GOLDEN QUEEN MINING COMPANY, INC.

SOLEDAD MOUNTAIN PROJECT

MOJAVE, KERN COUNTY, CALIFORNIA

DRAFT
ENVIRONMENTAL IMPACT REPORT /
ENVIRONMENTAL IMPACT STATEMENT

VOLUME 6
(Appendices IX through XII)

MAY 1997

COUNTY OF KERN
PLANNING DEPARTMENT
BAKERSFIELD, CALIFORNIA

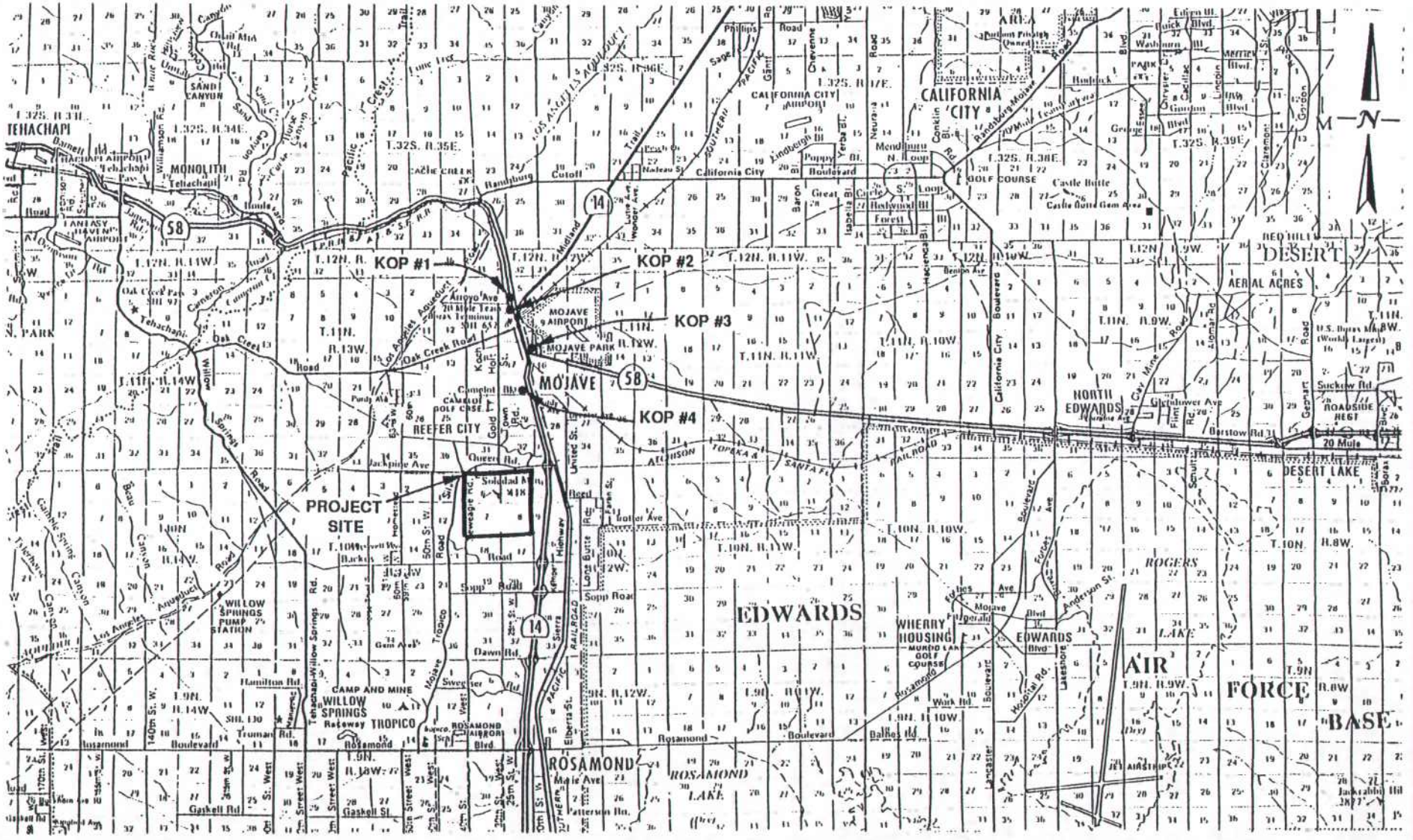
BUREAU OF LAND MANAGEMENT
RIDGECREST RESOURCE AREA
RIDGECREST, CALIFORNIA

VOLUME 6 OF 6

VISUAL IMPACT ANALYSIS

The visual resources of the project area were investigated using methods outlined in Section 8400 of the BLM Manual. Using these methods, the resources are analyzed by considering the scenic quality, viewer sensitivity and the distance between the viewer and the proposed modification of the landscape. The BLM visual resource management (VRM) system, which was developed by the BLM for identifying, evaluating and classifying visual resources of public lands, assigns a management class rating from I through IV by inventorying and evaluating both scenic quality and the sensitivity of a landscape. Discussions with Mr. Dave Wash at the BLM Office in Ridgecrest indicate that the BLM has not assigned a VRM rating to lands in the project area.

Contrast ratings were conducted from four (4) selected viewing locations, using methods outlined in Section 8400 of the BLM Manual. These Key Observation Points (KOPs), shown in Exhibit 1, were selected to represent the view from the intersections of major highways and local roads which carry the majority of traffic flow in the Mojave area and represent locations where the general public will view the project site. All photographs represent the view from the passenger seat of an automobile located at the KOP.



WZI INC.
BAKERSFIELD, CALIFORNIA

GOLDEN QUEEN MINING
SOLEDAD MOUNTAIN PROJECT

VISUAL IMPACT ANALYSIS
KEY OBSERVATION POINTS (KOP)

DATE		EXHIBIT
11/95	0733.0010	1

KOP #1 represents a view of the project area from Highway 58 and Arroyo Avenue north of Mojave. This intersection provides access to residential housing and is inside the 30 mile per hour speed zone approaching Mojave from the north. The foreground view is composed of power poles, highway signs, billboards and railroad tracks. The middleground is composed of power poles, residential housing and open space. The background is composed of Soledad Mountain and other distant mountains. Photographs 1 and 1A illustrate the existing conditions and a photographic simulation of the Proposed Action respectively. Photograph 1B is an enlargement of the photographic simulation with labels and outlines to identify the Proposed Actions.

H-8431-1 - VISUAL RESOURCE CONTRAST RATING

Visual Contrast Rating Worksheet

VISUAL CONTRAST RATING WORKSHEET

BASED ON
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT GUIDELINES

Date: JANUARY 2, 1995

Project:

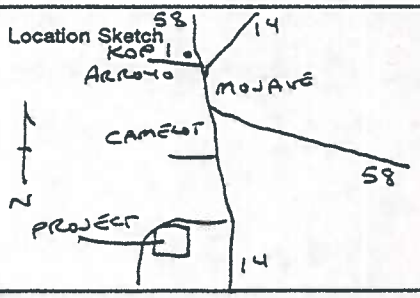
Project No.:

SECTION A. PROJECT INFORMATION

1. Project Name: SOLEDAD MOUNTAIN PROJECT
2. Key Observation Point: HWY 58 & ARROYO AVE.
3. VRM Class: UNCLASSIFIED

4. Location
Township 10N
Range 13W
Section 5,6,7,8
SAN BERNARDINO B & M

5. Location Sketch



SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	FORE: FLAT, ~~LINEAR, RECTANGULAR~~ BACK: COMPLEX, RUGGED	COARSE, ROUNDED	LINEAR, HORIZONTAL, RECTANGULAR
LINE	FORE: STRONG EDGES BACK: BOLD, ANGULAR	WEAK, SOFT	STRAIGHT, ANGULAR
COLOR	FORE: GREY, TAN BACK: TAN, BROWN	BROWN, RED, GREEN	BROWN, WHITE, GREY
TEXTURE	FORE: SMOOTH BACK: ROUGH	MEDIUM, SPARSE, RANDOM	SPARSE, PATCHY

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	SOLID, GEOMETRIC, SMOOTH	—	—
LINE	ANGULAR, CURVED	—	—
COLOR	BROWN, TAN	—	—
TEXTURE	SMOOTH, CONTRASTY	—	—

SECTION D. CONTRAST RATING ☒ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST	FEATURES: LAND/WATER BODY (1) Strong	Mod.	Weak	None	VEGETATION (2) Strong	Mod.	Weak	None	STRUCTURES (3) Strong	Mod.	Weak	None
FORM		—					—			-		
LINE			—				—					
COLOR			—				—					
TEXTURE			—				—					

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) N/A

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Name: DAVID A. WEISS Date: 4/2/95

EXHIBIT 1 - KOP #1 PRE-MINING PHOTOGRAPH

EXHIBIT 1A - KOP #1 POST-MINING PHOTOGRAPHIC SIMULATION

EXHIBIT 1B - KOP #1 POST-MINING PHOTOGRAPHIC ENLARGEMENT

KOP #2 represents a view of the project area from Highways 58 and 14 north of Mojave. This intersection is controlled by a traffic signal. The foreground view is composed of power poles, highway signs, billboards and railroad tracks. The middleground is composed of power poles, residential housing and open space. The background is composed of Soledad Mountain and other distant mountains. Photographs 2 and 2A illustrate the existing conditions and a photographic simulation of the Proposed Action respectively. Photograph 2B is an enlargement of the photographic simulation with labels and outlines to identify the Proposed Actions.

H-8431-1 - VISUAL RESOURCE CONTRAST RATING

Visual Contrast Rating Worksheet

VISUAL CONTRAST RATING WORKSHEET

BASED ON
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT GUIDELINES

Date: JANUARY 2, 1995

Project:

Project No.:

SECTION A. PROJECT INFORMATION

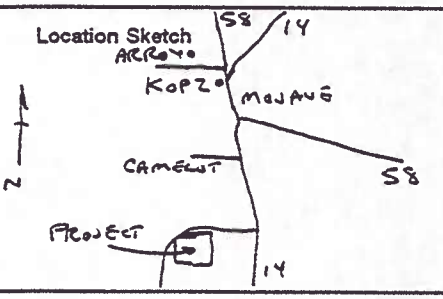
1. Project Name: SOLEDAD MOUNTAIN PROJECT

2. Key Observation Point: HWYS 58 & 14 NORTH OF MOJAVE

3. VRM Class: UNCLASSIFIED

4. Location
Township 10 N
Range 13W
Section 5,6,7,8
SAN BERNARDINO B & M

5. Location Sketch



SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	FORE: FLAT, SMOOTH BACK: COMPLEX, RUGGED	COARSE, ROUNDED	VERTICAL, LINEAR, RECTANGULAR
LINE	FORE: STRONG EDGES BACK: BOLD, ANGULAR	WEAK, IRREGULAR, SOFT	VERTICAL, STRAIGHT, GEOMETRIC
COLOR	FORE: TAN BACK: TAN, BROWN	GREEN, BROWN	GREY, BROWN, GREEN
TEXTURE	FORE: SMOOTH BACK: ROUGH	RANDOM, MEDIUM	SPARSE, ORDERED

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	SOLID, GEOMETRIC, SMOOTH	–	–
LINE	ANGULAR, CURVED	–	–
COLOR	TAN, BROWN	–	–
TEXTURE	SMOOTH, CONTRASTY	–	–

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

FEATURES

	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Mod.	Weak	None	Strong	Mod.	Weak	None	Strong	Mod.	Weak	None
FORM		✓					✓					
LINE			✓				✓					
COLOR			✓				✓					
TEXTURE			✓				✓					

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) N/A

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Name / Date

DAVID A. NEES 1/2/95

EXHIBIT 2 - KOP #2 PRE-MINING PHOTOGRAPH

EXHIBIT 2A - KOP #2 POST-MINING PHOTOGRAPHIC SIMULATION

EXHIBIT 2B - KOP #2 POST-MINING PHOTOGRAPHIC ENLARGEMENT

KOP #3 represents a view of the project area from Highways 58 and 14 in downtown Mojave. This intersection is controlled by a traffic signal. The foreground view is composed of power poles, highway signs, billboards and railroad tracks. The background is composed of Soledad Mountain. Photographs 3 and 3A illustrate the existing conditions and a photographic simulation of the Proposed Action respectively. Photograph 3B is an enlargement of the photographic simulation with labels and outlines to identify the Proposed Actions.

H-8431-1 - VISUAL RESOURCE CONTRAST RATING

Visual Contrast Rating Worksheet

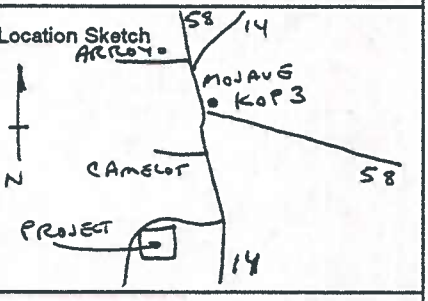
VISUAL CONTRAST RATING WORKSHEET BASED ON UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT GUIDELINES	Date JANUARY 2, 1995
	Project
	Project No.

SECTION A. PROJECT INFORMATION

1. Project Name: SOLEDAD MOUNTAIN PROJECT
2. Key Observation Point: HWYS 14 & 58 IN MOJAVE
3. VRM Class: UNCLASSIFIED

4. Location
Township 10N
Range 13W
Section 5, 6, 7, 8
SAN BERNARDINO B & M

5. Location Sketch



SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	FORE: FLAT, VERTICAL, LINEAR BACK: COMPLEX RUGGED	COARSE, ROUNDED	—
LINE	FORE: BOLD, STRAIGHT BACK: BOLD, ANGULAR	WEAK, SOFT	—
COLOR	FORE: GREY, TAN BACK: TAN, BROWN	BROWN	—
TEXTURE	FORE: SMOOTH, FINE BACK: ROUGH	SPARSE, RANDOM	—

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	SOLID, GEOMETRIC, SMOOTH	—	—
LINE	ANGULAR, CURVED	—	—
COLOR	BROWN, TAN	—	—
TEXTURE	SMOOTH, CONTRASTY	—	—

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

FEATURES

	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
	Strong	Mod.	Weak	None	Strong	Mod.	Weak	None	Strong	Mod.	Weak	None
FORM		✓					✓			✓		
LINE			✓				✓					
COLOR			✓				✓					
TEXTURE			✓				✓					

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) N/A

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Name — Date

DAVID A. WEISS 1/2/95

EXHIBIT 3 - KOP #3 PRE-MINING PHOTOGRAPH

EXHIBIT 3A - KOP #3 POST-MINING PHOTOGRAPHIC SIMULATION

EXHIBIT 3B - KOP #3 POST-MINING PHOTOGRAPHIC ENLARGEMENT

KOP #4 represents a view of the project area from Highway 14 and Camelot Boulevard south of Mojave. This intersection provides access to residential housing at the Camelot housing tract. The foreground view is composed of pavement, highway signs and markers for various buried utilities. The middleground is composed of open space and the existing Granite Construction Company aggregate operations at Standard Hill. The background is composed of Soledad Mountain. Photographs 4 and 4A illustrate the existing conditions and a photographic simulation of the Proposed Action respectively. Photograph 4B is an enlargement of the photographic simulation with labels and outlines to identify the Proposed Actions.

H-8431-1 - VISUAL RESOURCE CONTRAST RATING

Visual Contrast Rating Worksheet

VISUAL CONTRAST RATING WORKSHEET

BASED ON
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT GUIDELINES

Date: JANUARY 2, 1995

Project:

Project No.:

SECTION A. PROJECT INFORMATION

1. Project Name: SOLEDAD MOUNTAIN PROJECT

2. Key Observation Point: HWY 14 & CAMELOT BLVD

3. VRM Class: UNCLASSIFIED

4. Location

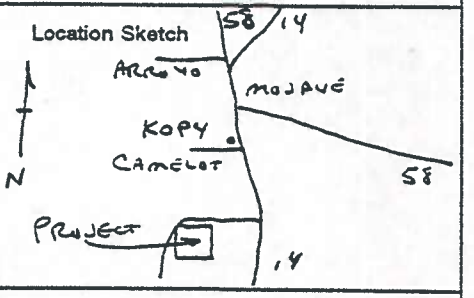
Township 10N

Range 13W

Section 5, 6, 7, 8

SAN BERNARDINO B & M

5. Location Sketch



SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	FORE: FLAT BACK: COMPLEX, RUGGED	COARSE, ROUNDED	—
LINE	FORE: BOLD, STRAIGHT BACK: BOLD, ANGULAR	WEAK SOFT	—
COLOR	FORE: GREY, TAN, YELLOW, RED BACK: BROWN TAN	TAN, BROWN	—
TEXTURE	FORE: MEDIUM, [redacted] BACK: ROUGH	MEDIUM, RANDOM	—

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	SOLID, GEOMETRIC, SMOOTH	—	—
LINE	ANGULAR, CURVED	—	—
COLOR	BROWN, TAN	—	—
TEXTURE	SMOOTH, CONTRASTY	—	—

SECTION D. CONTRAST RATING ☐ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

FEATURES

		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Mod.	Weak	None	Strong	Mod.	Weak	None	Strong	Mod.	Weak	None
	FORM		–					–			-		
	LINE			–				–					
	COLOR			–				–					
	TEXTURE			–				–					

2. Does project design meet visual resource management objectives? ☐ Yes ☐ No (Explain on reverse side) N/A

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Name: DAVID A WEISS Date: 1/2/95

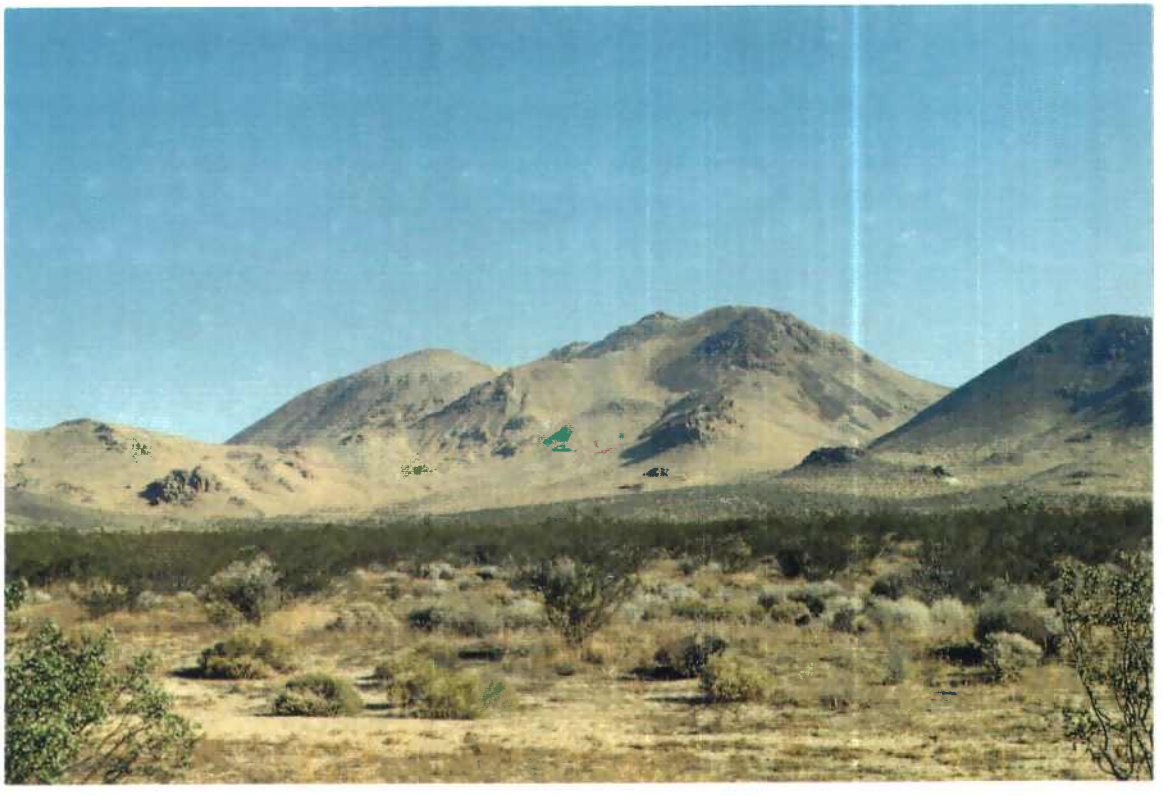
EXHIBIT 4 - KOP #4 PRE-MINING PHOTOGRAPH

EXHIBIT 4A - KOP #4 POST-MINING PHOTOGRAPHIC SIMULATION

EXHIBIT 4B - KOP #4 POST-MINING PHOTOGRAPHIC ENLARGEMENT

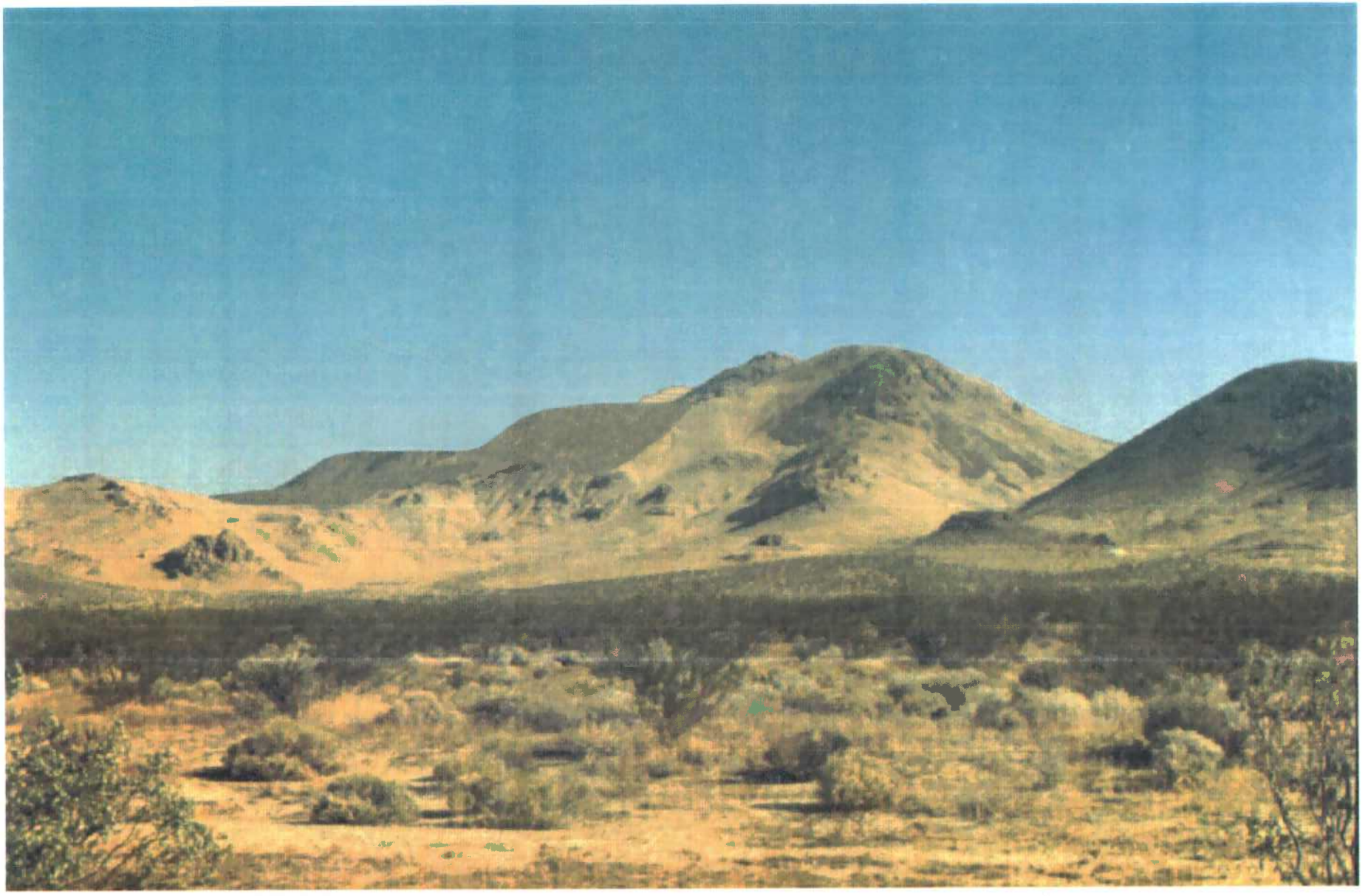
RESIDENTIAL VIEWS

A. VIEW, LOOKING SOUTH, FROM CAMELOT HOUSING DEVELOPMENT.



B. VIEW, LOOKING NORTHWEST, FROM HIGHWAY 14 AND BACKUS ROAD.

A. POST-MINING PHOTOGRAPHIC SIMULATION VIEW, LOOKING SOUTH FROM CAMELOT HOUSING DEVELOPMENT.



B. POST-MINING PHOTOGRAPHIC SIMULATION VIEW, LOOKING NORTHWEST FROM STATE ROUTE 14 AND BACKUS ROAD.

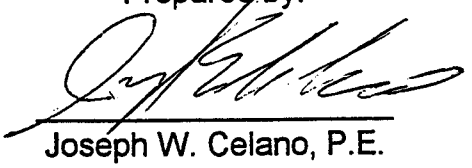
Hersh Acoustical Engineering, Inc.
780 Lakefield Road, Unit G
Westlake Village, CA 91361
(805) 373-8533 Fax (805) 373-0733

PRELIMINARY NOISE IMPACT ANALYSIS REPORT

GOLDEN QUEEN MINING COMPANY

SOLEDAD MOUNTAIN PROJECT

Prepared by:



Joseph W. Celano, P.E.

January 27, 1997

Submitted to:

WZI Inc.
4700 Stockdale Highway, Suite 120
P.O. Box 9217
Bakersfield, CA 93389

INTRODUCTION

Golden Queen Mining Company proposes to develop an open pit precious metal mine and heap leach pad operation at Soledad Mountain in Kern County, approximately 5 miles southerly of the town of Mojave. This report presents the results of a preliminary analysis of potential noise impacts on surrounding residential land uses. At the present time, no mining or blasting is being conducted. Therefore, this analysis has been based on file data for blast noise obtained at a similar open pit mining operation, file, published and manufacturer's data for heavy equipment noise levels, and ambient noise monitoring that was conducted by others during May 1990 thru April 1991.

DEFINITIONS

The criteria and analyses outlined below use several descriptors to characterize noise. Most noise exposure criteria and Codes are written in terms of A-weighted sound levels. A-weighting is a frequency response network that approximates the relative sensitivity of human hearing to sounds of differing frequency (ref. ANSI S1.4). Often, sound levels in Codes are quoted using units of dB(A) or dBA, however this is technically incorrect. International standards specify that no additional characters such as A or (A) are to be appended to the symbol dB. The correct nomenclature is A-weighted sound level in dB. Noise levels quoted in this report are A-weighted unless otherwise noted, and dB will be utilized without the appended "A".

- Decibel (dB) - A unit division on a logarithmic scale whose base is the tenth root of ten, used to represent ratios of quantities proportional to power. [In simple terms, if the power is multiplied by a factor of ten, then ten is added to the representation of the power on the decibel scale. If 0 dB represents 1 unit of power, 60 dB represents one million units, etc.]

- Sound Pressure Level (SPL - dB) - The ratio, in decibels, of the mean squared sound pressure to the square of the reference pressure, 20 micropascals.

- The equivalent sound level (L_{eqT}) is the level of a constant sound which would contain the same sound energy during the same time period (T) as the time-varying sound being evaluated.

- Sound Exposure Level (SEL - dB) - The logarithmic product of the average noise level (usually A-weighted) and the time duration. (It is not an actual measured noise level, but rather it is used in the computation of long term averages such as CNEL and DNL.)

- DNL and CNEL are descriptors for the 24 hour A-weighted equivalent noise level with time of day penalties applied to sounds occurring outside of "daytime" hours. Both apply a 10 dB penalty to sound levels during nighttime (10:00 p.m. to 7:00 a.m.) hours. CNEL also applies a 5 dB penalty during evening (7:00 p.m. to 10:00 p.m.) hours. Under most "normal" circumstances, the difference between the two is typically less than 1 dB.

- Ambient Noise - The noise which results from the combination of all sources, near and far. The ambient noise level is expressed as L_{eqT}, DNL or CNEL as judged appropriate to the situation.

- Percentile Exceeded Sound Level (L_{PE} - dB) - The sound level (usually A-weighted) which is exceeded PE percent of a specified time period.

- Background Noise - The steady noise level which characterizes a given environment in the absence of transient sources. The background noise is usually expressed as L_{90}, the noise level which is exceeded 90% of the specified time period.

- Intrusive Noise - Noise from an identifiable source which causes a discernable change in the existing acoustic environment. Noises can be intrusive by virtue of excessive overall level, or as the result of unusual spectral or temporal characteristics.

CRITERIA

The Noise Element of the Kern County General Plan has adopted Day Night Noise Level (DNL) 65 dB and 45 dB (A-weighted) as the maximum allowable noise exposure at outdoor and indoor living areas, respectively, of residential developments. The Noise Element does not contain specific criteria for noise due to mining operations or for noise due to blasting.

National Research Council (NRC) documents, *Guidelines for Preparing Environmental Statements on Noise* (1977) and *Assessment of Community Response to High-Energy Impulsive Sounds* (1981), recommend use of C-weighted DNL when evaluating impulsive noise sources such as blasting. Specifically, NRC recommends computing the C-weighted

DNL for environments subjected to impulses having a C-weighted level of 75 dB or higher. The C-weighted DNL due to the blast noise is then added logarithmically to the A-weighted noise exposure due to other noise sources and the composite is utilized to evaluate the overall noise environment.

The recommendation for use of C-weighting for blast noise analysis was confirmed by additional research conducted by Schomer at the U.S. Army, Construction Engineering Laboratory (CERL) that was published in 1985 and 1986.

The Walsh-Healy hearing conservation regulations state that exposure to any single impulse noise should not exceed 140 dB, peak sound pressure level.

PROJECT DESCRIPTION

The project site is located approximately 5 miles southerly of the city of Mojave in the southeasterly portion of Kern County. It consists of an approximately 3.5 square mile parcel located on and around Soledad Mountain. The proposed project covers approximately 2 square miles, primarily on the northerly slope of Soledad Mountain. The project will consist of an open pit precious metal mine, leach pads, overburden material piles, ore processing facilities, shop, office and other support facilities.

Mining operations will typically occur 24 hours a day, 7 days a week, except for holidays. Blasting would normally occur once a day, during daytime hours.

Existing residential uses are located northerly of the project, on the northerly side of Silver Queen Road, southwesterly of the project along Mojave Tropico Road, and northeasterly of the project in Goldtown, which is an area zoned for residential use. It was reported that the residence in Goldtown was unoccupied and that area was not habitable due to the absence of a potable water source and septic system.

NOISE SETTING

Ambient noise monitoring was conducted in the vicinity of the project by Air Sciences Inc. during the period May 31, 1990 thru April 5, 1991. The monitoring site was reportedly located approximately 120 ft northwesterly of Silver Queen Road in the vicinity of existing residential land uses. The results are summarized in Table 1, below, and in Table A-1 in the Appendix. No noise monitoring was conducted for this analysis.

	Day Night Noise Level (DNL) - dB (A-weighted)			
	June 1990	Sept 1990	Dec 1990	Mar 1991
Month Average	61.9	55.4	54.9	59.7
Highest Day	71	63	63	69
Lowest Day	50	47	48	52

Table 1
Summary of Air Sciences Inc.
Noise Monitoring Results

Upon examination of the data contained in Table 1, it can be seen that daily ambient noise levels at the monitoring site were in the range DNL 47-71 dB. Monthly average levels were in the range DNL 55-62 dB. For the most part, these noise levels were in compliance with the County's DNL 65 dB outdoor noise criterion for residential uses. However, the 65 dB criterion was exceeded on several days during June 1990 and March 1991. Since these data were obtained by means of unattended monitoring equipment, the causes of noise levels in excess of the criterion are not known.

NOISE IMPACTS

Noise due to mining operations such as this project falls into two categories. The first is general mining activity including front end loaders, off-road haul/dump trucks, bulldozers, rock drills, rock crushing and screening equipment, conveyors, etc., any or all of which could normally operate up to 24 hours a day, 7 days a week. The second is blasting, which would normally occur once a day during the daytime.

General Operational Noise:

General operational noise was modeled based on the "first year" equipment list shown in Table 2, below. The computer model assigned reference noise levels based on data furnished by the equipment manufacturer's representative, USEPA document *NTID300.1*, and file data from field measurements on other projects. These reference levels were adjusted to compute the Day Night Noise Level (DNL) based on first year operational hours estimates that were provided by the applicant and are shown in Table 2.

Equipment was distributed throughout the proposed project site based on likely operating locations. For example, off-road haul trucks, water trucks, wheel loaders, track dozers,

motor graders, light plants and support vehicles were distributed throughout the proposed mine pit, process facilities and perimeter overburden areas. Drills were confined to the pit area.

Equipment		Operation Schedule		Reference Noise	
Type	Quantity	Average Hours per Day	Time of Day and/or Night	Level - dB (A-wtd)	Distance feet
Blast Drills	3	12.3	Day & Night	96.4	21
Loaders	4	12.5	Day & Night	86	50
Haul Trucks	9	15	Day & Night	90	50
Dozers	3	15	Day & Night	89	50
Motor Graders	2	9.5	Day & Night	77	50
Water Trucks	2	20.4	Day & Night	89	50
Light Plants	6	9	Night only	68	23
ANFO Truck	1	12	Day & Night	83	50
Fuel Truck	1	12	Day & Night	83	50
Maint Truck	3	12	Day & Night	83	50
Pass Van	1	12	Day & Night	68	50

Table 2
First Year Mining Equipment List

The computer model assumes unobstructed line-of-sight sound transmission from all noise sources with no allowance for shielding of sound by intervening terrain features. Thus, it would tend to somewhat over predict offsite noise since it is not likely that all equipment would be visible at all times from all possible observer locations. Further, as development proceeds and the pit deepens, much of the equipment will operate within the pit where it would be shielded from off-site observers by the walls of the pit. Thus, future offsite noise levels would likely be lower.

The results of the computations are shown on the attached noise contour plot. Nearby existing residential uses are indicated on the plot by the numerals 1 through 9. All of these residences are located outside of the computed DNL 65 dB contour. Estimated noise exposure at residences 1 through 4 would be in the DNL 59-63 dB range and noise at

residences 6 through 9 would be in the DNL 53-58 dB range. The computed 65 dB contour just clears residence 5, however, it was reported that this residence cannot be occupied due to lack of an occupancy permit.

Upon examination of the contour plot, it can be seen that close to the mine, the shapes of the contours are irregular and reflect the somewhat arbitrary placement of the individual pieces of equipment. However, far from the mine, where the distances to the contours are large compared to the separations between individual pieces of equipment, the contours are approximately concentric circles around the center of activity.

Blast Noise:

Blast noise was measured on three occasions during 1994 at another mining operation which is located in easterly Kern County and was reported to be similar to the proposed project. The blasts consisted of from 143 to 230 individual ANFO charges distributed over areas of approximately 1.2 to 2 acres that were detonated in a defined sequence. During Blast 1, the detonation sequence was generally towards the measurement locations. Blasts 2 and 3 were sequenced generally away from the measurement locations. It was reported by mine staff that Blast 1 was unusually loud, possible due to shallower than normal blast hole depth, and that blasts this loud occur rarely, possibly once in five to ten blasts. Blasts 2 and 3 were reported to be "typical". Table 3, below summarizes the results of these measurements.

	Blast Noise Levels Normalized to 1000 ft Reference Distance From Center of Blast Area			
	Sound Exposure Level (SEL) - dB			Maximum Blast SPL - dB
	A-wtd	C-wtd	Flat	
Blast 1	100.3	120.4	125.3	140.8
Blast 2	74.4	99.6	107.4	116.0
Blast 3	58.9	96.3	109.6	111.2

Table 3
Summary of Blast Noise Measurement Results

If it is assumed that noise levels comparable to Blast 1 occur once in five blasts and that the other four blasts are comparable to Blasts 2 and 3, the average C-weighted sound

exposure level would be approximately SEL 114 dB at the 1000 ft reference distance. The proposed open pit mine will encompass approximately 250 acres in an irregularly shaped area some 4000 ft in "diameter". Thus, blast noise levels at any off-site location would vary substantially depending on the location of the blast within the pit. Table 4 below, shows blast noise exposure at various distances from the nominal center of the blast computed assuming the "maximum" SEL value of 120 dB based on the loudest of the three measured blasts, an "average" SEL value of 114 dB as described above, and a minimum SEL value of 96 dB based on the quietest of the three blasts.

Distance from Nominal Center of Blast - feet	Estimated C-wtd DNL - dB for Various Blast Sound Exposure Levels (SEL at 1000 ft)		
	SEL_{max} 120 dB	SEL_{avg} 114 dB	SEL_{min} 96 dB
1000	70.6	64.6	46.6
2000	64.6	58.6	40.6
3000	61.1	55.1	37.1
4000	58.6	52.6	34.6
5000	56.6	50.6	32.6
6000	55.0	49.0	31.0

Table 4
Range of Blast Noise Exposure for
Various Blast Noise Levels at Various Distances

Upon examination of the results shown in Table 4 it can be seen that the daily C-wtd DNL due to a single blast would be below 65 dB at 2000 ft from the center of a "worst case" blast and below 65 dB at 1000 ft from the center of an "average" blast. The nearest occupiable residential use would be at least 2500 ft from the center of a blast. Therefore, the blast noise exposure at this location would be approximately DNL 62.5 dB for a worst case blast and below DNL 57 for an average blast.

Composite Noise Exposure:

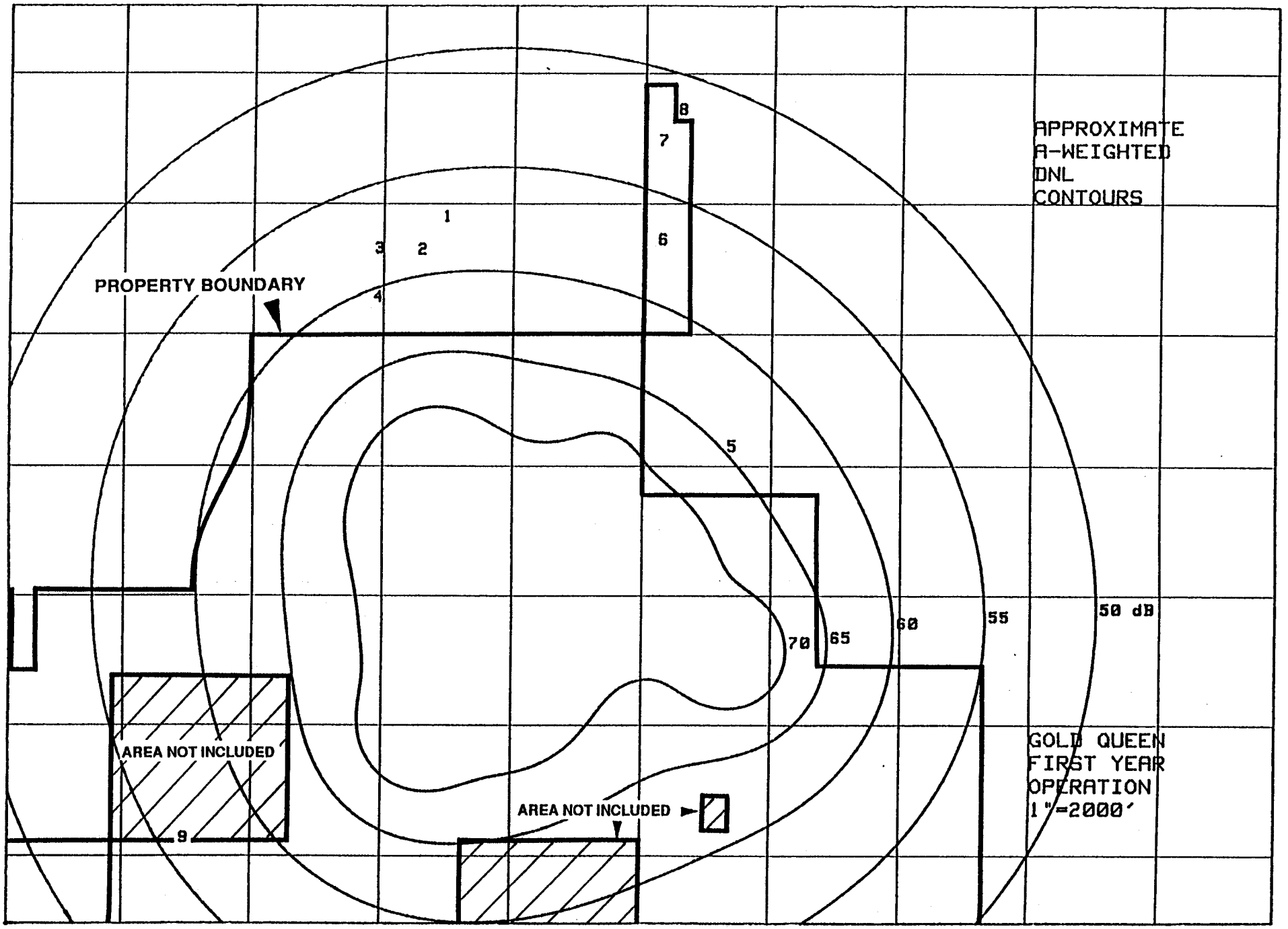
On the basis of the above, A-weighted non-blast noise exposure would be DNL 62-63 dB or lower at occupiable residences and C-weighted blast noise would be DNL 57 or lower for an average blast. Therefore, the composite noise exposure, computed per NRC recommendations would be below DNL 64 dB on a day that a average blast occurs.

A worst case blast could produce a C-weighted noise exposure of approximately DNL 62.5 dB at the nearest occupiable residence. This would result in a composite noise exposure of approximately DNL 65.5 dB on a day that a worst case blast occurs.

CONCLUSIONS

On the basis of these analyses, the project should conform with the County's DNL 65 dB maximum outdoor noise exposure requirement at occupiable residences when noise exposure is computed as recommended by NRC utilizing C-weighted blast noise. The overall noise exposure computed utilizing A-weighted levels only, since the County has no specific requirements for blast noise evaluation, would be essentially as shown on the A-weighted DNL contour plot since A-weighted blast noise exposure would be some 20 dB lower than C-weighted blast noise, and thus would be inconsequential on an overall daily basis.

At such time as the area surrounding the project should become developed, composite noise exposures could exceed the DNL 65 dB criterion at some residences, depending on the degree of shielding provided by intervening terrain features, both natural and man made, i.e. the walls of the pit, and on locations and hours of operation of equipment on the mine site. If this condition were to occur, noise mitigation measures would be necessary. The simplest mitigation scheme would be to place a restriction on nighttime equipment operational hours in portions of the mine closest to the noise impacted residences. Details could be determined on a case by case basis and should be based on noise monitoring of actual operations.


APPROXIMATE
A-WEIGHTED
DNL
CONTOURS
PROPERTY BOUNDARY
1
2
3
4
5
6
7
8
9
70
65
60
55
50 dB
AREA NOT INCLUDED
AREA NOT INCLUDED
GOLD QUEEN
FIRST YEAR
OPERATION
1"=2000'

Soledad Mountain Project
Summary of Air Sciences Inc.
Noise Monitoring Results

Day	Date	DNL	Day	Date	DNL	Day	Date	DNL	Day	Date	DNL
152	1-Jun-90	67	244	1-Sep-90	48	335	1-Dec-90	55	60	1-Mar-91	55
153	2-Jun-90	57	245	2-Sep-90	47	336	2-Dec-90	49	61	2-Mar-91	54
154	3-Jun-90	61	246	3-Sep-90	49	337	3-Dec-90	55	62	3-Mar-91	52
155	4-Jun-90	67	247	4-Sep-90	55	338	4-Dec-90	54	63	4-Mar-91	54
156	5-Jun-90	65	248	5-Sep-90	55	339	5-Dec-90	54	64	5-Mar-91	55
157	6-Jun-90	71	249	6-Sep-90	57	340	6-Dec-90	54	65	6-Mar-91	62
158	7-Jun-90	67	250	7-Sep-90	58	341	7-Dec-90	55	66	7-Mar-91	64
159	8-Jun-90	53	251	8-Sep-90	53	342	8-Dec-90	50	67	8-Mar-91	58
160	9-Jun-90	55	252	9-Sep-90	47	343	9-Dec-90	49	68	9-Mar-91	53
161	10-Jun-90	52	253	10-Sep-90	55	344	10-Dec-90	53	69	10-Mar-91	57
162	11-Jun-90	56	254	11-Sep-90	55	345	11-Dec-90	53	70	11-Mar-91	62
163	12-Jun-90	64	255	12-Sep-90	61	346	12-Dec-90	53	71	12-Mar-91	59
164	13-Jun-90	59	256	13-Sep-90	60	347	13-Dec-90	59	72	13-Mar-91	57
165	14-Jun-90	55	257	14-Sep-90	52	348	14-Dec-90	63	73	14-Mar-91	68
166	15-Jun-90	61	258	15-Sep-90	51	349	15-Dec-90	52	74	15-Mar-91	69
167	16-Jun-90	56	259	16-Sep-90	49	350	16-Dec-90	56	75	16-Mar-91	54
168	17-Jun-90	51	260	17-Sep-90	50	351	17-Dec-90	54	76	17-Mar-91	52
169	18-Jun-90	57	261	18-Sep-90	48	352	18-Dec-90	57	77	18-Mar-91	55
170	19-Jun-90	55	262	19-Sep-90	49	353	19-Dec-90	59	78	19-Mar-91	60
171	20-Jun-90	57	263	20-Sep-90	50	354	20-Dec-90	55	79	20-Mar-91	56
172	21-Jun-90	55	264	21-Sep-90	52	355	21-Dec-90	55	80	21-Mar-91	60
173	22-Jun-90	55	265	22-Sep-90	50	356	22-Dec-90	49	81	22-Mar-91	56
174	23-Jun-90	51	266	23-Sep-90	50	357	23-Dec-90	50	82	23-Mar-91	52
175	24-Jun-90	50	267	24-Sep-90	56	358	24-Dec-90	50	83	24-Mar-91	57
176	25-Jun-90	60	268	25-Sep-90	56	359	25-Dec-90	48	84	25-Mar-91	57
177	26-Jun-90	64	269	26-Sep-90	57	360	26-Dec-90	53	85	26-Mar-91	56
178	27-Jun-90	65	270	27-Sep-90	56	361	27-Dec-90	52	86	27-Mar-91	55
179	28-Jun-90	63	271	28-Sep-90	57	362	28-Dec-90	55	87	28-Mar-91	55
180	29-Jun-90	54	272	29-Sep-90	52	363	29-Dec-90	60	88	29-Mar-91	54
181	30-Jun-90	51	273	30-Sep-90	49	364	30-Dec-90	49	89	30-Mar-91	53
182	1-Jul-90	54	274	1-Oct-90	57	365	31-Dec-90	51	90	31-Mar-91	52
183	2-Jul-90	60	275	2-Oct-90	63	1	1-Jan-91	49	91	1-Apr-91	59
184	3-Jul-90	58				2	2-Jan-91	52	92	2-Apr-91	59
185	4-Jul-90	56				3	3-Jan-91	51	93	3-Apr-91	56
						4	4-Jan-91	51	94	4-Apr-91	56
Month Average		**61.9**			**55.4**			**54.9**			**59.7**
Highest Day		**71**			**63**			**63**			**69**
Lowest Day		**50**			**47**			**48**			**52**

Table A-1

AMBIENT BASELINE NOISE MONITORING PLAN
SOLEDAD MOUNTAIN PROJECT
MOJAVE, CALIFORNIA

Prepared for
Noranda Mining Corporation
Lakewood, CO

Prepared by
Air Sciences Inc.
Lakewood, CO

Project 58-07
June 1990

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1.0 INTRODUCTION

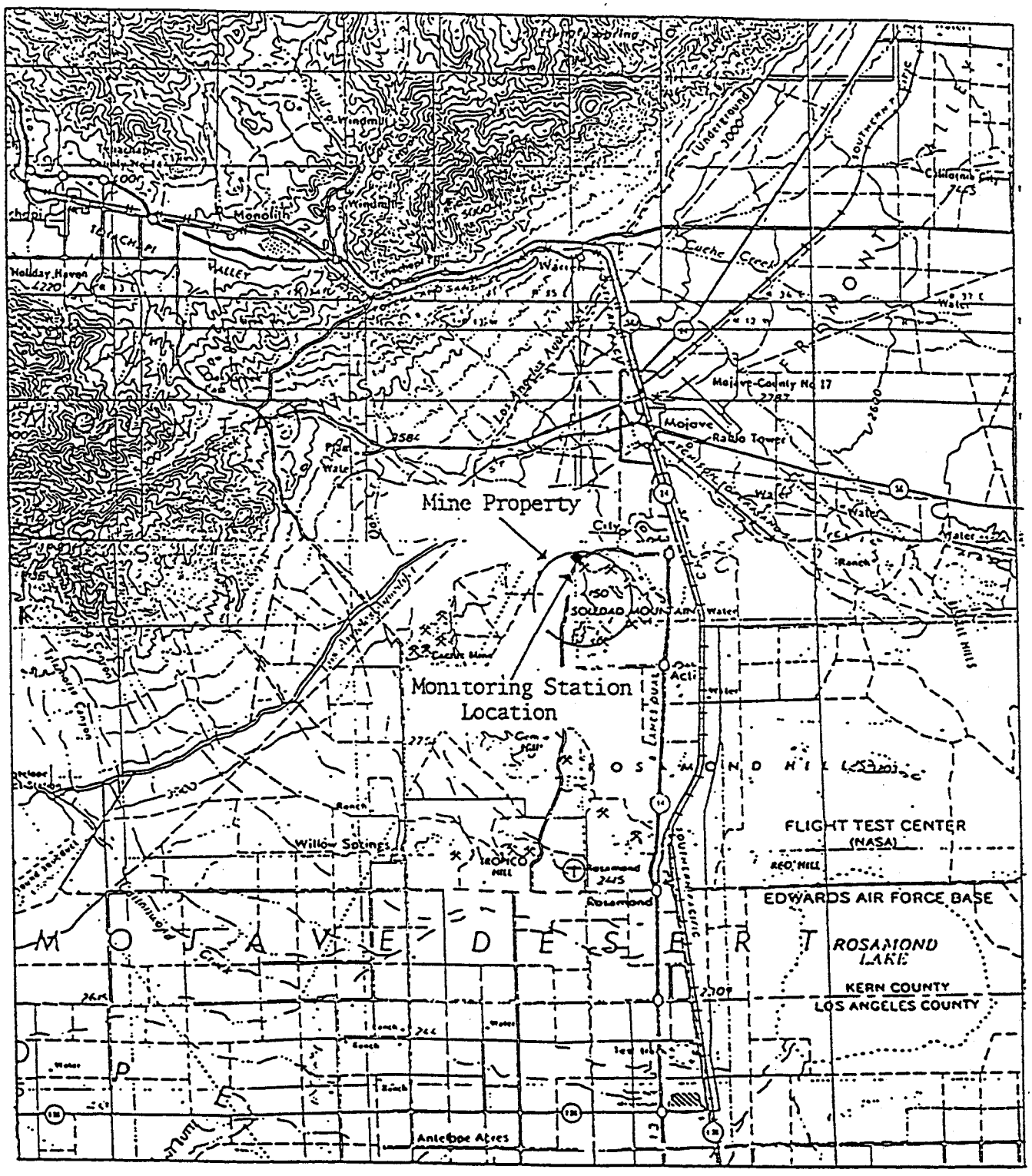
The noise monitoring study is being performed to determine baseline ambient noise levels adjacent to the Soledad Mountain Project, a proposed open-pit mining project. The Soledad Mountain Project is located in southeastern Kern County, California about 5 miles south southwest of the town of Mojave at Soledad Mountain in the Mojave Desert. This noise study will be part of an Environmental Impact Statement to be prepared to address county concerns from this project. Noise impacts will also be estimated for moving machinery and process equipment to be located at the mine, and these levels will be added to the baseline conditions determined by Air Sciences' study to estimate the ambient noise impact from this mining project when it is in operation. The noise level estimates are not be addressed in this document. The baseline noise data will be collected at one station located near Mojave-Tropico Road in an area between the mine and a nearby residential neighborhood. The noise monitoring station will be operated for one month during each season of the year in order to collect representative baseline noise level data for an entire year. Noise monitoring instruments will be calibrated at the time of initial installation and after every six months of data collection.

Noise levels will be measured with a sound level monitor which will be set for one second sampling of the A-weighted scale. Data will be recorded by digital data loggers and entered into dB categories of 1 dB width ranging from 30 to 80 dB. The maximum instantaneous sound level value and time of occurrence will be stored on the digital data storage modules by the data logger every hour. The dB distribution will also be written to the storage modules on an hourly basis. The sound data is processed and reported as sound level averages, frequency distributions, and instantaneous peaks on a daytime/nighttime/evening basis.

2.0 SAMPLING LOCATION

The baseline noise monitoring station will be located about 120 feet northwest of Mojave-Tropico Road on the northwestern side of the project. This area is near residences and should measure noise levels representative of those experienced by the nearby residents. Figure 1 shows the location of the noise monitoring station. The monitoring station is located on relatively flat ground with sagebrush and widely scattered Joshua trees.

FIGURE 1
GENERAL PROJECT LOCATION



CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS

TRANSVERSE MERCATOR PROJECTION

3.0 SAMPLING METHODS

Equipment for the sound study is composed of a sound level meter, a digital data logger, two data storage modules, and battery packs as power supply systems. The sound monitoring station will be installed, meters calibrated, and the data processed by Air Sciences. Soledad Mountain Project personnel will be responsible for changing battery packs and shipping data storage modules to Air Sciences for data processing.

The sound level meter will be a Quest Electronics Model 215 sound level meter. The meter will be calibrated with standards traceable to the U.S. National Bureau of Standards (USNBS) at station installation and every six months during data collection. The Model 215 sound level meter has a fixed omnidirectional microphone and will be shielded from the weather with a Quest Electronics Model WS-3 foam windscreen.

The digital data logger is a Campbell Scientific Model 21X micrologger, a digital data acquisition and processing microprocessor-based device. The data storage modules will be Campbell Scientific Model SM192 digital storage modules. The modules will be changed every week by the site operator and mailed by overnight mail to Air Sciences for data validation and processing.

The monitoring station system will be installed inside a fenced enclosure. The microphone will be mounted about 6 feet above ground level on a boom pointing toward the ground and positioned at least 2 feet from the mounting pole. The data logger will be inside a weather-proof enclosure that is equipped with a radiation shield to prevent heat buildup inside the enclosure. The logger is mounted at ground level opposite from the boom.

Calibrations of the sound level meter will be performed using a Quest Electronics Model CA-12 calibrator, a hand-held 1000 Hertz calibrator, traceable to USNBS sound pressure levels. An example of a calibration form is included in this report as Figure 2.

The data logger will be programmed to sample sound on a 1-second interval. These sound values will be stored in the logger's internal memory over a 1-hour time period and output to the storage module at the end of the 1-hour interval as a histogram of the sound data and the absolute maximum value and time of maximum value that occurred during the hour. The logger will distribute the noise data into categories of 1 dB width. The Model 215 meter will sample over a range of 30 to 80 dB (52 categories). Attachment A, located at the end of this report, is a description of the logger program used to collect the raw hourly data.

FIGURE 2

SOUND LEVEL SENSOR CALIBRATION FORM

Sensor Model No. :	_____	Client :	_____
Sensor Serial No. :	_____	Job No. :	_____
Sensor Height :	_____	Site :	_____
Logger Serial No :	_____	Date :	_____
Calibrator Serial # :	_____	Time :	_____
Calibrator Model # :	_____		

I. System Configuration:

Sound Meter Range : _____ to _____ db's

Weighing : _____

II. System Calibration Check:

Sensor Input (db)	Logger reading (db)
_____	_____
_____	_____
_____	_____

4.0 SITE OPERATIONS PROCEDURES

The site operator of the baseline noise monitoring station will be responsible for visiting the site to check the overall operating condition of the equipment, changing batteries and storage modules, and to make observations of any events such as weather conditions (thunder) or aircraft flyovers that might contribute to peak sound level values. A noise monitoring station field log form will be completed during each site check by the site operator. This form is included as Figure 3. The site operator will make note of the date of the visit, time of arrival and departure, document observations of noise events, and storage module and battery changes. The site operator will interrogate the logger and record the current sound level energy value being recorded and the battery voltages of the three battery packs that supply power for the monitoring system. These site check duties should be performed twice weekly, on Monday and again on Friday. The site operator will also be responsible for changing the storage module every week during data collection and mailing the module by overnight mail to Air Sciences for final processing. The battery packs normally should have a fully charged voltage of 9 volts. When the battery voltage of any power supply package should drop to below 7 volts, the site operator will be responsible for changing the battery pack and documenting the new battery voltage on the field log. Prior to each month of data collection all noise monitor system batteries should be replaced with new batteries. Attachment B, at the end of this report, is a schedule showing the months of sound monitoring with days for site checks and storage module changes indicated symbolically.

FIGURE 3

NOISE MONITORING STATION FIELD LOG

Date	Arrival Time	Equipment Condition	Current dB Reading	Battery Readings			Departure Time	Comments
				1	2	3		

5.0 DATA PROCESSING METHODS

Each day of data will be summarized into separate distributions by time of day. Daytime is defined as the hours of 7 a.m. to 7 p.m., evening is 7 p.m. to 10 p.m., and nighttime is the hours of 10 p.m. to 7 a.m. All these times will be in local time for consistency with lifestyle schedules. The frequency distributions by time of day are calculated as the arithmetic averages of the raw hourly distributions from the micrologger's built-in histogram program. These distributions will be summarized in monthly tables by time period showing the average histogram for each day with an average energy value, peak value, and time (accurate to 1 minute) of peak value for each day of the month. These tables will also include summary information by time of day for the entire month on a separate line. These monthly values will be averaged and peak values reported for the entire year of data collection. The frequency distributions to be produced and reported by Air Sciences will be composed of 19 dB categories, normally 3 dB in width except for the first and last categories. Table 1 details the categories and their ranges.

TABLE 1

DATA CATEGORIES FOR REPORTED SOUND LEVEL FREQUENCY DISTRIBUTIONS

CATEGORY	RANGE
Category 1	< 29 dB
Category 2	≥ 29, < 32 dB
Category 3	≥ 32, < 35 dB
Category 4	≥ 35, < 38 dB
Category 5	≥ 38, < 41 dB
Category 6	≥ 41, < 44 dB
Category 7	≥ 44, < 47 dB
Category 8	≥ 47, < 50 dB
Category 9	≥ 50, < 53 dB
Category 10	≥ 53, < 56 dB
Category 11	≥ 56, < 59 dB
Category 12	≥ 59, < 62 dB
Category 13	≥ 62, < 65 dB
Category 14	≥ 65, < 68 dB
Category 15	≥ 68, < 71 dB
Category 16	≥ 71, < 74 dB
Category 17	≥ 74, < 77 dB
Category 18	≥ 77, < 80 dB
Category 19	≥ 80 dB

For averaging purposes, any value less than 29 dB will be assigned a value of 29 dB and all values in each dB category above 29 dB will be assigned the value of the upper 1 dB limit of the category. The dB averages will be calculated as the arithmetic average of the acoustic energy equivalent of the dB values. Arithmetic averages are calculated according to the following equations:

$$\bar{I} = \frac{1}{N} \sum_{k=30}^{80} K_n \left(10^{\frac{dBn}{10}} \right)$$

$$\overline{dB} = 10 \log \bar{I}$$

where:

$\overline{dB}$ = average dB level

n = number of samples in period to be averaged

Kn = number of samples in that dB category

dBn = dB category

N = total number of samples

6.0 REPORTING

The baseline noise data will be reported as follows in one yearly report:

* Three tables (one for each time period) for each month of data collection containing:

  Frequency distribution for each day.

  Average energy level for the day.

  Peak value recorded during 1-second sampling for day.

  Time of peak value (to nearest minute) for day.

  Summary line for the month showing all of above information for the month.

* Three tables (one for each time period) for the entire year of data collection showing:

  Summary lines for each month as (above).

  Summary line for the year.

* Copies of all calibrations performed during the year.

* Copies of field log kept by site operator.

Attachment A

21X Program
for Soledad Mountain Sound Monitoring 05/09/90

ID	DATA	DESCRIPTION
LOG1	*	
00	1.0	1 second PROGRAM INTERVAL*
01P	1	VOLTAGE MEASUREMENT (SE)
01	1	repetitions
02	15	range 0-2,500 mv fast
03	1	input channel
04	1	storage location
05	.05	slope
06	30.0	intercept
02P	10	BATTERY VOLTAGE
01	2	storage location
03P	78	Set output resolution
01	1	High resolution
04P	92	IF TIME SET OUTPUT FLAG
01	0	T into INT
02	60	INT 60 minutes
03	10	set flag 0
05P	77	REAL TIME OUTPUT
01	110	output day, hour-minute
06P	71	AVERAGE
01	2	repetitions
02	1	starting input location
07P	73	MAXIMIZE
01	1	repetitions
02	10	output hour and minute
03	1	input storage location

08P	75	HISTOGRAM
01	1	repetitions
02	52	bins
03	0	open-beyond data limits included
04	1	bin select location (input storage)
05	0	frequency distribution
06	29	lower limit
07	81	upper limit

= Site Check
M = Change Storage Module

MAY 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	June Sampling Begins 31		

= Sl... Tech
SM = Change Storage Module

JUNE 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4 *	5	6	7	8 SM *	9
10	11 *	12	13	14	15 SM *	16
17	18 *	19	20	21	22 SM *	23
24	25 *	26	27	28	29 SM *	30

SM = Change Storage Module

JULY 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5 JUNE SAMPLING ENDS SM *	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

SM = Change Storage Module

AUGUST 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	September 31 Sampling Begins * B	

SEPTEMBER 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 *	4	5	6	7 SM *	8
9	10 *	11	12	13	14 SM *	15
16	17 *	18	19	20	21 SM *	22
23	24 *	25	26	27	28 SM *	29
30						

SM = Change Storage Module

OCTOBER 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	September 3 Sampling ends SM *	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SM = Change Storage Module

NOVEMBER 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	December 30 Sampling begins * B	

SM = Change Storage Module

DECEMBER 1990

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 *	4	5	6	7 SM *	8
9	10 *	11	12	13	14 SM *	15
16	17 *	18	19	20	21 SM *	22
23	24 *	25	26	27	28 SM *	29
30	31					

SM = Change Storage Module

JANUARY 1991

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	December 3 Sampling ends SM *	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

CSM = Change Storage Module

FEBRUARY 1991

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28 March Sampling begins * B		

SM = Change Storage Module

MARCH 1991

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4 *	5	6	7	8 SM *	9
10	11 *	12	13	14	15 SM *	16
17	18 *	19	20	21	22 SM *	23
24	25 *	26	27	28	29 SM *	30
31						

= Site Check
SM = Change Storage Module

APRIL·1991

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	March Sampling ends * SM 4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

NOISE LEVEL DATA COLLECTION AND PROCESSING METHODS

SOLEDAD MOUNTAIN PROJECT

DATA COLLECTION METHODS

The following is a brief summary of the noise level data collection methods employed on this project. Please refer to the attached sampling protocol for more detailed information. A Quest Model 215 Type II sound level meter was used to measure the ambient noise level (sound pressure level, re 20 micropascals, dBA). The output of the Model 215 was connected to a Campbell Scientific 21X data logger. The data logger was programmed to sample the output of the Model 215 once every second and store the data in the form of a frequency histogram. The histogram ranged from 30 to 80 dBA with 52 one dB wide "bins". The first bin contains all sound pressure levels (SPLs) below 30 dBA, and the last bin contains all SPLs above 80 dBA.

The data logger was programmed to calculate and store data on an hourly basis. The hourly data consists of the date (Julian day), time (hour), average SPL (arithmetic), average battery voltage, maximum SPL occurring in the hour, time of maximum SPL, and 52 histogram data points. Each histogram data point, or "bin", contains the number of SPL samples equal to the range for that bin divided by 3,600 (the number of seconds in an hour).

DATA COLLECTED

Data was collected continuously during the following periods:

May 31, 1990 - Jul. 05, 1990
Aug. 31, 1990 - Oct. 3, 1990
Nov. 30, 1990 - Jan. 5, 1991
Feb. 28, 1991 - Apr. 5, 1991

DATA PROCESSING METHODS

The hourly histogram data was processed to calculate the hourly Leq and hourly L90. The Ldn was calculated from the Leq date. These metrics are commonly used to describe ambient noise levels. The Leq is a single-number descriptor equal to the total sound energy of a time-varying sound level over a given time period. The day-night level (Ldn) is often used in assessing noise impact. It is essentially a 24-hour Leq with 10 dB added to the hourly Leqs between 10:00 p.m. and 7:00 a.m. to account for increased noise sensitivity during the nighttime. The level exceeded 90% of the time (L90) is the most common descriptor of ambient noise because it excludes noise levels of short duration. These levels tend to be caused by individual events which are not commonly occurring.

The original data was stored in twenty comma-delimited ASCII computer files. Each file contains about one week of data. These files were combined into one file, with a blank space between each of the four measurement periods. The Leq, Ldn, and L90 were calculated as follows:

$$\text{Leq} = 10 \times Log((1/3600) \times \sum_{n=1}^{52}(bin_n) \times (3600) \times 10\text{^}(Lp_n \div 10))$$

where n = bin number
bin_n = contents of bin "n"
Lp_n = sound pressure level value of bin "n"

$$\text{Ldn} = 10 \times Log((1/15) \times \sum_{d=1}^{15} 10\text{^}(Leq_d \div 10) + (1/9) \times \sum_{n=1}^{9} 10\text{^}((Leq_n + 10) \div 10))$$

where d = daytime hours of 7:00 a.m. to 10:00 p.m.
n = nighttime hours of 10:00 p.m. to 7:00 a.m.
Leq_d = daytime hourly Leqs
Leq_n = nighttime hourly Leqs

$$\text{L90} = Lp \Leftrightarrow 0.1 \sum_{n=1}^{52} bin_n$$

where n = bin number
Lp = sound pressure level
binn = contents of bin "n"

DATA FORMAT

The noise level data is contained in three files. The names, format, and contents of each of these files is as follows:

1. Name: ALLNOISE.RAW
   Format: comma-delimited ASCII
   Contents: All raw data as originally collected. See file for contents of each field.

2. Name: ALLNOISE.NEW
   Format: comma-delimited ASCII
   Contents: All calculated data including Leq, Ldn, and L90 levels. See file for field contents.

3. Name: ALLNOISE.XLS
   Format: Microsoft Excel Workbook (version 5.0)
   Contents: All calculated data including Leq, Ldn, and L90 levels. See file for field contents.

Day (Julian)	Time (hhmm)	Leq (dBA)	Ldn (dBA)	L90 (dBA)	Lmax (dBA)	
151	1500	60		47.5	75	START
151	1600	57		42.5	77	
151	1700	55		42.5	73	
151	1800	60		49.5	75	
151	1900	60		47.5	73	
151	2000	50		37.5	67	
151	2100	55		43.5	71	
151	2200	45		35.5	65	
151	2300	43		34.5	62	
152	0	59		44.5	76	
152	100	64		52.5	77	
152	200	51		38.5	67	
152	300	57		43.5	77	
152	400	60		40.5	79	
152	500	51		36.5	70	
152	600	51		38.5	68	
152	700	48		37.5	69	
152	800	51		39.5	65	
152	900	51		38.5	71	
152	1000	47		32.5	71	
152	1100	55		31.5	79	
152	1200	45	67	30.5	69	
152	1300	46		31.5	72	
152	1400	49		30.5	75	
152	1500	46		31.5	71	
152	1600	47		35.5	63	
152	1700	48		37.5	62	
152	1800	49		37.5	62	
152	1900	50		39.5	64	
152	2000	48		36.5	65	
152	2100	51		41.5	66	
152	2200	53		42.5	67	
152	2300	46		36.5	62	
153	0	49		39.5	65	
153	100	49		36.5	66	
153	200	48		35.5	67	
153	300	48		35.5	64	
153	400	49		32.5	67	

153	500	41		31.5	58
153	600	40		32.5	63
153	700	46		31.5	71
153	800	41		31.5	68
153	900	44		32.5	66
153	1000	45		31.5	67
153	1100	46		32.5	65
153	1200	43	57	30.5	64
153	1300	41		30.5	64
153	1400	39		30.5	59
153	1500	44		30.5	64
153	1600	45		30.5	65
153	1700	41		30.5	59
153	1800	42		32.5	61
153	1900	46		32.5	72
153	2000	41		31.5	61
153	2100	40		32.5	60
153	2200	41		32.5	58
153	2300	42		33.5	59
154	0	43		33.5	58
154	100	37		30.5	55
154	200	34		30.5	60
154	300	32		30.5	53
154	400	33		30.5	46
154	500	37		30.5	61
154	600	36		30.5	57
154	700	36		31.5	58
154	800	42		30.5	69
154	900	43		30.5	61
154	1000	47		30.5	73
154	1100	43		30.5	67
154	1200	44	61	30.5	65
154	1300	44		30.5	68
154	1400	41		30.5	58
154	1500	50		35.5	63
154	1600	56		42.5	69
154	1700	56		42.5	70
154	1800	58		45.5	72
154	1900	59		45.5	74
154	2000	54		42.5	69
154	2100	54		41.5	69
154	2200	54		43.5	69
154	2300	54		41.5	71

155	0	59		47.5	73
155	100	60		49.5	74
155	200	61		50.5	76
155	300	59		47.5	72
155	400	49		34.5	67
155	500	44		33.5	70
155	600	45		33.5	69
155	700	43		33.5	68
155	800	46		35.5	65
155	900	43		31.5	61
155	1000	44		32.5	64
155	1100	44		33.5	59
155	1200	51	67	35.5	69
155	1300	57		45.5	69
155	1400	59		47.5	73
155	1500	59		47.5	72
155	1600	58		46.5	71
155	1700	59		47.5	73
155	1800	59		46.5	74
155	1900	57		44.5	71
155	2000	58		44.5	77
155	2100	58		45.5	73
155	2200	59		44.5	79
155	2300	57		44.5	73
156	0	59		45.5	75
156	100	59		44.5	73
156	200	56		43.5	71
156	300	56		42.5	71
156	400	50		39.5	65
156	500	52		40.5	69
156	600	46		34.5	70
156	700	45		34.5	70
156	800	48		34.5	68
156	900	55		43.5	68
156	1000	57		45.5	70
156	1100	57		46.5	72
156	1200	57	65	44.5	73
156	1300	57		44.5	70
156	1400	61		43.5	81
156	1500	64		47.5	81
156	1600	61		45.5	81
156	1700	58		44.5	73
156	1800	56		43.5	71

156	1900	55		42.5	71
156	2000	52		39.5	68
156	2100	46		36.5	64
156	2200	51		36.5	69
156	2300	54		38.5	71
157	0	51		38.5	71
157	100	48		38.5	64
157	200	50		39.5	69
157	300	49		38.5	68
157	400	56		41.5	74
157	500	59		45.5	76
157	600	60		46.5	75
157	700	62		46.5	77
157	800	65		51.5	78
157	900	66		50.5	80
157	1000	62		45.5	79
157	1100	57		43.5	74
157	1200	64	71	47.5	77
157	1300	62		47.5	77
157	1400	62		48.5	75
157	1500	62		48.5	78
157	1600	63		47.5	79
157	1700	63		46.5	78
157	1800	64		49.5	79
157	1900	66		52.5	80
157	2000	64		50.5	77
157	2100	64		45.5	79
157	2200	65		45.5	81
157	2300	64		44.5	81
158	0	63		43.5	80
158	100	61		42.5	77
158	200	58		42.5	74
158	300	56		40.5	74
158	400	57		44.5	73
158	500	57		46.5	72
158	600	53		40.5	68
158	700	48		34.5	72
158	800	47		31.5	67
158	900	45		31.5	69
158	1000	47		31.5	71
158	1100	44		30.5	68
158	1200	48	67	30.5	74
158	1300	47		30.5	71

158	1400	59		31.5	81
158	1500	63		30.5	81
158	1600	43		31.5	60
158	1700	47		36.5	60
158	1800	48		37.5	64
158	1900	49		39.5	65
158	2000	57		42.5	75
158	2100	55		43.5	69
158	2200	55		44.5	72
158	2300	52		41.5	66
159	0	50		38.5	67
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159	600	44		31.5	66
159	700	43		31.5	64
159	800	46		30.5	70
159	900	45		30.5	69
159	1000	43		30.5	65
159	1100	42		30.5	63
159	1200	45	53	30.5	67
159	1300	44		30.5	66
159	1400	51		30.5	76
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160	400	41		32.5	60
160	500	45		30.5	67
160	600	49		30.5	69
160	700	45		30.5	69
160	800	43		34.5	62

160	900	43		31.5	66
160	1000	43		32.5	65
160	1100	50		39.5	64
160	1200	51	55	41.5	66
160	1300	51		40.5	68
160	1400	57		40.5	79
160	1500	46		34.5	62
160	1600	48		35.5	68
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160	1800	44		32.5	63
160	1900	46		34.5	62
160	2000	42		32.5	66
160	2100	42		33.5	59
160	2200	42		33.5	57
160	2300	44		33.5	66
161	0	41		32.5	61
161	100	36		32.5	52
161	200	37		31.5	61
161	300	32		31.5	44
161	400	34		31.5	57
161	500	36		31.5	61
161	600	34		31.5	56
161	700	38		31.5	54
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161	2200	39		32.5	61
161	2300	40		31.5	59
162	0	45		34.5	67
162	100	40		33.5	53
162	200	40		31.5	57
162	300	33		31.5	53

162	400	37		31.5	62
162	500	41		31.5	67
162	600	44		33.5	65
162	700	46		34.5	60
162	800	50		38.5	67
162	900	51		39.5	66
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162	1100	52		40.5	67
162	1200	51	56	38.5	68
162	1300	51		40.5	64
162	1400	55		44.5	69
162	1500	54		42.5	69
162	1600	57		43.5	69
162	1700	57		43.5	73
162	1800	57		44.5	72
162	1900	55		41.5	70
162	2000	52		34.5	77
162	2100	50		39.5	67
162	2200	51		37.5	67
162	2300	39		34.5	57
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163	100	50		33.5	70
163	200	51		36.5	69
163	300	41		33.5	61
163	400	45		32.5	66
163	500	59		46.5	74
163	600	56		38.5	77
163	700	51		37.5	75
163	800	54		42.5	68
163	900	54		42.5	69
163	1000	58		45.5	71
163	1100	54		42.5	66
163	1200	57	64	45.5	71
163	1300	57		44.5	71
163	1400	58		45.5	73
163	1500	61		48.5	74
163	1600	61		48.5	76
163	1700	57		44.5	73
163	1800	54		40.5	69
163	1900	54		42.5	68
163	2000	50		39.5	68
163	2100	50		37.5	68
163	2200	48		35.5	65

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164	0	48		35.5	68
164	100	40		31.5	59
164	200	46		32.5	63
164	300	34		32.5	50
164	400	38		31.5	59
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164	600	47		31.5	67
164	700	50		34.5	72
164	800	48		36.5	68
164	900	53		41.5	69
164	1000	57		46.5	70
164	1100	59		48.5	76
164	1200	60	59	49.5	74
164	1300	60		50.5	73
164	1400	59		48.5	72
164	1500	58		46.5	72
164	1600	59		48.5	73
164	1700	60		49.5	72
164	1800	56		44.5	71
164	1900	50		40.5	64
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164	2100	44		35.5	59
164	2200	43		33.5	67
164	2300	38		32.5	58
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165	500	45		31.5	67
165	600	43		32.5	65
165	700	49		35.5	75
165	800	51		40.5	69
165	900	51		39.5	67
165	1000	54		41.5	74
165	1100	54		39.5	76
165	1200	53	55	41.5	76
165	1300	53		41.5	69
165	1400	55		42.5	75
165	1500	51		39.5	67
165	1600	50		40.5	63
165	1700	53		42.5	67

165	1800	51		39.5	65
165	1900	52		34.5	77
165	2000	47		32.5	68
165	2100	43		32.5	63
165	2200	41		32.5	62
165	2300	39		32.5	61
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166	400	43		35.5	63
166	500	45		35.5	65
166	600	46		36.5	68
166	700	48		36.5	73
166	800	52		39.5	70
166	900	54		41.5	68
166	1000	57		44.5	74
166	1100	57		44.5	72
166	1200	58	61	46.5	71
166	1300	60		47.5	79
166	1400	60		48.5	72
166	1500	60		49.5	74
166	1600	58		46.5	72
166	1700	58		45.5	73
166	1800	59		45.5	76
166	1900	56		41.5	72
166	2000	53		39.5	72
166	2100	54		39.5	72
166	2200	54		39.5	74
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167	700	44		33.5	65
167	800	39		30.5	60
167	900	41		30.5	60
167	1000	40		31.5	59
167	1100	46		31.5	71
167	1200	44	56	30.5	67

167	1300	41		30.5	60
167	1400	40		30.5	62
167	1500	41		30.5	63
167	1600	40		30.5	62
167	1700	38		30.5	61
167	1800	43		30.5	63
167	1900	44		34.5	58
167	2000	44		33.5	61
167	2100	44		33.5	60
167	2200	45		34.5	62
167	2300	42		33.5	58
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168	100	37		31.5	57
168	200	36		31.5	58
168	300	31		30.5	44
168	400	37		30.5	64
168	500	35		30.5	57
168	600	40		30.5	65
168	700	38		30.5	62
168	800	40		30.5	67
168	900	40		30.5	58
168	1000	50		30.5	78
168	1100	46		31.5	70
168	1200	46	51	33.5	66
168	1300	48		35.5	66
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168	1500	49		36.5	64
168	1600	51		39.5	68
168	1700	51		40.5	66
168	1800	50		39.5	66
168	1900	47		36.5	66
168	2000	42		32.5	64
168	2100	40		32.5	56
168	2200	40		32.5	59
168	2300	40		31.5	62
169	0	43		32.5	62
169	100	40		32.5	56
169	200	38		31.5	56
169	300	36		31.5	61
169	400	41		31.5	67
169	500	42		31.5	66
169	600	46		31.5	70
169	700	46		31.5	68

169	800	45		31.5	69
169	900	53		31.5	77
169	1000	44		30.5	66
169	1100	39		30.5	64
169	1200	48	57	30.5	71
169	1300	42		30.5	62
169	1400	48		33.5	66
169	1500	52		40.5	67
169	1600	53		40.5	71
169	1700	54		43.5	68
169	1800	54		41.5	70
169	1900	50		35.5	65
169	2000	51		34.5	67
169	2100	50		34.5	70
169	2200	49		35.5	64
169	2300	46		35.5	65
170	0	52		34.5	71
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170	200	46		35.5	61
170	300	40		31.5	63
170	400	43		31.5	65
170	500	45		31.5	68
170	600	48		33.5	73
170	700	45		34.5	68
170	800	44		34.5	68
170	900	47		33.5	73
170	1000	52		34.5	77
170	1100	49		32.5	69
170	1200	44	55	33.5	64
170	1300	48		33.5	72
170	1400	46		32.5	65
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170	1600	43		30.5	62
170	1700	43		30.5	62
170	1800	42		30.5	65
170	1900	40		30.5	57
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170	2200	41		30.5	69
170	2300	40		30.5	62
171	0	34		30.5	56
171	100	36		30.5	59
171	200	34		30.5	57

171	300	32		30.5	45
171	400	43		31.5	66
171	500	50		31.5	73
171	600	49		32.5	74
171	700	52		34.5	76
171	800	48		32.5	70
171	900	45		32.5	69
171	1000	47		31.5	69
171	1100	46		30.5	70
171	1200	47	57	31.5	69
171	1300	46		30.5	70
171	1400	46		30.5	69
171	1500	45		30.5	68
171	1600	39		30.5	62
171	1700	42		30.5	63
171	1800	42		30.5	62
171	1900	46		30.5	72
171	2000	41		32.5	58
171	2100	42		33.5	58
171	2200	40		32.5	57
171	2300	39		31.5	59
172	0	38		31.5	58
172	100	35		30.5	55
172	200	32		30.5	43
172	300	32		30.5	39
172	400	41		31.5	64
172	500	48		31.5	70
172	600	47		31.5	71
172	700	50		32.5	71
172	800	50		31.5	72
172	900	49		31.5	70
172	1000	50		30.5	72
172	1100	48		30.5	71
172	1200	48	55	30.5	71
172	1300	48		30.5	72
172	1400	49		33.5	72
172	1500	48		35.5	73
172	1600	48		36.5	69
172	1700	49		37.5	67
172	1800	47		36.5	69
172	1900	41		30.5	60
172	2000	40		30.5	65
172	2100	39		31.5	58

172	2200	37		31.5	54
172	2300	41		31.5	65
173	0	37		31.5	58
173	100	37		31.5	57
173	200	34		30.5	46
173	300	39		31.5	59
173	400	41		31.5	63
173	500	47		31.5	70
173	600	46		31.5	70
173	700	47		31.5	69
173	800	50		31.5	73
173	900	45		31.5	72
173	1000	52		32.5	72
173	1100	47		31.5	72
173	1200	49	55	32.5	72
173	1300	49		35.5	69
173	1400	51		40.5	67
173	1500	52		41.5	68
173	1600	52		41.5	67
173	1700	51		39.5	71
173	1800	48		36.5	63
173	1900	42		32.5	63
173	2000	42		32.5	63
173	2100	44		34.5	64
173	2200	42		32.5	63
173	2300	41		32.5	61
174	0	38		31.5	58
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174	200	38		31.5	60
174	300	40		30.5	68
174	400	36		30.5	60
174	500	41		30.5	65
174	600	42		30.5	69
174	700	42		30.5	67
174	800	43		31.5	64
174	900	44		32.5	63
174	1000	44		33.5	63
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174	1200	47	51	35.5	67
174	1300	49		37.5	63
174	1400	49		37.5	65
174	1500	50		38.5	64
174	1600	48		37.5	64

174	1700	45		34.5	62
174	1800	47		36.5	65
174	1900	44		32.5	61
174	2000	41		30.5	62
174	2100	39		30.5	60
174	2200	42		30.5	63
174	2300	37		30.5	59
175	0	37		30.5	57
175	100	32		30.5	55
175	200	31		30.5	34
175	300	36		30.5	60
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255	2300	57		45.5	70
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256	100	51		36.5	73
256	200	45		34.5	65
256	300	55		42.5	71
256	400	50		33.5	70
256	500	46		32.5	70
256	600	48		31.5	71
256	700	48		32.5	69
256	800	49		33.5	70
256	900	48		31.5	68
256	1000	46		31.5	68
256	1100	55		39.5	69
256	1200	54	60	41.5	69
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256	1600	56		42.5	69
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256	1800	51		38.5	68
256	1900	49		37.5	64
256	2000	48		36.5	64

256	2100	47		35.5	64
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257	0	37		30.5	55
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257	200	37		30.5	55
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257	1600	50		37.5	66
257	1700	46		32.5	69
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257	1900	43		30.5	66
257	2000	39		30.5	63
257	2100	36		30.5	58
257	2200	37		30.5	58
257	2300	42		30.5	68
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258	1100	43		30.5	61
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258	1300	44		31.5	67
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260	1300	53		40.5	71
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268	2000	46		35.5	64
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269	500	46		31.5	72
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269	800	50		31.5	71
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269	1300	52		30.5	73
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271	400	45		35.5	62

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361	1500	45		31.5	65
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362	200	32		31.5	37
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362	400	33		32.5	36
362	500	41		32.5	64
362	600	43		32.5	68
362	700	44		32.5	71
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362	1100	50		33.5	72
362	1200	49	55	33.5	65
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362	1600	59		45.5	74
362	1700	55		40.5	75
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363	700	54		40.5	71
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363	900	54		35.5	72
363	1000	65		49.5	78
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363	1200	57	60	44.5	75
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74	100	54		38.5	71
74	200	53		40.5	73
74	300	62		45.5	80
74	400	63		47.5	80
74	500	61		46.5	78
74	600	57		43.5	74
74	700	50		36.5	76
74	800	51		35.5	76
74	900	52		34.5	78
74	1000	53		36.5	78
74	1100	53		39.5	76
74	1200	56	69	43.5	70
74	1300	53		40.5	68
74	1400	55		38.5	76
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74	1600	61		43.5	80
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95	300	39		33.5	62
95	400	37		33.5	48

95	500	43		33.5	66
95	600	50		34.5	76
95	700	48		34.5	71
95	800	44		33.5	67

GOLDEN QUEEN MINING COMPANY, INC.
SOLEDAD MOUNTAIN PROJECT

AMBIENT NOISE LEVEL MONITORING

Leq (dBA)	L90 (dBA)	Lmax (dBA)	
66	52.5	83	HIGHEST NOISE LEVELS
30	29.5	30	LOWEST NOISE LEVELS
45	34.7	65	AVERAGE NOISE LEVELS

ANALYSIS OF SOCIOECONOMIC IMPACTS OF THE PROPOSED GOLDEN QUEEN MINING CO. INC. SOLEDAD MOUNTAIN PROJECT

Date:

January 1995

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SYNOPSIS

The project proposed by Golden Queen Mining Co. Inc. would construct and operate an open pit precious metals mine in eastern Kern County near the community of Mojave. The project would be constructed over an eight-month period and would operate for a period of 7 to 10 years.

During construction phase, direct expenditures for labor and materials would infuse approximately $13.7 million dollars into the regional economy. Two hundred and fifty workers would be employed, earning some $9.9 million dollars in wages. This economic activity would indirectly support an additional 166 workers with wages of $3.7 million paid.

The project will create 144 permanent jobs, which will pay $4.8 million dollars in wages annually, exclusive of benefits. The annual expenditures made by Golden Queen Mining on goods, labor and other services will support another 136 jobs, which are expected to pay wages of $3.3 million. The value added annually by the direct and indirect effects of this activity are forecast at $8.3 million.

Because of its location, the project will impact both Kern and Los Angeles Counties, and adjustments have been made in this analysis to reflect this situation. It is assumed that about one-half of the people employed by the project will live in Los Angeles County and that they will spend their disposable income where they live.

A proportion valuation approach was taken in determining the fiscal impact the project would likely have on the County of Kern. That analysis indicates tax receipts would exceed the expenditures for government services necessitated by the project by approximately $40,700 in Year 1. This assumes a contribution to the County General and Fire Funds of $57,224 and projected service costs of $16,500.

This analysis concludes that the project will substantially enhance the regional economy. The project is not deemed growth inducing because the jobs created will, in all likelihood, replace those being eliminated by the closure of a similar facility within the area. Golden Queen anticipates hiring most, if not all, of its employees from that pool of people.

Predicted Impacts to Regional Economy
(Millions of dollars)

	Employment	Wages	Value Added
Direct	144	$4.8	$4.5
Indirect	136	$3.3	$3.8
Total	280	$8.1	$8.3

1.0 INTRODUCTION

This report presents the findings of the socioeconomic analysis of the development of the gold mining operation proposed by Golden Queen Mining Co. Inc. for eastern Kern County near the community of Mojave. The analysis includes direct impacts to County government and direct and indirect impacts to the regional economy that can be reasonably expected from the proposed development.

This report has been prepared specifically for this project. Assumptions have been made based on information provided by agents and employees of Golden Queen Mining Co. Inc. and by city and county agencies. The data, both given and derived, and the conclusions drawn from their analysis are specific to this project and cannot reliably be applied to any other project.

1.1 Summary Project Description

The project proposed by Golden Queen Mining Co. Inc. includes the construction and operation of an open pit precious metals mine and heap leach recovery operation on Soledad Mountain. The project location is approximately 5 miles from the community of Mojave, which is situated in southeastern Kern County, California.

If approved, the project's eight-month long construction phase would begin in mid-1995. Operations would continue for 7-10 years. They would include open pit mining and use of a heap leach process to extract the precious metals from the mined ore.

The project is expected to employ approximately 250 people during the construction phase, and 144 people during the operation of the facility. Permanent employees are expected to be drawn from people who were until recently or are currently employed by other mining companies that are currently operating within the County but expected to phase out their operations during the early stages of the proposed project.

Over the life of the project, approximately 4 million tons of precious metals ore will be produced on an annual basis. It is also anticipated that an estimated 50% to 60% of the overburden materials removed in the mining process will be sold as aggregate and construction material.

1.2 Methods

This study comprises two components: an analysis of fiscal impacts to the County of Kern and an analysis of the direct and indirect impacts to the regional economy of Kern County. Each of these is analyzed with respect to one-time impacts associated with construction of the project and to recurrent impacts associated with the operation of the facility over the course of its anticipated life.

The fiscal impacts are calculated using the estimated revenues generated by the project and accruing to the affected governmental agencies, and the estimated cost of services provided to the project by those agencies. Cost estimates are based on a proportional valuation method, which assumes that intensity of development is a good predictor of the level of government services required. This approach is used in the absence of marginal cost data for county services. Special attention is given to fire and police protection, but the anticipated costs of these services are included in the proportional valuation analysis. Because another comparable facility operating in this area is expected to close down in the near future and that Golden Queen will employ people currently working at that facility, the incremental costs added by this project are expected to be very small.

The impacts to the regional economy are both direct and indirect in nature. The former include sales of local goods and services to the project during both the construction and operations phases. The indirect impacts include the subsequent spending in the community by employees' families and other providers of goods and services. These latter are known as "multiplier" effects. It must be noted that these are particular to this project and cannot be generally applied. They relate specifically to the types of jobs created and the specific mix of goods and services demanded and are estimates and are based on assumed sector-specific regional purchase coefficients, which are used to model the inter-regional flows that are expected. Expressed a different way, these coefficients predict the leakage of direct purchases to other regions.

The following data sources, information and assumptions were used in preparing this report:

1. Project-specific information regarding construction and operation of the proposed facility was provided by Golden Queen Mining Co., Inc. Additional information was provided by WZI, Inc.
2. Estimates of revenues and costs accruing to the County of Kern are based on information provided by employees of that agency. A contact list is provided as an appendix.
3. Regional economic projections were prepared using the Regional Science Research Corporation input-output model customized for Kern County.
4. All costs and revenues are expressed in constant dollars using 1994 as the base year, with the exception of property tax revenue which is inflated by 2% per annum as allowed under the provisions of Proposition 13, passed by California voters in 1978. Since the average inflation rate since 1980 has been 4.7%, the purchasing power of property tax receipts has eroded over time, prompting local agencies to request fiscal impact analyses.
5. It is assumed that market forces will allocate natural resources to their highest and best use, and that the interest rate mechanism will allocate natural resources efficiently to present and future uses.

2.0 ANALYSIS OF IMPACTS

2.1 One-Time Impacts

One time impacts are those associated with the permitting and construction of the facility. For the purposes of this report, only those which affect the local economy are considered. They are as follows:

- **Direct Impacts**
  Infusion into the economy of $13.7 million in the form of expenditures on building materials and labor costs during the planned eight-month construction period beginning in June 1995. Approximately 250 workers will be employed during the construction phase.

  Expenditure of $250,000 locally for permitting fees and consultant services.

- **Indirect Impacts**
  Multiplier effects of the $13.7 million spent locally. This infusion is expected to support 166 additional jobs during the construction phase as it works its way through the economy when local firms and the workers to whom they pay wages make purchases of goods and services unrelated to the project. Additional wages indirectly attributable to the project are predicted to total $3.3 million.

2.2 Recurrent Impacts

Recurrent impacts are those associated with operation of the facility throughout its expected life. Only local impacts are considered. These fall into two categories: Fiscal impacts to local governmental agencies and impacts to the regional economy (county economy). Both direct and indirect regional economic effects are considered.

2.2.1 Fiscal Impacts

- **Revenue to Local Governments**

1. Property Taxes
   Based on cash flow projections for this project, a first year property tax payment of approximately $267,000 is anticipated. This figure was estimated by the Kern County Assessor's office using the preliminary information provided by Golden Queen Mining Co. The actual tax bill will be calculated when more detailed information is available.

   Because the calculations for subsequent years depend heavily on the level of productive activity, the timing of subsequent capital investments and the

methods used to depreciate these investments, it is difficult to predict the property tax bill for each year of operation. Consequently, only the first year impacts will be presented in this analysis. The level of government services necessitated by the project also depend heavily on productive activity, and as the present value of the project's anticipated stream of income declines over its expected life-span, so will the level of services required under the assumptions of the proportional valuation method being used.

Property taxes to be paid on the mining operations are levied at the rate of 1% of assessed value. Approximately 20.2% of these would accrue to the County of Kern's General Fund, which would receive about $53,900 in Year 1. An additional $2,260 would accrue to the County's Fire Fund. Total revenue received by both these County Funds from taxes on the mining operation would total about $56,200.

Property taxes amounting to $3,696 are currently being paid by Golden Queen Mining Company on property owned within the project boundaries. These taxes will continue to be paid in addition to those that would be paid on the mining operation. Property taxes being paid on other property which is being leased by Golden Queen for this project are not included in this analysis.

Golden Queen Mining Company's tax contribution for property taxes on the mining operation and the property owned within the project boundaries together would be approximately $54,650 to the General Fund and $2,574 to the Fire Fund, or a total of $57,224 in Year 1.

2. Sales Taxes

No sales tax will be directly generated by the project, however there will be indirect impacts as employees spend their earnings in the County. Wages, exclusive of benefits, of $4.8 million are forecast. Based on statistics from the California Board of Equalization, it is assumed that 35.9% of income will be spent on taxable sales. It is further assumed that roughly 50% of these employees will live in Los Angeles County, and that purchases will be made in place of residence. Under these assumptions, the County of Kern will collect approximately $8,600 annually in sales tax from employees of the proposed project. Additional tax revenue will be realized as receipts from taxable sales are spent by local merchants and their employees. More is said about this under the heading of regional economic impacts.

3. Annual Fees to County Agencies
The project will be inspected regularly by several county agencies and will pay approximately $4,935 in fees for those inspections. They are distributed as follows:

County Agency	Service	Estimated Fee
Engineering & Survey Services	Annual mine inspection	$100-$200
Engineering & Survey Services	Annual review of financial assurance	$150
Air Pollution Control District	Annual permit fees	$3,300
Fire Department	Annual facility inspection	$1,335

❑ Estimated Costs to Local Governments

A proportional valuation method was used to predict the cost of municipal services attributable to the project, using information from the Kern County assessment rolls to determine the percentage of service expenditures for all departments attributable to commercial/industrial property.

Assumptions of the proportional valuation method are as follows: Municipal service costs increase as the intensity of land use increases; the change in real property value is a reasonable indicator of intensity of use. When the average value of non-residential property within a jurisdiction differs significantly from the average real property value for all properties, the direct proportional relationship must be refined to avoid errors in estimating the costs incurred by the non-residential development. The aggregate impacts of commercial and industrial land uses on municipal service costs are similar enough to allow these uses to be considered in a single category.

Given the estimated project value of $26,689,000, cost of services totaling approximately $16,500 is anticipated. With predicted property tax proceeds of $57,224, the project will provide a fiscal benefit to the County of about $40,700.

Estimates of service costs for fire and police protection are included in the estimate given above, but these two public safety areas are given additional attention below.

1. Fire Protection
Property taxes from this project would contribute approximately $2,574 to the Fire Fund. The Fire Department may also receive funds from the County General Fund. To the extent this occurs in any budget year, the project's contribution to Fire Department operations would exceed the

amount given above. The project would also pay approximately $1,335 annually for inspection fees.

The most likely types of calls to be generated by this type of project are medical emergency calls and hazardous materials calls. The fire department estimates the cost per hours of providing these services at $223.06 for medical response and $459.85 for hazardous materials response. At these rates, the project's contribution to the Fire Fund alone would provide nearly 12 hours of medical response service or approximately 5.6 hours of hazardous materials response.

The Fire Department estimates that twelve calls will be generated annually by the project (Hailey, 12/13/94).

2. Police Protection
The Sheriff's Department was contacted for comments. Their representative indicated that they anticipate no additional calls for service as a consequence of this project.

Summary of Fiscal Impacts to County of Kern

Receipts to County	
General Fund	$54,650
Fire Fund	$2,574
Total	$57,224
Cost of Services	$16,500
Surplus (Deficit)	**$40,724**

2.2.2 Regional Economic Impacts

- **Direct Impacts**

The proposed project will create 144 permanent jobs, and it is anticipated that most, and perhaps all, employees will be hired from the local labor pool as other precious metals mining facilities in the area have either ceased production or are in the final phases of production and expected to cease production in the near future. Wages, exclusive of benefits, are estimated at $4.8 million per year. As the jobs created will largely be replacing jobs that have been or are being eliminated by other concerns, this project will limit contraction in the mining industry and cannot be considered growth inducing.

Associated with these direct impacts are state tax receipts of an estimated $328,000 per year and local taxes of $338,000 per year. These include state income tax, excise taxes, sales tax, and other taxes which are based on changes

in output or wages. How the local taxes are distributed among agencies will largely depend on where workers live. The assumption in this study is that approximately fifty percent will live in Los Angeles County (as detailed below), so it is expected some portion of the projected local tax revenue will flow to that locale.

- **Indirect Impacts**

The operation of the Golden Queen facility can be expected to indirectly support approximately 136 additional jobs on an annual basis, paying $3.3 million in wages and representing an additional $3.8 million value added to the gross regional product. These "multiplier" effects will occur:

1. as employees of Golden Queen spend their wages in the community.
2. as vendors who do business with Golden Queen disburse the proceeds of these transactions in the form of wages to workers.
3. as vendors who do business with Golden Queen purchase goods and services from other vendors.
4. as employees of vendors spend their wages in the community.

The cumulative effects of these spending rounds were calculated using an input-output model. Jobs are considered to be supported rather than created, and wages considered to be maintained rather than added because the Golden Queen project is expected to pick up slack created in the region's economy by earlier cut-backs and the anticipated closure of other mining facilities. Though there may be an incremental increase or decrease in overall levels of employment and wages, the extent cannot be determined without more explicit information regarding these other mining operations, and this is unavailable. Based on information from the project proponent, it is assumed that the losses and gains will be roughly offsetting. If the Golden Queen project is not approved, a contraction in the regional economy is to be expected when the currently operating mine is closed. Exact impact of that anticipated closure cannot be determined without data specific to that operation.

Associated with these indirect and induced effects is an estimated $3.8 million value added. How much of this increase would be realized in Kern County and how much would benefit neighboring Los Angeles County cannot be precisely determined without more detailed information about the location of workers' residences and expenditure patterns for that region of Eastern Kern County. The assumption made, using project proponent input, State Board of Equalization and census data is that approximately 50% of the workers will live in Los Angeles County. It is further assumed that local vendor purchases made by Golden Queen will be evenly distributed between the two counties. Capacity does exist in the Kern County regional economy to satisfy the

demand created by the operation of Golden Queen's project and the increase in area income associated with it, however.

Under the assumptions regarding spending patterns, local taxes accruing to public agencies in Kern County would be increased by approximately $320,000, with a comparable amount going to agencies in Los Angeles County, as a result of the direct and indirect activity.

3.0 CONCLUSIONS

The proposed development of the Golden Queen Mining Company project will greatly enhance the regional economy of Kern County, creating 144 permanent jobs paying $4.8 million in wages. These jobs will offset job losses associated with expected closure of a similar facility within the same region, so the project is viewed as preventing retraction in the regional economy rather than inducing growth.

The anticipated direct economic effects of this project include a value added of $4.5 million, and increase of approximately $328,000 in state tax receipts and of $338,000 in receipts to local jurisdictions. The project is expected to generate a $40,700 positive cash flow to the County of Kern by providing taxes in excess of the costs it would incur for County services.

The indirect impacts of this project include the support of an additional 136 jobs throughout the economy, providing $3.3 million in wages and another $3.8 million in value added. An additional $304,000 would be expected to accrue to both the state and local governments from the economic activity generated indirectly.

4.0 APPENDIX

4.1 CONTACTS

County of Kern

Adel Klein, Director of Policy Analysis & Intergovernmental Relations
Bruce Elliott, Senior Economic Analyst/Appraiser, Office of Kern County Assessor
Deputy Chief Dan Clark, Fire Department
Battalion Chief Le Costel Hailey, Hazardous Materials Control Unit, Fire Department
Chief Robert Fisher, Sheriff Department, Administrative Services Bureau
Aaron Light, Resource Management Agency, Engineering and Survey Services
Richard Lloyd, Resource Management Agency, Engineering and Survey Services
Tom Paxson, Director, Air Pollution Control District
Jim Ellis, Resource Management Agency, Planning and Development Services

4.2 REFERENCES

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County of Kern, Kern County Profile, 1994.
County of Kern, Adopted Budget Fiscal Year 1994-95.
County of Kern, Assessment Roll, 1993-94.
County of Kern, Fiscal Impact Analysis Guidelines, Fiscal Year 1994-95.
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U.S. Dept. of Commerce, Bureau of the Census, 1990 Census of the Population and Housing, California.
WZI, Inc., Golden Queen Mining Co. Inc. Project Description, October 1994.

KERN COUNTY FIRE DEPARTMENT

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ADMINISTRATIVE SERVICES OFFICER
MICHAEL R. PARKER

December 13, 1994

To: Ms. Susan Weaver
Weaver, Hawley, & Mills Consultants

From: Le Costel Hailey, Battalion Chief
Hazardous Materials Control Unit

Subject: Gold Mining Operations

This is in response to your request for information regarding gold mining operations in the Station 14 (Mojave) area. Using the Cactus Gold Mine business plan as a representative sample, we found that a company with five to six facilities, using a leach process, and with an excess of ten inventory items would expect to have an annual fee of approximately $1,335.00, for example:

108,000 lbs. of Sodium Cyanide x its Hazard Rating of .04 = 4,320 Volume Weighted Units = Fee Group 64

Variations in numbers of facilities, quantities, and hazard ratings would, of course, affect the annual fee amount. We are enclosing a copy of our fee ordinance/schedule for your reference.

Regarding the impact on the local fire station, we might anticipate approximately one call per month to this facility. If we can be of any further help, please call us at 861-2761.

LH/fw
Enclosure

SUSAN H. WEAVER

EDUCATION

Master of Arts (Economics), University of Southern California
Master of Planning, University of Southern California
Bachelor of Arts, University of Toledo

HONORS

Honor Society of Phi Kappa Phi
California Planning Foundation Award
Haynes First Year Fellow, USC
Pi Gamma Mu, National Social Science Honor Society

PROFESSIONAL EXPERIENCE

Coordinator Legislative and Public Affairs, Kern County Resource Management Agency
Assistant to the Third District Supervisor, Kern County Board of Supervisors
Economics Instructor, Bakersfield Community College
Associate Editor, Pacific Rim Business Digest
Assistant Lecturer, Freshman Writing Program, University of Southern California
City of Bakersfield Planning Commissioner

PROJECT EXPERIENCE

Fiscal Impact Analysis
Socioeconomic Impact Analysis
Econometric Modelling
Land Use Planning
Government Finance and Operations
Transportation Issues Analysis
Air Quality Regulation/Legislation Analysis
Growth Management Analysis

ASSOCIATIONS

American Planning Association
Air and Waste Management Association
Urban Land Institute, Associate Member
Urban and Regional Information Systems Association

SEDWAY KOTIN MOUCHLY GROUP
Real Estate and Urban Economics

Addendum to the Socio-Economic Study

Presented to:

Golden Queen Mining Company, Inc.

Presented by:

Sedway Kotin Mouchly Group

October 28, 1996

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S·K·M·G

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I. EXECUTIVE SUMMARY

Sedway Kotin Mouchly Group (SKMG) was retained to evaluate the potential impact on values of residential properties in proximity to the proposed Soledad Mountain Project. Golden Queen Mining Company proposes to develop an open pit precious metals (gold and silver) mine on and around Soledad Mountain, approximately 1.5 miles west of State Highway 14 off of Silver Queen Road, roughly four miles southwest of Mojave, an unincorporated area. To analyze this issue, SKMG utilized a three-prong approach including case studies to assess housing sales before and after the introduction of mining in the vicinity; a literature search to determine whether research on the subject exists; and interviews of entities involved in mining activities and local real estate.

In the case of the Golden Queen Mining Company's proposed Soledad Mountain Project, it is important to make several observations.

- *The Site is Already Zoned for Mining.* The current Specific Plan zoning allows mining operations at the Soledad Mountain Project site. Mining is a pre-existing land use.

- *Mining is Long Established in the Area.* Mining operations have existed in the area since the 1800s, and modern mining practices have been operational in the immediate area for over 10 years.

- *The Local Housing Market is in Decline.* The economic downturn in Southern California over the last six years has resulted in local housing values decreasing by over 25%.

- *Golden Queen Will Have a Positive Economic Impact.* The Soledad Mountain Project will provide a positive economic impact in the region by creating 144 permanent jobs generating an additional $4.8 million in wages to the local economy per year. In addition, 250 construction workers will be employed, earning approximately $9.9 million dollars in wages.

RESEARCH FINDINGS

There are three mines in the general vicinity of Soledad Mountain, all constructed since the mid-1980s. Historical home sales data was collected to evaluate whether there was any discernable negative impact on values by comparing average sales prices for periods prior

and subsequent to construction of the mines. No conclusive deductions could be drawn from this analysis due to several factors:

1. Tracking finite areas was not possible in this rural area over a 15-year time span with the available data sources;

2. There is a relatively limited number of homes and sales in proximity to the mines;

3. The homes are very diverse products (*e.g.*, they vary widely as to lot size, age of structure, quality, etc.); and

4. The severe economic downturn in the region generally commencing in 1989-1990 which led to such extraordinary market conditions as roughly 70% of resales being foreclosures.

However, the research disclosed that homes were built in the vicinity of mining after the Standard Hill and Cactus mines started operations and that these homes were purchased even though mining was located nearby. In summary, mining and housing have co-existed in the area for the last ten years.

Case study analysis of other mining areas resulted in the following findings. Typically, mining activities are located in regions more remote from residential areas and often precedes other types of development. It is not uncommon for mining to stimulate economic growth in an area. Interviews were conducted with representatives of mines and brokers in Green Valley, Arizona, and Jamestown, California. While these two mining areas do not have directly comparable characteristics, they were the best examples identified. The interviews provided anecdotal information, which although not definitive in nature, provides some insights.

Pricing of homes in Green Valley were reported to be similar to housing projects throughout the Tucson region and to not be impacted by mining activity. Housing in this area is adjacent to tailing mounds which are a couple of hundred feet high and terraced, although actual mining operations are roughly four miles away.

Large-lot housing was developed in Jamestown overlooking active mining operations which shows that mining did not stop housing development from occurring nor did it keep houses from selling which had close-up views of the active operations. One broker's anecdotal comments indicated the mine impacted housing values within an estimated half-mile radius, but concrete information as to dollar amount or other potential factors contributing to the pricing could not be ascertained. It was not possible to conduct a systematic, rigorous statistical analysis given the rural nature of these areas; limited sample size; variation in product characteristics; problems in obtaining historical data; and other similar factors.

SKMG found no studies on directly comparable issues through a literature search which employed the Appraisal Institute, Urban Land Institute, newspapers, and the Internet.

CONCLUSIONS

The following is a summary of the impact on property values expected to be experienced by the three residential areas in proximity to Soledad Mountain.

The economic stimulus provided by the 144 new jobs and $4.8 in wages represent a 2% to 3% increase in local employment and personal income. At a regional level, the proposed Soledad Mountain Project will have a *positive* impact on real estate values.

All residences in this area are already experiencing a downturn in prices due to the general economic depression in the Mojave/Rosamond area.

Silver Queen Road/Mojave Tropico (Immediately Adjacent Areas)

Residences within a half-mile of the mining operations could be impacted. There is insufficient data to anticipate the exact magnitude of price reduction. Values, currently depressed, are approximately $70,000 to $80,000.

Camelot

SKMG's analysis indicates that there will not be a measurable impact on property values in the Camelot community as a result of Golden Queen mining activities. Standard Hill Mine is closer to Camelot than is the proposed Soledad Mountain Project.

Backus Road Corridor

SKMG's analysis indicates that the residences along the Backus Road corridor will not experience any measurable value loss relative to the proposed Soledad Mountain Project, given the distance from the mining operations and the topography separating the two.

II. INTRODUCTION

As part of the EIR/EIS process for Golden Queen Mining Company, Sedway Kotin Mouchly Group (SKMG) was retained to estimate the potential impact of the proposed Soledad Mountain Project on the property values of existing residences in proximity to the proposed project. Golden Queen Mining Company proposes to develop an open pit precious metals (gold and silver) mine with cyanide heap leach, overburden piles and associated processing facilities. Aggregate and construction materials may be sold as by-products. This document will be incorporated into an EIR/EIS prepared under the Kern County Planning Department and the U.S. Bureau of Land Management as lead agencies prepared in response to scoping comments as required by the lead agencies.

APPROACH

In order to determine the potential impacts on residential property values, SKMG visited the mining project site and surrounding areas. An initial assessment was made based on information obtained from WZI Inc., and the Notice of Preparation and Visual Resources Analysis relative to the types of potential impacts of the mining operations. In conjunction with WZI, SKMG reviewed the anticipated sphere of influence for each major category of impact. To obtain information specific to the area, SKMG conducted interviews of local brokers and an appraiser and utilized data sources such as TRW/REDI Property Data, the Kern County Council of Government, and local chambers of commerce.

SKMG also conducted a literature search, researched case studies, and contacted various entities involved in mining activities and local real estate. The literature search employed resources from the Appraisal Institute, Urban Land Institute, and the Los Angeles Times archives, as well as a document search on the Internet in an effort to determine whether research existed on mining impacts on property values. Case studies were researched to determine whether there were impacts on residential values or long-term trends in value, and to identify any mitigations used to offset such impacts. Entities contacted by SKMG include California Mining Association, State Department of Conservation, Division of Mines and Geology, State Clearinghouse, Federal Bureau of Land Management, Southern California Rock Products Association, Aggregate Producers of Northern California, several mining companies, as well as local planning agencies and local real estate brokers and appraisers.

SKMG evaluated the applicability of the findings from the case studies and literature search and the various interviews as to the conditions associated with the proposed Soledad Mountain project.

PROJECT DESCRIPTION

The proposed mining operation is to be located in the high desert area of southeastern Kern County, approximately five miles north of Rosamond and four miles southwest of Mojave, both unincorporated areas. The subject site is located in the northern portion of the Antelope Valley, which encompasses the southern portion of Kern County and the northern portion of Los Angeles County, stretching between the Tehachapi Mountains and the Angeles National Forest. This northern portion of the Antelope Valley is much more rural than the southern portion, as illustrated by the population concentrations. The Mojave/Rosamond area had a population of only 26,000 in 1994, as compared to roughly 215,000 for the Palmdale/Lancaster area.

The project area is on and around Soledad Mountain. The entrance to the facility is expected to be approximately 1.5 miles west of State Highway 14, off of Silver Queen Road. The majority of the operations will be located on the northern side of the mountain.

The mining site encompasses approximately 1,228 acres, of which 935 acres will be disturbed. Approximately 208 acres of the project area have been disturbed by historical mining and mining related activities. Major mining activity and related disturbance is located on the north side of Soledad Mountain.

Construction of facilities is scheduled to commence in 1997 and is anticipated to require nine to twelve months to complete. Mining operations are anticipated to begin in 1998 and continue until approximately the year 2014, with processing operations continuing until approximately 2016, when closure and reclamation will begin.

A socioeconomic analysis of the proposed mining operation prepared in 1995 estimates that the mine will create 144 permanent jobs, generating an additional $4.8 million per year in wages in the local economy. The analysis estimated that expenditures made by the mining operation will support another 136 jobs, which are expected to pay wages of $3.3 million annually. Construction employment is expected to require 250 employees, and expenditures for labor and materials will infuse approximately $13.7 million into the regional economy.

III. SITE ANALYSIS

SURROUNDING RESIDENTIAL UNITS AND COMMUNITIES

There are three groupings of residential areas near the proposed project area: (1) those adjacent to the project area along Silver Queen Road and Mojave Tropico (*e.g.*, those within roughly one-third to one-half mile, at the base of the mountain); (2) the community of Camelot 2.5 miles to the north, and (3) residents along the Backus Road corridor on the south side of Soledad Mountain.

Silver Queen Road/Mojave Tropico

There are a half dozen houses within a half mile of the project's boundaries, with the closest home located approximately 1,000 feet from the project area.

Camelot

Camelot is a planned development located approximately 2.5 miles directly north of the project area. It encompasses 109 homes on approximately 15 acres and was built in 1986-87. A golf course is located adjacent to the development. Houses in Camelot were not designed with a view orientation to Soledad Mountain. There exists a large area between Camelot and the proposed Soledad Mountain Project that has been legally subdivided, but only a few residential structures have been developed to date.

Backus Road Corridor

Backus Road runs along the south side of Soledad Mountain. There is a variety of housing product in the area. The area is characterized by 2.5-acre lots with homes ranging from 1,000 to 2,000 square feet, most typically 1,300 to 1,400 square feet in size. Manufactured houses account for 85% of the homes in the area. Houses are scattered in this rural area.

GENERAL AREA DESCRIPTION

The area surrounding the proposed project is a rural and sparsely populated desert region, which has been actively mined since the mid 1980s. Kern County's "Specific Plan for Soledad Mountain - Elephant Butte & Vicinity - South of Mojave" establishes mining as an acceptable use in the area. In addition to Soledad Mountain, there has been gold mining at the Cactus Mine (Shumake and Middle Butte operations) and the Standard Hill Mine. Other mining and related activities in the immediate vicinity include Granite Construction (aggregate and

asphalt batch plant), Asphalt Construction (aggregate and asphalt batch plant), and California Portland Cement Mojave Plant (aggregate and cement plant).

Other physical conditions in proximity to Soledad Mountain include the following:

- An EPA Superfund Site (contaminated soil);
- A Unocal tank farm that is under construction which will be used to store oil shipped via rail cars from Bakersfield and which will be shipped via pipeline for delivery to other markets;
- Railroad lines;
- Industrial uses (*e.g.*, metal recovery from photographic processes); and
- State Road 14, a multi-lane State Highway.

Other land uses that impact the overall region include:

- The Tehachapi Wind Resource Area, with over five thousand wind turbines which are used to generate electricity. These facilities dominate a ridge line to the west and north of Soledad Mountain.
- The 301,000-acre Edwards Air Force Base, which is used as a training site for Air Force fighter pilots and testing and evaluation of manned and unmanned jets and space vehicles.
- Mojave Airport, which is used for storage and salvage of aircraft of all sizes, including commercial and military aircraft.

The above uses, while adding to the economic base of the overall region, have established the region's industrial character. Exhibit 1 outlines the distance of these land uses relative to each of the three groupings of housing surrounding the proposed Soledad Mountain Project area. Exhibit 2 is a map that illustrates the locations of these various land uses and the adjacent residences.

HISTORICAL MINING OPERATIONS

The first mining boom started in 1894, when gold was discovered in the Mojave area. Soon after, additional deposits were discovered at Soledad Mountain and mining operations were initiated. The mines were ordered closed by Government Order in 1942, and were idle for a number of years. However, the overburden piles and tailings piles from previous mining efforts remain, as do the areas of surface disturbance from previous mining operations. In 1968, California Portland Cement Company started operations to remove the old tailings pile on Soledad Mountain for commercial use at their Colton, California plant. With recent improvements in gold mining techniques, it has again become financially feasible to mine for gold in the previously discovered Mojave claim areas.

Other mining operations in the immediate area include Cactus and Standard Hill gold mines, which are within 2.25 miles of the proposed Soledad Mountain Project. These mines have been operational since the mid- and late-1980s, respectively. These mines are currently in the process of being closed. The Standard Hill Mine is located closer to the Camelot subdivision and Mojave than is the proposed Soledad Mountain Project.

Production of precious metals ore and overburden materials have averaged approximately 4.5 million tons per year at Standard Hill and 9 million tons for Cactus (Middle Butte and Shumake operations). It is anticipated that Golden Queen's projected production of 10 to 16 million tons per year will roughly equal the combined production of these two nearby mining operations.

An additional mining-oriented operation is the California Portland Cement Company. Although this facility is located roughly seven miles to the west, it is visible from the Soledad Mountain area.

In summary, the proposed Soledad Mountain Project is consistent with historical mining operations in the region.

ECONOMIC OVERVIEW

During the 1980s, the economy of Southern California expanded at a rapid pace, as employment and population both boomed. This economic growth spurred dramatic price appreciation in residential property values in Los Angeles County. As a result, many home builders moved to the Antelope Valley to develop more affordable housing, and thousands of families moved into Palmdale and Lancaster, thereby increasing real estate values through the Antelope Valley. The defense and aerospace industries were major job providers throughout the region, and the Antelope Valley shared in this job growth, with employers such as Edwards Air Force Base and Lockheed Martin. However, the recession of the early to mid-1990s cost Southern California more than 350,000 jobs, and the Antelope Valley area was hard hit by the loss of jobs.

Los Angeles County has always led the region in employment growth, and as it grew, surrounding counties experienced similar growth. Exhibit 3 tracks the overall employment growth in the County. By 1990 employment growth in Los Angeles County had peaked and job losses ensued through 1994 with a loss of 10.5%. Employment in Kern County did not register a downturn until 1991, but between 1991 and 1994 Kern County is estimated to have lost 6,500 jobs (3.1%). These losses were partly attributable to large number of job losses in defense and aerospace. These Kern County trends are noted in Exhibit 4. Mining employment in the County dropped by 3,900 jobs from 1984 to 1994, a 26.4% decline. Mining's share of total employment in the County dropped from 8.5% in 1984 to 4.4% in 1994.

Exhibit 5 identifies unemployment trends in the two counties and shows that overall unemployment rates in Kern County have averaged nearly twice the rates in Los Angeles County. The 1995 unemployment rate in Kern County was 13.8%, with the unemployment rate in the Antelope Valley approaching 30%.

Population Growth

The population of Kern County grew to an estimated 617,000 in 1994, from 543,477 in 1990. The population grew despite the previously noted job losses in the 1990s. In 1994 the population of the Rosamond area was estimated at 22,295, while the Mojave area population was estimated at 3,925, giving a combined total of 26,220. The Rosamond/Mojave area represents a relatively small percentage of the total Antelope Valley population. The two incorporated cities of Palmdale and Lancaster collectively accounted for 214,900 persons in 1994. More of the population growth, and thus more of the economic development, has occurred in the southern Antelope Valley. Exhibit 6 provides a summary of population trends in the region.

Housing Trends

Housing prices in Los Angeles County and the Antelope Valley area peaked around 1990. Exhibit 7 shows an index of housing values with 1990 representing 100%. Single-family home values have dropped considerably in both areas through mid-1996. Values in Los Angeles County have decreased by a reported 24.3% from April 1990 to April 1996, while values in the Palmdale-Lancaster area have declined by 33.5% over the same time period.

The Antelope Valley area has long been considered one of the most affordable housing markets in the greater Los Angeles area. Following the real estate boom in the Los Angeles Basin, the price of homes in the area increased by upwards of 50% from 1988 to 1990, and builders glutted the area with new product. By the end of 1992, new unsold homes in the Antelope Valley and nearby Santa Clarita totaled 72% of all new homes for sale in Los Angeles County.

By the end of 1995, the Antelope Valley was being touted as the "foreclosure capital" of California by some in the real estate industry. In Palmdale alone, about 140 homeowners per month were losing their homes through foreclosure, distress sales, or by simply walking away. Various brokers have indicated that between 60% and 80% of all resales in the Antelope Valley area are for homes that have been repossessed by banks. Many units are HUD sales which distress the entire Valley's pricing structure. It is unlikely that prices in the area will stabilize until the glut of repossessed properties is sold off. Even then, the large amount of land available for residential development will probably keep prices from returning to the levels of the late 1980s in the foreseeable future.

As home values decreased in the 1990s, the development of housing units slowed in both the Mojave and Rosamond areas. Housing unit trends are identified in Exhibit 8. From 1990 to 1996, the average home prices reported by TRW/REDI Property Data in the Mojave area decreased from $64,550 to $48,550. Over the same period, the reported sales average in the Rosamond area decreased from $98,740 to $78,740. These sales trends are reported in Exhibit 9.

Brokers contacted for this study indicated that housing units in Camelot were selling for $80,000 to $90,000 in the late 1980s, but have decreased in value to an estimated $45,000 to $65,000 at the present time.

A broker contacted for this analysis indicated that housing units directly to the north of Soledad Mountain were selling for $120,000 to $130,000 in 1989. Based on discussions with an appraiser in the area, houses in this area are currently valued at $70,000 to $80,000.

EVALUATION OF IMPACT ON HOUSING VALUES BY MOJAVE MINES

Mining is long established in the Mojave area. There are three mines in the general vicinity of Soledad Mountain, all constructed since the mid-1980s. Cactus Middle Butte Mine was built in 1985, Standard Hill in 1987, and Catus Shumake Mine in 1989. Exhibit 1 summarizes the proximity of housing to mining by three general study areas. Some residences in the area along Silver Queen Road and Mojave Tropico Road are closer to Standard Hill Mine (0.1 to 1.5 miles) than they will be from the proposed Soledad Mountain project (0.25 to 0.5 miles). Camelot is also closer to the Standard Hill Mine (1.5 miles) than to the proposed project (2.5 miles). Residences located generally along the Backus Road corridor are located further from the existing mines than they will be from the proposed Soledad Mountain Project.

Historical sales were collected with the intent to evaluate whether there was any discernable negative impact on home values from the prior mining activity. TRW/REDI Property Data was used for collecting detailed sales information based on County Assessor records. The data in Exhibit 9 is not all-inclusive because it only includes Full/Verified/Confirmed properties and regular sales and does not include foreclosures. It was not possible to do any rigorous statistical analysis given the rural nature of the area and its lack of published street maps for grouping into subareas. This was exacerbated by the quality of data available for the early 1980s. While housing prices clearly declined in the 1990s, no conclusive deductions could be drawn as to the impact of the mining operations. The limited number of home sales in proximity to the mines; the diversity of local housing products (which widely vary in lot size, age of structure, quality, etc.); and the impact of the severe economic downturn in the region of the first half of the 1990s, with roughly 70% of resales being foreclosures, makes it difficult to isolate specific causes of losses in residential property value.

However, the research disclosed that many homes were built and sold in the vicinity of the Standard Hill and Catus mines after they started operations. Standard Hill Mine commenced operations roughly the same time as the 109 Camelot homes were developed. Just north of Soledad Mountain off of Silver Queen Road, there are several homes which were constructed during mining operations at Standard Hill and Cactus.

Mining and housing have been co-existing in the area for the last ten years.

IV. CASE STUDIES AND LITERATURE SEARCH

CASE STUDIES

SKMG researched several case studies on the impacts of other mining operations on residential housing values. As part of this research effort, SKMG contacted numerous public agencies, several operating mines, local real estate brokers, and several professional organizations to determine whether mining operations had any impact on residential development.

Several broad generalizations can be made from the research:

- Mining activities tend to be remote from residential areas, given the land area and economies of scale required.
- Mining operations often precede other types of development, particularly residential development, which often encroaches into mining areas.
- Mining operations stimulate economic growth, and in small communities, have been associated with an increased need for housing and have helped to push up the price of housing.
- Mining operations are often accepted as neighboring land uses.
- Mining operations affect households and businesses in dramatically different fashions.

The following case studies provide a summary of specific mining operations at Green Valley, south of Tucson, Arizona, and Jamestown, north of Merced, California. Additional anecdotal information indicated that significant positive impacts resulted from large-scale mining operations such as EIK and Carlin in Nevada, with 3,000 to 4,000 employees.

Green Valley

Green Valley is a community approximately 20 miles south of Tucson, Arizona. Mining originated in the area in 1895, with modern mining practices beginning in 1957. Mining operations expanded in 1970, and approximately 115,000 tons of material is milled each day. Mining occurs along a 20-mile stretch of land from Green Valley north toward Tucson. Residential development at Green Valley consists of both conventional and retirement housing. There are approximately 8,000 residential units in the area. The town of Green

Valley was established in 1963 and the majority of housing in the area has been developed since 1970.

Anamax in Green Valley was a partnership of American Metals Climax (Amax) and Anaconda. The mine started in the 1960s and continued to the mid-1980s. The mine was reopened in the late 1980s and is still operating today. In the mid-1960s the mining company bought several hundred acres from property owners and developers to stop residential development in the immediately adjacent areas and to minimize any resistance to the mining activity. This land has now been sold and there are homes within a few hundred yards from the tailings which range in price from $90,000 entry level homes to $450,000 custom homes on one-half to one-acre lots. The tailings are a couple of hundred feet high and are terraced. These tailings are similar to the overburden piles proposed by Golden Queen.

Interviews with mine representatives indicated that mining operations are located approximately four miles west of the residential portions of Green Valley, but the tailings from the mine are mixed with water and pumped to a tailings dam directly adjacent to housing in Green Valley. The tailings are subsequently formed into vertical mounds along the border of the residential community. The base of the tailings mounds are hidden from view by earthen berms that have been landscaped with trees. The mature trees reach as high as 50 feet. The landscaped areas and the tailings mounds above and behind them are generally visible from most of the residential development in Green Valley.

Housing costs in Green Valley range from $100,000 to $500,000, with the average home priced at approximately $150,000. Houses typically range from 1,700 square feet to 2,000 square feet and are generally located on 9,000 square foot lots. A broker at Coldwell Banker indicated that homes at Green Valley are priced the same as housing projects throughout the Tucson region, and that the proximity to the mining operation has not affected the pricing of the units.

The view of the tailings mound does not appear to have affected the sales of lots and homes in Green Valley. It has been a strong market with prices similar to those found in the greater Tucson area. However, developers contacted for this study indicated that some potential buyers will not consider units that have a view of the tailings mounds.

Jamestown Mine

The Jamestown Mine is located adjacent to the City of Jamestown, California. Gold mining first began in the area in the late 1800s and continued through the early 1900s. A new mining operation was developed in July 1986 and became operational in January 1987. The mining operation consisted of mining two hills and then mining open pits where the hills had stood. The mine operated until July 1994, and is presently in the process of being closed.

Housing in Jamestown consists of smaller residences of approximately 1,200 to 1,400 square feet up to residences of approximately 2,200 to 2,400 square feet. The houses are up to 30 years old and may be located on large lots of a few acres up to 40 acres. Today's values for a typical 30-year-old residence of 2,000 square feet located on a 10-acre lot is approximately $150,000.

The closest residences were 600 feet from the mill and 300 feet from the pit, with additional residences within one-half mile of the mine. Downtown Jamestown is approximately one mile from the mine, and it is estimated that 2,000 people live nearby.

A mitigation measure established through the EIR process allowed the processing plant to operate 24 hours a day (in three shifts), but allowed operation of the mine for only two shifts (during daytime hours) each day. Evening and nighttime operations were required to operate at successively more stringent noise restrictions.

Effects on local residents as reported by the Tuolomne County Planning Department included complaints from visual and noise related issues. From a visual standpoint, the mining operation included waste rock piles, a tailings dam and tailings mounds, as well as the milling facility and equipment storage areas. The area has a low ambient noise level, and any noise generated by the mining operation was perceived to be a nuisance by many residents. However, a highly traveled road in the vicinity made it impossible to distinguish noise generated by the mining operation from general vehicle traffic on the roadway.

Some residences were located within the area of actual mining operations and were acquired by the mining operation out of necessity. Other residences located in the "sphere of influence" of the mine were purchased by the mining operation.

A local broker indicated that houses within an estimated one-half mile of the mine have been subject to specific nuisances related to the mine and that the value of the houses was negatively affected by the mining operation. However, some large-lot housing was developed on the hillsides overlooking the mining operation, which indicates that some buyers were willing to purchase in view of the mining operation.

LITERATURE SEARCH

As part of its analysis, SKMG conducted a literature search employing resources from the Appraisal Institute and Urban Land Institute, as well as a document search on the Internet and the archives of the Los Angeles Times in an effort to determine whether any studies had been published which relate to impacts on residential property values due to their proximity to mining operations. SKMG found no directly comparable information.

APPENDIX

Public agencies contacted include the California Department of Conservation, Division of Mines and Geology; Kern County Environmental Health and Building and Safety divisions; State Clearinghouse (Planning-related issues); California Environmental Protection Agency; local chambers of commerce; Kern Council of Governments; Federal Bureau of Land Management; and local planning Departments in several states. Trade and professional organizations contacted include; American Planning Association; the Planning and Zoning Center; Rock Products Association; California Mining Association; Appraisal Institute; and the Urban Land Institute. Other contacts include a literature search of the Los Angeles Times' archives, and an electronic search on the Internet. Additionally, several mining operations in were contacted in California, Arizona and Nevada, as well as local brokers and appraisers.

ASSUMPTIONS AND GENERAL LIMITING CONDITIONS

Sedway Kotin Mouchly Group (SKMG) has made extensive efforts to confirm the accuracy and timeliness of the information contained in this study. Such information was compiled from a variety of sources, including interviews with government officials, review of City and County documents, and other third parties deemed to be reliable. Although SKMG believes all information in this study is correct, it does not warrant the accuracy of such information and assumes no responsibility for inaccuracies in the information by third parties. We have no responsibility to update this report for events and circumstances occurring after the date of this report. Further, no guarantee is made as to the possible effect on development of present or future federal, state or local legislation, including any regarding environmental or ecological matters.

This report may not be used for any purpose other than that for which it is prepared.

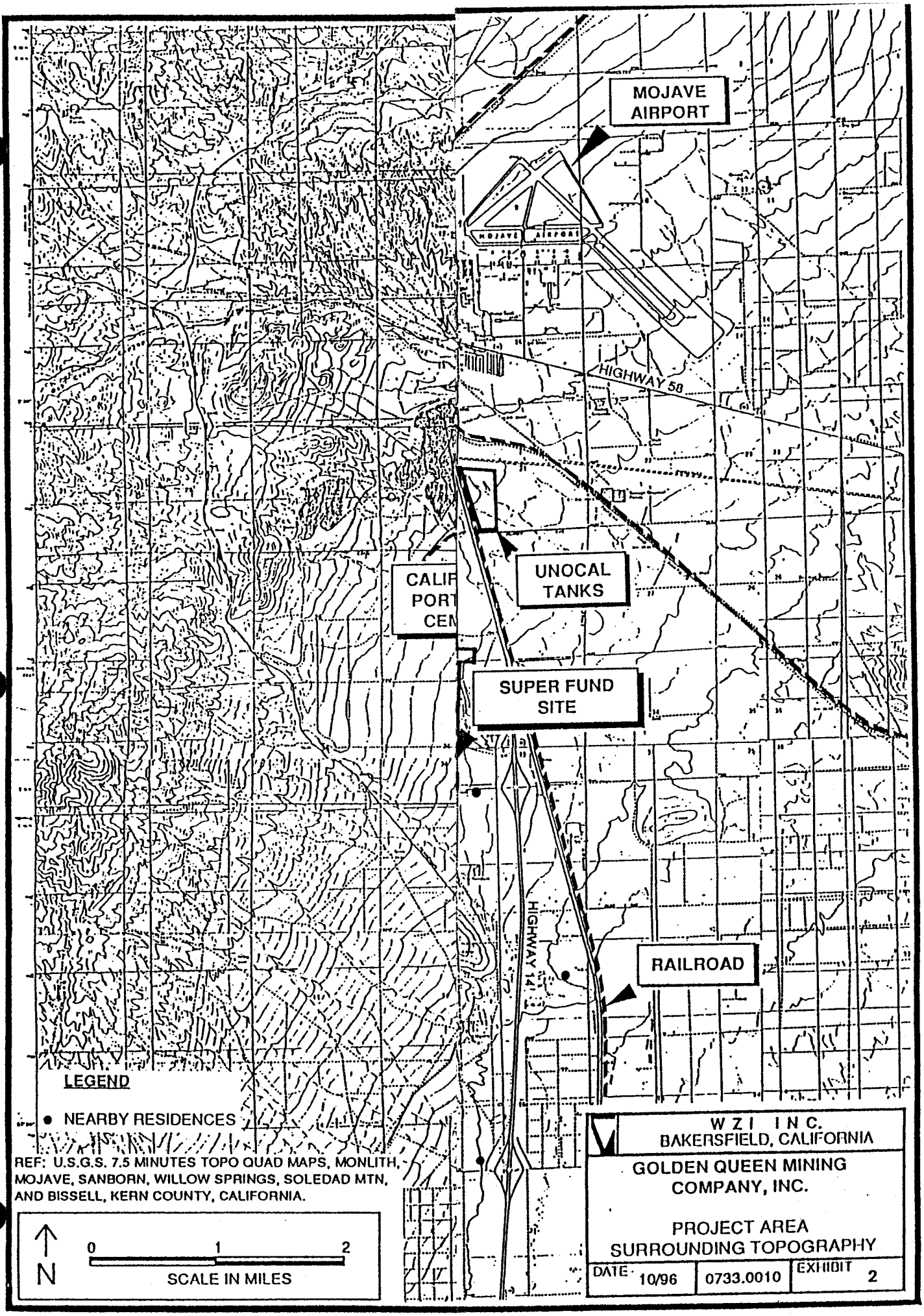
EXHIBIT 1

RELATIVE DISTANCE OF LAND USES FROM RESIDENTIAL AREAS

(Miles)

	Silver Queen Rd./ Mojave Tropico Rd.	Camelot	Backus Rd.
Standard Hill Mine	0.1 to 1.5	1.5	3.0 to 3.75
Cactus Mine	4.5 to 6.0	5.75	2.5 to 5.25
Granite Construction	0.5 to 1.75	1.5	3.75 to 4.5
Asphalt Construction	2.75 to 5.5	5.75	2.75 to 5.25
Super Fund Site	0.2 to 2.75	2.5	2.75 to 4.0
California Portland Cement	6.75 to 8.75	7.0	7.75 to 10.0
Railroad	0.6 to 3.5	1.0	1.0 to 3.5
State Highway	0.25 to 2.75	1.0	0.25 to 2.75
Proposed Soledad Mountain Project	0.25 to 0.5	2.5	1.0 to 2.5

Source: WZI and SKMG



REF: U.S.G.S. 7.5 MINUTES TOPO QUAD MAPS, MONLITH, MOJAVE, SANBORN, WILLOW SPRINGS, SOLEDAD MTN, AND BISSELL, KERN COUNTY, CALIFORNIA.

W Z I I N C.
BAKERSFIELD, CALIFORNIA

GOLDEN QUEEN MINING COMPANY, INC.

PROJECT AREA
SURROUNDING TOPOGRAPHY

DATE		EXHIBIT
10/96	0733.0010	2

EXHIBIT 3

HISTORICAL EMPLOYMENT - ANNUAL AVERAGES
LOS ANGELES COUNTY (1984 - 1994)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Agriculture	12,300	10,800	11,000	11,300	12,400	13,400	13,700	9,800	9,200	9,200	9,000
Mining	11,900	11,900	10,000	8,700	8,500	8,100	7,900	7,500	7,800	7,500	6,800
Construction	99,700	106,200	110,800	121,800	128,800	133,400	133,100	121,700	105,900	98,100	104,200
Manufacturing	858,800	864,800	878,300	887,200	875,800	864,000	834,600	774,900	714,900	660,200	638,700
Transportation and Public Utilities	192,400	195,500	200,500	204,600	207,400	210,500	211,600	209,700	202,700	199,600	199,800
Wholesale Trade	278,300	285,000	289,600	291,200	299,900	309,600	301,900	279,400	263,200	250,300	251,700
Retail Trade	576,100	592,600	609,900	628,000	638,000	644,700	647,700	614,900	584,900	571,500	563,300
Finance Insurance and Real Estate	245,100	251,200	261,000	268,700	270,000	273,200	277,600	265,600	254,900	250,000	243,400
Services	927,900	970,100	1,006,800	1,048,400	1,100,000	1,146,100	1,179,200	1,169,300	1,130,800	1,139,000	1,163,300
Government	467,700	477,200	487,400	494,900	505,600	521,800	539,800	539,900	539,400	531,400	532,800
Total	**3,670,200**	**3,765,300**	**3,865,300**	**3,964,800**	**4,046,400**	**4,124,800**	**4,147,100**	**3,992,700**	**3,813,700**	**3,716,800**	**3,713,000**

Source: State of California Employment Development Department and SKMG

File: DEMOG2.WK4

EXHIBIT 4

HISTORICAL EMPLOYMENT - ANNUAL AVERAGES
KERN COUNTY (1984 - 1994)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Agriculture	29,200	27,500	27,000	28,400	33,200	29,800	29,500	30,100	31,700	33,600	31,800
Mining	14,800	15,800	13,200	12,000	12,700	12,600	13,300	13,300	12,000	11,400	10,900
Construction	7,500	8,200	8,400	8,200	9,600	9,200	10,100	10,800	9,100	8,800	8,800
Manufacturing	10,100	10,200	10,200	10,600	10,600	10,500	10,400	10,100	10,600	9,900	9,600
Transportation and Public Utilities	7,500	8,000	8,000	7,900	8,400	8,700	8,900	9,100	8,500	8,800	8,400
Wholesale Trade	7,600	7,300	6,800	6,800	7,100	7,700	8,400	8,800	8,200	7,900	7,900
Retail Trade	30,400	30,900	31,400	31,500	32,300	31,900	32,600	33,800	33,600	33,000	33,000
Finance Insurance and Real Estate	5,500	5,600	6,000	5,900	6,200	6,100	6,300	6,100	5,900	5,800	5,900
Services	27,700	28,900	30,600	32,800	33,600	34,300	36,600	39,800	40,000	38,600	38,000
Government	34,400	36,300	38,700	40,300	40,700	42,400	44,000	45,600	45,500	45,700	46,700
Total	**174,600**	**178,700**	**180,200**	**184,300**	**193,300**	**193,200**	**200,200**	**207,400**	**204,900**	**203,500**	**200,900**

Source: State of California Employment Development Department and SKMG

File: DEMOG2[illegible]K4

EXHIBIT 5

HISTORICAL UNEMPLOYMENT RATES
KERN AND LOS ANGELES COUNTIES

YEAR	KERN COUNTY	LOS ANGELES COUNTY
1990	10.7%	5.8%
1991	11.9%	8.0%
1992	15.5%	9.6%
1993	15.8%	9.7%
1994	14.7%	9.4%
1995	13.8%	7.9%

Source: State of California Employment Development Department and SKMG

File: DEMOG2.WK4

EXHIBIT 6

Desert Region Population Trends (1990 - 1994)

	Actual Population Growth					Percent Change From Prior Year			
	1990	1991	1992	1993	1994	1991	1992	1993	1994
California City	5,929	7,196	7,925	8,601	8,741	21.4%	10.1%	8.5%	1.6%
Boron CDP	2,304	2,128	2,105	2,096	2,093	-7.6%	-1.1%	-0.4%	-0.1%
Mojave CDP	3,763	3,796	3,824	3,923	3,925	0.9%	0.7%	2.6%	0.1%
North Edwards CDP	1,285	1,287	1,299	1,312	1,311	0.2%	0.9%	1.0%	-0.1%
Outside City/ CDP	2,764	2,753	2,831	2,773	2,775	-0.4%	2.8%	-2.0%	0.1%
Cal City/Mojave Subtotal	16,045	17,160	17,984	18,705	18,845	6.9%	4.8%	4.0%	0.7%
Rosamond CDP	7,430	8,622	10,085	10,849	10,944	16.0%	17.0%	7.6%	0.9%
Edwards AFG CDP	7,423	7,569	7,718	7,984	8,881	2.0%	2.0%	3.4%	11.2%
Outside CDP's	1,962	2,331	2,410	2,467	2,470	18.8%	3.4%	2.4%	0.1%
Greater Rosamond Subtotal	16,815	18,522	20,213	21,300	22,295	10.2%	9.1%	5.4%	4.7%
Indian Wells Valley Subtotal	36,109	36,715	37,646	38,455	38,456	1.7%	2.5%	2.1%	0.0%
Desert Region Total	68,969	72,397	75,843	78,460	79,596	5.0%	4.8%	3.5%	1.4%
Kern County	543,477	560,562	584,086	602,954	617,004	3.1%	4.2%	3.2%	2.3%

Note: Desert Region consists of Indian Wells Valley, California City/Mojave and Greater Rosamond
Indian Wells includes Ridgecrest and surrounding area.
California City/Mojave includes California City, Boron, Mojave, North Edwards, and surrounding areas.
Greater Rosamond includes Rosamond, Edwards Air Force Base and surrounding areas.

Source: Kern County Council of Governments and SKMG

File: DEMOG2.WK4

EXHIBIT 7

INDEX OF MARKET PRICES OF EXISTING SINGLE FAMILY HOMES

	1990	1991	1992	1993	1994	1995	1996
Los Angeles County	100.0	94.7	92.3	86.1	80.2	77.3	75.7
Palmdale-Lancaster	100.0	89.7	84.0	77.6	71.5	67.7	64.5

Source: Real Estate Research Council of Southern California Semi-Annual Home Price Surveys and SKMG

File: DEMOG2.WK4

EXHIBIT 8

Desert Region Housing Units Trends (1990 - 1994)

	Actual Housing Unit Growth					Percent Change From Prior Year			
	1990	1991	1992	1993	1994	1991	1992	1993	1994
California City	2,384	2,884	3,154	3,288	3,450	21.0%	9.4%	4.2%	4.9%
Boron CDP	937	946	947	950	953	1.0%	0.1%	0.3%	0.3%
Mojave CDP	1,530	1,531	1,532	1,545	1,546	0.1%	0.1%	0.8%	0.1%
North Edwards CDP	470	480	485	491	493	2.1%	1.0%	1.2%	0.4%
Outside City/ CDP	1,239	1,272	1,305	1,276	1,299	2.7%	2.6%	-2.2%	1.8%
Cal City/Mojave Subtotal	6,560	7,113	7,423	7,550	7,741	8.4%	4.4%	1.7%	2.5%
Rosamond CDP	3,117	3,568	4,046	4,279	4,661	14.5%	13.4%	5.8%	8.9%
Edwards AFG CDP	2,107	2,107	2,107	2,107	2,107	0.0%	0.0%	0.0%	0.0%
Outside CDP's	846	875	905	934	957	3.4%	3.4%	3.2%	2.5%
Greater Rosamond Subtotal	6,070	6,550	7,058	7,320	7,725	7.9%	7.8%	3.7%	5.5%
Indian Wells Valley Subtotal	14,423	14,735	14,993	15,201	15,378	2.2%	1.8%	1.4%	1.2%
Desert Region Total	27,053	28,398	29,474	30,071	30,844	5.0%	3.8%	2.0%	2.6%
Kern County	198,636	202,710	206,807	210,928	215,165	2.1%	2.0%	2.0%	2.0%

Note: Desert Region consists of Indian Wells Valley, California City/Mojave and Greater Rosamond
Indian Wells includes Ridgecrest and surrounding area.
California City/Mojave includes California City, Boron, Mojave, North Edwards, and surrounding areas.
Greater Rosamond includes Rosamond, Edwards Air Force Base and surrounding areas.

Source: Kern County Council of Governments and SKMG

Exhibit 9

HISTORICAL HOUSING VALUE TRENDS, MOJAVE AND ROSAMOND REGIONS 1980-1996

	MOJAVE AREA					ROSAMOND AREA				
YEAR	NUMBER REPORTED SALES	PRICE RANGE LOW	PRICE RANGE HIGH	AVERAGE SALES PRICE	MEDIAN SALES PRICE	NUMBER REPORTED SALES	PRICE RANGE LOW	PRICE RANGE HIGH	AVERAGE SALES PRICE	MEDIAN SALES PRICE
1980	---	---	---	---	---	2	$52,500	$62,500	$57,500	$57,500
1981	1	$67,000	$67,000	$67,000	$67,000	1	$63,000	$63,000	$63,000	$63,000
1982	---	---	---	---	---	---	---	---	---	---
1983	---	---	---	---	---	1	$40,000	$40,000	$40,000	$40,000
1984	2	$61,000	$69,500	$65,250	$65,250	2	$55,000	$67,500	$61,250	$61,250
1985	1	$22,500	$22,500	$22,500	$22,500	1	$40,000	$40,000	$40,000	$40,000
1986	5	$36,500	$69,500	$49,200	$43,000	12	$40,000	$93,000	$57,750	$55,750
1987	8	$10,000	$76,000	$46,938	$58,250	17	$42,500	$95,500	$63,676	$65,000
1988	15	$29,000	$87,500	$63,967	$70,000	19	$30,500	$155,000	$79,158	$70,000
1989	15	$30,000	$92,000	$61,033	$56,500	19	$27,500	$236,500	$106,974	$103,000
1990	25	$26,000	$95,500	$66,228	$67,000	77	$54,000	$218,000	$107,031	$105,000
1991	16	$35,000	$120,000	$64,906	$66,750	86	$60,000	$159,000	$98,967	$98,000
1992	34	$33,500	$135,000	$63,779	$59,250	252	$16,000	$295,000	$101,617	$100,000
1993	31	$20,500	$83,000	$55,774	$55,000	164	$49,500	$285,000	$99,555	$100,000
1994	26	$10,000	$145,000	$50,741	$47,500	254	$6,500	$165,000	$93,903	$95,000
1995	24	$15,000	$82,000	$49,625	$46,250	210	$28,000	$275,000	$89,800	$86,000
1996 1/	9	$25,000	$76,500	$48,550	$46,500	83	$26,000	$205,000	$78,741	$75,500
TOTAL CHANGE 1980-96 /2										
ACTUAL				($18,450)	($20,500)				$21,241	$18,000
PERCENT				-27.5%	-30.6%				36.9%	31.3%
TOTAL CHANGE 1991-96										
ACTUAL				($16,356)	($20,250)				($20,226)	($22,500)
PERCENT				-25.2%	-30.3%				-20.4%	-23.0%

Notes:

1/ Based on data available for January through June 1996.

2/ Total change for Mojave Region based on 1981 figures as there were no reported sales in 1980.

Source: TRW REDI Property Data and Sedway Kotin Mouchly Group

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SOLEDAD MOUNTAIN PROJECT
MOJAVE, KERN COUNTY
CALIFORNIA

PRECONSTRUCTION DESIGN STUDY

March, 1997

Prepared for:

Golden Queen Mining Company
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Prepared by:

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I. INTRODUCTION

The Soledad Mountain Project will use a number of chemicals considered hazardous[1] under Federal and/or State regulations, such as the Federal Emergency Planning and Community Right to Know Act (EPCRA).[2] California implemented certain provisions of EPCRA through the Waters Bill.[3] In addition to defining certain chemicals as hazardous, EPCRA also lists chemicals which may pose a significant risk to the community in the event of a release. These are termed extremely hazardous chemicals. California had previously promulgated regulations which required businesses handling extremely hazardous chemicals[4] above specified threshold quantities to prepare Risk Management and Prevention Plans (RMPPs). The RMPPs included a report and analysis of past accidents involving the subject extremely hazardous chemical, information about the equipment used to handle the chemical, and controls and procedures to minimize the risks posed by the handling of the chemical. A foundational element of the RMPP was a hazards analysis which considered the system-specific probability of a catastrophic release of the subject extremely hazardous chemical and impact such a release could have on the surrounding community.

As authorized by the 1990 Clean Air Act Amendments, the United States Environmental Protection Agency (EPA) promulgated the Risk Management Program (RMP) regulations[5] in 1996 which were substantially the same as the existing California RMPP program. The Federal RMP program applies to a list of regulated substances. The California Legislature has replaced the RMPP program with the RMP program and sought primacy of the Federal

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1 The terms "hazardous chemical," "hazardous material" and "hazardous substance" are used interchangeably herein, unless otherwise noted.

2 40 CFR Part 355

3 California Health & Safety Code §25500 et. seq.

4 The California regulation actually applied to "acutely hazardous materials," which were defined as any chemical defined as an extremely hazardous chemical under EPCRA.

5 40 CFR Part 68

RMP program.[6] Under California's RMP program, the list of regulated substances includes certain EPCRA extremely hazardous chemicals, in addition to those chemicals listed under the Federal RMP program.

The Soledad Mountain Project will utilize two chemicals which later may be regulated under California's RMP program: sodium cyanide (NaCN) and propane (C_3H_8). Although preliminary engineering has not yet been completed for the project, the processes which will handle these chemicals are common in the mining industry. This preconstruction design study considers these general processes and addresses:

- Utilization
- Receipt
- Storage
- Quantities present
- Plant design standards and configuration

The study also identifies reasonably foreseeable upsets or accidents.

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6 California Health & Safety Code §25530 et. seq.

II. PROPANE

Propane, or liquefied petroleum gas (LPG), is a compressed or liquefied gas usually comprised of propane, some butane and small quantities of other light hydrocarbons and impurities. The propane used at Soledad Mountain will be received from a local supplier with a trace quantity of mercaptan (thiol) as a "stench additive" to make the presence of propane noticeable.

LPG is proposed for storage and utilization in the following locations:

Location	Gas-Fired Equipment	Tank Capacity (gal WC)
Administration	Forced air heaters Water heaters	500
Laboratory	Forced air heaters Water heaters Sample drying ovens	500
Mining shop/warehouse	Forced air heaters Radiant heaters Water heaters	500
Process shop/warehouse	Forced air heaters Radiant heaters Water heaters	500
Process wet plant	Forced air heaters Radiant heaters	N/A
Process gold room	Indirect fired retort Direct fired smelting furnace	2,000

Note: gal WC = gallons water capacity. Working capacity = 80% gal WC

Electric forced air heaters, water heaters and indirect fired retort may be purchased rather than LPG-fired units, depending upon the competitive tender during the procurement phase of project development.

LPG will be delivered from the Mojave or Bakersfield areas approximately once or twice per week in the form of a liquid, assuming 1,400 gallon tanker trucks are used. Delivery will be made by the supplier in DOT-approved transport tankers. The site will be accessed by way of State Route 14 and Silver Queen Road. Onsite safety and security policies, ensuring compliance with regulations, will apply, including check-in and vehicle escort to the point of delivery, if required.

The LPG will be stored at the various locations (listed above) in ASME-approved stationary horizontal or vertical tanks. Maximum total onsite storage of LPG will be approximately 3,200 gallons.

The proposed facility will be engineered, designed and constructed in accordance with applicable codes and standards, including:

- Uniform Building Code (UBC)
- National Electrical Code (NEC)
- National Fire Protection Association (NFPA)
- American Society of Mechanical Engineers (ASME)
- Mine Safety and Health Administration (MSHA)
- National Institute for Occupational Safety and Health (NIOSH)
- Uniform Mechanical Code
- Uniform Plumbing Code
- National LP-Gas Association

The design standard for the tankage will comprise ASME code vessels in open air, mounted at ground level on concrete plinths. Suitably sized traffic barriers will protect the installation from vehicle traffic and mobile equipment.

The tanks will be equipped with pressure relief valves, and the transition piping between buried and above ground levels will be completed with flexible tubing. A tanker fill bulkhead will be installed for the 2,000 gallon tank location. A "breakaway" type fill valve

will be installed to shut down the system in the event the delivery truck is inadvertently moved while its fill hose is still attached to the fixed bulkhead. Attendance by trained personnel will be continuous during the delivery process.

In addition to onsite fire fighting equipment and capability, a deluge-type sprinkler system will be installed at each tank to prevent a boiling liquid expanding vapor explosion (BLEVE) in the event a fire occurs.

Reasonably foreseeable upset or accident conditions, causes and controls are summarized in the table below:

Upset or Accident Condition	Cause	Possible Results	Controls
Delivery truck accident or rollover (off-site).	Human error	Tank rupture, release to atmosphere and/or fire.	DOT-approved/ASME code vessel. Trained drivers.
Delivery truck accident or rollover (onsite).	Human error	Tank rupture, release to atmosphere and/or fire.	DOT-approved/ASME code vessel. Vehicle escort, site safety policy (speed limit, specified travel areas, etc.). Trained drivers.
Delivery truck roll away or driven away with fill hose connected.	Human error	System shut down.	Breakaway valve and tether.
Differential settlement or ground movement.	Earthquake	Tank must be re-leveled.	Flexible tubing between tank and buried piping.
Fire at tankage.	Human error	Unauthorized welding/ cutting or open flames.	Sign posting, policy and safety training. Hot work permits.
Fire at tankage.	Human error	BLEVE	Deluge-type sprinkler system, tank mount PRV.

III. SODIUM CYANIDE

Sodium cyanide is a synthetic compound comprised of sodium, carbon and nitrogen, manufactured in liquid form, dehydrated and pelletized or briquetted to minimize dusting. Dry solid sodium cyanide contains minor impurities, primarily magnesium and chloride, as well as other cations and anions with affinities to salt formation. The cyanide radical (CN^-) is used primarily in the manufacture of steel, chemicals and polymers. This radical is also a powerful oxidant used in the dissolution of stable metals. Water soluble and stable in aqueous solutions of elevated pH, cyanide is proposed to be used in dilute liquid form ($\leq$ 250 ppm) at Soledad Mountain.

Sodium cyanide is a fast acting poison that can cause death quickly at low levels of exposure. The chemical toxicity stems from its ability to inhibit specific processes in body cells by restricting oxygen use in cellular respiration, particularly in cells in the brain and heart. Poisoning can result from: breathing cyanide gas, dust, or solution; adsorption through the skin, particularly the eyes and membranes, and feet; and from ingestion. Cyanide is not a cumulative poison or a carcinogen. Furthermore, it is believed that there are no chronic effects of cyanide poisoning unless repeated, prolonged exposures above established limits were to occur. With prompt treatment, recovery from overexposure is normally quick and complete.[7]

Sodium cyanide solution is proposed to be stored or processed through the following tanks:

Point of Use	Storage	Tankage (gal WC)
Cyanide storage tank	30% solution	40,000
Barren solution tank	Dilute (~250 ppm) solution	750,000
Pregnant solution tank	Dilute (~250 ppm) solution	250,000

Note: gal WC = gallons water capacity; maximum storage = 21,000 gallons; allowing 2 feet freeboard

7 DuPont Chemicals, *Sodium Cyanide: Properties, Uses, Storage and Handling*, 1993.

Sodium cyanide will be received in bulk as a dry solid from a supplier outside the State of California. It is anticipated that deliveries will be made at an average frequency of once per week, based on 20 ton loads. Delivery of the solid will be made in a single compartment, DOT-approved tanker truck. Access to the project site will be made on the main access road after exiting State Route 14 at Silver Queen Road. Onsite safety and security policies, ensuring compliance with regulations, will apply, including check-in, induction and vehicle escort to the point of delivery, if required.

Upon arrival at the point of delivery, the tanker truck will be driven onto a curbed, concrete containment area in preparation for in-tanker solubilization and transfer. The 40,000 gallon sodium cyanide solution storage tank will be filled to the appropriate level with barren process solution at the dilute cyanide concentration (approximately 250 ppm [CN^-]) and a pH greater than 10.5. This solution is then circulated through the tanker in a closed loop until the solid sodium cyanide is dissolved. The form of storage of the resultant 24,000 ppm (CN^-) solution will be in the closed 40,000 gallon cyanide storage tank, located within a curbed, concrete containment area.

A process flow diagram of the heap leach system is shown in Exhibit 1. The system will be engineered, designed and constructed in accordance with applicable codes and standards, including:

- Uniform Building Code (UBC)
- National Electrical Code (NEC)
- National Fire Protection Association (NFPA)
- American Society of Mechanical Engineers (ASME)
- Mine Safety and Health Administration (MSHA)
- National Institute for Occupational Safety and Health (NIOSH)
- Uniform Mechanical Code
- Uniform Plumbing Code

The design for the cyanide storage tank will comprise an open air, fully closed, flat bottom tank of mild steel construction, with suitable aspect ratio to prevent overturning. The tank will be landed on a concrete pedestal inside a monolithic concrete, curbed containment area allowing free drainage into the leach pad in the event of tank rupture or leakage. A tanker fill bulkhead will be installed with "breakaway" type valves in both the tanker fill and return lines to shut down the system in the event the delivery truck is inadvertently moved while the hoses are still attached to the fixed bulkhead.

Concentrated solution from the cyanide storage tank (TK31) will be diluted when it is added to the circulating heap leach system for makeup at the barren solution tank (TK04). From the barren solution tank, the dilute cyanide solution will be pumped to the heap leach pads where it will be drip-applied to the heap at a rate of up to 5,400 gallons per minute. The double-lined heap leach pads will consist of a high density polyethylene (HDPE) liner atop a clay liner in accordance with Regional Water Quality Control Board requirements. The pads will be designed to contain a 100-year, 24-hour storm event. After percolating through the heap and dissolving precious metals, the pregnant solution will be collected from the toe of the lined pad and pumped to the pregnant solution tank (TK03) before being pumped to the wet plant for precious metals removal. After processing in the wet plant, the barren solution completes the cycle, returning to the barren solution tank.

Sodium cyanide dissolved in water forms a strong alkaline solution and an equilibrium between ionized sodium cyanide and highly volatile hydrogen cyanide (HCN). HCN is toxic with an OSHA workplace exposure limit of 10 ppm (8-hour average) in air. However, HCN formation can be controlled by maintaining the alkalinity, or pH, of the cyanide solution. Golden Queen will maintain an alkaline cyanide solution at 10.5 pH or greater to control HCN formation. Cement or lime will be blended with the crushed ore prior to placement on the heap. By contacting the agglomerated ore in the heap, the alkalinity of the barren solution will be maintained above the target level. Addition of cement or lime to the crushed ore will be at a manually set rate.

Should Golden Queen need to raise the pH of the cyanide solution further, liquid sodium hydroxide (NaOH) will be stored on-site (TK32). Addition of NaOH, when necessary, will also be at a manually set rate.

Because the volume of the dilute cyanide solution in the heap leaching system is so large, sudden changes will not occur. Thus, monitoring and adjustment of cyanide solution alkalinity will be manually performed.

Upset or Accident Condition	Possible Cause	Possible Results	Controls
Delivery truck accident or rollover (off-site).	Human error	Tank rupture, dry sodium cyanide spill.	DOT-approved container. Trained drivers.
Delivery truck accident or rollover (onsite).	Human error	Tank rupture, dry sodium cyanide spill.	DOT-approved vessel, vehicle escort, site safety policy (speed limit, specified travel areas, etc.). Trained drivers. Available neutralization agents.
Delivery truck roll away or driven away with fill hose connected.	Human error	System shut down.	Breakaway valves and tether.
Liquid leaks or spills in tanker area during solubilization and transfer.	Human error or materials failure	Liquid cyanide spill.	Curbed, concrete containment area, personal protective equipment (PPE). Spill response plan. Available neutralization reagents.
Low pH of solubilization liquid.	Human error	Hydrogen cyanide gas generation.	Barren solution used in solubilization, only solution made available for use. pH monitoring.
Storage tank rupture or leakage.	Materials failure or earthquake	Liquid sodium cyanide spill.	Curbed, concrete containment area. Spill response plan.
Barren or pregnant pipe rupture	Materials failure or earthquake	Liquid sodium cyanide spill	Double-walled piping and containment areas
Rupture or leakage from heap leach pad	Storm event or earthquake	Release liquid sodium cyanide to earth	Double lined heap leach pads and sizing for 100-year, 24-hour storm event.

All solution being contained or transferred will have an appropriate form of secondary containment. Tanks will be in concrete containment areas or over synthetically-lined areas. Piping will be within concrete containment areas, over synthetically-lined areas or double walled.

As shown above, the possible results from the plausible upset or accident conditions would be either: (1) release of dry sodium cyanide; (2) a release of concentrated cyanide solution from the tanker truck during solubilization or a rupture of the cyanide storage tank; or (3) release of dilute cyanide solution.

The most hazardous of these scenarios would be a release of concentrated cyanide. A release from the tank due to seismic activity, material failure, or operator error would be fully contained. The evolution of hydrogen cyanide would be largely mitigated by elevated alkalinity, minimizing any threat to the community.

Releases of dilute cyanide solution would pose a significantly lower inhalation hazard, and would also be mitigated by the operating alkalinity of 10.5 pH or greater. Releases of the dilute solution will be prevented to the maximum extent possible through the use of double-walled piping outside of contained areas and the double-lined heap leach pads. A leachate collection system will be used to monitor heap leach pad integrity.

EXHIBIT

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

RADIAL STACKER CONVEYOR (CV12)
HORIZONTAL SELF-POWERED CONVEYOR (CV11)
PORTABLE LOADER FEEDER CONVEYOR (CV10)
STANDARD CONVEYORS
OVERLAND CONVEYOR
AGGLOMERATORE
58.0

INVENTORY 90.8
PPT 7.5
EVAP 17.5
DRIP EMITTERS
860.7
HEAP LEACHING PAD
SUBMERSABLE PUMPS (SP11,12,21,22)
BOOSTER HEAD TANK (TK20,21)
BOOSTER PUMP (BP11,21)
818.0
AGGLOM.
57.9
PREGNANT SOLUTION TANK (TK03)
PREG SOLUTION PUMP (PP01)
TP05
BARREN SOLN PUMP (PP03)
545.0
BARREN SOLUTION TANK (TK04)
TP04
0.6
0.6
CYANIDE STORAGE TANK (TK31)
TP01
NaOH STORAGE TANK (TK32)
TP02
TP03
ANTI-SCALENT STORAGE TANK (TK33)

(SP01) (SP02)
WATER WELLS
HEAD TANK (TK01)
BOOSTER PUMP (CP01)
165.9
59.5
INDUSTRIAL WATER STORAGE TANK (TK02)
6.8
WET PLANT
SEE 14200R-PD002
273.0
279.7
373.6
0.1
AGGLOMERATOR
TP06
ST06
93.9

CRUSHING PLANT 2.3
LABORATORY 0.5
MINING MAINT. SHOP/WHOUSE 2.0
PROCESS MAINT. SHOP/WHOUSE 0.6
ADMINISTRATION 0.3

WET PLANT
LABORATORY
MINING MAINT. SHOP/WHOUSE
PROCESS MAINT. SHOP/WHOUSE
ADMINISTRATION

LEGEND
m/hr LIQUID
LOM OPERATING AVERAGE USED IN WATER BALANCE

NOTE: All units are metric unless otherwise indicated.

NOT FOR CONSTRUCTION

PINCOCK, ALLEN & HOLT
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Suite 200
Lakewood, Colorado 80228

GOLDEN QUEEN MINING COMPANY
SOLEDAD MOUNTAIN PROJECT

HEAP LEACH FLOW DIAGRAM

SIZE D | FSCM NO. | DWG NO. 14200DR-PD003 | REV
SCALE NONE | GQ_HEP | SHEET 1 OF 1