sample 2 Data: Background Chromium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detects	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	7.5	15
Maximum Detect	40	30
Mean of Detects	18.36	22.5
Median of Detects	17.5	22.5
SD of Detects	7.557	4.957
KM Mean	18.36	22.5
KM SD	7.557	4.957

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.031
TW Critical Value (0.05)	1.645
P-Value	0.979

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:15:53 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Chromium

Sample 2 Data: Background Chromium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	7.5	15
Maximum Detect	40	30
Mean of Detects	18.36	22.5
Median of Detects	17.5	22.5
SD of Detects	7.557	4.957

Wilcoxon-Mann-Whitney (WMW) Test

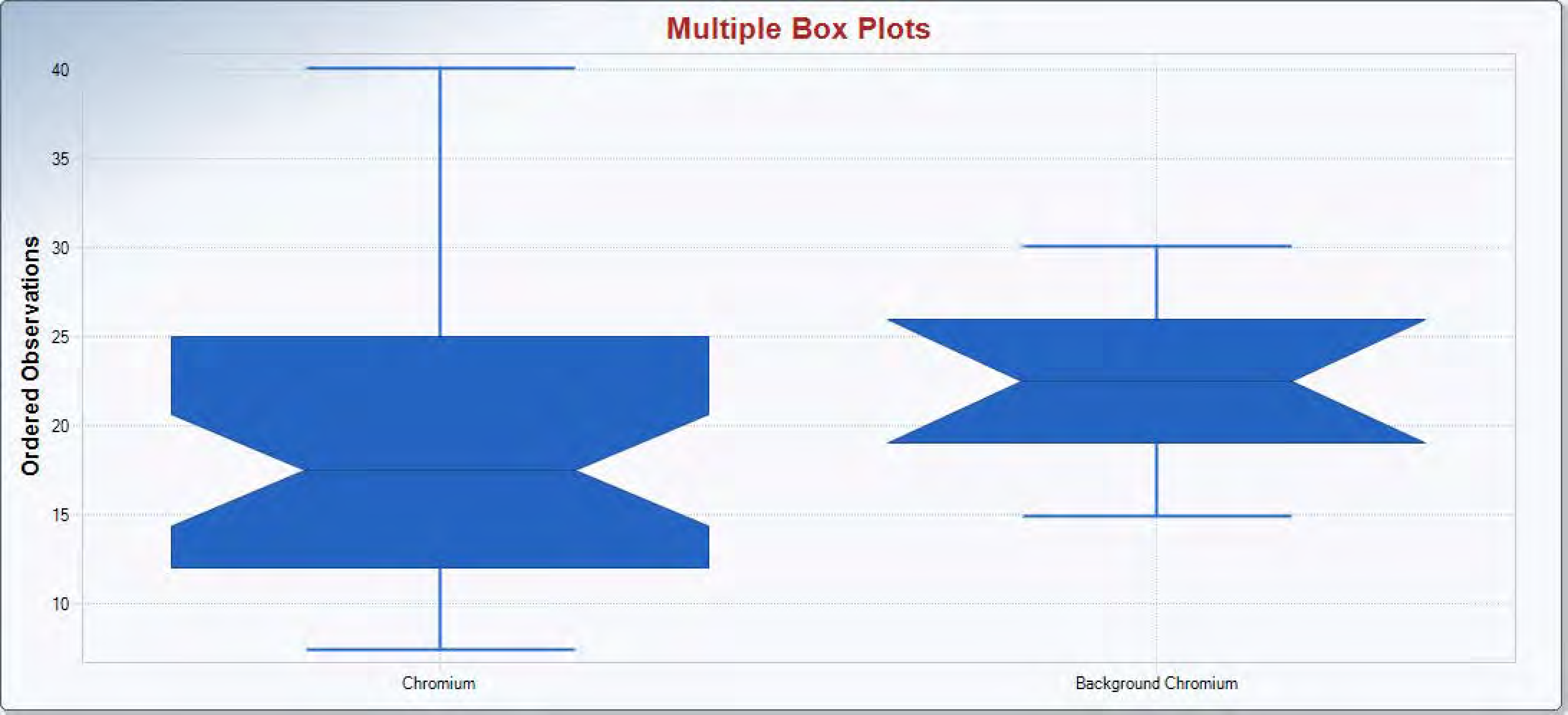
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

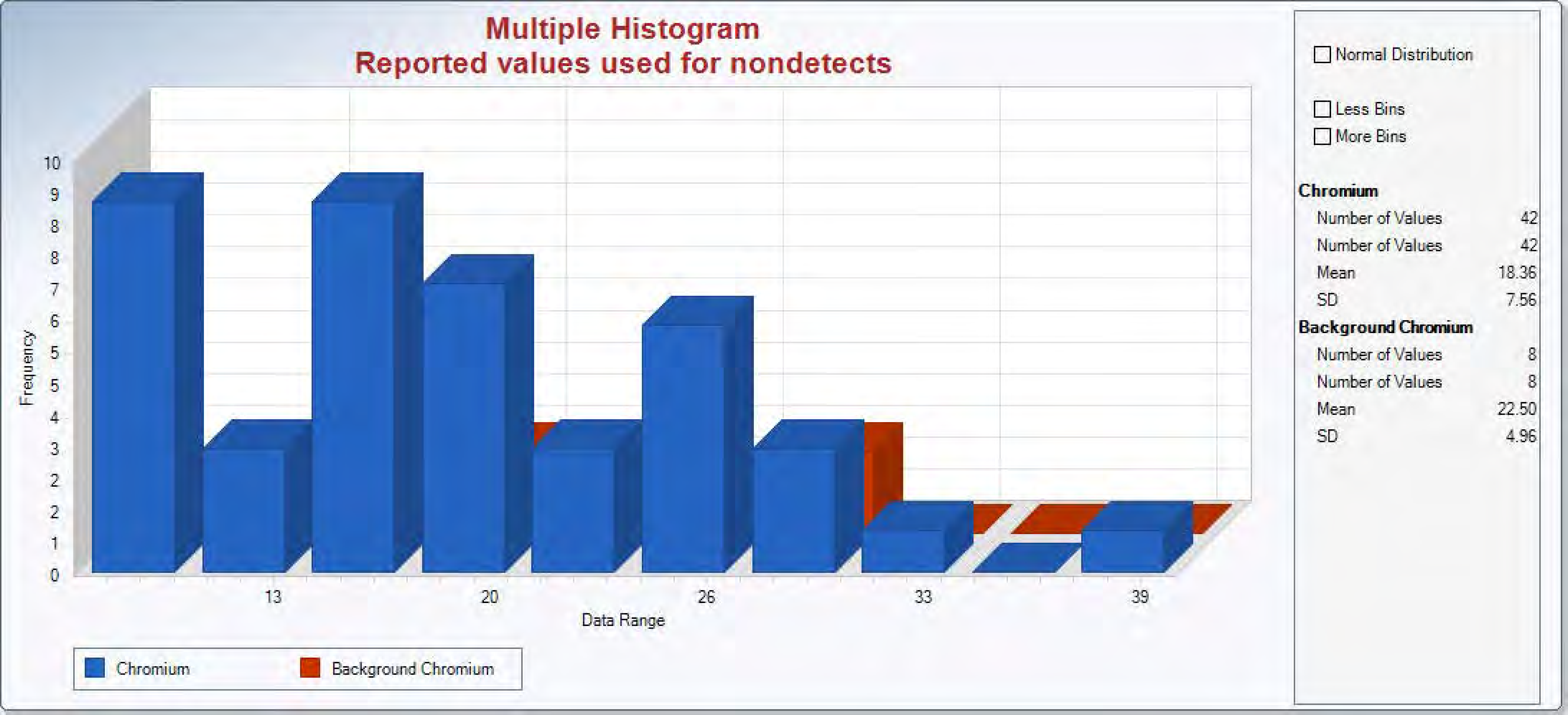
Sample 1 Rank Sum W-Stat	1007
Standardized WMW U-Stat	-1.71
Mean (U)	168
SD(U) - Adj ties	37.73
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.956

Conclusion with Alpha = 0.05

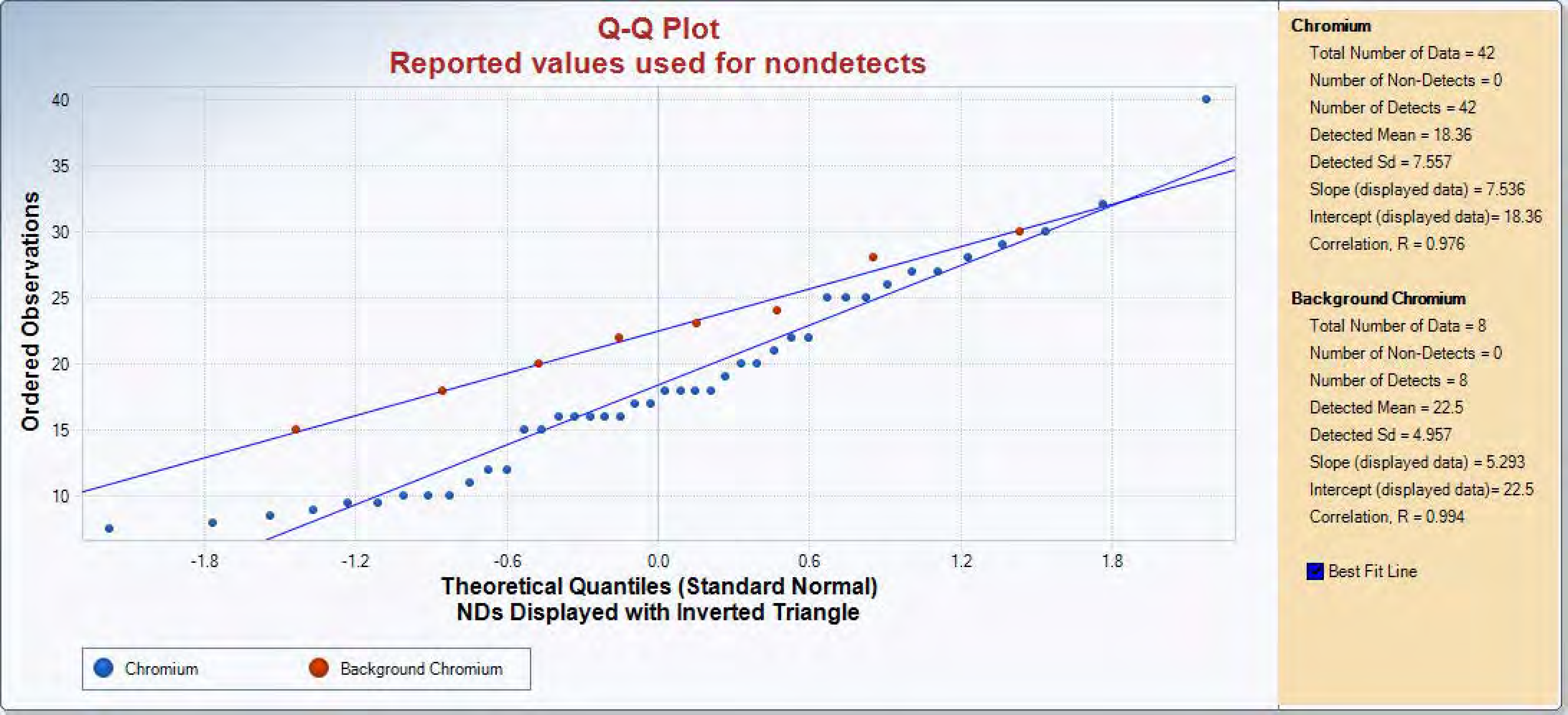
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)


Multiple Box Plots
Ordered Observations
40
35
30
25
20
15
10
Chromium
Background Chromium



Multiple Histogram
Reported values used for nondetects
10
9
8
8
7
6
5
5
4
3
2
2
1
0
Frequency
13
20
26
33
39
Data Range
Chromium
Background Chromium
Normal Distribution
Less Bins
More Bins
Chromium
Number of Values 42
Number of Values 42
Mean 18.36
SD 7.56
Background Chromium
Number of Values 8
Number of Values 8
Mean 22.50
SD 4.96


Q-Q Plot
Reported values used for nondetects
Ordered Observations
40
35
30
25
20
15
10
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Chromium
Background Chromium
Chromium
Total Number of Data = 42
Number of Non-Detects = 0
Number of Detects = 42
Detected Mean = 18.36
Detected Sd = 7.557
Slope (displayed data) = 7.536
Intercept (displayed data)= 18.36
Correlation, R = 0.976
Background Chromium
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 22.5
Detected Sd = 4.957
Slope (displayed data) = 5.293
Intercept (displayed data)= 22.5
Correlation, R = 0.994
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:20:27 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt

Sample 2 Data: Background Cobalt

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	3.5	5.9
Maximum Detect	14	13
Mean of Detects	8	9.713
Median of Detects	7.4	10.15
SD of Detects	3.006	2.495
KM Mean	8	9.713
KM SD	3.006	2.495

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.641
Critical z (0.05)	1.645
P-Value	0.95

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:22:35 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt

Sample 2 Data: Background Cobalt

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	3.5	5.9
Maximum Detect	14	13
Mean of Detects	8	9.713
Median of Detects	7.4	10.15
SD of Detects	3.006	2.495

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1016
Standardized WMW U-Stat	-1.473
Mean (U)	168
SD(U) - Adj ties	37.68
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.93

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:21:12 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Cobalt

Sample 2 Data: Background Cobalt

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detects	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	3.5	5.9
Maximum Detect	14	13
Mean of Detects	8	9.713
Median of Detects	7.4	10.15
SD of Detects	3.006	2.495
KM Mean	8	9.713
KM SD	3.006	2.495

Sample 1 vs Sample 2 Tarone-Ware Test

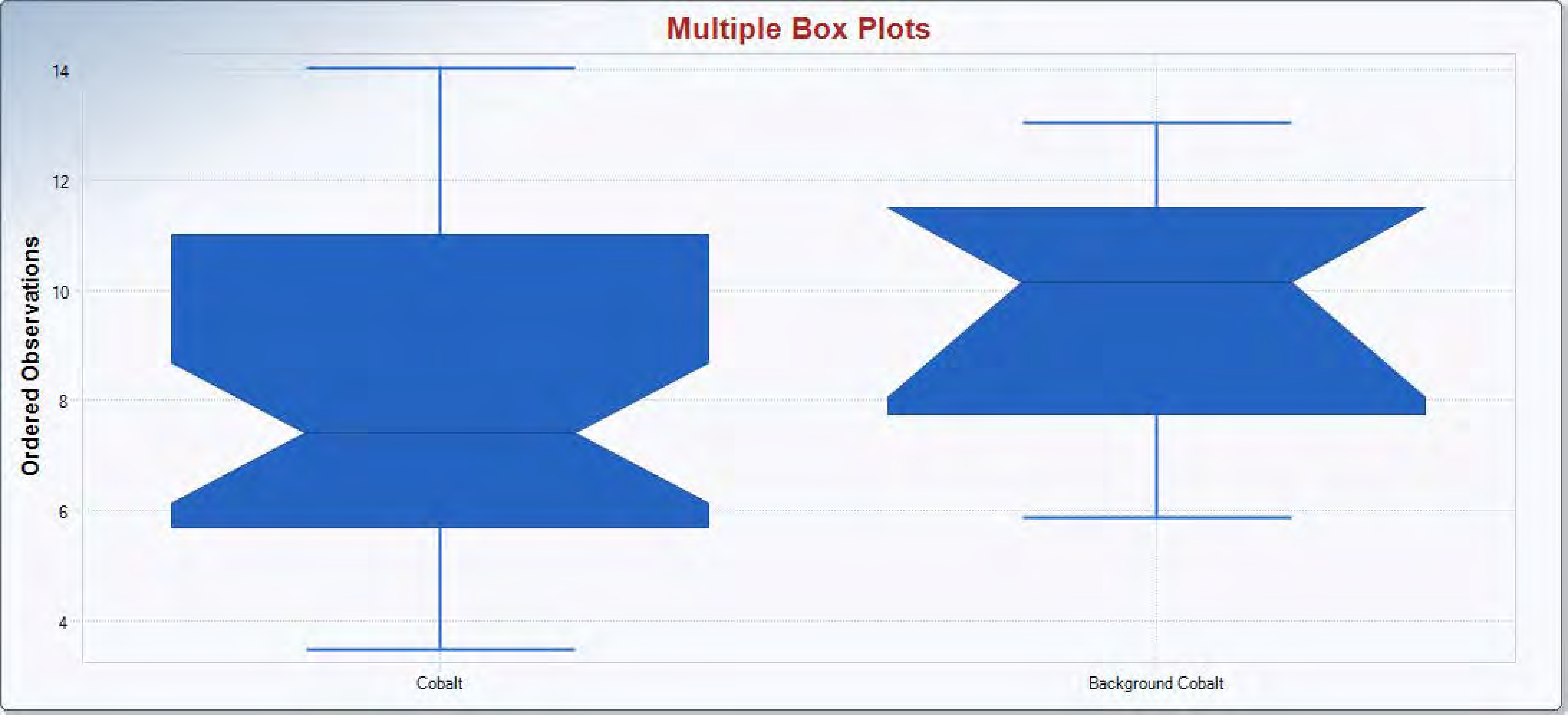
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.725
TW Critical Value (0.05)	1.645
P-Value	0.958

Conclusion with Alpha = 0.05

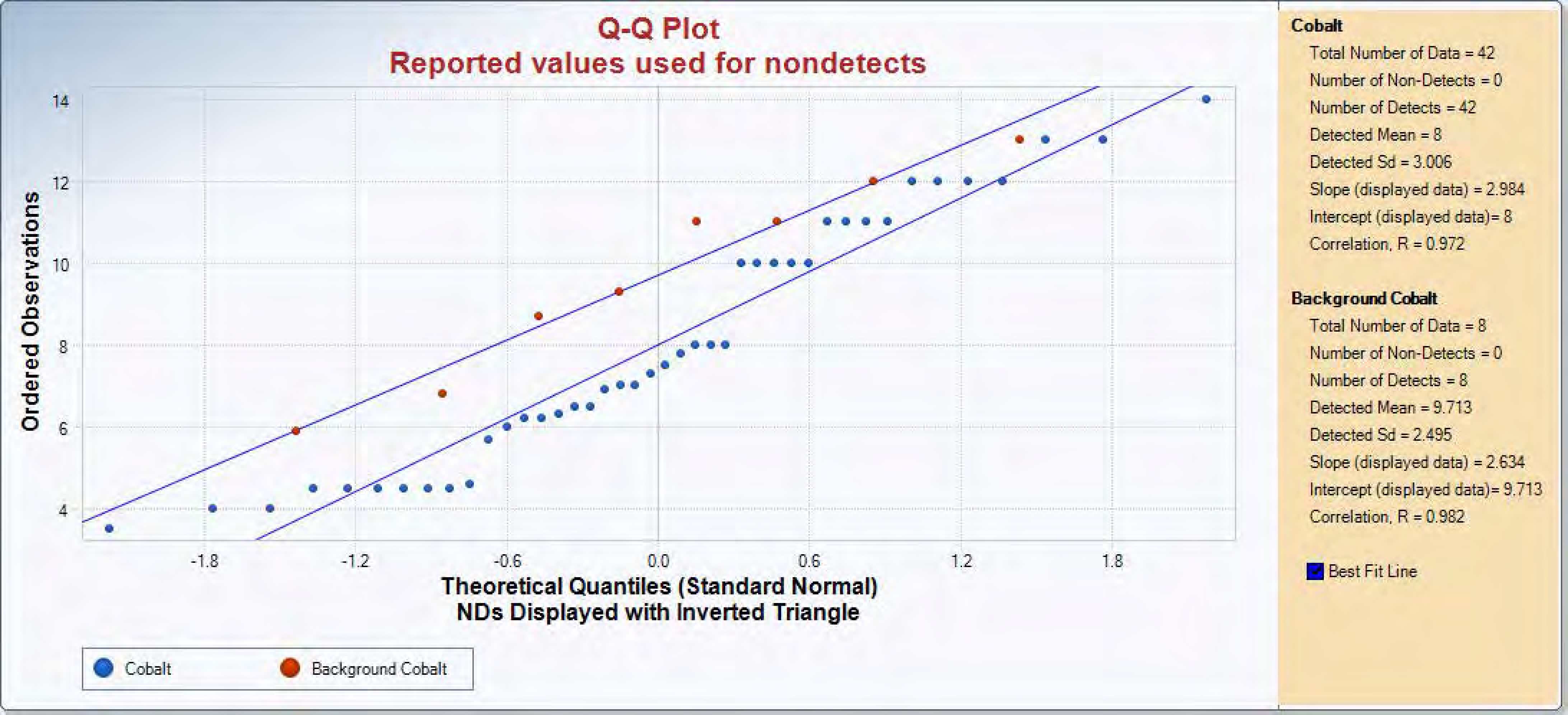
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
14
12
10
8
6
4
Cobalt
Background Cobalt


Multiple Histogram
Reported values used for nondetects
10
9
8
8
7
6
5
5
4
3
2
2
1
0
Frequency
3
4
5
6
7
8
9
11
12
13
14
Data Range
Cobalt
Background Cobalt
Normal Distribution
Less Bins
More Bins
Cobalt
Number of Values 42
Number of Values 42
Mean 8.00
SD 3.01
Background Cobalt
Number of Values 8
Number of Values 8
Mean 9.71
SD 2.49


Q-Q Plot
Reported values used for nondetects
Ordered Observations
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
14
12
10
8
6
4
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Cobalt
Background Cobalt
Cobalt
Total Number of Data = 42
Number of Non-Detects = 0
Number of Detects = 42
Detected Mean = 8
Detected Sd = 3.006
Slope (displayed data) = 2.984
Intercept (displayed data)= 8
Correlation, R = 0.972
Background Cobalt
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 9.713
Detected Sd = 2.495
Slope (displayed data) = 2.634
Intercept (displayed data)= 9.713
Correlation, R = 0.982
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:26:15 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Copper

Sample 2 Data: Background Copper

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	5	0
Number of Detect Data	37	8
Minimum Non-Detect	3	N/A
Maximum Non-Detect	3	N/A
Percent Non-detects	11.90%	0.00%
Minimum Detect	3	6.5
Maximum Detect	48	16
Mean of Detects	15.28	10.7
Median of Detects	12	10.4
SD of Detects	9.601	3.181
KM Mean	13.82	10.7
KM SD	9.738	3.181

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	0.291
Critical z (0.05)	1.645
P-Value	0.385

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:27:05 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Copper

Sample 2 Data: Background Copper

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	5	0
Number of Detects	37	8
Minimum Non-Detect	3	N/A
Maximum Non-Detect	3	N/A
Percent Non-detects	11.90%	0.00%
Minimum Detect	3	6.5
Maximum Detect	48	16
Mean of Detects	15.28	10.7
Median of Detects	12	10.4
SD of Detects	9.601	3.181
KM Mean	13.82	10.7
KM SD	9.738	3.181

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.0497
TW Critical Value (0.05)	1.645
P-Value	0.52

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:27:47 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Copper

Sample 2 Data: Background Copper

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	5	0
Number of Detect Data	37	8
Minimum Non-Detect	3	N/A
Maximum Non-Detect	3	N/A
Percent Non-detects	11.90%	0.00%
Minimum Detect	3	6.5
Maximum Detect	48	16
Mean of Detects	15.28	10.7
Median of Detects	12	10.4
SD of Detects	9.601	3.181

Wilcoxon-Mann-Whitney (WMW) Test

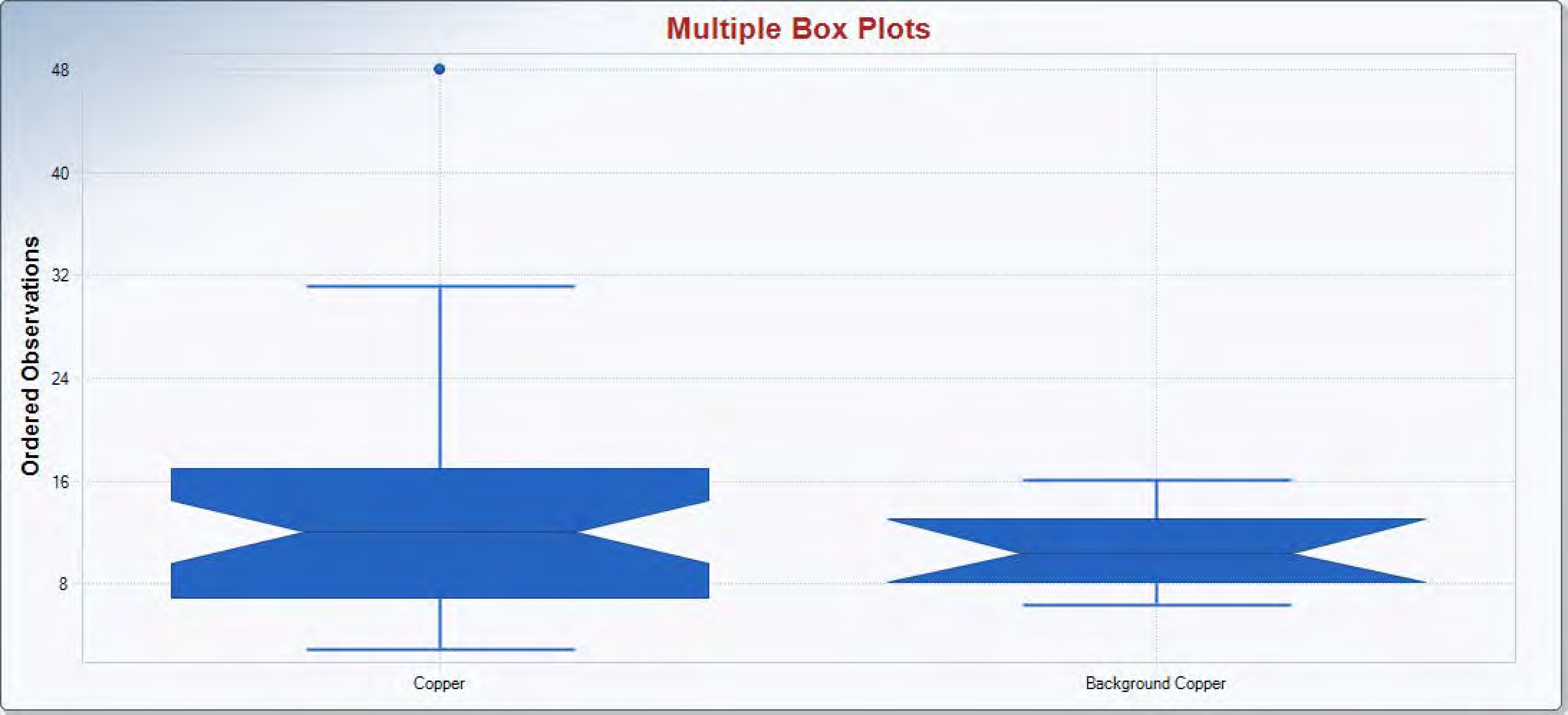
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1084
Standardized WMW U-Stat	0.331
Mean (U)	168
SD(U) - Adj ties	37.76
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.37

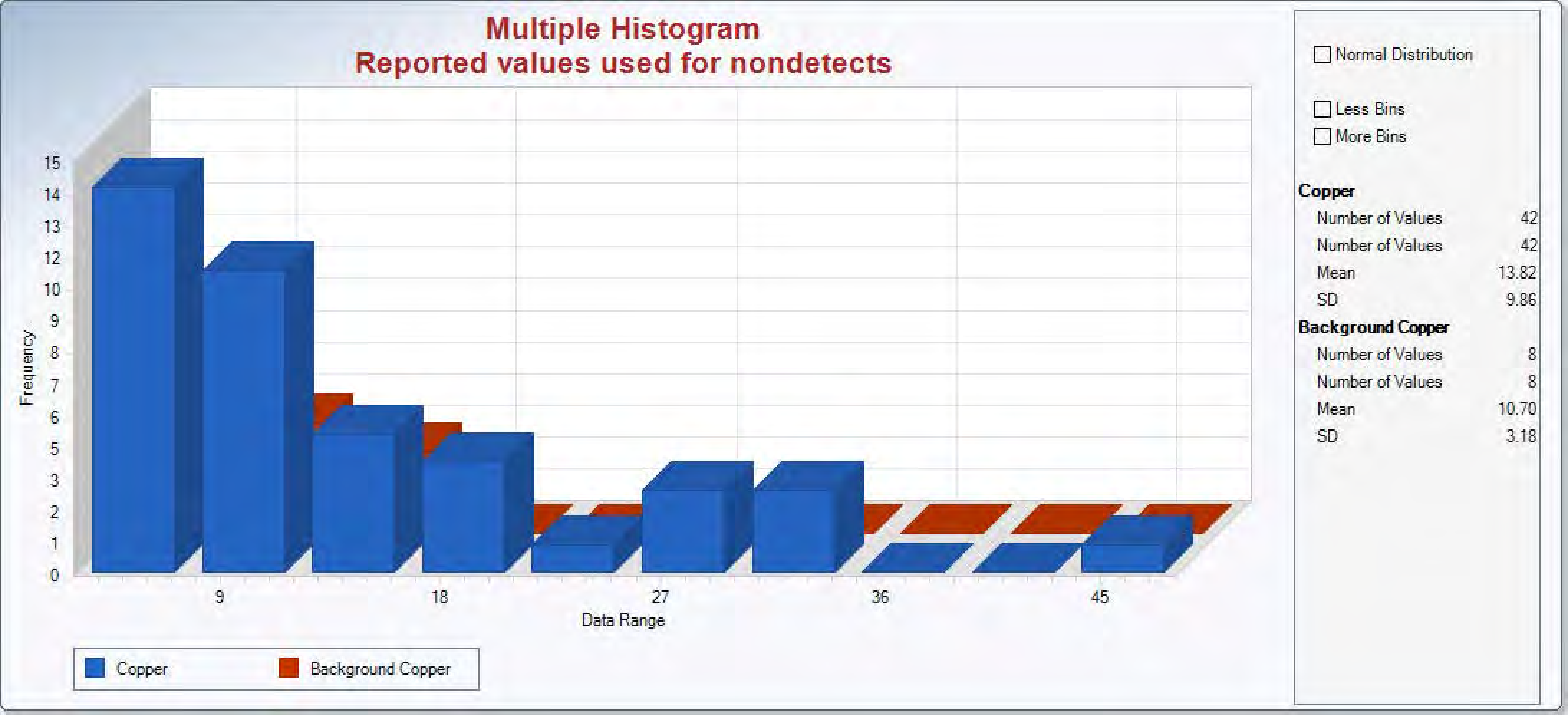
Conclusion with Alpha = 0.05

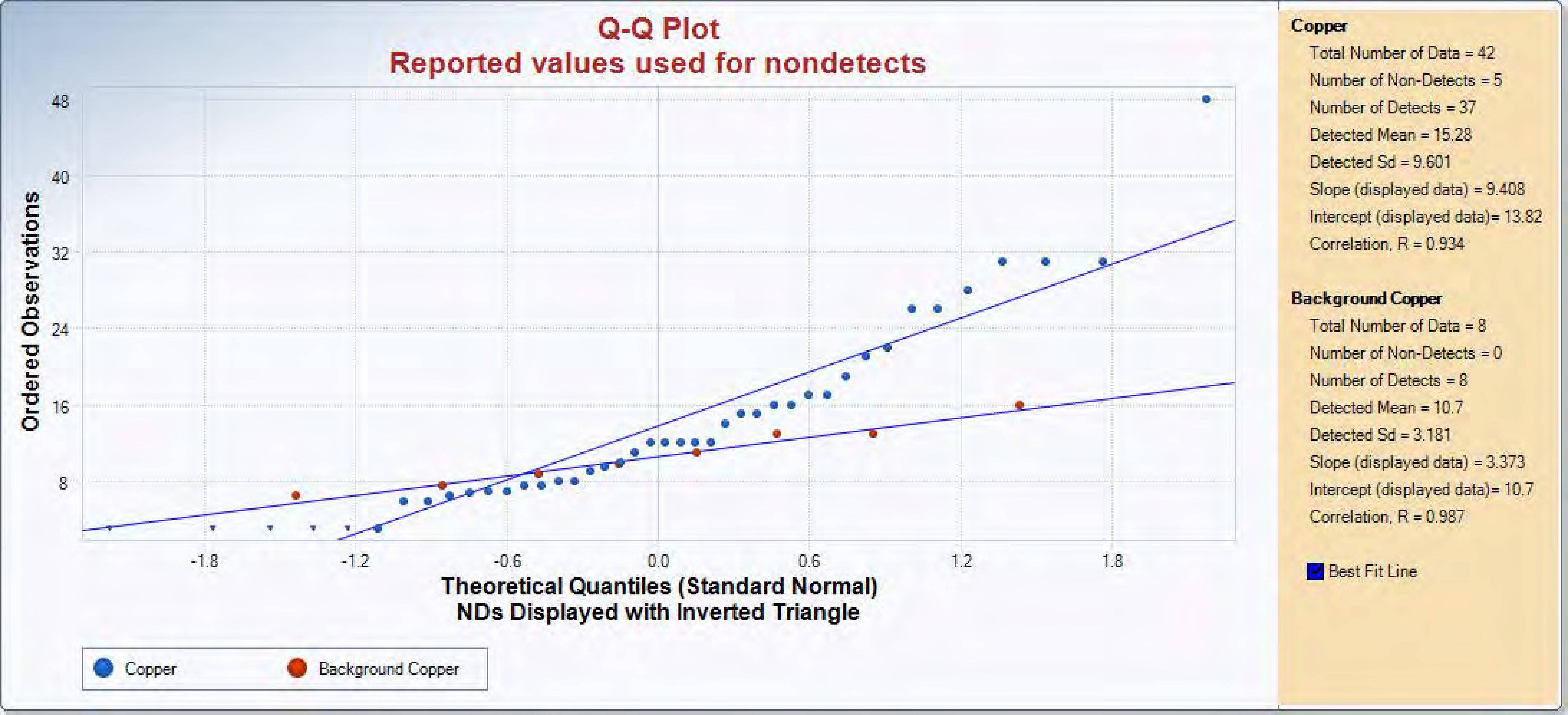
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
48
40
32
24
16
8
Copper
Background Copper


Multiple Histogram
Reported values used for nondetects
Frequency
0
1
2
3
5
6
7
8
9
10
12
13
14
15
9
18
27
36
45
Data Range
Copper
Background Copper
Normal Distribution
Less Bins
More Bins
Copper
Number of Values 42
Number of Values 42
Mean 13.82
SD 9.86
Background Copper
Number of Values 8
Number of Values 8
Mean 10.70
SD 3.18


Q-Q Plot
Reported values used for nondetects
Ordered Observations
48
40
32
24
16
8
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Copper
Background Copper
Copper
Total Number of Data = 42
Number of Non-Detects = 5
Number of Detects = 37
Detected Mean = 15.28
Detected Sd = 9.601
Slope (displayed data) = 9.408
Intercept (displayed data)= 13.82
Correlation, R = 0.934
Background Copper
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 10.7
Detected Sd = 3.181
Slope (displayed data) = 3.373
Intercept (displayed data)= 10.7
Correlation, R = 0.987
Best Fit Line

	A	B	C	D	E	F	G	H	I	J	K	L
1	Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/28/2018 4:31:07 PM								
5	From File			Metals with Background Metals Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Selected Null Hypothesis			Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)								
9	Alternative Hypothesis			Sample 1 Mean/Median > Sample 2 Mean/Median								
10												
11												
12	**Sample 1 Data: Lead**											
13	**Sample 2 Data: Background Lead**											
14												
15	**Raw Statistics**											
16					Sample 1	Sample 2						
17	Number of Valid Data				42	8						
18	Number of Non-Detects				1	0						
19	Number of Detect Data				41	8						
20	Minimum Non-Detect				0.25	N/A						
21	Maximum Non-Detect				0.25	N/A						
22	Percent Non-detects				2.38%	0.00%						
23	Minimum Detect				0.5	3.8						
24	Maximum 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 vs Sample 2 Gehan Test**											
32												
33	**H0: Mean/Median of Sample 1 <= Mean/Median of background**											
34												
35	Gehan z Test Value				-2.435							
36	Critical z (0.05)				1.645							
37	P-Value				0.993							
38												
39	**Conclusion with Alpha = 0.05**											
40	**Do Not Reject H0, Conclude Sample 1 <= Sample 2**											
41	**P-Value >= alpha (0.05)**											
42												

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:31:51 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead

Sample 2 Data: Background Lead

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	1	0
Number of Detects	41	8
Minimum Non-Detect	0.25	N/A
Maximum Non-Detect	0.25	N/A
Percent Non-detects	2.38%	0.00%
Minimum Detect	0.5	3.8
Maximum Detect	100	16
Mean of Detects	7.651	7.15
Median of Detects	4.3	6.4
SD of Detects	15.87	3.688
KM Mean	7.475	7.15
KM SD	15.53	3.688

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-3.032
TW Critical Value (0.05)	1.645
P-Value	0.999

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:32:37 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Lead

Sample 2 Data: Background Lead

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	1	0
Number of Detect Data	41	8
Minimum Non-Detect	0.25	N/A
Maximum Non-Detect	0.25	N/A
Percent Non-detects	2.38%	0.00%
Minimum Detect	0.5	3.8
Maximum Detect	100	16
Mean of Detects	7.651	7.15
Median of Detects	4.3	6.4
SD of Detects	15.87	3.688

Wilcoxon-Mann-Whitney (WMW) Test

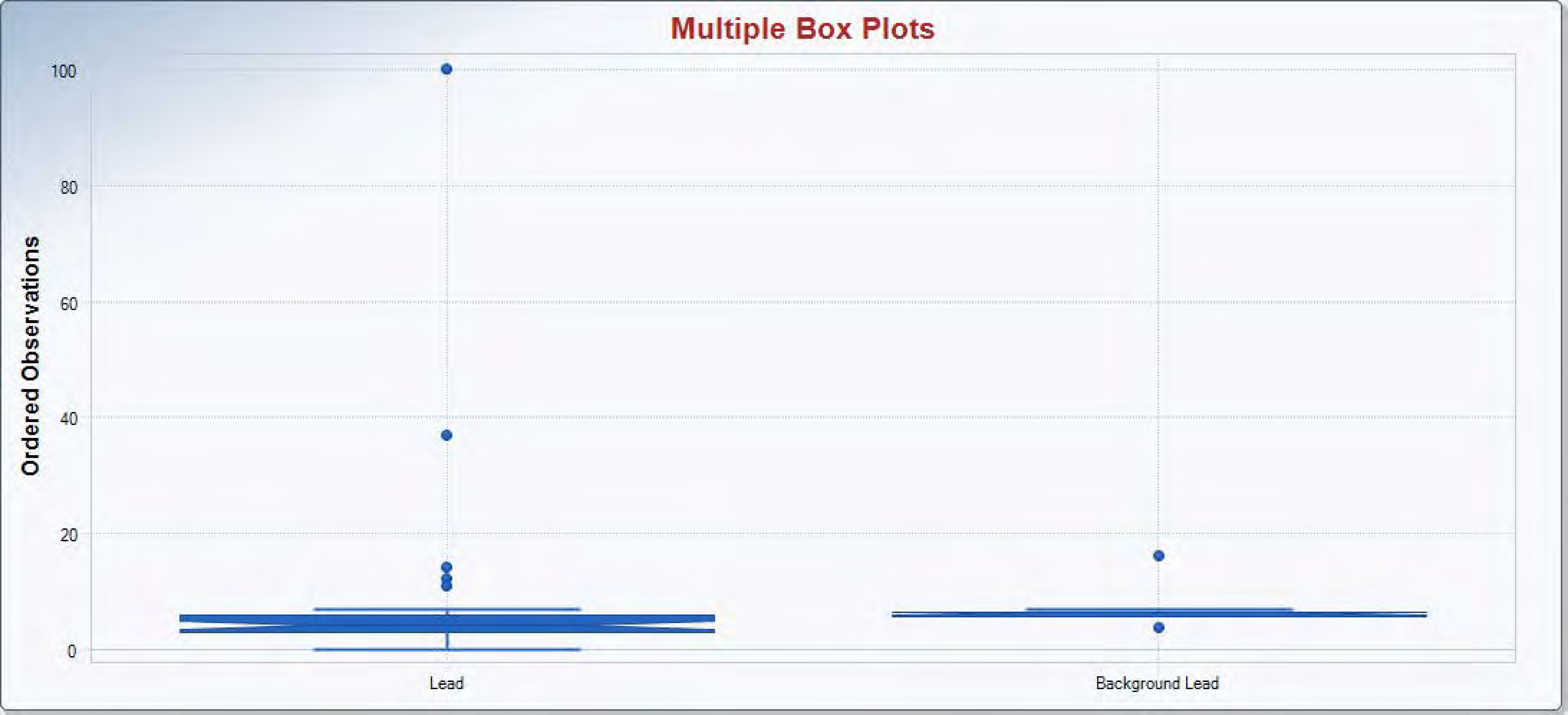
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

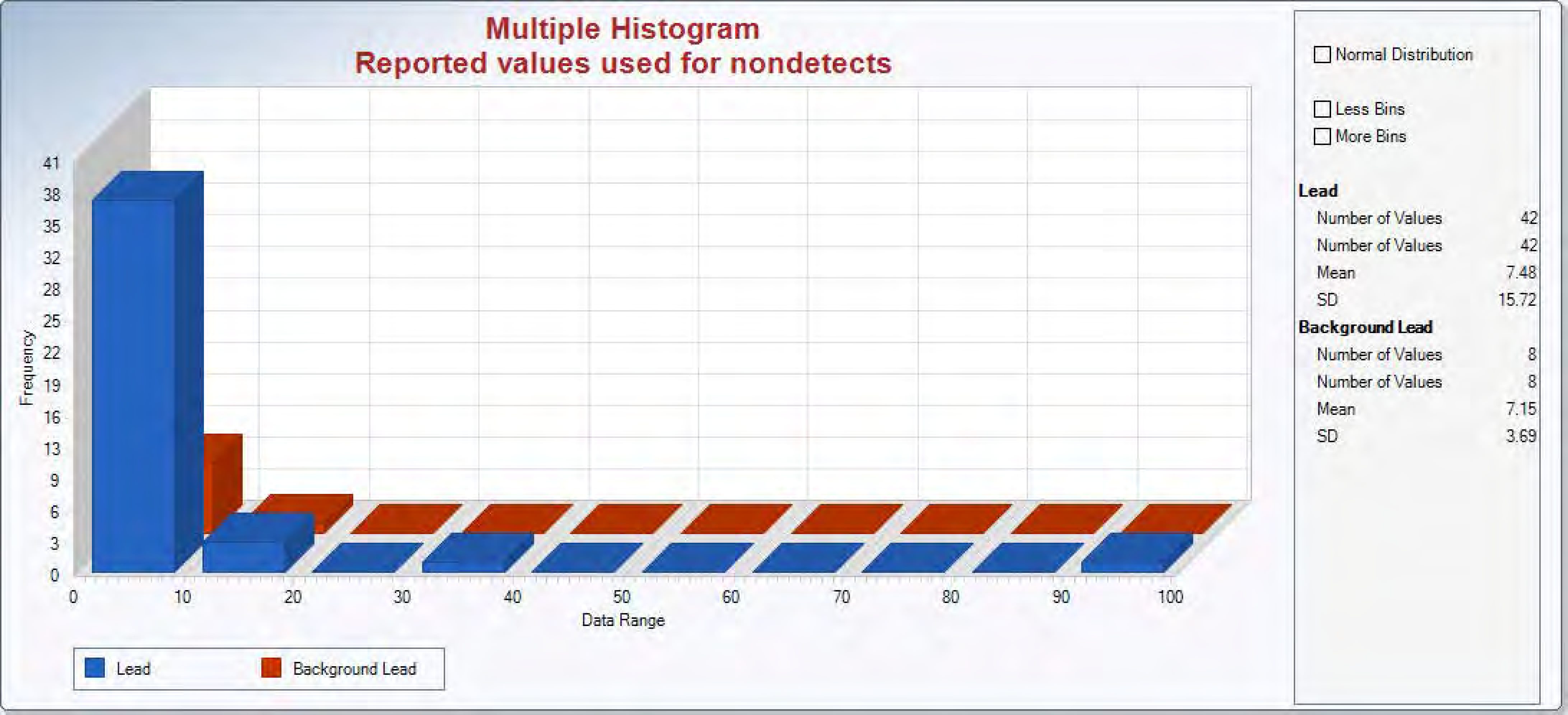
Sample 1 Rank Sum W-Stat	979.5
Standardized WMW U-Stat	-2.441
Mean (U)	168
SD(U) - Adj ties	37.7
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.993

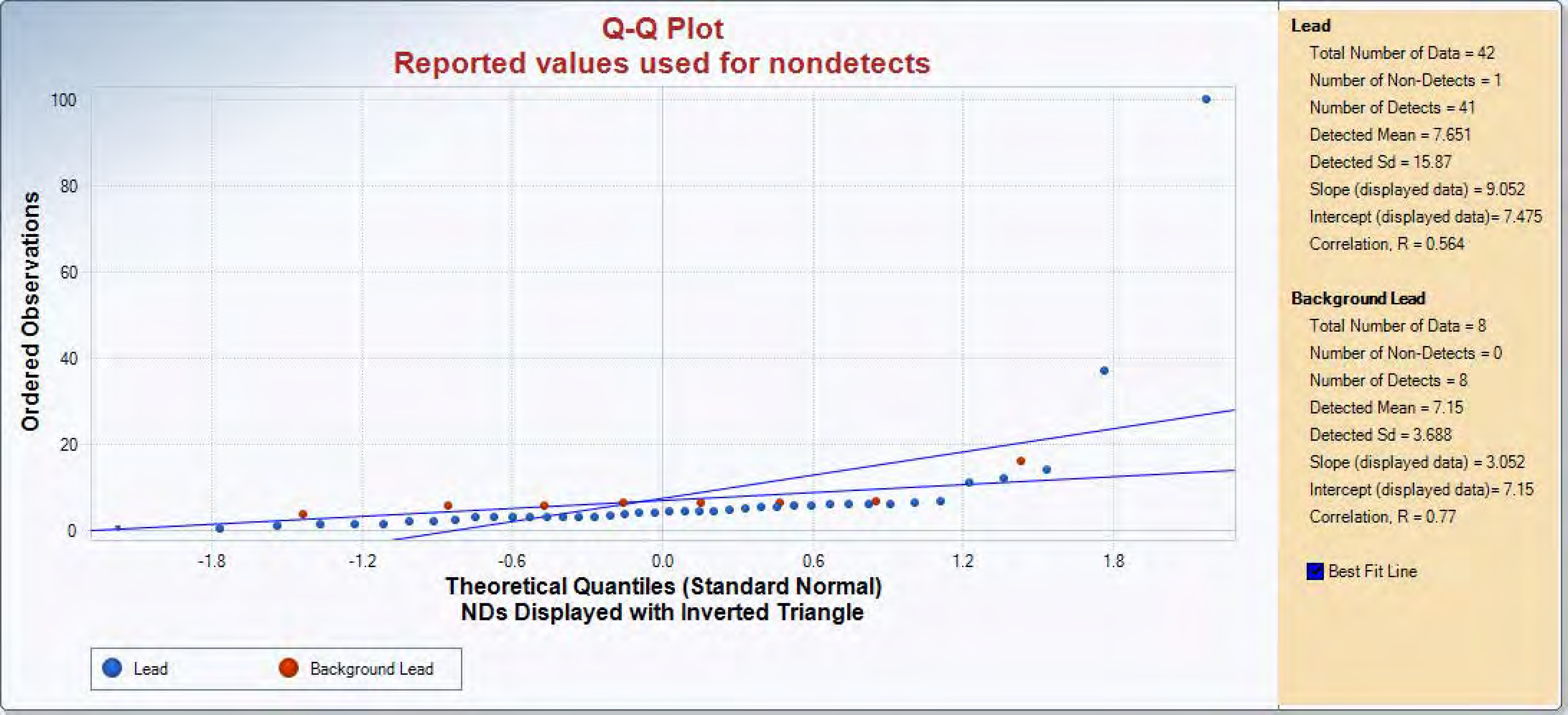
Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)


Multiple Box Plots
Ordered Observations
100
80
60
40
20
0
Lead
Background Lead


Multiple Histogram
Reported values used for nondetects
Frequency
41
38
35
32
28
25
22
19
16
13
9
6
3
0
0
10
20
30
40
50
60
70
80
90
100
Data Range
Lead
Background Lead
Normal Distribution
Less Bins
More Bins
Lead
Number of Values 42
Number of Values 42
Mean 7.48
SD 15.72
Background Lead
Number of Values 8
Number of Values 8
Mean 7.15
SD 3.69


Q-Q Plot
Reported values used for nondetects
Ordered Observations
100
80
60
40
20
0
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Lead
Background Lead
Lead
Total Number of Data = 42
Number of Non-Detects = 1
Number of Detects = 41
Detected Mean = 7.651
Detected Sd = 15.87
Slope (displayed data) = 9.052
Intercept (displayed data)= 7.475
Correlation, R = 0.564
Background Lead
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 7.15
Detected Sd = 3.688
Slope (displayed data) = 3.052
Intercept (displayed data)= 7.15
Correlation, R = 0.77
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:58:51 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury
Sample 2 Data: Background Mercury

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	8
Number of Non-Detects	26	3
Number of Detect Data	15	5
Minimum Non-Detect	0.02	0.02
Maximum Non-Detect	0.1	0.02
Percent Non-detects	63.41%	37.50%
Minimum Detect	0.024	0.024
Maximum Detect	3	0.074
Mean of Detects	0.262	0.0464
Median of Detects	0.076	0.044
SD of Detects	0.758	0.0189
KM Mean	0.125	0.0365
KM SD	0.455	0.0185

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	1.627
Critical z (0.05)	1.645
P-Value	0.0518

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:59:32 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury

Sample 2 Data: Background Mercury

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	8
Number of Non-Detects	26	3
Number of Detects	15	5
Minimum Non-Detect	0.02	0.02
Maximum Non-Detect	0.1	0.02
Percent Non-detects	63.41%	37.50%
Minimum Detect	0.024	0.024
Maximum Detect	3	0.074
Mean of Detects	0.262	0.0464
Median of Detects	0.076	0.044
SD of Detects	0.758	0.0189
KM Mean	0.125	0.0365
KM SD	0.455	0.0185

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	1.409
TW Critical Value (0.05)	1.645
P-Value	0.0795

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 5:00:12 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Mercury

Sample 2 Data: Background Mercury

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	41	8
Number of Non-Detects	26	3
Number of Detect Data	15	5
Minimum Non-Detect	0.02	0.02
Maximum Non-Detect	0.1	0.02
Percent Non-detects	63.41%	37.50%
Minimum Detect	0.024	0.024
Maximum Detect	3	0.074
Mean of Detects	0.262	0.0464
Median of Detects	0.076	0.044
SD of Detects	0.758	0.0189

WMW test is meant for a Single Detection Limit Case

Use of Gehan or T-W test is suggested when multiple detection limits are present

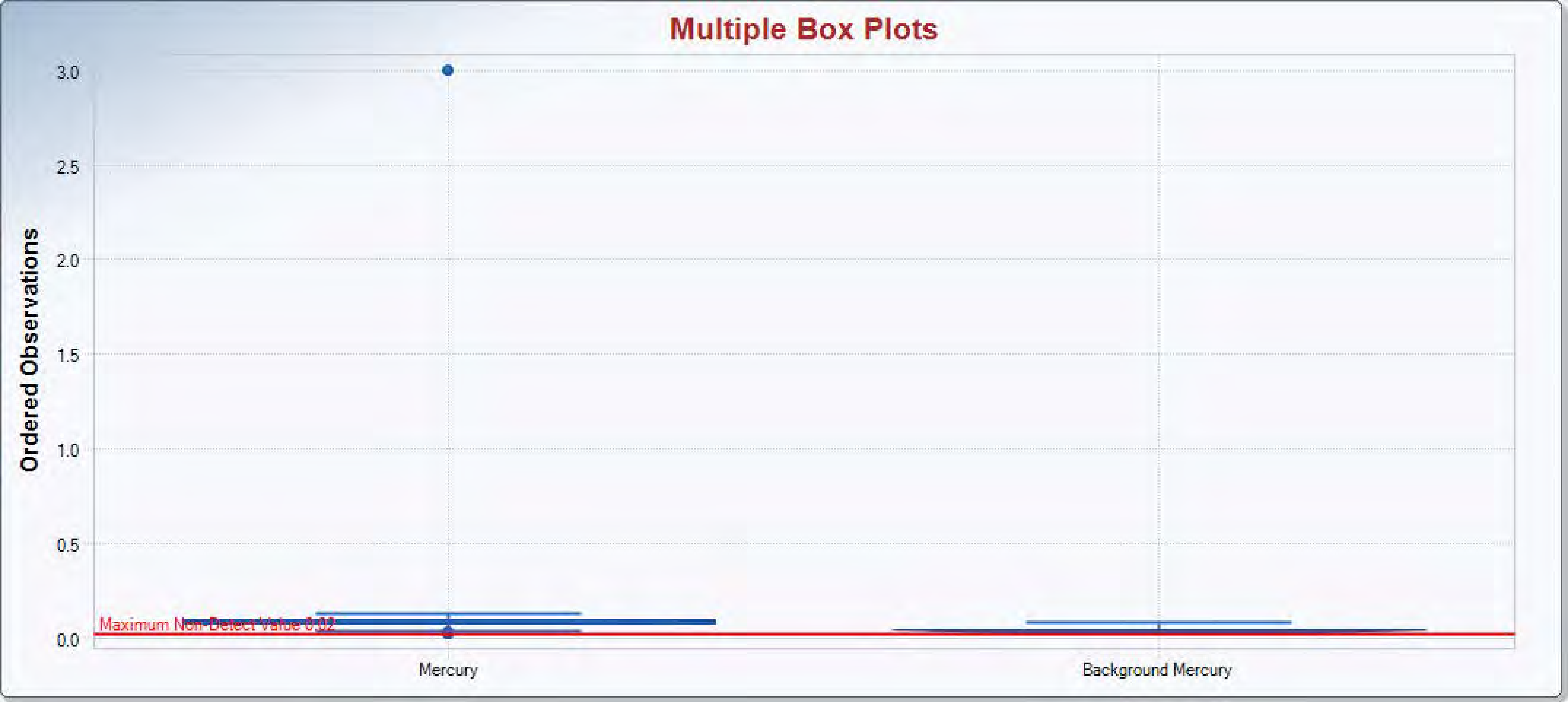
All observations <= 0.1 (Max DL) are ranked the same

Wilcoxon-Mann-Whitney (WMW) Test

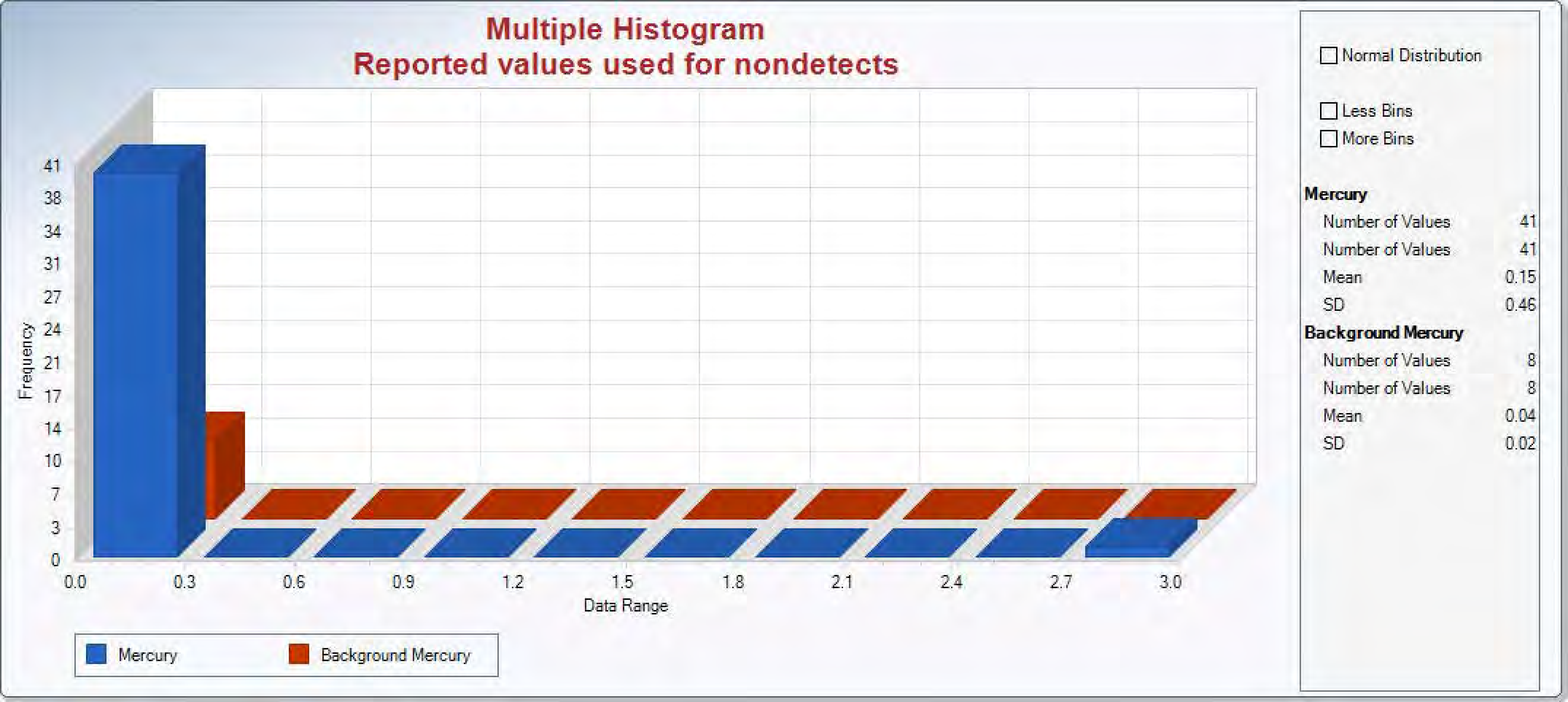
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

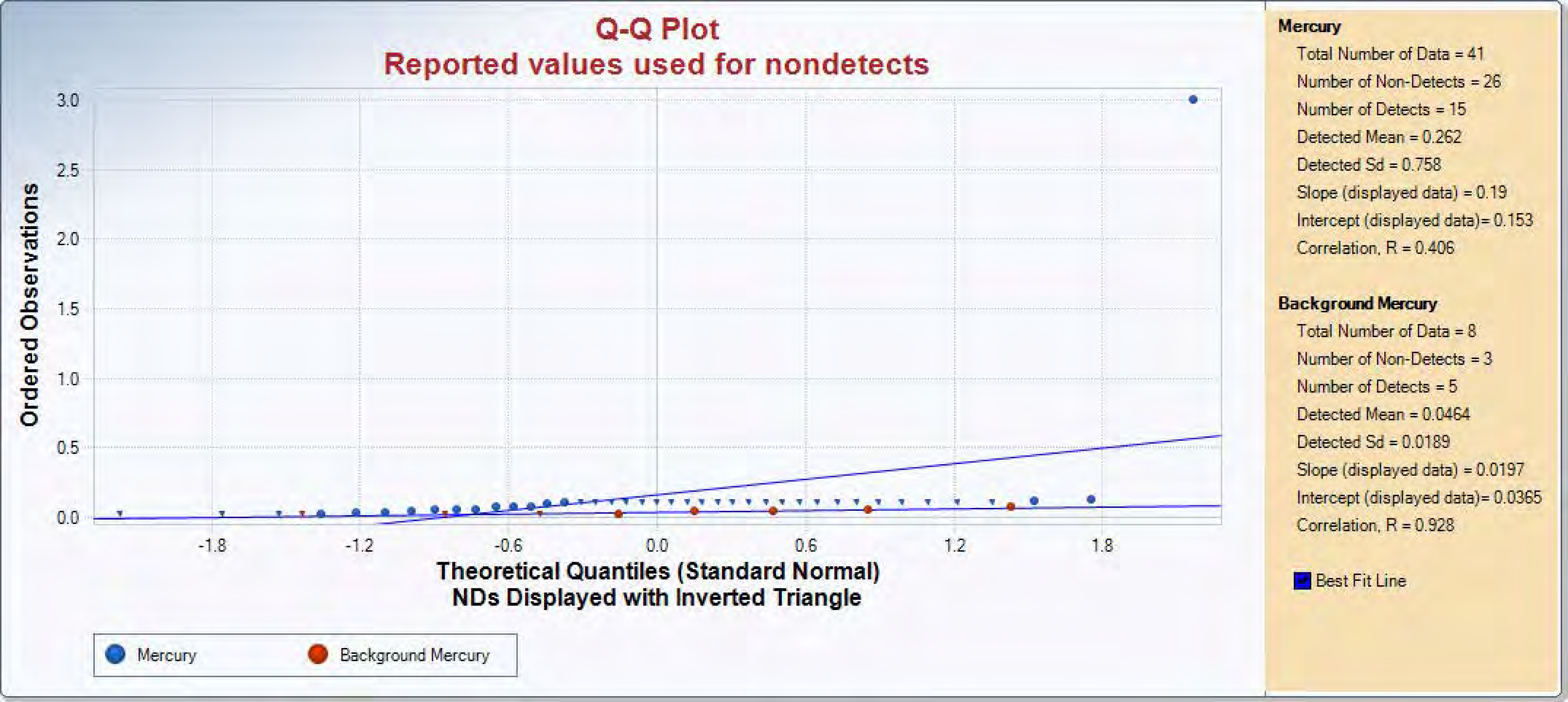
All observations are identical in at least one group

No analysis will be performed



Multiple Box Plots
Ordered Observations
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Maximum Non-Detect Value 0.02
Mercury
Background Mercury


Multiple Histogram
Reported values used for nondetects
Frequency
41
38
34
31
27
24
21
17
14
10
7
3
0
0.0
0.3
0.6
0.9
1.2
1.5
1.8
2.1
2.4
2.7
3.0
Data Range
Mercury
Background Mercury
Normal Distribution
Less Bins
More Bins
Mercury
Number of Values 41
Number of Values 41
Mean 0.15
SD 0.46
Background Mercury
Number of Values 8
Number of Values 8
Mean 0.04
SD 0.02


Q-Q Plot
Reported values used for nondetects
Ordered Observations
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Mercury
Background Mercury
Mercury
Total Number of Data = 41
Number of Non-Detects = 26
Number of Detects = 15
Detected Mean = 0.262
Detected Sd = 0.758
Slope (displayed data) = 0.19
Intercept (displayed data)= 0.153
Correlation, R = 0.406
Background Mercury
Total Number of Data = 8
Number of Non-Detects = 3
Number of Detects = 5
Detected Mean = 0.0464
Detected Sd = 0.0189
Slope (displayed data) = 0.0197
Intercept (displayed data)= 0.0365
Correlation, R = 0.928
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:44:11 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Nickel

Sample 2 Data: Background Nickel

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.5	8.8
Maximum Detect	64	23
Mean of Detects	14.3	15.85
Median of Detects	12	16
SD of Detects	9.589	4.806
KM Mean	14.3	15.85
KM SD	9.589	4.806

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-1.323
Critical z (0.05)	1.645
P-Value	0.907

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:44:56 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Nickel
Sample 2 Data: Background Nickel

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detects	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.5	8.8
Maximum Detect	64	23
Mean of Detects	14.3	15.85
Median of Detects	12	16
SD of Detects	9.589	4.806
KM Mean	14.3	15.85
KM SD	9.589	4.806

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-1.405
TW Critical Value (0.05)	1.645
P-Value	0.92

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects		
User Selected Options		
Date/Time of Computation	ProUCL 5.15/28/2018 4:45:35 PM	
From File	Metals with Background Metals Input.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)	
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median	

Sample 1 Data: Nickel

Sample 2 Data: Background Nickel

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	4.5	8.8
Maximum Detect	64	23
Mean of Detects	14.3	15.85
Median of Detects	12	16
SD of Detects	9.589	4.806

Wilcoxon-Mann-Whitney (WMW) Test

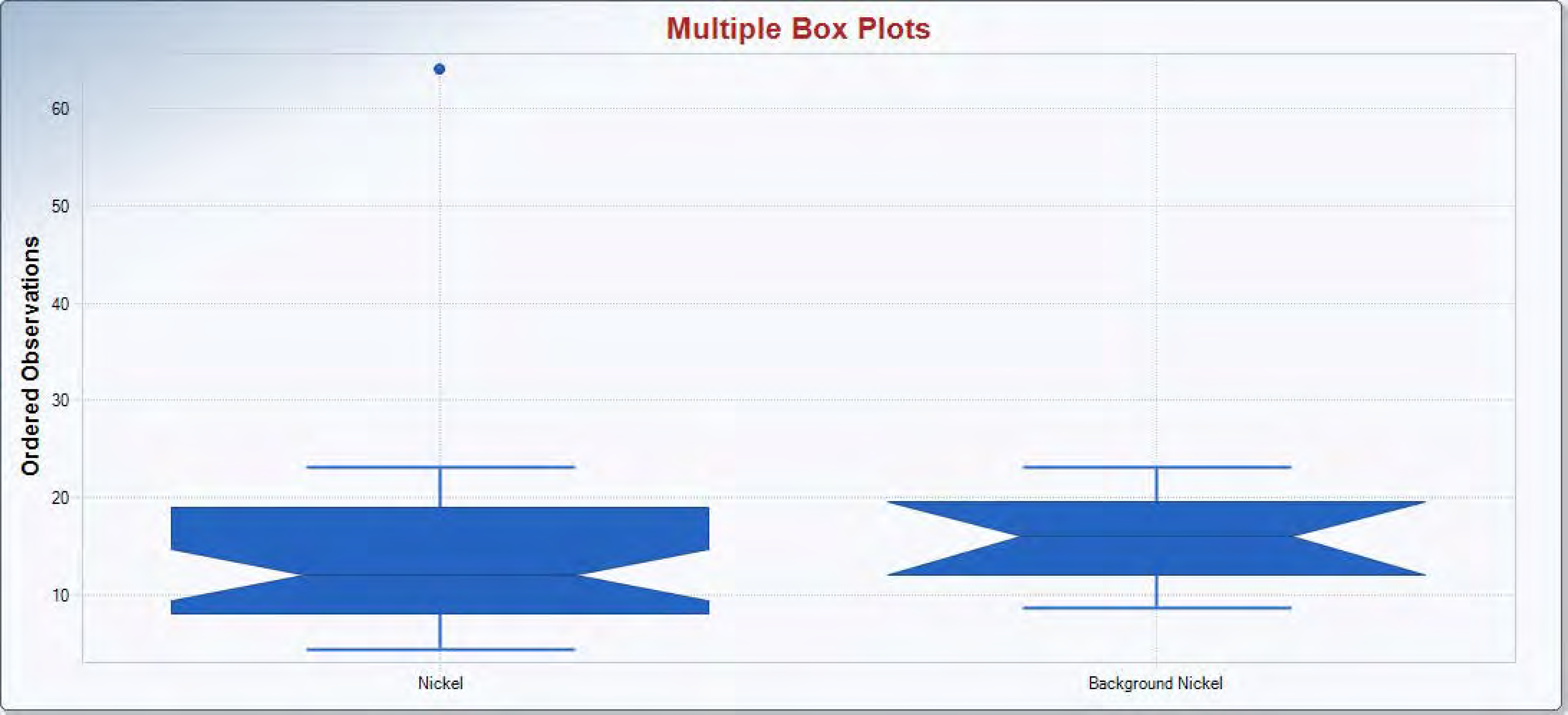
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1028
Standardized WMW U-Stat	-1.154
Mean (U)	168
SD(U) - Adj ties	37.68
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.876

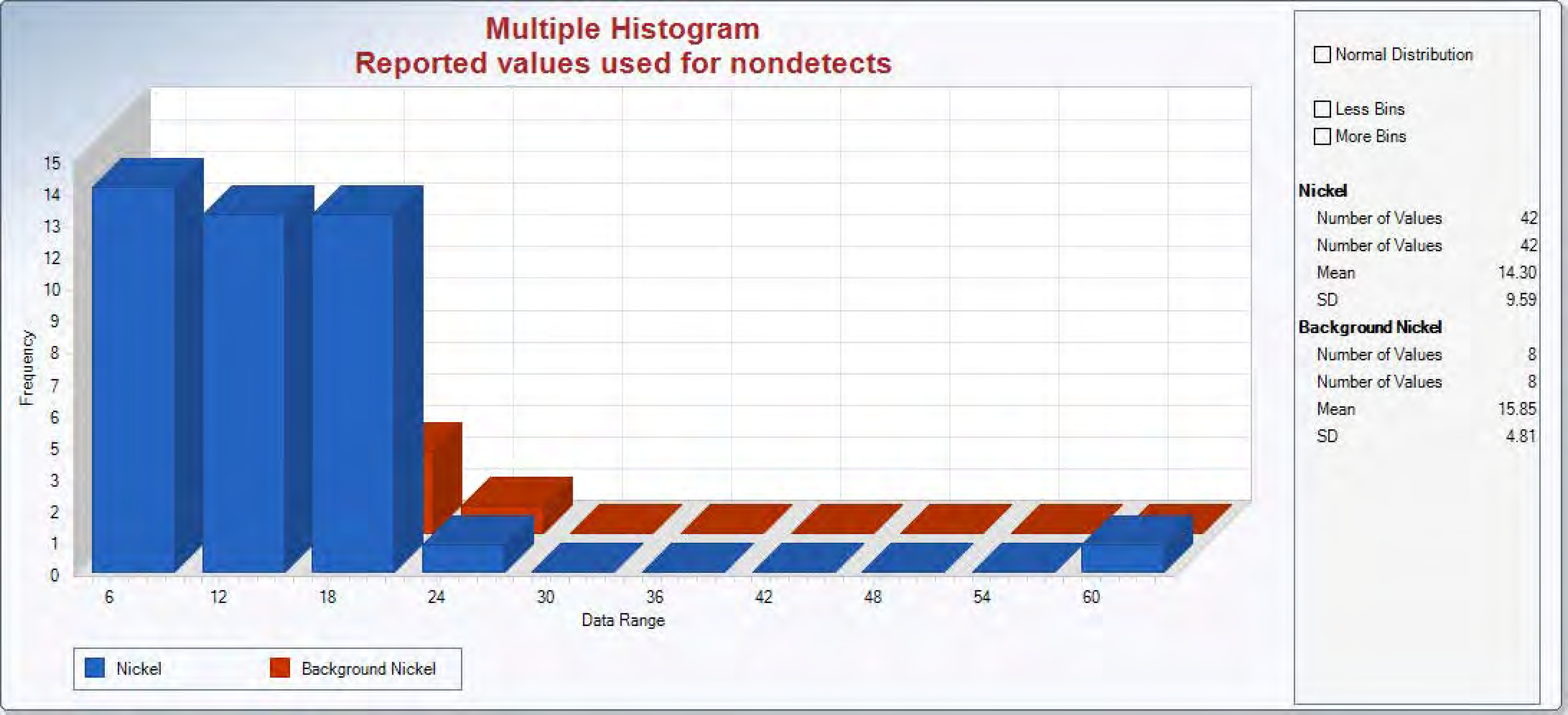
Conclusion with Alpha = 0.05

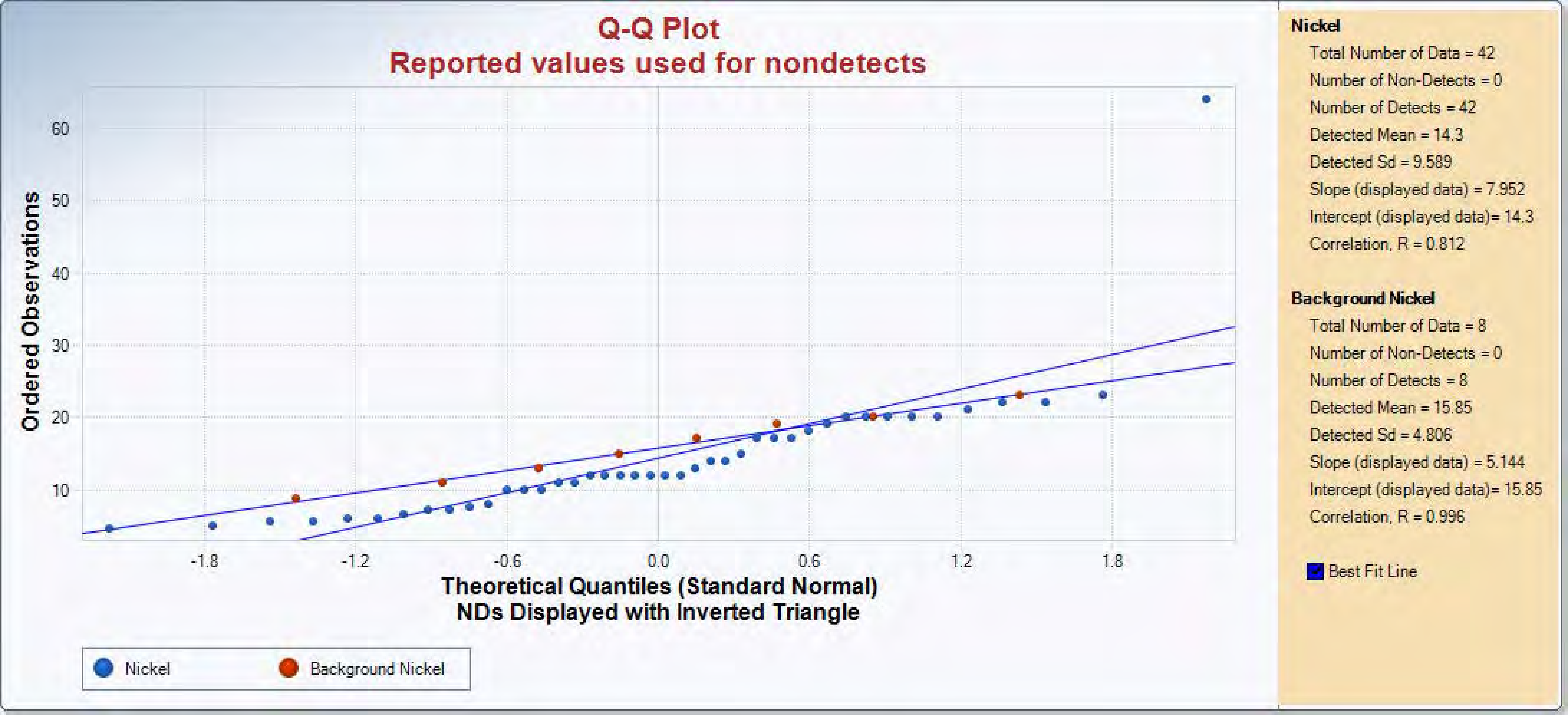
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
60
50
40
30
20
10
Nickel
Background Nickel


Multiple Histogram
Reported values used for nondetects
Frequency
0
1
2
3
5
6
7
8
9
10
12
13
14
15
6
12
18
24
30
36
42
48
54
60
Data Range
Nickel
Background Nickel
Normal Distribution
Less Bins
More Bins
Nickel
Number of Values 42
Number of Values 42
Mean 14.30
SD 9.59
Background Nickel
Number of Values 8
Number of Values 8
Mean 15.85
SD 4.81


Q-Q Plot
Reported values used for nondetects
Ordered Observations
60
50
40
30
20
10
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Nickel
Background Nickel
Nickel
Total Number of Data = 42
Number of Non-Detects = 0
Number of Detects = 42
Detected Mean = 14.3
Detected Sd = 9.589
Slope (displayed data) = 7.952
Intercept (displayed data)= 14.3
Correlation, R = 0.812
Background Nickel
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 15.85
Detected Sd = 4.806
Slope (displayed data) = 5.144
Intercept (displayed data)= 15.85
Correlation, R = 0.996
Best Fit Line

Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:49:39 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Vanadium

Sample 2 Data: Background Vanadium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	15	32
Maximum Detect	120	61
Mean of Detects	36.14	46
Median of Detects	32	49
SD of Detects	18.63	10.45
KM Mean	36.14	46
KM SD	18.63	10.45

Sample 1 vs Sample 2 Gehan Test

H0: Mean/Median of Sample 1 <= Mean/Median of background

Gehan z Test Value	-2.329
Critical z (0.05)	1.645
P-Value	0.99

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:50:26 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Vanadium

Sample 2 Data: Background Vanadium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detects	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	15	32
Maximum Detect	120	61
Mean of Detects	36.14	46
Median of Detects	32	49
SD of Detects	18.63	10.45
KM Mean	36.14	46
KM SD	18.63	10.45

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-2.684
TW Critical Value (0.05)	1.645
P-Value	0.996

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:51:11 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Vanadium

Sample 2 Data: Background Vanadium

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	15	32
Maximum Detect	120	61
Mean of Detects	36.14	46
Median of Detects	32	49
SD of Detects	18.63	10.45

Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

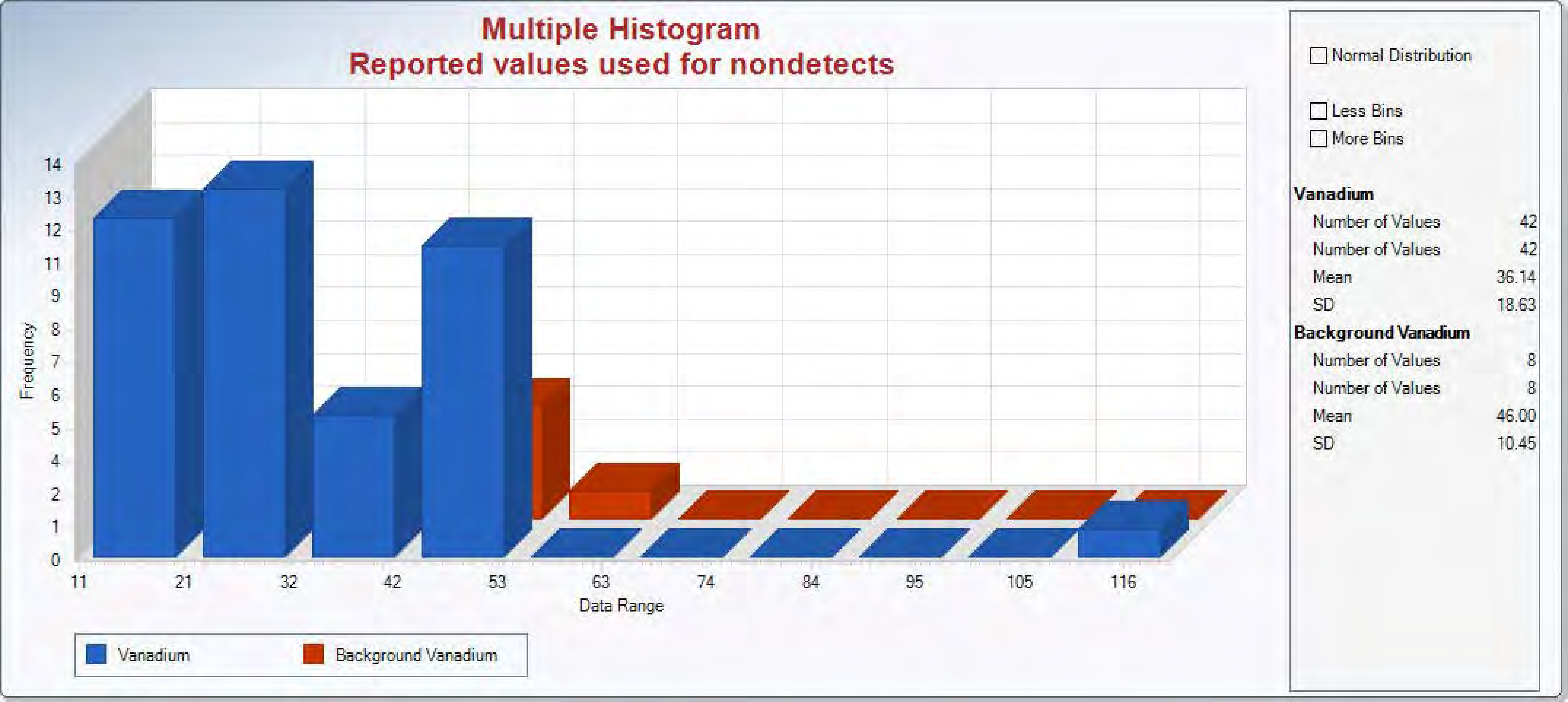
Sample 1 Rank Sum W-Stat	988
Standardized WMW U-Stat	-2.212
Mean (U)	168
SD(U) - Adj ties	37.76
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.987

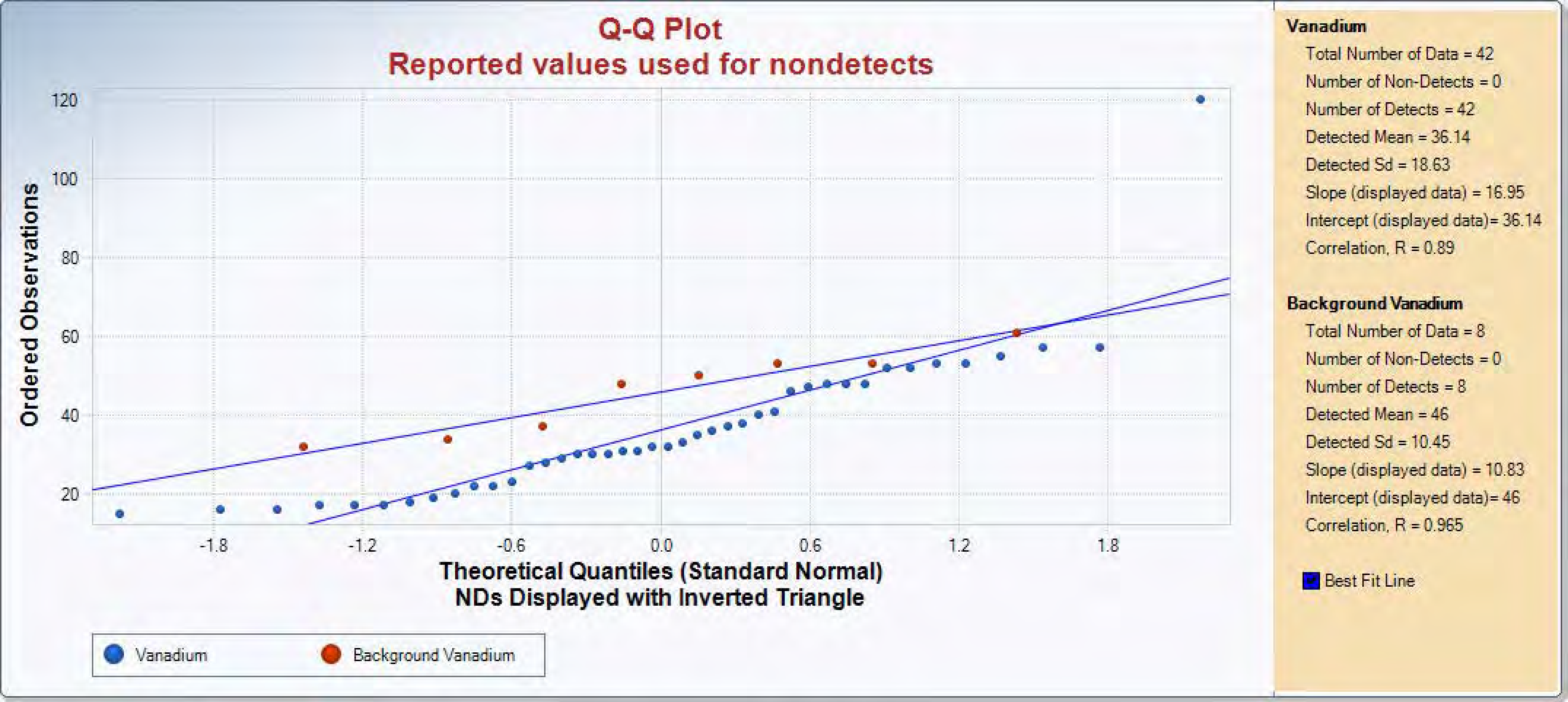
Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)


Multiple Box Plots
Ordered Observations
120
100
80
60
40
20
Vanadium
Background Vanadium


Multiple Histogram
Reported values used for nondetects
Frequency
0
1
2
4
5
6
7
8
9
11
12
13
14
11
21
32
42
53
63
74
84
95
105
116
Data Range
Vanadium
Background Vanadium
Normal Distribution
Less Bins
More Bins
Vanadium
Number of Values 42
Number of Values 42
Mean 36.14
SD 18.63
Background Vanadium
Number of Values 8
Number of Values 8
Mean 46.00
SD 10.45


Q-Q Plot
Reported values used for nondetects
Ordered Observations
120
100
80
60
40
20
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Vanadium
Background Vanadium
Vanadium
Total Number of Data = 42
Number of Non-Detects = 0
Number of Detects = 42
Detected Mean = 36.14
Detected Sd = 18.63
Slope (displayed data) = 16.95
Intercept (displayed data)= 36.14
Correlation, R = 0.89
Background Vanadium
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 46
Detected Sd = 10.45
Slope (displayed data) = 10.83
Intercept (displayed data)= 46
Correlation, R = 0.965
Best Fit Line

	A	B	C	D	E	F	G	H	I	J	K	L
1	Gehan Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/28/2018 4:54:24 PM								
5	From File			Metals with Background Metals Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Selected Null Hypothesis			Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)								
9	Alternative Hypothesis			Sample 1 Mean/Median > Sample 2 Mean/Median								
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 Valid Data				42	8						
18	Number of Non-Detects				0	0						
19	Number of Detect Data				42	8						
20	Minimum Non-Detect				N/A	N/A						
21	Maximum Non-Detect				N/A	N/A						
22	Percent Non-detects				0.00%	0.00%						
23	Minimum Detect				22	26						
24	Maximum Detect				200	48						
25	Mean of Detects				42.33	38.75						
26	Median of Detects				38.5	39.5						
27	SD of Detects				27.62	7.126						
28	KM Mean				42.33	38.75						
29	KM SD				27.62	7.126						
30												
31			Sample 1 vs Sample 2 Gehan Test									
32												
33	H0: Mean/Median of Sample 1 <= Mean/Median of background											
34												
35	Gehan z Test Value				-0.212							
36	Critical z (0.05)				1.645							
37	P-Value				0.584							
38												
39	Conclusion with Alpha = 0.05											
40	Do Not Reject H0, Conclude Sample 1 <= Sample 2											
41	P-Value >= alpha (0.05)											
42												

Tarone-Ware Sample 1 vs Sample 2 Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:55:07 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Zinc

Sample 2 Data: Background Zinc

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detects	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	22	26
Maximum Detect	200	48
Mean of Detects	42.33	38.75
Median of Detects	38.5	39.5
SD of Detects	27.62	7.126
KM Mean	42.33	38.75
KM SD	27.62	7.126

Sample 1 vs Sample 2 Tarone-Ware Test

H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

TW Statistic	-0.431
TW Critical Value (0.05)	1.645
P-Value	0.667

Conclusion with Alpha = 0.05

Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Sample 1 vs Sample 2 Comparison Test for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/28/2018 4:55:46 PM
From File	Metals with Background Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Selected Null Hypothesis	Sample 1 Mean/Median <= Sample 2 Mean/Median (Form 1)
Alternative Hypothesis	Sample 1 Mean/Median > Sample 2 Mean/Median

Sample 1 Data: Zinc

Sample 2 Data: Background Zinc

Raw Statistics

	Sample 1	Sample 2
Number of Valid Data	42	8
Number of Non-Detects	0	0
Number of Detect Data	42	8
Minimum Non-Detect	N/A	N/A
Maximum Non-Detect	N/A	N/A
Percent Non-detects	0.00%	0.00%
Minimum Detect	22	26
Maximum Detect	200	48
Mean of Detects	42.33	38.75
Median of Detects	38.5	39.5
SD of Detects	27.62	7.126

Wilcoxon-Mann-Whitney (WMW) Test

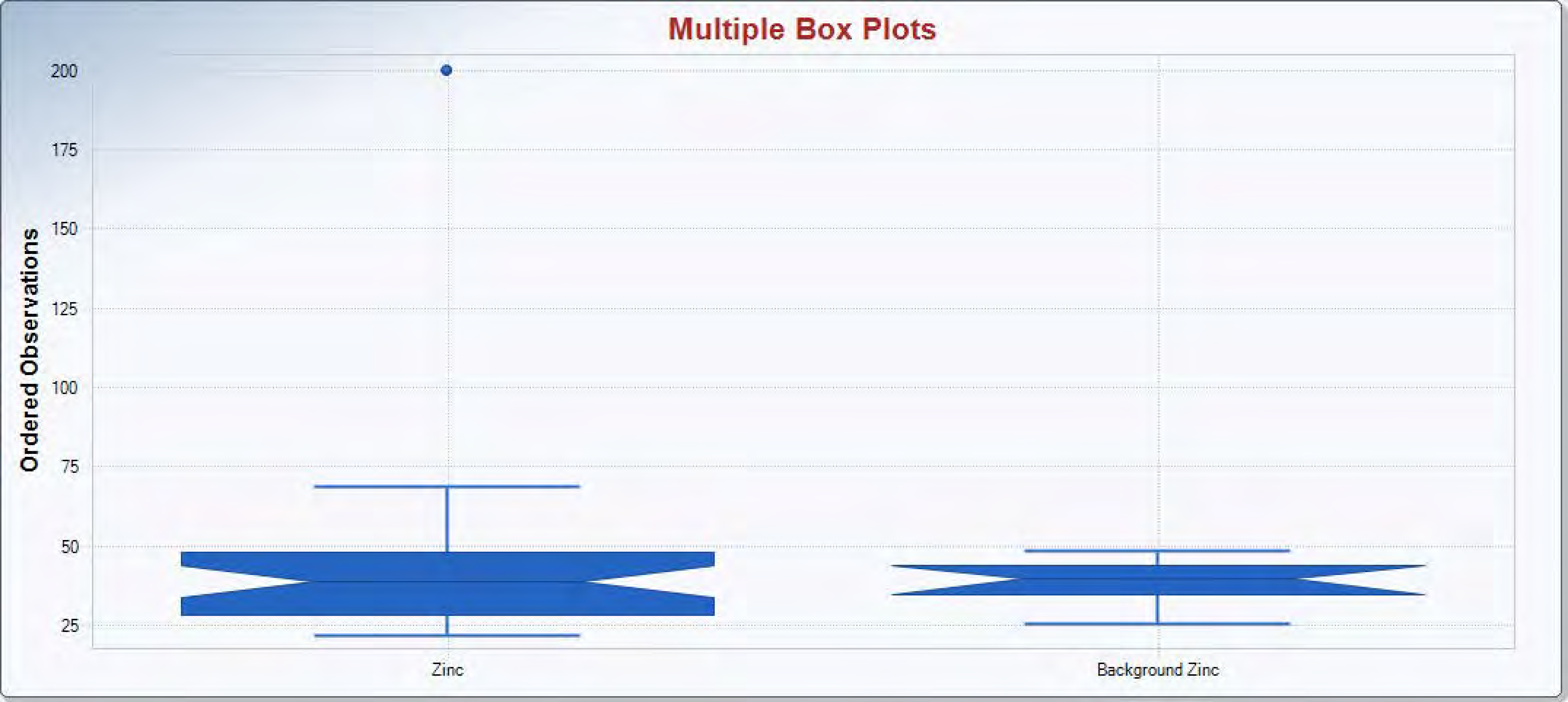
H0: Mean/Median of Sample 1 <= Mean/Median of Sample 2

Sample 1 Rank Sum W-Stat	1066
Standardized WMW U-Stat	-0.146
Mean (U)	168
SD(U) - Adj ties	37.76
Approximate U-Stat Critical Value (0.05)	1.645
P-Value (Adjusted for Ties)	0.558

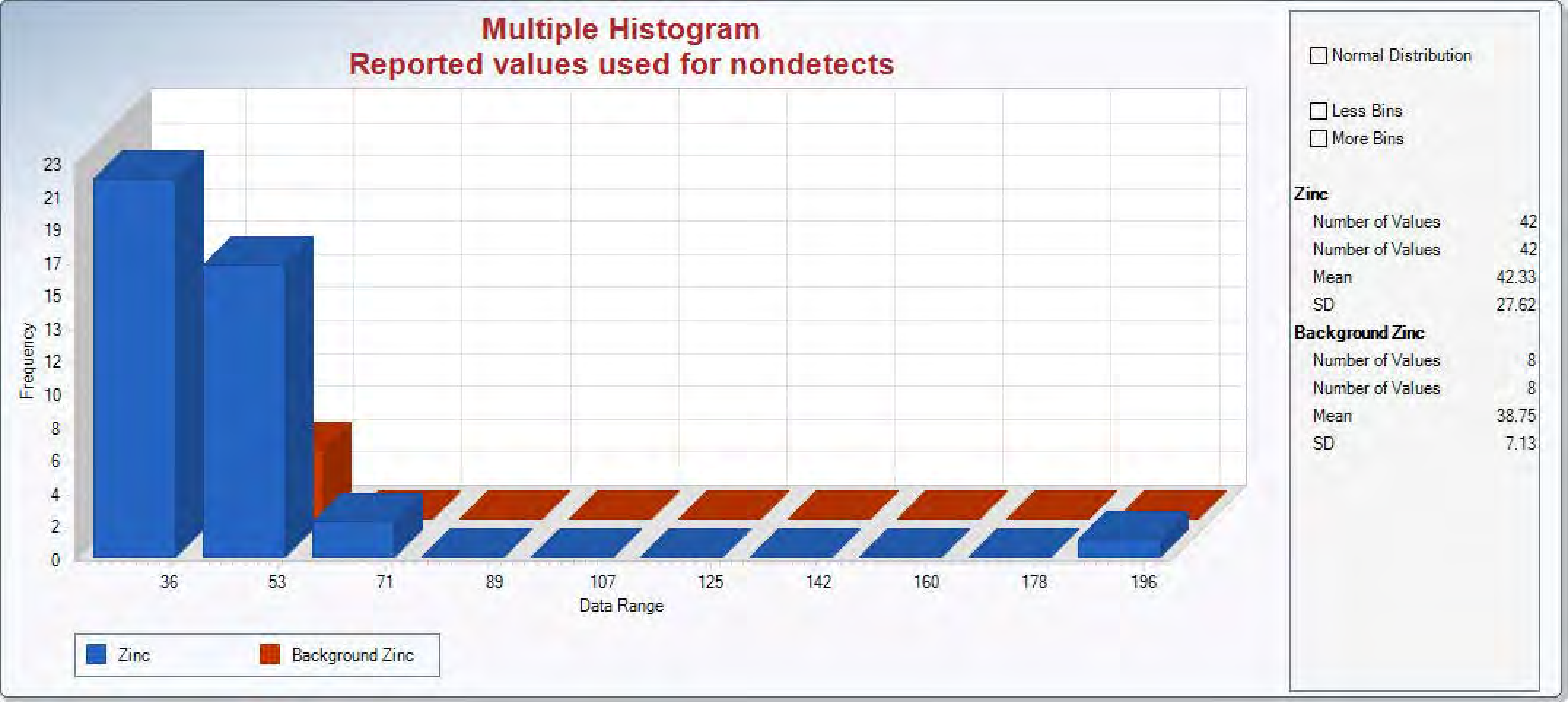
Conclusion with Alpha = 0.05

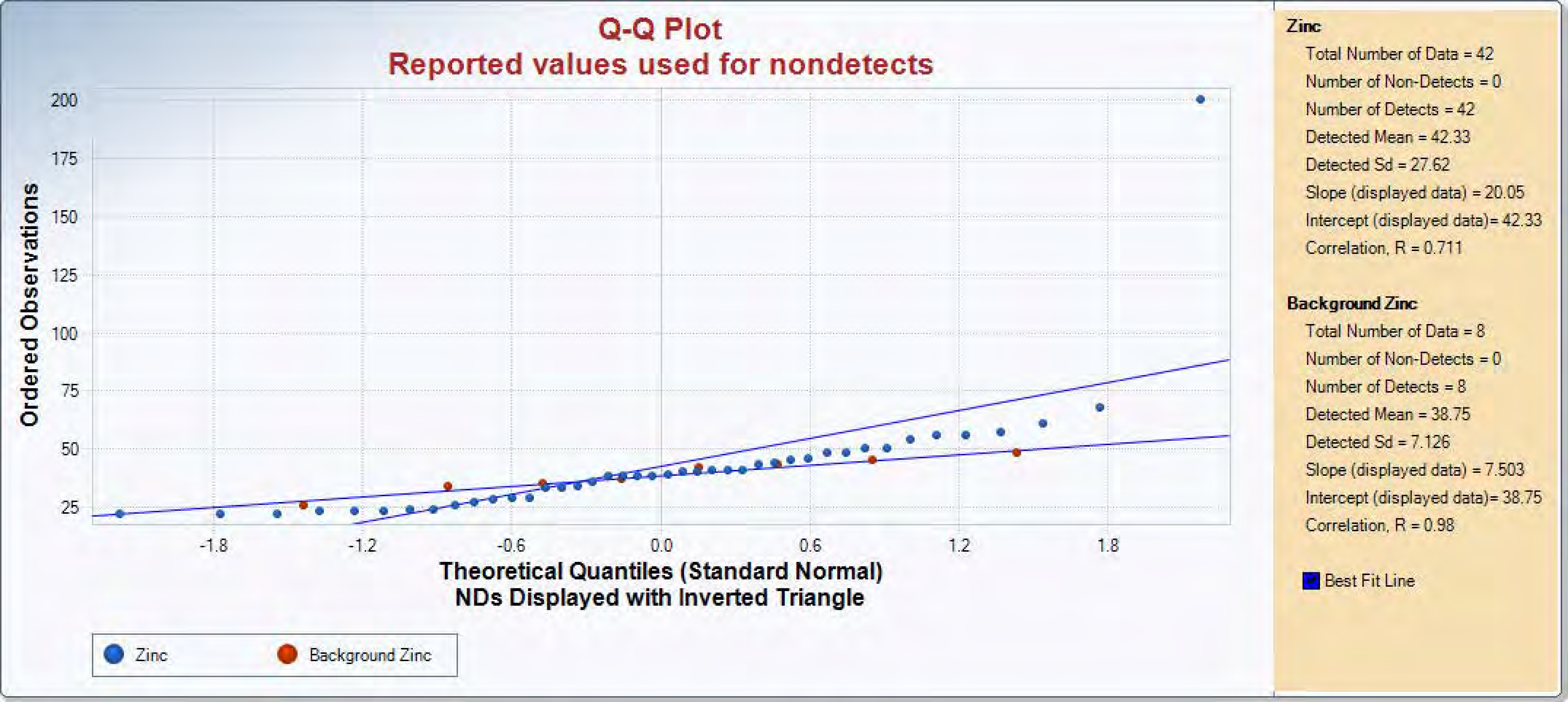
Do Not Reject H0, Conclude Sample 1 <= Sample 2

P-Value >= alpha (0.05)



Multiple Box Plots
Ordered Observations
200
175
150
125
100
75
50
25
Zinc
Background Zinc


Multiple Histogram
Reported values used for nondetects
Frequency
0
2
4
6
8
10
12
13
15
17
19
21
23
36
53
71
89
107
125
142
160
178
196
Data Range
Zinc
Background Zinc
Normal Distribution
Less Bins
More Bins
Zinc
Number of Values 42
Number of Values 42
Mean 42.33
SD 27.62
Background Zinc
Number of Values 8
Number of Values 8
Mean 38.75
SD 7.13



Q-Q Plot
Reported values used for nondetects
Ordered Observations
200
175
150
125
100
75
50
25
-1.8
-1.2
-0.6
0.0
0.6
1.2
1.8
Theoretical Quantiles (Standard Normal)
NDs Displayed with Inverted Triangle
Zinc
Background Zinc
Zinc
Total Number of Data = 42
Number of Non-Detects = 0
Number of Detects = 42
Detected Mean = 42.33
Detected Sd = 27.62
Slope (displayed data) = 20.05
Intercept (displayed data)= 42.33
Correlation, R = 0.711
Background Zinc
Total Number of Data = 8
Number of Non-Detects = 0
Number of Detects = 8
Detected Mean = 38.75
Detected Sd = 7.126
Slope (displayed data) = 7.503
Intercept (displayed data)= 38.75
Correlation, R = 0.98
Best Fit Line

APPENDIX G

ProUCL Statistics Soil Matrix
Western Parcel

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.15/23/2018 12:58:59 PM		
From File	Onsite Metals Input.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Arsenic			
General Statistics			
Total Number of Observations	64	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	1.6	Mean	6.881
Maximum	18	Median	6.4
SD	2.749	Std. Error of Mean	0.344
Coefficient of Variation	0.399	Skewness	1.271
Normal GOF Test			
Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0032	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0837	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Normal at 5% Significance Level	
Data appear Approximate Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.455	95% Adjusted-CLT UCL (Chen-1995)	7.505
		95% Modified-t UCL (Johnson-1978)	7.464
Gamma GOF Test			
A-D Test Statistic	0.243	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0489	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.112	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	6.707	k star (bias corrected MLE)	6.403
Theta hat (MLE)	1.026	Theta star (bias corrected MLE)	1.075
nu hat (MLE)	858.5	nu star (bias corrected)	819.6
MLE Mean (bias corrected)	6.881	MLE Sd (bias corrected)	2.719
		Approximate Chi Square Value (0.05)	754.2
Adjusted Level of Significance	0.0463	Adjusted Chi Square Value	752.7
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	7.478	95% Adjusted Gamma UCL (use when n<50)	7.493

	A	B	C	D	E	F	G	H	I	J	K	L
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic					0.985	**Shapiro Wilk Lognormal GOF Test**					
53	5% Shapiro Wilk P Value					0.87	Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic					0.0691	**Lilliefors Lognormal GOF Test**					
55	5% Lilliefors Critical Value					0.111	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					0.47	Mean of logged Data					1.852
60	Maximum of Logged Data					2.89	SD of logged Data					0.403
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					7.579	90% Chebyshev (MVUE) UCL					7.985
64	95% Chebyshev (MVUE) UCL					8.474	97.5% Chebyshev (MVUE) UCL					9.153
65	99% Chebyshev (MVUE) UCL					10.49						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					7.446	95% Jackknife UCL					7.455
72	95% Standard Bootstrap UCL					7.434	95% Bootstrap-t UCL					7.519
73	95% Hall's Bootstrap UCL					7.559	95% Percentile Bootstrap UCL					7.45
74	95% BCA Bootstrap UCL					7.464						
75	90% Chebyshev(Mean, Sd) UCL					7.912	95% Chebyshev(Mean, Sd) UCL					8.379
76	97.5% Chebyshev(Mean, Sd) UCL					9.027	99% Chebyshev(Mean, Sd) UCL					10.3
77												
78	**Suggested UCL to Use**											
79	95% Student's-t UCL					7.455						
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 1:00:13 PM
From File	Onsite Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Barium

General Statistics

Total Number of Observations	64	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	87	Mean	151.7
Maximum	310	Median	140
SD	38.97	Std. Error of Mean	4.872
Coefficient of Variation	0.257	Skewness	1.543

Normal GOF Test

Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	2.7595E-6	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.15	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	159.8	95% Adjusted-CLT UCL (Chen-1995)	160.7
		95% Modified-t UCL (Johnson-1978)	160

Gamma GOF Test

A-D Test Statistic	1.217	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.117	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.111	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	17.85	k star (bias corrected MLE)	17.02
Theta hat (MLE)	8.497	Theta star (bias corrected MLE)	8.909
nu hat (MLE)	2285	nu star (bias corrected)	2179
MLE Mean (bias corrected)	151.7	MLE Sd (bias corrected)	36.76
		Approximate Chi Square Value (0.05)	2072
Adjusted Level of Significance	0.0463	Adjusted Chi Square Value	2069

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	159.5	95% Adjusted Gamma UCL (use when n<50)	159.7

	A–E	F	G–K	L
51	**Lognormal GOF Test**			
52	Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**	
53	5% Shapiro Wilk P Value	0.0754	Data appear Lognormal at 5% Significance Level	
54	Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**	
55	5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level	
56	**Data appear Approximate Lognormal at 5% Significance Level**			
57				
58	**Lognormal Statistics**			
59	Minimum of Logged Data	4.466	Mean of logged Data	4.993
60	Maximum of Logged Data	5.737	SD of logged Data	0.233
61				
62	**Assuming Lognormal Distribution**			
63	95% H-UCL	159.4	90% Chebyshev (MVUE) UCL	164.8
64	95% Chebyshev (MVUE) UCL	170.9	97.5% Chebyshev (MVUE) UCL	179.3
65	99% Chebyshev (MVUE) UCL	195.9		
66				
67	**Nonparametric Distribution Free UCL Statistics**			
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**			
69				
70	**Nonparametric Distribution Free UCLs**			
71	95% CLT UCL	159.7	95% Jackknife UCL	159.8
72	95% Standard Bootstrap UCL	159.7	95% Bootstrap-t UCL	160.9
73	95% Hall's Bootstrap UCL	162	95% Percentile Bootstrap UCL	159.6
74	95% BCA Bootstrap UCL	160.3		
75	90% Chebyshev(Mean, Sd) UCL	166.3	95% Chebyshev(Mean, Sd) UCL	172.9
76	97.5% Chebyshev(Mean, Sd) UCL	182.1	99% Chebyshev(Mean, Sd) UCL	200.1
77				
78	**Suggested UCL to Use**			
79	95% Student's-t UCL	159.8	or 95% Modified-t UCL	160
80	or 95% H-UCL	159.4		
81				
82	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
83	Recommendations are based upon data size, data distribution, and skewness.			
84	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
85	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
86				
87	**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**			
88	**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**			
89	**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**			
90	**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**			
91				

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 1:01:00 PM
From File	Onsite Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Chromium

General Statistics			
Total Number of Observations	64	Number of Distinct Observations	22
		Number of Missing Observations	0
Minimum	14	Mean	24.5
Maximum	38	Median	24
SD	5.413	Std. Error of Mean	0.677
Coefficient of Variation	0.221	Skewness	0.582
Normal GOF Test			
Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0.0715	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.0877	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.111	Data appear Normal at 5% Significance Level	
Data appear Normal at 5% Significance Level			
Assuming Normal Distribution			
95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	25.63	95% Adjusted-CLT UCL (Chen-1995)	25.67
		95% Modified-t UCL (Johnson-1978)	25.64
Gamma GOF Test			
A-D Test Statistic	0.271	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.749	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.0645	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.111	Detected data appear Gamma Distributed at 5% Significance Level	
Detected data appear Gamma Distributed at 5% Significance Level			
Gamma Statistics			
k hat (MLE)	21.3	k star (bias corrected MLE)	20.32
Theta hat (MLE)	1.15	Theta star (bias corrected MLE)	1.206
nu hat (MLE)	2727	nu star (bias corrected)	2600
MLE Mean (bias corrected)	24.5	MLE Sd (bias corrected)	5.436
		Approximate Chi Square Value (0.05)	2483
Adjusted Level of Significance	0.0463	Adjusted Chi Square Value	2480
Assuming Gamma Distribution			
95% Approximate Gamma UCL (use when n>=50))	25.66	95% Adjusted Gamma UCL (use when n<50)	25.69

	A	B	C	D	E	F	G	H	I	J	K	L
51	**Lognormal GOF Test**											
52					Shapiro Wilk Test Statistic	0.98	**Shapiro Wilk Lognormal GOF Test**					
53					5% Shapiro Wilk P Value	0.671	Data appear Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.0566	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	2.639					Mean of logged Data	3.175
60					Maximum of Logged Data	3.638					SD of logged Data	0.22
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	25.7					90% Chebyshev (MVUE) UCL	26.54
64					95% Chebyshev (MVUE) UCL	27.46					97.5% Chebyshev (MVUE) UCL	28.74
65					99% Chebyshev (MVUE) UCL	31.26						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	25.61					95% Jackknife UCL	25.63
72					95% Standard Bootstrap UCL	25.58					95% Bootstrap-t UCL	25.67
73					95% Hall's Bootstrap UCL	25.72					95% Percentile Bootstrap UCL	25.66
74					95% BCA Bootstrap UCL	25.61						
75					90% Chebyshev(Mean, Sd) UCL	26.53					95% Chebyshev(Mean, Sd) UCL	27.45
76					97.5% Chebyshev(Mean, Sd) UCL	28.73					99% Chebyshev(Mean, Sd) UCL	31.23
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	25.63						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/23/2018 1:01:44 PM								
5	From File			Onsite Metals Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Cobalt											
12												
13	General Statistics											
14	Total Number of Observations					64	Number of Distinct Observations					28
15							Number of Missing Observations					0
16	Minimum					4.9	Mean					9.447
17	Maximum					14	Median					9.4
18	SD					1.838	Std. Error of Mean					0.23
19	Coefficient of Variation					0.195	Skewness					0.258
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic					0.976	Shapiro Wilk GOF Test					
23	5% Shapiro Wilk P Value					0.47	Data appear Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.116	Lilliefors GOF Test					
25	5% Lilliefors Critical Value					0.111	Data Not Normal at 5% Significance Level					
26	Data appear Approximate Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL					9.831	95% Adjusted-CLT UCL (Chen-1995)					9.833
31							95% Modified-t UCL (Johnson-1978)					9.832
32												
33	Gamma GOF Test											
34	A-D Test Statistic					0.373	Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value					0.749	Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.0941	Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value					0.111	Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)					26.24	k star (bias corrected MLE)					25.02
42	Theta hat (MLE)					0.36	Theta star (bias corrected MLE)					0.378
43	nu hat (MLE)					3359	nu star (bias corrected)					3203
44	MLE Mean (bias corrected)					9.447	MLE Sd (bias corrected)					1.889
45							Approximate Chi Square Value (0.05)					3072
46	Adjusted Level of Significance					0.0463	Adjusted Chi Square Value					3069
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))					9.848	95% Adjusted Gamma UCL (use when n<50)					9.858
50												

51	Lognormal GOF Test			
52	Shapiro Wilk Test Statistic	0.973	**Shapiro Wilk Lognormal GOF Test**	
53	5% Shapiro Wilk P Value	0.379	Data appear Lognormal at 5% Significance Level	
54	Lilliefors Test Statistic	0.0862	**Lilliefors Lognormal GOF Test**	
55	5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level	
56	**Data appear Lognormal at 5% Significance Level**			
57				
58	**Lognormal Statistics**			
59	Minimum of Logged Data	1.589	Mean of logged Data	2.227
60	Maximum of Logged Data	2.639	SD of logged Data	0.2
61				
62	**Assuming Lognormal Distribution**			
63	95% H-UCL	9.872	90% Chebyshev (MVUE) UCL	10.17
64	95% Chebyshev (MVUE) UCL	10.49	97.5% Chebyshev (MVUE) UCL	10.94
65	99% Chebyshev (MVUE) UCL	11.82		
66				
67	**Nonparametric Distribution Free UCL Statistics**			
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**			
69				
70	**Nonparametric Distribution Free UCLs**			
71	95% CLT UCL	9.825	95% Jackknife UCL	9.831
72	95% Standard Bootstrap UCL	9.821	95% Bootstrap-t UCL	9.836
73	95% Hall's Bootstrap UCL	9.823	95% Percentile Bootstrap UCL	9.827
74	95% BCA Bootstrap UCL	9.838		
75	90% Chebyshev(Mean, Sd) UCL	10.14	95% Chebyshev(Mean, Sd) UCL	10.45
76	97.5% Chebyshev(Mean, Sd) UCL	10.88	99% Chebyshev(Mean, Sd) UCL	11.73
77				
78	**Suggested UCL to Use**			
79	95% Student's-t UCL	9.831		
80				
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test			
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL			
83				
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
85	Recommendations are based upon data size, data distribution, and skewness.			
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
88				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/23/2018 1:02:19 PM								
5	From File			Onsite Metals Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Copper											
11												
12	General Statistics											
13	Total Number of Observations					64	Number of Distinct Observations					40
14	Number of Detects					63	Number of Non-Detects					1
15	Number of Distinct Detects					39	Number of Distinct Non-Detects					1
16	Minimum Detect					3.8	Minimum Non-Detect					3
17	Maximum Detect					100	Maximum Non-Detect					3
18	Variance Detects					181.4	Percent Non-Detects					1.563%
19	Mean Detects					13.84	SD Detects					13.47
20	Median Detects					11	CV Detects					0.973
21	Skewness Detects					4.657	Kurtosis Detects					27.42
22	Mean of Logged Detects					2.409	SD of Logged Detects					0.597
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.567	Normal GOF Test on Detected Observations Only					
26	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.256	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.111	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					13.67	KM Standard Error of Mean					1.679
33	KM SD					13.32	95% KM (BCA) UCL					16.9
34	95% KM (t) UCL					16.47	95% KM (Percentile Bootstrap) UCL					16.63
35	95% KM (z) UCL					16.43	95% KM Bootstrap t UCL					18.43
36	90% KM Chebyshev UCL					18.7	95% KM Chebyshev UCL					20.99
37	97.5% KM Chebyshev UCL					24.15	99% KM Chebyshev UCL					30.37
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					2.031	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.761	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.138	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.113	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					2.442	k star (bias corrected MLE)					2.337
48	Theta hat (MLE)					5.666	Theta star (bias corrected MLE)					5.922
49	nu hat (MLE)					307.7	nu star (bias corrected)					294.4
50	Mean (detects)					13.84						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	13.62
59	Maximum	100	Median	10.5
60	SD	13.47	CV	0.989
61	k hat (MLE)	1.749	k star (bias corrected MLE)	1.677
62	Theta hat (MLE)	7.788	Theta star (bias corrected MLE)	8.121
63	nu hat (MLE)	223.9	nu star (bias corrected)	214.7
64	Adjusted Level of Significance (β)	0.0463		
65	Approximate Chi Square Value (214.71, α)	181.8	Adjusted Chi Square Value (214.71, β)	181.1
66	95% Gamma Approximate UCL (use when n>=50)	16.09	95% Gamma Adjusted UCL (use when n<50)	16.15
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	13.67	SD (KM)	13.32
70	Variance (KM)	177.5	SE of Mean (KM)	1.679
71	k hat (KM)	1.053	k star (KM)	1.014
72	nu hat (KM)	134.7	nu star (KM)	129.8
73	theta hat (KM)	12.99	theta star (KM)	13.48
74	80% gamma percentile (KM)	21.97	90% gamma percentile (KM)	31.37
75	95% gamma percentile (KM)	40.75	99% gamma percentile (KM)	62.52
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (129.75, α)	104.4	Adjusted Chi Square Value (129.75, β)	103.9
79	95% Gamma Approximate KM-UCL (use when n>=50)	16.98	95% Gamma Adjusted KM-UCL (use when n<50)	17.07
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Approximate Test Statistic	0.952	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk P Value	0.0334	Detected Data Not Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.0894	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.111	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Approximate Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	13.66	Mean in Log Scale	2.385
90	SD in Original Scale	13.44	SD in Log Scale	0.623
91	95% t UCL (assumes normality of ROS data)	16.46	95% Percentile Bootstrap UCL	16.44
92	95% BCA Bootstrap UCL	18.19	95% Bootstrap t UCL	19.03
93	95% H-UCL (Log ROS)	15.36		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	2.388	KM Geo Mean	10.9
97	KM SD (logged)	0.609	95% Critical H Value (KM-Log)	1.94
98	KM Standard Error of Mean (logged)	0.0768	95% H-UCL (KM -Log)	15.22
99	KM SD (logged)	0.609	95% Critical H Value (KM-Log)	1.94
100	KM Standard Error of Mean (logged)	0.0768		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					13.65	Mean in Log Scale					2.378
105	SD in Original Scale					13.45	SD in Log Scale					0.643
106	95% t UCL (Assumes normality)					16.45	95% H-Stat UCL					15.54
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	KM H-UCL					15.22						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/23/2018 1:06:00 PM
From File	Onsite Metals Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Hexavalent Chromium

General Statistics

Total Number of Observations	64	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	62
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.057	Minimum Non-Detect	0.04
Maximum Detect	0.16	Maximum Non-Detect	0.04
Variance Detects	0.0053	Percent Non-Detects	96.88%
Mean Detects	0.109	SD Detects	0.0728
Median Detects	0.109	CV Detects	0.671
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-2.349	SD of Logged Detects	0.73

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.0421	KM Standard Error of Mean	0.00265
KM SD	0.015	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0466	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0465	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0501	95% KM Chebyshev UCL	0.0537
97.5% KM Chebyshev UCL	0.0587	99% KM Chebyshev UCL	0.0685

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	4.077	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0266	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	16.31	nu star (bias corrected)	N/A
Mean (detects)	0.109		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.0421	SD (KM)	0.015
Variance (KM)	2.2493E-4	SE of Mean (KM)	0.00265

	A–E	F	G–K	L
51	k hat (KM)	7.895	k star (KM)	7.535
52	nu hat (KM)	1011	nu star (KM)	964.5
53	theta hat (KM)	0.00534	theta star (KM)	0.00559
54	80% gamma percentile (KM)	0.0542	90% gamma percentile (KM)	0.0626
55	95% gamma percentile (KM)	0.0702	99% gamma percentile (KM)	0.0858
56				
57	**Gamma Kaplan-Meier (KM) Statistics**			
58			Adjusted Level of Significance (β)	0.0463
59	Approximate Chi Square Value (964.51, α)	893.4	Adjusted Chi Square Value (964.51, β)	891.9
60	95% Gamma Approximate KM-UCL (use when n>=50)	0.0455	95% Gamma Adjusted KM-UCL (use when n<50)	0.0456
61				
62	**Lognormal GOF Test on Detected Observations Only**			
63	**Not Enough Data to Perform GOF Test**			
64				
65	**Lognormal ROS Statistics Using Imputed Non-Detects**			
66	Mean in Original Scale	0.00412	Mean in Log Scale	-10.52
67	SD in Original Scale	0.0211	SD in Log Scale	3.623
68	95% t UCL (assumes normality of ROS data)	0.00852	95% Percentile Bootstrap UCL	0.00919
69	95% BCA Bootstrap UCL	0.0126	95% Bootstrap t UCL	0.0411
70	95% H-UCL (Log ROS)	0.173		
71				
72	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
73	KM Mean (logged)	-3.192	KM Geo Mean	0.0411
74	KM SD (logged)	0.177	95% Critical H Value (KM-Log)	1.704
75	KM Standard Error of Mean (logged)	0.0312	95% H-UCL (KM -Log)	0.0434
76	KM SD (logged)	0.177	95% Critical H Value (KM-Log)	1.704
77	KM Standard Error of Mean (logged)	0.0312		
78				
79	**DL/2 Statistics**			
80	**DL/2 Normal**		**DL/2 Log-Transformed**	
81	Mean in Original Scale	0.0228	Mean in Log Scale	-3.863
82	SD in Original Scale	0.018	SD in Log Scale	0.289
83	95% t UCL (Assumes normality)	0.0265	95% H-Stat UCL	0.0233
84	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
85				
86	**Nonparametric Distribution Free UCL Statistics**			
87	**Data do not follow a Discernible Distribution at 5% Significance Level**			
88				
89	**Suggested UCL to Use**			
90	95% KM (Chebyshev) UCL	0.0537		
91				
92	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
93	Recommendations are based upon data size, data distribution, and skewness.			
94	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
95	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
96				

UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
Date/Time of Computation	ProUCL 5.15/23/2018 1:02:57 PM		
From File	Onsite Metals Input.xls		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
Lead			
General Statistics			
Total Number of Observations	77	Number of Distinct Observations	55
Number of Detects	75	Number of Non-Detects	2
Number of Distinct Detects	53	Number of Distinct Non-Detects	2
Minimum Detect	0.522	Minimum Non-Detect	0.1
Maximum Detect	570	Maximum Non-Detect	0.2
Variance Detects	6850	Percent Non-Detects	2.597%
Mean Detects	30.93	SD Detects	82.77
Median Detects	7.6	CV Detects	2.676
Skewness Detects	5.235	Kurtosis Detects	29.81
Mean of Logged Detects	2.391	SD of Logged Detects	1.155
Normal GOF Test on Detects Only			
Shapiro Wilk Test Statistic	0.359	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.357	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.102	Detected Data Not Normal at 5% Significance Level	
Detected Data Not Normal at 5% Significance Level			
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	30.13	KM Standard Error of Mean	9.326
KM SD	81.29	95% KM (BCA) UCL	48.23
95% KM (t) UCL	45.66	95% KM (Percentile Bootstrap) UCL	45.83
95% KM (z) UCL	45.47	95% KM Bootstrap t UCL	69.95
90% KM Chebyshev UCL	58.11	95% KM Chebyshev UCL	70.78
97.5% KM Chebyshev UCL	88.37	99% KM Chebyshev UCL	122.9
Gamma GOF Tests on Detected Observations Only			
A-D Test Statistic	10.15	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.808	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.335	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.108	Detected Data Not Gamma Distributed at 5% Significance Level	
Detected Data Not Gamma Distributed at 5% Significance Level			
Gamma Statistics on Detected Data Only			
k hat (MLE)	0.594	k star (bias corrected MLE)	0.58
Theta hat (MLE)	52.04	Theta star (bias corrected MLE)	53.38
nu hat (MLE)	89.16	nu star (bias corrected)	86.93
Mean (detects)	30.93		

		F		L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	30.13
59	Maximum	570	Median	7.6
60	SD	81.82	CV	2.716
61	k hat (MLE)	0.527	k star (bias corrected MLE)	0.515
62	Theta hat (MLE)	57.21	Theta star (bias corrected MLE)	58.52
63	nu hat (MLE)	81.11	nu star (bias corrected)	79.28
64	Adjusted Level of Significance (β)	0.0469		
65	Approximate Chi Square Value (79.28, α)	59.77	Adjusted Chi Square Value (79.28, β)	59.45
66	95% Gamma Approximate UCL (use when n>=50)	39.97	95% Gamma Adjusted UCL (use when n<50)	40.18
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	30.13	SD (KM)	81.29
70	Variance (KM)	6607	SE of 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	theta hat (KM)	219.3	theta star (KM)	214.1
74	80% gamma percentile (KM)	31.05	90% gamma percentile (KM)	88.47
75	95% gamma percentile (KM)	167.8	99% gamma percentile (KM)	401.2
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (21.67, α)	12.09	Adjusted Chi Square Value (21.67, β)	11.96
79	95% Gamma Approximate KM-UCL (use when n>=50)	54	95% Gamma Adjusted KM-UCL (use when n<50)	54.62
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Approximate Test Statistic	0.838	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk P Value	2.734E-11	Detected Data Not Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.244	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.102	Detected Data Not Lognormal at 5% Significance Level	
86	**Detected Data Not Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	30.15	Mean in Log Scale	2.322
90	SD in Original Scale	81.81	SD in Log Scale	1.216
91	95% t UCL (assumes normality of ROS data)	45.68	95% Percentile Bootstrap UCL	46.78
92	95% BCA Bootstrap UCL	53.44	95% Bootstrap t UCL	70.9
93	95% H-UCL (Log ROS)	30.21		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	2.269	KM Geo Mean	9.67
97	KM SD (logged)	1.356	95% Critical H Value (KM-Log)	2.64
98	KM Standard Error of Mean (logged)	0.156	95% H-UCL (KM -Log)	36.59
99	KM SD (logged)	1.356	95% Critical H Value (KM-Log)	2.64
100	KM Standard Error of Mean (logged)	0.156		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					30.13	Mean in Log Scale					2.26
105	SD in Original Scale					81.82	SD in Log Scale					1.398
106	95% t UCL (Assumes normality)					45.66	95% H-Stat UCL					39.17
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Data do not follow a Discernible Distribution at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	95% KM (Chebyshev) UCL					70.78						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/23/2018 1:05:26 PM								
5	From File			Onsite Metals Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Mercury											
11												
12	General Statistics											
13	Total Number of Observations					64	Number of Distinct Observations					46
14	Number of Detects					61	Number of Non-Detects					3
15	Number of Distinct Detects					45	Number of Distinct Non-Detects					1
16	Minimum Detect					0.024	Minimum Non-Detect					0.02
17	Maximum Detect					25	Maximum Non-Detect					0.02
18	Variance Detects					11.98	Percent Non-Detects					4.688%
19	Mean Detects					0.75	SD Detects					3.461
20	Median Detects					0.061	CV Detects					4.617
21	Skewness Detects					6.366	Kurtosis Detects					42.64
22	Mean of Logged Detects					-2.36	SD of Logged Detects					1.387
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.227	Normal GOF Test on Detected Observations Only					
26	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.451	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.113	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					0.716	KM Standard Error of Mean					0.423
33	KM SD					3.355	95% KM (BCA) UCL					1.481
34	95% KM (t) UCL					1.421	95% KM (Percentile Bootstrap) UCL					1.52
35	95% KM (z) UCL					1.411	95% KM Bootstrap t UCL					7.726
36	90% KM Chebyshev UCL					1.984	95% KM Chebyshev UCL					2.559
37	97.5% KM Chebyshev UCL					3.356	99% KM Chebyshev UCL					4.923
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					12	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.857	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.369	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.123	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.328	k star (bias corrected MLE)					0.323
48	Theta hat (MLE)					2.286	Theta star (bias corrected MLE)					2.323
49	nu hat (MLE)					40.02	nu star (bias corrected)					39.38
50	Mean (detects)					0.75						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	0.715
59	Maximum	25	Median	0.0605
60	SD	3.382	CV	4.729
61	k hat (MLE)	0.32	k star (bias corrected MLE)	0.316
62	Theta hat (MLE)	2.232	Theta star (bias corrected MLE)	2.265
63	nu hat (MLE)	41	nu star (bias corrected)	40.41
64	Adjusted Level of Significance (β)	0.0463		
65	Approximate Chi Square Value (40.41, α)	26.85	Adjusted Chi Square Value (40.41, β)	26.59
66	95% Gamma Approximate UCL (use when n>=50)	1.076	95% Gamma Adjusted UCL (use when n<50)	1.087
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	0.716	SD (KM)	3.355
70	Variance (KM)	11.26	SE of Mean (KM)	0.423
71	k hat (KM)	0.0455	k star (KM)	0.0538
72	nu hat (KM)	5.822	nu star (KM)	6.883
73	theta hat (KM)	15.73	theta star (KM)	13.31
74	80% gamma percentile (KM)	0.124	90% gamma percentile (KM)	1.195
75	95% gamma percentile (KM)	3.898	99% gamma percentile (KM)	15.12
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (6.88, α)	2.106	Adjusted Chi Square Value (6.88, β)	2.046
79	95% Gamma Approximate KM-UCL (use when n>=50)	2.338	95% Gamma Adjusted KM-UCL (use when n<50)	2.407
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Approximate Test Statistic	0.771	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk P Value	1.782E-12	Detected Data Not Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.113	Detected Data Not Lognormal at 5% Significance Level	
86	**Detected Data Not Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	0.715	Mean in Log Scale	-2.501
90	SD in Original Scale	3.382	SD in Log Scale	1.498
91	95% t UCL (assumes normality of ROS data)	1.421	95% Percentile Bootstrap UCL	1.5
92	95% BCA Bootstrap UCL	2.038	95% Bootstrap t UCL	7.918
93	95% H-UCL (Log ROS)	0.401		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-2.433	KM Geo Mean	0.0878
97	KM SD (logged)	1.382	95% Critical H Value (KM-Log)	2.304
98	KM Standard Error of Mean (logged)	0.174	95% H-UCL (KM -Log)	0.341
99	KM SD (logged)	1.382	95% Critical H Value (KM-Log)	2.304
100	KM Standard Error of Mean (logged)	0.174		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					0.715	Mean in Log Scale					-2.465
105	SD in Original Scale					3.382	SD in Log Scale					1.435
106	95% t UCL (Assumes normality)					1.421	95% H-Stat UCL					0.365
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Data do not follow a Discernible Distribution at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	95% KM (Chebyshev) UCL					2.559						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

1	**UCL Statistics for Data Sets with Non-Detects**			
2				
3	User Selected Options			
4	Date/Time of Computation	ProUCL 5.15/23/2018 1:03:37 PM		
5	From File	Onsite Metals Input.xls		
6	Full Precision	OFF		
7	Confidence Coefficient	95%		
8	Number of Bootstrap Operations	2000		
9				
10				
11	Nickel			
12				
13	**General Statistics**			
14	Total Number of Observations	64	Number of Distinct Observations	17
15			Number of Missing Observations	0
16	Minimum	9.3	Mean	19.41
17	Maximum	66	Median	19
18	SD	7	Std. Error of Mean	0.875
19	Coefficient of Variation	0.361	Skewness	4.804
20				
21	**Normal GOF Test**			
22	Shapiro Wilk Test Statistic	0.621	**Shapiro Wilk GOF Test**	
23	5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
24	Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**	
25	5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
26	**Data Not Normal at 5% Significance Level**			
27				
28	**Assuming Normal Distribution**			
29	**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**	
30	95% Student's-t UCL	20.87	95% Adjusted-CLT UCL (Chen-1995)	21.41
31			95% Modified-t UCL (Johnson-1978)	20.96
32				
33	**Gamma GOF Test**			
34	A-D Test Statistic	2.152	**Anderson-Darling Gamma GOF Test**	
35	5% A-D Critical Value	0.75	Data Not Gamma Distributed at 5% Significance Level	
36	K-S Test Statistic	0.181	**Kolmogorov-Smirnov Gamma GOF Test**	
37	5% K-S Critical Value	0.111	Data Not Gamma Distributed at 5% Significance Level	
38	**Data Not Gamma Distributed at 5% Significance Level**			
39				
40	**Gamma Statistics**			
41	k hat (MLE)	12.92	k star (bias corrected MLE)	12.33
42	Theta hat (MLE)	1.502	Theta star (bias corrected MLE)	1.574
43	nu hat (MLE)	1654	nu star (bias corrected)	1578
44	MLE Mean (bias corrected)	19.41	MLE Sd (bias corrected)	5.528
45			Approximate Chi Square Value (0.05)	1487
46	Adjusted Level of Significance	0.0463	Adjusted Chi Square Value	1485
47				
48	**Assuming Gamma Distribution**			
49	95% Approximate Gamma UCL (use when n>=50))	20.6	95% Adjusted Gamma UCL (use when n<50)	20.63
50				

	A	B	C	D	E	F	G	H	I	J	K	L
51	Lognormal GOF Test											
52					Shapiro Wilk Test Statistic	0.896	Shapiro Wilk Lognormal GOF Test					
53					5% Shapiro Wilk P Value	9.6824E-6	Data Not Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.154	Lilliefors Lognormal GOF Test					
55					5% Lilliefors Critical Value	0.111	Data Not Lognormal at 5% Significance Level					
56	Data Not Lognormal at 5% Significance Level											
57												
58	Lognormal Statistics											
59					Minimum of Logged Data	2.23					Mean of logged Data	2.927
60					Maximum of Logged Data	4.19					SD of logged Data	0.26
61												
62	Assuming Lognormal Distribution											
63					95% H-UCL	20.43					90% Chebyshev (MVUE) UCL	21.2
64					95% Chebyshev (MVUE) UCL	22.06					97.5% Chebyshev (MVUE) UCL	23.26
65					99% Chebyshev (MVUE) UCL	25.62						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data do not follow a Discernible Distribution (0.05)											
69												
70	Nonparametric Distribution Free UCLs											
71					95% CLT UCL	20.85					95% Jackknife UCL	20.87
72					95% Standard Bootstrap UCL	20.86					95% Bootstrap-t UCL	21.83
73					95% Hall's Bootstrap UCL	27.67					95% Percentile Bootstrap UCL	20.95
74					95% BCA Bootstrap UCL	21.63						
75					90% Chebyshev(Mean, Sd) UCL	22.04					95% Chebyshev(Mean, Sd) UCL	23.23
76					97.5% Chebyshev(Mean, Sd) UCL	24.88					99% Chebyshev(Mean, Sd) UCL	28.12
77												
78	Suggested UCL to Use											
79					95% Student's-t UCL	20.87					or 95% Modified-t UCL	20.96
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/23/2018 1:04:13 PM								
5	From File			Onsite Metals Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10												
11	Vanadium											
12												
13	**General Statistics**											
14	Total Number of Observations					64	Number of Distinct Observations					33
15							Number of Missing Observations					0
16	Minimum					29	Mean					45.92
17	Maximum					94	Median					42.5
18	SD					11.83	Std. Error of Mean					1.479
19	Coefficient of Variation					0.258	Skewness					1.567
20												
21	**Normal GOF Test**											
22	Shapiro Wilk Test Statistic					0.89	**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk P Value					4.4560E-6	Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic					0.144	**Lilliefors GOF Test**					
25	5% Lilliefors Critical Value					0.111	Data Not Normal at 5% Significance Level					
26	**Data Not Normal at 5% Significance Level**											
27												
28	**Assuming Normal Distribution**											
29	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
30	95% Student's-t UCL					48.39	95% Adjusted-CLT UCL (Chen-1995)					48.66
31							95% Modified-t UCL (Johnson-1978)					48.44
32												
33	**Gamma GOF Test**											
34	A-D Test Statistic					0.769	**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value					0.749	Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic					0.124	**Kolmogorov-Smirnov Gamma GOF Test**					
37	5% K-S Critical Value					0.111	Data Not Gamma Distributed at 5% Significance Level					
38	**Data Not Gamma Distributed at 5% Significance Level**											
39												
40	**Gamma Statistics**											
41	k hat (MLE)					17.68	k star (bias corrected MLE)					16.86
42	Theta hat (MLE)					2.598	Theta star (bias corrected MLE)					2.724
43	nu hat (MLE)					2263	nu star (bias corrected)					2158
44	MLE Mean (bias corrected)					45.92	MLE Sd (bias corrected)					11.18
45							Approximate Chi Square Value (0.05)					2051
46	Adjusted Level of Significance					0.0463	Adjusted Chi Square Value					2049
47												
48	**Assuming Gamma Distribution**											
49	95% Approximate Gamma UCL (use when n>=50))					48.32	95% Adjusted Gamma UCL (use when n<50)					48.37
50												

	A	B	C	D	E	F	G	H	I	J	K	L
51	**Lognormal GOF Test**											
52					Shapiro Wilk Test Statistic	0.963	**Shapiro Wilk Lognormal GOF Test**					
53					5% Shapiro Wilk P Value	0.136	Data appear Lognormal at 5% Significance Level					
54					Lilliefors Test Statistic	0.11	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.111	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	3.367					Mean of logged Data	3.798
60					Maximum of Logged Data	4.543					SD of logged Data	0.235
61												
62	**Assuming Lognormal Distribution**											
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	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	48.35					95% Jackknife UCL	48.39
72					95% Standard Bootstrap UCL	48.3					95% Bootstrap-t UCL	48.8
73					95% Hall's Bootstrap UCL	48.9					95% Percentile Bootstrap UCL	48.38
74					95% BCA Bootstrap UCL	48.47						
75					90% Chebyshev(Mean, Sd) UCL	50.36					95% Chebyshev(Mean, Sd) UCL	52.37
76					97.5% Chebyshev(Mean, Sd) UCL	55.16					99% Chebyshev(Mean, Sd) UCL	60.64
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	48.39					or 95% Modified-t UCL	48.44
80					or 95% H-UCL	48.28						
81												
82	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
83	Recommendations are based upon data size, data distribution, and skewness.											
84	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
85	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
86												
87	**ProUCL computes and outputs H-statistic based UCLs for historical reasons only.**											
88	**H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.**											
89	**It is therefore recommended to avoid the use of H-statistic based 95% UCLs.**											
90	**Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.**											
91												

	A–E	F	G–K	L
1	UCL Statistics for Data Sets with Non-Detects			
2				
3	User Selected Options			
4	Date/Time of Computation	ProUCL 5.15/23/2018 1:04:49 PM		
5	From File	Onsite Metals Input.xls		
6	Full Precision	OFF		
7	Confidence Coefficient	95%		
8	Number of Bootstrap Operations	2000		
9				
10				
11	Zinc			
12				
13	**General Statistics**			
14	Total Number of Observations	64	Number of Distinct Observations	37
15			Number of Missing Observations	0
16	Minimum	24	Mean	54.31
17	Maximum	290	Median	39
18	SD	42.21	Std. Error of Mean	5.277
19	Coefficient of Variation	0.777	Skewness	3.435
20				
21	**Normal GOF Test**			
22	Shapiro Wilk Test Statistic	0.604	**Shapiro Wilk GOF Test**	
23	5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
24	Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**	
25	5% Lilliefors Critical Value	0.111	Data Not Normal at 5% Significance Level	
26	**Data Not Normal at 5% Significance Level**			
27				
28	**Assuming Normal Distribution**			
29	**95% Normal UCL**		**95% UCLs (Adjusted for Skewness)**	
30	95% Student's-t UCL	63.12	95% Adjusted-CLT UCL (Chen-1995)	65.41
31			95% Modified-t UCL (Johnson-1978)	63.5
32				
33	**Gamma GOF Test**			
34	A-D Test Statistic	5.919	**Anderson-Darling Gamma GOF Test**	
35	5% A-D Critical Value	0.757	Data Not Gamma Distributed at 5% Significance Level	
36	K-S Test Statistic	0.282	**Kolmogorov-Smirnov Gamma GOF Test**	
37	5% K-S Critical Value	0.112	Data Not Gamma Distributed at 5% Significance Level	
38	**Data Not Gamma Distributed at 5% Significance Level**			
39				
40	**Gamma Statistics**			
41	k hat (MLE)	3.282	k star (bias corrected MLE)	3.138
42	Theta hat (MLE)	16.55	Theta star (bias corrected MLE)	17.31
43	nu hat (MLE)	420.1	nu star (bias corrected)	401.7
44	MLE Mean (bias corrected)	54.31	MLE Sd (bias corrected)	30.66
45			Approximate Chi Square Value (0.05)	356.3
46	Adjusted Level of Significance	0.0463	Adjusted Chi Square Value	355.3
47				
48	**Assuming Gamma Distribution**			
49	95% Approximate Gamma UCL (use when n>=50))	61.24	95% Adjusted Gamma UCL (use when n<50)	61.41
50				

	A	B	C	D	E	F	G	H	I	J	K	L
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic					0.824	**Shapiro Wilk Lognormal GOF Test**					
53	5% Shapiro Wilk P Value					3.661E-10	Data Not Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic					0.237	**Lilliefors Lognormal GOF Test**					
55	5% Lilliefors Critical Value					0.111	Data Not Lognormal at 5% Significance Level					
56	**Data Not Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					3.178	Mean of logged Data					3.835
60	Maximum of Logged Data					5.67	SD of logged Data					0.501
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					59.01	90% Chebyshev (MVUE) UCL					62.69
64	95% Chebyshev (MVUE) UCL					67.38	97.5% Chebyshev (MVUE) UCL					73.88
65	99% Chebyshev (MVUE) UCL					86.66						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data do not follow a Discernible Distribution (0.05)**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					62.99	95% Jackknife UCL					63.12
72	95% Standard Bootstrap UCL					62.92	95% Bootstrap-t UCL					67.06
73	95% Hall's Bootstrap UCL					70.23	95% Percentile Bootstrap UCL					63.44
74	95% BCA Bootstrap UCL					66.42						
75	90% Chebyshev(Mean, Sd) UCL					70.14	95% Chebyshev(Mean, Sd) UCL					77.31
76	97.5% Chebyshev(Mean, Sd) UCL					87.27	99% Chebyshev(Mean, Sd) UCL					106.8
77												
78	**Suggested UCL to Use**											
79	95% Chebyshev (Mean, Sd) UCL					77.31						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 10:19:57 AM								
5	From File			ProUCL Input TPHg TPHd.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	TPH-d											
11												
12	General Statistics											
13	Total Number of Observations					114	Number of Distinct Observations					93
14	Number of Detects					94	Number of Non-Detects					20
15	Number of Distinct Detects					91	Number of Distinct Non-Detects					3
16	Minimum Detect					2.1	Minimum Non-Detect					5
17	Maximum Detect					23000	Maximum Non-Detect					25
18	Variance Detects					19489301	Percent Non-Detects					17.54%
19	Mean Detects					3465	SD Detects					4415
20	Median Detects					1326	CV Detects					1.274
21	Skewness Detects					1.91	Kurtosis Detects					4.307
22	Mean of Logged Detects					6.908	SD of Logged Detects					2.116
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.771	Normal GOF Test on Detected Observations Only					
26	5% Shapiro Wilk P Value					0	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.216	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.0916	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					2858	KM Standard Error of Mean					395.4
33	KM SD					4199	95% KM (BCA) UCL					3549
34	95% KM (t) UCL					3513	95% KM (Percentile Bootstrap) UCL					3521
35	95% KM (z) UCL					3508	95% KM Bootstrap t UCL					3653
36	90% KM Chebyshev UCL					4044	95% KM Chebyshev UCL					4581
37	97.5% KM Chebyshev UCL					5327	99% KM Chebyshev UCL					6792
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.467	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.817	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.0735	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.0976	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.51	k star (bias corrected MLE)					0.5
48	Theta hat (MLE)					6798	Theta star (bias corrected MLE)					6923
49	nu hat (MLE)					95.82	nu star (bias corrected)					94.09
50	Mean (detects)					3465						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	2857
59	Maximum	23000	Median	651
60	SD	4218	CV	1.476
61	k hat (MLE)	0.234	k star (bias corrected MLE)	0.234
62	Theta hat (MLE)	12215	Theta star (bias corrected MLE)	12231
63	nu hat (MLE)	53.33	nu star (bias corrected)	53.26
64	Adjusted Level of Significance (β)	0.0479		
65	Approximate Chi Square Value (53.26, α)	37.49	Adjusted Chi Square Value (53.26, β)	37.32
66	95% Gamma Approximate UCL (use when n>=50)	4058	95% Gamma Adjusted UCL (use when n<50)	4077
67				
68	**Estimates of Gamma Parameters 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	**Gamma Kaplan-Meier (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 GOF Test on Detected 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 Level	
84	Lilliefors Test Statistic	0.12	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.0916	Detected Data Not Lognormal at 5% Significance Level	
86	**Detected Data Not Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	2861	Mean in Log Scale	6.201
90	SD in Original Scale	4215	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	3555	95% Bootstrap t UCL	3572
93	95% H-UCL (Log ROS)	27518		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	5.912	KM Geo Mean	369.3
97	KM SD (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)	2.89	95% Critical H Value (KM-Log)	4.47
100	KM Standard Error of Mean (logged)	0.275		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					2858	Mean in Log Scale					6.012
105	SD in Original Scale					4217	SD in Log Scale					2.742
106	95% t UCL (Assumes normality)					3513	95% H-Stat UCL					52869
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Gamma Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	95% KM Approximate Gamma UCL					3647						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

1	UCL Statistics for Data Sets with Non-Detects			
2				
3	User Selected Options			
4	Date/Time of Computation	ProUCL 5.15/24/2018 10:18:59 AM		
5	From File	ProUCL Input TPHg TPHd.xls		
6	Full Precision	OFF		
7	Confidence Coefficient	95%		
8	Number of Bootstrap Operations	2000		
9				
10	TPH-g			
11				
12	General Statistics			
13	Total Number of Observations	110	Number of Distinct Observations	84
14			Number of Missing Observations	2
15	Number of Detects	90	Number of Non-Detects	20
16	Number of Distinct Detects	82	Number of Distinct Non-Detects	2
17	Minimum Detect	1.5	Minimum Non-Detect	1
18	Maximum Detect	19000	Maximum Non-Detect	4.5
19	Variance Detects	9096832	Percent Non-Detects	18.18%
20	Mean Detects	1985	SD Detects	3016
21	Median Detects	757.5	CV Detects	1.52
22	Skewness Detects	3.117	Kurtosis Detects	12.49
23	Mean of Logged Detects	6.383	SD of Logged Detects	2.063
24				
25	Normal GOF Test on Detects Only			
26	Shapiro Wilk Test Statistic	0.657	Normal GOF Test on Detected Observations Only	
27	5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level	
28	Lilliefors Test Statistic	0.255	Lilliefors GOF Test	
29	5% Lilliefors Critical Value	0.0936	Detected Data Not Normal at 5% Significance Level	
30	Detected Data Not Normal at 5% Significance Level			
31				
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
33	KM Mean	1624	KM Standard Error of Mean	270.3
34	KM SD	2819	95% KM (BCA) UCL	2085
35	95% KM (t) UCL	2072	95% KM (Percentile Bootstrap) UCL	2072
36	95% KM (z) UCL	2069	95% KM Bootstrap t UCL	2189
37	90% KM Chebyshev UCL	2435	95% KM Chebyshev UCL	2802
38	97.5% KM Chebyshev UCL	3312	99% KM Chebyshev UCL	4313
39				
40	Gamma GOF Tests on Detected Observations Only			
41	A-D Test Statistic	0.331	Anderson-Darling GOF Test	
42	5% A-D Critical Value	0.816	Detected data appear Gamma Distributed at 5% Significance Level	
43	K-S Test Statistic	0.0554	Kolmogorov-Smirnov GOF	
44	5% K-S Critical Value	0.0995	Detected data appear Gamma Distributed at 5% Significance Level	
45	Detected data appear Gamma Distributed at 5% Significance Level			
46				
47	Gamma Statistics on Detected Data Only			
48	k hat (MLE)	0.522	k star (bias corrected MLE)	0.512
49	Theta hat (MLE)	3806	Theta star (bias corrected MLE)	3880
50	nu hat (MLE)	93.87	nu star (bias corrected)	92.07

	A–E	F	G–K	L
51	Mean (detects)	1985		
52				
53	**Gamma ROS Statistics using Imputed Non-Detects**			
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
57	This is especially true when the sample size is small.			
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
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 corrected MLE)	0.238
63	Theta hat (MLE)	6821	Theta star (bias corrected MLE)	6833
64	nu hat (MLE)	52.37	nu star (bias corrected)	52.28
65	Adjusted Level of Significance (β)	0.0478		
66	Approximate Chi Square Value (52.28, α)	36.67	Adjusted Chi Square Value (52.28, β)	36.5
67	95% Gamma Approximate UCL (use when n>=50)	2315	95% Gamma Adjusted UCL (use when n<50)	2326
68				
69	**Estimates of Gamma Parameters using KM Estimates**			
70	Mean (KM)	1624	SD (KM)	2819
71	Variance (KM)	7945483	SE 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	theta hat (KM)	4893	theta star (KM)	4937
75	80% gamma percentile (KM)	2542	90% gamma percentile (KM)	4733
76	95% gamma percentile (KM)	7209	99% gamma percentile (KM)	13575
77				
78	**Gamma Kaplan-Meier (KM) Statistics**			
79	Approximate Chi Square Value (72.37, α)	53.78	Adjusted Chi Square Value (72.37, β)	53.57
80	95% Gamma Approximate KM-UCL (use when n>=50)	2185	95% Gamma Adjusted KM-UCL (use when n<50)	2194
81				
82	**Lognormal GOF Test on Detected Observations Only**			
83	Shapiro Wilk Approximate Test Statistic	0.899	**Shapiro Wilk GOF Test**	
84	5% Shapiro Wilk P Value	6.4744E-8	Detected Data Not Lognormal at 5% Significance Level	
85	Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**	
86	5% Lilliefors Critical Value	0.0936	Detected Data Not Lognormal at 5% Significance Level	
87	**Detected Data Not Lognormal at 5% Significance Level**			
88				
89	**Lognormal ROS Statistics Using Imputed Non-Detects**			
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 UCL (assumes normality of ROS data)	2074	95% Percentile Bootstrap UCL	2107
93	95% BCA Bootstrap UCL	2151	95% Bootstrap t UCL	2248
94	95% H-UCL (Log ROS)	16958		
95				
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
97	KM Mean (logged)	5.227	KM Geo Mean	186.2
98	KM SD (logged)	3.076	95% Critical H Value (KM-Log)	4.703
99	KM Standard Error of Mean (logged)	0.295	95% H-UCL (KM -Log)	84481
100	KM SD (logged)	3.076	95% Critical H Value (KM-Log)	4.703

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.295						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					1624	Mean in Log Scale					5.138
106	SD in Original Scale					2832	SD in Log Scale					3.252
107	95% t UCL (Assumes 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 Data appear Gamma Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	95% KM Approximate Gamma UCL					2185						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/24/2018 12:26:38 PM
From File	ProUCL Input VOCs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,2,4-Trimethylbenzene

General Statistics

Total Number of Observations	50	Number of Distinct Observations	36
Number of Detects	34	Number of Non-Detects	16
Number of Distinct Detects	33	Number of Distinct Non-Detects	3
Minimum Detect	0.012	Minimum Non-Detect	0.005
Maximum Detect	170	Maximum Non-Detect	0.5
Variance Detects	1310	Percent Non-Detects	32%
Mean Detects	26.36	SD Detects	36.19
Median Detects	10.6	CV Detects	1.373
Skewness Detects	2.299	Kurtosis Detects	6.621
Mean of Logged Detects	1.89	SD of Logged Detects	2.404

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.728	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.933	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.253	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	17.93	KM Standard Error of Mean	4.575
KM SD	31.87	95% KM (BCA) UCL	25.82
95% KM (t) UCL	25.6	95% KM (Percentile Bootstrap) UCL	25.84
95% KM (z) UCL	25.45	95% KM Bootstrap t UCL	28.68
90% KM Chebyshev UCL	31.65	95% KM Chebyshev UCL	37.87
97.5% KM Chebyshev UCL	46.5	99% KM Chebyshev UCL	63.45

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.29	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.819	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0796	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.16	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.465	k star (bias corrected MLE)	0.444
Theta hat (MLE)	56.68	Theta star (bias corrected MLE)	59.42
nu hat (MLE)	31.62	nu star (bias corrected)	30.17
Mean (detects)	26.36		

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	17.93
59	Maximum	170	Median	2.735
60	SD	32.19	CV	1.796
61	k hat (MLE)	0.234	k star (bias corrected MLE)	0.233
62	Theta hat (MLE)	76.76	Theta star (bias corrected MLE)	76.99
63	nu hat (MLE)	23.36	nu star (bias corrected)	23.29
64	Adjusted Level of Significance (β)	0.0452		
65	Approximate Chi Square Value (23.29, α)	13.31	Adjusted Chi Square Value (23.29, β)	13.08
66	95% Gamma Approximate UCL (use when n>=50)	31.37	95% Gamma Adjusted UCL (use when n<50)	31.91
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	17.93	SD (KM)	31.87
70	Variance (KM)	1016	SE of Mean (KM)	4.575
71	k hat (KM)	0.316	k star (KM)	0.311
72	nu hat (KM)	31.65	nu star (KM)	31.08
73	theta hat (KM)	56.65	theta star (KM)	57.68
74	80% gamma percentile (KM)	27.72	90% gamma percentile (KM)	52.64
75	95% gamma percentile (KM)	81.08	99% gamma percentile (KM)	154.7
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (31.08, α)	19.34	Adjusted Chi Square Value (31.08, β)	19.07
79	95% Gamma Approximate KM-UCL (use when n>=50)	28.8	95% Gamma Adjusted KM-UCL (use when n<50)	29.22
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.933	Detected Data Not Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.16	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.15	Detected Data Not Lognormal at 5% Significance Level	
86	**Detected Data Not Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	17.95	Mean in Log Scale	0.292
90	SD in Original Scale	32.18	SD in Log Scale	3.146
91	95% t UCL (assumes normality of ROS data)	25.58	95% Percentile Bootstrap UCL	26
92	95% BCA Bootstrap UCL	28.07	95% Bootstrap t UCL	28.65
93	95% H-UCL (Log ROS)	2051		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-0.363	KM Geo Mean	0.696
97	KM SD (logged)	3.833	95% Critical H Value (KM-Log)	6.354
98	KM Standard Error of Mean (logged)	0.552	95% H-UCL (KM -Log)	35003
99	KM SD (logged)	3.833	95% Critical H Value (KM-Log)	6.354
100	KM Standard Error of Mean (logged)	0.552		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					17.95	Mean in Log Scale					-0.116
105	SD in Original Scale					32.18	SD in Log Scale					3.738
106	95% t UCL (Assumes normality)					25.58	95% H-Stat UCL					26553
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Gamma Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	95% KM Approximate Gamma UCL					28.8						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:27:13 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	1,3,5-Trimethylbenzene											
11												
12	General Statistics											
13	Total Number of Observations					47	Number of Distinct Observations					33
14							Number of Missing Observations					2
15	Number of Detects					30	Number of Non-Detects					17
16	Number of Distinct Detects					30	Number of Distinct Non-Detects					3
17	Minimum Detect					0.014	Minimum Non-Detect					0.005
18	Maximum Detect					250	Maximum Non-Detect					0.5
19	Variance Detects					2033	Percent Non-Detects					36.17%
20	Mean Detects					13.53	SD Detects					45.09
21	Median Detects					3.235	CV Detects					3.333
22	Skewness Detects					5.318	Kurtosis Detects					28.76
23	Mean of Logged Detects					0.939	SD of Logged Detects					1.877
24												
25	Normal GOF Test on Detects Only											
26	Shapiro Wilk Test Statistic					0.285	Shapiro Wilk GOF Test					
27	5% Shapiro Wilk Critical Value					0.927	Detected Data Not Normal at 5% Significance Level					
28	Lilliefors Test Statistic					0.411	Lilliefors GOF Test					
29	5% Lilliefors Critical Value					0.159	Detected Data Not Normal at 5% Significance Level					
30	Detected Data Not Normal at 5% Significance Level											
31												
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
33	KM Mean					8.645	KM Standard Error of Mean					5.342
34	KM SD					36.01	95% KM (BCA) UCL					19.4
35	95% KM (t) UCL					17.61	95% KM (Percentile Bootstrap) UCL					19.35
36	95% KM (z) UCL					17.43	95% KM Bootstrap t UCL					62.32
37	90% KM Chebyshev UCL					24.67	95% KM Chebyshev UCL					31.93
38	97.5% KM Chebyshev UCL					42	99% KM Chebyshev UCL					61.79
39												
40	Gamma GOF Tests on Detected Observations Only											
41	A-D Test Statistic					1.668	Anderson-Darling GOF Test					
42	5% A-D Critical Value					0.832	Detected Data Not Gamma Distributed at 5% Significance Level					
43	K-S Test Statistic					0.197	Kolmogorov-Smirnov GOF					
44	5% K-S Critical Value					0.171	Detected Data Not Gamma Distributed at 5% Significance Level					
45	Detected Data Not Gamma Distributed at 5% Significance Level											
46												
47	Gamma Statistics on Detected Data Only											
48	k hat (MLE)					0.396	k star (bias corrected MLE)					0.378
49	Theta hat (MLE)					34.19	Theta star (bias corrected MLE)					35.76
50	nu hat (MLE)					23.74	nu star (bias corrected)					22.7

51	Mean (detects)	13.53		
52				
53	**Gamma ROS Statistics using Imputed Non-Detects**			
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
57	This is especially true when the sample size is small.			
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
59	Minimum	0.01	Mean	8.639
60	Maximum	250	Median	0.77
61	SD	36.4	CV	4.213
62	k hat (MLE)	0.224	k star (bias corrected MLE)	0.224
63	Theta hat (MLE)	38.52	Theta star (bias corrected MLE)	38.54
64	nu hat (MLE)	21.08	nu star (bias corrected)	21.07
65	Adjusted Level of Significance (β)	0.0449		
66	Approximate Chi Square Value (21.07, α)	11.64	Adjusted Chi Square Value (21.07, β)	11.42
67	95% Gamma Approximate UCL (use when n>=50)	15.63	95% Gamma Adjusted UCL (use when n<50)	15.94
68				
69	**Estimates of Gamma Parameters using KM Estimates**			
70	Mean (KM)	8.645	SD (KM)	36.01
71	Variance (KM)	1296	SE of Mean (KM)	5.342
72	k hat (KM)	0.0576	k star (KM)	0.0681
73	nu hat (KM)	5.418	nu star (KM)	6.406
74	theta hat (KM)	150	theta star (KM)	126.9
75	80% gamma percentile (KM)	2.907	90% gamma percentile (KM)	18.26
76	95% gamma percentile (KM)	49.55	99% gamma percentile (KM)	164.9
77				
78	**Gamma Kaplan-Meier (KM) Statistics**			
79	Approximate Chi Square Value (6.41, α)	1.851	Adjusted Chi Square Value (6.41, β)	1.774
80	95% Gamma Approximate KM-UCL (use when n>=50)	29.92	95% Gamma Adjusted KM-UCL (use when n<50)	31.21
81	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
82				
83	**Lognormal GOF Test on Detected Observations Only**			
84	Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**	
85	5% Shapiro Wilk Critical Value	0.927	Detected Data appear Lognormal at 5% Significance Level	
86	Lilliefors Test Statistic	0.0977	**Lilliefors GOF Test**	
87	5% Lilliefors Critical Value	0.159	Detected Data appear Lognormal at 5% Significance Level	
88	**Detected Data appear Lognormal at 5% Significance Level**			
89				
90	**Lognormal ROS Statistics Using Imputed Non-Detects**			
91	Mean in Original Scale	8.658	Mean in Log Scale	-0.601
92	SD in Original Scale	36.39	SD in Log Scale	2.638
93	95% t UCL (assumes normality of ROS data)	17.57	95% Percentile Bootstrap UCL	18.87
94	95% BCA Bootstrap UCL	24.86	95% Bootstrap t UCL	59.54
95	95% H-UCL (Log ROS)	102.3		
96				
97	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
98	KM Mean (logged)	-1.212	KM Geo Mean	0.298
99	KM SD (logged)	3.272	95% Critical H Value (KM-Log)	5.445
100	KM Standard Error of Mean (logged)	0.494	95% H-UCL (KM -Log)	871.2

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM SD (logged)					3.272	95% Critical H Value (KM-Log)					5.445
102	KM Standard Error of Mean (logged)					0.494						
103												
104	**DL/2 Statistics**											
105	**DL/2 Normal**						**DL/2 Log-Transformed**					
106	Mean in Original Scale					8.663	Mean in Log Scale					-1.019
107	SD in Original Scale					36.39	SD in Log Scale					3.26
108	95% t UCL (Assumes normality)					17.57	95% H-Stat UCL					996.7
109	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
110												
111	**Nonparametric Distribution Free UCL Statistics**											
112	**Detected Data appear Lognormal Distributed at 5% Significance Level**											
113												
114	**Suggested UCL to Use**											
115	95% KM (Chebyshev) UCL					31.93						
116												
117	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
118	Recommendations are based upon data size, data distribution, and skewness.											
119	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
120	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
121												

	A–E	F	G–K	L
1	**UCL Statistics for Data Sets with Non-Detects**			
2				
3	User Selected Options			
4	Date/Time of Computation	ProUCL 5.15/24/2018 12:23:31 PM		
5	From File	ProUCL Input VOCs.xls		
6	Full Precision	OFF		
7	Confidence Coefficient	95%		
8	Number of Bootstrap Operations	2000		
9				
10	**4-Isopropyltoluene**			
11				
12	**General Statistics**			
13	Total Number of Observations	23	Number of Distinct Observations	13
14	Number of Detects	11	Number of Non-Detects	12
15	Number of Distinct Detects	11	Number of Distinct Non-Detects	4
16	Minimum Detect	0.01	Minimum Non-Detect	0.005
17	Maximum Detect	16	Maximum Non-Detect	5
18	Variance Detects	23.29	Percent Non-Detects	52.17%
19	Mean Detects	3.452	SD Detects	4.826
20	Median Detects	1.6	CV Detects	1.398
21	Skewness Detects	2.133	Kurtosis Detects	4.582
22	Mean of Logged Detects	-0.1	SD of Logged Detects	2.415
23				
24	**Normal GOF Test on Detects Only**			
25	Shapiro Wilk Test Statistic	0.719	**Shapiro Wilk GOF Test**	
26	5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
27	Lilliefors Test Statistic	0.297	**Lilliefors GOF Test**	
28	5% Lilliefors Critical Value	0.251	Detected Data Not Normal at 5% Significance Level	
29	**Detected Data Not Normal at 5% Significance Level**			
30				
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**			
32	KM Mean	1.683	KM Standard Error of Mean	0.792
33	KM SD	3.615	95% KM (BCA) UCL	3.001
34	95% KM (t) UCL	3.044	95% KM (Percentile Bootstrap) UCL	3.047
35	95% KM (z) UCL	2.986	95% KM Bootstrap t UCL	5.636
36	90% KM Chebyshev UCL	4.06	95% KM Chebyshev UCL	5.137
37	97.5% KM Chebyshev UCL	6.632	99% KM Chebyshev UCL	9.568
38				
39	**Gamma GOF Tests on Detected Observations Only**			
40	A-D Test Statistic	0.286	**Anderson-Darling GOF Test**	
41	5% A-D Critical Value	0.785	Detected data appear Gamma Distributed at 5% Significance Level	
42	K-S Test Statistic	0.136	**Kolmogorov-Smirnov GOF**	
43	5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level	
44	**Detected data appear Gamma Distributed at 5% Significance Level**			
45				
46	**Gamma Statistics on Detected Data Only**			
47	k hat (MLE)	0.478	k star (bias corrected MLE)	0.408
48	Theta hat (MLE)	7.227	Theta star (bias corrected MLE)	8.461
49	nu hat (MLE)	10.51	nu star (bias corrected)	8.975
50	Mean (detects)	3.452		

51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	1.656
59	Maximum	16	Median	0.01
60	SD	3.698	CV	2.233
61	k hat (MLE)	0.242	k star (bias corrected MLE)	0.239
62	Theta hat (MLE)	6.853	Theta star (bias corrected MLE)	6.926
63	nu hat (MLE)	11.12	nu star (bias corrected)	11
64	Adjusted Level of Significance (β)	0.0389		
65	Approximate Chi Square Value (11.00, α)	4.576	Adjusted Chi Square Value (11.00, β)	4.279
66	95% Gamma Approximate UCL (use when n>=50)	3.981	95% Gamma Adjusted UCL (use when n<50)	4.258
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	1.683	SD (KM)	3.615
70	Variance (KM)	13.07	SE of Mean (KM)	0.792
71	k hat (KM)	0.217	k star (KM)	0.217
72	nu hat (KM)	9.97	nu star (KM)	10
73	theta hat (KM)	7.766	theta star (KM)	7.74
74	80% gamma percentile (KM)	2.31	90% gamma percentile (KM)	5.086
75	95% gamma percentile (KM)	8.48	99% gamma percentile (KM)	17.7
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (10.00, α)	3.943	Adjusted Chi Square Value (10.00, β)	3.671
79	95% Gamma Approximate KM-UCL (use when n>=50)	4.269	95% Gamma Adjusted KM-UCL (use when n<50)	4.586
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.847	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.85	Detected Data Not Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.251	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Approximate Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	1.658	Mean in Log Scale	-2.78
90	SD in Original Scale	3.697	SD in Log Scale	3.278
91	95% t UCL (assumes normality of ROS data)	2.982	95% Percentile Bootstrap UCL	3.019
92	95% BCA Bootstrap UCL	3.494	95% Bootstrap t UCL	5.724
93	95% H-UCL (Log ROS)	1056		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-2.68	KM Geo Mean	0.0686
97	KM SD (logged)	3.023	95% Critical H Value (KM-Log)	5.807
98	KM Standard Error of Mean (logged)	0.674	95% H-UCL (KM -Log)	279.9
99	KM SD (logged)	3.023	95% Critical H Value (KM-Log)	5.807
100	KM Standard Error of Mean (logged)	0.674		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					1.815	Mean in Log Scale					-1.782
105	SD in Original Scale					3.66	SD in Log Scale					2.921
106	95% t UCL (Assumes 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	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Gamma Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)					4.586						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:19:31 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Benzene											
11												
12	General Statistics											
13	Total Number of Observations					48	Number of Distinct Observations					37
14	Number of Detects					34	Number of Non-Detects					14
15	Number of Distinct Detects					33	Number of Distinct Non-Detects					4
16	Minimum Detect					0.0049	Minimum Non-Detect					0.002
17	Maximum Detect					11.3	Maximum Non-Detect					2
18	Variance Detects					10.03	Percent Non-Detects					29.17%
19	Mean Detects					1.886	SD Detects					3.167
20	Median Detects					0.248	CV Detects					1.679
21	Skewness Detects					1.968	Kurtosis Detects					2.957
22	Mean of Logged Detects					-1.076	SD of Logged Detects					2.162
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.643	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.933	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.296	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.15	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					1.35	KM Standard Error of Mean					0.404
33	KM SD					2.757	95% KM (BCA) UCL					2.064
34	95% KM (t) UCL					2.028	95% KM (Percentile Bootstrap) UCL					2.04
35	95% KM (z) UCL					2.015	95% KM Bootstrap t UCL					2.266
36	90% KM Chebyshev UCL					2.562	95% KM Chebyshev UCL					3.111
37	97.5% KM Chebyshev UCL					3.873	99% KM Chebyshev UCL					5.37
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					1.18	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.837	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.197	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.162	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.387	k star (bias corrected MLE)					0.372
48	Theta hat (MLE)					4.877	Theta star (bias corrected MLE)					5.068
49	nu hat (MLE)					26.3	nu star (bias corrected)					25.31
50	Mean (detects)					1.886						

Gamma ROS Statistics using Imputed Non-Detects			
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., <15-20)			
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	0.0049	Mean	1.34
Maximum	11.3	Median	0.101
SD	2.79	CV	2.082
k hat (MLE)	0.293	k star (bias corrected MLE)	0.289
Theta hat (MLE)	4.571	Theta star (bias corrected MLE)	4.641
nu hat (MLE)	28.14	nu star (bias corrected)	27.72
Adjusted Level of Significance (β)	0.045		
Approximate Chi Square Value (27.72, α)	16.71	Adjusted Chi Square Value (27.72, β)	16.44
95% Gamma Approximate UCL (use when n>=50)	2.223	95% Gamma Adjusted UCL (use when n<50)	2.259
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	1.35	SD (KM)	2.757
Variance (KM)	7.6	SE of Mean (KM)	0.404
k hat (KM)	0.24	k star (KM)	0.239
nu hat (KM)	23.02	nu star (KM)	22.92
theta hat (KM)	5.629	theta star (KM)	5.655
80% gamma percentile (KM)	1.927	90% gamma percentile (KM)	4.064
95% gamma percentile (KM)	6.624	99% gamma percentile (KM)	13.48
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (22.92, α)	13.03	Adjusted Chi Square Value (22.92, β)	12.8
95% Gamma Approximate KM-UCL (use when n>=50)	2.375	95% Gamma Adjusted KM-UCL (use when n<50)	2.418
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.933	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.102	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.15	Detected Data appear Lognormal at 5% Significance Level	
Detected Data appear Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	1.344	Mean in Log Scale	-2.128
SD in Original Scale	2.788	SD in Log Scale	2.605
95% t UCL (assumes normality of ROS data)	2.019	95% Percentile Bootstrap UCL	2.044
95% BCA Bootstrap UCL	2.166	95% Bootstrap t UCL	2.265
95% H-UCL (Log ROS)	19.33		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-2.172	KM Geo Mean	0.114
KM SD (logged)	2.667	95% Critical H Value (KM-Log)	4.559
KM Standard Error of Mean (logged)	0.41	95% H-UCL (KM -Log)	23.52
KM SD (logged)	2.667	95% Critical H Value (KM-Log)	4.559
KM Standard Error of Mean (logged)	0.41		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					1.372	Mean in Log Scale					-1.918
105	SD in Original Scale					2.778	SD in Log Scale					2.581
106	95% t UCL (Assumes normality)					2.044	95% H-Stat UCL					21.81
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Lognormal Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	97.5% KM (Chebyshev) UCL					3.873						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:22:18 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Ethylbenzene											
11												
12	General Statistics											
13	Total Number of Observations					49	Number of Distinct Observations					45
14	Number of Detects					42	Number of Non-Detects					7
15	Number of Distinct Detects					42	Number of Distinct Non-Detects					3
16	Minimum Detect					0.0045	Minimum Non-Detect					0.002
17	Maximum Detect					28	Maximum Non-Detect					0.2
18	Variance Detects					60.33	Percent Non-Detects					14.29%
19	Mean Detects					6.485	SD Detects					7.768
20	Median Detects					2.515	CV Detects					1.198
21	Skewness Detects					1.341	Kurtosis Detects					0.954
22	Mean of Logged Detects					0.393	SD of Logged Detects					2.552
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.763	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.942	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.219	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.135	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					5.561	KM Standard Error of Mean					1.078
33	KM SD					7.457	95% KM (BCA) UCL					7.387
34	95% KM (t) UCL					7.37	95% KM (Percentile Bootstrap) UCL					7.424
35	95% KM (z) UCL					7.335	95% KM Bootstrap t UCL					7.817
36	90% KM Chebyshev UCL					8.796	95% KM Chebyshev UCL					10.26
37	97.5% KM Chebyshev UCL					12.29	99% KM Chebyshev UCL					16.29
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.495	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.827	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.0988	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.145	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.439	k star (bias corrected MLE)					0.424
48	Theta hat (MLE)					14.77	Theta star (bias corrected MLE)					15.31
49	nu hat (MLE)					36.87	nu star (bias corrected)					35.57
50	Mean (detects)					6.485						

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.0045					Mean	5.595
59					Maximum	28					Median	1.9
60					SD	7.51					CV	1.342
61					k hat (MLE)	0.41					k star (bias corrected MLE)	0.398
62					Theta hat (MLE)	13.65					Theta star (bias corrected MLE)	14.04
63					nu hat (MLE)	40.17					nu star (bias corrected)	39.04
64					Adjusted Level of Significance (β)	0.0451						
65					Approximate Chi Square Value (39.04, α)	25.73					Adjusted Chi Square Value (39.04, β)	25.4
66					95% Gamma Approximate UCL (use when n>=50)	8.489					95% Gamma Adjusted UCL (use when n<50)	8.599
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	5.561					SD (KM)	7.457
70					Variance (KM)	55.61					SE of 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					theta hat (KM)	9.999					theta star (KM)	10.38
74					80% gamma percentile (KM)	9.155					90% gamma percentile (KM)	14.83
75					95% gamma percentile (KM)	20.84					99% gamma percentile (KM)	35.54
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (52.50, α)	36.86					Adjusted Chi Square Value (52.50, β)	36.46
79					95% Gamma Approximate KM-UCL (use when n>=50)	7.922					95% Gamma Adjusted KM-UCL (use when n<50)	8.008
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.822	**Shapiro Wilk GOF Test**					
83					5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level					
84					Lilliefors Test Statistic	0.166	**Lilliefors GOF Test**					
85					5% Lilliefors Critical Value	0.135	Detected Data Not Lognormal at 5% Significance Level					
86	**Detected Data Not Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	5.562					Mean in Log Scale	-0.287
90					SD in Original Scale	7.533					SD in Log Scale	2.932
91					95% t UCL (assumes normality of ROS data)	7.367					95% Percentile Bootstrap UCL	7.463
92					95% BCA Bootstrap UCL	7.704					95% Bootstrap t UCL	7.745
93					95% H-UCL (Log ROS)	450.9						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	-0.45					KM Geo Mean	0.638
97					KM SD (logged)	3.156					95% Critical H Value (KM-Log)	5.303
98					KM Standard Error of Mean (logged)	0.461					95% H-UCL (KM -Log)	1040
99					KM SD (logged)	3.156					95% Critical H Value (KM-Log)	5.303
100					KM Standard Error of Mean (logged)	0.461						

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					5.565	Mean in Log Scale					-0.354
105	SD in Original Scale					7.531	SD in Log Scale					3.113
106	95% t UCL (Assumes 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	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)					8.008						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/24/2018 12:22:56 PM
From File	ProUCL Input VOCs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Isopropylbenzene

General Statistics

Total Number of Observations	50	Number of Distinct Observations	40
Number of Detects	38	Number of Non-Detects	12
Number of Distinct Detects	37	Number of Distinct Non-Detects	3
Minimum Detect	0.012	Minimum Non-Detect	0.005
Maximum Detect	13	Maximum Non-Detect	5
Variance Detects	14.03	Percent Non-Detects	24%
Mean Detects	3.659	SD Detects	3.746
Median Detects	2.1	CV Detects	1.024
Skewness Detects	1.158	Kurtosis Detects	0.226
Mean of Logged Detects	0.4	SD of Logged Detects	1.85

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.833	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.208	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.142	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	2.809	KM Standard Error of Mean	0.512
KM SD	3.567	95% KM (BCA) UCL	3.689
95% KM (t) UCL	3.667	95% KM (Percentile Bootstrap) UCL	3.694
95% KM (z) UCL	3.651	95% KM Bootstrap t UCL	3.815
90% KM Chebyshev UCL	4.344	95% KM Chebyshev UCL	5.04
97.5% KM Chebyshev UCL	6.006	99% KM Chebyshev UCL	7.902

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.531	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.796	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.103	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.15	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.677	k star (bias corrected MLE)	0.641
Theta hat (MLE)	5.405	Theta star (bias corrected MLE)	5.708
nu hat (MLE)	51.45	nu star (bias corrected)	48.72
Mean (detects)	3.659		

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	2.806
59	Maximum	13	Median	1.515
60	SD	3.6	CV	1.283
61	k hat (MLE)	0.4	k star (bias corrected MLE)	0.389
62	Theta hat (MLE)	7.017	Theta star (bias corrected MLE)	7.209
63	nu hat (MLE)	39.98	nu star (bias corrected)	38.92
64	Adjusted Level of Significance (β)	0.0452		
65	Approximate Chi Square Value (38.92, α)	25.63	Adjusted Chi Square Value (38.92, β)	25.31
66	95% Gamma Approximate UCL (use when n>=50)	4.261	95% Gamma Adjusted UCL (use when n<50)	4.315
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	2.809	SD (KM)	3.567
70	Variance (KM)	12.73	SE of Mean (KM)	0.512
71	k hat (KM)	0.62	k star (KM)	0.596
72	nu hat (KM)	61.99	nu star (KM)	59.6
73	theta hat (KM)	4.531	theta star (KM)	4.712
74	80% gamma percentile (KM)	4.63	90% gamma percentile (KM)	7.316
75	95% gamma percentile (KM)	10.13	99% gamma percentile (KM)	16.94
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (59.60, α)	42.85	Adjusted Chi Square Value (59.60, β)	42.43
79	95% Gamma Approximate KM-UCL (use when n>=50)	3.907	95% Gamma Adjusted KM-UCL (use when n<50)	3.946
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.853	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.938	Detected Data Not Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.142	Detected Data Not Lognormal at 5% Significance Level	
86	**Detected Data Not Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	2.802	Mean in Log Scale	-0.408
90	SD in Original Scale	3.602	SD in Log Scale	2.225
91	95% t UCL (assumes normality of ROS data)	3.656	95% Percentile Bootstrap UCL	3.674
92	95% BCA Bootstrap UCL	3.752	95% Bootstrap t UCL	3.817
93	95% H-UCL (Log ROS)	27.66		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-0.799	KM Geo Mean	0.45
97	KM SD (logged)	2.766	95% Critical H Value (KM-Log)	4.733
98	KM Standard Error of Mean (logged)	0.406	95% H-UCL (KM -Log)	134
99	KM SD (logged)	2.766	95% Critical H Value (KM-Log)	4.733
100	KM Standard Error of Mean (logged)	0.406		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					2.851	Mean in Log Scale					-0.627
105	SD in Original Scale					3.58	SD in Log Scale					2.759
106	95% t UCL (Assumes 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	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	95% KM Approximate Gamma UCL					3.907						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:27:49 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	m,p-Xylenes											
11												
12	General Statistics											
13	Total Number of Observations					49	Number of Distinct Observations					34
14							Number of Missing Observations					1
15	Number of Detects					33	Number of Non-Detects					16
16	Number of Distinct Detects					32	Number of Distinct Non-Detects					3
17	Minimum Detect					0.003	Minimum Non-Detect					0.002
18	Maximum Detect					210	Maximum Non-Detect					0.2
19	Variance Detects					1597	Percent Non-Detects					32.65%
20	Mean Detects					19.87	SD Detects					39.97
21	Median Detects					7.29	CV Detects					2.012
22	Skewness Detects					3.777	Kurtosis Detects					16.5
23	Mean of Logged Detects					1.123	SD of Logged Detects					2.54
24												
25	Normal GOF Test on Detects Only											
26	Shapiro Wilk Test Statistic					0.533	Shapiro Wilk GOF Test					
27	5% Shapiro Wilk Critical Value					0.931	Detected Data Not Normal at 5% Significance Level					
28	Lilliefors Test Statistic					0.31	Lilliefors GOF Test					
29	5% Lilliefors Critical Value					0.152	Detected Data Not Normal at 5% Significance Level					
30	Detected Data Not Normal at 5% Significance Level											
31												
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
33	KM Mean					13.38	KM Standard Error of Mean					4.877
34	KM SD					33.62	95% KM (BCA) UCL					22.21
35	95% KM (t) UCL					21.56	95% KM (Percentile Bootstrap) UCL					22.18
36	95% KM (z) UCL					21.4	95% KM Bootstrap t UCL					31.85
37	90% KM Chebyshev UCL					28.01	95% KM Chebyshev UCL					34.64
38	97.5% KM Chebyshev UCL					43.84	99% KM Chebyshev UCL					61.91
39												
40	Gamma GOF Tests on Detected Observations Only											
41	A-D Test Statistic					0.433	Anderson-Darling GOF Test					
42	5% A-D Critical Value					0.842	Detected data appear Gamma Distributed at 5% Significance Level					
43	K-S Test Statistic					0.134	Kolmogorov-Smirnov GOF					
44	5% K-S Critical Value					0.165	Detected data appear Gamma Distributed at 5% Significance Level					
45	Detected data appear Gamma Distributed at 5% Significance Level											
46												
47	Gamma Statistics on Detected Data Only											
48	k hat (MLE)					0.359	k star (bias corrected MLE)					0.346
49	Theta hat (MLE)					55.38	Theta star (bias corrected MLE)					57.36
50	nu hat (MLE)					23.68	nu star (bias corrected)					22.86

	A	B	C	D	E	F	G	H	I	J	K	L
51					Mean (detects)	19.87						
52												
53	**Gamma ROS Statistics using Imputed Non-Detects**											
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
57	This is especially true when the sample size is small.											
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
59					Minimum	0.003					Mean	13.38
60					Maximum	210					Median	0.56
61					SD	33.96					CV	2.537
62					k hat (MLE)	0.217					k star (bias corrected MLE)	0.218
63					Theta hat (MLE)	61.58					Theta star (bias corrected MLE)	61.49
64					nu hat (MLE)	21.3					nu star (bias corrected)	21.33
65					Adjusted Level of Significance (β)	0.0451						
66					Approximate Chi Square Value (21.33, α)	11.84					Adjusted Chi Square Value (21.33, β)	11.62
67					95% Gamma Approximate UCL (use when n>=50)	24.12					95% Gamma Adjusted UCL (use when n<50)	24.56
68												
69	**Estimates of Gamma Parameters using KM Estimates**											
70					Mean (KM)	13.38					SD (KM)	33.62
71					Variance (KM)	1130					SE of Mean (KM)	4.877
72					k hat (KM)	0.158					k star (KM)	0.162
73					nu hat (KM)	15.53					nu star (KM)	15.91
74					theta hat (KM)	84.44					theta star (KM)	82.41
75					80% gamma percentile (KM)	15.49					90% gamma percentile (KM)	40.06
76					95% gamma percentile (KM)	72.47					99% gamma percentile (KM)	165.1
77												
78	**Gamma Kaplan-Meier (KM) Statistics**											
79					Approximate Chi Square Value (15.91, α)	7.902					Adjusted Chi Square Value (15.91, β)	7.73
80					95% Gamma Approximate KM-UCL (use when n>=50)	26.95					95% Gamma Adjusted KM-UCL (use when n<50)	27.55
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.931	Detected Data appear Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level					
87	**Detected Data appear Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	13.39					Mean in Log Scale	-0.728
91					SD in Original Scale	33.96					SD in Log Scale	3.482
92					95% t UCL (assumes normality of ROS data)	21.53					95% Percentile Bootstrap UCL	21.51
93					95% BCA Bootstrap UCL	26.02					95% Bootstrap t UCL	32.93
94					95% H-UCL (Log ROS)	3818						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	-1.224					KM Geo Mean	0.294
98					KM SD (logged)	3.96					95% Critical H Value (KM-Log)	6.529
99					KM Standard Error of Mean (logged)	0.577					95% H-UCL (KM -Log)	31239
100					KM SD (logged)	3.96					95% Critical H Value (KM-Log)	6.529

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.577						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					13.39	Mean in Log Scale					-0.973
106	SD in Original Scale					33.96	SD in Log Scale					3.864
107	95% t UCL (Assumes normality)					21.53	95% H-Stat UCL					23209
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
109												
110	**Nonparametric Distribution Free UCL Statistics**											
111	**Detected Data appear Gamma Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)					27.55						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/24/2018 12:24:58 PM
From File	ProUCL Input VOCs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Naphthalene

General Statistics			
Total Number of Observations	49	Number of Distinct Observations	43
		Number of Missing Observations	1
Number of Detects	43	Number of Non-Detects	6
Number of Distinct Detects	39	Number of Distinct Non-Detects	4
Minimum Detect	0.0081	Minimum Non-Detect	0.001
Maximum Detect	50.7	Maximum Non-Detect	10
Variance Detects	124.1	Percent Non-Detects	12.24%
Mean Detects	9.623	SD Detects	11.14
Median Detects	5.2	CV Detects	1.157
Skewness Detects	1.769	Kurtosis Detects	3.588
Mean of Logged Detects	1.106	SD of Logged Detects	2.195

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.808	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.943	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.134	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	8.5	KM Standard Error of Mean	1.556
KM SD	10.76	95% KM (BCA) UCL	11.15
95% KM (t) UCL	11.11	95% KM (Percentile Bootstrap) UCL	11.17
95% KM (z) UCL	11.06	95% KM Bootstrap t UCL	11.71
90% KM Chebyshev UCL	13.17	95% KM Chebyshev UCL	15.28
97.5% KM Chebyshev UCL	18.22	99% KM Chebyshev UCL	23.98

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.469	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.809	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.096	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.142	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.542	k star (bias corrected MLE)	0.519
Theta hat (MLE)	17.77	Theta star (bias corrected MLE)	18.53
nu hat (MLE)	46.58	nu star (bias corrected)	44.66

	A	B	C	D	E	F	G	H	I	J	K	L
51					Mean (detects)	9.623						
52												
53	**Gamma ROS Statistics using Imputed Non-Detects**											
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
57	This is especially true when the sample size is small.											
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
59					Minimum	0.0081					Mean	8.484
60					Maximum	50.7					Median	4.77
61					SD	10.87					CV	1.281
62					k hat (MLE)	0.404					k star (bias corrected MLE)	0.393
63					Theta hat (MLE)	20.99					Theta star (bias corrected MLE)	21.58
64					nu hat (MLE)	39.61					nu star (bias corrected)	38.52
65					Adjusted Level of Significance (β)	0.0451						
66					Approximate Chi Square Value (38.52, α)	25.31					Adjusted Chi Square Value (38.52, β)	24.98
67					95% Gamma Approximate UCL (use when n>=50)	12.91					95% Gamma Adjusted UCL (use when n<50)	13.08
68												
69	**Estimates of Gamma Parameters using KM Estimates**											
70					Mean (KM)	8.5					SD (KM)	10.76
71					Variance (KM)	115.7					SE of Mean (KM)	1.556
72					k hat (KM)	0.625					k star (KM)	0.6
73					nu hat (KM)	61.2					nu star (KM)	58.79
74					theta hat (KM)	13.61					theta star (KM)	14.17
75					80% gamma percentile (KM)	14.01					90% gamma percentile (KM)	22.11
76					95% gamma percentile (KM)	30.59					99% gamma percentile (KM)	51.1
77												
78	**Gamma Kaplan-Meier (KM) Statistics**											
79					Approximate Chi Square Value (58.79, α)	42.16					Adjusted Chi Square Value (58.79, β)	41.73
80					95% Gamma Approximate KM-UCL (use when n>=50)	11.85					95% Gamma Adjusted KM-UCL (use when n<50)	11.97
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.862	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.943	Detected Data Not Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.134	Detected Data Not Lognormal at 5% Significance Level					
87	**Detected Data Not Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	8.464					Mean in Log Scale	0.624
91					SD in Original Scale	10.88					SD in Log Scale	2.466
92					95% t UCL (assumes normality of ROS data)	11.07					95% Percentile Bootstrap UCL	11.09
93					95% BCA Bootstrap UCL	11.47					95% Bootstrap t UCL	11.79
94					95% H-UCL (Log ROS)	179.3						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	0.255					KM Geo Mean	1.29
98					KM SD (logged)	3.182					95% Critical H Value (KM-Log)	5.342
99					KM Standard Error of Mean (logged)	0.465					95% H-UCL (KM -Log)	2373
100					KM SD (logged)	3.182					95% Critical H Value (KM-Log)	5.342

	A–E	F	G–K	L
101	KM Standard Error of Mean (logged)	0.465		
102				
103	**DL/2 Statistics**			
104	**DL/2 Normal**		**DL/2 Log-Transformed**	
105	Mean in Original Scale	8.547	Mean in Log Scale	0.34
106	SD in Original Scale	10.84	SD in Log Scale	3.12
107	95% t UCL (Assumes normality)	11.14	95% H-Stat UCL	1944
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
109				
110	**Nonparametric Distribution Free UCL Statistics**			
111	**Detected Data appear Gamma Distributed at 5% Significance Level**			
112				
113	**Suggested UCL to Use**			
114	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	11.97		
115				
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
117	Recommendations are based upon data size, data distribution, and skewness.			
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
120				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:20:19 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	n-Butylbenzene											
11												
12	General Statistics											
13	Total Number of Observations					46	Number of Distinct Observations					29
14	Number of Detects					19	Number of Non-Detects					27
15	Number of Distinct Detects					19	Number of Distinct Non-Detects					10
16	Minimum Detect					0.0011	Minimum Non-Detect					0.005
17	Maximum Detect					9.4	Maximum Non-Detect					5
18	Variance Detects					8.418	Percent Non-Detects					58.7%
19	Mean Detects					2.417	SD Detects					2.901
20	Median Detects					1.7	CV Detects					1.2
21	Skewness Detects					1.512	Kurtosis Detects					1.44
22	Mean of Logged Detects					-0.488	SD of Logged Detects					2.49
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.787	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.901	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.212	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.197	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					1.012	KM Standard Error of Mean					0.33
33	KM SD					2.171	95% KM (BCA) UCL					1.603
34	95% KM (t) UCL					1.565	95% KM (Percentile Bootstrap) UCL					1.54
35	95% KM (z) UCL					1.554	95% KM Bootstrap t UCL					1.757
36	90% KM Chebyshev UCL					2	95% KM Chebyshev UCL					2.448
37	97.5% KM Chebyshev UCL					3.07	99% KM Chebyshev UCL					4.291
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.316	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.809	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.133	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.211	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.468	k star (bias corrected MLE)					0.429
48	Theta hat (MLE)					5.162	Theta star (bias corrected MLE)					5.63
49	nu hat (MLE)					17.79	nu star (bias corrected)					16.32
50	Mean (detects)					2.417						

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.0011					Mean	1.004
59					Maximum	9.4					Median	0.01
60					SD	2.192					CV	2.182
61					k hat (MLE)	0.245					k star (bias corrected MLE)	0.243
62					Theta hat (MLE)	4.1					Theta star (bias corrected MLE)	4.125
63					nu hat (MLE)	22.54					nu star (bias corrected)	22.4
64					Adjusted Level of Significance (β)	0.0448						
65					Approximate Chi Square Value (22.40, α)	12.64					Adjusted Chi Square Value (22.40, β)	12.4
66					95% Gamma Approximate UCL (use when n>=50)	1.78					95% Gamma Adjusted UCL (use when n<50)	1.814
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	1.012					SD (KM)	2.171
70					Variance (KM)	4.711					SE of Mean (KM)	0.33
71					k hat (KM)	0.217					k star (KM)	0.218
72					nu hat (KM)	19.98					nu star (KM)	20.01
73					theta hat (KM)	4.658					theta star (KM)	4.651
74					80% gamma percentile (KM)	1.389					90% gamma percentile (KM)	3.057
75					95% gamma percentile (KM)	5.096					99% gamma percentile (KM)	10.64
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (20.01, α)	10.86					Adjusted Chi Square Value (20.01, β)	10.64
79					95% Gamma Approximate KM-UCL (use when n>=50)	1.864					95% Gamma Adjusted KM-UCL (use when n<50)	1.902
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.873	**Shapiro Wilk GOF Test**					
83					5% Shapiro Wilk Critical Value	0.901	Detected Data Not Lognormal at 5% Significance Level					
84					Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**					
85					5% Lilliefors Critical Value	0.197	Detected Data Not Lognormal at 5% Significance Level					
86	**Detected Data Not Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	1.004					Mean in Log Scale	-3.454
90					SD in Original Scale	2.192					SD in Log Scale	3.199
91					95% t UCL (assumes normality of ROS data)	1.546					95% Percentile Bootstrap UCL	1.577
92					95% BCA Bootstrap UCL	1.766					95% Bootstrap t UCL	1.855
93					95% H-UCL (Log ROS)	66.47						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	-3.995					KM Geo Mean	0.0184
97					KM SD (logged)	3.437					95% Critical H Value (KM-Log)	5.676
98					KM Standard Error of Mean (logged)	0.541					95% H-UCL (KM -Log)	123.8
99					KM SD (logged)	3.437					95% Critical H Value (KM-Log)	5.676
100					KM Standard Error of Mean (logged)	0.541						

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104					Mean in Original Scale	1.069					Mean in Log Scale	-2.843
105					SD in Original Scale	2.193					SD in Log Scale	2.861
106					95% t UCL (Assumes normality)	1.612					95% H-Stat UCL	27.21
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113					Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	1.902						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:25:32 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	n-Propylbenzene											
11												
12	General Statistics											
13	Total Number of Observations					50	Number of Distinct Observations					43
14	Number of Detects					42	Number of Non-Detects					8
15	Number of Distinct Detects					41	Number of Distinct Non-Detects					2
16	Minimum Detect					0.021	Minimum Non-Detect					0.005
17	Maximum Detect					19	Maximum Non-Detect					0.5
18	Variance Detects					34.05	Percent Non-Detects					16%
19	Mean Detects					5.55	SD Detects					5.836
20	Median Detects					3.195	CV Detects					1.051
21	Skewness Detects					1.064	Kurtosis Detects					-0.201
22	Mean of Logged Detects					0.794	SD of Logged Detects					1.825
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.779	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.942	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.213	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.135	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					4.664	KM Standard Error of Mean					0.81
33	KM SD					5.661	95% KM (BCA) UCL					5.953
34	95% KM (t) UCL					6.023	95% KM (Percentile Bootstrap) UCL					6.003
35	95% KM (z) UCL					5.997	95% KM Bootstrap t UCL					6.187
36	90% KM Chebyshev UCL					7.095	95% KM Chebyshev UCL					8.196
37	97.5% KM Chebyshev UCL					9.725	99% KM Chebyshev UCL					12.73
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.454	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.798	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.0875	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.143	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.662	k star (bias corrected MLE)					0.631
48	Theta hat (MLE)					8.383	Theta star (bias corrected MLE)					8.801
49	nu hat (MLE)					55.62	nu star (bias corrected)					52.98
50	Mean (detects)					5.55						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	4.664
59	Maximum	19	Median	2.215
60	SD	5.719	CV	1.226
61	k hat (MLE)	0.411	k star (bias corrected MLE)	0.4
62	Theta hat (MLE)	11.34	Theta star (bias corrected MLE)	11.66
63	nu hat (MLE)	41.14	nu star (bias corrected)	40
64	Adjusted Level of Significance (β)	0.0452		
65	Approximate Chi Square Value (40.00, α)	26.51	Adjusted Chi Square Value (40.00, β)	26.18
66	95% Gamma Approximate UCL (use when n>=50)	7.038	95% Gamma Adjusted UCL (use when n<50)	7.126
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	4.664	SD (KM)	5.661
70	Variance (KM)	32.05	SE of Mean (KM)	0.81
71	k hat (KM)	0.679	k star (KM)	0.651
72	nu hat (KM)	67.87	nu star (KM)	65.13
73	theta hat (KM)	6.872	theta star (KM)	7.161
74	80% gamma percentile (KM)	7.681	90% gamma percentile (KM)	11.91
75	95% gamma percentile (KM)	16.29	99% gamma percentile (KM)	26.83
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (65.13, α)	47.56	Adjusted Chi Square Value (65.13, β)	47.12
79	95% Gamma Approximate KM-UCL (use when n>=50)	6.387	95% Gamma Adjusted KM-UCL (use when n<50)	6.447
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.135	Detected Data Not Lognormal at 5% Significance Level	
86	**Detected Data Not Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	4.673	Mean in Log Scale	0.198
90	SD in Original Scale	5.711	SD in Log Scale	2.185
91	95% t UCL (assumes normality of ROS data)	6.027	95% Percentile Bootstrap UCL	6.1
92	95% BCA Bootstrap UCL	6.186	95% Bootstrap t UCL	6.255
93	95% H-UCL (Log ROS)	44.53		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-0.158	KM Geo Mean	0.854
97	KM SD (logged)	2.748	95% Critical H Value (KM-Log)	4.706
98	KM Standard Error of Mean (logged)	0.394	95% H-UCL (KM -Log)	236.4
99	KM SD (logged)	2.748	95% Critical H Value (KM-Log)	4.706
100	KM Standard Error of Mean (logged)	0.394		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					4.668	Mean in Log Scale					-0.2
105	SD in Original Scale					5.716	SD in Log Scale					2.908
106	95% t UCL (Assumes normality)					6.023	95% H-Stat UCL					437.8
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	95% KM Approximate Gamma UCL					6.387						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:28:24 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**o-Xylene**											
11												
12	**General Statistics**											
13	Total Number of Observations					48	Number of Distinct Observations					31
14							Number of Missing Observations					2
15	Number of Detects					27	Number of Non-Detects					21
16	Number of Distinct Detects					26	Number of Distinct Non-Detects					5
17	Minimum Detect					0.015	Minimum Non-Detect					0.002
18	Maximum Detect					36	Maximum Non-Detect					2
19	Variance Detects					106.1	Percent Non-Detects					43.75%
20	Mean Detects					5.879	SD Detects					10.3
21	Median Detects					1.4	CV Detects					1.752
22	Skewness Detects					2.327	Kurtosis Detects					4.564
23	Mean of Logged Detects					0.0948	SD of Logged Detects					2.157
24												
25	**Normal GOF Test on Detects Only**											
26	Shapiro Wilk Test Statistic					0.601	**Shapiro Wilk GOF Test**					
27	5% Shapiro Wilk Critical Value					0.923	Detected Data Not Normal at 5% Significance Level					
28	Lilliefors Test Statistic					0.286	**Lilliefors GOF Test**					
29	5% Lilliefors Critical Value					0.167	Detected Data Not Normal at 5% Significance Level					
30	**Detected Data Not Normal at 5% Significance Level**											
31												
32	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
33	KM Mean					3.32	KM Standard Error of Mean					1.194
34	KM SD					8.119	95% KM (BCA) UCL					5.618
35	95% KM (t) UCL					5.323	95% KM (Percentile Bootstrap) UCL					5.422
36	95% KM (z) UCL					5.284	95% KM Bootstrap t UCL					6.597
37	90% KM Chebyshev UCL					6.902	95% KM Chebyshev UCL					8.525
38	97.5% KM Chebyshev UCL					10.78	99% KM Chebyshev UCL					15.2
39												
40	**Gamma GOF Tests on Detected Observations Only**											
41	A-D Test Statistic					0.892	**Anderson-Darling GOF Test**					
42	5% A-D Critical Value					0.832	Detected Data Not Gamma Distributed at 5% Significance Level					
43	K-S Test Statistic					0.187	**Kolmogorov-Smirnov GOF**					
44	5% K-S Critical Value					0.18	Detected Data Not Gamma Distributed at 5% Significance Level					
45	**Detected Data Not Gamma Distributed at 5% Significance Level**											
46												
47	**Gamma Statistics on Detected Data Only**											
48	k hat (MLE)					0.394	k star (bias corrected MLE)					0.374
49	Theta hat (MLE)					14.94	Theta star (bias corrected MLE)					15.7
50	nu hat (MLE)					21.25	nu star (bias corrected)					20.22

	A	B	C	D	E	F	G	H	I	J	K	L
51					Mean (detects)	5.879						
52												
53	**Gamma ROS Statistics using Imputed Non-Detects**											
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
57	This is especially true when the sample size is small.											
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
59					Minimum	0.01					Mean	3.312
60					Maximum	36					Median	0.119
61					SD	8.208					CV	2.478
62					k hat (MLE)	0.228					k star (bias corrected MLE)	0.228
63					Theta hat (MLE)	14.51					Theta star (bias corrected MLE)	14.54
64					nu hat (MLE)	21.9					nu star (bias corrected)	21.87
65					Adjusted Level of Significance (β)	0.045						
66					Approximate Chi Square Value (21.87, α)	12.24					Adjusted Chi Square Value (21.87, β)	12.02
67					95% Gamma Approximate UCL (use when n>=50)	5.917					95% Gamma Adjusted UCL (use when n<50)	6.027
68												
69	**Estimates of Gamma Parameters using KM Estimates**											
70					Mean (KM)	3.32					SD (KM)	8.119
71					Variance (KM)	65.91					SE of Mean (KM)	1.194
72					k hat (KM)	0.167					k star (KM)	0.171
73					nu hat (KM)	16.05					nu star (KM)	16.38
74					theta hat (KM)	19.86					theta star (KM)	19.46
75					80% gamma percentile (KM)	3.978					90% gamma percentile (KM)	9.978
76					95% gamma percentile (KM)	17.78					99% gamma percentile (KM)	39.86
77												
78	**Gamma Kaplan-Meier (KM) Statistics**											
79					Approximate Chi Square Value (16.38, α)	8.231					Adjusted Chi Square Value (16.38, β)	8.051
80					95% Gamma Approximate KM-UCL (use when n>=50)	6.606					95% Gamma Adjusted KM-UCL (use when n<50)	6.753
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.923	Detected Data appear Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.167	Detected Data Not Lognormal at 5% Significance Level					
87	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	3.318					Mean in Log Scale	-2.005
91					SD in Original Scale	8.205					SD in Log Scale	3.07
92					95% t UCL (assumes normality of ROS data)	5.305					95% Percentile Bootstrap UCL	5.347
93					95% BCA Bootstrap UCL	5.863					95% Bootstrap t UCL	7.169
94					95% H-UCL (Log ROS)	150.8						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	-2.36					KM Geo Mean	0.0944
98					KM SD (logged)	3.365					95% Critical H Value (KM-Log)	5.601
99					KM Standard Error of Mean (logged)	0.518					95% H-UCL (KM -Log)	423.8
100					KM SD (logged)	3.365					95% Critical H Value (KM-Log)	5.601

	A–E	F	G–K	L
101	KM Standard Error of Mean (logged)	0.518		
102				
103	**DL/2 Statistics**			
104	**DL/2 Normal**		**DL/2 Log-Transformed**	
105	Mean in Original Scale	3.345	Mean in Log Scale	-1.985
106	SD in Original Scale	8.195	SD in Log Scale	3.27
107	95% t UCL (Assumes normality)	5.33	95% H-Stat UCL	389.5
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
109				
110	**Nonparametric Distribution Free UCL Statistics**			
111	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**			
112				
113	**Suggested UCL to Use**			
114	97.5% KM (Chebyshev) UCL	10.78		
115				
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
117	Recommendations are based upon data size, data distribution, and skewness.			
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
120				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:20:59 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	sec-Butylbenzene											
11												
12	General Statistics											
13	Total Number of Observations					50	Number of Distinct Observations					42
14	Number of Detects					40	Number of Non-Detects					10
15	Number of Distinct Detects					39	Number of Distinct Non-Detects					3
16	Minimum Detect					0.012	Minimum Non-Detect					0.005
17	Maximum Detect					11.1	Maximum Non-Detect					0.5
18	Variance Detects					9.997	Percent Non-Detects					20%
19	Mean Detects					3.123	SD Detects					3.162
20	Median Detects					1.8	CV Detects					1.012
21	Skewness Detects					1.168	Kurtosis Detects					0.371
22	Mean of Logged Detects					0.326	SD of Logged Detects					1.718
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.833	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.94	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.228	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.139	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					2.501	KM Standard Error of Mean					0.438
33	KM SD					3.057	95% KM (BCA) UCL					3.23
34	95% KM (t) UCL					3.235	95% KM (Percentile Bootstrap) UCL					3.223
35	95% KM (z) UCL					3.221	95% KM Bootstrap t UCL					3.378
36	90% KM Chebyshev UCL					3.814	95% KM Chebyshev UCL					4.409
37	97.5% KM Chebyshev UCL					5.235	99% KM Chebyshev UCL					6.857
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.453	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.79	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.0966	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.145	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.738	k star (bias corrected MLE)					0.699
48	Theta hat (MLE)					4.231	Theta star (bias corrected MLE)					4.465
49	nu hat (MLE)					59.05	nu star (bias corrected)					55.96
50	Mean (detects)					3.123						

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	2.501
59					Maximum	11.1					Median	1.285
60					SD	3.088					CV	1.235
61					k hat (MLE)	0.42					k star (bias corrected MLE)	0.408
62					Theta hat (MLE)	5.958					Theta star (bias corrected MLE)	6.131
63					nu hat (MLE)	41.97					nu star (bias corrected)	40.79
64					Adjusted Level of Significance (β)	0.0452						
65					Approximate Chi Square Value (40.79, α)	27.15					Adjusted Chi Square Value (40.79, β)	26.82
66					95% Gamma Approximate UCL (use when n>=50)	3.757					95% Gamma Adjusted UCL (use when n<50)	3.803
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	2.501					SD (KM)	3.057
70					Variance (KM)	9.346					SE of Mean (KM)	0.438
71					k hat (KM)	0.669					k star (KM)	0.642
72					nu hat (KM)	66.91					nu star (KM)	64.22
73					theta hat (KM)	3.738					theta star (KM)	3.894
74					80% gamma percentile (KM)	4.119					90% gamma percentile (KM)	6.404
75					95% gamma percentile (KM)	8.78					99% gamma percentile (KM)	14.49
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (64.22, α)	46.79					Adjusted Chi Square Value (64.22, β)	46.34
79					95% Gamma Approximate KM-UCL (use when n>=50)	3.433					95% Gamma Adjusted KM-UCL (use when n<50)	3.465
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.863	**Shapiro Wilk GOF Test**					
83					5% Shapiro Wilk Critical Value	0.94	Detected Data Not Lognormal at 5% Significance Level					
84					Lilliefors Test Statistic	0.159	**Lilliefors GOF Test**					
85					5% Lilliefors Critical Value	0.139	Detected Data Not Lognormal at 5% Significance Level					
86	**Detected Data Not Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	2.509					Mean in Log Scale	-0.357
90					SD in Original Scale	3.081					SD in Log Scale	2.084
91					95% t UCL (assumes normality of ROS data)	3.24					95% Percentile Bootstrap UCL	3.222
92					95% BCA Bootstrap UCL	3.362					95% Bootstrap t UCL	3.39
93					95% H-UCL (Log ROS)	18.71						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	-0.761					KM Geo Mean	0.467
97					KM SD (logged)	2.669					95% Critical H Value (KM-Log)	4.588
98					KM Standard Error of Mean (logged)	0.384					95% H-UCL (KM -Log)	94.63
99					KM SD (logged)	2.669					95% Critical H Value (KM-Log)	4.588
100					KM Standard Error of Mean (logged)	0.384						

	A–E	F	G–K	L
101				
102	**DL/2 Statistics**			
103	**DL/2 Normal**		**DL/2 Log-Transformed**	
104	Mean in Original Scale	2.509	Mean in Log Scale	-0.739
105	SD in Original Scale	3.082	SD in Log Scale	2.767
106	95% t UCL (Assumes normality)	3.239	95% H-Stat UCL	142.6
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
108				
109	**Nonparametric Distribution Free UCL Statistics**			
110	**Detected Data appear Gamma Distributed at 5% Significance Level**			
111				
112	**Suggested UCL to Use**			
113	95% KM Approximate Gamma UCL	3.433		
114				
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
116	Recommendations are based upon data size, data distribution, and skewness.			
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
119				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 12:21:35 PM								
5	From File			ProUCL Input VOCs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**tert-Butylbenzene**											
11												
12	**General Statistics**											
13	Total Number of Observations					49	Number of Distinct Observations					27
14							Number of Missing Observations					1
15	Number of Detects					22	Number of Non-Detects					27
16	Number of Distinct Detects					22	Number of Distinct Non-Detects					5
17	Minimum Detect					0.016	Minimum Non-Detect					0.005
18	Maximum Detect					0.926	Maximum Non-Detect					5
19	Variance Detects					0.0661	Percent Non-Detects					55.1%
20	Mean Detects					0.292	SD Detects					0.257
21	Median Detects					0.156	CV Detects					0.882
22	Skewness Detects					0.925	Kurtosis Detects					-0.147
23	Mean of Logged Detects					-1.678	SD of Logged Detects					1.043
24												
25	**Normal GOF Test on Detects Only**											
26	Shapiro Wilk Test Statistic					0.849	**Shapiro Wilk GOF Test**					
27	5% Shapiro Wilk Critical Value					0.911	Detected Data Not Normal at 5% Significance Level					
28	Lilliefors Test Statistic					0.238	**Lilliefors GOF Test**					
29	5% Lilliefors Critical Value					0.184	Detected Data Not Normal at 5% Significance Level					
30	**Detected Data Not Normal at 5% Significance Level**											
31												
32	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
33	KM Mean					0.161	KM Standard Error of Mean					0.0347
34	KM SD					0.222	95% KM (BCA) UCL					0.214
35	95% KM (t) UCL					0.219	95% KM (Percentile Bootstrap) UCL					0.218
36	95% KM (z) UCL					0.218	95% KM Bootstrap t UCL					0.226
37	90% KM Chebyshev UCL					0.265	95% KM Chebyshev UCL					0.312
38	97.5% KM Chebyshev UCL					0.377	99% KM Chebyshev UCL					0.506
39												
40	**Gamma GOF Tests on Detected Observations Only**											
41	A-D Test Statistic					0.756	**Anderson-Darling GOF Test**					
42	5% A-D Critical Value					0.764	Detected data appear Gamma Distributed at 5% Significance Level					
43	K-S Test Statistic					0.162	**Kolmogorov-Smirnov GOF**					
44	5% K-S Critical Value					0.19	Detected data appear Gamma Distributed at 5% Significance Level					
45	**Detected data appear Gamma Distributed at 5% Significance Level**											
46												
47	**Gamma Statistics on Detected Data Only**											
48	k hat (MLE)					1.264	k star (bias corrected MLE)					1.122
49	Theta hat (MLE)					0.231	Theta star (bias corrected MLE)					0.26
50	nu hat (MLE)					55.62	nu star (bias corrected)					49.37

	A	B	C	D	E	F	G	H	I	J	K	L
51					Mean (detects)	0.292						
52												
53	**Gamma ROS Statistics using Imputed Non-Detects**											
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
57	This is especially true when the sample size is small.											
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
59					Minimum	0.01					Mean	0.157
60					Maximum	0.926					Median	0.068
61					SD	0.217					CV	1.386
62					k hat (MLE)	0.589					k star (bias corrected MLE)	0.567
63					Theta hat (MLE)	0.266					Theta star (bias corrected MLE)	0.277
64					nu hat (MLE)	57.74					nu star (bias corrected)	55.54
65					Adjusted Level of Significance (β)	0.0451						
66					Approximate Chi Square Value (55.54, α)	39.42					Adjusted Chi Square Value (55.54, β)	39
67					95% Gamma Approximate UCL (use when n>=50)	0.221					95% Gamma Adjusted UCL (use when n<50)	0.223
68												
69	**Estimates of Gamma Parameters using KM Estimates**											
70					Mean (KM)	0.161					SD (KM)	0.222
71					Variance (KM)	0.0491					SE of Mean (KM)	0.0347
72					k hat (KM)	0.525					k star (KM)	0.507
73					nu hat (KM)	51.47					nu star (KM)	49.65
74					theta hat (KM)	0.306					theta star (KM)	0.317
75					80% gamma percentile (KM)	0.264					90% gamma percentile (KM)	0.433
76					95% gamma percentile (KM)	0.614					99% gamma percentile (KM)	1.058
77												
78	**Gamma Kaplan-Meier (KM) Statistics**											
79					Approximate Chi Square Value (49.65, α)	34.47					Adjusted Chi Square Value (49.65, β)	34.09
80					95% Gamma Approximate KM-UCL (use when n>=50)	0.231					95% Gamma Adjusted KM-UCL (use when n<50)	0.234
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.134	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.184	Detected Data appear Lognormal at 5% Significance Level					
87	**Detected Data appear Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	0.158					Mean in Log Scale	-2.691
91					SD in Original Scale	0.213					SD in Log Scale	1.368
92					95% t UCL (assumes normality of ROS data)	0.209					95% Percentile Bootstrap UCL	0.209
93					95% BCA Bootstrap UCL	0.219					95% Bootstrap t UCL	0.221
94					95% H-UCL (Log ROS)	0.298						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	-3.159					KM Geo Mean	0.0425
98					KM SD (logged)	1.881					95% Critical H Value (KM-Log)	3.445
99					KM Standard Error of Mean (logged)	0.319					95% H-UCL (KM -Log)	0.635
100					KM SD (logged)	1.881					95% Critical H Value (KM-Log)	3.445

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.319						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					0.264	Mean in Log Scale					-2.607
106	SD in Original Scale					0.404	SD in Log Scale					2.097
107	95% t UCL (Assumes normality)					0.361	95% H-Stat UCL					2.064
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
109												
110	**Nonparametric Distribution Free UCL Statistics**											
111	**Detected Data appear Gamma Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	95% KM Adjusted Gamma UCL					0.234	95% GROS Adjusted Gamma UCL					0.223
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/24/2018 12:26:05 PM
From File	ProUCL Input VOCs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Toluene

General Statistics			
Total Number of Observations	48	Number of Distinct Observations	32
		Number of Missing Observations	2
Number of Detects	23	Number of Non-Detects	25
Number of Distinct Detects	23	Number of Distinct Non-Detects	9
Minimum Detect	0.0033	Minimum Non-Detect	0.002
Maximum Detect	3.9	Maximum Non-Detect	2
Variance Detects	1.04	Percent Non-Detects	52.08%
Mean Detects	0.868	SD Detects	1.02
Median Detects	0.472	CV Detects	1.175
Skewness Detects	2.03	Kurtosis Detects	3.698
Mean of Logged Detects	-0.895	SD of Logged Detects	1.667

Normal GOF Test on Detects Only		
Shapiro Wilk Test Statistic	0.716	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.914	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.18	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
KM Mean	0.426	KM Standard Error of Mean	0.121
KM SD	0.815	95% KM (BCA) UCL	0.65
95% KM (t) UCL	0.628	95% KM (Percentile Bootstrap) UCL	0.632
95% KM (z) UCL	0.624	95% KM Bootstrap t UCL	0.762
90% KM Chebyshev UCL	0.788	95% KM Chebyshev UCL	0.952
97.5% KM Chebyshev UCL	1.18	99% KM Chebyshev UCL	1.627

Gamma GOF Tests on Detected Observations Only		
A-D Test Statistic	0.86	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.78	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.199	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.188	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only			
k hat (MLE)	0.789	k star (bias corrected MLE)	0.715
Theta hat (MLE)	1.099	Theta star (bias corrected MLE)	1.213
nu hat (MLE)	36.3	nu star (bias corrected)	32.9

	A	B	C	D	E	F	G	H	I	J	K	L
51					Mean (detects)	0.868						
52												
53	**Gamma ROS Statistics using Imputed Non-Detects**											
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
57	This is especially true when the sample size is small.											
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
59					Minimum	0.0033					Mean	0.421
60					Maximum	3.9					Median	0.01
61					SD	0.821					CV	1.951
62					k hat (MLE)	0.344					k star (bias corrected MLE)	0.336
63					Theta hat (MLE)	1.225					Theta star (bias corrected MLE)	1.253
64					nu hat (MLE)	32.99					nu star (bias corrected)	32.27
65					Adjusted Level of Significance (β)	0.045						
66					Approximate Chi Square Value (32.27, α)	20.28					Adjusted Chi Square Value (32.27, β)	19.99
67					95% Gamma Approximate UCL (use when n>=50)	0.67					95% Gamma Adjusted UCL (use when n<50)	0.68
68												
69	**Estimates of Gamma Parameters using KM Estimates**											
70					Mean (KM)	0.426					SD (KM)	0.815
71					Variance (KM)	0.664					SE of Mean (KM)	0.121
72					k hat (KM)	0.273					k star (KM)	0.27
73					nu hat (KM)	26.23					nu star (KM)	25.92
74					theta hat (KM)	1.559					theta star (KM)	1.577
75					80% gamma percentile (KM)	0.634					90% gamma percentile (KM)	1.27
76					95% gamma percentile (KM)	2.013					99% gamma percentile (KM)	3.972
77												
78	**Gamma Kaplan-Meier (KM) Statistics**											
79					Approximate Chi Square Value (25.92, α)	15.32					Adjusted Chi Square Value (25.92, β)	15.06
80					95% Gamma Approximate KM-UCL (use when n>=50)	0.721					95% Gamma Adjusted KM-UCL (use when n<50)	0.733
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.79	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.914	Detected Data Not Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.278	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.18	Detected Data Not Lognormal at 5% Significance Level					
87	**Detected Data Not Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	0.427					Mean in Log Scale	-2.63
91					SD in Original Scale	0.818					SD in Log Scale	2.151
92					95% t UCL (assumes normality of ROS data)	0.625					95% Percentile Bootstrap UCL	0.639
93					95% BCA Bootstrap UCL	0.692					95% Bootstrap t UCL	0.739
94					95% H-UCL (Log ROS)	2.41						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	-3.536					KM Geo Mean	0.0291
98					KM SD (logged)	2.858					95% Critical H Value (KM-Log)	4.842
99					KM Standard Error of Mean (logged)	0.431					95% H-UCL (KM -Log)	13.04
100					KM SD (logged)	2.858					95% Critical H Value (KM-Log)	4.842

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.431						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					0.464	Mean in Log Scale					-2.763
106	SD in Original Scale					0.813	SD in Log Scale					2.719
107	95% t UCL (Assumes normality)					0.661	95% H-Stat UCL					16
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
109												
110	**Nonparametric Distribution Free UCL Statistics**											
111	**Data do not follow a Discernible Distribution at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	95% KM (Chebyshev) UCL					0.952						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 2:12:02 PM								
5	From File			ProUCL Input PAHs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Acenaphthene											
11												
12	General Statistics											
13	Total Number of Observations					29	Number of Distinct Observations					14
14	Number of Detects					7	Number of Non-Detects					22
15	Number of Distinct Detects					7	Number of Distinct Non-Detects					7
16	Minimum Detect					0.033	Minimum Non-Detect					0.01
17	Maximum Detect					0.794	Maximum Non-Detect					5
18	Variance Detects					0.0856	Percent Non-Detects					75.86%
19	Mean Detects					0.304	SD Detects					0.293
20	Median Detects					0.159	CV Detects					0.963
21	Skewness Detects					0.843	Kurtosis Detects					-0.691
22	Mean of Logged Detects					-1.736	SD of Logged Detects					1.234
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.879	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.803	Detected Data appear Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.261	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.304	Detected Data appear Normal at 5% Significance Level					
29	Detected Data appear Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					0.093	KM Standard Error of Mean					0.0393
33	KM SD					0.187	95% KM (BCA) UCL					0.157
34	95% KM (t) UCL					0.16	95% KM (Percentile Bootstrap) UCL					0.153
35	95% KM (z) UCL					0.158	95% KM Bootstrap t UCL					0.184
36	90% KM Chebyshev UCL					0.211	95% KM Chebyshev UCL					0.264
37	97.5% KM Chebyshev UCL					0.338	99% KM Chebyshev UCL					0.484
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.285	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.727	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.173	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.319	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					1.054	k star (bias corrected MLE)					0.697
48	Theta hat (MLE)					0.288	Theta star (bias corrected MLE)					0.435
49	nu hat (MLE)					14.75	nu star (bias corrected)					9.765
50	Mean (detects)					0.304						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	0.0837
59	Maximum	0.794	Median	0.01
60	SD	0.186	CV	2.218
61	k hat (MLE)	0.473	k star (bias corrected MLE)	0.447
62	Theta hat (MLE)	0.177	Theta star (bias corrected MLE)	0.187
63	nu hat (MLE)	27.41	nu star (bias corrected)	25.91
64	Adjusted Level of Significance (β)	0.0407		
65	Approximate Chi Square Value (25.91, α)	15.31	Adjusted Chi Square Value (25.91, β)	14.82
66	95% Gamma Approximate UCL (use when n>=50)	0.142	95% Gamma Adjusted UCL (use when n<50)	0.146
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	0.093	SD (KM)	0.187
70	Variance (KM)	0.0349	SE of Mean (KM)	0.0393
71	k hat (KM)	0.248	k star (KM)	0.245
72	nu hat (KM)	14.38	nu star (KM)	14.23
73	theta hat (KM)	0.375	theta star (KM)	0.379
74	80% gamma percentile (KM)	0.134	90% gamma percentile (KM)	0.28
75	95% gamma percentile (KM)	0.453	99% gamma percentile (KM)	0.915
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (14.23, α)	6.727	Adjusted Chi Square Value (14.23, β)	6.42
79	95% Gamma Approximate KM-UCL (use when n>=50)	0.197	95% Gamma Adjusted KM-UCL (use when n<50)	0.206
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.181	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.304	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	0.0833	Mean in Log Scale	-4.159
90	SD in Original Scale	0.186	SD in Log Scale	1.817
91	95% t UCL (assumes normality of ROS data)	0.142	95% Percentile Bootstrap UCL	0.146
92	95% BCA Bootstrap UCL	0.164	95% Bootstrap t UCL	0.205
93	95% H-UCL (Log ROS)	0.282		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-3.658	KM Geo Mean	0.0258
97	KM SD (logged)	1.401	95% Critical H Value (KM-Log)	3.004
98	KM Standard Error of Mean (logged)	0.327	95% H-UCL (KM -Log)	0.152
99	KM SD (logged)	1.401	95% Critical H Value (KM-Log)	3.004
100	KM Standard Error of Mean (logged)	0.327		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					0.221	Mean in Log Scale					-2.84
105	SD in Original Scale					0.476	SD in Log Scale					1.763
106	95% t UCL (Assumes normality)					0.371	95% H-Stat UCL					0.901
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
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	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 2:13:44 PM								
5	From File			ProUCL Input PAHs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Anthracene											
11												
12	General Statistics											
13	Total Number of Observations					25	Number of Distinct Observations					10
14	Number of Detects					4	Number of Non-Detects					21
15	Number of Distinct Detects					4	Number of Distinct Non-Detects					6
16	Minimum Detect					0.114	Minimum Non-Detect					0.01
17	Maximum Detect					2	Maximum Non-Detect					5
18	Variance Detects					0.777	Percent Non-Detects					84%
19	Mean Detects					0.794	SD Detects					0.881
20	Median Detects					0.53	CV Detects					1.111
21	Skewness Detects					1.159	Kurtosis Detects					0.277
22	Mean of Logged Detects					-0.854	SD of Logged Detects					1.372
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.866	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.264	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.375	Detected Data appear Normal at 5% Significance Level					
29	Detected Data appear Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					0.145	KM Standard Error of Mean					0.101
33	KM SD					0.426	95% KM (BCA) UCL					N/A
34	95% KM (t) UCL					0.317	95% KM (Percentile Bootstrap) UCL					N/A
35	95% KM (z) UCL					0.31	95% KM Bootstrap t UCL					N/A
36	90% KM Chebyshev UCL					0.447	95% KM Chebyshev UCL					0.583
37	97.5% KM Chebyshev UCL					0.773	99% KM Chebyshev UCL					1.146
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.359	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.668	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.303	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.403	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.934	k star (bias corrected MLE)					0.4
48	Theta hat (MLE)					0.849	Theta star (bias corrected MLE)					1.982
49	nu hat (MLE)					7.475	nu star (bias corrected)					3.202
50	Mean (detects)					0.794						

51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	0.135
59	Maximum	2	Median	0.01
60	SD	0.428	CV	3.161
61	k hat (MLE)	0.337	k star (bias corrected MLE)	0.324
62	Theta hat (MLE)	0.401	Theta star (bias corrected MLE)	0.418
63	nu hat (MLE)	16.87	nu star (bias corrected)	16.18
64	Adjusted Level of Significance (β)	0.0395		
65	Approximate Chi Square Value (16.18, α)	8.087	Adjusted Chi Square Value (16.18, β)	7.699
66	95% Gamma Approximate UCL (use when n>=50)	0.271	95% Gamma Adjusted UCL (use when n<50)	N/A
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	0.145	SD (KM)	0.426
70	Variance (KM)	0.182	SE of Mean (KM)	0.101
71	k hat (KM)	0.115	k star (KM)	0.128
72	nu hat (KM)	5.746	nu star (KM)	6.39
73	theta hat (KM)	1.258	theta star (KM)	1.131
74	80% gamma percentile (KM)	0.136	90% gamma percentile (KM)	0.416
75	95% gamma percentile (KM)	0.818	99% gamma percentile (KM)	2.025
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (6.39, α)	1.842	Adjusted Chi Square Value (6.39, β)	1.681
79	95% Gamma Approximate KM-UCL (use when n>=50)	0.501	95% Gamma Adjusted KM-UCL (use when n<50)	0.549
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.262	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	0.132	Mean in Log Scale	-5.399
90	SD in Original Scale	0.429	SD in Log Scale	2.66
91	95% t UCL (assumes normality of ROS data)	0.279	95% Percentile Bootstrap UCL	0.287
92	95% BCA Bootstrap UCL	0.36	95% Bootstrap t UCL	1.736
93	95% H-UCL (Log ROS)	2.441		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-3.899	KM Geo Mean	0.0203
97	KM SD (logged)	1.515	95% Critical H Value (KM-Log)	3.217
98	KM Standard Error of Mean (logged)	0.376	95% H-UCL (KM -Log)	0.173
99	KM SD (logged)	1.515	95% Critical H Value (KM-Log)	3.217
100	KM Standard Error of Mean (logged)	0.376		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					0.288	Mean in Log Scale					-2.948
105	SD in Original Scale					0.623	SD in Log Scale					1.973
106	95% t UCL (Assumes normality)					0.501	95% H-Stat UCL					1.792
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
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					0.317						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 2:14:18 PM								
5	From File			ProUCL Input PAHs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**Benz(a)anthracene**											
11												
12	**General Statistics**											
13	Total Number of Observations					23	Number of Distinct Observations					7
14	Number of Detects					1	Number of Non-Detects					22
15	Number of Distinct Detects					1	Number of Distinct Non-Detects					6
16												
17	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
18	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
19												
20	**The data set for variable Benz(a)anthracene was not processed!**											
21												
22												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 2:14:57 PM								
5	From File			ProUCL Input PAHs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**Chrysene**											
11												
12	**General Statistics**											
13	Total Number of Observations					25	Number of Distinct Observations					9
14	Number of Detects					3	Number of Non-Detects					22
15	Number of Distinct Detects					3	Number of Distinct Non-Detects					6
16	Minimum Detect					0.688	Minimum Non-Detect					0.01
17	Maximum Detect					1.083	Maximum Non-Detect					5
18	Variance Detects					0.04	Percent Non-Detects					88%
19	Mean Detects					0.868	SD Detects					0.2
20	Median Detects					0.832	CV Detects					0.23
21	Skewness Detects					0.777	Kurtosis Detects					N/A
22	Mean of Logged Detects					-0.159	SD of Logged Detects					0.228
23												
24	**Warning: Data set has only 3 Detected Values.**											
25	**This is not enough to compute meaningful or reliable statistics and estimates.**											
26												
27												
28	**Normal GOF Test on Detects Only**											
29	Shapiro Wilk Test Statistic					0.976	**Shapiro Wilk GOF Test**					
30	5% Shapiro Wilk Critical Value					0.767	Detected Data appear Normal at 5% Significance Level					
31	Lilliefors Test Statistic					0.237	**Lilliefors GOF Test**					
32	5% Lilliefors Critical Value					0.425	Detected Data appear Normal at 5% Significance Level					
33	**Detected Data appear Normal at 5% Significance Level**											
34												
35	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
36	KM Mean					0.117	KM Standard Error of Mean					0.0724
37	KM SD					0.289	95% KM (BCA) UCL					N/A
38	95% KM (t) UCL					0.241	95% KM (Percentile Bootstrap) UCL					N/A
39	95% KM (z) UCL					0.236	95% KM Bootstrap t UCL					N/A
40	90% KM Chebyshev UCL					0.334	95% KM Chebyshev UCL					0.433
41	97.5% KM Chebyshev UCL					0.569	99% KM Chebyshev UCL					0.837
42												
43	**Gamma GOF Tests on Detected Observations Only**											
44	**Not Enough Data to Perform GOF Test**											
45												
46	**Gamma Statistics on Detected Data Only**											
47	k hat (MLE)					28.84	k star (bias corrected MLE)					N/A
48	Theta hat (MLE)					0.0301	Theta star (bias corrected MLE)					N/A
49	nu hat (MLE)					173	nu star (bias corrected)					N/A
50	Mean (detects)					0.868						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	0.144
59	Maximum	1.083	Median	0.01
60	SD	0.289	CV	2.003
61	k hat (MLE)	0.397	k star (bias corrected MLE)	0.376
62	Theta hat (MLE)	0.364	Theta star (bias corrected MLE)	0.384
63	nu hat (MLE)	19.83	nu star (bias corrected)	18.78
64	Adjusted Level of Significance (β)	0.0395		
65	Approximate Chi Square Value (18.78, α)	9.96	Adjusted Chi Square Value (18.78, β)	9.523
66	95% Gamma Approximate UCL (use when n>=50)	0.272	95% Gamma Adjusted UCL (use when n<50)	N/A
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	0.117	SD (KM)	0.289
70	Variance (KM)	0.0838	SE of Mean (KM)	0.0724
71	k hat (KM)	0.164	k star (KM)	0.171
72	nu hat (KM)	8.198	nu star (KM)	8.548
73	theta hat (KM)	0.715	theta star (KM)	0.686
74	80% gamma percentile (KM)	0.141	90% gamma percentile (KM)	0.352
75	95% gamma percentile (KM)	0.628	99% gamma percentile (KM)	1.406
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (8.55, α)	3.056	Adjusted Chi Square Value (8.55, β)	2.836
79	95% Gamma Approximate KM-UCL (use when n>=50)	0.328	95% Gamma Adjusted KM-UCL (use when n<50)	0.353
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	0.299	Mean in Log Scale	-1.439
90	SD in Original Scale	0.241	SD in Log Scale	0.662
91	95% t UCL (assumes normality of ROS data)	0.381	95% Percentile Bootstrap UCL	0.382
92	95% BCA Bootstrap UCL	0.402	95% Bootstrap t UCL	0.43
93	95% H-UCL (Log ROS)	0.393		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	-4.049	KM Geo Mean	0.0174
97	KM SD (logged)	1.472	95% Critical H Value (KM-Log)	3.152
98	KM Standard Error of Mean (logged)	0.368	95% H-UCL (KM -Log)	0.133
99	KM SD (logged)	1.472	95% Critical H Value (KM-Log)	3.152
100	KM Standard Error of Mean (logged)	0.368		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					0.275	Mean in Log Scale					-2.886
105	SD in Original Scale					0.542	SD in Log Scale					2.001
106	95% t UCL (Assumes normality)					0.46	95% H-Stat UCL					2.094
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
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					0.241						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

UCL Statistics for Data Sets with Non-Detects				
User Selected Options				
Date/Time of Computation	ProUCL 5.15/24/2018 2:15:28 PM			
From File	ProUCL Input PAHs.xls			
Full Precision	OFF			
Confidence Coefficient	95%			
Number of Bootstrap Operations	2000			
Fluoranthene				
General Statistics				
Total Number of Observations	27		Number of Distinct Observations	11
Number of Detects	5		Number of Non-Detects	22
Number of Distinct Detects	5		Number of Distinct Non-Detects	6
Minimum Detect	0.048		Minimum Non-Detect	0.01
Maximum Detect	0.57		Maximum Non-Detect	5
Variance Detects	0.0495		Percent Non-Detects	81.48%
Mean Detects	0.173		SD Detects	0.223
Median Detects	0.089		CV Detects	1.284
Skewness Detects	2.192		Kurtosis Detects	4.845
Mean of Logged Detects	-2.223		SD of Logged Detects	0.97
Normal GOF Test on Detects Only				
Shapiro Wilk Test Statistic	0.636	**Shapiro Wilk GOF Test**		
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level		
Lilliefors Test Statistic	0.434	**Lilliefors GOF Test**		
5% Lilliefors Critical Value	0.343	Detected Data Not Normal at 5% Significance Level		
Detected Data Not Normal at 5% Significance Level				
Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs				
KM Mean	0.0495		KM Standard Error of Mean	0.0245
KM SD	0.108		95% KM (BCA) UCL	0.0929
95% KM (t) UCL	0.0913		95% KM (Percentile Bootstrap) UCL	0.0909
95% KM (z) UCL	0.0898		95% KM Bootstrap t UCL	0.119
90% KM Chebyshev UCL	0.123		95% KM Chebyshev UCL	0.156
97.5% KM Chebyshev UCL	0.203		99% KM Chebyshev UCL	0.293
Gamma GOF Tests on Detected Observations Only				
A-D Test Statistic	0.772	**Anderson-Darling GOF Test**		
5% A-D Critical Value	0.689	Detected Data Not Gamma Distributed at 5% Significance Level		
K-S Test Statistic	0.403	**Kolmogorov-Smirnov GOF**		
5% K-S Critical Value	0.363	Detected Data Not Gamma Distributed at 5% Significance Level		
Detected Data Not Gamma Distributed at 5% Significance Level				
Gamma Statistics on Detected Data Only				
k hat (MLE)	1.201		k star (bias corrected MLE)	0.614
Theta hat (MLE)	0.144		Theta star (bias corrected MLE)	0.283
nu hat (MLE)	12.01		nu star (bias corrected)	6.137
Mean (detects)	0.173			

Gamma ROS Statistics using Imputed Non-Detects			
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., <15-20)			
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	Mean	0.0418
Maximum	0.57	Median	0.01
SD	0.108	CV	2.593
k hat (MLE)	0.665	k star (bias corrected MLE)	0.615
Theta hat (MLE)	0.0629	Theta star (bias corrected MLE)	0.068
nu hat (MLE)	35.88	nu star (bias corrected)	33.23
Adjusted Level of Significance (β)	0.0401		
Approximate Chi Square Value (33.23, α)	21.05	Adjusted Chi Square Value (33.23, β)	20.43
95% Gamma Approximate UCL (use when n>=50)	0.066	95% Gamma Adjusted UCL (use when n<50)	0.068
Estimates of Gamma Parameters using KM Estimates			
Mean (KM)	0.0495	SD (KM)	0.108
Variance (KM)	0.0118	SE of Mean (KM)	0.0245
k hat (KM)	0.208	k star (KM)	0.21
nu hat (KM)	11.23	nu star (KM)	11.32
theta hat (KM)	0.238	theta star (KM)	0.236
80% gamma percentile (KM)	0.0667	90% gamma percentile (KM)	0.15
95% gamma percentile (KM)	0.252	99% gamma percentile (KM)	0.531
Gamma Kaplan-Meier (KM) Statistics			
Approximate Chi Square Value (11.32, α)	4.781	Adjusted Chi Square Value (11.32, β)	4.512
95% Gamma Approximate KM-UCL (use when n>=50)	0.117	95% Gamma Adjusted KM-UCL (use when n<50)	0.124
Lognormal GOF Test on Detected Observations Only			
Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.345	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data Not Lognormal at 5% Significance Level	
Detected Data appear Approximate Lognormal at 5% Significance Level			
Lognormal ROS Statistics Using Imputed Non-Detects			
Mean in Original Scale	0.0449	Mean in Log Scale	-4.149
SD in Original Scale	0.108	SD in Log Scale	1.345
95% t UCL (assumes normality of ROS data)	0.0804	95% Percentile Bootstrap UCL	0.0848
95% BCA Bootstrap UCL	0.107	95% Bootstrap t UCL	0.171
95% H-UCL (Log ROS)	0.086		
Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution			
KM Mean (logged)	-3.899	KM Geo Mean	0.0203
KM SD (logged)	1.109	95% Critical H Value (KM-Log)	2.667
KM Standard Error of Mean (logged)	0.3	95% H-UCL (KM -Log)	0.067
KM SD (logged)	1.109	95% Critical H Value (KM-Log)	2.667
KM Standard Error of Mean (logged)	0.3		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					0.181	Mean in Log Scale					-3.211
105	SD in Original Scale					0.48	SD in Log Scale					1.758
106	95% t UCL (Assumes normality)					0.339	95% H-Stat UCL					0.663
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Approximate Lognormal Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	KM H-UCL					0.067						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 2:16:06 PM								
5	From File			ProUCL Input PAHs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Fluorene											
11												
12	General Statistics											
13	Total Number of Observations					27	Number of Distinct Observations					18
14	Number of Detects					12	Number of Non-Detects					15
15	Number of Distinct Detects					12	Number of Distinct Non-Detects					6
16	Minimum Detect					0.018	Minimum Non-Detect					0.01
17	Maximum Detect					4.35	Maximum Non-Detect					5
18	Variance Detects					2.444	Percent Non-Detects					55.56%
19	Mean Detects					1.559	SD Detects					1.563
20	Median Detects					1.105	CV Detects					1.003
21	Skewness Detects					0.809	Kurtosis Detects					-0.858
22	Mean of Logged Detects					-0.429	SD of Logged Detects					1.761
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.857	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.859	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.207	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.243	Detected Data appear Normal at 5% Significance Level					
29	Detected Data appear Approximate Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					0.727	KM Standard Error of Mean					0.261
33	KM SD					1.276	95% KM (BCA) UCL					1.168
34	95% KM (t) UCL					1.173	95% KM (Percentile Bootstrap) UCL					1.138
35	95% KM (z) UCL					1.157	95% KM Bootstrap t UCL					1.351
36	90% KM Chebyshev UCL					1.511	95% KM Chebyshev UCL					1.866
37	97.5% KM Chebyshev UCL					2.359	99% KM Chebyshev UCL					3.327
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.272	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.77	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.137	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.256	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.693	k star (bias corrected MLE)					0.575
48	Theta hat (MLE)					2.25	Theta star (bias corrected MLE)					2.71
49	nu hat (MLE)					16.63	nu star (bias corrected)					13.81
50	Mean (detects)					1.559						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	0.699
59	Maximum	4.35	Median	0.01
60	SD	1.284	CV	1.839
61	k hat (MLE)	0.29	k star (bias corrected MLE)	0.283
62	Theta hat (MLE)	2.408	Theta star (bias corrected MLE)	2.472
63	nu hat (MLE)	15.66	nu star (bias corrected)	15.26
64	Adjusted Level of Significance (β)	0.0401		
65	Approximate Chi Square Value (15.26, α)	7.44	Adjusted Chi Square Value (15.26, β)	7.092
66	95% Gamma Approximate UCL (use when n>=50)	1.432	95% Gamma Adjusted UCL (use when n<50)	1.503
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	0.727	SD (KM)	1.276
70	Variance (KM)	1.628	SE of Mean (KM)	0.261
71	k hat (KM)	0.324	k star (KM)	0.313
72	nu hat (KM)	17.52	nu star (KM)	16.91
73	theta hat (KM)	2.24	theta star (KM)	2.321
74	80% gamma percentile (KM)	1.126	90% gamma percentile (KM)	2.132
75	95% gamma percentile (KM)	3.279	99% gamma percentile (KM)	6.244
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (16.91, α)	8.607	Adjusted Chi Square Value (16.91, β)	8.229
79	95% Gamma Approximate KM-UCL (use when n>=50)	1.428	95% Gamma Adjusted KM-UCL (use when n<50)	1.493
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.166	**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				
88	**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 Bootstrap 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-Log)	4.612
98	KM Standard Error of Mean (logged)	0.486	95% H-UCL (KM -Log)	9.521
99	KM SD (logged)	2.343	95% Critical H Value (KM-Log)	4.612
100	KM Standard Error of Mean (logged)	0.486		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					0.801	Mean in Log Scale					-2.311
105	SD in Original Scale					1.316	SD in Log Scale					2.433
106	95% t UCL (Assumes normality)					1.233	95% H-Stat UCL					18.58
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
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					1.173						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 2:16:38 PM								
5	From File			ProUCL Input PAHs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Naphthalene											
11												
12	General Statistics											
13	Total Number of Observations					32	Number of Distinct Observations					25
14							Number of Missing Observations					1
15	Number of Detects					22	Number of Non-Detects					10
16	Number of Distinct Detects					22	Number of Distinct Non-Detects					3
17	Minimum Detect					0.067	Minimum Non-Detect					0.01
18	Maximum Detect					52.9	Maximum Non-Detect					5
19	Variance Detects					146.5	Percent Non-Detects					31.25%
20	Mean Detects					7.908	SD Detects					12.1
21	Median Detects					3.165	CV Detects					1.53
22	Skewness Detects					2.737	Kurtosis Detects					8.952
23	Mean of Logged Detects					0.918	SD of Logged Detects					1.764
24												
25	Normal GOF Test on Detects Only											
26	Shapiro Wilk Test Statistic					0.66	Shapiro Wilk GOF Test					
27	5% Shapiro Wilk Critical Value					0.911	Detected Data Not Normal at 5% Significance Level					
28	Lilliefors Test Statistic					0.263	Lilliefors GOF Test					
29	5% Lilliefors Critical Value					0.184	Detected Data Not Normal at 5% Significance Level					
30	Detected Data Not Normal at 5% Significance Level											
31												
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
33	KM Mean					5.485	KM Standard Error of Mean					1.89
34	KM SD					10.45	95% KM (BCA) UCL					9.189
35	95% KM (t) UCL					8.691	95% KM (Percentile Bootstrap) UCL					8.733
36	95% KM (z) UCL					8.595	95% KM Bootstrap t UCL					11.39
37	90% KM Chebyshev UCL					11.16	95% KM Chebyshev UCL					13.73
38	97.5% KM Chebyshev UCL					17.29	99% KM Chebyshev UCL					24.29
39												
40	Gamma GOF Tests on Detected Observations Only											
41	A-D Test Statistic					0.442	Anderson-Darling GOF Test					
42	5% A-D Critical Value					0.8	Detected data appear Gamma Distributed at 5% Significance Level					
43	K-S Test Statistic					0.159	Kolmogorov-Smirnov GOF					
44	5% K-S Critical Value					0.195	Detected data appear Gamma Distributed at 5% Significance Level					
45	Detected data appear Gamma Distributed at 5% Significance Level											
46												
47	Gamma Statistics on Detected Data Only											
48	k hat (MLE)					0.545	k star (bias corrected MLE)					0.501
49	Theta hat (MLE)					14.51	Theta star (bias corrected MLE)					15.79
50	nu hat (MLE)					23.98	nu star (bias corrected)					22.04

	A	B	C	D	E	F	G	H	I	J	K	L
51					Mean (detects)	7.908						
52												
53	**Gamma ROS Statistics using Imputed Non-Detects**											
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
57	This is especially true when the sample size is small.											
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
59					Minimum	0.01					Mean	5.44
60					Maximum	52.9					Median	0.69
61					SD	10.63					CV	1.954
62					k hat (MLE)	0.279					k star (bias corrected MLE)	0.274
63					Theta hat (MLE)	19.51					Theta star (bias corrected MLE)	19.88
64					nu hat (MLE)	17.85					nu star (bias corrected)	17.51
65					Adjusted Level of Significance (β)	0.0416						
66					Approximate Chi Square Value (17.51, α)	9.037					Adjusted Chi Square Value (17.51, β)	8.711
67					95% Gamma Approximate UCL (use when n>=50)	10.54					95% Gamma Adjusted UCL (use when n<50)	10.93
68												
69	**Estimates of Gamma Parameters using KM Estimates**											
70					Mean (KM)	5.485					SD (KM)	10.45
71					Variance (KM)	109.1					SE of Mean (KM)	1.89
72					k hat (KM)	0.276					k star (KM)	0.271
73					nu hat (KM)	17.65					nu star (KM)	17.33
74					theta hat (KM)	19.89					theta star (KM)	20.26
75					80% gamma percentile (KM)	8.179					90% gamma percentile (KM)	16.36
76					95% gamma percentile (KM)	25.92					99% gamma percentile (KM)	51.09
77												
78	**Gamma Kaplan-Meier (KM) Statistics**											
79					Approximate Chi Square Value (17.33, α)	8.908					Adjusted Chi Square Value (17.33, β)	8.585
80					95% Gamma Approximate KM-UCL (use when n>=50)	10.67					95% Gamma Adjusted KM-UCL (use when n<50)	11.07
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.911	Detected Data appear Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.184	Detected Data appear Lognormal at 5% Significance Level					
87	**Detected Data appear Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	5.475					Mean in Log Scale	-0.195
91					SD in Original Scale	10.61					SD in Log Scale	2.302
92					95% t UCL (assumes normality of ROS data)	8.656					95% Percentile Bootstrap UCL	8.716
93					95% BCA Bootstrap UCL	9.859					95% Bootstrap t UCL	11.42
94					95% H-UCL (Log ROS)	68.84						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	-0.456					KM Geo Mean	0.634
98					KM SD (logged)	2.639					95% Critical H Value (KM-Log)	4.835
99					KM Standard Error of Mean (logged)	0.51					95% H-UCL (KM -Log)	204.1
100					KM SD (logged)	2.639					95% Critical H Value (KM-Log)	4.835

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.51						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					5.544	Mean in Log Scale					-0.193
106	SD in Original Scale					10.59	SD in Log Scale					2.471
107	95% t UCL (Assumes normality)					8.717	95% H-Stat UCL					132.6
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
109												
110	**Nonparametric Distribution Free UCL Statistics**											
111	**Detected Data appear Gamma Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)					11.07						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

1	UCL Statistics for Data Sets with Non-Detects			
2				
3	User Selected Options			
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				
10	Phenanthrene			
11				
12	General Statistics			
13	Total Number of Observations	32	Number of Distinct Observations	20
14			Number of Missing Observations	1
15	Number of Detects	16	Number of Non-Detects	16
16	Number of Distinct Detects	16	Number of Distinct Non-Detects	6
17	Minimum Detect	0.059	Minimum Non-Detect	0.01
18	Maximum Detect	30.9	Maximum Non-Detect	5
19	Variance Detects	91.38	Percent Non-Detects	50%
20	Mean Detects	5.323	SD Detects	9.559
21	Median Detects	0.865	CV Detects	1.796
22	Skewness Detects	2.19	Kurtosis Detects	3.869
23	Mean of Logged Detects	0.14	SD of Logged Detects	1.903
24				
25	Normal GOF Test on Detects Only			
26	Shapiro Wilk Test Statistic	0.602	Shapiro Wilk GOF Test	
27	5% Shapiro Wilk Critical Value	0.887	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	
30	Detected Data Not Normal at 5% Significance Level			
31				
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs			
33	KM Mean	2.685	KM Standard Error of Mean	1.289
34	KM SD	7.059	95% KM (BCA) UCL	4.961
35	95% KM (t) UCL	4.87	95% KM (Percentile Bootstrap) UCL	4.771
36	95% KM (z) UCL	4.805	95% KM Bootstrap t UCL	8.765
37	90% KM Chebyshev UCL	6.552	95% KM Chebyshev UCL	8.303
38	97.5% KM Chebyshev UCL	10.73	99% KM Chebyshev UCL	15.51
39				
40	Gamma GOF Tests on Detected Observations Only			
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% Significance Level	
43	K-S Test Statistic	0.22	Kolmogorov-Smirnov GOF	
44	5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level	
45	Detected data follow Appr. Gamma Distribution at 5% Significance Level			
46				
47	Gamma Statistics on Detected Data Only			
48	k hat (MLE)	0.425	k star (bias corrected MLE)	0.387
49	Theta hat (MLE)	12.51	Theta star (bias corrected MLE)	13.74
50	nu hat (MLE)	13.61	nu star (bias corrected)	12.39

	A–E	F	G–K	L
51	Mean (detects)	5.323		
52				
53	**Gamma ROS Statistics using Imputed Non-Detects**			
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
57	This is especially true when the sample size is small.			
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM 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 corrected MLE)	0.225
63	Theta hat (MLE)	11.86	Theta star (bias corrected MLE)	11.87
64	nu hat (MLE)	14.39	nu star (bias corrected)	14.37
65	Adjusted Level of Significance (β)	0.0416		
66	Approximate Chi Square Value (14.37, α)	6.828	Adjusted Chi Square Value (14.37, β)	6.55
67	95% Gamma Approximate UCL (use when n>=50)	5.613	95% Gamma Adjusted UCL (use when n<50)	5.851
68				
69	**Estimates of Gamma Parameters using KM Estimates**			
70	Mean (KM)	2.685	SD (KM)	7.059
71	Variance (KM)	49.82	SE of Mean (KM)	1.289
72	k hat (KM)	0.145	k star (KM)	0.152
73	nu hat (KM)	9.259	nu star (KM)	9.724
74	theta hat (KM)	18.56	theta star (KM)	17.67
75	80% gamma percentile (KM)	2.953	90% gamma percentile (KM)	7.975
76	95% gamma percentile (KM)	14.74	99% gamma percentile (KM)	34.32
77				
78	**Gamma Kaplan-Meier (KM) Statistics**			
79	Approximate Chi Square Value (9.72, α)	3.77	Adjusted Chi Square Value (9.72, β)	3.573
80	95% Gamma Approximate KM-UCL (use when n>=50)	6.925	95% Gamma Adjusted KM-UCL (use when n<50)	7.306
81				
82	**Lognormal GOF Test on Detected Observations Only**			
83	Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**	
84	5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level	
85	Lilliefors Test Statistic	0.116	**Lilliefors GOF Test**	
86	5% Lilliefors Critical Value	0.213	Detected Data appear Lognormal at 5% Significance Level	
87	**Detected Data appear Lognormal at 5% Significance Level**			
88				
89	**Lognormal ROS Statistics Using Imputed Non-Detects**			
90	Mean in Original Scale	2.673	Mean in Log Scale	-2.157
91	SD in Original Scale	7.174	SD in Log Scale	2.839
92	95% t UCL (assumes normality of ROS data)	4.823	95% Percentile Bootstrap UCL	5.067
93	95% BCA Bootstrap UCL	5.76	95% Bootstrap t UCL	9.395
94	95% H-UCL (Log ROS)	90.35		
95				
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
97	KM Mean (logged)	-2.034	KM Geo Mean	0.131
98	KM SD (logged)	2.626	95% Critical H Value (KM-Log)	4.814
99	KM Standard Error of Mean (logged)	0.498	95% H-UCL (KM -Log)	39.87
100	KM SD (logged)	2.626	95% Critical H Value (KM-Log)	4.814

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.498						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					2.771	Mean in Log Scale					-1.565
106	SD in Original Scale					7.15	SD in Log Scale					2.542
107	95% t UCL (Assumes 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	**Detected Data appear Approximate Gamma Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)					7.306						
115												
116	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
117	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
118												
119	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
120	Recommendations are based upon data size, data distribution, and skewness.											
121	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
122	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
123												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/24/2018 2:17:46 PM								
5	From File			ProUCL Input PAHs.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Pyrene											
11												
12	General Statistics											
13	Total Number of Observations					26	Number of Distinct Observations					11
14	Number of Detects					5	Number of Non-Detects					21
15	Number of Distinct Detects					5	Number of Distinct Non-Detects					6
16	Minimum Detect					0.712	Minimum Non-Detect					0.01
17	Maximum Detect					30.9	Maximum Non-Detect					5
18	Variance Detects					167.3	Percent Non-Detects					80.77%
19	Mean Detects					8.336	SD Detects					12.93
20	Median Detects					1.24	CV Detects					1.551
21	Skewness Detects					1.988	Kurtosis Detects					3.962
22	Mean of Logged Detects					1.104	SD of Logged Detects					1.581
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.698	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.762	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.322	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.343	Detected Data appear Normal at 5% Significance Level					
29	Detected Data appear Approximate Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					1.616	KM Standard Error of Mean					1.325
33	KM SD					6.041	95% KM (BCA) UCL					3.962
34	95% KM (t) UCL					3.879	95% KM (Percentile Bootstrap) UCL					3.897
35	95% KM (z) UCL					3.795	95% KM Bootstrap t UCL					19.88
36	90% KM Chebyshev UCL					5.59	95% KM Chebyshev UCL					7.39
37	97.5% KM Chebyshev UCL					9.889	99% KM Chebyshev UCL					14.8
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.546	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.706	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.349	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.37	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.607	k star (bias corrected MLE)					0.376
48	Theta hat (MLE)					13.74	Theta star (bias corrected MLE)					22.17
49	nu hat (MLE)					6.068	nu star (bias corrected)					3.761
50	Mean (detects)					8.336						

Row				
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	1.611
59	Maximum	30.9	Median	0.01
60	SD	6.161	CV	3.824
61	k hat (MLE)	0.187	k star (bias corrected MLE)	0.191
62	Theta hat (MLE)	8.631	Theta star (bias corrected MLE)	8.445
63	nu hat (MLE)	9.708	nu star (bias corrected)	9.921
64	Adjusted Level of Significance (β)	0.0398		
65	Approximate Chi Square Value (9.92, α)	3.892	Adjusted Chi Square Value (9.92, β)	3.646
66	95% Gamma Approximate UCL (use when n>=50)	4.107	95% Gamma Adjusted UCL (use when n<50)	4.385
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	1.616	SD (KM)	6.041
70	Variance (KM)	36.49	SE of Mean (KM)	1.325
71	k hat (KM)	0.0716	k star (KM)	0.089
72	nu hat (KM)	3.724	nu star (KM)	4.627
73	theta hat (KM)	22.57	theta star (KM)	18.17
74	80% gamma percentile (KM)	0.934	90% gamma percentile (KM)	4.074
75	95% gamma percentile (KM)	9.419	99% gamma percentile (KM)	27.2
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (4.63, α)	0.984	Adjusted Chi Square Value (4.63, β)	0.88
79	95% Gamma Approximate KM-UCL (use when n>=50)	7.601	95% Gamma Adjusted KM-UCL (use when n<50)	8.495
80	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
81				
82	**Lognormal GOF Test on Detected Observations Only**			
83	Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**	
84	5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
85	Lilliefors Test Statistic	0.313	**Lilliefors GOF Test**	
86	5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
87	**Detected Data appear Lognormal at 5% Significance Level**			
88				
89	**Lognormal ROS Statistics Using Imputed Non-Detects**			
90	Mean in Original Scale	1.62	Mean in Log Scale	-4.049
91	SD in Original Scale	6.159	SD in Log Scale	3.213
92	95% t UCL (assumes normality of ROS data)	3.683	95% Percentile Bootstrap UCL	3.873
93	95% BCA Bootstrap UCL	5.448	95% Bootstrap t UCL	29.46
94	95% H-UCL (Log ROS)	149.8		
95				
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
97	KM Mean (logged)	-3.484	KM Geo Mean	0.0307
98	KM SD (logged)	2.346	95% Critical H Value (KM-Log)	4.58
99	KM Standard Error of Mean (logged)	0.519	95% H-UCL (KM -Log)	4.125
100	KM SD (logged)	2.346	95% Critical H Value (KM-Log)	4.58

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.519						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					1.758	Mean in Log Scale					-2.491
106	SD in Original Scale					6.141	SD in Log Scale					2.506
107	95% t UCL (Assumes 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	**Nonparametric Distribution Free UCL Statistics**											
111	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	95% KM (t) UCL					3.879						
115												
116	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
117	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
118												
119	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
120	Recommendations are based upon data size, data distribution, and skewness.											
121	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
122	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
123												

APPENDIX H

ProUCL Statistics Soil Matrix
Eastern Parcel

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:52:27 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**1,2,4-TMB**											
11												
12	**General Statistics**											
13	Total Number of Observations					50	Number of Distinct Observations					30
14	Number of Detects					15	Number of Non-Detects					35
15	Number of Distinct Detects					14	Number of Distinct Non-Detects					16
16	Minimum Detect					550	Minimum Non-Detect					9.83
17	Maximum Detect					580000	Maximum Non-Detect					50000
18	Variance Detects					3.703E+10	Percent Non-Detects					70%
19	Mean Detects					93193	SD Detects					192438
20	Median Detects					7770	CV Detects					2.065
21	Skewness Detects					2.217	Kurtosis Detects					3.702
22	Mean of Logged Detects					9.454	SD of Logged Detects					2.029
23												
24	**Normal GOF Test on Detects Only**											
25	Shapiro Wilk Test Statistic					0.533	**Shapiro Wilk GOF Test**					
26	5% Shapiro Wilk Critical Value					0.881	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.383	**Lilliefors GOF Test**					
28	5% Lilliefors Critical Value					0.22	Detected Data Not Normal at 5% Significance Level					
29	**Detected Data Not Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32	KM Mean					28202	KM Standard Error of Mean					16158
33	KM SD					110368	95% KM (BCA) UCL					59262
34	95% KM (t) UCL					55291	95% KM (Percentile Bootstrap) UCL					58402
35	95% KM (z) UCL					54779	95% KM Bootstrap t UCL					137252
36	90% KM Chebyshev UCL					76675	95% KM Chebyshev UCL					98631
37	97.5% KM Chebyshev UCL					129106	99% KM Chebyshev UCL					188968
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40	A-D Test Statistic					1.626	**Anderson-Darling GOF Test**					
41	5% A-D Critical Value					0.827	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.303	**Kolmogorov-Smirnov GOF**					
43	5% K-S Critical Value					0.239	Detected Data Not Gamma Distributed at 5% Significance 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 corrected MLE)					0.316
48	Theta hat (MLE)					274291	Theta star (bias corrected MLE)					294679
49	nu hat (MLE)					10.19	nu star (bias corrected)					9.488
50	Mean (detects)					93193						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	27958
59	Maximum	580000	Median	0.01
60	SD	111543	CV	3.99
61	k hat (MLE)	0.0787	k star (bias corrected MLE)	0.0873
62	Theta hat (MLE)	355455	Theta star (bias corrected MLE)	320368
63	nu hat (MLE)	7.865	nu star (bias corrected)	8.727
64	Adjusted Level of Significance (β)	0.0452		
65	Approximate Chi Square Value (8.73, α)	3.163	Adjusted Chi Square Value (8.73, β)	3.064
66	95% Gamma Approximate UCL (use when n>=50)	77142	95% Gamma Adjusted UCL (use when n<50)	79636
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	28202	SD (KM)	110368
70	Variance (KM)	1.218E+10	SE of 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	theta hat (KM)	431923	theta star (KM)	377488
74	80% gamma percentile (KM)	11675	90% gamma percentile (KM)	63884
75	95% gamma percentile (KM)	163284	99% gamma percentile (KM)	515767
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (7.47, α)	2.433	Adjusted Chi Square Value (7.47, β)	2.348
79	95% Gamma Approximate KM-UCL (use when n>=50)	86613	95% Gamma Adjusted KM-UCL (use when n<50)	89733
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.892	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.22	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	28034	Mean in Log Scale	5.466
90	SD in Original Scale	111523	SD in Log Scale	3.15
91	95% t UCL (assumes normality of ROS data)	54477	95% Percentile Bootstrap UCL	54993
92	95% BCA Bootstrap UCL	68959	95% Bootstrap t UCL	190181
93	95% H-UCL (Log ROS)	367928		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	4.738	KM Geo Mean	114.2
97	KM SD (logged)	3.511	95% Critical H Value (KM-Log)	5.859
98	KM Standard Error of Mean (logged)	0.548	95% H-UCL (KM -Log)	1024107
99	KM SD (logged)	3.511	95% Critical H Value (KM-Log)	5.859
100	KM Standard Error of Mean (logged)	0.548		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					30251	Mean in Log Scale					6.336
105	SD in Original Scale					111114	SD in Log Scale					3.441
106	95% t UCL (Assumes normality)					56596	95% H-Stat UCL					3556557
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Lognormal Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	95% KM (Chebyshev) UCL					98631						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:43:39 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	1,2-DCB											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					17
14	Number of Detects					1	Number of Non-Detects					37
15	Number of Distinct Detects					1	Number of Distinct Non-Detects					16
16												
17	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
18	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
19												
20	The data set for variable 1,2-DCB was not processed!											
21												
22												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:53:04 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**1,3,5-TMB**											
11												
12	**General Statistics**											
13	Total Number of Observations					50	Number of Distinct Observations					26
14	Number of Detects					10	Number of Non-Detects					40
15	Number of Distinct Detects					10	Number of Distinct Non-Detects					16
16	Minimum Detect					1720	Minimum Non-Detect					9.83
17	Maximum Detect					370000	Maximum Non-Detect					50000
18	Variance Detects					1.900E+10	Percent Non-Detects					80%
19	Mean Detects					85288	SD Detects					137854
20	Median Detects					13415	CV Detects					1.616
21	Skewness Detects					1.663	Kurtosis Detects					1.319
22	Mean of Logged Detects					9.832	SD of Logged Detects					1.963
23												
24	**Normal GOF Test on Detects Only**											
25	Shapiro Wilk Test Statistic					0.661	**Shapiro Wilk GOF Test**					
26	5% Shapiro Wilk Critical Value					0.842	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.331	**Lilliefors GOF Test**					
28	5% Lilliefors Critical Value					0.262	Detected Data Not Normal at 5% Significance Level					
29	**Detected Data Not Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32	KM Mean					17224	KM Standard Error of Mean					10093
33	KM SD					67687	95% KM (BCA) UCL					35614
34	95% KM (t) UCL					34146	95% KM (Percentile Bootstrap) UCL					35266
35	95% KM (z) UCL					33826	95% KM Bootstrap t UCL					91012
36	90% KM Chebyshev UCL					47503	95% KM Chebyshev UCL					61219
37	97.5% KM Chebyshev UCL					80256	99% KM Chebyshev UCL					117650
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40	A-D Test Statistic					0.687	**Anderson-Darling GOF Test**					
41	5% A-D Critical Value					0.79	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.253	**Kolmogorov-Smirnov GOF**					
43	5% K-S Critical Value					0.283	Detected data appear Gamma Distributed at 5% Significance Level					
44	**Detected data appear Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47	k hat (MLE)					0.428	k star (bias corrected MLE)					0.366
48	Theta hat (MLE)					199403	Theta star (bias corrected MLE)					232984
49	nu hat (MLE)					8.554	nu star (bias corrected)					7.321
50	Mean (detects)					85288						

Row	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	17058
59	Maximum	370000	Median	0.01
60	SD	68396	CV	4.01
61	k hat (MLE)	0.0735	k star (bias corrected MLE)	0.0824
62	Theta hat (MLE)	232163	Theta star (bias corrected MLE)	207016
63	nu hat (MLE)	7.347	nu star (bias corrected)	8.24
64	Adjusted Level of Significance (β)	0.0452		
65	Approximate Chi Square Value (8.24, α)	2.875	Adjusted Chi Square Value (8.24, β)	2.781
66	95% Gamma Approximate UCL (use when n>=50)	48893	95% Gamma Adjusted UCL (use when n<50)	50538
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	17224	SD (KM)	67687
70	Variance (KM)	4.582E+9	SE of Mean (KM)	10093
71	k hat (KM)	0.0648	k star (KM)	0.0742
72	nu hat (KM)	6.475	nu star (KM)	7.42
73	theta hat (KM)	265999	theta star (KM)	232128
74	80% gamma percentile (KM)	7026	90% gamma percentile (KM)	38826
75	95% gamma percentile (KM)	99664	99% gamma percentile (KM)	315996
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (7.42, α)	2.404	Adjusted Chi Square Value (7.42, β)	2.32
79	95% Gamma Approximate KM-UCL (use when n>=50)	53164	95% Gamma Adjusted KM-UCL (use when n<50)	55088
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.905	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.262	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	17109	Mean in Log Scale	4.198
90	SD in Original Scale	68383	SD in Log Scale	3.463
91	95% t UCL (assumes normality of ROS data)	33323	95% Percentile Bootstrap UCL	34428
92	95% BCA Bootstrap UCL	40382	95% Bootstrap t UCL	94051
93	95% H-UCL (Log ROS)	467630		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	3.943	KM Geo Mean	51.59
97	KM SD (logged)	3.201	95% Critical H Value (KM-Log)	5.388
98	KM Standard Error of Mean (logged)	0.499	95% H-UCL (KM -Log)	101839
99	KM SD (logged)	3.201	95% Critical H Value (KM-Log)	5.388
100	KM Standard Error of Mean (logged)	0.499		

	A–E	F	G–K	L
101				
102	**DL/2 Statistics**			
103	**DL/2 Normal**		**DL/2 Log-Transformed**	
104	Mean in Original Scale	19407	Mean in Log Scale	6.111
105	SD in Original Scale	68054	SD in Log Scale	3.294
106	95% t UCL (Assumes normality)	35542	95% H-Stat UCL	1379461
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
108				
109	**Nonparametric Distribution Free UCL Statistics**			
110	**Detected Data appear Gamma Distributed at 5% Significance Level**			
111				
112	**Suggested UCL to Use**			
113	95% KM Approximate Gamma UCL	53164		
114				
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
116	Recommendations are based upon data size, data distribution, and skewness.			
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
119				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:44:14 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	1,3-DCB											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					17
14	Number of Detects					1	Number of Non-Detects					37
15	Number of Distinct Detects					1	Number of Distinct Non-Detects					16
16												
17	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
18	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
19												
20	The data set for variable 1,3-DCB was not processed!											
21												
22												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:44:45 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

1,4-DCB

General Statistics

Total Number of Observations	38	Number of Distinct Observations	16
Number of Detects	1	Number of Non-Detects	37
Number of Distinct Detects	1	Number of Distinct Non-Detects	16

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable 1,4-DCB was not processed!

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:51:51 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	2,2,4-TMP											
11												
12	General Statistics											
13	Total Number of Observations					37	Number of Distinct Observations					19
14							Number of Missing Observations					1
15	Number of Detects					6	Number of Non-Detects					31
16	Number of Distinct Detects					6	Number of Distinct Non-Detects					13
17	Minimum Detect					350	Minimum Non-Detect					9.34
18	Maximum Detect					11000	Maximum Non-Detect					220000
19	Variance Detects					22505350	Percent Non-Detects					83.78%
20	Mean Detects					4545	SD Detects					4744
21	Median Detects					2750	CV Detects					1.044
22	Skewness Detects					0.774	Kurtosis Detects					-1.769
23	Mean of Logged Detects					7.708	SD of Logged Detects					1.49
24												
25	Normal GOF Test on Detects Only											
26	Shapiro Wilk Test Statistic					0.813	Shapiro Wilk GOF Test					
27	5% Shapiro Wilk Critical Value					0.788	Detected Data appear Normal at 5% Significance Level					
28	Lilliefors Test Statistic					0.302	Lilliefors GOF Test					
29	5% Lilliefors Critical Value					0.325	Detected Data appear Normal at 5% Significance Level					
30	Detected Data appear Normal at 5% Significance Level											
31												
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
33	KM Mean					985.5	KM Standard Error of Mean					550.6
34	KM SD					2693	95% KM (BCA) UCL					2036
35	95% KM (t) UCL					1915	95% KM (Percentile Bootstrap) UCL					1926
36	95% KM (z) UCL					1891	95% KM Bootstrap t UCL					2985
37	90% KM Chebyshev UCL					2637	95% KM Chebyshev UCL					3385
38	97.5% KM Chebyshev UCL					4424	99% KM Chebyshev UCL					6464
39												
40	Gamma GOF Tests on Detected Observations Only											
41	A-D Test Statistic					0.408	Anderson-Darling GOF Test					
42	5% A-D Critical Value					0.719	Detected data appear Gamma Distributed at 5% Significance Level					
43	K-S Test Statistic					0.213	Kolmogorov-Smirnov GOF					
44	5% K-S Critical Value					0.343	Detected data appear Gamma Distributed at 5% Significance Level					
45	Detected data appear Gamma Distributed at 5% Significance Level											
46												
47	Gamma Statistics on Detected Data Only											
48	k hat (MLE)					0.828	k star (bias corrected MLE)					0.525
49	Theta hat (MLE)					5488	Theta star (bias corrected MLE)					8654
50	nu hat (MLE)					9.937	nu star (bias corrected)					6.302

	A–E	F	G–K	L
51	Mean (detects)	4545		
52				
53	**Gamma ROS Statistics using Imputed Non-Detects**			
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
57	This is especially true when the sample size is small.			
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
59	Minimum	0.01	Mean	737
60	Maximum	11000	Median	0.01
61	SD	2452	CV	3.326
62	k hat (MLE)	0.0894	k star (bias corrected MLE)	0.1
63	Theta hat (MLE)	8245	Theta star (bias corrected MLE)	7358
64	nu hat (MLE)	6.615	nu star (bias corrected)	7.412
65	Adjusted Level of Significance (β)	0.0431		
66	Approximate Chi Square Value (7.41, α)	2.399	Adjusted Chi Square Value (7.41, β)	2.277
67	95% Gamma Approximate UCL (use when n>=50)	2277	95% Gamma Adjusted UCL (use when n<50)	2399
68				
69	**Estimates of Gamma Parameters using KM Estimates**			
70	Mean (KM)	985.5	SD (KM)	2693
71	Variance (KM)	7253887	SE 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	theta hat (KM)	7360	theta star (KM)	6987
75	80% gamma percentile (KM)	1018	90% gamma percentile (KM)	2895
76	95% gamma percentile (KM)	5487	99% gamma percentile (KM)	13106
77				
78	**Gamma Kaplan-Meier (KM) Statistics**			
79	Approximate Chi Square Value (10.44, α)	4.218	Adjusted Chi Square Value (10.44, β)	4.047
80	95% Gamma Approximate KM-UCL (use when n>=50)	2439	95% Gamma Adjusted KM-UCL (use when n<50)	2542
81				
82	**Lognormal GOF Test on Detected Observations Only**			
83	Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk GOF Test**	
84	5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
85	Lilliefors Test Statistic	0.208	**Lilliefors GOF Test**	
86	5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	
87	**Detected Data appear Lognormal at 5% Significance Level**			
88				
89	**Lognormal ROS Statistics Using Imputed Non-Detects**			
90	Mean in Original Scale	776.5	Mean in Log Scale	3.79
91	SD in Original Scale	2440	SD in Log Scale	2.287
92	95% t UCL (assumes normality of ROS data)	1454	95% Percentile Bootstrap UCL	1534
93	95% BCA Bootstrap UCL	1743	95% Bootstrap t UCL	3012
94	95% H-UCL (Log ROS)	2949		
95				
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
97	KM Mean (logged)	3.556	KM Geo Mean	35.02
98	KM SD (logged)	2.374	95% Critical H Value (KM-Log)	4.289
99	KM Standard Error of Mean (logged)	0.522	95% H-UCL (KM -Log)	3198
100	KM SD (logged)	2.374	95% Critical H Value (KM-Log)	4.289

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.522						
102												
103	DL/2 Statistics											
104	DL/2 Normal						DL/2 Log-Transformed					
105	Mean in Original Scale					6883	Mean in Log Scale					5.693
106	SD in Original Scale					18712	SD in Log Scale					3.302
107	95% t UCL (Assumes normality)					12077	95% H-Stat UCL					1621583
108	DL/2 is not a recommended method, provided for comparisons and historical reasons											
109												
110	Nonparametric Distribution Free UCL Statistics											
111	Detected Data appear Normal Distributed at 5% Significance Level											
112												
113	Suggested UCL to Use											
114	95% KM (t) UCL					1915						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:45:51 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

4-Ethyltoluene

General Statistics

Total Number of Observations	39	Number of Distinct Observations	19
Number of Detects	5	Number of Non-Detects	34
Number of Distinct Detects	5	Number of Distinct Non-Detects	14
Minimum Detect	18000	Minimum Non-Detect	9.83
Maximum Detect	350000	Maximum Non-Detect	50000
Variance Detects	2.405E+10	Percent Non-Detects	87.18%
Mean Detects	156048	SD Detects	155072
Median Detects	103239	CV Detects	0.994
Skewness Detects	0.486	Kurtosis Detects	-2.681
Mean of Logged Detects	11.31	SD of Logged Detects	1.431

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.851	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	20168	KM Standard Error of Mean	12894
KM SD	72003	95% KM (BCA) UCL	40265
95% KM (t) UCL	41907	95% KM (Percentile Bootstrap) UCL	41887
95% KM (z) UCL	41377	95% KM Bootstrap t UCL	61120
90% KM Chebyshev UCL	58851	95% KM Chebyshev UCL	76373
97.5% KM Chebyshev UCL	100693	99% KM Chebyshev UCL	148465

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.443	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.694	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.265	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.365	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.899	k star (bias corrected MLE)	0.493
Theta hat (MLE)	173544	Theta star (bias corrected MLE)	316522
nu hat (MLE)	8.992	nu star (bias corrected)	4.93
Mean (detects)	156048		

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	20006
59	Maximum	350000	Median	0.01
60	SD	72970	CV	3.647
61	k hat (MLE)	0.0681	k star (bias corrected MLE)	0.08
62	Theta hat (MLE)	293795	Theta star (bias corrected MLE)	250229
63	nu hat (MLE)	5.311	nu star (bias corrected)	6.236
64	Adjusted Level of Significance (β)	0.0437		
65	Approximate Chi Square Value (6.24, α)	1.762	Adjusted Chi Square Value (6.24, β)	1.67
66	95% Gamma Approximate UCL (use when n>=50)	70818	95% Gamma Adjusted UCL (use when n<50)	74707
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	20168	SD (KM)	72003
70	Variance (KM)	5.184E+9	SE of Mean (KM)	12894
71	k hat (KM)	0.0785	k star (KM)	0.0895
72	nu hat (KM)	6.119	nu star (KM)	6.982
73	theta hat (KM)	257065	theta star (KM)	225305
74	80% gamma percentile (KM)	11768	90% gamma percentile (KM)	50988
75	95% gamma percentile (KM)	117505	99% gamma percentile (KM)	338392
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (6.98, α)	2.161	Adjusted Chi Square Value (6.98, β)	2.057
79	95% Gamma Approximate KM-UCL (use when n>=50)	65170	95% Gamma Adjusted KM-UCL (use when n<50)	68470
80	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)			
81				
82	**Lognormal GOF Test on Detected Observations Only**			
83	Shapiro Wilk Test Statistic	0.844	**Shapiro Wilk GOF Test**	
84	5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
85	Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**	
86	5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
87	**Detected Data appear Lognormal at 5% Significance Level**			
88				
89	**Lognormal ROS Statistics Using Imputed Non-Detects**			
90	Mean in Original Scale	20309	Mean in Log Scale	5.377
91	SD in Original Scale	72887	SD in Log Scale	2.932
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				
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
100	KM SD (logged)	3.103	95% Critical H Value (KM-Log)	5.468

	A	B	C	D	E	F	G	H	I	J	K	L
101	KM Standard Error of Mean (logged)					0.57						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105	Mean in Original Scale					22923	Mean in Log Scale					5.776
106	SD in Original Scale					72446	SD in Log Scale					3.616
107	95% t UCL (Assumes normality)					42482	95% H-Stat UCL					8900974
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
109												
110	**Nonparametric Distribution Free UCL Statistics**											
111	**Detected Data appear Normal Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114	95% KM (t) UCL					41907						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:48:49 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	4- Isopropyltoluene											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					17
14	Number of Detects					1	Number of Non-Detects					37
15	Number of Distinct Detects					1	Number of Distinct Non-Detects					16
16												
17	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
18	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
19												
20	The data set for variable 4- Isopropyltoluene was not processed!											
21												
22												

	A–E	F	G–K	L
1	**UCL Statistics for Data Sets with Non-Detects**			
2				
3	User Selected Options			
4	Date/Time of Computation	ProUCL 5.15/25/2018 9:39:48 AM		
5	From File	Soil Vapor Input.xls		
6	Full Precision	OFF		
7	Confidence Coefficient	95%		
8	Number of Bootstrap Operations	2000		
9				
10	Acetone			
11				
12	**General Statistics**			
13	Total Number of Observations	38	Number of Distinct Observations	22
14	Number of Detects	6	Number of Non-Detects	32
15	Number of Distinct Detects	6	Number of Distinct Non-Detects	16
16	Minimum Detect	11	Minimum Non-Detect	10
17	Maximum Detect	89	Maximum Non-Detect	300000
18	Variance Detects	919.5	Percent Non-Detects	84.21%
19	Mean Detects	39.33	SD Detects	30.32
20	Median Detects	25	CV Detects	0.771
21	Skewness Detects	1.112	Kurtosis Detects	-0.219
22	Mean of Logged Detects	3.428	SD of Logged Detects	0.766
23				
24	**Normal GOF Test on Detects Only**			
25	Shapiro Wilk Test Statistic	0.844	**Shapiro Wilk GOF Test**	
26	5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
27	Lilliefors Test Statistic	0.325	**Lilliefors GOF Test**	
28	5% Lilliefors Critical Value	0.325	Detected Data Not Normal at 5% Significance Level	
29	**Detected Data appear Approximate Normal at 5% Significance Level**			
30				
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**			
32	KM Mean	23.25	KM Standard Error of Mean	6.787
33	KM SD	23.03	95% KM (BCA) UCL	35.55
34	95% KM (t) UCL	34.7	95% KM (Percentile Bootstrap) UCL	34.74
35	95% KM (z) UCL	34.41	95% KM Bootstrap t UCL	47.56
36	90% KM Chebyshev UCL	43.61	95% KM Chebyshev UCL	52.83
37	97.5% KM Chebyshev UCL	65.64	99% KM Chebyshev UCL	90.78
38				
39	**Gamma GOF Tests on Detected Observations Only**			
40	A-D Test Statistic	0.405	**Anderson-Darling GOF Test**	
41	5% A-D Critical Value	0.704	Detected data appear Gamma Distributed at 5% Significance Level	
42	K-S Test Statistic	0.282	**Kolmogorov-Smirnov GOF**	
43	5% K-S Critical Value	0.336	Detected data appear Gamma Distributed at 5% Significance Level	
44	**Detected data appear Gamma Distributed at 5% Significance Level**			
45				
46	**Gamma Statistics on Detected Data Only**			
47	k hat (MLE)	2.2	k star (bias corrected MLE)	1.211
48	Theta hat (MLE)	17.87	Theta star (bias corrected MLE)	32.47
49	nu hat (MLE)	26.41	nu star (bias corrected)	14.54
50	Mean (detects)	39.33		

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	12.06
59	Maximum	89	Median	2.887
60	SD	19.16	CV	1.589
61	k hat (MLE)	0.251	k star (bias corrected MLE)	0.249
62	Theta hat (MLE)	48.03	Theta star (bias corrected MLE)	48.47
63	nu hat (MLE)	19.08	nu star (bias corrected)	18.9
64	Adjusted Level of Significance (β)	0.0434		
65	Approximate Chi Square Value (18.90, α)	10.05	Adjusted Chi Square Value (18.90, β)	9.778
66	95% Gamma Approximate UCL (use when n>=50)	22.68	95% Gamma Adjusted UCL (use when n<50)	23.3
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	23.25	SD (KM)	23.03
70	Variance (KM)	530.3	SE of 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	theta hat (KM)	22.81	theta star (KM)	24.31
74	80% gamma percentile (KM)	37.55	90% gamma percentile (KM)	54.12
75	95% gamma percentile (KM)	70.76	99% gamma percentile (KM)	109.5
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (72.69, α)	54.06	Adjusted Chi Square Value (72.69, β)	53.39
79	95% Gamma Approximate KM-UCL (use when n>=50)	31.26	95% Gamma Adjusted KM-UCL (use when n<50)	31.65
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.936	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.235	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.325	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	15.58	Mean in Log Scale	2.393
90	SD in Original Scale	16.79	SD in Log Scale	0.812
91	95% t UCL (assumes normality of ROS data)	20.17	95% Percentile Bootstrap UCL	20.23
92	95% BCA Bootstrap UCL	21.44	95% Bootstrap t UCL	23.72
93	95% H-UCL (Log ROS)	20.39		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	2.83	KM Geo Mean	16.94
97	KM SD (logged)	0.713	95% Critical H Value (KM-Log)	2.095
98	KM Standard Error of Mean (logged)	0.214	95% H-UCL (KM -Log)	27.92
99	KM SD (logged)	0.713	95% Critical H Value (KM-Log)	2.095
100	KM Standard Error of Mean (logged)	0.214		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					10408	Mean in Log Scale					5.795
105	SD in Original Scale					29922	SD in Log Scale					3.029
106	95% t UCL (Assumes normality)					18597	95% H-Stat UCL					457559
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
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					34.7						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:35:08 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Benzene

General Statistics

Total Number of Observations	50	Number of Distinct Observations	30
Number of Detects	20	Number of Non-Detects	30
Number of Distinct Detects	19	Number of Distinct Non-Detects	12
Minimum Detect	2500	Minimum Non-Detect	6.39
Maximum Detect	2000000	Maximum Non-Detect	15000
Variance Detects	2.145E+11	Percent Non-Detects	60%
Mean Detects	252630	SD Detects	463195
Median Detects	81000	CV Detects	1.833
Skewness Detects	3.187	Kurtosis Detects	11.31
Mean of Logged Detects	10.98	SD of Logged Detects	2.004

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.57	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.334	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	101105	KM Standard Error of Mean	45151
KM SD	311184	95% KM (BCA) UCL	179722
95% KM (t) UCL	176803	95% KM (Percentile Bootstrap) UCL	180052
95% KM (z) UCL	175372	95% KM Bootstrap t UCL	288404
90% KM Chebyshev UCL	236559	95% KM Chebyshev UCL	297915
97.5% KM Chebyshev UCL	383075	99% KM Chebyshev UCL	550356

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.517	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.815	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.146	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.206	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.443	k star (bias corrected MLE)	0.41
Theta hat (MLE)	570758	Theta star (bias corrected MLE)	616830
nu hat (MLE)	17.7	nu star (bias corrected)	16.38
Mean (detects)	252630		

Gamma ROS Statistics using Imputed Non-Detects

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., <15-20)

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	Mean	101052
Maximum	2000000	Median	0.01
SD	314360	CV	3.111
k hat (MLE)	0.0838	k star (bias corrected MLE)	0.0921
Theta hat (MLE)	1205290	Theta star (bias corrected MLE)	1096683
nu hat (MLE)	8.384	nu star (bias corrected)	9.214
Adjusted Level of Significance (β)	0.0452		
Approximate Chi Square Value (9.21, α)	3.457	Adjusted Chi Square Value (9.21, β)	3.353
95% Gamma Approximate UCL (use when n>=50)	269351	95% Gamma Adjusted UCL (use when n<50)	277740

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	101105	SD (KM)	311184
Variance (KM)	9.684E+10	SE of Mean (KM)	45151
k hat (KM)	0.106	k star (KM)	0.113
nu hat (KM)	10.56	nu star (KM)	11.26
theta hat (KM)	957777	theta star (KM)	898218
80% gamma percentile (KM)	82214	90% gamma percentile (KM)	281042
95% gamma percentile (KM)	581216	99% gamma percentile (KM)	1512607

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (11.26, α)	4.741	Adjusted Chi Square Value (11.26, β)	4.616
95% Gamma Approximate KM-UCL (use when n>=50)	240031	95% Gamma Adjusted KM-UCL (use when n<50)	246565

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.192	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	101317	Mean in Log Scale	7.572
SD in Original Scale	314274	SD in Log Scale	3.278
95% t UCL (assumes normality of ROS data)	175832	95% Percentile Bootstrap UCL	177098
95% BCA Bootstrap UCL	220470	95% Bootstrap t UCL	275357
95% H-UCL (Log ROS)	5515660		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	5.575	KM Geo Mean	263.8
KM SD (logged)	4.629	95% Critical H Value (KM-Log)	7.589
KM Standard Error of Mean (logged)	0.679	95% H-UCL (KM -Log)	1.794E+9
KM SD (logged)	4.629	95% Critical H Value (KM-Log)	7.589
KM Standard Error of Mean (logged)	0.679		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					101441	Mean in Log Scale					6.878
105	SD in Original Scale					314235	SD in Log Scale					4.095
106	95% t UCL (Assumes normality)					175946	95% H-Stat UCL					2.215E+8
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	95% KM Approximate Gamma UCL					240031						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:41:09 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Carbon Disulfide

General Statistics

Total Number of Observations	38	Number of Distinct Observations	19
Number of Detects	3	Number of Non-Detects	35
Number of Distinct Detects	3	Number of Distinct Non-Detects	16
Minimum Detect	330	Minimum Non-Detect	6.23
Maximum Detect	5900	Maximum Non-Detect	300000
Variance Detects	10000900	Percent Non-Detects	92.11%
Mean Detects	2250	SD Detects	3162
Median Detects	520	CV Detects	1.406
Skewness Detects	1.725	Kurtosis Detects	N/A
Mean of Logged Detects	6.912	SD of Logged Detects	1.55

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.776	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.374	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	250.6	KM Standard Error of Mean	245.2
KM SD	1075	95% KM (BCA) UCL	N/A
95% KM (t) UCL	664.3	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	653.9	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	986.2	95% KM Chebyshev UCL	1319
97.5% KM Chebyshev UCL	1782	99% KM Chebyshev UCL	2690

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.743	k star (bias corrected MLE)	N/A
Theta hat (MLE)	3029	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	4.458	nu star (bias corrected)	N/A
Mean (detects)	2250		

Gamma ROS Statistics using Imputed Non-Detects

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., <15-20)

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	Mean	177.6
Maximum	5900	Median	0.01
SD	958.5	CV	5.396
k hat (MLE)	0.0924	k star (bias corrected MLE)	0.103
Theta hat (MLE)	1923	Theta star (bias corrected MLE)	1731
nu hat (MLE)	7.022	nu star (bias corrected)	7.801
Adjusted Level of Significance (β)	0.0434		
Approximate Chi Square Value (7.80, α)	2.62	Adjusted Chi Square Value (7.80, β)	2.497
95% Gamma Approximate UCL (use when n>=50)	528.8	95% Gamma Adjusted UCL (use when n<50)	N/A

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	250.6	SD (KM)	1075
Variance (KM)	1155902	SE of Mean (KM)	245.2
k hat (KM)	0.0543	k star (KM)	0.0676
nu hat (KM)	4.129	nu star (KM)	5.136
theta hat (KM)	4613	theta star (KM)	3708
80% gamma percentile (KM)	82.59	90% gamma percentile (KM)	525.6
95% gamma percentile (KM)	1435	99% gamma percentile (KM)	4798

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (5.14, α)	1.216	Adjusted Chi Square Value (5.14, β)	1.14
95% Gamma Approximate KM-UCL (use when n>=50)	1059	95% Gamma Adjusted KM-UCL (use when n<50)	1129

95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.331	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	184	Mean in Log Scale	1.4
SD in Original Scale	957.3	SD in Log Scale	2.302
95% t UCL (assumes normality of ROS data)	446	95% Percentile Bootstrap UCL	493.7
95% BCA Bootstrap UCL	781.7	95% Bootstrap t UCL	3249
95% H-UCL (Log ROS)	281.1		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.484	KM Geo Mean	11.99
KM SD (logged)	1.716	95% Critical H Value (KM-Log)	3.331
KM Standard Error of Mean (logged)	0.435	95% H-UCL (KM -Log)	133.6
KM SD (logged)	1.716	95% Critical H Value (KM-Log)	3.331

	A–E	F	G–K	L
101	KM Standard Error of Mean (logged)	0.435		
102				
103	**DL/2 Statistics**			
104	**DL/2 Normal**		**DL/2 Log-Transformed**	
105	Mean in Original Scale	10060	Mean in Log Scale	5.525
106	SD in Original Scale	29732	SD in Log Scale	3.413
107	95% t UCL (Assumes normality)	18197	95% H-Stat UCL	2368018
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
109				
110	**Nonparametric Distribution Free UCL Statistics**			
111	**Detected Data appear Normal Distributed at 5% Significance Level**			
112				
113	**Suggested UCL to Use**			
114	95% KM (t) UCL	664.3		
115				
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
117	Recommendations are based upon data size, data distribution, and skewness.			
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
120				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:41:56 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**Chloroform**											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					17
14	Number of Detects					0	Number of Non-Detects					38
15	Number of Distinct Detects					0	Number of Distinct Non-Detects					17
16												
17	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
18	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
19	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
20												
21	**The data set for variable Chloroform was not processed!**											
22												
23												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:42:34 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Cyclohexane											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					24
14							Number of Missing Observations					1
15	Number of Detects					15	Number of Non-Detects					23
16	Number of Distinct Detects					14	Number of Distinct Non-Detects					10
17	Minimum Detect					130	Minimum Non-Detect					6.88
18	Maximum Detect					3600000	Maximum Non-Detect					5000
19	Variance Detects					1.394E+12	Percent Non-Detects					60.53%
20	Mean Detects					1280441	SD Detects					1180569
21	Median Detects					1200000	CV Detects					0.922
22	Skewness Detects					0.433	Kurtosis Detects					-0.942
23	Mean of Logged Detects					12.23	SD of Logged Detects					3.51
24												
25	Normal GOF Test on Detects Only											
26	Shapiro Wilk Test Statistic					0.903	Shapiro Wilk GOF Test					
27	5% Shapiro Wilk Critical Value					0.881	Detected Data appear Normal at 5% Significance Level					
28	Lilliefors Test Statistic					0.19	Lilliefors GOF Test					
29	5% Lilliefors Critical Value					0.22	Detected Data appear Normal at 5% Significance Level					
30	Detected Data appear Normal at 5% Significance Level											
31												
32	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
33	KM Mean					505447	KM Standard Error of Mean					159757
34	KM SD					951415	95% KM (BCA) UCL					771281
35	95% KM (t) UCL					774972	95% KM (Percentile Bootstrap) UCL					762544
36	95% KM (z) UCL					768223	95% KM Bootstrap t UCL					850766
37	90% KM Chebyshev UCL					984718	95% KM Chebyshev UCL					1201811
38	97.5% KM Chebyshev UCL					1503128	99% KM Chebyshev UCL					2095008
39												
40	Gamma GOF Tests on Detected Observations Only											
41	A-D Test Statistic					1.143	Anderson-Darling GOF Test					
42	5% A-D Critical Value					0.822	Detected Data Not Gamma Distributed at 5% Significance Level					
43	K-S Test Statistic					0.251	Kolmogorov-Smirnov GOF					
44	5% K-S Critical Value					0.238	Detected Data Not Gamma Distributed at 5% Significance Level					
45	Detected Data Not Gamma Distributed at 5% Significance Level											
46												
47	Gamma Statistics on Detected Data Only											
48	k hat (MLE)					0.364	k star (bias corrected MLE)					0.336
49	Theta hat (MLE)					3519243	Theta star (bias corrected MLE)					3816329
50	nu hat (MLE)					10.92	nu star (bias corrected)					10.07

	A–E	F	G–K	L
51	Mean (detects)	1280441		
52				
53	**Gamma ROS Statistics using Imputed Non-Detects**			
54	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
55	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
56	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
57	This is especially true when the sample size is small.			
58	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
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 star (bias corrected MLE)	0.0872
63	Theta hat (MLE)	6680199	Theta star (bias corrected MLE)	5794135
64	nu hat (MLE)	5.75	nu star (bias corrected)	6.63
65	Adjusted Level of Significance (β)	0.0434		
66	Approximate Chi Square Value (6.63, α)	1.97	Adjusted Chi Square Value (6.63, β)	1.866
67	95% Gamma Approximate UCL (use when n>=50)	1701245	95% Gamma Adjusted UCL (use when n<50)	1795315
68				
69	**Estimates of Gamma Parameters using KM Estimates**			
70	Mean (KM)	505447	SD (KM)	951415
71	Variance (KM)	9.052E+11	SE 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	theta hat (KM)	1790871	theta star (KM)	1821448
75	80% gamma percentile (KM)	759138	90% gamma percentile (KM)	1503610
76	95% gamma percentile (KM)	2369940	99% gamma percentile (KM)	4643872
77				
78	**Gamma Kaplan-Meier (KM) Statistics**			
79	Approximate Chi Square Value (21.09, α)	11.66	Adjusted Chi Square Value (21.09, β)	11.37
80	95% Gamma Approximate KM-UCL (use when n>=50)	914342	95% Gamma Adjusted KM-UCL (use when n<50)	937765
81				
82	**Lognormal GOF Test on Detected Observations Only**			
83	Shapiro Wilk Test Statistic	0.755	**Shapiro Wilk GOF Test**	
84	5% Shapiro Wilk Critical Value	0.881	Detected Data Not Lognormal at 5% Significance Level	
85	Lilliefors Test Statistic	0.269	**Lilliefors GOF Test**	
86	5% Lilliefors Critical Value	0.22	Detected Data Not Lognormal at 5% Significance Level	
87	**Detected Data Not Lognormal at 5% Significance Level**			
88				
89	**Lognormal ROS Statistics Using Imputed Non-Detects**			
90	Mean in Original Scale	505554	Mean in Log Scale	7.183
91	SD in Original Scale	964128	SD in Log Scale	4.936
92	95% t UCL (assumes normality of ROS data)	769419	95% Percentile Bootstrap UCL	778478
93	95% BCA Bootstrap UCL	787571	95% Bootstrap t UCL	851395
94	95% H-UCL (Log ROS)	2.350E+11		
95				
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
97	KM Mean (logged)	6.118	KM Geo Mean	453.9
98	KM SD (logged)	5.406	95% Critical H Value (KM-Log)	9.169
99	KM Standard Error of Mean (logged)	0.917	95% H-UCL (KM -Log)	3.474E+12
100	KM SD (logged)	5.406	95% Critical H Value (KM-Log)	9.169

	A	B	C	D	E	F	G	H	I	J	K	L
101			KM Standard Error of Mean (logged)			0.917						
102												
103	**DL/2 Statistics**											
104	**DL/2 Normal**						**DL/2 Log-Transformed**					
105					Mean in Original Scale	505687					Mean in Log Scale	7.143
106					SD in Original Scale	964057					SD in Log Scale	5.044
107					95% t UCL (Assumes normality)	769533					95% H-Stat UCL	5.194E+11
108	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
109												
110	**Nonparametric Distribution Free UCL Statistics**											
111	**Detected Data appear Normal Distributed at 5% Significance Level**											
112												
113	**Suggested UCL to Use**											
114					95% KM (t) UCL	774972						
115												
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
117	Recommendations are based upon data size, data distribution, and skewness.											
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
120												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:45:18 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Ethanol											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					17
14	Number of Detects					2	Number of Non-Detects					36
15	Number of Distinct Detects					1	Number of Distinct Non-Detects					16
16												
17	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
18	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
19												
20	The data set for variable Ethanol was not processed!											
21												
22												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:37:57 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**Ethylbenzene**											
11												
12	**General Statistics**											
13	Total Number of Observations					50	Number of Distinct Observations					37
14	Number of Detects					26	Number of Non-Detects					24
15	Number of Distinct Detects					26	Number of Distinct Non-Detects					11
16	Minimum Detect					13	Minimum Non-Detect					8.68
17	Maximum Detect					3000000	Maximum Non-Detect					50000
18	Variance Detects					5.000E+11	Percent Non-Detects					48%
19	Mean Detects					235455	SD Detects					707117
20	Median Detects					23950	CV Detects					3.003
21	Skewness Detects					3.492	Kurtosis Detects					11.53
22	Mean of Logged Detects					9.636	SD of Logged Detects					2.804
23												
24	**Normal GOF Test on Detects Only**											
25	Shapiro Wilk Test Statistic					0.362	**Shapiro Wilk GOF Test**					
26	5% Shapiro Wilk Critical Value					0.92	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.438	**Lilliefors GOF Test**					
28	5% Lilliefors Critical Value					0.17	Detected Data Not Normal at 5% Significance Level					
29	**Detected Data Not Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32	KM Mean					122966	KM Standard Error of Mean					74066
33	KM SD					513544	95% KM (BCA) UCL					268248
34	95% KM (t) UCL					247141	95% KM (Percentile Bootstrap) UCL					264585
35	95% KM (z) UCL					244793	95% KM Bootstrap t UCL					1504683
36	90% KM Chebyshev UCL					345163	95% KM Chebyshev UCL					445811
37	97.5% KM Chebyshev UCL					585506	99% KM Chebyshev UCL					859910
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40	A-D Test Statistic					1.992	**Anderson-Darling GOF Test**					
41	5% A-D Critical Value					0.872	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.231	**Kolmogorov-Smirnov GOF**					
43	5% K-S Critical Value					0.188	Detected Data Not Gamma Distributed at 5% Significance Level					
44	**Detected Data Not Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47	k hat (MLE)					0.258	k star (bias corrected MLE)					0.254
48	Theta hat (MLE)					911013	Theta star (bias corrected MLE)					925991
49	nu hat (MLE)					13.44	nu star (bias corrected)					13.22
50	Mean (detects)					235455						

Gamma ROS Statistics using Imputed Non-Detects

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., <15-20)

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	Mean	122436
Maximum	3000000	Median	13.5
SD	518873	CV	4.238
k hat (MLE)	0.092	k star (bias corrected MLE)	0.0998
Theta hat (MLE)	1330346	Theta star (bias corrected MLE)	1226267
nu hat (MLE)	9.203	nu star (bias corrected)	9.984
Adjusted Level of Significance (β)	0.0452		
Approximate Chi Square Value (9.98, α)	3.932	Adjusted Chi Square Value (9.98, β)	3.819
95% Gamma Approximate UCL (use when n>=50)	310896	95% Gamma Adjusted UCL (use when n<50)	320066

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	122966	SD (KM)	513544
Variance (KM)	2.637E+11	SE of Mean (KM)	74066
k hat (KM)	0.0573	k star (KM)	0.0672
nu hat (KM)	5.733	nu star (KM)	6.723
theta hat (KM)	2144722	theta star (KM)	1829102
80% gamma percentile (KM)	40008	90% gamma percentile (KM)	256764
95% gamma percentile (KM)	703521	99% gamma percentile (KM)	2359830

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (6.72, α)	2.02	Adjusted Chi Square Value (6.72, β)	1.944
95% Gamma Approximate KM-UCL (use when n>=50)	409303	95% Gamma Adjusted KM-UCL (use when n<50)	425189

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.92	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.17	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	122526	Mean in Log Scale	6.862
SD in Original Scale	518852	SD in Log Scale	3.72
95% t UCL (assumes normality of ROS data)	245545	95% Percentile Bootstrap UCL	247643
95% BCA Bootstrap UCL	324493	95% Bootstrap t UCL	1584287
95% H-UCL (Log ROS)	25752387		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	6.34	KM Geo Mean	567
KM SD (logged)	4.175	95% Critical H Value (KM-Log)	6.882
KM Standard Error of Mean (logged)	0.624	95% H-UCL (KM -Log)	2.091E+8
KM SD (logged)	4.175	95% Critical H Value (KM-Log)	6.882
KM Standard Error of Mean (logged)	0.624		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					124148	Mean in Log Scale					7.199
105	SD in Original Scale					518492	SD in Log Scale					3.914
106	95% t UCL (Assumes 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	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Approximate Lognormal Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	97.5% KM (Chebyshev) UCL					585506						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:46:27 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Heptane

General Statistics

Total Number of Observations	39	Number of Distinct Observations	21
Number of Detects	12	Number of Non-Detects	27
Number of Distinct Detects	10	Number of Distinct Non-Detects	11
Minimum Detect	990	Minimum Non-Detect	8.2
Maximum Detect	3900000	Maximum Non-Detect	5000
Variance Detects	1.176E+12	Percent Non-Detects	69.23%
Mean Detects	633931	SD Detects	1084608
Median Detects	225000	CV Detects	1.711
Skewness Detects	2.913	Kurtosis Detects	8.992
Mean of Logged Detects	12.23	SD of Logged Detects	2.005

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.575	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.338	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.243	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	195070	KM Standard Error of Mean	108053
KM SD	646063	95% KM (BCA) UCL	405972
95% KM (t) UCL	377242	95% KM (Percentile Bootstrap) UCL	384218
95% KM (z) UCL	372801	95% KM Bootstrap t UCL	813676
90% KM Chebyshev UCL	519229	95% KM Chebyshev UCL	666062
97.5% KM Chebyshev UCL	869860	99% KM Chebyshev UCL	1270183

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.539	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.781	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.197	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.258	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.554	k star (bias corrected MLE)	0.471
Theta hat (MLE)	1143338	Theta star (bias corrected MLE)	1344790
nu hat (MLE)	13.31	nu star (bias corrected)	11.31
Mean (detects)	633931		

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	195056
59					Maximum	3900000					Median	0.01
60					SD	654513					CV	3.356
61					k hat (MLE)	0.0727					k star (bias corrected MLE)	0.0842
62					Theta hat (MLE)	2684725					Theta star (bias corrected MLE)	2317700
63					nu hat (MLE)	5.667					nu star (bias corrected)	6.564
64					Adjusted Level of Significance (β)	0.0437						
65					Approximate Chi Square Value (6.56, α)	1.935					Adjusted Chi Square Value (6.56, β)	1.838
66					95% Gamma Approximate UCL (use when n>=50)	661796					95% Gamma Adjusted UCL (use when n<50)	696824
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	195070					SD (KM)	646063
70					Variance (KM)	4.174E+11					SE of Mean (KM)	108053
71					k hat (KM)	0.0912					k star (KM)	0.101
72					nu hat (KM)	7.111					nu star (KM)	7.897
73					theta hat (KM)	2139736					theta star (KM)	1926678
74					80% gamma percentile (KM)	137793					90% gamma percentile (KM)	521830
75					95% gamma percentile (KM)	1131403					99% gamma percentile (KM)	3079461
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (7.90, α)	2.676					Adjusted Chi Square Value (7.90, β)	2.557
79					95% Gamma Approximate KM-UCL (use when n>=50)	575751					95% Gamma Adjusted KM-UCL (use when n<50)	602472
80	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)											
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.843	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.859	Detected Data Not Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.243	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.243	Detected Data Not Lognormal at 5% Significance Level					
87	**Detected Data Not Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	196068					Mean in Log Scale	8.166
91					SD in Original Scale	654206					SD in Log Scale	3.235
92					95% t UCL (assumes normality of ROS data)	372683					95% Percentile Bootstrap UCL	388106
93					95% BCA Bootstrap UCL	508618					95% Bootstrap t UCL	838870
94					95% H-UCL (Log ROS)	12950490						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	5.261					KM Geo Mean	192.8
98					KM SD (logged)	4.788					95% Critical H Value (KM-Log)	8.197
99					KM Standard Error of Mean (logged)	0.805					95% H-UCL (KM -Log)	1.066E+10
100					KM SD (logged)	4.788					95% Critical H Value (KM-Log)	8.197

	A	B	C	D	E	F	G	H	I	J	K	L
101			KM Standard Error of Mean (logged)			0.805						
102												
103						**DL/2 Statistics**						
104			**DL/2 Normal**						**DL/2 Log-Transformed**			
105					Mean in Original Scale	195379					Mean in Log Scale	6.494
106					SD in Original Scale	654414					SD in Log Scale	4.516
107					95% t UCL (Assumes 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 appear Gamma Distributed at 5% Significance Level**						
112												
113						**Suggested UCL to Use**						
114					Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	602472						
115												
116						Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.						
117						Recommendations are based upon data size, data distribution, and skewness.						
118						These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).						
119						However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.						
120												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:47:36 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Isopropanol

General Statistics

Total Number of Observations	38	Number of Distinct Observations	18
Number of Detects	2	Number of Non-Detects	36
Number of Distinct Detects	2	Number of Distinct Non-Detects	16
Minimum Detect	12	Minimum Non-Detect	9.83
Maximum Detect	14	Maximum Non-Detect	300000
Variance Detects	2	Percent Non-Detects	94.74%
Mean Detects	13	SD Detects	1.414
Median Detects	13	CV Detects	0.109
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	2.562	SD of Logged Detects	0.109

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	10.36	KM Standard Error of Mean	0.51
KM SD	1.25	95% KM (BCA) UCL	N/A
95% KM (t) UCL	11.22	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	11.2	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	11.89	95% KM Chebyshev UCL	12.58
97.5% KM Chebyshev UCL	13.55	99% KM Chebyshev UCL	15.44

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	168.7	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.0771	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	674.7	nu star (bias corrected)	N/A
Mean (detects)	13		

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	10.36	SD (KM)	1.25
Variance (KM)	1.562	SE of Mean (KM)	0.51

51	k hat (KM)	68.68	k star (KM)	63.27
52	nu hat (KM)	5219	nu star (KM)	4809
53	theta hat (KM)	0.151	theta star (KM)	0.164
54	80% gamma percentile (KM)	11.44	90% gamma percentile (KM)	12.06
55	95% gamma percentile (KM)	12.59	99% gamma percentile (KM)	13.63
56				
57	**Gamma Kaplan-Meier (KM) Statistics**			
58			Adjusted Level of Significance (β)	0.0434
59	Approximate Chi Square Value (N/A, α)	4648	Adjusted Chi Square Value (N/A, β)	4642
60	95% Gamma Approximate KM-UCL (use when n>=50)	10.72	95% Gamma Adjusted KM-UCL (use when n<50)	10.73
61				
62	**Lognormal GOF Test on Detected Observations Only**			
63	**Not Enough Data to Perform GOF Test**			
64				
65	**Lognormal ROS Statistics Using Imputed Non-Detects**			
66	Mean in Original Scale	7.493	Mean in Log Scale	1.983
67	SD in Original Scale	1.964	SD in Log Scale	0.247
68	95% t UCL (assumes normality of ROS data)	8.031	95% Percentile Bootstrap UCL	8.047
69	95% BCA Bootstrap UCL	8.083	95% Bootstrap t UCL	8.123
70	95% H-UCL (Log ROS)	8.048		
71				
72	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
73	KM Mean (logged)	2.332	KM Geo Mean	10.29
74	KM SD (logged)	0.108	95% Critical H Value (KM-Log)	1.7
75	KM Standard Error of Mean (logged)	0.044	95% H-UCL (KM -Log)	10.67
76	KM SD (logged)	0.108	95% Critical H Value (KM-Log)	1.7
77	KM Standard Error of Mean (logged)	0.044		
78				
79	**DL/2 Statistics**			
80	**DL/2 Normal**		**DL/2 Log-Transformed**	
81	Mean in Original Scale	10041	Mean in Log Scale	5.489
82	SD in Original Scale	29782	SD in Log Scale	3.289
83	95% t UCL (Assumes normality)	18191	95% H-Stat UCL	1200622
84	**DL/2 is not a recommended method, provided for comparisons and historical reasons**			
85				
86	**Nonparametric Distribution Free UCL Statistics**			
87	**Data do not follow a Discernible Distribution at 5% Significance Level**			
88				
89	**Suggested UCL to Use**			
90	95% KM (t) UCL	11.22	KM H-UCL	10.67
91	95% KM (BCA) UCL	N/A		
92	**Warning: One or more Recommended UCL(s) not available!**			
93				
94	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
95	Recommendations are based upon data size, data distribution, and skewness.			
96	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
97	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
98				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:48:11 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	**Isopropylbenzene**											
11												
12	**General Statistics**											
13	Total Number of Observations					38	Number of Distinct Observations					23
14	Number of Detects					11	Number of Non-Detects					27
15	Number of Distinct Detects					11	Number of Distinct Non-Detects					12
16	Minimum Detect					88	Minimum Non-Detect					10
17	Maximum Detect					29000	Maximum Non-Detect					300000
18	Variance Detects					83318883	Percent Non-Detects					71.05%
19	Mean Detects					7783	SD Detects					9128
20	Median Detects					7000	CV Detects					1.173
21	Skewness Detects					1.441	Kurtosis Detects					1.831
22	Mean of Logged Detects					7.857	SD of Logged Detects					1.99
23												
24	**Normal GOF Test on Detects Only**											
25	Shapiro Wilk Test Statistic					0.824	**Shapiro Wilk GOF Test**					
26	5% Shapiro Wilk Critical Value					0.85	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.231	**Lilliefors GOF Test**					
28	5% Lilliefors Critical Value					0.251	Detected Data appear Normal at 5% Significance Level					
29	**Detected Data appear Approximate Normal at 5% Significance Level**											
30												
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
32	KM Mean					2822	KM Standard Error of Mean					1208
33	KM SD					6388	95% KM (BCA) UCL					5159
34	95% KM (t) UCL					4860	95% KM (Percentile Bootstrap) UCL					4901
35	95% KM (z) UCL					4809	95% KM Bootstrap t UCL					6705
36	90% KM Chebyshev UCL					6447	95% KM Chebyshev UCL					8089
37	97.5% KM Chebyshev UCL					10368	99% KM Chebyshev UCL					14844
38												
39	**Gamma GOF Tests on Detected Observations Only**											
40	A-D Test Statistic					0.326	**Anderson-Darling GOF Test**					
41	5% A-D Critical Value					0.776	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.191	**Kolmogorov-Smirnov GOF**					
43	5% K-S Critical Value					0.268	Detected data appear Gamma Distributed at 5% Significance Level					
44	**Detected data appear Gamma Distributed at 5% Significance Level**											
45												
46	**Gamma Statistics on Detected Data Only**											
47	k hat (MLE)					0.565	k star (bias corrected MLE)					0.472
48	Theta hat (MLE)					13774	Theta star (bias corrected MLE)					16505
49	nu hat (MLE)					12.43	nu star (bias corrected)					10.37
50	Mean (detects)					7783						

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	2253
59					Maximum	29000					Median	0.01
60					SD	5943					CV	2.638
61					k hat (MLE)	0.0939					k star (bias corrected MLE)	0.104
62					Theta hat (MLE)	23998					Theta star (bias corrected MLE)	21660
63					nu hat (MLE)	7.135					nu star (bias corrected)	7.905
64					Adjusted Level of Significance (β)	0.0434						
65					Approximate Chi Square Value (7.91, α)	2.68					Adjusted Chi Square Value (7.91, β)	2.556
66					95% Gamma Approximate UCL (use when n>=50)	6645					95% Gamma Adjusted UCL (use when n<50)	6969
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	2822					SD (KM)	6388
70					Variance (KM)	40803489					SE of Mean (KM)	1208
71					k hat (KM)	0.195					k star (KM)	0.197
72					nu hat (KM)	14.83					nu star (KM)	15
73					theta hat (KM)	14459					theta star (KM)	14303
74					80% gamma percentile (KM)	3692					90% gamma percentile (KM)	8534
75					95% gamma percentile (KM)	14592					99% gamma percentile (KM)	31306
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (15.00, α)	7.258					Adjusted Chi Square Value (15.00, β)	7.035
79					95% Gamma Approximate KM-UCL (use when n>=50)	5830					95% Gamma Adjusted KM-UCL (use when n<50)	6015
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**					
83					5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level					
84					Lilliefors Test Statistic	0.237	**Lilliefors GOF Test**					
85					5% Lilliefors Critical Value	0.251	Detected Data appear Lognormal at 5% Significance Level					
86	**Detected Data appear Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	2299					Mean in Log Scale	4.555
90					SD in Original Scale	5925					SD in Log Scale	2.738
91					95% t UCL (assumes normality of ROS data)	3921					95% Percentile Bootstrap UCL	4073
92					95% BCA Bootstrap UCL	4338					95% Bootstrap t UCL	5299
93					95% H-UCL (Log ROS)	36176						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	4.427					KM Geo Mean	83.7
97					KM SD (logged)	2.882					95% Critical H Value (KM-Log)	5.094
98					KM Standard Error of Mean (logged)	0.56					95% H-UCL (KM -Log)	59413
99					KM SD (logged)	2.882					95% Critical H Value (KM-Log)	5.094
100					KM Standard Error of Mean (logged)	0.56						

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					12291	Mean in Log Scale					6.106
105	SD in Original Scale					29861	SD in Log Scale					3.487
106	95% t UCL (Assumes normality)					20464	95% H-Stat UCL					6307333
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
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 data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:38:32 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	m,p-Xylenes											
11												
12	General Statistics											
13	Total Number of Observations					50	Number of Distinct Observations					26
14	Number of Detects					12	Number of Non-Detects					38
15	Number of Distinct Detects					12	Number of Distinct Non-Detects					15
16	Minimum Detect					3000	Minimum Non-Detect					10
17	Maximum Detect					11000000	Maximum Non-Detect					52108
18	Variance Detects					1.400E+13	Percent Non-Detects					76%
19	Mean Detects					1755663	SD Detects					3741497
20	Median Detects					132500	CV Detects					2.131
21	Skewness Detects					2.141	Kurtosis Detects					3.371
22	Mean of Logged Detects					11.58	SD of Logged Detects					2.751
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.534	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.859	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.418	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.243	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					421541	KM Standard Error of Mean					281882
33	KM SD					1908352	95% KM (BCA) UCL					953525
34	95% KM (t) UCL					894131	95% KM (Percentile Bootstrap) UCL					895089
35	95% KM (z) UCL					885196	95% KM Bootstrap t UCL					10064859
36	90% KM Chebyshev UCL					1267188	95% KM Chebyshev UCL					1650238
37	97.5% KM Chebyshev UCL					2181897	99% KM Chebyshev UCL					3226236
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.926	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.846	Detected Data Not Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.273	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.268	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected Data Not Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.253	k star (bias corrected MLE)					0.245
48	Theta hat (MLE)					6939365	Theta star (bias corrected MLE)					7157034
49	nu hat (MLE)					6.072	nu star (bias corrected)					5.887
50	Mean (detects)					1755663						

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	421359
59					Maximum	11000000					Median	0.01
60					SD	1927766					CV	4.575
61					k hat (MLE)	0.0626					k star (bias corrected MLE)	0.0722
62					Theta hat (MLE)	6726824					Theta star (bias corrected MLE)	5834895
63					nu hat (MLE)	6.264					nu star (bias corrected)	7.221
64					Adjusted Level of Significance (β)	0.0452						
65					Approximate Chi Square Value (7.22, α)	2.293					Adjusted Chi Square Value (7.22, β)	2.211
66					95% Gamma Approximate UCL (use when n>=50)	1327082					95% Gamma Adjusted UCL (use when n<50)	1376041
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	421541					SD (KM)	1908352
70					Variance (KM)	3.642E+12					SE of Mean (KM)	281882
71					k hat (KM)	0.0488					k star (KM)	0.0592
72					nu hat (KM)	4.879					nu star (KM)	5.92
73					theta hat (KM)	8639275					theta star (KM)	7120711
74					80% gamma percentile (KM)	97951					90% gamma percentile (KM)	782346
75					95% gamma percentile (KM)	2355486					99% gamma percentile (KM)	8553397
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (5.92, α)	1.599					Adjusted Chi Square Value (5.92, β)	1.534
79					95% Gamma Approximate KM-UCL (use when n>=50)	1560576					95% Gamma Adjusted KM-UCL (use when n<50)	1626915
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**					
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												
88	**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 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
100					KM Standard Error of Mean (logged)	0.63						

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					423355	Mean in Log Scale					6.628
105	SD in Original Scale					1927331	SD in Log Scale					3.919
106	95% t UCL (Assumes normality)					880326	95% H-Stat UCL					61713384
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
108												
109	Nonparametric Distribution Free UCL Statistics											
110	Detected Data appear Lognormal Distributed at 5% Significance Level											
111												
112	Suggested UCL to Use											
113	97.5% KM (Chebyshev) UCL					2181897						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:49:26 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	Naphthalene											
11												
12	General Statistics											
13	Total Number of Observations					39	Number of Distinct Observations					18
14	Number of Detects					1	Number of Non-Detects					38
15	Number of Distinct Detects					1	Number of Distinct Non-Detects					17
16												
17	Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!											
18	It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).											
19												
20	The data set for variable Naphthalene was not processed!											
21												
22												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:47:01 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

n-Hexane

General Statistics

Total Number of Observations	39	Number of Distinct Observations	23
Number of Detects	11	Number of Non-Detects	28
Number of Distinct Detects	11	Number of Distinct Non-Detects	12
Minimum Detect	1500	Minimum Non-Detect	7.05
Maximum Detect	1500000	Maximum Non-Detect	30000
Variance Detects	2.487E+11	Percent Non-Detects	71.79%
Mean Detects	458734	SD Detects	498711
Median Detects	450000	CV Detects	1.087
Skewness Detects	1.166	Kurtosis Detects	0.686
Mean of Logged Detects	11.75	SD of Logged Detects	2.328

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.843	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	129436	KM Standard Error of Mean	54775
KM SD	326149	95% KM (BCA) UCL	220685
95% KM (t) UCL	221784	95% KM (Percentile Bootstrap) UCL	221024
95% KM (z) UCL	219533	95% KM Bootstrap t UCL	291310
90% KM Chebyshev UCL	293761	95% KM Chebyshev UCL	368194
97.5% KM Chebyshev UCL	471505	99% KM Chebyshev UCL	674438

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.519	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.782	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.224	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.269	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.496	k star (bias corrected MLE)	0.422
Theta hat (MLE)	924422	Theta star (bias corrected MLE)	1088319
nu hat (MLE)	10.92	nu star (bias corrected)	9.273
Mean (detects)	458734		

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	129386
59					Maximum	1500000					Median	0.01
60					SD	330432					CV	2.554
61					k hat (MLE)	0.0718					k star (bias corrected MLE)	0.0834
62					Theta hat (MLE)	1802421					Theta star (bias corrected MLE)	1552198
63					nu hat (MLE)	5.599					nu star (bias corrected)	6.502
64					Adjusted Level of Significance (β)	0.0437						
65					Approximate Chi Square Value (6.50, α)	1.901					Adjusted Chi Square Value (6.50, β)	1.805
66					95% Gamma Approximate UCL (use when n>=50)	442422					95% Gamma Adjusted UCL (use when n<50)	466000
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	129436					SD (KM)	326149
70					Variance (KM)	1.064E+11					SE of Mean (KM)	54775
71					k hat (KM)	0.158					k star (KM)	0.162
72					nu hat (KM)	12.29					nu star (KM)	12.67
73					theta hat (KM)	821816					theta star (KM)	796634
74					80% gamma percentile (KM)	149884					90% gamma percentile (KM)	387448
75					95% gamma percentile (KM)	700839					99% gamma percentile (KM)	1595953
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (12.67, α)	5.674					Adjusted Chi Square Value (12.67, β)	5.489
79					95% Gamma Approximate KM-UCL (use when n>=50)	289120					95% Gamma Adjusted KM-UCL (use when n<50)	298852
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk GOF Test**					
83					5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level					
84					Lilliefors Test Statistic	0.275	**Lilliefors GOF Test**					
85					5% Lilliefors Critical Value	0.251	Detected Data Not Lognormal at 5% Significance Level					
86	**Detected Data appear Approximate Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	129629					Mean in Log Scale	6.529
90					SD in Original Scale	330335					SD in Log Scale	3.904
91					95% t UCL (assumes normality of ROS data)	218809					95% Percentile Bootstrap UCL	218969
92					95% BCA Bootstrap UCL	258727					95% Bootstrap t UCL	285785
93					95% H-UCL (Log ROS)	1.008E+8						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	4.778					KM Geo Mean	118.9
97					KM SD (logged)	4.569					95% Critical H Value (KM-Log)	7.84
98					KM Standard Error of Mean (logged)	0.775					95% H-UCL (KM -Log)	1.357E+9
99					KM SD (logged)	4.569					95% Critical H Value (KM-Log)	7.84
100					KM Standard Error of Mean (logged)	0.775						

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	DL/2 Statistics											
103	DL/2 Normal						DL/2 Log-Transformed					
104	Mean in Original Scale					130214	Mean in Log Scale					6.275
105	SD in Original Scale					330110	SD in Log Scale					4.33
106	95% t UCL (Assumes normality)					219333	95% H-Stat UCL					1.168E+9
107	DL/2 is not a recommended method, provided for comparisons and historical reasons											
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					221784						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:50:35 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	n-Propylbenzene											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					22
14	Number of Detects					12	Number of Non-Detects					26
15	Number of Distinct Detects					12	Number of Distinct Non-Detects					11
16	Minimum Detect					75	Minimum Non-Detect					10
17	Maximum Detect					300000	Maximum Non-Detect					58994
18	Variance Detects					1.062E+10	Percent Non-Detects					68.42%
19	Mean Detects					51712	SD Detects					103067
20	Median Detects					7350	CV Detects					1.993
21	Skewness Detects					2.099	Kurtosis Detects					3.089
22	Mean of Logged Detects					8.829	SD of Logged Detects					2.362
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.548	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.859	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.428	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.243	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					16724	KM Standard Error of Mean					10239
33	KM SD					60381	95% KM (BCA) UCL					36024
34	95% KM (t) UCL					33998	95% KM (Percentile Bootstrap) UCL					34975
35	95% KM (z) UCL					33565	95% KM Bootstrap t UCL					163542
36	90% KM Chebyshev UCL					47440	95% KM Chebyshev UCL					61354
37	97.5% KM Chebyshev UCL					80666	99% KM Chebyshev UCL					118599
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.782	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.817	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.235	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.264	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.335	k star (bias corrected MLE)					0.307
48	Theta hat (MLE)					154520	Theta star (bias corrected MLE)					168689
49	nu hat (MLE)					8.032	nu star (bias corrected)					7.357
50	Mean (detects)					51712						

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	16330
59					Maximum	300000					Median	0.01
60					SD	61250					CV	3.751
61					k hat (MLE)	0.0826					k star (bias corrected MLE)	0.0936
62					Theta hat (MLE)	197731					Theta star (bias corrected MLE)	174446
63					nu hat (MLE)	6.277					nu star (bias corrected)	7.114
64					Adjusted Level of Significance (β)	0.0434						
65					Approximate Chi Square Value (7.11, α)	2.234					Adjusted Chi Square Value (7.11, β)	2.122
66					95% Gamma Approximate UCL (use when n>=50)	52015					95% Gamma Adjusted UCL (use when n<50)	54750
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	16724					SD (KM)	60381
70					Variance (KM)	3.646E+9					SE of Mean (KM)	10239
71					k hat (KM)	0.0767					k star (KM)	0.0882
72					nu hat (KM)	5.83					nu star (KM)	6.703
73					theta hat (KM)	218000					theta star (KM)	189608
74					80% gamma percentile (KM)	9517					90% gamma percentile (KM)	41957
75					95% gamma percentile (KM)	97450					99% gamma percentile (KM)	282632
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (6.70, α)	2.009					Adjusted Chi Square Value (6.70, β)	1.905
79					95% Gamma Approximate KM-UCL (use when n>=50)	55795					95% Gamma Adjusted KM-UCL (use when n<50)	58856
80	95% Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50)											
81												
82	**Lognormal GOF Test on Detected Observations Only**											
83					Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**					
84					5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level					
85					Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**					
86					5% Lilliefors Critical Value	0.243	Detected Data appear Lognormal at 5% Significance Level					
87	**Detected Data appear Lognormal at 5% Significance Level**											
88												
89	**Lognormal ROS Statistics Using Imputed Non-Detects**											
90					Mean in Original Scale	16371					Mean in Log Scale	4.704
91					SD in Original Scale	61239					SD in Log Scale	3.489
92					95% t UCL (assumes normality of ROS data)	33131					95% Percentile Bootstrap UCL	33262
93					95% BCA Bootstrap UCL	41550					95% Bootstrap t UCL	189280
94					95% H-UCL (Log ROS)	1568609						
95												
96	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
97					KM Mean (logged)	4.714					KM Geo Mean	111.5
98					KM SD (logged)	3.355					95% Critical H Value (KM-Log)	5.843
99					KM Standard Error of Mean (logged)	0.611					95% H-UCL (KM -Log)	777554
100					KM SD (logged)	3.355					95% Critical H Value (KM-Log)	5.843

	A–E	F	G–K	L
101	KM Standard Error of Mean (logged)	0.611		
102				
103	**DL/2 Statistics**			
104	**DL/2 Normal**		**DL/2 Log-Transformed**	
105	Mean in Original Scale	19527	Mean in Log Scale	6.08
106	SD in Original Scale	60869	SD in Log Scale	3.574
107	95% t UCL (Assumes 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 appear Gamma Distributed at 5% Significance Level**			
112				
113	**Suggested UCL to Use**			
114	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	58856		
115				
116	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.			
117	Recommendations are based upon data size, data distribution, and skewness.			
118	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).			
119	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.			
120				

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:39:13 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	o-Xylenes											
11												
12	General Statistics											
13	Total Number of Observations					50	Number of Distinct Observations					24
14	Number of Detects					8	Number of Non-Detects					42
15	Number of Distinct Detects					8	Number of Distinct Non-Detects					16
16	Minimum Detect					300	Minimum Non-Detect					8.68
17	Maximum Detect					3200000	Maximum Non-Detect					50000
18	Variance Detects					1.738E+12	Percent Non-Detects					84%
19	Mean Detects					782170	SD Detects					1318519
20	Median Detects					111500	CV Detects					1.686
21	Skewness Detects					1.493	Kurtosis Detects					0.394
22	Mean of Logged Detects					11.1	SD of Logged Detects					3.238
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.638	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.818	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.423	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.283	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					125212	KM Standard Error of Mean					86269
33	KM SD					570613	95% KM (BCA) UCL					259097
34	95% KM (t) UCL					269846	95% KM (Percentile Bootstrap) UCL					265975
35	95% KM (z) UCL					267112	95% KM Bootstrap t UCL					2136167
36	90% KM Chebyshev UCL					384019	95% KM Chebyshev UCL					501249
37	97.5% KM Chebyshev UCL					663961	99% KM Chebyshev UCL					983576
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.387	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.804	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.236	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.318	Detected data appear Gamma Distributed at 5% Significance Level					
44	Detected data appear Gamma Distributed at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.282	k star (bias corrected MLE)					0.26
48	Theta hat (MLE)					2768815	Theta star (bias corrected MLE)					3009605
49	nu hat (MLE)					4.52	nu star (bias corrected)					4.158
50	Mean (detects)					782170						

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	125147
59	Maximum	3200000	Median	0.01
60	SD	576419	CV	4.606
61	k hat (MLE)	0.062	k star (bias corrected MLE)	0.0716
62	Theta hat (MLE)	2018611	Theta star (bias corrected MLE)	1747617
63	nu hat (MLE)	6.2	nu star (bias corrected)	7.161
64	Adjusted Level of Significance (β)	0.0452		
65	Approximate Chi Square Value (7.16, α)	2.259	Adjusted Chi Square Value (7.16, β)	2.178
66	95% Gamma Approximate UCL (use when n>=50)	396656	95% Gamma Adjusted UCL (use when n<50)	411376
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	125212	SD (KM)	570613
70	Variance (KM)	3.256E+11	SE of 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	theta hat (KM)	2600373	theta star (KM)	2136878
74	80% gamma percentile (KM)	28248	90% gamma percentile (KM)	229951
75	95% gamma percentile (KM)	697998	99% gamma percentile (KM)	2551784
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (5.86, α)	1.569	Adjusted Chi Square Value (5.86, β)	1.504
79	95% Gamma Approximate KM-UCL (use when n>=50)	467756	95% Gamma Adjusted KM-UCL (use when n<50)	487787
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	125154	Mean in Log Scale	-0.0291
90	SD in Original Scale	576417	SD in Log Scale	6.186
91	95% t UCL (assumes normality of ROS data)	261823	95% Percentile Bootstrap UCL	263898
92	95% BCA Bootstrap UCL	344320	95% Bootstrap t UCL	2344184
93	95% H-UCL (Log ROS)	1.344E+12		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	3.741	KM Geo Mean	42.15
97	KM SD (logged)	3.521	95% Critical H Value (KM-Log)	5.875
98	KM Standard Error of Mean (logged)	0.557	95% H-UCL (KM -Log)	397728
99	KM SD (logged)	3.521	95% Critical H Value (KM-Log)	5.875
100	KM Standard Error of Mean (logged)	0.557		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					127461	Mean in Log Scale					6.137
105	SD in Original Scale					575936	SD in Log Scale					3.588
106	95% t UCL (Assumes normality)					264016	95% H-Stat UCL					6199007
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	95% KM Approximate Gamma UCL					467756						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:49:59 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

PCE

General Statistics

Total Number of Observations	38	Number of Distinct Observations	18
Number of Detects	3	Number of Non-Detects	35
Number of Distinct Detects	3	Number of Distinct Non-Detects	15
Minimum Detect	260	Minimum Non-Detect	10
Maximum Detect	2000	Maximum Non-Detect	300000
Variance Detects	757200	Percent Non-Detects	92.11%
Mean Detects	1120	SD Detects	870.2
Median Detects	1100	CV Detects	0.777
Skewness Detects	0.103	Kurtosis Detects	N/A
Mean of Logged Detects	6.722	SD of Logged Detects	1.049

Warning: Data set has only 3 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	1	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.177	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	153.6	KM Standard Error of Mean	111.6
KM SD	444.6	95% KM (BCA) UCL	N/A
95% KM (t) UCL	341.9	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	337.2	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	488.5	95% KM Chebyshev UCL	640.2
97.5% KM Chebyshev UCL	850.7	99% KM Chebyshev UCL	1264

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.818	k star (bias corrected MLE)	N/A
Theta hat (MLE)	616	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	10.91	nu star (bias corrected)	N/A
Mean (detects)	1120		

	A	B	C	D	E	F	G	H	I	J	K	L
51												
52	**Gamma ROS Statistics using Imputed Non-Detects**											
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01					Mean	88.43
59					Maximum	2000					Median	0.01
60					SD	366.9					CV	4.149
61					k hat (MLE)	0.0992					k star (bias corrected MLE)	0.109
62					Theta hat (MLE)	891.3					Theta star (bias corrected MLE)	811.8
63					nu hat (MLE)	7.541					nu star (bias corrected)	8.279
64					Adjusted Level of Significance (β)	0.0434						
65					Approximate Chi Square Value (8.28, α)	2.897					Adjusted Chi Square Value (8.28, β)	2.767
66					95% Gamma Approximate UCL (use when n>=50)	252.7					95% Gamma Adjusted UCL (use when n<50)	N/A
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	153.6					SD (KM)	444.6
70					Variance (KM)	197704					SE of Mean (KM)	111.6
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					theta star (KM)	1205
74					80% gamma percentile (KM)	143.8					90% gamma percentile (KM)	442
75					95% gamma percentile (KM)	869.3					99% gamma percentile (KM)	2155
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (9.69, α)	3.748					Adjusted Chi Square Value (9.69, β)	3.595
79					95% Gamma Approximate KM-UCL (use when n>=50)	397.1					95% Gamma Adjusted KM-UCL (use when n<50)	413.9
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.946	**Shapiro Wilk GOF Test**					
83					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level					
84					Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**					
85					5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level					
86	**Detected Data appear Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	101.6					Mean in Log Scale	2.213
90					SD in Original Scale	364					SD in Log Scale	1.962
91					95% t UCL (assumes normality of ROS data)	201.2					95% Percentile Bootstrap UCL	204.5
92					95% BCA Bootstrap UCL	257.2					95% Bootstrap t UCL	834.8
93					95% H-UCL (Log ROS)	205.8						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	2.918					KM Geo Mean	18.51
97					KM SD (logged)	1.536					95% Critical H Value (KM-Log)	3.078
98					KM Standard Error of Mean (logged)	0.406					95% H-UCL (KM -Log)	131.1
99					KM SD (logged)	1.536					95% Critical H Value (KM-Log)	3.078
100					KM Standard Error of Mean (logged)	0.406						

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					10268	Mean in Log Scale					5.64
105	SD in Original Scale					29794	SD in Log Scale					3.338
106	95% t UCL (Assumes normality)					18422	95% H-Stat UCL					1795841
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
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					341.9						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/25/2018 9:51:12 AM
From File	Soil Vapor Input.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Propylene

General Statistics

Total Number of Observations	38	Number of Distinct Observations	18
Number of Detects	4	Number of Non-Detects	34
Number of Distinct Detects	4	Number of Distinct Non-Detects	15
Minimum Detect	78	Minimum Non-Detect	3.44
Maximum Detect	1000	Maximum Non-Detect	300000
Variance Detects	158083	Percent Non-Detects	89.47%
Mean Detects	522	SD Detects	397.6
Median Detects	505	CV Detects	0.762
Skewness Detects	0.204	Kurtosis Detects	-1.188
Mean of Logged Detects	5.904	SD of Logged Detects	1.118

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.375	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	96.8	KM Standard Error of Mean	58.15
KM SD	241.3	95% KM (BCA) UCL	N/A
95% KM (t) UCL	194.9	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	192.4	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	271.3	95% KM Chebyshev UCL	350.3
97.5% KM Chebyshev UCL	460	99% KM Chebyshev UCL	675.4

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.25	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.662	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.216	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.399	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.558	k star (bias corrected MLE)	0.556
Theta hat (MLE)	335	Theta star (bias corrected MLE)	938.5
nu hat (MLE)	12.47	nu star (bias corrected)	4.45
Mean (detects)	522		

51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	54.96
59	Maximum	1000	Median	0.01
60	SD	197.9	CV	3.601
61	k hat (MLE)	0.107	k star (bias corrected MLE)	0.116
62	Theta hat (MLE)	512.5	Theta star (bias corrected MLE)	472.5
63	nu hat (MLE)	8.15	nu star (bias corrected)	8.84
64	Adjusted Level of Significance (β)	0.0434		
65	Approximate Chi Square Value (8.84, α)	3.231	Adjusted Chi Square Value (8.84, β)	3.091
66	95% Gamma Approximate UCL (use when n>=50)	150.4	95% Gamma Adjusted UCL (use when n<50)	N/A
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	96.8	SD (KM)	241.3
70	Variance (KM)	58247	SE of 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	theta hat (KM)	601.7	theta star (KM)	584.2
74	80% gamma percentile (KM)	113.7	90% gamma percentile (KM)	290.3
75	95% gamma percentile (KM)	521.9	99% gamma percentile (KM)	1181
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (12.59, α)	5.62	Adjusted Chi Square Value (12.59, β)	5.428
79	95% Gamma Approximate KM-UCL (use when n>=50)	216.9	95% Gamma Adjusted KM-UCL (use when n<50)	224.6
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.375	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	71.85	Mean in Log Scale	2.841
90	SD in Original Scale	193.8	SD in Log Scale	1.502
91	95% t UCL (assumes normality of ROS data)	124.9	95% Percentile Bootstrap UCL	130
92	95% BCA Bootstrap UCL	155.4	95% Bootstrap t UCL	240.7
93	95% H-UCL (Log ROS)	111.8		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	2.141	KM Geo Mean	8.512
97	KM SD (logged)	1.863	95% Critical H Value (KM-Log)	3.544
98	KM Standard Error of Mean (logged)	0.475	95% H-UCL (KM -Log)	143.1
99	KM SD (logged)	1.863	95% Critical H Value (KM-Log)	3.544
100	KM Standard Error of Mean (logged)	0.475		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					9823	Mean in Log Scale					5.449
105	SD in Original Scale					29771	SD in Log Scale					3.411
106	95% t UCL (Assumes normality)					17971	95% H-Stat UCL					2181553
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
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					194.9						
114												
115	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
116	Recommendations are based upon data size, data distribution, and skewness.											
117	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
118	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
119												

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Data Sets with Non-Detects											
2												
3	User Selected Options											
4	Date/Time of Computation			ProUCL 5.15/25/2018 9:40:29 AM								
5	From File			Soil Vapor Input.xls								
6	Full Precision			OFF								
7	Confidence Coefficient			95%								
8	Number of Bootstrap Operations			2000								
9												
10	sec-Butylbenzene											
11												
12	General Statistics											
13	Total Number of Observations					38	Number of Distinct Observations					21
14	Number of Detects					8	Number of Non-Detects					30
15	Number of Distinct Detects					8	Number of Distinct Non-Detects					13
16	Minimum Detect					120	Minimum Non-Detect					10
17	Maximum Detect					6400	Maximum Non-Detect					300000
18	Variance Detects					5675370	Percent Non-Detects					78.95%
19	Mean Detects					2006	SD Detects					2382
20	Median Detects					565	CV Detects					1.187
21	Skewness Detects					1.095	Kurtosis Detects					-0.208
22	Mean of Logged Detects					6.794	SD of Logged Detects					1.448
23												
24	Normal GOF Test on Detects Only											
25	Shapiro Wilk Test Statistic					0.788	Shapiro Wilk GOF Test					
26	5% Shapiro Wilk Critical Value					0.818	Detected Data Not Normal at 5% Significance Level					
27	Lilliefors Test Statistic					0.352	Lilliefors GOF Test					
28	5% Lilliefors Critical Value					0.283	Detected Data Not Normal at 5% Significance Level					
29	Detected Data Not Normal at 5% Significance Level											
30												
31	Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs											
32	KM Mean					594.8	KM Standard Error of Mean					295.9
33	KM SD					1475	95% KM (BCA) UCL					1106
34	95% KM (t) UCL					1094	95% KM (Percentile Bootstrap) UCL					1093
35	95% KM (z) UCL					1082	95% KM Bootstrap t UCL					1509
36	90% KM Chebyshev UCL					1483	95% KM Chebyshev UCL					1885
37	97.5% KM Chebyshev UCL					2443	99% KM Chebyshev UCL					3539
38												
39	Gamma GOF Tests on Detected Observations Only											
40	A-D Test Statistic					0.563	Anderson-Darling GOF Test					
41	5% A-D Critical Value					0.746	Detected data appear Gamma Distributed at 5% Significance Level					
42	K-S Test Statistic					0.31	Kolmogorov-Smirnov GOF					
43	5% K-S Critical Value					0.304	Detected Data Not Gamma Distributed at 5% Significance Level					
44	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
45												
46	Gamma Statistics on Detected Data Only											
47	k hat (MLE)					0.741	k star (bias corrected MLE)					0.546
48	Theta hat (MLE)					2709	Theta star (bias corrected MLE)					3673
49	nu hat (MLE)					11.85	nu star (bias corrected)					8.738
50	Mean (detects)					2006						

51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
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 corrected MLE)	0.108
62	Theta hat (MLE)	4284	Theta star (bias corrected MLE)	3898
63	nu hat (MLE)	7.493	nu star (bias corrected)	8.235
64	Adjusted Level of Significance (β)	0.0434		
65	Approximate Chi Square Value (8.24, α)	2.872	Adjusted Chi Square Value (8.24, β)	2.742
66	95% Gamma Approximate UCL (use when n>=50)	1211	95% Gamma Adjusted UCL (use when n<50)	1269
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	594.8	SD (KM)	1475
70	Variance (KM)	2175483	SE of 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	theta hat (KM)	3657	theta star (KM)	3554
74	80% gamma percentile (KM)	703.4	90% gamma percentile (KM)	1785
75	95% gamma percentile (KM)	3200	99% gamma percentile (KM)	7218
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (12.72, α)	5.704	Adjusted Chi Square Value (12.72, β)	5.509
79	95% Gamma Approximate KM-UCL (use when n>=50)	1326	95% Gamma Adjusted KM-UCL (use when n<50)	1373
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.913	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.247	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.283	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	460	Mean in Log Scale	4.028
90	SD in Original Scale	1315	SD in Log Scale	1.922
91	95% t UCL (assumes normality of ROS data)	820	95% Percentile Bootstrap UCL	843.8
92	95% BCA Bootstrap UCL	947.8	95% Bootstrap t UCL	1163
93	95% H-UCL (Log ROS)	1121		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	3.807	KM Geo Mean	45.02
97	KM SD (logged)	2.183	95% Critical H Value (KM-Log)	4.018
98	KM Standard Error of Mean (logged)	0.478	95% H-UCL (KM -Log)	2062
99	KM SD (logged)	2.183	95% Critical H Value (KM-Log)	4.018
100	KM Standard Error of Mean (logged)	0.478		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					10827	Mean in Log Scale					5.894
105	SD in Original Scale					29921	SD in Log Scale					3.299
106	95% t UCL (Assumes normality)					19016	95% H-Stat UCL					1896380
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												
109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Approximate Gamma Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)					1373						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

1	UCL Statistics for Data Sets with Non-Detects			
2				
3	User Selected Options			
4	Date/Time of Computation	ProUCL 5.15/25/2018 9:37:16 AM		
5	From File	Soil Vapor Input.xls		
6	Full Precision	OFF		
7	Confidence Coefficient	95%		
8	Number of Bootstrap Operations	2000		
9				
10	**Toluene**			
11				
12	**General Statistics**			
13	Total Number of Observations	50	Number of Distinct Observations	22
14	Number of Detects	5	Number of Non-Detects	45
15	Number of Distinct Detects	5	Number of Distinct Non-Detects	17
16	Minimum Detect	19000	Minimum Non-Detect	7.54
17	Maximum Detect	13000000	Maximum Non-Detect	50000
18	Variance Detects	3.217E+13	Percent Non-Detects	90%
19	Mean Detects	3642160	SD Detects	5672062
20	Median Detects	70800	CV Detects	1.557
21	Skewness Detects	1.557	Kurtosis Detects	1.878
22	Mean of Logged Detects	12.56	SD of Logged Detects	3.122
23				
24	**Normal GOF Test on Detects Only**			
25	Shapiro Wilk Test Statistic	0.754	**Shapiro Wilk GOF Test**	
26	5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level	
27	Lilliefors Test Statistic	0.336	**Lilliefors GOF Test**	
28	5% Lilliefors Critical Value	0.343	Detected Data appear Normal at 5% Significance Level	
29	**Detected Data appear Approximate Normal at 5% Significance Level**			
30				
31	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**			
32	KM Mean	364340	KM Standard Error of Mean	306903
33	KM SD	1941024	95% KM (BCA) UCL	984885
34	95% KM (t) UCL	878878	95% KM (Percentile Bootstrap) UCL	884914
35	95% KM (z) UCL	869150	95% KM Bootstrap t UCL	47017510
36	90% KM Chebyshev UCL	1285049	95% KM Chebyshev UCL	1702099
37	97.5% KM Chebyshev UCL	2280948	99% KM Chebyshev UCL	3417986
38				
39	**Gamma GOF Tests on Detected Observations Only**			
40	A-D Test Statistic	0.559	**Anderson-Darling GOF Test**	
41	5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
42	K-S Test Statistic	0.337	**Kolmogorov-Smirnov GOF**	
43	5% K-S Critical Value	0.382	Detected data appear Gamma Distributed at 5% Significance Level	
44	**Detected data appear Gamma Distributed at 5% Significance Level**			
45				
46	**Gamma Statistics on Detected Data Only**			
47	k hat (MLE)	0.275	k star (bias corrected MLE)	0.243
48	Theta hat (MLE)	13268047	Theta star (bias corrected MLE)	14979943
49	nu hat (MLE)	2.745	nu star (bias corrected)	2.431
50	Mean (detects)	3642160		

	A–E	F	G–K	L
51				
52	**Gamma ROS Statistics using Imputed Non-Detects**			
53	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs			
54	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)			
55	For such situations, GROS method may yield incorrect values of UCLs and BTVs			
56	This is especially true when the sample size is small.			
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates			
58	Minimum	0.01	Mean	364216
59	Maximum	13000000	Median	0.01
60	SD	1960753	CV	5.383
61	k hat (MLE)	0.0552	k star (bias corrected MLE)	0.0653
62	Theta hat (MLE)	6592421	Theta star (bias corrected MLE)	5580473
63	nu hat (MLE)	5.525	nu star (bias corrected)	6.527
64	Adjusted Level of Significance (β)	0.0452		
65	Approximate Chi Square Value (6.53, α)	1.915	Adjusted Chi Square Value (6.53, β)	1.842
66	95% Gamma Approximate UCL (use when n>=50)	1241540	95% Gamma Adjusted UCL (use when n<50)	1290754
67				
68	**Estimates of Gamma Parameters using KM Estimates**			
69	Mean (KM)	364340	SD (KM)	1941024
70	Variance (KM)	3.768E+12	SE of Mean (KM)	306903
71	k hat (KM)	0.0352	k star (KM)	0.0465
72	nu hat (KM)	3.523	nu star (KM)	4.645
73	theta hat (KM)	10340827	theta star (KM)	7843279
74	80% gamma percentile (KM)	37654	90% gamma percentile (KM)	502581
75	95% gamma percentile (KM)	1882732	99% gamma percentile (KM)	8154850
76				
77	**Gamma Kaplan-Meier (KM) Statistics**			
78	Approximate Chi Square Value (4.65, α)	0.992	Adjusted Chi Square Value (4.65, β)	0.944
79	95% Gamma Approximate KM-UCL (use when n>=50)	1706168	95% Gamma Adjusted KM-UCL (use when n<50)	1792483
80				
81	**Lognormal GOF Test on Detected Observations Only**			
82	Shapiro Wilk Test Statistic	0.823	**Shapiro Wilk GOF Test**	
83	5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
84	Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**	
85	5% Lilliefors Critical Value	0.343	Detected Data appear Lognormal at 5% Significance Level	
86	**Detected Data appear Lognormal at 5% Significance Level**			
87				
88	**Lognormal ROS Statistics Using Imputed Non-Detects**			
89	Mean in Original Scale	364222	Mean in Log Scale	-2.07
90	SD in Original Scale	1960752	SD in Log Scale	6.615
91	95% t UCL (assumes normality of ROS data)	829116	95% Percentile Bootstrap UCL	882393
92	95% BCA Bootstrap UCL	1145256	95% Bootstrap t UCL	71413971
93	95% H-UCL (Log ROS)	9.675E+12		
94				
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**			
96	KM Mean (logged)	3.12	KM Geo Mean	22.65
97	KM SD (logged)	3.323	95% Critical H Value (KM-Log)	5.572
98	KM Standard Error of Mean (logged)	0.535	95% H-UCL (KM -Log)	79678
99	KM SD (logged)	3.323	95% Critical H Value (KM-Log)	5.572
100	KM Standard Error of Mean (logged)	0.535		

	A	B	C	D	E	F	G	H	I	J	K	L
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**						**DL/2 Log-Transformed**					
104	Mean in Original Scale					366956	Mean in Log Scale					6.01
105	SD in Original Scale					1960245	SD in Log Scale					3.573
106	95% t UCL (Assumes normality)					831730	95% H-Stat UCL					5027213
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
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					878878						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												

APPENDIX I

Johnson & Ettinger Model Results
Soil Vapor & Groundwater Residential
Western Parcel

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: 1,2,4-Trimethylbenzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (µg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m^3)	Cancer Risk	Noncancer Hazard
5.80E+05	3.2E-04	1.9E+02	NA	2.5E+01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95636	5.80E+05			1,2,4-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **1,2-Dichlorobenzene**

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.30E+03	3.0E-04	6.9E-01	NA	3.3E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95501	2.30E+03			1,2-Dichlorobenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: 1,3,5-Trimethylbenzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.70E+05	3.2E-04	1.2E+02	NA	3.2E+00

MESSAGE: Risk and/or hazard quotient is based on route-to-route extrapolation.

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108678	3.70E+05			1,3,5-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: **Residential**
Chemical: **1,3-Dichlorobenzene**

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.10E+03	3.0E-04	3.3E-01	NA	3.0E-03

MESSAGE: Risk and/or hazard quotient is based on route-to-route extrapolation.

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
541731	1.10E+03			1,3-Dichlorobenzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: 1,4-Dichlorobenzene

DATA ENTRY SHEET

Results Summary				
Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.00E+03	2.9E-04	2.9E-01	1.2E-06	3.5E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106467	1.00E+03			1,4-Dichlorobenzene

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 ($^{\circ}C$)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Acetone

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
8.90E+01	5.4E-04	4.8E-02	NA	1.5E-06

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67641	8.90E+01			Acetone

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: **Residential**
Chemical: **Benzene**

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.00E+06	4.4E-04	8.9E+02	9.2E-03	2.8E+02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.00E+06			Benzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Carbon disulfide

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
5.90E+03	5.1E-04	3.0E+00	NA	4.1E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
75150	5.90E+03			Carbon disulfide

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: Cumene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.90E+04	3.2E-04	9.2E+00	NA	2.2E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
98828	2.90E+04			Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Cyclohexane

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.60E+06	4.0E-04	1.5E+03	NA	2.3E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110827	3.60E+06			Cyclohexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Ethylbenzene**

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
3.00E+06	3.6E-04	1.1E+03	9.5E-04	1.0E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	3.00E+06			Ethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: m-Xylene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.10E+07	3.5E-04	3.9E+03	NA	3.7E+01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108383	1.10E+07			m-Xylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: Naphthalene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.30E+03	3.2E-04	4.2E-01	5.1E-06	1.3E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
91203	1.30E+03			Naphthalene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: **Residential**
Chemical: **Hexane**

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
1.50E+06	3.8E-04	5.6E+02	NA	7.7E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110543	1.50E+06			Hexane

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	ENTER 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^V (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 ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: n-Propylbenzene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.00E+05	3.2E-04	9.5E+01	NA	9.1E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
103651	3.00E+05			n-Propylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **o-Xylene**

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.20E+06	3.6E-04	1.1E+03	NA	1.1E+01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	3.20E+06			o-Xylene

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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: sec-Butylbenzene

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
6.40E+03	2.8E-04	1.8E+00	NA	4.3E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
135988	6.40E+03			sec-Butylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Tetrachloroethylene**

Results Summary

Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m³)	Cancer Risk	Noncancer Hazard
2.00E+03	2.7E-04	5.4E-01	1.1E-06	1.5E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
127184	2.00E+03			Tetrachloroethylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

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 $(hour)^{-1}$
70	26	26	350	24	0.5
				(NEW)	(NEW)

NEW=> Residential

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Toluene

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
1.30E+07	4.0E-04	5.1E+03	NA	1.6E+01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	1.30E+07			Toluene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: 1,2,4-Trimethylbenzene

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
9.86E+04	3.2E-04	3.2E+01	NA	4.3E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95636	9.86E+04			1,2,4-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **1,3,5-Trimethylbenzene**

Results Summary				
Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
5.32E+04	3.2E-04	1.7E+01	NA	4.6E-01

MESSAGE: Risk and/or hazard quotient is based on route-to-route extrapolation.

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108678	5.32E+04			1,3,5-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: Acetone

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.47E+01	5.4E-04	1.9E-02	NA	5.8E-07

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67641	3.47E+01			Acetone

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: Benzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
2.40E+05	4.4E-04	1.1E+02	1.1E-03	3.4E+01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.40E+05			Benzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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 (^{o}C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24 (NEW)	0.5 (NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Carbon disulfide

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
6.64E+02	5.1E-04	3.4E-01	NA	4.7E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
75150	6.64E+02			Carbon disulfide

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Cumene**

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
4.86E+03	3.2E-04	1.5E+00	NA	3.7E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
98828	4.86E+03			Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

Lookup Soil

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^V (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 ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Cyclohexane

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
7.75E+05	4.0E-04	3.1E+02	NA	5.0E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110827	7.75E+05			Cyclohexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Ethylbenzene

Results Summary

Soil Gas Conc. (µg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m^3)	Cancer Risk	Noncancer Hazard
5.86E+05	3.6E-04	2.1E+02	1.9E-04	2.0E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	5.86E+05			Ethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: m-Xylene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.18E+06	3.5E-04	7.7E+02	NA	7.4E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108383	2.18E+06			m-Xylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: Hexane

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
2.22E+05	3.8E-04	8.3E+01	NA	1.1E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110543	2.22E+05			Hexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: n-Propylbenzene

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
5.89E+04	3.2E-04	1.9E+01	NA	1.8E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
103651	5.89E+04			n-Propylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: o-Xylene

Results Summary				
Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
4.68E+05	3.6E-04	1.7E+02	NA	1.6E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	4.68E+05			o-Xylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: sec-Butylbenzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
1.37E+03	2.8E-04	3.9E-01	NA	9.3E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
135988	1.37E+03			sec-Butylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Tetrachloroethylene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.42E+02	2.7E-04	9.3E-02	2.0E-07	2.5E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
127184	3.42E+02			Tetrachloroethylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Toluene

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
8.79E+05	4.0E-04	3.5E+02	NA	1.1E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	8.79E+05			Toluene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **1,2,4-Trimethylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
1.61E+05	3.8E-05	6.1E+00	NA	8.4E-01	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95636	6.80E+02	1,2,4-Trimethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **1,2-Dichloroethane**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.75E+03	5.4E-05	9.4E-02	8.7E-07	1.3E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
107062	3.80E+01	1,2-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **1,3,5-Trimethylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (µg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (µg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (µg/L)	Noncancer HQ = 1 (µg/L)
7.41E+04	3.8E-05	2.8E+00	NA	7.7E-02	NA	NA

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 Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108678	2.20E+02	1,3,5-Trimethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Methylethylketone (2-butanone)**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
4.01E+01	6.1E-05	2.4E-03	NA	4.7E-07	NA	NA

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
78933	1.80E+01	Methylethylketone (2-butanone)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

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 $(hour)^{-1}$
1.0E-06	1	70	26	26	350	24	0.5
Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

NEW=> Residential

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Acenaphthene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
1.17E+02	3.3E-05	3.9E-03	NA	1.8E-05	NA	NA

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 Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
83329	1.70E+01	Acenaphthene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Acetone**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary

Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Risk-Based Groundwater Concentration: Cancer Risk = 10^{-6} ($\mu g/L$)	Risk-Based Groundwater Concentration: Noncancer HQ = 1 ($\mu g/L$)
2.20E+02	7.3E-05	1.6E-02	NA	4.9E-07	NA	NA

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
67641	1.60E+02	Acetone

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Benzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.37E+06	5.6E-05	7.6E+01	7.9E-04	2.4E+01	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
71432	6.30E+03	**Benzene**

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **cis-1,2-Dichloroethylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
2.40E+04	5.5E-05	1.3E+00	NA	1.8E-01	NA	NA

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 Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
156592	1.50E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Cumene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ (μg/L)	Noncancer HQ = 1 (μg/L)
3.12E+05	3.8E-05	1.2E+01	NA	2.8E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
98828	7.10E+02	Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S ($^{\circ}$C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Ethylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
3.66E+05	4.3E-05	1.6E+01	1.4E-05	1.5E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
100414	1.20E+03	Ethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Fluorene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary

Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Risk-Based Groundwater Concentration: Cancer Risk = 10^{-6} ($\mu g/L$)	Risk-Based Groundwater Concentration: Noncancer HQ = 1 ($\mu g/L$)
1.01E+02	3.0E-05	3.0E-03	NA	2.0E-05	NA	NA

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 Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
86737	2.80E+01	Fluorene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24 (NEW)	0.5 (NEW)

Used to calculate risk-based groundwater concentration.

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **m-Xylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108383	1.40E+03	m-Xylene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
3.89E+05	4.3E-05	1.7E+01	NA	1.6E-01	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Naphthalene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ (μg/L)	Noncancer HQ = 1 (μg/L)
2.69E+04	3.8E-05	1.0E+00	1.3E-05	3.3E-01	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
91203	1.60E+03	Naphthalene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)
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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **n-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
104518	3.70E+02	n-Butylbenzene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
2.26E+05	3.3E-05	7.5E+00	NA	4.1E-02	NA	NA

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 below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **n-Propylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
3.43E+05	3.8E-05	1.3E+01	NA	1.2E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
103651	8.50E+02	n-Propylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **o-Xylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
4.81E+03	4.3E-05	2.1E-01	NA	2.0E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
95476	2.40E+01	o-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24 (NEW)	0.5 (NEW)

Used to calculate risk-based groundwater concentration.

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **sec-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.65E+05	3.3E-05	5.5E+00	NA	1.3E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
135988	4.20E+02	sec-Butylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **tert-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
2.46E+04	3.3E-05	8.2E-01	NA	2.0E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
98066	4.80E+01	tert-Butylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Tetrachloroethylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
127184	8.00E+00	Tetrachloroethylene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
5.50E+03	3.2E-05	1.7E-01	3.7E-07	4.8E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Toluene**

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
3.36E+03	4.9E-05	1.6E-01	NA	5.2E-04	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
108883	1.30E+01	Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

APPENDIX J

Johnson & Ettinger Model Results
Soil Vapor & Groundwater Commercial
Western Parcel

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: 1,2,4-Trimethylbenzene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
5.80E+05	1.6E-04	9.3E+01	NA	3.0E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95636	5.80E+05			1,2,4-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: 1,2-Dichlorobenzene

Results Summary				
Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.30E+03	**1.5E-04**	**3.4E-01**	**NA**	**3.9E-04**

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95501	2.30E+03			1,2-Dichlorobenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: 1,3,5-Trimethylbenzene

Results Summary				
Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.70E+05	1.6E-04	5.9E+01	NA	3.8E-01

MESSAGE: Risk and/or hazard quotient is based on route-to-route extrapolation.

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108678	3.70E+05			1,3,5-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: 1,3-Dichlorobenzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.10E+03	1.5E-04	1.6E-01	NA	3.5E-04

MESSAGE: Risk and/or hazard quotient is based on route-to-route extrapolation.

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
541731	1.10E+03			1,3-Dichlorobenzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: 1,4-Dichlorobenzene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.00E+03	1.5E-04	1.5E-01	1.3E-07	4.2E-05

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106467	1.00E+03			1,4-Dichlorobenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Acetone

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
8.90E+01	2.7E-04	2.4E-02	NA	1.8E-07

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67641	8.90E+01			Acetone

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Benzene

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
2.00E+06	2.2E-04	4.4E+02	1.1E-03	3.4E+01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.00E+06			Benzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

Lookup Soil

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^V (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 ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Carbon disulfide

DATA ENTRY SHEET

Results Summary				
Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
5.90E+03	2.6E-04	1.5E+00	NA	4.9E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
75150	5.90E+03			Carbon disulfide

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Cumene

Results Summary				
Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
2.90E+04	1.6E-04	4.6E+00	NA	2.6E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
98828	2.90E+04			Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Cyclohexane

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.60E+06	2.0E-04	7.3E+02	NA	2.8E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110827	3.60E+06			Cyclohexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Ethylbenzene

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
3.00E+06	1.8E-04	5.3E+02	1.1E-04	1.2E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	3.00E+06			Ethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: **Commercial**
Chemical: **m-Xylene**

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m³)	Cancer Risk	Noncancer Hazard
1.10E+07	1.8E-04	2.0E+03	NA	4.5E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108383	1.10E+07			m-Xylene

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	ENTER 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, 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 ↓

Lookup Receptor Parameters

	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
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Naphthalene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.30E+03	1.6E-04	2.1E-01	5.8E-07	1.6E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
91203	1.30E+03			Naphthalene

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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Hexane**

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.50E+06	1.9E-04	2.8E+02	NA	9.2E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110543	1.50E+06			Hexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: n-Propylbenzene

Results Summary

Soil Gas Conc. (µg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m^3)	Cancer Risk	Noncancer Hazard
3.00E+05	1.6E-04	4.8E+01	NA	1.1E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
103651	3.00E+05			n-Propylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: o-Xylene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.20E+06	1.8E-04	5.7E+02	NA	1.3E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	3.20E+06			o-Xylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: sec-Butylbenzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
6.40E+03	1.4E-04	9.1E-01	NA	5.2E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
135988	6.40E+03			sec-Butylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Tetrachloroethylene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.00E+03	1.4E-04	2.7E-01	1.3E-07	1.8E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
127184	2.00E+03			Tetrachloroethylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Toluene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.30E+07	2.0E-04	2.6E+03	NA	2.0E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	1.30E+07			Toluene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: 1,2,4-Trimethylbenzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
9.86E+04	1.6E-04	1.6E+01	NA	5.1E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95636	9.86E+04			1,2,4-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **1,3,5-Trimethylbenzene**

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
5.32E+04	1.6E-04	8.5E+00	NA	5.5E-02

MESSAGE: Risk and/or hazard quotient is based on route-to-route extrapolation.

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108678	5.32E+04			1,3,5-Trimethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Acetone

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
3.47E+01	2.7E-04	9.4E-03	NA	6.9E-08

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67641	3.47E+01			Acetone

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Benzene

DATA ENTRY SHEET

Results Summary				
Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
2.40E+05	2.2E-04	5.3E+01	1.3E-04	4.1E+00

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71432	2.40E+05			Benzene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Carbon disulfide**

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
6.64E+02	2.6E-04	1.7E-01	NA	5.5E-05

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
75150	6.64E+02			Carbon disulfide

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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Cumene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
4.86E+03	1.6E-04	7.7E-01	NA	4.4E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
98828	4.86E+03			Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Cyclohexane

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
7.75E+05	**2.0E-04**	**1.6E+02**	**NA**	**6.0E-03**

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110827	7.75E+05			Cyclohexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Ethylbenzene

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
5.86E+05	1.8E-04	1.0E+02	2.1E-05	2.4E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	5.86E+05			Ethylbenzene

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 (^{o}C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: m-Xylene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.18E+06	1.8E-04	3.9E+02	NA	8.8E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108383	2.18E+06			m-Xylene

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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Hexane

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.22E+05	1.9E-04	4.2E+01	NA	1.4E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110543	2.22E+05			Hexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: n-Propylbenzene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
5.89E+04	1.6E-04	9.3E+00	NA	2.1E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
103651	5.89E+04			n-Propylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: o-Xylene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
4.68E+05	1.8E-04	8.4E+01	NA	1.9E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476	4.68E+05			o-Xylene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: sec-Butylbenzene

DATA ENTRY SHEET

Results Summary				
Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.37E+03	1.4E-04	1.9E-01	NA	1.1E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
135988	1.37E+03			sec-Butylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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 ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Tetrachloroethylene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
3.42E+02	1.4E-04	4.7E-02	2.2E-08	3.0E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)		ENTER Soil gas conc., C_g (ppmv)	Chemical
		OR		
127184	3.42E+02			Tetrachloroethylene

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)		ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S	OR	

MORE ↓

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^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: **Commercial**
Chemical: **Toluene**

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
8.79E+05	2.0E-04	1.7E+02	NA	1.3E-01

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	8.79E+05			Toluene

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	ENTER 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, 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 ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **1,2,4-Trimethylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.61E+05	1.9E-05	3.1E+00	NA	1.0E-01	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
95636	6.80E+02	1,2,4-Trimethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **1,2-Dichloroethane**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.75E+03	2.7E-05	4.7E-02	1.0E-07	1.5E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
107062	3.80E+01	1,2-Dichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	5

MORE ↓

Lookup Soil

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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **1,3,5-Trimethylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
7.41E+04	1.9E-05	1.4E+00	NA	9.1E-03	NA	NA

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 Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
108678	2.20E+02	1,3,5-Trimethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Methylethylketone (2-butanone)**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (µg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (µg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (µg/L)	Noncancer HQ = 1 (µg/L)
4.01E+01	3.0E-05	1.2E-03	NA	5.6E-08	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
78933	1.80E+01	Methylethylketone (2-butanone)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Acenaphthene**

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.17E+02	1.6E-05	1.9E-03	NA	2.1E-06	NA	NA

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 Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
83329	1.70E+01	Acenaphthene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Acetone**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
2.20E+02	3.6E-05	8.0E-03	NA	5.9E-08	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
67641	1.60E+02	Acetone

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Benzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.37E+06	2.8E-05	3.8E+01	9.0E-05	2.9E+00	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
71432	6.30E+03	**Benzene**

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

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 $(hour)^{-1}$
1.0E-06	1	70	25	25	250	8	1
						(NEW)	(NEW)

NEW=> Commercial

Used to calculate risk-based groundwater concentration.

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **cis-1,2-Dichloroethylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ (μg/L)	Noncancer HQ = 1 (μg/L)
2.40E+04	2.8E-05	6.6E-01	NA	2.2E-02	NA	NA

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 Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
156592	1.50E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Cumene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
98828	7.10E+02	**Cumene**

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
3.12E+05	1.9E-05	5.9E+00	NA	3.4E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Ethylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
3.66E+05	2.1E-05	7.9E+00	1.6E-06	1.8E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
100414	1.20E+03	Ethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Fluorene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
86737	2.80E+01	Fluorene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
1.01E+02	1.5E-05	1.5E-03	NA	2.4E-06	NA	NA

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 below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Scenario: **Commercial**
Chemical: **m-Xylene**

Reset to Defaults

DATA ENTRY SHEET

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
3.89E+05	2.1E-05	8.3E+00	NA	1.9E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
108383	1.40E+03	m-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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 (cm²)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Naphthalene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
91203	1.60E+03	Naphthalene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ (μg/L)	Noncancer HQ = 1 (μg/L)
2.69E+04	1.9E-05	5.2E-01	1.4E-06	3.9E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **n-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
104518	3.70E+02	n-Butylbenzene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
2.26E+05	1.7E-05	3.7E+00	NA	4.9E-03	NA	NA

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 below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **n-Propylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m³)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m³)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
3.43E+05	1.9E-05	6.5E+00	NA	1.5E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
103651	8.50E+02	n-Propylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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 (cm²)	ENTER Vadose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^V (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

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **o-Xylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ (μg/L)	Noncancer HQ = 1 (μg/L)
4.81E+03	2.2E-05	1.0E-01	NA	2.4E-04	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95476	2.40E+01	o-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **sec-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.65E+05	1.7E-05	2.7E+00	NA	1.6E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
135988	4.20E+02	sec-Butylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **tert-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
2.46E+04	1.7E-05	4.1E-01	NA	2.3E-04	NA	NA

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
98066	4.80E+01	tert-Butylbenzene

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Tetrachloroethylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
5.50E+03	1.6E-05	8.7E-02	4.2E-08	5.7E-04	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
127184	8.00E+00	Tetrachloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Toluene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
3.36E+03	2.4E-05	8.2E-02	NA	6.2E-05	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
108883	1.30E+01	Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

APPENDIX K

Johnson & Ettinger Model Results
Soil Vapor & Groundwater Residential
Eastern Parcel

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December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Acetone

Results Summary

Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
4.00E+01	9.2E-04	3.7E-02	NA	1.1E-06

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67641	4.00E+01			Acetone

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

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Version 2.0, 04/2003

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December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Chloroform

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.00E+01	7.4E-04	1.5E-02	1.2E-07	1.4E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67663	2.00E+01			Chloroform

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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Methyl chloride (chloromethane)**

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
4.30E+01	1.0E-03	4.3E-02	NA	4.6E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
74873	4.30E+01			Methyl chloride (chloromethane)

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

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Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Cyclohexane

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.80E+05	7.6E-04	2.1E+02	NA	3.4E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110827	2.80E+05			Cyclohexane

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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Ethylbenzene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
1.08E+04	6.8E-04	7.3E+00	6.5E-06	7.0E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	1.08E+04			Ethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

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Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Residential
Chemical: Hexane

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
8.30E+04	7.1E-04	5.9E+01	NA	8.1E-02

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110543	8.30E+04			Hexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Residential
Chemical: Toluene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
8.80E+01	7.4E-04	6.5E-02	NA	2.1E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	8.80E+01			Toluene

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 (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	70	26	26	350	24	0.5
					(NEW)	(NEW)

END

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Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Bis(2-chloroethyl)ether**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
9.69E+02	4.6E-05	4.5E-02	1.1E-05	NA	NA	NA

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
111444	1.50E+03	Bis(2-chloroethyl)ether

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Cumene**

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					**Risk-Based Groundwater Concentration**	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
5.84E+03	3.8E-05	2.2E-01	NA	5.3E-04	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
98828	1.33E+01	Cumene

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **Naphthalene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
1.09E+03	3.8E-05	4.2E-02	5.1E-07	1.3E-02	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
91203	6.47E+01	**Naphthalene**

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **n-Propylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
103651	1.32E+01	n-Propylbenzene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
5.33E+03	3.8E-05	2.0E-01	NA	1.9E-04	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^{o}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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **o-Xylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
6.01E+02	4.3E-05	2.6E-02	NA	2.5E-04	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
95476	3.00E+00	**o-Xylene**

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)
15	1259.84	S	24

ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
5

MORE ↓

Lookup Soil

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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Residential**
Chemical: **sec-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
135988	1.70E+00	sec-Butylbenzene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
6.70E+02	3.3E-05	2.2E-02	NA	5.3E-05	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Residential	1.0E-06	1	70	26	26	350	24	0.5
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

APPENDIX L

Johnson & Ettinger Model Results
Soil Vapor & Groundwater Commercial
Western Parcel

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Acetone

Results Summary

Soil Gas Conc. (µg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (µg/m³)	Cancer Risk	Noncancer Hazard
4.00E+01	4.6E-04	1.8E-02	NA	1.4E-07

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (µg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67641	4.00E+01			Acetone

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Chloroform**

Results Summary				
Soil Gas Conc. (μg/m^3)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m^3)	Cancer Risk	Noncancer Hazard
2.00E+01	3.7E-04	7.4E-03	1.4E-08	1.7E-05

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m^3)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67663	2.00E+01			Chloroform

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: **Commercial**
Chemical: **Methyl chloride (chloromethane)**

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
4.30E+01	5.0E-04	2.2E-02	NA	5.5E-05

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)		ENTER Soil gas conc., C_g (ppmv)	Chemical
74873	4.30E+01	OR		Methyl chloride (chloromethane)

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this 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)		ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S	OR	

MORE ↓

Lookup Soil

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

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December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Cyclohexane

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
2.80E+05	3.8E-04	1.1E+02	NA	4.0E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110827	2.80E+05			Cyclohexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

Scenario: Commercial
Chemical: Ethylbenzene

DATA ENTRY SHEET

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
1.08E+04	3.4E-04	3.7E+00	7.5E-07	8.4E-04

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414	1.08E+04			Ethylbenzene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

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^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA SG-SCREEN
Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Hexane

Results Summary

Soil Gas Conc. (μg/m³)	Attenuation Factor (unitless)	Indoor Air Conc. (μg/m³)	Cancer Risk	Noncancer Hazard
8.30E+04	3.6E-04	3.0E+01	NA	9.6E-03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g (μg/m³)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
110543	8.30E+04			Hexane

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm²)
15	152	24	S		

MORE ↓

Lookup Soil

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^V (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	1.72	0.358	0.122	5

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8 (NEW)	1 (NEW)

END

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Version 2.0, 04/2003

DTSC Modification
December 2014

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Soil Gas

DATA ENTRY SHEET

Scenario: Commercial
Chemical: Toluene

Results Summary

Soil Gas Conc. ($\mu g/m^3$)	Attenuation Factor (unitless)	Indoor Air Conc. ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard
8.80E+01	3.7E-04	3.3E-02	NA	2.5E-05

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883	8.80E+01			Toluene

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	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152	24	S		

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (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	1.72	0.358	0.122	5

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	70	25	25	250	8	1
					(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

DTSC Modification
December 2014

Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Bis(2-chloroethyl)ether**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
9.69E+02	2.3E-05	2.2E-02	1.3E-06	NA	NA	NA

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
111444	1.50E+03	Bis(2-chloroethyl)ether

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

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Version 3.0, 04/2003

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Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Cumene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					**Risk-Based Groundwater Concentration**	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
5.84E+03	1.9E-05	1.1E-01	NA	6.3E-05	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
98828	1.33E+01	**Cumene**

MESSAGE: See VLOOKUP table comments on chemical properties and/or toxicity criteria for this chemical.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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 (cm²)	ENTER Vadose zone SCS soil type (Lookup Soil)	ENTER Vadose zone soil dry bulk density, ρ_b^V (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

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

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Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **Naphthalene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
91203	6.47E+01	Naphthalene

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) (μg/m^3)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) (μg/m^3)	Cancer Risk	Noncancer Hazard	Cancer Risk = 10^{-6} (μg/L)	Noncancer HQ = 1 (μg/L)
1.09E+03	1.9E-05	2.1E-02	5.8E-08	1.6E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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)$^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

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Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

Reset to Defaults

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **n-Propylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ (μg/L)	Noncancer HQ = 1 (μg/L)
3.29E+05	1.9E-05	6.2E+00	NA	1.4E-03	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (μg/L)	Chemical
103651	8.13E+02	n-Propylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (^oC)
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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

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 $(hour)^{-1}$
1.0E-06	1	70	25	25	250	8	1
Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

NEW=> Commercial

END

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Version 3.0, 04/2003

DTSC Modification
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Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **o-Xylene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
6.01E+02	2.2E-05	1.3E-02	NA	3.0E-05	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
95476	3.00E+00	o-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END

USEPA GW-SCREEN
Version 3.0, 04/2003

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Reset to Defaults

Department of Toxic Substances Control
Vapor Intrusion Screening Model - Groundwater

DATA ENTRY SHEET

Scenario: **Commercial**
Chemical: **sec-Butylbenzene**

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Results Summary					Risk-Based Groundwater Concentration	
Soil Gas Conc. (C_{source}) ($\mu g/m^3$)	Attenuation Factor (alpha) (unitless)	Indoor Air Conc. ($C_{building}$) ($\mu g/m^3$)	Cancer Risk	Noncancer Hazard	Cancer Risk $= 10^{-6}$ ($\mu g/L$)	Noncancer HQ = 1 ($\mu g/L$)
6.70E+02	1.7E-05	1.1E-02	NA	6.3E-06	NA	NA

MESSAGE: Attenuation factor < 6E-05 is unreasonably low.

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W ($\mu g/L$)	Chemical
135988	1.70E+00	sec-Butylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
15	1259.84	S	24	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	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)
S			S	1.64	0.392	0.197

Lookup Soil

MORE ↓

Lookup Receptor Parameters

	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 $(hour)^{-1}$
NEW=> Commercial	1.0E-06	1	70	25	25	250	8	1
	Used to calculate risk-based groundwater concentration.						(NEW)	(NEW)

END