4.7 Recordkeeping

This section describes recordkeeping procedures that will be followed during the removal and restoration activities at the Site, including daily field notes, the project permit book, and field and laboratory material characterization activities.

4.7.1 Daily Field Notes

Daily field notes, consisting of the following forms, will be produced during Site removal and restoration activities:

- Site visitor form – All site visitors will be required to sign in and out of the Site.
- Daily tailgate form - The daily tailgate form will document the days planned activities and health and safety discussions. This form will be signed by all Site visitors (form included in Site HASP).
- Field log - The field log will document Site activities, which includes, but not limited to, work completed, volumes excavated, materials leaving the Site, phone log, and decisions made in the field.
- Air monitoring log - Real time air monitoring and dust monitoring will be recorded daily (log included in the Site HASP).
- Off-site truck log - Off-site truck logs will contain the date, time, truck, material leaving the Site and the manifest for the load, if appropriate. It will be paired with a receiving log for materials imported to the Site, such as cap fill material.
- Photo log - Photo logs will be digital images of the progress of work throughout the day. Site photos as well as detailed photos will be organized chronologically and maintained electronically.

All of the Site daily field logs will be kept by the construction manager during Site construction activities, and will be provided to the project manager following completion of construction, for placement into the project file.

4.7.2 Permit Book

A record of all project approvals and permit conditions will be created as they are obtained and a "*Permit Book*" will be developed that contains all certified and signed permissions and exemptions, and a complete list of conditions and BMPs that are to be adhered to during construction. A hard copy of the Permit Book will remain on Site during construction, and copies will be distributed to appropriate responsible parties and contractor leads.

Following completion of removal and restoration activities, the Permit Book will be incorporated into the project file by the project manager.

4.7.3 Field and Laboratory Material Characterization Data Management

Data generated in the field may include field logbook entries, sample dates, field parameter measurements, observations, and additional information (such as field duplicate number). These data will be manually entered into an electronic format, and then checked by a second person, before final inclusion in the database. Following review and acceptance, analytical data generated by the subcontract laboratories will be obtained as an electronic data deliverable for import into the project database.

5.0 PROJECT SCHEDULE

Due to the nature of the removal actions presented herein, the implementation of the bulk of fieldwork will be limited to the dry construction season months of May through October. Considering these conditions, a conceptual project implementation schedule has been prepared based on potential implementation during the 2013 construction season as the earliest possible implementation time-frame. The project schedule is presented on Figure 5-1.

6.0 LIMITATIONS

This document was prepared for the exclusive use of Sunoco (R&M) Inc. (Sunoco) and the Central Valley Regional Water Quality Control Board (CVRWQCB) for the express purpose of complying with a regulatory directive for environmental investigation and development of a Site Remediation Work Plan. SGI and Sunoco must approve any re-use of this work product in whole or in part for a different purpose or by others in writing. If any such unauthorized use occurs, it shall be at the user's sole risk without liability to SGI or Sunoco. To the extent that this report is based on information provided to SGI by third parties, including Sunoco, their direct contractors, previous workers, and other stakeholders, SGI cannot guarantee the completeness or accuracy of this information, even where efforts were made to verify third-party information. SGI has exercised professional judgment to collect and present findings and opinions of a scientific and technical nature. The opinions expressed are based on the conditions of the Site existing at the time of the field investigation, current regulatory requirements, and any specified assumptions. The presented findings and recommendations in this report are intended to be taken in their entirety to assist Sunoco and the CVRWQCB personnel in applying their own professional judgment in making decisions related to the property. SGI cannot provide conclusions on environmental conditions outside the completed scope of work. SGI cannot guarantee that future conditions will not change and affect the validity of the presented conclusions and recommended work. No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, conclusions, and recommendations.

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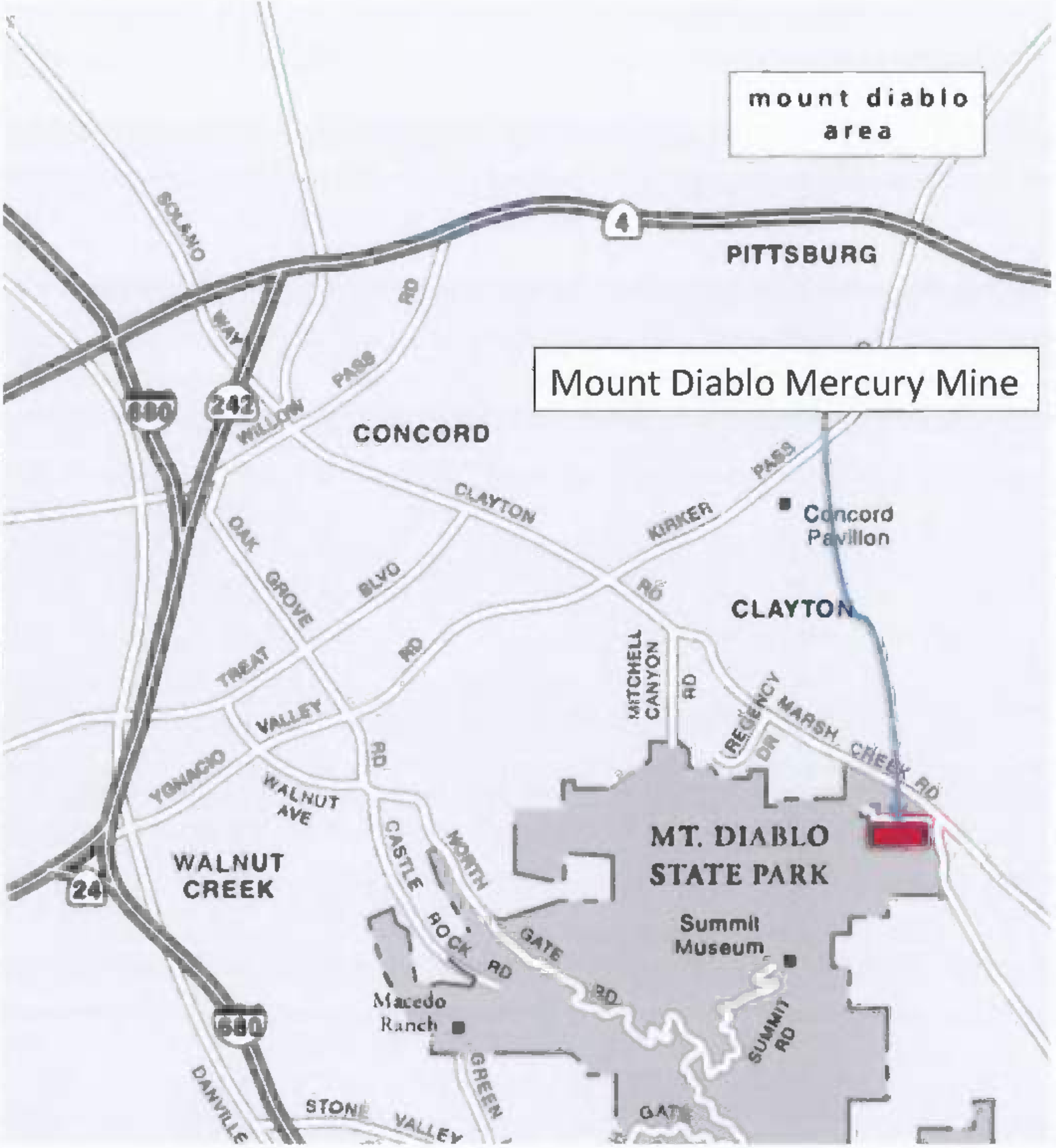
FIGURES



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PLEASANT HILL, CA 94523

MOUNT DIABLO MERCURY MINE
2430 Morgan Territory Road
Contra Costa County, Calif

SITE LOCATION MAP

FILE NAME	DATE	DR. BY:	APP. BY:	PROJECT No.	FIGURE
Diablo RP Figures Landscape.pptx	05/08/12	PDH	PDH	01-SUN-050	2-1

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

2004 AERIAL PHOTO WITH MINE FEATURES

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01-SUN-055	05/03/12	GT	PH

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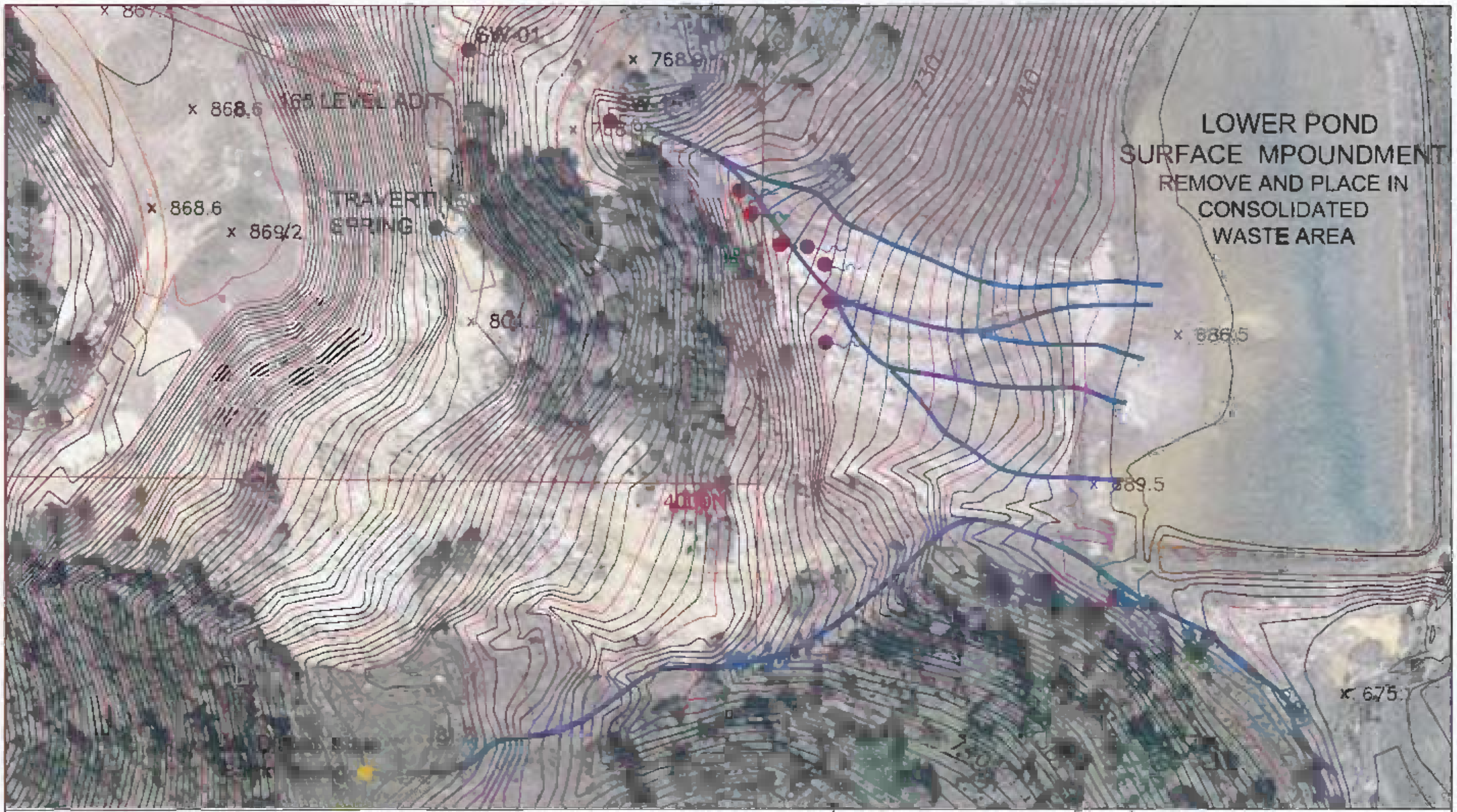
FIGURE
2-2



LEGEND

- ● SPRING DISCHARGE & SEEPS
- ● PRE-MINING LOCATION OF TRAVERTINE SPRING
- 165 LEVEL ADIT BURIED PORTAL
- TOPOGRAPHIC CONTOUR INTERVAL = 2 ft
- ● MT. DIABLO STATE PARK SPRING
- SPRING SEEPS FLOW DIRECTION

N

0 60 120
HORIZONTAL SCALE IN FEET

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

MINE SPRINGS AND SEEPS

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01-SUN-055	04/24/12	GT	PR

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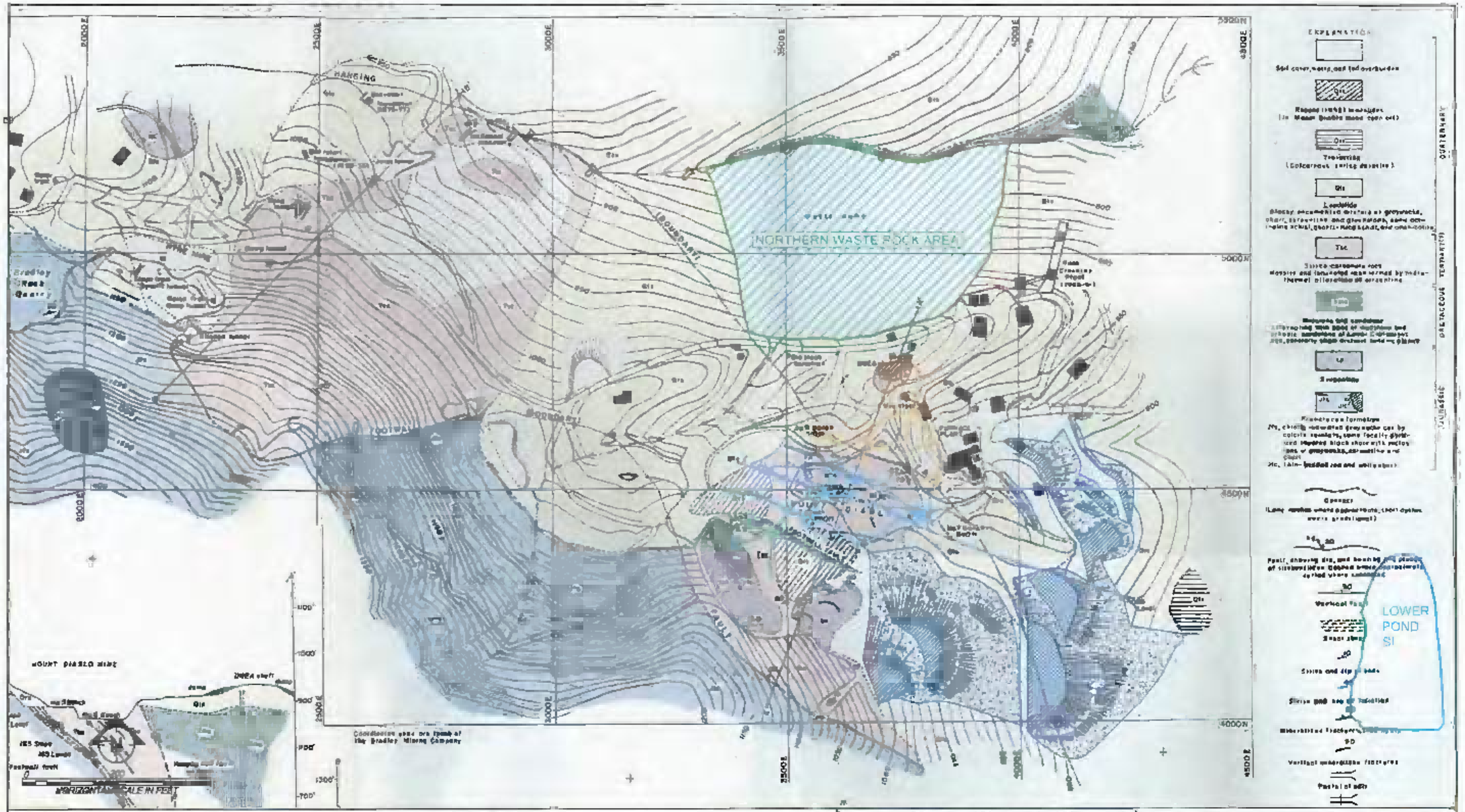
FIGURE
2-3



LEGEND

- Mine Structure (1953)
- Tailings/Waste Rock (Bradley)
- Tailings/Waste Rock (DMEA/Cordero)
- *Adit Level*
- 80-ft Level
- 165-ft Level
- 270-ft Level
- 360-ft Level

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

SITE GEOLOGY FROM PAMPEYAN

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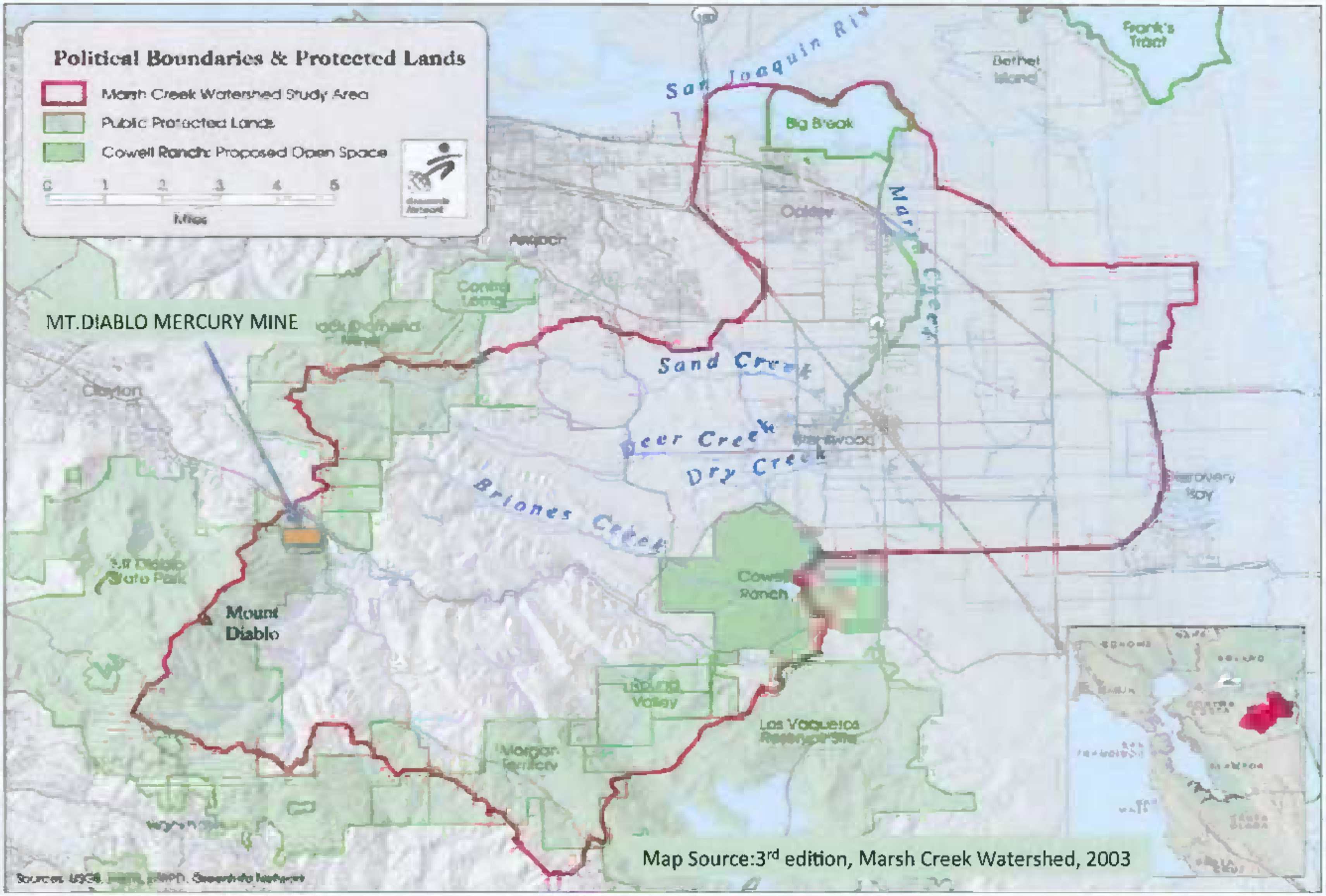
FIGURE
2-4



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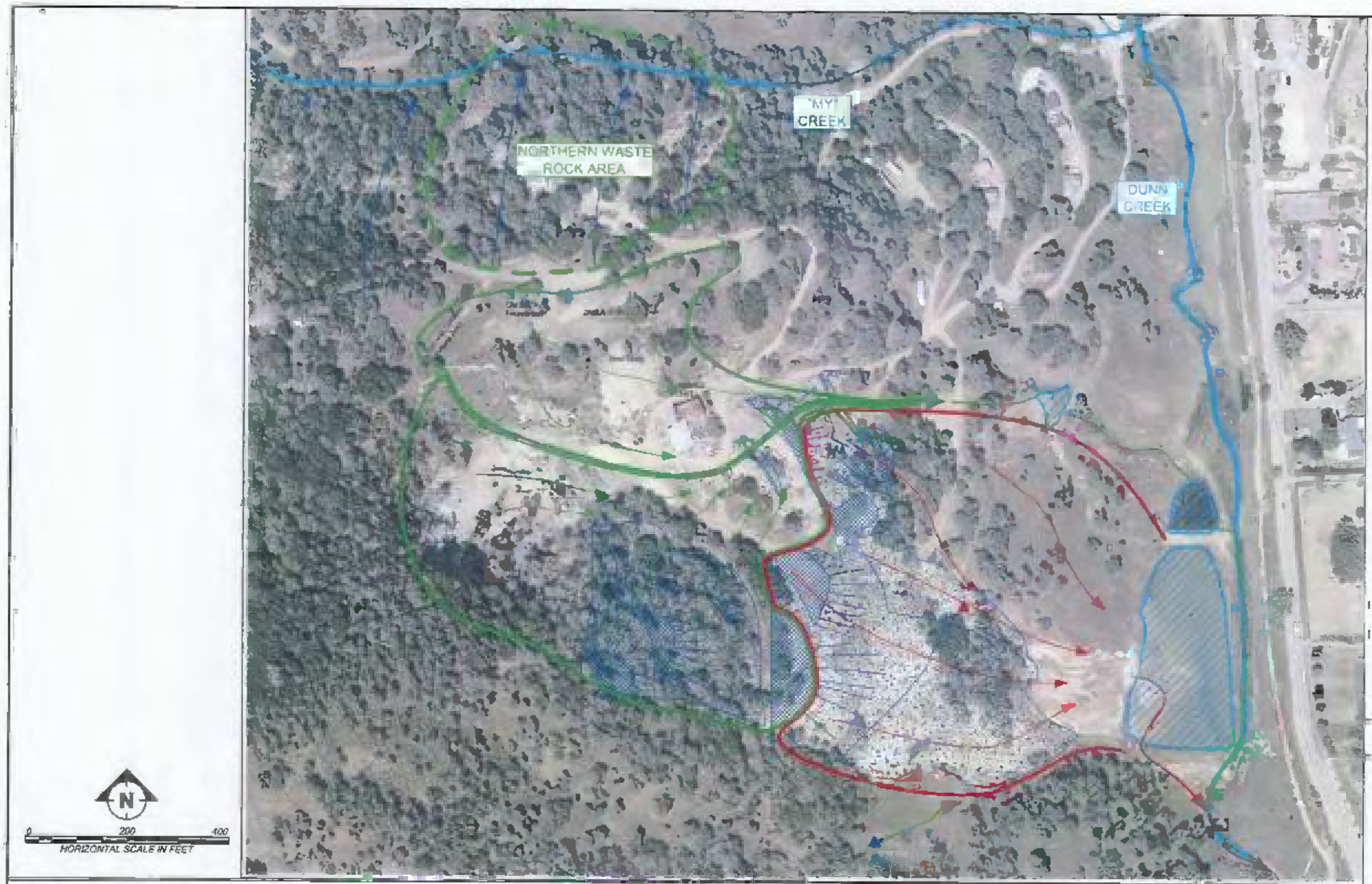
MOUNT DIABLO MERCURY MINE
2430 Morgan Territory Road
Contra Costa County, California

MARSH CREEK WATERSHED

FILE NAME	DATE	DR. BY:	APP. BY:	PROJECT No.	FIGURE
Diablo RP Figures Landscape.PPTX	05/07/12	PDH	PDH	01-SUN-050	2-5



LEGEND

▭	Mine Structure
▲	Spring
▨	Pond (2004 Configuration)
▨	Tailings/Waste Rock (Bradley)
→	Surface flow
→	Surface flow

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

SURFACE WATER DRAINAGE AND FLOW PATTERNS

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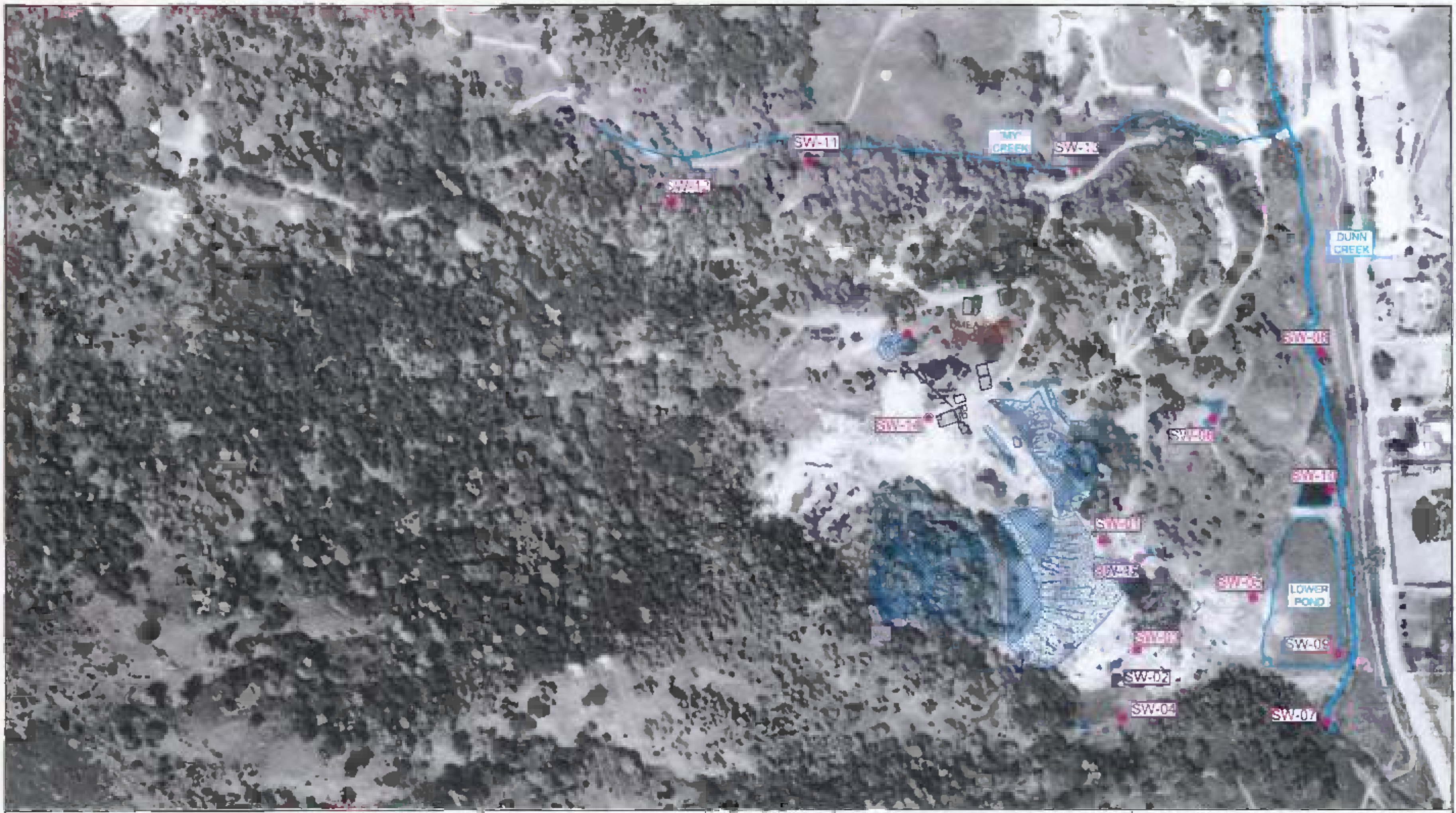
FIGURE
2-6



LEGEND

Mine Structure (1953)

Tailings/Waste Rock (BRADLEY)

● Surface Water Sample Locations

N

0 250 500
HORIZONTAL SCALE IN FEET

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

SGI SURFACE WATER SAMPLING LOCATIONS 2010

PROJECT NO	DATE	DRAWN BY:	APP. BY:
01-SUN-055	05/03/12	GT	PH

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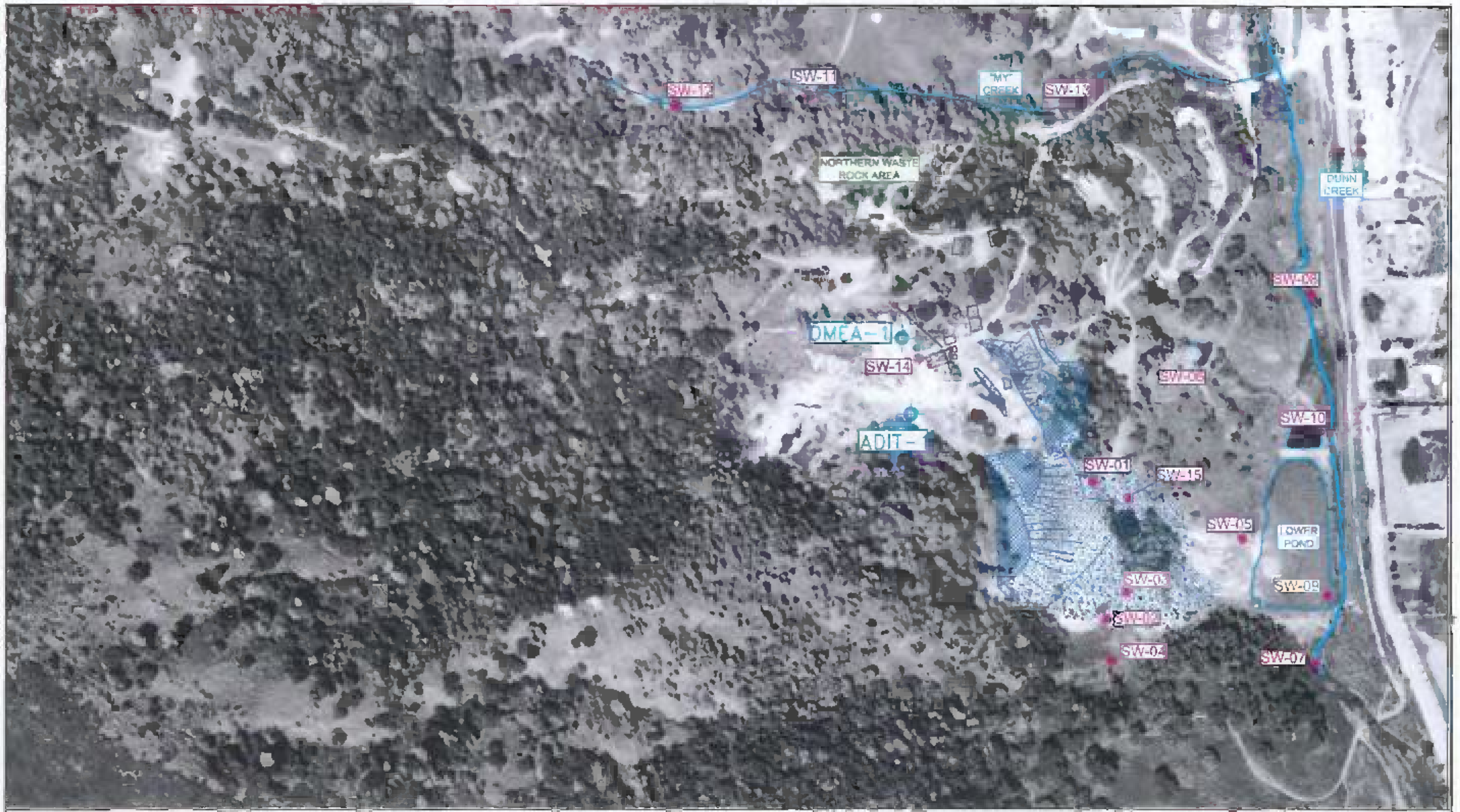
FIGURE
2-7



LEGEND

▭	Mine Structure (1953)
▨	Tailings/Waste Rock (BRADLEY)
⊕	Monitoring Well Location
◉	Surface Water Sample Location

N

0 250 500
HORIZONTAL SCALE IN FEET

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

SGI SURFACE WATER SAMPLING LOCATIONS 2011

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-SUN-055	05/03/12	GT	PH

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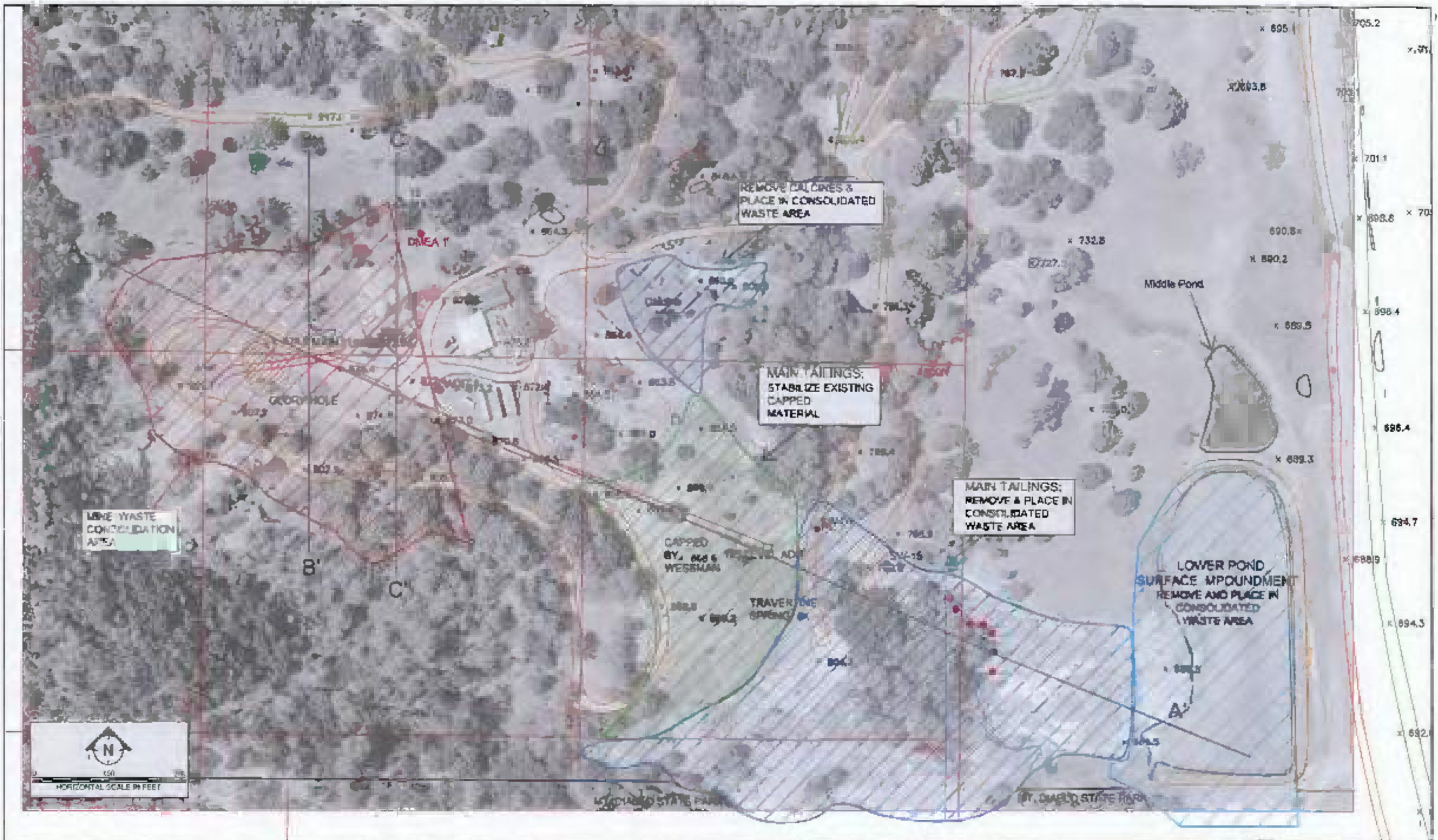
FIGURE
2-8



LEGEND

▨ AREA OF MAIN TAILINGS PROPOSED FOR REMOVAL AND CONSOLIDATION IN MAIN PIT AREA

▨ AREA OF CAPPED TAILINGS

▨ AREA OF LOWER POND FOR REMOVAL

▨ AREA OF CALCINES TO BE REMOVED AND PLACED IN CONSOLIDATED WASTE AREA

▨ MINE WASTE CONSOLIDATION FOOTPRINT

OUTLINE MIDDLE POND

A A' CROSS SECTIONS LOCATIONS

SPRING DISCHARGE & SEEPS

PRE-MINING LOCATION OF TRAVERTINE SPRING

[illegible] LEVEL ADIT BURIED PORTAL

TOPOGRAPHIC CONTOUR INTERVAL = 2 ft

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

REMEDIAL PLAN FEATURES MAP

PROJECT NO.	DATE	DRAWN BY	APP. BY
[illegible]	[illegible]	[illegible]	[illegible]

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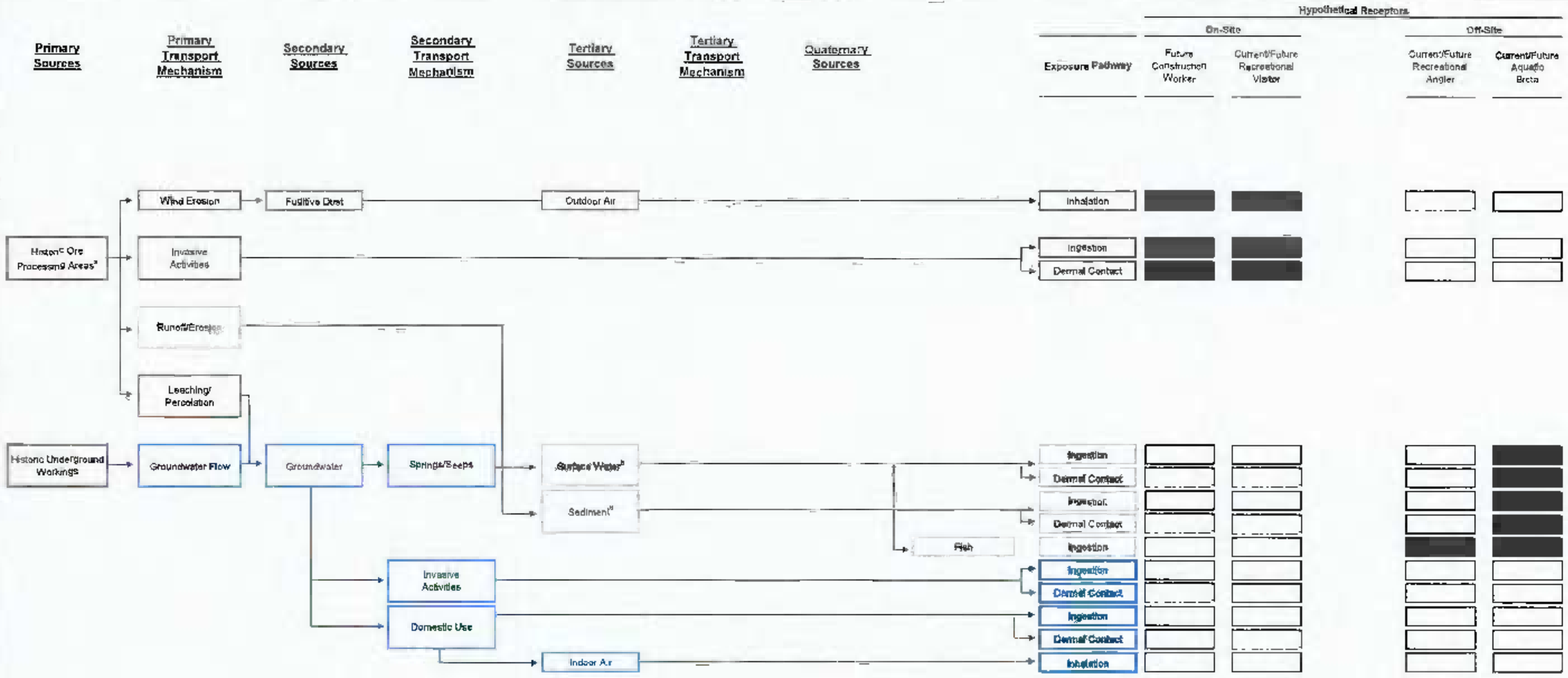
FIGURE
2-9



☐ CSM components related to soil.

☐ CSM components related to groundwater.

☐ CSM components related to surface water and sediment.

■ Receptor likely to be exposed via this route, so pathway is considered potentially complete

▨ Receptor may be exposed via this route, so pathway is considered potentially complete; however, pathway is considered minor.

☐ Pathway is incomplete, no further evaluation required.

---

[a] Historic ore processing areas include buildings, process tailings, waste rock.

[b] All surface water leaving the Mine is ultimately captured by Dunn Creek. Dunn creek flows south from the Mine Site to join Marsh Creek 0.5 miles downstream. Marsh Creek then flows approximately 11 miles to discharge into the Marsh Creek Reservoir and then into the western San Joaquin Delta at Big Break.

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CALIFORNIA

RISK SCREENING CONCEPTUAL SITE MODEL

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01-SUN-050	04/23/12	TC	[illegible]

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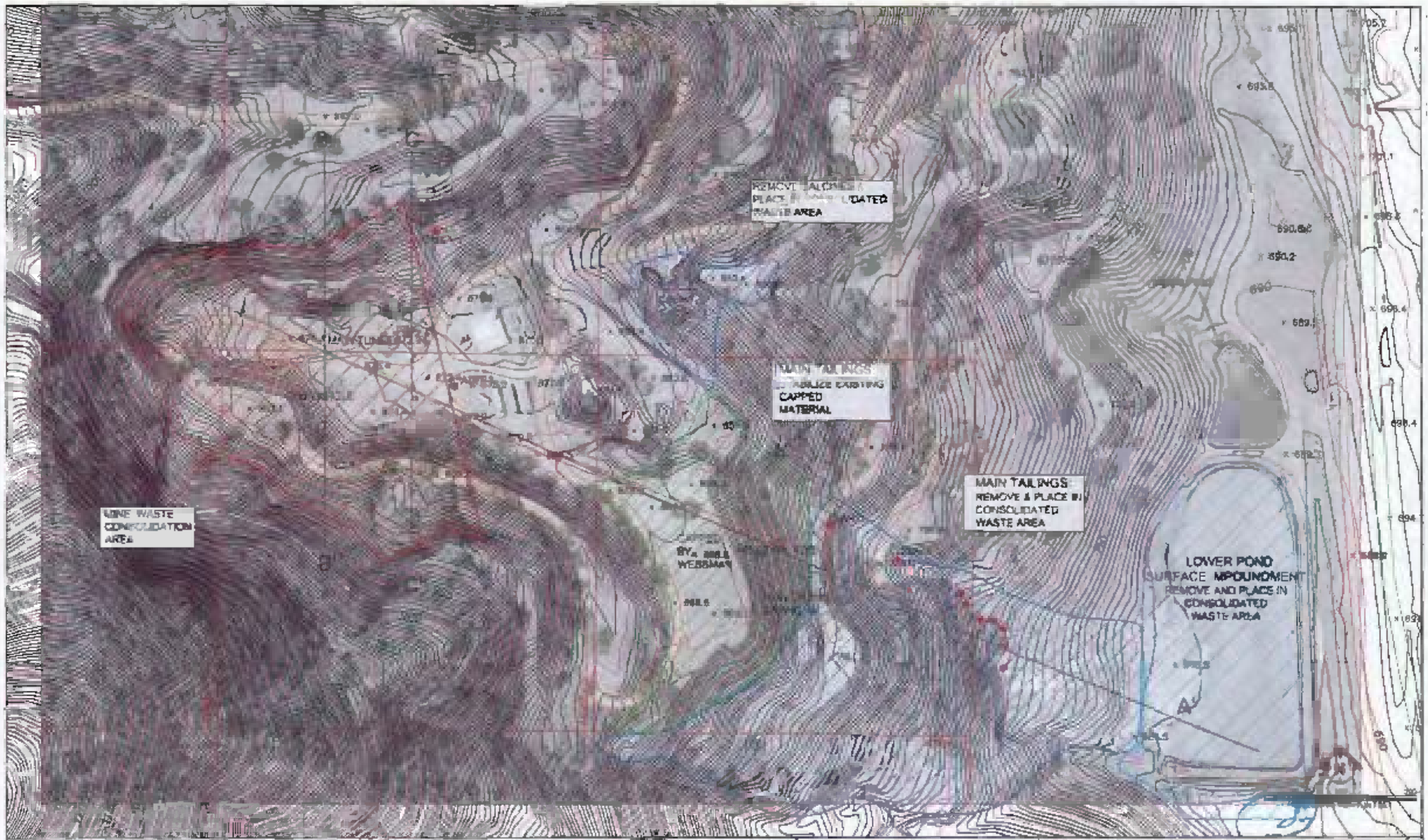
FIGURE
2-10



MOUNT DIABLO MERCURY MINE
MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

REMEDIAL PLAN FEATURES WITH TOPOGRAPHY

PROJECT NO	[illegible]	[illegible]	APP. BY:
[illegible]	[illegible]	[illegible]	[illegible]

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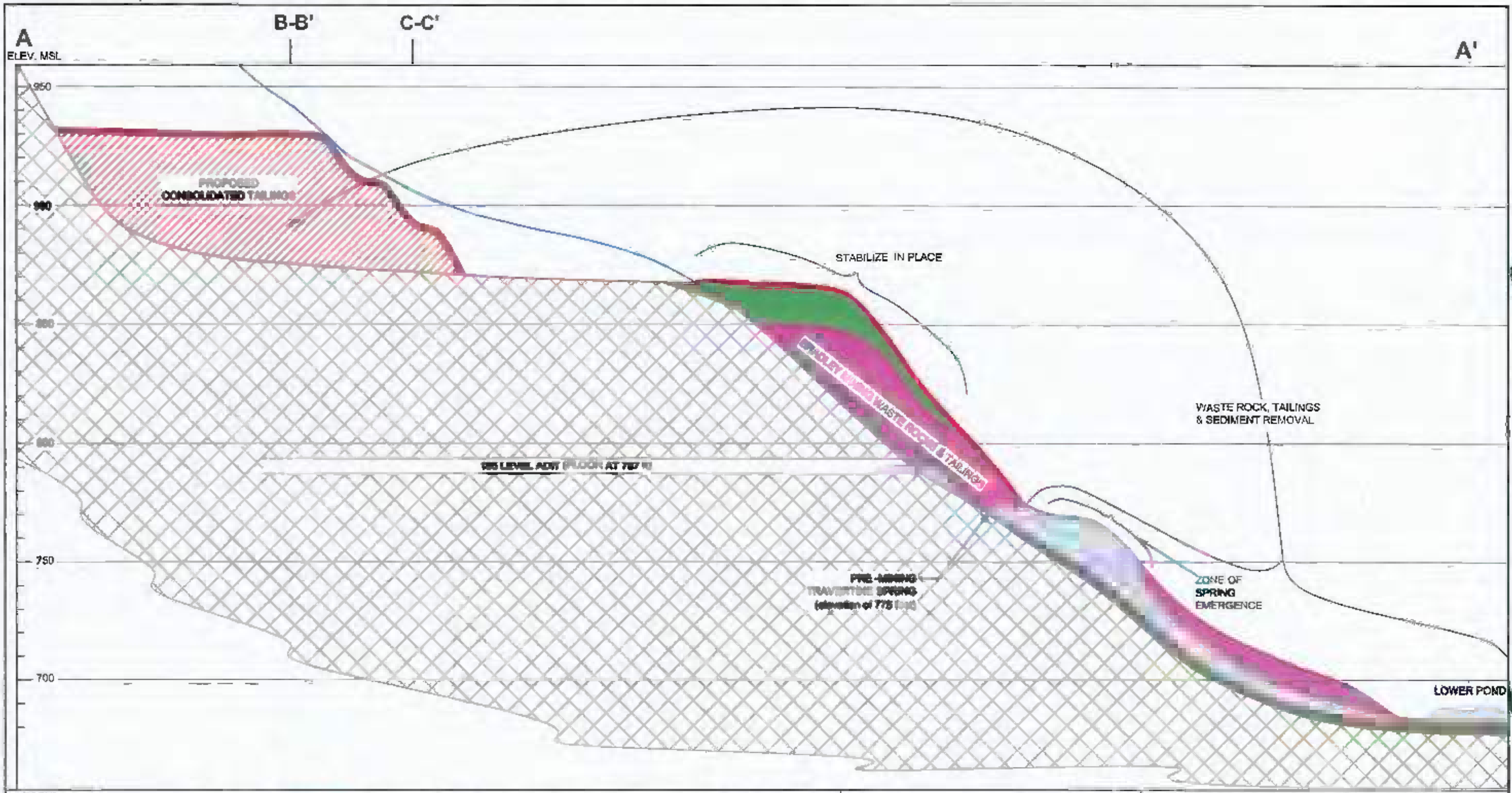
FIGURE
3-1



LEGEND

—	SITE TOPOGRAPHY [illegible]	🟩	CAPPING BY WESSMAN
—	SITE TOPOGRAPHY 1995	🟥	PROPOSED CAPPING
▨	PROPOSED CONSOLIDATED TAILINGS AND SEDIMENT	🟩	TRAVERTINE DEPOST
🟪	BRADLEY MINING ROCK AND TAILINGS	☒	BEDROCK
▭	POND AND/OR SPRING WATER		

HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"=40'

N

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CALIFORNIA

TOPOGRAPHIC CROSS SECTION A-A'

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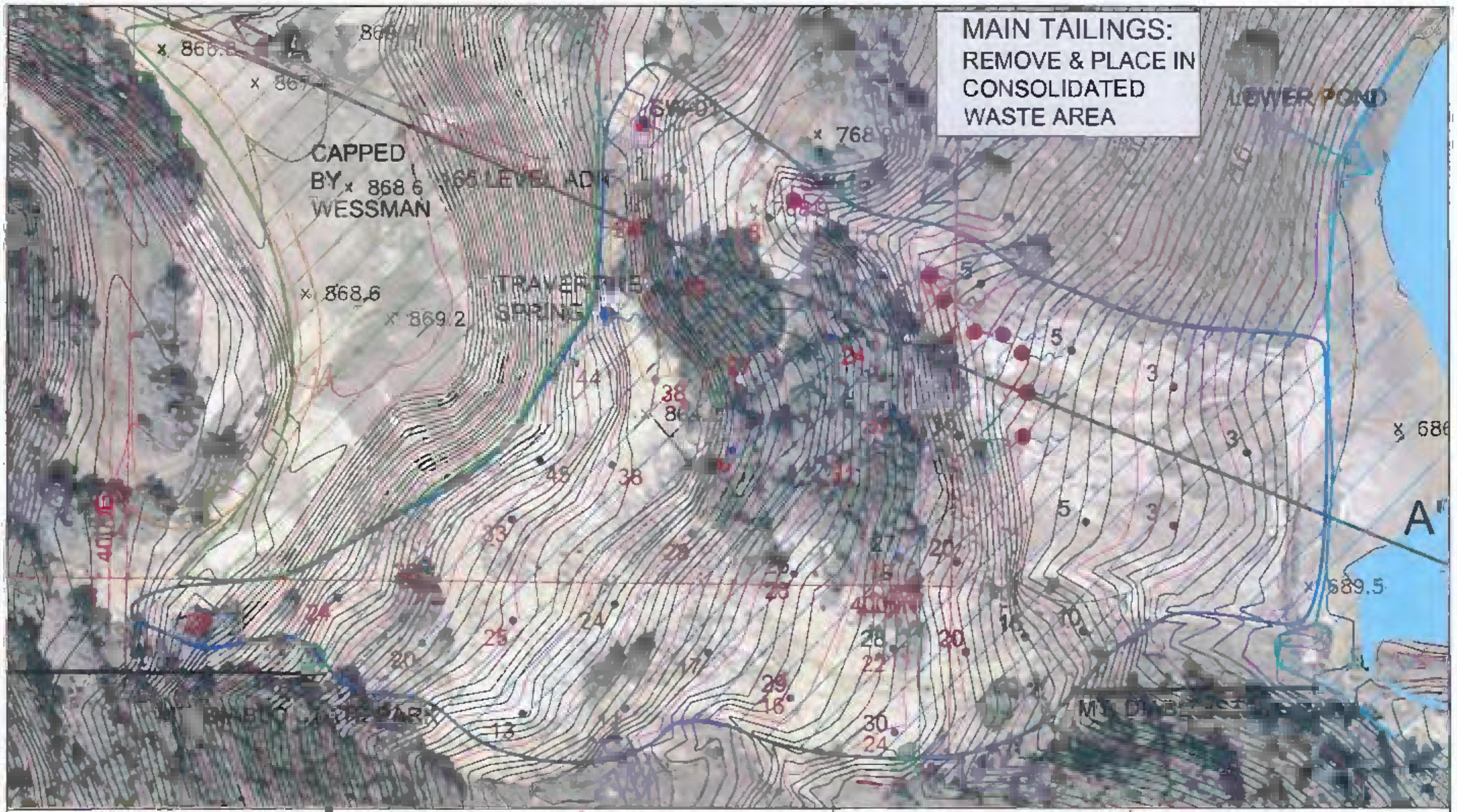
FIGURE
3-2



LEGEND

▨ OUTLINE OF AREA OF MAIN TAILINGS PROPOSED FOR REMOVAL AND CONSOLIDATION IN MAIN PIT AREA

▨ AREA OF MAIN TAILING USED TO STABILIZE EXISTING CAPPED MATERIAL

TOPOGRAPHIC CONTOUR INTERVAL = 2 ft

0 50 100
HORIZONTAL SCALE IN FEET

● WASTE THICKNESS (ft)

● ESTIMATED WASTE THICKNESS

● SPRING DISCHARGE & SEEPS

● PRE-MINING LOCATION OF TRAVERTINE SPRING

165 LEVEL ADIT BURIED PORTAL

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CA

THICKNESS MAP / MAIN TAILINGS PROPOSED FOR REMOVAL

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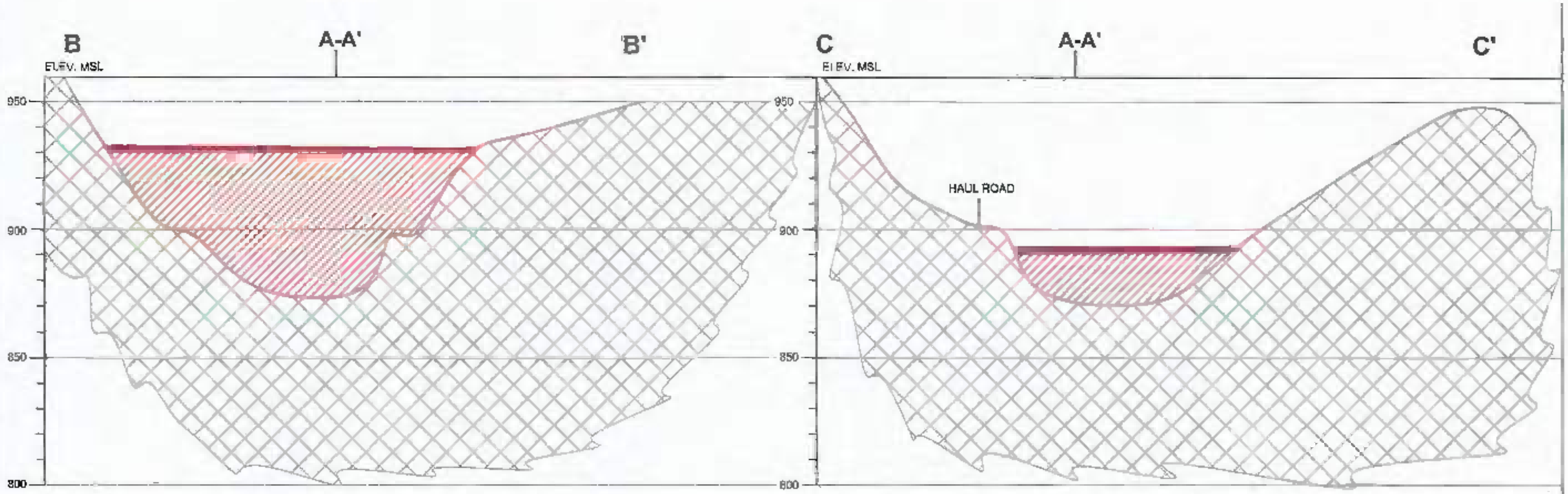
FIGURE
3-3



LEGEND

— SITE TOPOGRAPHY 2010

🟥 PROPOSED CAPPING

▨ PROPOSED CONSOLIDATED TAILINGS AND SEDIMENT

⊠ BEDROCK

HORIZONTAL SCALE: 1"=100'
VERTICAL SCALE: 1"=40'

MOUNT DIABLO MERCURY MINE
2430 MORGAN TERRITORY ROAD
CONTRA COSTA COUNTY, CALIFORNIA

CROSS SECTION B-B'
CROSS SECTION C-C'

PROJECT NO	DATE	DRAWN BY:	APP. BY:
01-SUN-0052	04/20/12	ZA	PDH

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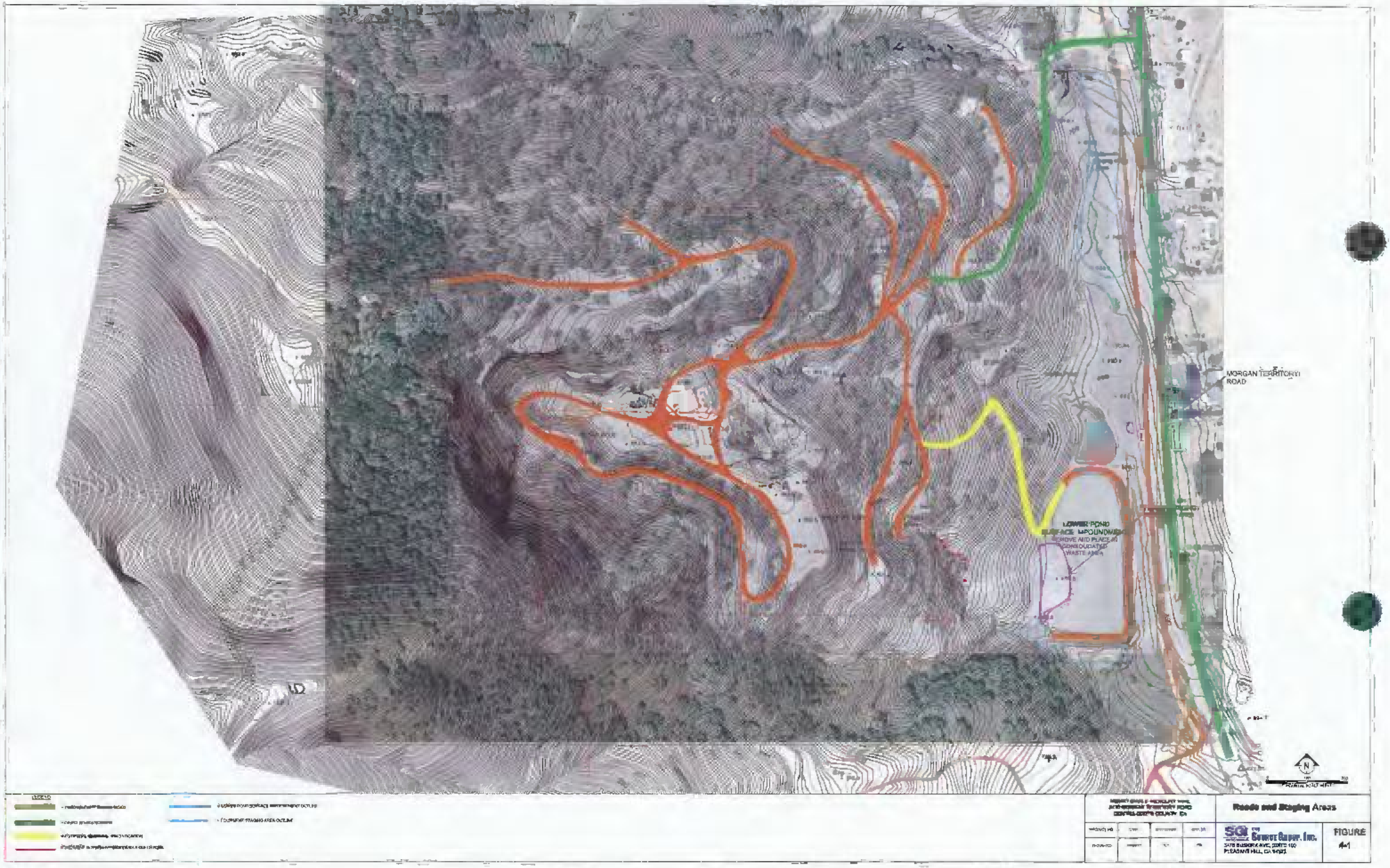
FIGURE
3-4



Roads and Staging Areas

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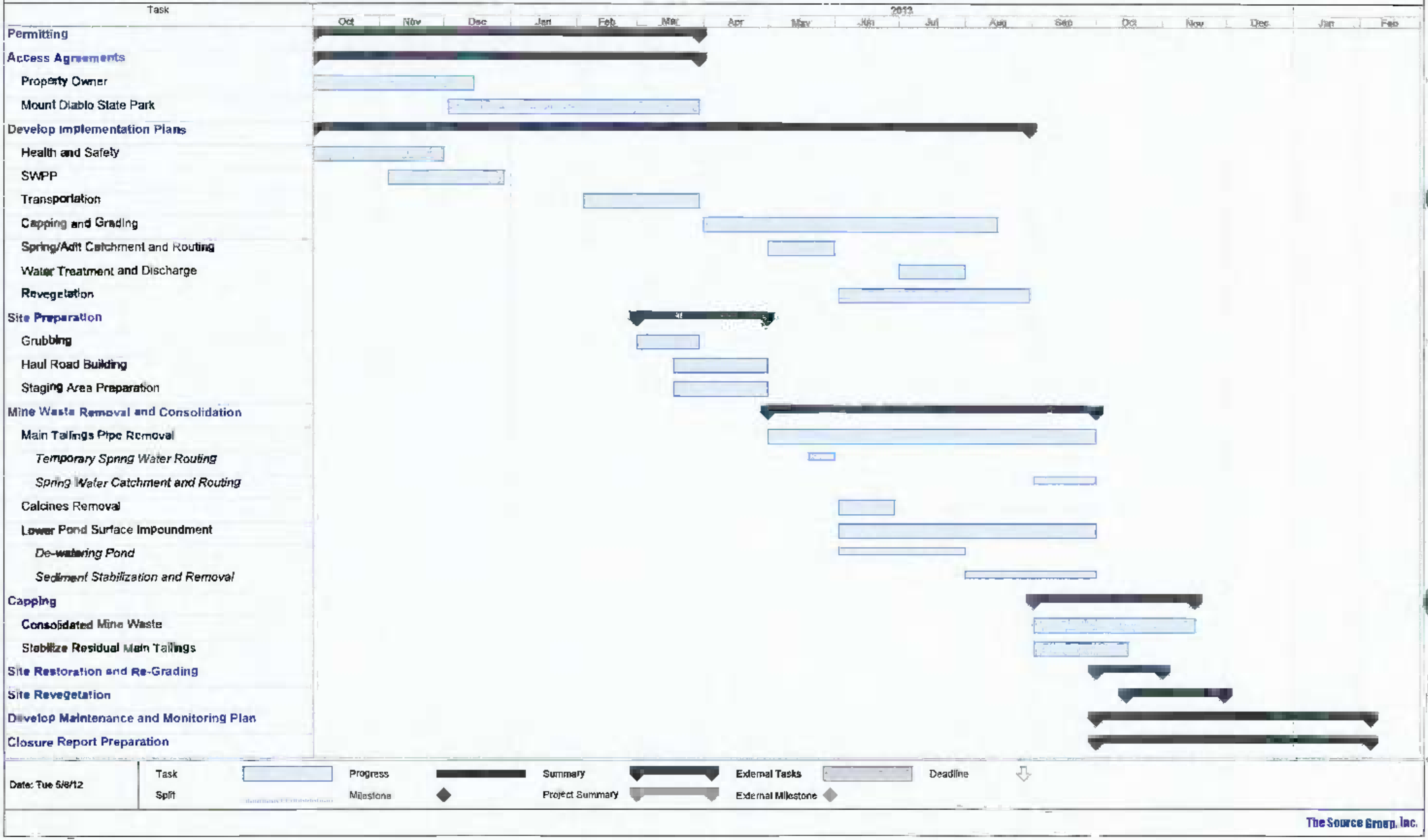
FIGURE
4-1

Figure 5-1
Conceptual Project Schedule



TABLES

Table 2-1
Mine Production Statistics
Mount Diablo Mercury Mine
Contra Costa County, California

PRODUCTION STATISTICS- MOUNT DIABLO MINE "MILL WORKINGS"

Operator	Date	Cubic Yards of Ore Milled	Waste rock from tunnels, crosscuts,raises,shafts and stopes (cubic yards)	Dewater volume (acre-feet)	Mercury Produced, flasks
Welch	1863	shaft and placer	NA	none	NA
Unknown	1875-1877	NA	NA	NA	1000
Mt. Diablo Quicksilver MC, operator Ericson	1930-1936	NA	NA	NA	739
leased to Bradley MC	1936-1951	78,188(1)	24,815(2)	161(3)	10,455
leased Ronnie B. Smith	Sept 1951- June 1953	920(4)	NA	NA	125(5)
DMEA and Smith	June 1953 - Jan 1954	none	630(6)	minor	none
DMEA, Johnson and Jonas	Jan 1954 - Feb 1954	none	67(7)	NA	none
leased to Cordero MC	Nov 1954 - Dec 1955	none	1,228 (8)	19.5(9)	none
leased to Nevada Scheelite Corp.	1956	none	see note(10)	see note(10)	none
Total Cubic Yards of Material Taken Out			105,848 (11)		

Notes:

(1) Table 4, Ross 1958, reported 126,664 tons of ore milled. Converted here to cubic yards above based on conversion of 1.62 tons per cubic yard (cy).

(2) Total length of workings 4,570 ft (Pampeyan 1963. p 25) x 5 feet x 7 feet x bulking factor plus 20% = 7,108 cy less (2) and (3). Included 550 ft of shafts and raises (935 cy) and stopes of 19,000 cy (Pampeyan, Plate 5).

(3) Estimate 10 gpm for 10 years.

(4) Used the ratio of ore milled to flasks produced for Bradley to estimate the amount of ore milled by Smith.

(5) DMEA internal memo dated 2/4/57.   ref doc no. 2:88/384

(6) 300-ft DMEA shaft 4.5 ft x 8.5 ft (Ross 1958) plus 77 ft of tunnel at 5 ft x 7 ft on the 360 level w/ bulking factor of 20%.

(7) 43 ft of tunnel on the 360 level x 5 feet x 7 feet w/ bulking factor of 20% .

(8) 790 ft of crosscuts and drifts on the 360 level (Pampeyan, and Sheahan 1957) x 5 feet x 7 feet w/ bulking factor of 20%.

(9) Best guess: 90 gpm for 27 days to dewater the mine (ref. DMEA payment records to Smith for same) and 200 days at 10 gpm.

(10) In 1956 the Nevada Scheelite Company leased the mine and installed a deep-well pump to remove water which had risen to a point 112 feet below the collar of the shaft. Since the downstream ranchers objected to the discharge of acid mine water into the creek this work was suspended. Attention was then directed to the open pit where some exploration was done using wagon drills. A small tonnage of retort-grade ore was developed. Since this was not sufficient to satisfy the requirements of the company the lease was relinquished (Division of Mines, 1958).

(11) Sum of Ore Milled and Waste Rock

Table 2-2

Estimated Waste Volumes

Mount Diablo Mercury Mine
Contra Costa County, California

Waste Material For Removal and Consolidation	**Surface Area** (Square Feet)	**Thickness** (Feet)	**Volume** (Cubic Yards)
Main Tailings Pile (uncapped portion)			
Area 1 - Known Thickness	98,604	24	87,648
Area 2 - Estimated Thickness	17,650	15	9,806
Area 3 - Estimated Thickness	36,964	3.5	4,792
Calcines	20,364	10	7,542
Pond Sediments	72,570	3.5	9,407
Pond Impoundment Materials	8,112	8	2,404
Waste Below Impoundment	21,400	3	2,378
Total Waste For Removal			123,976

Notes:

1) Area 1 thickness determined by 1938 topo map comparison to 2010 topo map. Coverage was limited.

2) Pond sediment thickness is based on estimate provided by Iovenetti, 1989.

3) Remaining thickness values are estimates based on site review and topographic interpolation.

Edgcomb Law Group
JOHN D. EDGCOMB (SBN 112275)
ADAM P. BAAS (SBN 220464)
One Post Street, Suite 2100
San Francisco, California 94104
Telephone: (415) 399-1555
Facsimile: (415) 399-1885
jedgcomb@edgcomb-law.com

Attorneys for Petitioner
SUNOCO, INC.

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In the Matter of SUNOCO, INC., Petitioner, For Review and Rescission and Stay of Cleanup and Abatement Order No. R5-2013-0701, Mount Diablo Mine, Contra Costa County, dated April 16, 2013	PETITION NO. **DECLARATION OF ROBERT M. GAILEY IN SUPPORT OF SUNOCO, INC.'S PETITION FOR REVIEW AND RESCISSION AND STAY OF CLEANUP AND ABATEMENT ORDER NO. R5-2013-0701**

I, the undersigned Robert M. Gailey, declare as follows:

1) I am a Professional Geologist and Certified Hydrogeologist licensed with the State of California. I am also a Principal Hydrogeologist with The Source Group, Inc. ("SGI"), an environmental consulting firm. I have 28 years of experience as a practicing hydrogeologist involved in both technical and management aspects of environmental and water supply projects. Among other tasks performed during my career, I have conducted site investigations ranging from preliminary site assessments to remedial investigations, predicted exposure point concentrations, designed and implemented remedial actions, assessed the effectiveness of ongoing remediation programs, and performed comparative data

analyses to meet various project needs. This work has included execution of field data collection and detailed technical analysis for the purpose of evaluating water flow and contaminant transport at environmentally-impacted sites. Attached as **Exhibit A** is a true and correct copy of my current curriculum vitae.

2) SGI has been retained by Sunoco, Inc. ("Sunoco") to provide technical consulting services related to both historical mining operations and current conditions at the Mount Diablo Mercury Mine Site ("Site"). Part of this work has involved evaluating the impact of historical operations conducted by the Cordero Mining Company ("Cordero") on environmental conditions at the Site. I am familiar with the facts set forth herein from both my visit to the Site and my review of historical and technical documents related to the Site.

3) This declaration is in support of Sunoco's Petition for Review and Rescission, and Stay, of the Cleanup and Abatement Order ("CAO") R5-2013-0701 issued by the California Regional Water Quality Control Board, Central Valley Region ("Regional Board") on April 16, 2013.

4) Opinions expressed in this declaration rely, in part, on the SGI report titled Additional Characterization Report, Mount Diablo Mercury Mine and dated December 7, 2011 ("Characterization Report"). Attached as **Exhibit B** is a true and correct copy of the Characterization Report.

5) Opinions expressed in this declaration rely, in part, on the SGI report titled Divisibility Position Paper, Mount Diablo Mercury Mine and dated July 31, 2009 ("Divisibility Report"). Attached as **Exhibit C** is a true and correct copy of the Divisibility Report.

6) Opinions expressed in this declaration rely, in part, on the Declaration of Paul D. Horton in Support of Sunoco, Inc.'s Petition for Review and Rescission of Revised Technical Reporting Order No. R5-2009-0869 and Sunoco, Inc.'s Petition for Stay of Revised Technical Reporting Order No. R5-2009-0869,

including exhibits, dated January 28, 2010 ("Horton Declaration"). Attached as **Exhibit D** is a true and correct copy of the Horton Declaration.

7) Based upon my review of documents related to the Site, including but not limited to the Characterization Report, the Divisibility Report, and the Horton Declaration, and my visit to the Site, it is my opinion that Cordero operations had limited, if any, environmental impact to the Site.

8) Cordero leased the Site from Mt. Diablo Quicksilver Company Ltd. for the purpose of performing mining operations on November 1, 1954 (Exhibit C – Appendix A). Cordero then a) performed exploratory mining operations from January, 1955 through December, 1955 and transferred the lease to Nevada Scheelite, Inc. in March, 1956 (Exhibit C – Section 2). During the period that Cordero conducted operations, an estimated 1,228 cubic yards of waste rock, and approximately 50 to 100 cubic yards of low-grade ore, were generated. The total amount of material generated is estimated to be less than 1.2 percent of the total volume of material (waste rock and ore) removed from the mine by all operators (Exhibit C – Section 5.1). The waste rock generated by Cordero appears to have been discarded in the Northern Waste Dump Area (Exhibit B – Figure 2-2 and Horton Declaration). Water pumped from the mine appears to have been piped to a disposal location approximately 1,350 feet west of Cordero's point of access to the underground mine workings - the DMEA Shaft – and generally evaporated and/or drained into the My Creek drainage (Exhibit B – Figure 3-2, Exhibit C – Section 5.2).

9) The Characterization Report establishes relationships between different water sources, overland flow patterns at the Site, and resulting environmental impacts. There are three sources of water at the Site (Exhibit B - Section 4.4):

a. Water sourced from underground mine workings (groundwater that reaches the ground surface near the abandoned and buried 165-level Adit and then contacts mine tailings and waste rock as overland flow that ultimately enters the Lower Pond adjacent to Dunn Creek);

b. Water sourced from precipitation that contacts mine tailings and waste rock (rainwater that falls onto the Site, then contacts mine tailings and waste rock as overland flow, and ultimately enters a pond or one of the creeks adjacent to the Site); and

c. Water flows not in contact with mine tailings or waste rock (rainwater that falls onto, as well as groundwater that reaches the ground surface through springs at, certain Site locations that do not involve contact with mine tailings or waste rock).

10) The first source of water, water sourced from underground mine workings, is groundwater that reaches the ground surface near the abandoned and buried 165-level Adit and then contacts mine tailings and waste rock as overland flow that ultimately enters the Lower Pond adjacent to Dunn Creek (Exhibit B, Section 4.4 and Figure 3-2). Before exiting the 165-level Adit, this water a) contains concentrations of constituents that include total mercury, methyl mercury, arsenic, and several cations and anions and b) is slightly acidic (results for monitoring well ADIT-1, Exhibit B - Section 4.4.1 plus subsections, Figure 4-3 and Table 3-4). After contact with the mine tailings and waste rock, the water a) contains higher concentrations of constituents that include mercury (total and dissolved) and methyl mercury, b) contains lower concentrations of constituents that include arsenic and some cations and anions and c) is more acidic (results for sampling location SW-15, Exhibit B - Section 4.4.1 plus subsections, Figure 4-3 and Table 3-2). These results indicate that contact of mine water with the tailings and waste rock located in the southeastern portion of the Site increases the acidic condition and mercury content in overland flows that ultimately reach the Lower

Pond adjacent to Dunn Creek. The results also indicate that contact of the mine water with the mine tailings and waste rock reduces concentrations of arsenic and some cations and anions. Therefore, water sourced from the 165-level Adit, in combination with the mine tailings and waste rock that it contacts, create an environmental impact related to mercury.

11) The groundwater sampling results indicate geochemical dissimilarities between groundwater at the 165-level (the Bradley workings) and 360-level (the Cordero workings) within the underground workings (results for monitoring wells ADIT-1 and DMEA-1, Exhibit B – Section 4.4.1 plus subsections, Figure 4-3 and Table 3-4). One difference is that water deeper in the underground workings (the 360-level) contains no mercury (Id.) Another difference is the inorganic geochemical signature of the 165-level and 360-level waters observed during the July, 2011 sampling (Exhibit B – Table 3-4 and Appendix G). These observations indicate that groundwater from the 360-level underground workings does not contribute mercury to flows at ground surface. The observations also indicate that the 360-level underground workings contribute little, if any, flow to the overland flow that is sourced from underground mine workings at the Site. If the deeper workings did contribute significant flow, the geochemical signature of the deeper groundwater observed in July, 2011 would be evident, which it is not.

12) As set forth in the Divisibility Paper and the Horton Declaration, the 165-level Adit and associated underground workings, as well as the above-referenced mine tailings and waste rock, were not constructed during Cordero's operations. In addition, the groundwater at the 360-level (the Cordero workings) contains no mercury and has little, if any, impact on the flow exiting the 165-level Adit. Therefore, environmental impacts associated with the first listed source of water (water sourced from the 165-level Adit) are not a result of Cordero operations.

13) The second source of water, water sourced from precipitation that contacts mine tailings and waste rock, is rainwater that falls onto the Site, then contacts mine tailings and waste rock as overland flow, and ultimately enters a pond or one of the creeks adjacent to the Site (Exhibit B, Section 4.4 and Figure 3-2). This source of water involves two distinct geographic portions of the Site, central/southern and northern, located on opposite sides of an east-west oriented ridge that acts as a surface water flow divide.

14) Data collected for the central and southern portions of the Site indicate that, after contact with the mine tailings and waste rock, the overland flow from rainwater a) contains elevated concentrations of constituents that include mercury (total and dissolved), arsenic, and some cations and anions and b) is acidic (results for sampling locations SW-01, SW-02, SW-03 and SW-06; Exhibit B - Section 4.4.2 plus subsections, Figure 4-3 and Table 3-2). The environmental impacts are more pronounced for the southeastern portion of the Site than in the central portion of the Site.

15) As set forth in the Divisibility Paper and the Horton Declaration, the mine tailings and waste rock in this portion of the Site did not result from Cordero operations. Therefore, environmental impacts associated with this portion of the second source of water (water sourced from precipitation that contacts mine tailings and waste rock) are not a result of Cordero operations.

16) Data collected for the northern portion of the Site, where I understand that no mine tailings are present, indicate that, after contact with waste rock, the overland flow from rainwater a) contains no mercury (total or dissolved) or arsenic and significantly lower concentrations of some cations and anions, b) is not acidic and c) has a different geochemical signature than the water collected in the central and southern portions of the Site (results for sampling locations SW-11 and SW-13; Exhibit B - Section 4.4.2 plus subsections, Figure 4-3, Table 3-2 and Appendix

G). Therefore, there are no apparent environmental impacts associated with the northern portion of the Site.

17) As set forth in the Divisibility Paper and the Horton Declaration, some of the waste rock in the northern portion of the Site may have been associated with Cordero operations. Therefore, there are no apparent environmental impacts associated with the portion of the second source of water (water sourced from precipitation that contacts mine tailings and waste rock) that did result from Cordero operations.

18) The third and final source of water, water flows not in contact with mine tailings or waste rock, are derived from rainwater that falls onto, as well as groundwater that reaches the ground surface through springs at, certain Site locations that do not involve contact with mine tailings or waste rock (Exhibit B - Section 4.4 and Figure 3-2). Data collected for these portions of the Site indicate that the overland flow from rainwater a) contains little to no mercury (total and dissolved), methyl mercury or arsenic and generally lower concentrations of some cations and anions and b) is not acidic – with the exception of SW-14 (results for sampling locations SW-04, SW-08, SW-12, SW-14 and SW-16; Exhibit B - Section 4.4.3 plus subsections, Figure 4-3 and Table 3-2). Based upon Site research and reconnaissance discussed in Exhibit B to this declaration, and also the above-referenced Horton declaration, these observations of environmental conditions at the Site are considered reflective of background conditions in the vicinity of the mineable deposits.

19) For all of the reasons presented above, it is clear that the Cordero operations contributed little, if any, to environmental impacts observed at the site, which are instead the result of mine water from the 165-level Adit and rainwater that landed on and flowed through, and continues to land on and flow through, the tailings and waste rock left on the surface of the southeastern portion of the Site by

owners and operators other than Cordero.

I declare under penalty of perjury under the laws of the State of California and the United States of America that the foregoing is true and correct. Executed this 15th day of May, 2013 in Berkeley, California.

PROFESSIONAL GEOLOGIST
exp 11/30/13
ROBERT M. GAILEY
No. 5338
STATE OF CALIFORNIA

By: Robert M. Gailey

EXHIBIT A

Robert M. Gailey, P.G., C.HG.

Principal Hydrogeologist

Summary

Mr. Gailey has 28 years of experience on a wide range of projects in the field of hydrogeology. In the process of conducting projects throughout much of the United States, he has conducted site investigations ranging from preliminary site assessments to remedial investigations, negotiated with regulatory agencies for closure of contaminated sites as well as operation of municipal supply wells, provided critical review of technical documents, prepared written and verbal arguments for litigation and cost allocation, evaluated strategies for capture of groundwater solute plumes, designed and implemented remedial actions, assessed the effectiveness of ongoing groundwater remediation programs, mapped aquifers and assessed conditions for water supply development, performed water supply well siting evaluations, assessed water supply well conditions and performance, evaluated potential effects of well-field operations on water rights for adjacent parcels, and evaluated potential impacts on groundwater supplies related to groundwater contamination and proposed land development. This work has been conducted in accordance with local and state requirements, and federal requirements (CERCLA, RCRA, and SDWA) as administered by both state and federal agencies. Many of the hydrogeologic evaluations have been performed at scales that range up to basin-wide analysis.

For remediation and wastewater projects, Mr. Gailey has worked on both active and inactive industrial and commercial facilities where both organic constituents (petroleum, semi-volatile organic compounds [SVOCs], and volatile organic compounds [VOCs]) and inorganic constituents (heavy metals, nitrate, perchlorate, total dissolved solids [TDS], and tritium) have been present. The types of industries involved include agriculture (dairy and crop), airline, banking, barrel processing, chemical, defense, dry cleaning, electronics, food processing, flare manufacturing, insurance, machining, mining, petroleum (retail, storage, and refining), real estate, steel, trucking, waste disposal, and wood treatment. In addition, he has performed review and analysis for law firms and government agencies (Army Corps of Engineers [ACE], Department of Energy [DOE], Environmental Protection Agency [EPA], and Washington Department of Ecology). This work has involved hydrogeologic evaluation, modeling, statistical and other data analysis, and database management. The purposes of this work have included characterizing site conditions, predicting exposure point concentrations, developing remedial designs, evaluating ongoing remedial effectiveness, and performing comparative data analyses to meet various project needs.

For water supply projects, Mr. Gailey has worked on both municipal and rural facilities. The industries served include private and municipal water supply, agriculture, food processing, hospital, hotel, and mining. This work has involved hydrogeologic evaluation, well siting and performance evaluation (step discharge, pumping and wire-to-water tests), flow and concentration profiling (under pumping and static conditions using both spinner logs and the U.S. Geological Survey [USGS] dye tracer approach) water quality impact assessment (arsenic, bacteria, nitrate, pesticides, TDS, uranium and VOCs), feasibility testing for well modification, modeling, database management, economic and optimization analysis, and preparing construction and equipment specifications. The purposes of this work have been included developing and rehabilitating municipal and other water supplies, enhancing well field operations, and managing groundwater resources.

Project Experience

- Provides technical analysis related to hydrogeologic aspects of projects. Issues for analysis include hydraulic analysis for water supply and construction projects, water supply assessment, the distribution and migration of constituents of concern in groundwater, benefits of naturally occurring biodegradation, remediation system performance, and environmental impact assessment under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).
- Provides testimony, technical counsel, and support for regulatory negotiations and litigation involving 1) groundwater/soil cleanup and cost allocation related to serial and adjacent tenancy of commercial, industrial, and retail parcels and 2) conflicts over water resources. Has prepared expert reports and material for interrogatories and declarations, participated in the meet-and-confer process and settlement discussion, developed case strategy under the client-attorney confidentiality umbrella, briefed expert witnesses on technical aspects of cases, and provided deposition testimony.

Water Supply Assessment and Service

- Serving as Technical Lead evaluating the source of PCE in a municipal water supply well located in the Central Valley of California. Vertical flow and concentration profiling (USGS dye tracer approach) under ambient (non-pumping) conditions has been performed and profiling under dynamic (pumping) conditions is planned. The goal of the project is to modify the well and improve water quality at the wellhead.

Project Experience – ***Water Supply Assessment and Service (cont.)***

- Serving as Technical Lead for ongoing supply well water quality evaluations at various locations throughout California. At issue is whether pumping operations and the well screens can be modified to reduce constituent concentrations (i.e., arsenic, manganese, nitrate, TDS, uranium and VOCs) to below drinking water standards. Vertical flow and concentration profile data are often collected from the wells using miniaturized tools so that the pumps do not have to be removed (USGS dye tracer approach). Data collection plans are developed to, among other things, account for uncertainty in pump intake depths, maximize information value and minimize the impact of any data collection uncertainties. For projects where evaluation results indicate that modifications may improve water quality, feasibility testing is performed and, as appropriate, recommendations for final modification of operations and facilities are provided. Management, or support as appropriate, of fieldwork is provided throughout the projects.
- Serving as Technical Lead performing analysis and construction tasks related to rehabilitating and modifying a water supply well for a disadvantaged community located in the Central Valley of California. The goal of the project is to reduce nitrate concentrations at the wellhead. Project work includes preparing technical specifications as well as conducting construction inspection, vertical flow and concentration profiling (USGS dye tracer approach), feasibility testing data analysis.
- Providing technical support to a public utility district regarding data collection and analysis for establishing baseline hydrologic conditions in a small groundwater basin located on the Central Coast of California. The work is being performed to support interest in developing the water resource. Project work has included installing water level and barometric transducers, training district staff regarding transducer maintenance and data retrieval, and data analysis related to evaluating safe yield for the basin
- Serving as Technical Lead to provide technical specifications and construction inspection support for the rehabilitation of four municipal water supply wells located in the Central Valley of California. The work is being performed subsequent to an initial evaluation of ten wells (specific capacity testing, progressive-volume water quality sampling, and video inspection without removing the vertical turbine pumps). The wells have not been rehabilitated within the past 40 to 60 years, and the removal of significant amounts of calcium carbonate scaling is necessary to increase the specific capacities of the wells. Space and wastewater discharge limitations are particular challenges being addressed to successfully complete the project. Particular attention has been given to balancing the benefits of improving hydraulic performance of the wells against the potential costs of damaging the aged wells. Thus far, spinner log and specific capacity testing conducted before and after the rehabilitation work have quantified performance increases in specific capacity of as much as 30 percent.
- Serving as Technical Lead to provide technical specifications and construction inspection support for the rehabilitation of four municipal water supply wells and pumps located in the Central Valley of California. The wells have not been rehabilitated within the past 20 years, and the removal of calcium carbonate and iron oxide scaling as well as bacterial mass is necessary to increase the specific capacities of the wells. Because the municipality relies heavily on the groundwater portion of its water supply, the project is being phased so that the construction activity does not impede the municipality's ability to meet demand. Thus far, spinner log, specific capacity and wire to water testing conducted before and after the rehabilitation work have quantified performance increases in specific capacity of 16 percent and plant efficiency of 32 percent.
- Serving as Technical Lead for evaluating potential hydraulic manipulation evaluation of a municipal water supply well located in the Central Valley of California. The focus of the work is to reduce nitrate concentration at the wellhead by changing how the well draws from strata that contain varying concentrations of nitrate. Vertical flow and concentration profiling data from the well (USGS dye tracer approach) were considered in order to identify a design strategy that would allow the well to be brought back on-line without the use of expensive wellhead treatment. The design strategy entailed well screen modification. Field testing of the design concept entailed step-discharge testing, sequential discharge sampling and packer testing in order to evaluate the potential improvement to water quality and decrease in production capacity associated with the chosen well screen modification design. The testing results proved that well modification will be sufficient to address the water quality issue and no treatment system will be required. Current project activities involve finalizing the well modification.
- Provided technical consultation related to bringing a new municipal water supply well online in the Central Valley of California. At issue were bacterial concentrations (total coliform and heterotrophic place counts). Extended purging, chlorination and cycle testing resulted in approval from the Department of Public Health for bringing the well online.

Project Experience – *Water Supply Assessment and Service (cont.)*

- Served as Technical Lead to perform an analysis for a county water management agency in northeastern California that determined the applicability of alternative monitoring approaches for compliance with the California Statewide Groundwater Elevation Monitoring (CASGEM) program. Six basins were evaluated and a report consistent with California Water Code requirements was prepared within five weeks to meet a client deadline. The report, first in the state to be accepted by the California Department of Water Resources (DWR), was finalized with only minor revisions after review by the DWR.
- Provided technical review of a draft Environmental Impact Statement prepared in accordance with NEPA for a proposed shale gas hydraulic fracturing project to be performed in a western state. At issue were a variety of concerns related to impacts upon water quantity and quality.
- Served as Technical Lead for an expedited review of well and pumping system conditions for four municipal supply wells located in the Central Valley of California. Issues of interest were 1) reduced production rates over time and 2) potential improvements in water quality through well modification in order to avoid the use of treatment systems. Miniaturized equipment was used to video log the wells in order to perform an initial assessment of well and pumping system condition. The pumps in all four wells were further evaluated by performing wire-to-water testing. Three of the wells were further evaluated by performing flow and concentration profiling (USGS dye tracer approach). The constituents of potential concern were arsenic, uranium, manganese and TDS. The findings were that 1) reduced production rates had resulted from both pump wear and well screen fouling and 2) well modification likely would not significantly improve water quality. The field work and reporting was completed in just under four weeks to meet this client's schedule requirements.
- Provided consultation related to increasing the water supply for a medical facility in northern California. The initial task was to review water development efforts in a limited-access area that had been unsuccessful and to recommend additional efforts in the same area. After reviewing the available information and performing field reconnaissance of the subject area, an alternative course of action was identified. The alternative approach to water development was based upon making a connection, previously missed by others, between pieces of information related to the groundwater availability and pumping system capacity. Once limited pumping capacity was identified as the primary issue, additional work in the remote access area was avoided and a significant water supply was readily developed.
- Served as Technical Lead for evaluating potential hydraulic manipulation of a municipal water supply well located in southern California east of Los Angeles. The focus of the work was to reduce arsenic concentrations at the wellhead by changing how the well draws from strata that contain varying concentrations of arsenic. Vertical flow and concentration profiling data (USGS dye tracer approach) from the well were considered along with other water supply system information in order to identify a design strategy that would allow the well to be brought back on-line without the use of expensive wellhead treatment. The design strategy included a combination of well screen modification and blending of the well discharge with that from two other wells. Field testing of the design concept entailed step-discharge testing, sequential discharge sampling and packer testing in order to evaluate the potential improvement to water quality and decrease in production capacity associated with the chosen well screen modification design. In this case, it was established that the site hydrogeology did not support successful well modification.
- Served as Technical Lead for evaluating the potential to hydraulically manipulate a municipal water supply well located in the Central Valley of California. The constituent of concern was arsenic. Vertical flow and concentration profiling data (USGS dye tracer approach) were collected. No additional work related to well modification was performed since it was determined that the distribution of arsenic concentrations in strata located along the well screen was not conducive to well modification.
- Served as Technical Lead for a groundwater supply management analysis for a city in the Central Valley of California. The purpose of the project was to evaluate current production operations and suggest operational guidelines and facility modifications to both maintain required production and protect water quality from a variety of constituents (nitrate, uranium and VOCs).
- Served as Technical Lead for developing an irrigation supply well for an athletic park in a coastal area of northern California. Issues considered included well siting, design and yield, and potential water quality impacts from a nearby municipal wastewater treatment facility. An opinion on the potential affects on the groundwater system with respect to production potential and water quality was also prepared for use in a CEQA analysis.

Project Experience – ***Water Supply Assessment and Service (cont.)***

- Served as Technical Lead for a water supply well source area contamination assessment in the Central Valley of California. The sources and migration pathways related to nitrate and other potential contaminants were evaluated through 1) property and well records review, 2) focused well sampling and 3) isotopic analysis to evaluate the age of water pumped from different screened intervals (USGS dye tracer approach) in the municipal well and fingerprint the source of contamination. The purposes of the assessment were to provide information for 1) designing a wellhead treatment system, 2) addressing groundwater cleanup needs and 3) negotiating with the responsible party (RP) and the Central Valley Regional Water Quality Control Board (RWQCB).

- Served as Technical Lead for a hydrogeologic evaluation of water supply development potential in a basin located near the Central Coast of California. Factors considered included geologic formation and structure of water-bearing strata, groundwater flow patterns, existing well yields, water quality distribution patterns and trends, and hydrogeologic conditions specific to the parcel considered for development. Because the basin was not in a state of overdraft, recommendations were made for site-specific investigation of the parcel.

- Served as Technical Lead for a water quality impact analysis in support of regulatory negotiations regarding plans for increased groundwater pumping by a growing community in the Central Valley of California. At issue was whether additional deep pumping would degrade water quality by causing shallow nitrate contamination to migrate downward in significant quantities. The available data were reviewed and historic conditions under which downward migration of nitrate had occurred were identified. This information suggested that the increased pumping would not cause water quality degradation. Technical negotiations with the State Water Board were conducted and a limited amount of additional hydrogeologic data was collected. The collected data corroborated the original findings and the plans for increased pumping were approved.

- Provided technical review for a hydrogeologic impact assessment of dewatering related to expansion of gravel mining operations in the Central Valley of California. The review entailed comparing the results of two different groundwater modeling studies, explaining differences in results of the two studies, and evaluating these differences within the context of potential impacts to the local groundwater system.

- Served as Senior Hydrogeologist for the preparation of a State loan application/workplan to conduct a feasibility study for supplementing a municipal groundwater-based drinking water supply in the Central Valley of California. The workplan included tasks related to modeling groundwater recharge and wellfield operations, and groundwater management planning under the Groundwater Management Act.

- Served as Senior Hydrogeologist and Project Manager on a water well rehabilitation and maintenance project for a water purveyor in northern California. The initial focus of the project was to develop and implement a course of action to rehabilitate under-performing wells. The second focus of the project was to develop and implement a long-term plan for preserving efficiency and extending the lives of satisfactorily-performing wells by considering the economic life expectancy of each well and specifying data collection requirements for tracking performance. This information was managed using database and economic analysis software.

- Served as Senior Hydrogeologist Project Manager for the rehabilitation of a municipal water supply well in northern California. Services included developing specifications for both chemical/mechanical rehabilitation of the well screen and installation of a new pumping system that was compatible with an existing variable-frequency drive.

- Served as Project Manager and Senior Hydrogeologist for a new well and reservoir siting study conducted for a municipality in northern California. The goal of the project was to identify viable sites for the new facilities from the list of surplus city-owned lands. Issues considered included aquifer characteristics, proximity to groundwater contamination, proximity to existing facilities, potential for well interference, site suitability for aboveground facilities, aesthetics, and other criteria.

- Served as Project Manager on the design of pumping and transmission facilities for two new municipal water supply wells on the Central Coast of California. Services included developing equipment and construction specifications, and providing construction and system startup inspection. Timely completion of the project allowed the client to apply for project cost reimbursement from Federal funds.

Project Experience – ***Water Supply Assessment and Service (cont.)***

- Provided consultation regarding the rehabilitation needs of a municipal water supply well located in the Central Valley of California. Services provided included consulting with the client on issues that arose during field implementation of the rehabilitation measures.
- Served as Senior Hydrogeologist for an electronics manufacturing facility siting assessment in western Mexico. Issues related to the quality and reliability of the water supply for the proposed site were considered as part of the assessment.
- Served as Senior Hydrogeologist for assessing conditions for developing a groundwater supply for a fruit processing facility located in the northern Central Valley of California. The local groundwater quality was poor, and a well was designed to maintain efficiency and integrity under anticipated use scenarios. Requirements for the well installation and related water treatment system construction were specified in accordance with the California Department of Health Services Office of Drinking Water.
- Developed and installed groundwater and surface water level measurement instruments for a watershed monitoring project in southwestern Mexico. The work was part of a larger malaria control research project.
- Evaluated potential impacts on groundwater supplies related to a proposed land development project on the Central Coast of California. Available hydrogeologic data were reviewed within the context of plans for groundwater withdrawal related to the development. Potential reductions in water availability were identified, and recommendations were made to further assess the degree of impact.
- Performed data collection and interpretation for groundwater resource evaluations in eastern South Dakota. Glacially derived aquifers were delineated and characterized in support of agricultural water supply development.

Wastewater

- Serving as Technical Lead for review and commenting on a draft Waste Discharge Requirements (WDRs) General Order issued by the Central Valley RWQCB regarding the Irrigated Lands Regulatory Program. Specific areas of contribution address potential problems with the proposed groundwater monitoring requirements given the local hydrogeology. Project deliverables to date have included presentation at a RWQCB workshop and a report of findings.
- Serving as Technical Lead related to renegotiation of WDRs for a cheese plant in southern California east of San Diego. The project is driven by changes in the wastewater stream. Tasks performed include 1) characterization of the wastewater quantity and quality, 2) preparation of a Report of Waste Discharge and a Nutrient/Salt Management Plan, and 3) contribution of various types of information and insights to support infrastructure modifications at the facility. Negotiation with the Colorado River Basin RWQCB on the WDR modification is in-process.
- Serving as Technical Expert reviewing and commenting on draft language for a General Order and WDRs regarding the Irrigated Lands Regulatory Program that has been prepared by the Central Valley RWQCB.
- Served as Project Manager for an environmental site assessment conducted on a 150-acre mixed-use/agricultural parcel located in the Central Valley of California. The purpose of the assessment was to facilitate acquisition of the parcel for expansion of wastewater land application operations at a food processing facility. Accordingly, the list of details for the assessment was expanded to address the intended use of the parcel.
- Served as Technical Lead for planning and analysis related to technical and regulatory aspects of performing surface and groundwater drainage in a coastal area of northern California. Issues considered include potential rates of drainage, surface water quality, septic discharges and permissible ocean discharges.
- Served as Technical Lead related to renegotiation of WDRs for a dairy in southern California east of San Diego. The project was driven by changes in both the wastewater stream and the lands to which the water would be discharged. Tasks performed include 1) completion of a water use audit that resulted in a 40% reduction in wastewater production, 2) preparation of a Nutrient Management Plan and an Engineered Wastewater Management Plan that were accepted by the RWQCB in initial form, 3) contribution of various types of information and insights that supported infrastructure modifications at the facility, and 4) expedited negotiation with the RWQCB on the WDR modification.

Groundwater Modeling and Optimization Analysis

- Served as Technical Lead for a prospective performance evaluation of a new wastewater storage pond liner technology proposed at a dairy in the Central Valley of California. Information on site conditions and planned pond design were used to construct a groundwater flow and transport model. A range of estimated seepage rates through the liner were simulated with the model in order to evaluate potential impacts to shallow groundwater quality. The evaluation was used to finalize construction requirements and permitting details for the new wastewater pond.
- Served as Technical Lead for a probabilistic cost analysis regarding the remediation of a commercial property in the Central Valley of California that was impacted by chlorinated volatile organic compounds. Site conditions were somewhat uncertainty because only preliminary characterization of soil, soil gas and groundwater had been performed. The set of tasks required to perform the cleanup were identified and cost ranges were estimated based upon the existing uncertainties. A Monte Carlo analysis was performed to evaluate the range in total project cost and the probabilities of occurrence for costs within the range. The results provided a cost-benefit basis for the potential purchaser of the property to make decisions regarding site management.
- Served as Technical Lead for sea water intrusion and groundwater/surface water interaction modeling studies. The work considered past and potential future effects of groundwater extraction for irrigation upon flow and water quality in a river and estuary on the Central Coast of California. Technical aspects of this work were assessing buried channel geometry and hydraulic properties from the wide range of available data, and evaluating the simultaneous effects of groundwater pumping and spring tide occurrence. Detailed transient models that included several river reaches and hourly tidal variations were created based upon previously available information and data collected for this project. The work was used to support negotiations with the California Department of Fish and Game and, ultimately, hearings at the State Water Resources Control Board.
- Served as Technical Lead for flow and transport modeling conducted to evaluate the source of nitrate contamination to a municipal water supply well located in the Central Valley of California. The model was calibrated using the results of 1) a 30-day pumping test and 2) flow and concentration profiling performed on the impacted municipal supply well. Important aspects of the modeling were 1) simulating the contaminant plume response to different historical pumping periods and 2) including the effects of a nearby improperly constructed water supply well that acted as a vertical conduit.
- Served as Technical Lead for hydrogeologic analysis and development of software for the prediction of groundwater quality impacts resulting from operations at a northern California facility. The software used historic and projected facility operations to predict sourcing and migration of tritium in groundwater. A flow and transport code was developed to simulate advection, dispersion, decay and other processes particular to the site that are not included in standard modeling packages (in-place constituent mass creation and rate-limited mass transfer at multiple spatial scales). Once calibrated, the model was used to evaluate the impacts of various future operations scenarios within the context of making facilities management and regulatory negotiation decisions.
- Served as Technical Advisor for modeling performed in support of a feasibility study regarding groundwater cleanup in the Central Valley of California. Flow and transport modeling were performed to evaluate contaminant plume movement under different remedial pumping scenarios. Of particular importance in this work were the effects of many water supply wells located near the plume and flows between vertically adjacent water-bearing zones.
- Served as Technical Lead for a study that developed conjunctive use strategies and wellfield operational rules related to meeting future municipal water supply requirements of a growing community in the Central Valley of California. The project entailed developing a groundwater flow model that included 1) the operations of wellfields run by two adjacent communities and 2) groundwater-surface water interactions. Once calibrated, the model was linked to optimization tools in order to cost effectively evaluate a range of operational scenarios. At issue was how to meet projected higher demands without mobilizing contaminants (naturally occurring total dissolved solids and two plumes containing VOCs and pesticides) that would result in increased future treatment costs. Results of the study included wellfield operations guidelines, suggested maximum extraction schedules, and proposed coordination of wellfield operations by the two adjacent communities. The model was extended in time and recalibrated four years later. Future plans are to use the model as part of water supply planning for city expansion.

Project Experience – *Groundwater Modeling and Optimization Analysis (cont.)*

- Served as Technical Lead on a groundwater management study performed to support remedial design for a landfill site in Arizona. Remedial designs necessary to accommodate Groundwater flows resulting from present and future water supply management practices were evaluated with a groundwater model developed for the project. The goal of the work was to develop designs that were both economically viable and able to contain the leachate plume as water supply pumping and basin recharge practices changed.
- Served as Senior Hydrogeologist for a feasibility study and remedial action at an industrial site in the Central Valley of California. The project was reviewed by the California Department of Toxic Substances Control (DTSC) and entailed hydrogeologic analysis and groundwater modeling to mitigate impacts to a water supply wellfield by VOCs. Evaluating and implementing wellhead treatment as the remedial approach entailed accounting for both seasonal variations in wellfield pumping demand and economic constraints on performance of the project. Use of automated/optimization techniques for assessment of design options streamlined the modeling process and reduced project expenditures. The work also included developing a cost-effective monitoring program for the remedial action.
- Served as Senior Hydrogeologist for a remedial action at a decommissioned research facility located in northern California. The project was reviewed by the EPA, DTSC, and the Central Valley RWQCB. It included hydrogeologic analysis and modeling to mitigate impacts to groundwater and nearby irrigation supply wells by VOCs, and litigation support. This work supported preparation of an Engineering Evaluation/Cost Analysis and an Interim Remedial Action, and favorable settlement of the litigation matter. The work also included an assessment of rehabilitation needs for injection wells used in the remedial action.
- Served as Technical Lead for an assessment of potential VOC, SVOC and metals concentrations in groundwater at an industrial facility located in northern California. The project, reviewed by the EPA, DTSC, and National Oceanic and Atmospheric Administration, entailed modeling groundwater transport of constituents of potential concern and mixing of the constituents with surface waters. The concentration predictions were used to support performance of ecological and human health risk assessments.
- Served as Technical Lead on a groundwater supply management study for a mining operation located in the western United States. The focus of the project was exploring options for both meeting water production requirements and capturing impacted water while accounting for restrictions related to water rights and well/transmission line capacity limits. Use of automated/optimization techniques for assessing options streamlined the process and allowed a more detailed study to be conducted with a limited budget.
- Served as Technical Lead for an evaluation of groundwater drainage rates and volumes resulting from a planned tunnel construction project in the Sierra Nevada of California. A spreadsheet model was constructed to simulate transient drainage from fractured host rock surrounding the planned tunnel construction. Best- and worst-case estimates of the drainage rates and volumes were prepared to support plans for removal of suspended solids from the water prior to discharge.
- Provided consultation regarding the feasibility of modeling groundwater flow and solute transport in an alluvial valley located in the western United States. Flow in the valley has been increasingly influenced by water supply pumping. Key elements for conducting the assessment were development of a complete conceptual model of how groundwater flow patterns have changed over time, and identifying a viable approach for model calibration.
- Served as Senior Hydrogeologist to develop a remedial approach for an industrial site in Nevada impacted by chlorinated VOCs. Groundwater modeling was used as a planning tool for phased implementation of a pumping system to address remediation requirements for the 7,000-foot-long plume. The plume was present throughout the saturated alluvium in a small valley, and viable remedial pumping designs are highly sensitive to available drawdowns and potential dewatering. Use of automated/optimization techniques for model calibration and design development streamlined the modeling process and reduced project expenditures.
- Supported development of technical strategy and provided senior review for groundwater modeling performed for remedial investigation/feasibility study and litigation tasks related to a site in Oregon impacted by chlorinated VOCs. Hydrogeologic analysis involved accounting for the effects of nearby water supply well pumping on VOC transport in the vicinity of the site. Automated/optimization techniques were developed and demonstrated to streamline the modeling process.

Project Experience – ***Groundwater Modeling and Optimization Analysis (cont.)***

- Evaluated an optimization model for cost-effective disposal of dredging wastes for potential application to San Francisco Bay. The evaluation was performed for the ACE. Methods were developed for applying the model to problems that included constraints imposed by environmental regulations. A result of the evaluation was the determination that increased permitting fees might not change disposal patterns within the Bay.
- Analyzed transient hydraulic head data collected during soil boring to estimate the hydraulic conductivity and potential solute migration rates for a petroleum site in Oregon. The analysis entailed developing a mathematical model for assessing slug test data in a three-dimensional flow field. Performance of the analysis reduced project costs by providing migration rate information without installation of monitoring wells.
- Conducted a modeling study for the DOE to determine the effect of spatially variable solute adsorption on groundwater solute concentration predictions. This included use of statistical techniques to increase the reliability of the transport predictions. These techniques have recently been used on other projects to defend conclusions that are based upon model predictions.
- Developed pump-and-treat designs for capturing organic and heavy metal compounds at an impacted groundwater site in Canada. The design involved development of a site-specific model of groundwater flow and solute transport for prediction of exposure point concentrations and application of optimization techniques for developing designs. The designs involved minimum capital and recurring remediation costs. Reliability of concentration predictions upon which the designs were based was demonstrated through application of statistical techniques.

Modeling, statistical analysis, and database management tasks performed by Mr. Gailey on many of the above-referenced projects have entailed use of software including Groundwater Vistas, MODFLOW, MODPATH, MT3D, SEAWAT, RT3D, MOC, Bioscreen, Bioplume II/III, SUTRA, PEST, LINDO, STARPAC, GEOEAS, NPSOL, AQMAN, Visual MODFLOW, GMS, ModelCad and GIS/Key.

Groundwater Remediation

- Provided technical support on subsurface characterization, modeling and reporting for a solvent contamination site in southern California. Much of the work focused on addressing technical challenges posed by the hydrogeologic setting (structurally deformed, fractured sedimentary rock). The project included significant scientific contributions in the areas of field characterization and groundwater flow modeling.
- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed conducting remedial activities (groundwater and soil vapor extraction) and monitoring progress toward cleanup for a multiparty, subregional plume of chlorinated VOCs. Reporting and interaction with the San Francisco Bay RWQCB involved completing semi-annual Self Monitoring Reports. Recent activity also included conducting a Five-Year Remedial Effectiveness Evaluation. Documenting and emphasizing the effects of impediments to pump-and-treat and naturally occurring biodegradation were important aspects of this project with respect to limiting future remedial requirements.
- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed conducting remedial activity (groundwater extraction) and monitoring progress toward cleanup for a plume of chlorinated VOCs. Reporting and interaction with the North Coast RWQCB involved completing semi-annual Self Monitoring Reports. Other project work also included reassessment of the hydrogeology and the approach to groundwater extraction with the goal of increasing project efficiency.
- Served as Principal Hydrogeologist for evaluating the results of shutting down a groundwater extraction system at an industrial site located in northern California. The San Francisco RWQCB approved remedial system shutdown on a temporary basis because (1) on-going pump-and-treat efforts had resulted in only limited progress toward attaining remedial goals and (2) there was evidence that naturally occurring biodegradation may have prevented plume migration. The project entailed evaluating the groundwater data (elevations as well as VOC and inorganic water chemistry) for pre- and post-shutdown periods. A convincing case for VOC degradation was made based on spatial data trends. A case for plume stabilization was also been made based on temporal data trends. Accounting for the effects of concentration rebound after pumping and plume migration from the source area was an important consideration for future site monitoring in order to assess whether the plume front was stable.

Project Experience – ***Groundwater Remediation (cont.)***

- Served as Principal Hydrogeologist for proposing monitored remedial system shutdown at an industrial site in northern California. The proposal to the North Coast RWQCB included a workplan for collecting the necessary groundwater data to demonstrate the effects of naturally occurring biodegradation of VOCs in groundwater.
- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed enhancing remedial activities (groundwater and soil vapor extraction) for a plume of chlorinated VOCs. Reporting and interaction with the DTSC involved conducting expedited conceptual and engineering design for expansion of a remedial system. Plans were also been developed for collecting data to document the potential effects of naturally occurring biodegradation in order to limit future remedial requirements. This work was conducted within the context of negotiating a Prospective Purchaser Agreement for an adjacent parcel that was impacted by the plume.
- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed conducting remedial activity (groundwater extraction) and monitoring progress toward cleanup for a specific site within a multiparty, subregional plume of chlorinated VOCs. Reporting and interaction with the EPA involved semi-annual Self Monitoring Reports. Recent activity also included reevaluating measures for maintaining a site-specific capture zone given that remedial activities were also occurring on adjacent sites.
- Served as Lead Hydrogeologist for remedial action design related to petroleum-impacted groundwater near residential water supply wells in central California. The constituents of concern included MTBE, and the Central Valley RWQCB conducted a detailed review of the Remedial Action Plan. The potential effects of residential well pumping were factored into the remedial pumping design so that containment of the constituents of concem was achieved and the water supplies were protected.
- Served as Senior Hydrogeologist for a fate and transport analysis related to petroleum-impacted groundwater near residential water supply wells in Alaska. The effects of naturally occurring biodegradation were incorporated into the analysis and supported the conclusion that risk to the water supplies was low.
- Served as Senior Hydrogeologist for a remedial investigation and action at an industrial facility in central California. The project was reviewed by the Central Valley RWQCB. It included hydrogeologic analysis, historical review, and negotiation to define remedial action requirements and allocate responsibility among responsible parties.
- Served as Project Manager and Senior Hydrogeologist for a subsurface investigation of an air cargo facility at the San Francisco International Airport. The project was reviewed by the RWQCB and parties involved in cost allocation for cleanup of petroleum-impacted groundwater and soil. Evaluation of subsurface impacts and recommendation of future actions was conducted within the context of maintaining current business activities at the site and deferring any intrusive remedial activities until an appropriate time in the future.
- Served as Senior Hydrogeologist for a landfill closure in Mexico City, Mexico. Tasks performed included acquiring data on potential leachate production rates and recommending design parameters for a leachate collection system. Collection of the leachate was required to facilitate the next step of the closure, extraction of accumulated landfill gas.
- Served as Senior Hydrogeologist for a five-year review and remedial effectiveness evaluation of a groundwater cleanup operation in northern California. The project entailed evaluation of remedial performance data for six groundwater extraction systems installed in alluvial sediments and was reviewed by the San Francisco RWQCB. Key points considered during the evaluation were hydraulic containment of the chlorinated VOC groundwater plume, cumulative removal of groundwater and VOCs, VOC removal efficiency, offsite sources of VOCs, and the potential for attaining cleanup goals set by the RWQCB. Presentation of the project findings positioned the client well for negotiation on further remedial actions.
- Provided technical/economic analysis and technical review for remedial investigations/ feasibility studies involving three industrial sites owned by a single client in southern California. The work was performed under the review of the DTSC. Project findings were used to develop estimates of cleanup cost and facilitate completion of real estate transactions for the benzene-impacted properties. Detailed evidence of naturally occurring biodegradation was developed and used to limit the extent of cleanup measures that were considered.

Project Experience – *Groundwater Remediation (cont.)*

- Served as Senior Hydrogeologist for a remedial investigation conducted at a commercial site in northern California. The investigation was performed under review of the San Francisco Bay RWQCB. Communication with the RWQCB on technical aspects of the investigation prior to commencing work positioned the client well for negotiations on further investigative requirements. The option for cost recovery was developed by maintaining consistency with the National Contingency Plan during the remedial investigation and interim remedial action, and by presenting arguments for the presence of off-site sources of chlorinated VOCs. Potential off-site source areas were identified, and arguments for requiring subsurface investigation by neighboring parties were supported through an analysis of site hydrogeology and migration potential. The arguments were presented and defended to the RWQCB. The ultimate goal of this effort is to identify other parties also responsible for the cleanup so that costs may be shared.
- Served as Project Manager and Senior Hydrogeologist for a soil and groundwater remedial investigation/feasibility study and an ecological river assessment conducted at a decommissioned wood treatment facility in Michigan. Creosote was present at the facility as a dense nonaqueous phase liquid. Negotiations with state regulatory agencies were key to successfully limiting the scopes of the investigations. Early data review allowed expeditious performance of the site characterization and development of a risk assessment strategy that both met regulatory requirements and was protective of client cleanup liability. The quality of the site characterization work contributed to the cooperative relationship between the client and regulatory agency, which reduced the potential for natural resource damage claims by the state.
- Performed remedial investigations and developed site closure arguments for petroleum sites in California, Florida, Massachusetts, and Rhode Island. The work in California was performed under the review of the Kern County Department of Environmental Health. Site closure arguments were accepted in all four states.
- Performed an emergency investigation, and designed, installed, and maintained a petroleum recovery system in response to a high-volume spill of diesel fuel into the subsurface at a commercial site in Massachusetts. Implementation of interim petroleum recovery measures minimized petroleum migration away from the source area. During the first year of recovery system operation, 25,000 gallons of fuel were recovered. System enhancements were then made to maintain recovery rates. Project costs were defrayed by reuse of the recovered fuel.
- Designed, installed and maintained numerous petroleum and groundwater recovery systems in several states. This work also included evaluation of overall remedial effectiveness and the benefits of using groundwater infiltration systems to enhance petroleum recovery. Work in California was performed under review of the Central Valley RWQCB.
- Performed site assessments for real estate transactions involving retail petroleum, commercial, and industrial sites throughout California and Massachusetts. The assessment findings were used to facilitate completion of the transactions.

Litigation Support

- Recent cases in which Mr. Gailey has been declared as an expert:
  - RF Land Inc. v. City of Ripon (California) 2010
  - Raymond Coldani v. Jack Hamm and Patricia Hamm (Federal 2009)
  - NCH Corporation v. Hartford Accident and Indemnity Company, et al. (New Jersey) Deposition testimony in 2007
  - Union Bank of California v. Rheem Corp. (California), 2006
  - Pinal Creek Group v. Newmont Mining Corp., et al. (Federal – Arizona) Deposition testimony in 2003 and 2006
- Serving as a Technical Consultant regarding responsibility for VOC contamination of a municipal water supply well. The case is being heard in the California courts.
- Served as an expert witness regarding financial responsibility for nitrate contamination of a municipal supply well from an industrial facility in northern California. Contributions included planning both data collection from the impacted well and inspection of the industrial facility, as well as presenting findings during mediation. The case, filed in the California state court system, ultimately settled.

Project Experience – ***Litigation Support (cont.)***

- Served as an expert witness regarding responsibility for nitrate contamination of groundwater in the vicinity of a dairy in northern California. Work on the case, filed under the Clean Water Act in the California state court system, involved field investigation and analysis, mediation support and presentations, and preparing a technical declaration in support of a motion for recovery of attorney/expert fees and costs. The case was ultimately rescinded.
- Served as an expert witness regarding cost recovery and future apportionment among RPs for cleanup of a large acid mine drainage site in Arizona. The case involved several RPs active over almost a century and located throughout a mining complex, had been filed under CERCLA, and was heard in the federal court system. Expert analysis included a comprehensive consideration of the site hydrogeology and historic mining activities, and flow calculations (water budgets and mass balance assessments on surface water and groundwater flows, and three-dimensional groundwater flow modeling) to assess the relative contributions to the acid plume by various RPs. Video taped deposition testimony was given twice.
- Served as an expert witness regarding insurance coverage claims related to cleanup of a Superfund site. The case was filed under CERCLA and heard in the New Jersey state court system. Analysis and opinion development focused on hydrogeologic and regulatory factors that would influence the ultimate cost of the cleanup. Methods for incorporating uncertainty into the cost estimates was also addressed. Deposition testimony was given. Issues related to the above-referenced opinions were subsequently dropped from the case.
- Served as an expert witness regarding cost recovery for a former electronics manufacturing facility. The case was filed under CERCLA and heard in the California state court system. Analysis and opinion development focused on hydrogeologic factors that controlled both the duration of release to groundwater and the extent of subsequent off-site migration. The case settled before any testimony was given.
- Served as a consultant regarding a CERCLA claim for damages related to a release of contamination into a San Francisco Bay Area aquifer that serves a large population of individual well owners (residential and agricultural). The case, filed by a class of plaintiffs, involves releases from a single industrial parcel where multiple RPs operated over time and was heard in the federal court system. Consultation has included document review, quantitative analysis related to the extent of contamination and potential cleanup timeframe, mediation brief preparation, development of computer animation visual aids for mediation discussions, and presentation at mediation.
- Provided consultation for mediation of cleanup cost allocation for petroleum-impacted groundwater and soil at the San Francisco International Airport. The project involved research and strategy development focused on supporting negotiations with some twenty responsible parties.
- Provided consultation for legal defense against a claim concerning financial responsibility for contamination of residential and agricultural water supplies and soil. The case involved two adjacent parcels in northern California, was filed under CERCLA, and heard in the federal court system. Data analysis and discussions with attorneys focused on the plausibility of claims made by the plaintiff with respect to source area locations, site hydrogeology and migration potential of the constituents, and differences in signature assemblages of constituents present at each of the two sites. The case settled before any testimony was given.
- Provided consultation for legal defense against a claim concerning financial responsibility for petroleum and heavy metals present in soil and groundwater. The case involved two adjacent industrial parcels in northern California, was filed under CERCLA and heard in the federal court system. Data analysis and development of arguments focused on the plausibility of claims made by the plaintiff with respect to source area locations, site hydrogeology and migration potential of the constituents, and differences in signature assemblages of constituents present at each of the two sites. The arguments prepared supported successful opposition to motions made by the plaintiff for widespread inspection of the defendant's property, settlement discussions, and the defendant's motion for summary judgment. Prior to a settlement being reached, Mr. Gailey participated in settlement discussions and preparing the expert witness for trial.
- Provided consultation for legal defense against a claim concerning financial responsibility for petroleum contamination at two adjacent retail/industrial parcels in northern California. Data analysis and development of arguments focused upon the adequacy of previously implemented remedial actions for which the plaintiff sought compensation. The technical merits of written arguments developed for the defense resulted in the plaintiff's claim being rescinded prior to the case being heard in court.

Project Experience – *Litigation Support (cont.)*

- Served as an expert witness for a defendant regarding a cost recovery claim concerning petroleum and chlorinated VOCs present in soil and groundwater. The case was filed under CERCLA and heard in the federal court system. It involved a single property in northern California, an initial owner-operator (the plaintiff), and a subsequent series of occupants (the codefendants). Data analysis and development of written arguments focused on both changes in the chemical composition of materials used for automotive fueling and repair between the 1940s and the 1980s, and the appropriate allocation of cost for site cleanup among the involved parties. Estimation of total cost for the cleanup was also performed. 1,2-Dichloroethane (DCA) was identified as a signature compound for releases to the environment that occurred before the codefendants occupied the site. Data collected by the plaintiff demonstrated that DCA was present across the property and supported arguments that the plaintiff was also responsible for the cleanup. The case settled before any testimony was given.
- Provided consultation in support of a class action suit against the state of California concerning a levee failure. Three-dimensional transient groundwater flow and soil mechanical processes were modeled to show that departure from guidelines for levee maintenance could have caused the failure. Mr. Gailey defended the modeling work in deposition. This work supported testimony of the expert witness.

Insurance Analysis Support

- Conducted a comprehensive assessment and estimation of future remediation costs in support of insurance premium pricing for a cost cap policy on two sites. Annual costs over the life of the policy were developed for three possible scenarios (high, medium, and low costs) based on detailed review and consideration of project characteristics. These characteristics included technical (engineering and science), regulatory and logistical issues. The results were presented and discussed during negotiations between the insurance company and insurance brokers over premium price.
- Conducted several assessments of remediation projects in support of insurance claims analyses. The overall approach and effectiveness of remedial actions were evaluated. In addition, costs incurred were identified and categorized with respect to policy coverage and exclusion categories. General projections of future costs and timelines were also prepared.

Education

MBA, University of California, Berkeley, 2003.
MS, Applied Hydrogeology, Stanford University, 1991.
BS, Geology/Biology, Brown University, 1985.

Professional Certifications and Registrations

Professional Geologist, California No. 5338
Certified Hydrogeologist, California No. 259
40-Hour OSHA HAZWOPER Safety Training
8-Hour OSHA HAZWOPER Refresher/Respirator Fit Test
8-Hour OSHA Site Supervisor Certification
First Aid/CPR Training

Continued Education

Isotope Methods for Groundwater Investigation, Groundwater Resources Association of California, 2007
Endangered Species Acts: Meeting the Challenges, Association of California Water Agencies, 1999
Groundwater Use and Management, University of California at Berkeley Extension, 1998
Drinking Water Regulation, University of California at Berkeley Extension, 1998
Water Supply and Fish in the Sacramento-San Joaquin Delta, University of California at Berkeley Extension, 1997
Managing Groundwater into the 21st Century, Association of California Water Agencies, 1997
Watershed Management and Source Water Protection: The First Barrier, American Water Works Association, 1997
Aquifer Storage and Recovery, American Water Works Association, 1997
Graduate Study in Environmental Engineering, Stanford University, 1990
Surveying, Wentworth Institute of Technology, 1986

Professional Memberships and Activities

Association of Ground Water Scientists and Engineers
Groundwater Resources Association of California
Technical reviewer for various journals

Publications

Gailey, R.M. 2000. Application of Mixed-Integer Linear Programming Techniques for Water Supply Wellfield Management and Plume Containment at a California EPA Site. Proceedings of the International Symposium On Integrated Water Resources Management, International Association of Hydrological Sciences.

Gailey, R.M. 1999. Application of Mixed-Integer Linear Programming Techniques for Water Supply Wellfield Management and Plume Containment at a California EPA site. Proceedings of the 26th Annual Conference on Water Resources Planning and Management, American Society of Civil Engineers. (Published on compact disc.)

Gailey, R.M. and M. Eisen. 1997. An Optimization-based Evaluation for Groundwater Plume Containment and Water Supply Management at a California EPA Site. p. 138. In: proceedings of XXVIIth IAHR Congress, Water for a Changing Global Community, Theme C: Groundwater An Endangered Resource.

Brogan, S.D. and R.M. Gailey. 1995. A method for estimating field-scale mass transfer rate parameters and assessing aquifer clean-up times. Ground Water 33 (6) 997-1009.

Gailey, R.M. and S.M. Gorelick. 1993. Optimal, reliable plume capture schemes: application to The Gloucester Landfill groundwater contamination problem. Ground Water 31 (1) 107-114.

Gailey, R.M., A.S. Crowe, and S.M. Gorelick. 1991. Coupled process parameter estimation and prediction uncertainty using hydraulic head and concentration data. Advances in Water Resources 14 (5) 301-314.

Gailey, R.M. and D.E. Jones. 1987. The use of sediment permeability variations in the performance of petroleum recovery from glacial sediments. p. 515. In: Proc. of the Focus on Eastern Regional Groundwater Issues, National Water Well Association.

Presentations

A Case for Alternative Groundwater Monitoring under CASGEM in Northeastern California. Session Speaker, Groundwater Resources Association of California, 21st Annual Meeting and Conference, California Groundwater: Data, Planning and Opportunities, October 4 and 5, 2012, Rohnert Park, California.

Water Supply Well Rehabilitation Methods: Alternatives and Successes. Invited Speaker, Groundwater Resources Association of California Managing Wells in California and Protecting Groundwater Resources Symposium, August 22 and 29, 2012, Sacramento, California.

Factors Affecting Nitrate Concentrations in Water Supply Wells. 28th Biennial Groundwater Conference and 20th Annual Meeting of the Groundwater Resources Association of California, California's Water's Future Goes Underground, October 5-6, 2011, Sacramento, California.

Identifying the Sources of Nitrate to a Deep Municipal Water Supply Well Using Stable Isotopes of Nitrate, Groundwater Age Dating and Depth-Specific Sampling. Copresenter with Brad Esser, Groundwater Resources Association of California Environmental Forensics Symposium, April 12, 2011, Irvine, California.

Reducing Arsenic Concentrations from a Municipal Supply Well through Well Screen Modification. Invited Speaker, Arsenic Symposium: Treatment Alternatives and Case Studies, December 8-10, 2009, Bakersfield, Barstow and Ontario, California.

Simulating Flow and Transport Uncertainty Associated with Water Supply Well Modification Based upon Well Profiling and Pumping Test Data. Coauthor with Grace Su, 2010 National Groundwater Association Groundwater Summit, April 12-14, 2010, Denver, Colorado.

Reducing Arsenic Concentrations from a Municipal Supply Well through Well Screen Modification. Invited Speaker, Arsenic Symposium: Treatment Alternatives and Case Studies, December 8-10, 2009, Bakersfield, Barstow and Ontario, California.

Presentations (cont.)

Considering the Consumption of Energy and Other Resources during Pumping at the Well and Wellfield Scales. Invited Speaker, 27th Biennial Groundwater Conference and 18th Annual Meeting of the Groundwater Resources Association of California, Water Crisis and Uncertainty: Shaping Groundwater's Future, October 6-7, 2009, Sacramento, California.

Planning Combined Municipal Use of Groundwater and Surface Water: Technical and General Results from a Case Study. Session Speaker, Groundwater Protection Council Annual Forum 2009, Water/Energy Sustainability Symposium – Water and Energy Policy in the 21st Century, September 13-16, 2009, Salt Lake City, Utah.

Optimal Conjunctive Use of Surface Water and Groundwater Resources: A Tale of Two Cities. Session Speaker and Symposium Co-Chair, Applications of Optimization Techniques to Groundwater, a Groundwater Resources Association of California Symposium, October 16, 2008, Sacramento, California.

Details of Optimization and Applications to Groundwater Projects. Course Instructor and Co-Chair, a Groundwater Resources Association of California Short Course, October 15, 2008, Sacramento, California.

Application of a Simulation-Optimization Approach for Water Supply Wellfield Management and Plume Containment. Session Speaker, Groundwater Resources Association of California, 13th Annual Meeting and Conference, Managing Aquifers for Sustainability – Protection, Restoration, Replenishment, and Water Reuse, September 23-24, 2004, Rohnert Park, California.

Application of Mixed-Integer Linear Programming Techniques for Water Supply Wellfield Management and Plume Containment at a California EPA site. Session Speaker, International Association of Hydrological Sciences, International Symposium On Integrated Water Resources Management, April 9-12, 2000, Davis, California.

Application of Mixed-Integer Linear Programming Techniques for Water Supply Well Fixed Management and Plume Containment at a California EPA site. Session Moderator and Speaker, American Society of Civil Engineers Water Resources Planning and Management Division Annual Conference, June 6-9, 1999, Tempe, Arizona.

Wellfield Optimization: A Case Study. Session speaker, American Water Works Association, California-Nevada Section, Fall Conference, October 6-9, 1998, Reno, Nevada.

A Linear Programming Application for Water Resource Management at a Mining Operation. Session speaker, 25th Annual Conference on Water Resources Planning and Management, American Society of Civil Engineers, June 7-10, 1998, Chicago, Illinois.

Water Disposal Concerns with a Well Rehabilitation Project. Invited Speaker, American Water Works Association, California-Nevada Section, Water Well Monitoring and Rehabilitation Seminar, May 20-21, 1998, Stockton, California.

Quantifying Rate-Limited Mass Transfer Effects in the Field: Challenges Faced by Environmental Science Practitioners. Session speaker, American Geophysical Union Fall Meeting, December 8-12, 1997, San Francisco, California.

An optimization-based evaluation for groundwater plume containment and water supply management at a California EPA site. Session speaker, American Water Resources Association Annual Conference and Symposium on Conjunctive Use of Water Resources: Aquifer Storage and Recovery, October 19-23, 1997, Long Beach, California.

An optimization-based evaluation for groundwater plume containment and water supply management at a California EPA site. Session speaker, XXVII in IAHR Congress, Water For A Changing Global Community, August 10-15, 1997, San Francisco, California.

A method for estimating field-scale mass transfer rate parameters and predicting aquifer clean-up times. Session speaker, 1994 Groundwater Modeling Conference, August 10-12, 1994, Fort Collins, Colorado.

Design of optimal, reliable groundwater capture schemes. Session speaker, solving Ground Water Problems with Models, February 11-13, 1992, Dallas, Texas.

Design of optimal, reliable groundwater capture schemes. Lecturer, National Research and Development Conference on the Control of Hazardous Materials, February 4-6, 1992, San Francisco, California.

Design of optimal, reliable plume capture schemes: application to the Gloucester Landfill. Invited speaker, American Geophysical Union Fall Meeting, December 9-13, 1991, San Francisco, California.

Presentations (cont.)

The use of sediment permeability variations in the performance of petroleum recovery from glacial sediments. Session speaker, Focus on Eastern Regional Groundwater Issues, July 14-16, 1987, Burlington, Vermont.

Presentations on aspects of quantitative hydrogeology at the U.S. Geological Survey, Lawrence Berkeley National Laboratory, California Department of Water Resources, and universities (California State University at Sacramento, Harvard, Stanford, and the University of Illinois).

EXHIBIT B

ADDITIONAL CHARACTERIZATION REPORT

Mount Diablo Mercury Mine

2430 Morgan Territory Road
Contra Costa County, California

01-SUN-055

Prepared For:

SUNOCO

10 Industrial Highway, MS4
Lester, PA 19029

Prepared By:

SGI environmental THE SOURCE GROUP, INC.

3451C Vincent Road
Pleasant Hill, CA 94619

December 7, 2011

Prepared By:

Jon R. Philipp, P.G., C.Hg.
Senior Hydrogeologist

Kristene Tidwell, P.G.
Project Geologist

Reviewed By:

Paul D. Horton, P.G., C.Hg.
Principal Hydrogeologist

PROFESSIONAL GEOLOGIST
PAUL D. HORTON
No.5435
STATE OF CALIFORNIA

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1.0 INTRODUCTION

The Source Group, Inc. (SGI), on behalf of Sunoco, (R&M) Inc. (Sunoco), conducted additional investigations at the former Mount Diablo Mercury Mine in Contra Costa County, California (the Site or Mine), consistent with the Central Valley Regional Water Quality Control Board's (CVRWQCB) December 30, 2009 Revised Technical Reporting Order R5-2009-0869 (Rev. Order).

This work supplements SGI's *Characterization Report, Mount Diablo Mercury Mine* (Characterization Report; SGI 2010a), which identified data gaps and recommended work elements to complete characterization of the Site pursuant to the Rev. Order. CVRWQCB staff concurred with the proposed additional elements in its August 30, 2010 letter to Sunoco. SGI then presented a detailed scope of work in its *Additional Characterization Work Plan* (Work Plan; SGI, 2010b), including the following activities:

- Performance of a topographic survey;
- Installation of two groundwater monitoring wells: 1) a well within the Bradley Mining Company (Bradley) mine workings, specifically, in Bradley's 165-level lateral Adit, which exits to the surface within Bradley's historic mercury ore tailings piles (completed at a total depth of 85 feet below ground surface (bgs) and; 2) a well into the former Defense Minerals Exploration Agency (DMEA)/Cordero Mining Co. (Cordero) underground mine workings, specifically, into the Cordero 360-level lateral tunnel (completed at a total depth of 275 feet bgs);
- Sampling and analysis of groundwater and evaluation of gradients within these wells; and
- Surface water sampling to determine and/or confirm sources of mercury to Site surface waters to assist the CVRWQCB's evaluation of remedial alternatives.

CVRWQCB Staff concurred with the Work Plan's proposed scope of additional work in its October 26, 2010 letter to Sunoco. SGI successfully completed each task identified in the approved Work Plan on behalf of Sunoco, thereby completing the investigation required in the Rev. Order.

2.0 SITE BACKGROUND

2.1 Location and Current Use

The Site, which is located in an unincorporated area of Contra Costa County, California at the northeastern base of Mount Diablo, includes the former Mine and its historic working areas , and is generally described as the 80 acres of land on the southwest quadrant of the intersection of Marsh Creek Road and Morgan Territory Road as shown on Figure 1-1. The Site is adjoined to the south and west by lands of Mount Diablo State Park and to the north and east by Marsh Creek Road and Morgan Territory Road.

The Mine has reportedly been closed since around 1969. Most assay and process equipment has been removed from the Site, which still retains some abandoned wood structures that were part of the facility operations (Figure 2-1, aerial photograph of Mine). The Site is situated at an elevation of approximately 700 to 1100 feet above mean sea level (msl). Currently the Site owners, Jack and Carolyn Wessman, and their lessees, use the Site for residential purposes and cattle ranching.

2.2 Site Operational and Mining History

2.2.1 Pre-Cordero History

Mining operations first began at the Site in 1863. Between 1863 and 1936, various operators removed approximately 1,739 flasks of mercury from the Site. Bradley produced more than 10,000 flasks of mercury during its 15 years of mining operations at the Site between 1936 to 1951. At the end of Bradley's operations, the underground mine workings consisted of four levels in a steeply dipping shear zone. The Bradley workings were accessed by a main shaft and had an "adit" tunnel that exited to the surface on the 165-level (the 165-level Adit; Pampeyan, 1963).

Bradley generated 78,188 cubic yards of milled tailings and 24,815 cubic yards of waste rock from the mine tunnels (Ross 1940). The material generated by Bradley represents 97.3 percent of all waste material generated, and nearly 100% of all mill tailings, as documented in the attached Table 2-1. In addition to the materials generated from the Mine, Bradley also operated a rock quarry to the west of the Mine. Waste rock generated from Bradley's quarry operation is reported to have been placed in the area called the "Waste Dump" on maps produced by the California Division of Mines and Geology (Pampeyan, 1963). Historical records indicate that Bradley's mining and milling operations resulted in 97.3 percent of the currently existing waste and tailings piles at the Site; these waste piles match the waste pile configuration reflected in the 1953 California Division of Mines and Geology's Site mapping (Pampeyan, 1963). Figure 2-2 provides a map depicting the locations of the tailings and waste rock piles that Bradley generated on the Site. SGI's field confirmed locations of mercury mine tailings and waste rock are depicted in blue hatched outline and can be readily discerned as bare looking areas on the aerial photographs (Figure 2-2.) The waste dump that received Bradley's quarry waste rock is north (northern waste rock) and is circled in a dashed green outline. The northern waste rock area is physically different from the other Bradley waste areas as it has an extensive tree cover as reflected in Figure 2-2.

Following the period of extensive Bradley operations, Mt. Diablo Quicksilver Co., Ltd. (Mt. Diablo Quicksilver) next leased the Mine to Ronnie B. Smith and partners (Smith, 1951). Using surface (open pit) mining methods, Smith, et al. produced an estimated 125 flasks of mercury in a rotary furnace. In 1953, the DMEA granted Smith, et al. a loan to explore the deeper parts of the shear zone (Schuette, 1954). With DMEA's grant money, and under the DMEA's supervision, Smith, et al. constructed a 300-foot-deep shaft (historically referred to as the DMEA Shaft) during the period from August 15, 1953 to January 16, 1954 (Schuette, 1954). The DMEA Shaft and workings flooded on February 18, 1954 and, subsequently, Smith, et al. abandoned the project (Schuette, 1954).

2.2.2 Cordero Operational and Mining History

Cordero Mining Company (Cordero) rejected a DMEA contract and leased the Site from Mt. Diablo Quicksilver on November 1, 1954, and began reconditioning the DMEA Shaft in January 1955 before discontinuing operations in December 1955. The former Cordero lease area as presented in Figure 2-2 excludes a significant portion of the easterly areas of Bradley's exposed waste rock, the spring outflow area emanating from the 165-level Adit from which Bradley operated, and the current waste and settlement pond adjacent to Morgan Territory Road.

Cordero conducted its underground mining efforts from the pre-existing DMEA Shaft (Pampeyan and Sheahan, 1957). The area of this shaft and the interpreted potential surface work area is presented on Figure 2-3 (Cordero never conducted any surface mining at the Site). Records also indicate that Cordero conducted water handling and treatment operations extending from the DMEA Shaft to a location 1,350 feet to the west within the lease area (Sheahan, 1956 and WPCB, 1955). The total volume of waste rock generated by Cordero was approximately 1,228 cubic yards (Table 2-1). Cordero generated an estimated 100 to 200 tons of ore with a grade of 3 to 10 pounds of mercury per ton (Pampeyan and Sheahan, 1957), which equates to approximately 50 to 100 cubic yards of ore material.

The calculated total ore and waste rock generated by all documented mining activities prior to and including those of Cordero is approximately 105,848 cubic yards as referenced on Table 2-1. Based on these material calculations, waste rock and ore generated by Cordero represents less than 1.2 percent of the total volume of mined material at the entire Site.

The areas depicted on Figure 2-3 showing the DMEA Shaft and the waste rock dump area, and the water disposal area west of the DMEA Shaft, are the only documented potential Cordero work areas and represent the extent of known operations by Cordero.

2.2.3 Post-Cordero Activities

In 1956 the Nevada Scheelite Corp. leased the mine and installed a deep-well pump (550 gallons per minute) to remove water which had risen to a point 112 feet below the collar of the shaft. Since the downstream ranchers objected to the discharge of acid mine water into the creek this work was suspended. Attention was then directed to the open pit where some exploration was done using wagon drills. A small tonnage of retort-grade ore was developed. Since this was not sufficient to satisfy the requirements of the company the lease was relinquished (Division of Mines, 1958).

A June 1958 State Water Pollution Control Board (WPCB) inspection report states the Mine was leased to John E. Johnson and that he was operating it, but he apparently died later that year and the Site ceased operation. Welty and Randall Mining Co. subsequently operated an unidentified portion of the Site from approximately 1965 to 1969. They apparently re-worked mine tailings at the Site under a lease from Victoria Resources Company (Victoria Resources), which purchased the Mine from Mt. Diablo Quicksilver in May 1962. On or about December 9, 1969, Guadalupe Mining Co. (Guadalupe) purchased the Mine from Victoria Resources. It is unclear whether Guadalupe actually operated the Mine. In June 1974, the current owners, Jack and Carolyn Wessman and the Wessman Family Trust purchased the Site from Guadalupe. In 1977, the Wessmans sold the portion of the Site containing the settlement pond to Ellen and Frank Meyer, but subsequently repurchased it in 1989.

2.3 Previous Investigations

The potential for contamination of Marsh Creek from the Site has long been of concern, resulting in considerable sampling of Marsh Creek, Dunn Creek, Horse Creek, pond effluent, etc., over the past 50+ years (WPCB Document Log) by the following:

- CVRWQCB and its predecessor, the WPCB, as part of inspection visits to the Mine since the late 1930's;
- J.L. Iovenitti, Weiss Associates, and J. Wessman, as part of *Mount Diablo Mine Surface Impoundment Technical Report* dated June 30, 1989; and
- Professor Darell G. Slotton, U.C. Davis, as part of the *Marsh Creek Watershed Mercury Assessment Project* conducted in March 1996, July 1997, and June 1998.

The following sections summarize these previous investigations.

2.3.1 State Water Pollution Control Board / California Regional Water Quality Control Board Investigations

Beginning in the late 1930's, the CVRWQCB and its predecessor, the WPCB, periodically inspected the Site and collected surface water grab samples under varying conditions (ranging from high runoff periods, to periods of little or no runoff) from the following locations:

- Dunn Creek (at various locations);
- Horse Creek (upstream of pond outlet);
- Perkins Creek (above the confluence with Marsh Creek);
- Curry Creek (above the confluence with Marsh Creek);
- Marsh Creek (at various locations);
- Drainage from mine/tailings on Wessman property;
- Drainage from ponded area, north of tailings;
- Springs on State Park Land;
- Alkali Spring below and east of pond/dam;
- Mine pond;
- Zuur well;
- Prison Farm well; and
- Marsh Creek Springs Resort well.

These samples were analyzed for general water quality parameters and metals. The Characterization Report (SGI 2010a) includes a summary of these water sample results.

2.3.2 J.L. Iovenitti, Weiss Associates, and J. Wessman, *Mount Diablo Mine Surface Impoundment Technical Report*

In 1989, a technical report evaluating the geohydrochemical setting of the Site's surface impoundment, the source of contaminants in the surface impoundment, waste control alternatives, and preliminary cost estimates for these alternatives was prepared as part of the application to qualify for an exemption authorized by the Amendment to the Toxic Pits Cleanup Act of 1984 (Iovenitti, 1989). The report characterized the contaminants in the surface impoundment based on historical data obtained from 11 water samples collected from the surface impoundment from 1953 through 1988. The surface water samples were analyzed for general water quality parameters and metals. The results indicated that the metals concentrations detected in the water within the surface impoundment exceeded primary drinking water standards. As summarized in Appendix A to the Characterization Report (SGI, 2010a), in April and May of 1989, J.L. Iovenitti, a consulting geoscientist based in Pleasant Hill, California, collected nine surface water samples from Dunn

Creek (various locations), Ore House Spring, the creek above the Northern Pond, the Northern Pond, and the surface impoundment (two locations: Iovenitti, 1989)

2.3.3 Professor Darell G. Slotton, Marsh Creek Watershed Mercury Assessment Project

Contra Costa County sponsored a three-year study (1995, 1996, and 1997) of the Marsh Creek Watershed to comprehensively determine the sources of mercury in the Marsh Creek Watershed, both natural and anthropogenic. These studies also documented mercury concentrations in indicator species, surface water, and sediment to evaluate mercury bioavailability within the Marsh Creek Watershed. These studies were designed to characterize baseline conditions of the Marsh Creek Watershed and to evaluate the relative effectiveness of potential future remedial actions at the Mine.

The results of the 1995 study are summarized in a March 1996 report titled "Marsh Creek Watershed 1995 Mercury Assessment Project – Final Report" prepared by Darell G. Slotton, Shaun M. Ayers, and John E. Reuter (Slotton, et al, 1996). The 1995 study evaluated aspects of mercury loading within the Marsh Creek Watershed. As part of this Mercury Assessment Project, sampling was conducted at the Site, including the Lower Pond, the spring on State Park property, the spring emanating from the tailings pile, and other locations upstream in Dunn Creek and downstream along Marsh Creek. The chemical results of the Slotton et al. 1996 study in the area of the Site are summarized in Table 2-2.

The results of the 1996 study are summarized in a July 1997, report titled "Marsh Creek Watershed Mercury Assessment Project – Second Year (1996) Baseline Data Report" prepared by Darell G. Slotton, Shaun M. Ayers, and John E. Reuter (Slotton, et al, 1997). The 1996 study, (the second year of the three-year baseline study), evaluated mercury availability in indicator species and sediment within stream sites and the Marsh Creek Reservoir by collecting 175 individual and composite samples of invertebrates, sediment, and young fish from 13 stream sites and the Marsh Creek Reservoir (Slotton, et al., 1997).

The results of the 1997 study are summarized in a June 1998 report titled "Marsh Creek Watershed Mercury Assessment Project – Third Year (1997) Baseline Data Report with 3-Year Review of Selected Data" prepared by Darell G. Slotton, Shaun M. Ayers, and John E. Reuter (Slotton, et al, 1998). As with the 1996 study, the 1997 study (i.e., final year of the three-year baseline study) focused on evaluating mercury availability in indicator species and sediments within stream sites and the Marsh Creek Reservoir and involved the collection of 137 individual and composite samples of invertebrates, sediment, and young fish from 12 stream sites and the Marsh Creek Reservoir, (Slotton, et al., 1998).

Slotton, et al.'s three-year study and extensive sampling of the entire Marsh Creek Watershed (Slotton, 1996) specifically concluded that Initial work in 1995 documented that the Mt. Diablo

Mercury Mine region contributed the great majority of the entire watershed's mecury loading (95% with 88% directly traceable to the ongoing drainage from exposed tailings, i.e. Bradley Mining Company's waste) at the Site (Slotton, et. Al., 1996). Accordingly, Slotton's findings indicate that Bradley's exposed mine tailings piles are responsible for approximately 94.3% of the mercury discharge from the upper watershed that includes the mine.

2.4 Previous Remedial Actions

Since the operations of Cordero in 1955, multiple operators and property owners have been involved in actions that have modified some of the physical features of the Site. Most notably, the current property owner, Jack Wessman, over the period of his ownership since 1974, has conducted work in an effort to minimize the impact of exposed mine waste material to surface water runoff. This work has included earth moving at the Site involving the importation of a large quantity of fill material (reported by Jack Wessman to be on the order of 50,000 cubic yards), and the movement and grading of this fill material around the Site to cap mine waste.

Based on SGI's discussions with Jack Wessman during Site inspections in 2008, this work has specifically included: 1) infilling and capping of the original collapsed mine workings located to the north of the DMEA Shaft and Cordero work area, 2) filling of the DMEA Shaft and filling and capping of waste rock below the shaft toward the furnace, 3) filling and capping of a small pond located west of the DMEA Shaft, 4) grading of waste rock and tailings piles located to the east of and overlying the mine workings as part of surface drainage control actions, 5) re-configuring, enhancing and maintaining impoundments around the lower waste ponds, and 6) installing drains and drainage pipe for the purpose of redirecting surface rainfall runoff in the upper Mine area around the exposed tailings and waste rock into Dunn Creek directly bypassing flow through the Lower Pond.

Current surface drainage for the higher elevations of the Site, including the Cordero operations around the DMEA Shaft area, is captured and routed around the exposed tailings and waste rock, and around the Lower Pond, emptying directly into Dunn Creek at a location up-gradient of the Lower Pond.

In response to an Order from the United States Environmental Protection Agency (USEPA), Sunoco conducted an emergency stabilization of the southeastern wall of the Lower Pond's impoundment dam to prevent continued storm flow erosion of the impoundment in 2008/2009. This work was documented in the SGI report titled "Final Summary Report for Removal Action to Stabilize the Impoundment Berm, January 28, 2009".

3.0 FIELD ACTIVITIES

In accordance with the Work Plan, field activities presented herein were performed and details of these activities are presented in the following sections.

3.1 Topographic Site Survey

A licensed surveyor performed a Site survey, which included determining exact locations of a number of features associated with the Mine. These features were selected for survey so that they could be referenced to historical maps depicting subterranean adits and laterals targeted for well installations.

A topographic survey was performed at a two-foot contour interval for the Site produced from aerial photography stereo pairs of the Site from a project specific flyover event conducted by HJW Geospatial. The topographic map included as Figure 3-1 was used in monitoring well placement. In general, historic structures still in existence were used to georeference the location of former underground mine workings with current surface features to ensure accurate placement of the monitoring wells.

3.2 Surface Water Sampling

On October 20, 2010, February 17 and June 14, 2011, SGI collected surface water samples from various locations around the Site per the Work Plan to identify and quantify sources of mercury and other chemicals in runoff water and confirm the results of the previous surface water sampling conducted by SGI in April and May of 2010.

Surface water samples were collected at the following locations (as available) during all five sampling events (including the April and May 2010 events which were included in the Characterization Report, SGI 2010a):

- Bradley tailings piles (including SW-01, SW-02, and SW-03);
- Springs (including the Adit Spring [SW-15], Mount Diablo State Park Spring [Park Spring, SW-04], and the Ore House Spring [SW-14]);
- Runoff water observed moving between the Bradley tailings piles and the Lower Pond (SW-05);
- Storm Water Retention Ponds (including the Upper Pond [SW-06], the Middle Pond [SW-10], and the Lower Pond [SW-09]);
- Dunn Creek (including downstream of the Lower Pond [SW-07], between the Middle Pond and My Creek [SW-08], and upstream of My Creek [SW-16]); and

- My Creek (including upstream, within, and downstream of the northern waste rock area [SW-12, SW-11, and SW-13, respectively]).

Upstream surface water sampling locations SW-12 and SW-16 are considered background locations as they are located upstream of all identified former mining activities in the upper watershed. Sampling location SW-04, the natural and undisturbed spring on State Park property, is considered representative of natural background conditions of spring water flow in the area of the mine. The 16 surface water sampling locations (SW-01 to SW-16) are presented on Figure 3-2. A sample location key is summarized in Table 3-1.

3.2.1 Sample Collection Procedures

Samples were collected in clean laboratory-supplied containers by allowing flowing surface water to enter into the container. In some cases (generally resulting from a lack of access), a clean sample container was used to initially capture the water s`ample, which was then subsequently decanted into the appropriate container. If water was observed emerging from the wet area, the sample was collected as close to the origin as possible. Each sample was capped, labeled, and placed in a cooler with ice and transported to California-certified Accutest Laboratory located in San Jose, California (Accutest). Chain-of-custody procedures were followed at all times. Chain-of-custody documentation is included with the laboratory reports in Appendix A.

3.2.2 Equipment Decontamination

No reusable sampling equipment was employed during the collection of the samples. Following the collection of each sample, all sampling equipment, such as gloves, were properly disposed of and not reused for any subsequent sample collection.

3.2.3 Laboratory Analysis

The surface water samples were analyzed for the following parameters:

- Total Mercury;
- Dissolved Mercury;
- Methyl Mercury;
- pH;
- Alkalinity (Bicarbonate, Carbonate and total);
- Dissolved Organic Carbon;
- Specific Conductivity;

- Total Dissolved Solids;
- Hardness (as $CaCO_3$);
- Turbidity;
- Dissolved Silica;
- Cations - B, K, Fe, Mn, Mg, Ca, Na, Si;
- Anions - Cl, F, SO_4, Br, NO_3, Zn, As; and
- Remaining Priority Pollutant Metals - Sb, Be, Cd, Cr, Cu, Pb, Ni, Se, Ag, T.

Analytical results for surface water samples are included in Table 3-2.

3.3 Monitoring Well Installation and Sampling

On May 2 through May 9, 2011, Boart Longyear (Boart) of Yuba City, California mobilized to the Site and under the supervision of SGI, installed monitoring wells in the Bradley 165-level Adit (ADIT-1) and the DMEA/Cordero 360-level lateral tunnel (DMEA-1). Details of well construction and sampling activities are presented below. Locations of these wells are presented in Figures 3-2 and 3-3.

Well DMEA-1 was installed to intercept the DMEA/Cordero underground workings, specifically the 360-level lateral tunnel. Well ADIT-1 was installed to intercept the Bradley underground workings, specifically the 165-level Adit. Both wells were screened across the apparent intervals of their respective tunnel systems. Figure 3-3 shows the well locations in relation to the tunnel systems. Figure 3-4 shows the tunnel workings in cross-section including elevation indications of the different tunnel levels.

As presented in Figure 3-4, the 165-level and 360-level are located at approximate elevations feet above msl of 787 and 620, respectively. Based on this map and surface elevation measurements, the approximate depths estimated to encounter the two tunnels were 76 feet bgs for ADIT-1 and 278 feet bgs for DMEA-1. The tunnel zone for well ADIT-1 was encountered at approximately the expected depth (72 feet bgs). For well DMEA-1, the tunnel was encountered higher than expected at approximately 244 feet bgs, and was also greater in height (over 20 feet thick), than expected. Both of these observations suggest that the roof of the tunnel was encountered, but has collapsed over time.

3.3.1 Soil Boring Advancement

Prior to well installation, soil borings were advanced using a sonic drill rig. The sonic drilling technology combines harmonics (vibration) and rotation as the basis for tool advancement. Sonic drilling uses water as the fluid medium. Drilling was conducted using an inner casing (core barrel) followed by an outer casing. A 4-inch diameter core barrel and 9- and 8-inch diameter outer casing were used. The drilling procedure occurred as follows:

- The core barrel was advanced 10 feet into the subsurface, followed by the 9-inch diameter outer casing;
- The core barrel was removed from the borehole and the soil/rock was logged then transferred to a bin for disposal;
- The core barrel was then put back into the borehole and advanced another 10 feet; and
- An additional 10 foot length of outer casing was added to the outer casing that is in the ground and was drilled to meet the bottom of the core barrel.

This process continued until total depth was reached for each well. ADIT-1 was completed to a total depth of 85 feet bgs and DMEA-1 was drilled to a total depth of 275 feet bgs. The boring/well logs for these wells are presented in Appendix B.

3.3.2 Well Construction

ADIT-1 and DMEA-1 were constructed using 4-inch diameter schedule 80 polyvinyl chloride (PVC) well casings and 0.010-inch machined slot screen. ADIT-1 was screened with a filter pack of #3 Monterey sand around the well screen, extending from 65 to 80 feet bgs. Ten feet of blank PVC was installed in the bottom of the borehole for the purpose of trapping sediment. DMEA-1 was screened from 240 to 265 feet bgs, also with 10 feet of blank PVC for trapping sediment. Since a void was encountered in this screen interval during drilling, a packer was set at 230 feet bgs and no filter pack was placed around the screen. Hydrated bentonite was placed above the filter pack or packer. Neat cement-grout was then placed above the bentonite to the surface. Wells were completed using stovepipe well boxes set in a concrete pad. Well construction details are presented in Table 3-3. Well logs are presented in Appendix B.

3.3.3 Well Development

On May 24, 2011, Boart mobilized to the Site to develop the two new groundwater monitoring wells. The wells were developed by surging and purging until the water in each was relatively free of sediment. Well development water was temporarily stored in 4,000-gallon poly tanks pending profiling and offsite disposal.

3.3.4 Transducer Deployment

Subsequent to the installation of ADIT-1 and DMEA-1, In-Situ brand Level Troll 500 data logging transducers were installed in each well on June 15, 2011. Each transducer was set to record water temperature and water pressure (as water column height) hourly. Data was downloaded during groundwater sampling events on June 29, July 21, and August 16, 2011. During each visit, depth to water was measured manually with a Solinst Model 101 water level meter. A reading from each transducer coincident with the manual depth to water measurement provided the reference distance from the transducer sensor to the surveyed top of casing measurement point. The manual data allowed all subsequent data collected by each transducer to be translated from elevation of water above the transducer sensor to absolute water level elevation in feet above mean sea level.

3.3.5 Groundwater Monitoring and Sample Collection Procedures

On June 15, and July 21, 2011, monitoring wells were gauged to the nearest 0.01 foot bgs and sampled. Groundwater samples were collected using the low-flow sampling method. Well water was purged at a low-flow rate of approximately one (1) liter per minute while monitoring the stability of the water quality parameters (i.e., pH, temperature, electrical conductivity [EC] dissolved oxygen [DO], and oxidation-reduction potential [ORP]). A submersible pump attached to a flow-through cell using disposable tubing was used to purge wells and groundwater parameters were monitored using a YSI 660 water quality meter. Parameters were allowed to stabilize before groundwater samples were collected. Field data sheets for gauging and sampling the monitoring wells are presented in Appendix C.

Upon completion of well purging, groundwater samples were collected through the pump and decanted into laboratory-supplied containers. Each sample was capped, labeled, and placed in a cooler with ice, and transported to Accutest. Chain-of-custody procedures were followed at all times. Chain-of-custody documentation is included with the laboratory reports in Appendix A.

3.3.6 Equipment Decontamination

All non-disposable gauging and sampling equipment, including the pump and the flow-through cell, were decontaminated between wells using a non-phosphate detergent and distilled water. All tubing used to connect the pump to the flow-through cell was replaced between each well.

3.3.7 Laboratory Analysis

Groundwater samples were analyzed for the same parameters as surface water samples, as listed in Section 3.2.3 above. The groundwater samples were additionally analyzed for dissolved arsenic. Analytical results for groundwater samples are included in Table 3-4.

3.3.8 Well Survey

Subsequent to well installations on June 14, 2011, a licensed professional surveyed the ground elevation, measuring point elevation, and location of each groundwater monitoring well (Appendix D).

3.3.9 Waste Handling

Soil cuttings, well development, decontamination, and purge water generated during the drilling and sampling processes were properly placed in a soil bin and/or 4,000 gallon baker tanks onsite pending characterization and offsite disposal. A total of 4,753 gallons of waste water were transported by Clean Harbors on July 14, 2011 and August 10, 2011 for disposal at the Clean Harbors recycling facility in San Jose, California and 15 cubic yards of soil was transported by Clean Harbors on September 8, 2011 to the Clean Harbors facility in Buttonwillow, California. Copies of the waste manifests are included in Appendix E.

4.0 INVESTIGATION RESULTS

The August 2010 Characterization Report (SGI 2010a) detailed the results of a field survey of the Site which included the mapping of tailings and waste piles, the mapping of surface water flows, the identification of springs and associated flows, and the history of flows to and from the ponds. Based on the results, sixteen surface water sampling locations were identified and sampled in April and May, 2010, the analytical results of which were also presented in the Characterization Report. Sampling events that occurred subsequent to the Characterization Report (October 2010, and in February and June 2011) increased the overall surface water data set and our understanding of the Site water flow pathways. For example, surface water sampling point SW-01 was previously believed to flow from the Adit Spring, while later observations and water quality data now suggest that it is runoff from Bradley tailings or waste rock piles. Therefore, based on the full suite of water sampling results, along with water chemistry data obtained from the wells installed in the underground workings, the presentation of the data has been altered for this report relative to the Characterization Report, which grouped waters by chemical signature. This report traces the various waters by physical flow pathway in and around the Site, and compares the history and chemical alterations along the various flow paths using the full suite of available data. The results of this additional investigation are detailed below.

4.1 Site Survey Results

A new topographic survey was conducted of the Site and immediate surroundings. The resulting map (Figure 3-1) shows the topography of the Site in two-foot contour intervals and surface features of the former mine site. The source survey map, including the entire surveyed area, is included in Appendix F. This topographic map was used along with historic structures still in existence to georeference the location of former underground mine workings relative to current surface features in order to correctly place the installation of the two monitoring wells to intercept specific locations within the underground workings.

4.2 Water Level Monitoring Results

Following the installation of monitoring wells ADIT-1 and DMEA-1, both were surveyed for location and measuring point elevation relative to mean sea level, allowing for the installation of groundwater transducers. Groundwater elevation monitoring data showed consistently higher elevations in the Cordero workings well (DMEA-1) relative to the Bradley workings well (ADIT-1). Specifically, water elevation in DMEA-1 was, on average, 0.28 feet higher than the water elevation in ADIT-1 based on data collected between June 14 and August 16, 2011. A graphical representation of water levels in the two monitoring wells is included as Figure 4-1. Water levels in both ADIT-1 and DMEA-1 have declined approximately 2.7 feet since the start of data collection.

4.3 Connection between Bradley and Cordero Tunnels

The Bradley workings and the 165-level Adit were excavated long before the existence of Cordero workings. The Bradley tunnels were advanced into a shear zone within a silica-carbonate rock formation containing mercury ore. Groundwater was encountered within the silica-carbonate rock formation and along the fractures and brecciated rock within the shear zone. As a consequence, Bradley had to continuously remove water from the tunnels to avoid flooding. One reason Bradley installed the 165-level Adit was to facilitate the removal of water from the mine workings. Once Bradley closed down the underground workings in 1951, groundwater infiltration flooded the tunnels and escaped out through the 165-level Adit. Though the adit portal was subsequently buried beneath tailings and waste rock, water continued to flow, the surface expression of which became known as Adit Spring.

Subsequent to the departure of Bradley from the Site, Cordero excavated a series of workings from the DMEA shaft toward the same shear zone encountered by the Bradley workings. The DMEA shaft itself was installed within a dry mudstone and sandstone formation, which Cordero had to tunnel through to reach the silica-carbonate formation and the shear zone. Groundwater was encountered at the transition between the mudstone/sandstone formation and the silica-carbonate formation, and pumping was necessary to keep the tunnels dry. Eventually, the Cordero workings were directly connected to the Bradley workings above via a subvertical shaft called the Main Winze.

The Cordero tunnels encountered the same water bearing zone as the Bradley tunnels (i.e., the two tunnel systems tapped into rock formations under the same hydraulic pressure). This was demonstrated by recent water level monitoring which showed the hydraulic head of the water in the Cordero tunnel system is on average only three and a quarter inches higher than that of the Bradley tunnel near the 165-level Adit. The lower head measured in the Adit-1 monitoring well is indicative of naturally expected conditions of decreasing head down-gradient towards the ultimate discharge point at the mouth of the Adit-1 tunnel.

Most of the tunneling, including the Main Winze, and ore removal from the shear zone was done by the Bradley Mining Company. Cordero approached the shear zone with its tunnels and connected to the Main Winze, which had already penetrated the shear zone, but conducted no bulk mining activities within the shear zone and thus exposed very little additional surface area. The ADIT-1 monitoring well data shows that the Cordero workings do not contribute any mercury to the Bradley workings above.

4.4 Water Flow Pathways and Related Water Chemistry Analytical Results

Waters associated with the Site and immediate surroundings that have been studied as part of this investigation include surface flows, subterranean flows (i.e., flow within the former mine workings), precipitation captured as surface flow, and springs. The flow of these waters can be generally classified as following one of three pathways from a source to the final disposition of all waters from the Site which is downstream flow in Dunn Creek:

- Water sourced from underground mine workings;
- Water sourced from precipitation falling across the Site, then flowing as surface water over and through mine tailings and waste rock found at the Site; and
- Water that flows near or on the Site, but generally does not contact any mine tailings or waste rock.

The first pathway is followed by water sourced from the underground workings of the Mine. This water emanates from the underground workings through the Bradley 165-level Adit, and then through Bradley's tailings and waste rock piles to the surface at a point commonly called Adit Spring (SW-15). From there, it runs downhill as surface flow over more mine tailings and travertine deposits (SW-5) before entering into the main catchment pond (Lower Pond, SW-9). The second pathway is followed by precipitation that falls across the Site, which then immediately flows as surface water over and through Bradley's mine tailings, waste rock and the natural geologic formations found at the Site. Some of the water flows through the Bradley tailings located in the south east section of the Site (SW-2, SW-3), above the Lower Pond, which largely receives these waters. Other waters, largely from the mine workings area, have either been channeled by the current landowner to bypass flow to the Lower Pond or flow north toward My Creek. A third pathway is followed by surface water that flows through the Site but generally does not contact any mine tailings. This includes the waters from Dunn Creek and My Creek, along with waters sourced from the Ore House Spring and the Park Spring (SW-6). A chart showing the nature of the three flow pathways is shown on Figure 4-2. The following sections detail what is known about these three flow paths based on surface water and groundwater samples collected at various points around the Site during the site investigation. Surface water sample locations are shown on Figure 3-2, and Table 3-1 contains a surface water sample location key. Mercury and arsenic, being the primary contaminants of concern, were specifically examined, and Stiff Diagrams were employed to facilitate comparisons of water chemistry. Tables 3-2 and 3-4 are summaries of chemical analytical results from surface water sampling and groundwater sampling, respectively. The full set of Stiff Diagrams for all water chemistry results is included in Appendix G.

4.4.1 Water Sourced From Underground Mine Workings

Bradley mined several levels of underground workings, one of which included a 300-foot long adit on the 165-level that daylighted on the east sloping hill overlooking the current Lower Pond (Figure 2-1). This adit was used to give mine water a pathway out of the workings. Following abandonment of the underground workings, tailing and waste rock deposition buried the adit opening. However, water continued to flow from the buried adit through the tailings and waste rock, the surface expression of which flowed year round and was known as Adit Spring. The presence of a natural spring was documented in this area as part of a geologic site investigation documented in 1938 (Knox, 1938). The presence of a natural spring in this area is also documented geologically by the presence of calcareous deposits down slope of this spring area noted both by Knox and Pampeyan (Knox, 1938 and Pampeyan, 1963).

The Cordero underground workings were completed after the Bradley workings. During the tunneling process, a physical connection between the two workings was established through the Main Winze which connected the Cordero workings (i.e., the 360-level) to the 270-level of the Bradley workings. As part of the current Site investigation, a monitoring well has been installed in the former Cordero workings (DMEA-1) and in the Bradley workings at the level of the former adit opening (ADIT-1).

The water sourced from the Mine has been sampled at several locations along the flow path from the Mine to the Lower Pond. The Mine workings themselves are sampled at the DMEA-1 and ADIT-1 wells. Water from the Adit Spring, the point on the east facing hill above the Lower Pond where water from the Bradley 165-level Adit daylights, is sampled at point SW-15. Surface water flowing down slope from the Adit Spring is sampled just above the Lower Pond at point SW-05. Finally, the Lower Pond itself is sampled at point SW-09 (near the outflow to Dunn Creek). See Figure 3-2 for a map showing the sampling locations.

4.4.1.1 Mercury Results

There were no detectable concentrations of total or dissolved mercury found in the samples from the Cordero workings (DMEA-1). Accordingly, no mercury is contributed from the Cordero workings into the 165-level Adit. Dissolved mercury was also not detected in the Bradley workings (ADIT-1). However, the maximum total mercury concentration detected in ADIT-1 was 22.7 micrograms per liter (µg/L). Water from the Bradley workings emerges from the 165-level Adit, flows through the tailings and daylights approximately at the SW-15 sampling location. Surface water samples collected at this point contained total and dissolved mercury with maximum concentrations of 153 µg/L and 55.6 µg/L, respectively. This shows that water from the Bradley underground workings picks up a significant quantity of mercury from the tailings after emerging from the 165-level Adit. Further down the slope toward the Lower Pond, sampling at the SW-05 location also showed elevated concentrations of total and dissolved phase mercury, though only at maximum concentrations of 108 µg/L and 39.7 µg/L, respectively. The Lower Pond (SW-09), sampled near its outflow to Dunn Creek, had maximum concentrations of total and dissolved mercury of 149 µg/L and 143 µg/L, respectively. In summary, water from the Bradley workings contains low quantities of total mercury, but picks up significant quantities of it when daylighting through the Bradley tailings piles at the Adit Spring location. This mercury laden water then flows down hill and into the Lower Pond where the mercury then accumulates.

Mercury results for surface water and monitoring well samples are included in Tables 3-2 and 3-4, respectively. Mercury results for both surface water and groundwater samples are presented in Figure 4-3.

4.4.1.2 Arsenic Results

Elevated arsenic concentrations were detected in groundwater sampled from both ADIT-1 and DMEA-1. The maximum concentrations detected were 1,720 µg/L and 1,570 µg/L, respectively. Elevated concentrations of arsenic were also detected at the Adit Spring sampling location (SW-15) and on the lower slope of the hill above the Lower Pond (SW-05) at maximum concentrations of 182 µg/L and 282 µg/L, respectively. Concentrations of arsenic above detection limits were not found in samples from the Lower Pond (SW-09). In summary, elevated concentrations of arsenic exist within the underground workings which appear to largely precipitate out upon exiting the 165-level Adit.

4.4.1.3 General Water Chemistry Results

The water chemistry of the Bradley and Cordero workings was sampled via ADIT-1 and DMEA-1, respectively, in June and again in July, 2011. The resulting chemical analysis of the waters from both the Bradley and Cordero workings showed they were generally slightly acidic, contain almost no bicarbonate, and had high sulfate content. However, the July 2011 sample from DMEA-1 was different, exhibiting elevated sodium, chloride and bicarbonate concentrations, a nearly neutral pH, and lower sulfide concentrations. The difference in chemistry is illustrated on Figure 4-4. It is unknown why the water chemistry of the sample from DMEA-1 was altered relative to the June 2011 sample. However, if this different chemical signature had any effect on the water in the Bradley workings, it did not significantly alter the chemistry of the water in the Bradley workings as shown in the July sample from ADIT-1, as would be expected if there is a significant and ongoing flow of water from the Cordero workings to the Bradley workings. The chemistry of the waters collected from the SW-15 Adit Spring location were very similar to the chemistry of the waters from the Bradley mine workings in all respects, reinforcing the link between the two. The chemistry of the waters collected from the SW-05 location, just above the Lower Pond, shows a range of chemical configurations relative to the ADIT-1 and SW-15 samples. One alteration common to all samples is an increase in bicarbonate and pH, showing that the travertine deposits act as a neutralizing agent for the slightly acidic waters from the Mine. In summary, the chemistry of the waters along the flow path from the Mine to the Lower Ponds suggests that source water from the Bradley mine workings is largely unaffected by water from the Cordero mine workings, and shows that the water from Adit Spring is derived from the mine in an acidic state, then is neutralized and chemically altered as it flows over the travertine deposits before entering into the Lower Pond.

4.4.2 Water Sourced From Precipitation Percolating Through Mine Tailings and Waste Rock

Piles of mine tailings and waste rock are prominent features of the Site. Tailings and waste rock from the Bradley mining operations are found in large piles in the south-east portion of the Site on the east facing slopes overlooking the Lower Pond. Waste rock from the Cordero mining operation is also known to have been deposited in the northern waste rock area along the north edge of the Site overlooking My Creek. The former mine workings themselves are located in the central portion of the Site, including the area in which surface mining was conducted by Bradley and other operators.

To determine the chemistry of overland flow sourced from precipitation falling on the Site (including delayed drainage from rainwater landing on, then percolating through, tailings and waste rock piles), surface water samples were collected from several places around the Site. To sample runoff from the Bradley tailings and waste rock piles, samples SW-01, SW-02 and SW-03 were collected. SW-01 was initially thought to be the source of the Adit Spring. Subsequent sampling events showed that the SW-01 only flows during rain events and is upslope of the perennial Adit Spring, and thus represents rainwater that has flowed over or through Bradley tailings and waste rock piles. SW-06 is the designation for the sample from the Upper Pond. The current land owner has completed several surface water runoff drainage control projects that have channeled rain water from the central portion of the Site into culverts and then into the Upper Pond. Water from the Upper Pond flows downhill and is collected in the Middle Pond, water from which is collected as SW-10. Finally, rainwater runoff from the northern waste rock area collects and flows into My Creek. Water samples of My Creek adjacent to and downstream of the northern waste rock area are collected at points SW-11 and SW-13, respectively. See Figure 3-2 for a map showing the sampling locations.

4.4.2.1 Mercury Results

No dissolved mercury and only minor concentrations of total mercury (2.2 µg/L) were detected in SW-01 surface water samples. In contrast, maximum total mercury concentrations in surface water samples SW-02 and SW-03 were 179 µg/L and 74 µg/L, respectively, while maximum dissolved mercury concentrations were 175 µg/L and 35 µg/L. These data collection locations were chosen in order to sample surface water runoff after its passage through the Bradley tailings piles, confirming their continued mercury loading potential. Sample location SW-06 (Upper Pond) had maximum total and dissolved mercury concentrations of 31.9 µg/L and 13.8 µg/L, respectively. This shows that rain water runoff from the central part of the Site encounters mercury laden materials along the flow path to the Upper Pond. The Middle Pond sample designation is SW-10, and it receives waters from the Upper Pond and some local surface water runoff. The maximum total and dissolved mercury concentrations detected in SW-10 are 18 µg/L and 0.59 µg/L respectively, significantly less than is found in the Upper Pond. A majority of the water in the

Middle Pond is runoff from the Upper Pond; however, the lower mercury concentrations suggest that mercury settles out in the Upper Pond or is otherwise filtered out on the way to the Middle Pond. No concentrations of total or dissolved mercury were detected in surface water samples at the SW-11 and SW-13 locations, strongly supporting the notion that the northern waste rock area contains only waste rock and not mercury laden tailings material.

4.4.2.2 Arsenic Results

Arsenic was detected in tailings pile runoff samples SW-02 and SW-03 at maximum concentrations of 119 µg/L and 1,570 µg/L, respectively. Arsenic was also detected in the Upper Pond (SW-06) and Middle pond (SW-10) at maximum concentrations of 53.2 µg/L and 23.8 µg/L, respectively. Concentrations of arsenic were not detected in tailings pile runoff sample SW-01 and in My Creek samples SW-11 and SW-13.

4.4.2.3 General Water Chemistry Results

The chemistry of the two water samples collected from the SW-01 location both contain low concentrations of the range of tested anions and cations relative to water samples collected at other locations (e.g., SW-02 and SW-03). This suggests that the water collected at the SW-01 location did not travel a sufficient distance across or through tailings or waste rock before being collected (i.e., the water collected at the SW-01 location was not sourced from the Bradley 165-level Adit). The waters collected at the SW-02 and SW-03 locations share several chemical similarities, including low to negligible concentrations of sodium and chloride, higher concentrations of sulfate and very low pH values (all less than 3.9) with the associated lack of bicarbonate. This chemical signature found at the SW-02 and SW-03 locations is similar to that found in the sample collected in ADIT-1, indicative of all of the waters being in contact with similar materials, though the water from the 165-level Adit generally has higher pH and greater relative quantities of sodium and chloride. The chemical composition of the water samples collected from the Upper Pond (SW-06) were also similar to those found in the Bradley 165-level Adit and at SW-02 and SW-03, also suggestive of contact with similar materials. However, the chemistry of the water in the Middle Pond (SW-10) is highly variable and generally shows much lower concentration of cations and anions relative to the samples from SW-02, SW-03 and SW-06. This shows that, although water from the Upper Pond drains to the Middle Pond, it makes up only a small fraction of the largely clean water that accumulates in the Middle Pond. Tested cation and anion concentrations were much lower in the samples from SW-11 and SW-13, indicating a lack of travel through tailings and/or waste rock. The chemical signatures of the waters from these two locations are also significantly different from those found at SW-02, SW-03, SW-06, SW-15 and ADIT-1, having the highest equivalent concentration of bicarbonate and basic (greater than 8) pH.

4.4.3 Water Flows Not in Contact with Mine Tailings or Waste Rock

Water samples have been collected from several sources near the Site that have come into contact with neither tailings nor waste rock derived from former mining operations. These include My Creek and Dunn Creek above the Site, the Park Spring along the southern border of the Site, and Ore House Spring in the central portion of the Site. The upstream sample point on My Creek is designated SW-12 and the upstream sample point on Dunn Creek is designated SW-16. Park Spring is designated SW-04 and the Ore House Spring is called SW-14. The water from My Creek flows into Dunn Creek and is sampled again at a point upstream of the ponds at a point designated as SW-08. Dunn Creek flows adjacent to both the Middle and Lower Ponds before continuing downstream offsite. During high water events, it is likely that exchange of water can occur through both over topping of the ponds or through the berms between Dunn Creek and the ponds.

4.4.3.1 Mercury Results

In general, concentrations of mercury at all four sample locations were generally low to undetectable. No detectable concentrations of total or dissolved mercury were found in the samples from My Creek. No concentrations of total mercury and only a single concentration of 0.31 µg/L of dissolved mercury was detected in Dunn Creek. The maximum concentrations of total and dissolved mercury were detected in Park Spring at concentrations of 0.63 µg/L and 0.51 µg/L, respectively. No dissolved mercury was detected in the Ore House Spring, while the maximum concentration of total mercury detected was 1.3 µg/L.

4.4.3.2 Arsenic Results

Arsenic was not detected in any of the samples collected from the Park Spring, the Ore House Spring, My Creek, or Dunn Creek.

4.4.3.3 General Water Chemistry Results

Water samples from Park Spring (SW-04) exhibited elevated concentrations of the range of tested anions and cations, a nearly neutral pH, and low concentrations of bicarbonate. This spring is sourced upgradient from the Site, but may be related to the same groundwater that infiltrates the underground workings. Water samples from the Ore House Spring (SW-14) exhibited low concentrations of the range of tested anions and cations, a pH of approximately 6, and low concentrations of bicarbonate, all suggestive of a flow path that is not through tailings of waste rock piles. The upgradient samples from both My Creek (SW-12) and Dunn Creek (SW-16), and the sample from Dunn Creek above the Middle Pond (SW-08) had pH levels above 7.5 and contained elevated concentrations of bicarbonate relative to the other cations and anions on the Stiff Diagrams. Overall, though, cation and anion concentrations were very low relative to the tailings pile runoff samples.

4.5 Water Quality Criteria Evaluation

The analytical results of the surface water samples collected during all previous sampling events were compared to water quality criteria developed for bodies of freshwater by the California CVRWQCB (2008) and the USEPA (2009). Additionally, there are an alternate set of criteria related to human health for the consumption of water and organisms and for the consumption of organisms only. These water quality criteria are found on Tables 3-2 and 3-4 along with the analytical results from sampling events. Analytical results that exceed one or more of the water quality criteria are shown in bold font.

The freshwater criteria for total mercury is 0.91 µg/L, which has been exceeded by samples obtained from the Bradley workings (ADIT-1), the Ore House Spring (SW-14), the Adit Spring (SW-15), all three ponds (SW-06, SW-09, and SW-10), the Bradley tailing piles sample locations (SW-01, SW-02 and SW-03), and the flow of water from the Adit Spring just before entering the Lower Pond (SW-05). The water quality criteria for consumption related to human health is much lower than the analytical method used was able to detect (i.e., analytical results for total mercury less than 0.20 µg/L were not available, while the human health consumption criteria was even lower, 0.05 µg/L for water plus organism and 0.051 µg/L for organism only).

The criteria for arsenic in freshwater is 150 µg/L, which was exceeded by samples from both the Bradley and Cordero workings (ADIT-1 and DMEA-1), the Adit Spring (SW-15) and from sample locations SW-03 and SW-05. It is likely that there is naturally occurring arsenic in the local rocks, and that the pulverized Bradley tailings piles have exacerbated the release of arsenic into the environment. The water quality criteria for consumption related to human health for arsenic were again much lower than the analytical method used was able to detect (i.e., analytical results for arsenic less than 10 µg/L were not available, while the human health consumption criteria was 0.018 µg/L for water plus organism and 0.14 µg/L for organism only).

Freshwater water quality criteria also exists for tested constituents, including pH, alkalinity, total dissolved solids, cadmium, chloride, chromium, iron, lead, nickel, selenium, and zinc. With the possible exceptions of cadmium, lead, and selenium (based on their elevated detection limit thresholds relative to the water quality criteria), all of these constituents exceeded their water quality criteria in one or more samples collected during the surface water sampling events.

4.6 Point of Compliance Water Quality

All of the water from the Site eventually flows as water in Dunn Creek downstream of the Lower Pond. This water has been sampled as point SW-07 as part of the Site investigation, and is the natural point of compliance sampling location for future Site monitoring. General chemistry results have been non-consistent as is illustrated in the Stiff Diagrams for the sample location (Appendix G). This is a result of variances in flows both from the Site and in Dunn Creek, reflective of the seasonal nature of large precipitation events. In winter, rain events fill Dunn Creek resulting in a dilution of the waters flowing from the Site. Flow from the Site is greatly reduced during the generally dry summer months, though there is typically no baseflow in Dunn Creek to dilute it. However, across the range of flows that have been sampled during this site investigation, no mercury (total or dissolved) or arsenic have been detected at concentrations that have exceeded the freshwater criteria. Freshwater criteria that have been exceeded by waters from sample location SW-07 include methyl mercury, alkalinity, total dissolved solids, chloride, iron, and nickel. With the exception of methyl mercury, all of these compounds were also found at concentrations exceeding the freshwater criteria in the samples collected from the Park Spring sample location (SW-04). The Park Spring is an offsite source of water with no known connection to the Mine. The waters from this spring are reflective of natural chemistry of waters that would flow from the area around the mine. Park Spring water contains concentrations in excess of the freshwater criteria of similar constituents to that of Dunn Creek immediately downgradient of the Site, which indicates that these exceedences would occur independent of any impacts caused by former Mine operations.

5.0 INVESTIGATION SUMMARY AND CONCLUSIONS

The investigation activities described in this report have included the following:

- Additional background site mapping using a topographic survey;
- Installation and sampling of wells completed within the former tunnel systems of the Bradley 165-level and the DMEA 360-level; and
- Surface water sampling at a total of sixteen locations.

The data collected during this phase of investigation have enabled a more complete understanding of the relationships between different water sources and overland flow patterns at the Site. Specifically, water sampling results from the two monitoring wells (ADIT-1 and DMEA-1) has enabled comparison of these results to the surface water sampling events that have been carried out in 2010 and 2011. This comparison and evaluation has resulted in more holistic understanding of the sources of surface water present at the Site, which specifically falls into three general categories: water sourced from underground mine workings (i.e. the Bradley mine workings); water sourced from overland flow through mine tailings and waste rock; and surface water which does not come in contact with mine tailings.

As described in Section 4.1.1.3 the chemical signatures of the water present in DMEA-1 and ADIT-1 are generally similar to one another, with the exception that DMEA-1 contains no mercury. Both wells contain arsenic. A dissimilarity in chemical signature between the wells was noted during the July 2011 well sampling compared to the June 2011 sampling, indicating that water present in the 165-level Adit had not been significantly affected by the 360-level. This observation suggests that the connection between the two systems is likely muted and being overwhelmed by the other sources of water flowing into the 165-level Adit level, specifically the brecciated source rocks and the saturated zone of the nearby fault. Therefore, the contribution of groundwater flow directly from the 360-level to the 165-level is likely small and insignificant, with the majority of water emanating from Adit Spring sample location (SW-15) being sourced from the natural fractures and saturated fault zone present near the mine workings, and independent of the Cordero tunnel systems.

Water flowing across the Site is either sourced from springs (including the Adit Spring) or from rainwater. These sources result in the three flow patterns described in Section 4.4 which include water sourced from the former underground mine workings, water that is sourced from precipitation which travels through the Bradley tailings and waste rock, and background water sources that generally do not contact mine tailings or waste rock. Water sampling along the pathway from the Adit Spring to the pond indicate that mercury concentrations increase the longer they are in contact with the mine tailings, and are highest in the lower pond, after the most time in contact with the tailings. Arsenic concentrations generally decrease, indicating the tailings are not a source of additional arsenic in water at the Site. Rainwater which percolates into the tailings piles also picks up mercury and other compounds in its way to the pond. Sample locations SW-02 and SW-03 are representative of this pathway, but are similar in chemistry to SW-15. This observation shows they are all in contact with similar material, although not sourced from the same water. Water sampling locations SW-12, SW-16, and SW-4 are indicative of water that does not come into contact with former mine tailings. Samples collected from these locations are considered background concentrations and represent pre-mining site surface water conditions.

Surface sample location SW-07 is collected in Dunn Creek, downstream of surface water from the Site, and is considered a point-of-compliance sampling point. As such, the analytical results from this sampling location and all other surface sampling locations were compared to water quality criteria developed for bodies of freshwater by the CVRWQCB and the USEPA. The comparisons indicated several key points including:

- Mercury and arsenic are not present in location SW-07 above water quality criteria;
- Freshwater criteria are exceeded by waters from sample location SW-07 including methyl mercury, alkalinity, total dissolved solids, chloride, iron, and nickel; and
- With the exception of methyl mercury, all of these compounds are also detected at concentrations exceeding the freshwater criteria in the samples collected from the background Park Spring sample location (SW-04).

This point of compliance and water quality criteria evaluation shows that water downgradient of the Site exceeds water quality criteria only for compounds present in background samples above water quality criteria. Although mercury and other compounds from the mine are travelling into Dunn Creek, the contribution of the water from these sources is so small compared to other sources (i.e. Park Spring, runoff that does not come in contact with tailings), the presence of these compounds are reduced to background or near background levels at point of compliance sampling location SW-07.

The additional surface water samples collected have confirmed the results of previous samples collected earlier in 2010 and the Slotton data. These similar results support the conclusions of the Characterization Report that the majority (94.3 percent based on Slotton, 1995 calculations) of the mercury mass loading from the Site into Dunn Creek originates via surface runoff through the Bradley tailings piles, into the Lower Pond, and then into Dunn Creek.

The Site surface water sampling locations associated with runoff of surface water through the Bradley tailings piles and into the Lower Pond (SW-15, SW-02, SW-03, SW-05 and SW-09) fairly consistently exceeded water quality criteria for total and dissolved mercury, nickel, lead, and zinc, and less consistently exceeded the same criteria for methyl mercury, arsenic and chromium (e.g., Lower Pond sample location SW-09 had no methyl mercury, arsenic or chromium exceedences).

Data collected to date, including historical and current data, indicate that 1) the 360-level Cordero workings have little to no impact on the flow of water from the 165-level Adit workings that were mined by Bradley; 2) water emanating from the 165-level at sample location SW-15 and in ADIT-1 contains mercury concentrations above freshwater CVRWQCB and USEPA criteria, but does not contribute a significant enough flow into Dunn Creek to result in downgradient concentrations above the criteria; and 3) other compounds present in SW-07 (Dunn Creek) above these criteria area are also present in background water samples above water quality criteria. Data collected support conclusions by previous investigations that the key remedial focus at the Site is mitigating contact of surface and mine water with the Bradley tailings piles through removal and/or capping.

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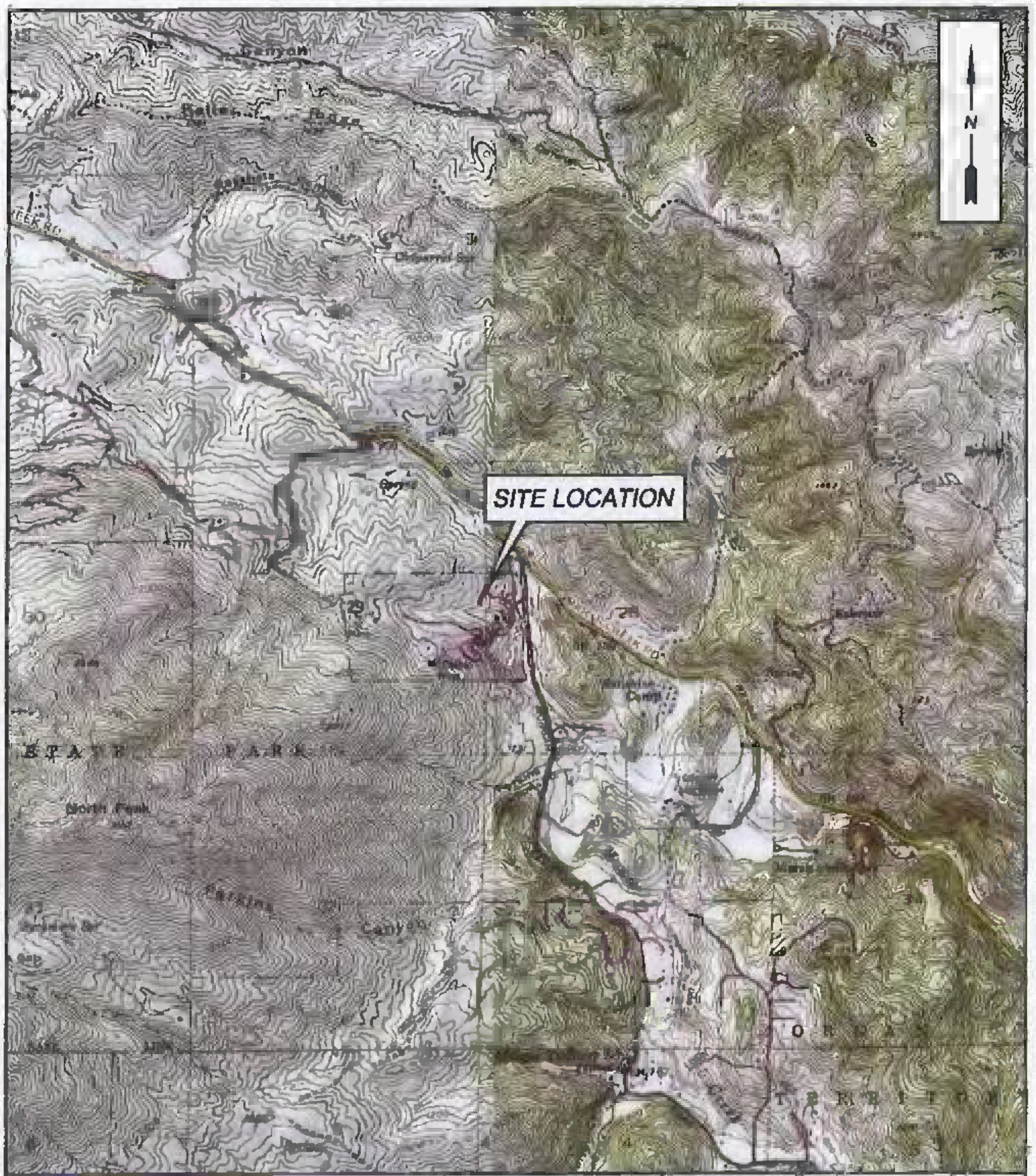
FIGURES



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SGI environmental

3451 C VINCENT ROAD
PLEASANT HILL, CA 94523

MAP SOURCE: U.S.G.S.

SCALE: 0 MILES 0.5	SITE LOCATION MAP
SITE: SUNOCO MT. DIABLO MERCURY MINE	DATE: 12/05/08
LOCATION: 2430 MORGAN TERRITORY ROAD CLAYTON, CALIFORNIA	FIGURE: 1-1

LEGEND

- ▱ Mine Structure (1953)
- ▲ Spring
- ○ Pond (2004 Outline)

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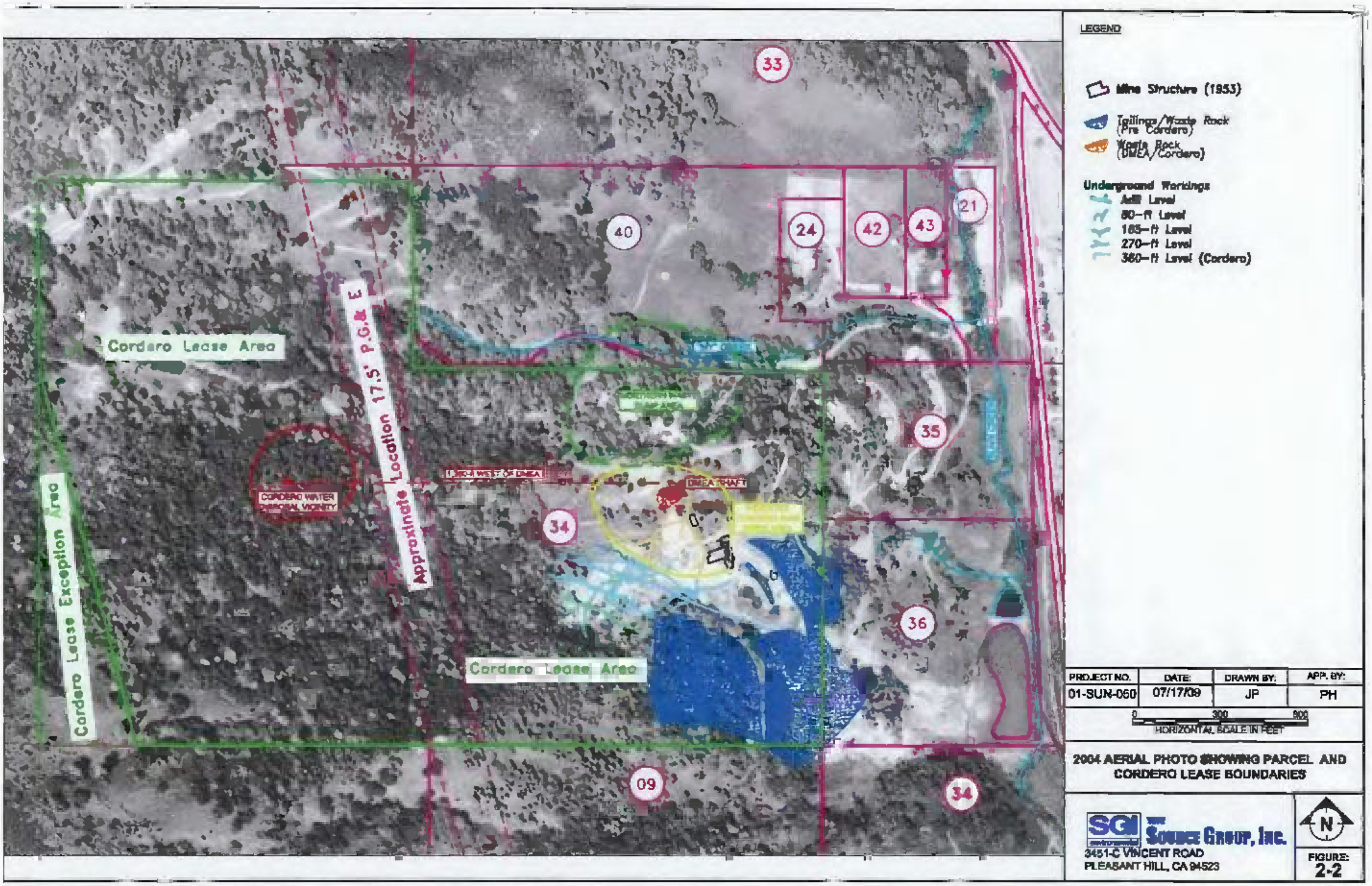
SCALE
0 150 300
SCALE IN FEET

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

2004 AERIAL PHOTO OF MT DIABLO MINE SITE

FILE NAME	DATE	DR. BY	APP. BY	PROJECT NO.	FIGURE NO.
Mine Features Map.dwg	5/4/09	JP	PH	01-SUN-050	2-1



PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-050	07/17/09	JP	PH

2004 AERIAL PHOTO SHOWING PARCEL AND CORDERO LEASE BOUNDARIES

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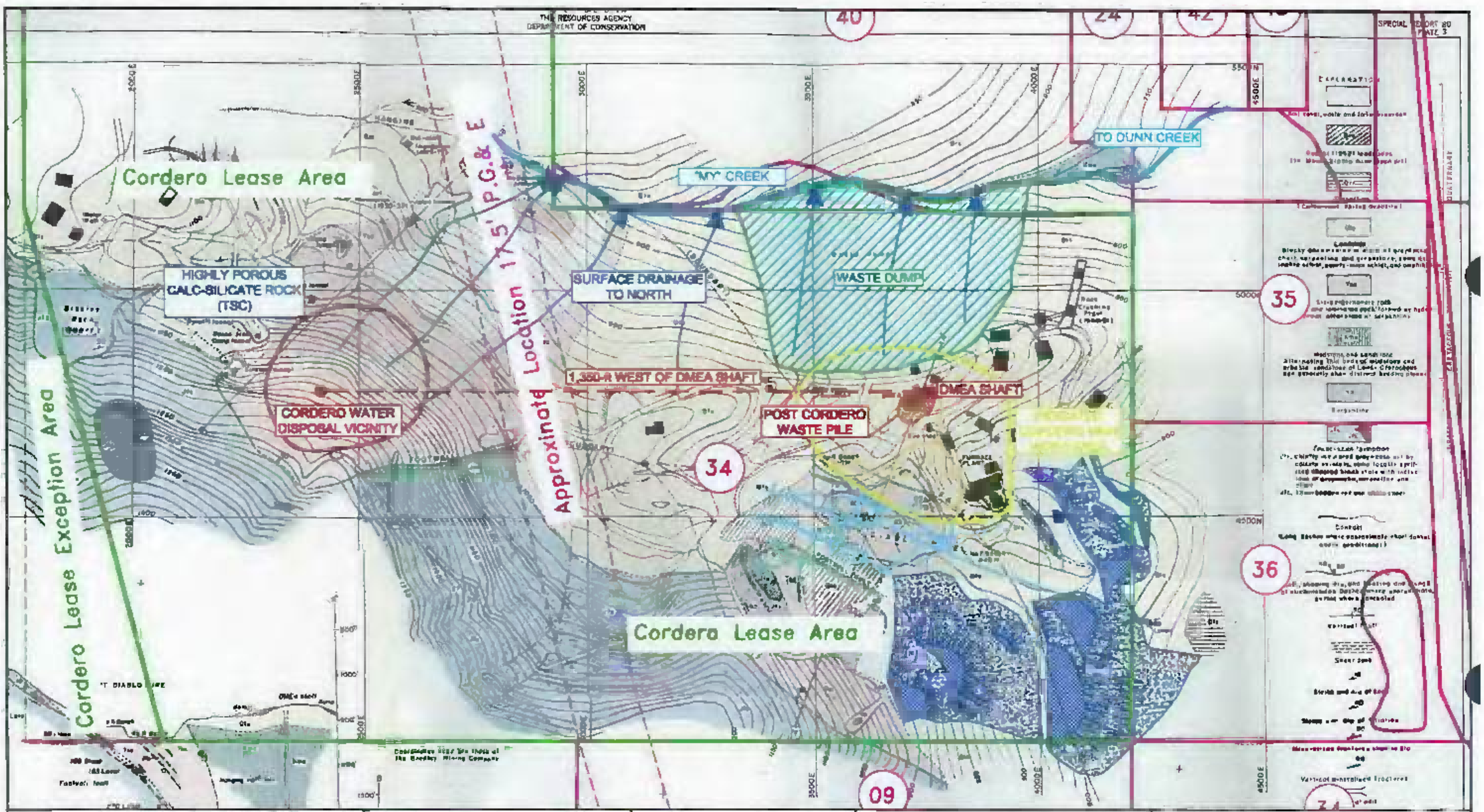
FIGURE:
2-2



LEGEND

Mine Structure (1953)

Tailings/Waste Rock (Pre Cordero)

Waste Rock (DMEA/Cordero)

Underground Workings

Adit Level

80–ft Level

165–ft Level

270–ft Level

360–ft Level (Cordero)

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SCALE

0 200 400

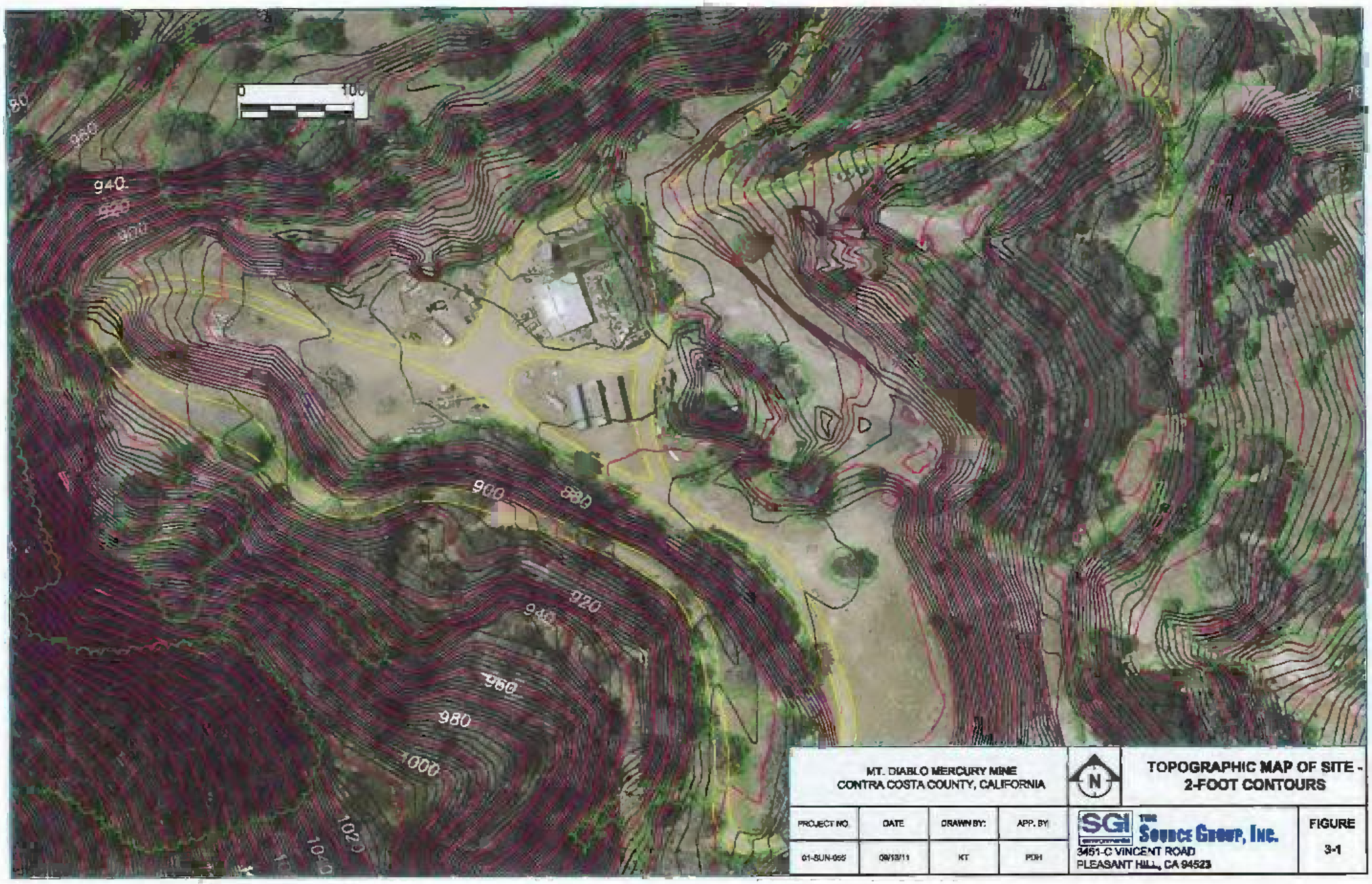
SCALE IN FEET

FILE NAME
Mine Features Map.dwg

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

DMEA MAP SHOWING PRE- AND POST- DMEA/CORDERO MINE FEATURES

DATE	DR. BY	APP. BY	PROJECT NO.	EXHIBIT
4/14/09	JP	PH	01–SUN–050	2-3



MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA

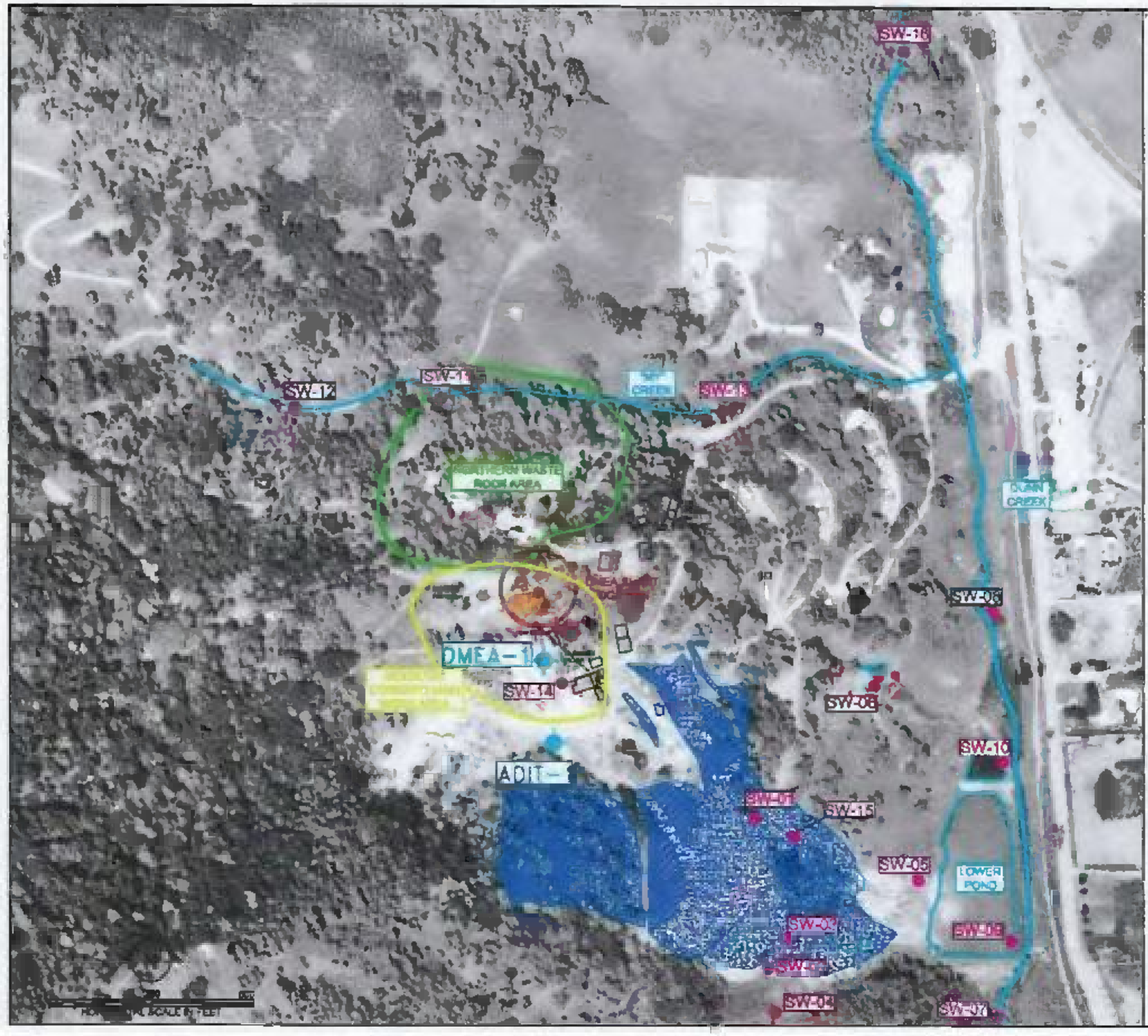
N

TOPOGRAPHIC MAP OF SITE - 2-FOOT CONTOURS

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-SUN-055	09/13/11	KT	PDH

SGI THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

FIGURE
3-1



LEGEND

▱ Mine Structure (1953)

▨ Tailings/Waste Rock (Pre Cordero)

▨ Waste Rock (OMEA/Cordero)

● Surface Water Sample Location

⊕ Monitoring Well Location

SITE MAP WITH SURFACE WATER SAMPLING AND MONITORING WELL LOCATIONS

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-SUN-053	9/13/11	JP	PH

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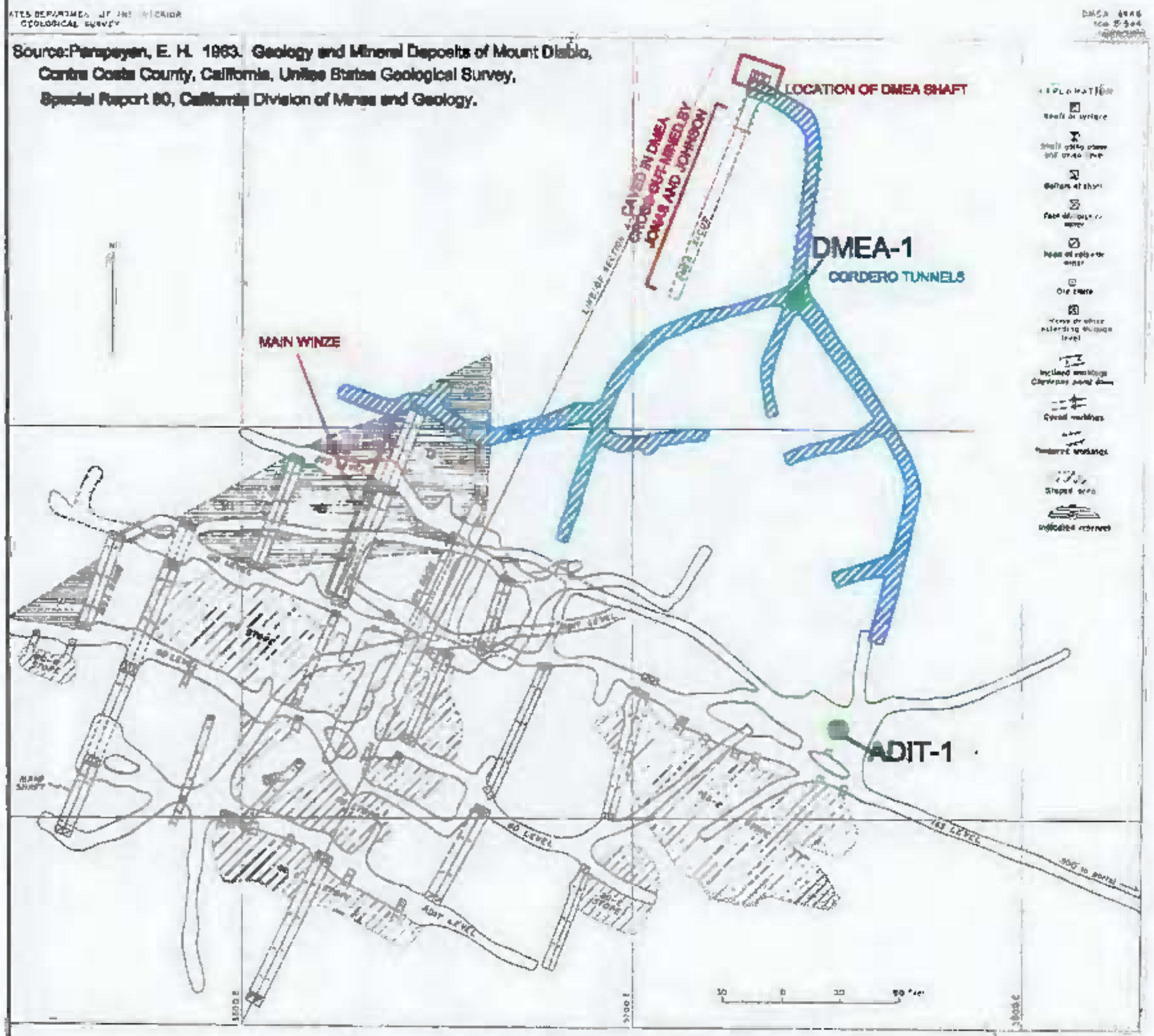
PLEASANT HILL, CA 94523

FIGURE
3-2

3- 90/597



Source:Pampeyan, E. H. 1963. Geology and Mineral Deposits of Mount Diablo, Contra Costa County, California, United States Geological Survey, Special Report 80, California Division of Mines and Geology.

Figure 4. COMPOSITE MAP OF MILL WORKINGS, MT DIABLO MINE CONTRA COSTA COUNTY, CALIFORNIA

LEGEND

▨ Cordero Workings

ADIT-1 ● Monitoring Well Location

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-050	07/16/09	JP	PH

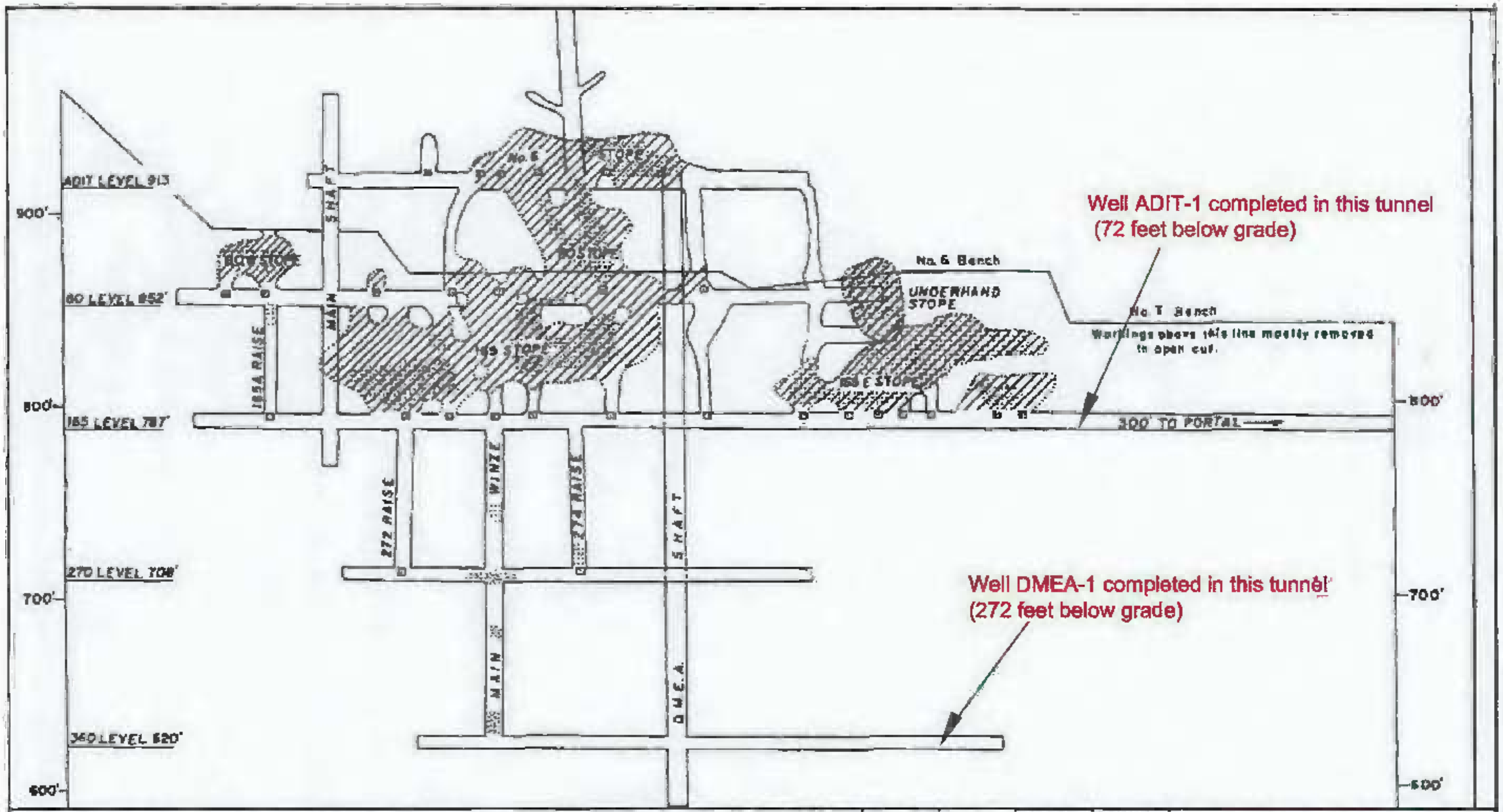
0 60 120
HORIZONTAL SCALE IN FEET

MONITORING WELL LOCATIONS WITH CORDERO AND BRADLEY TUNNEL SYSTEMS

SGI The Source Group, Inc.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE: 3-3



Well ADIT-1 completed in this tunnel
(72 feet below grade)

Well DMEA-1 completed in this tunnel
(272 feet below grade)

Source: Pampeyan, E. H. 1963. Geology and Mineral Deposits of Mount Diablo, Contra Costa County, California, United States Geological Survey, Special Report 80, California Division of Mines and Geology.

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-055	10/10/11	KT	PDH

0 200 400
HORIZONTAL SCALE IN FEET

CROSS SECTION OF TUNNEL SYSTEMS

SGI environmental
THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE:
3-4

Figure 4-1
Mt Diablo Well Groundwater Elevations, 2011

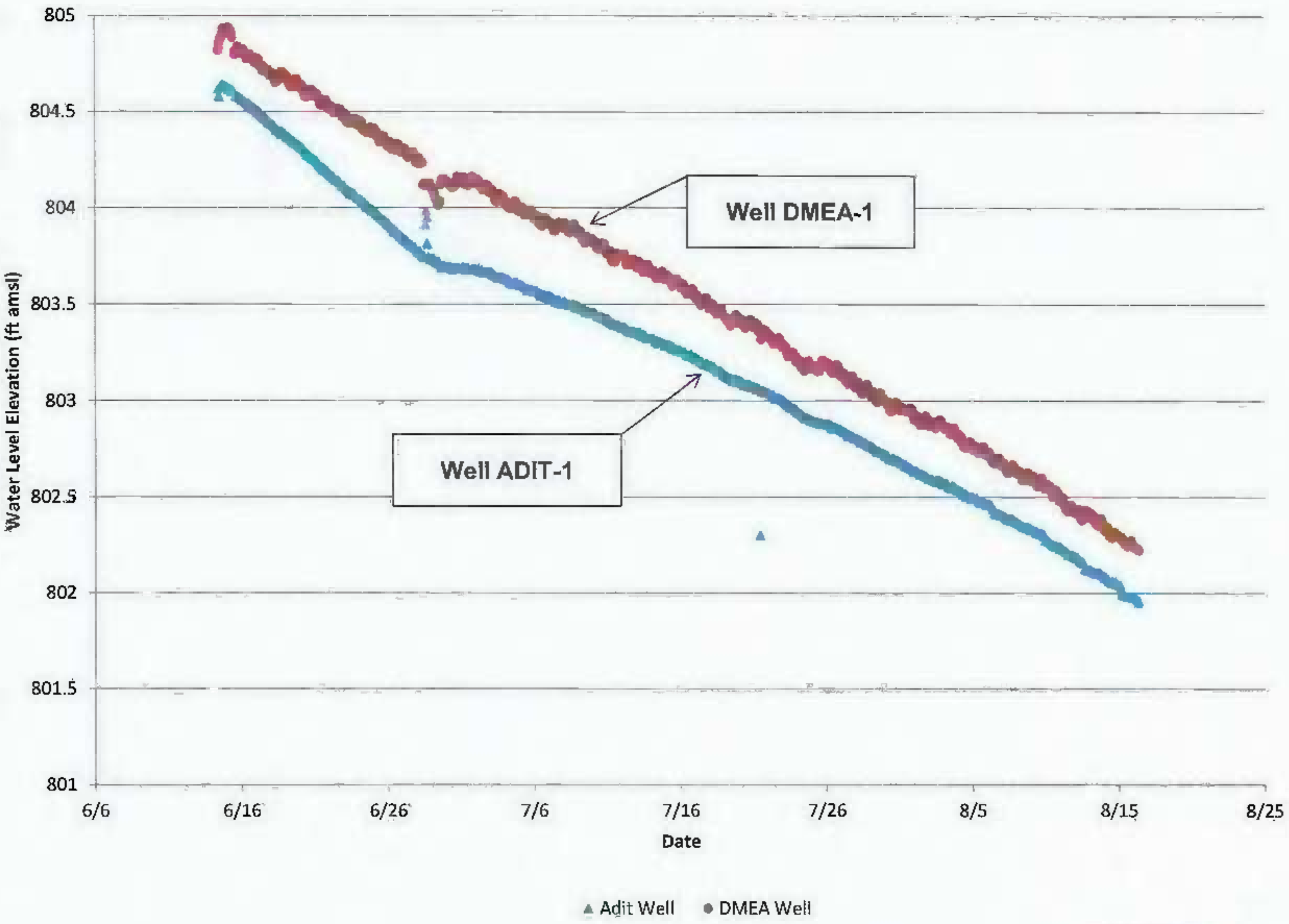


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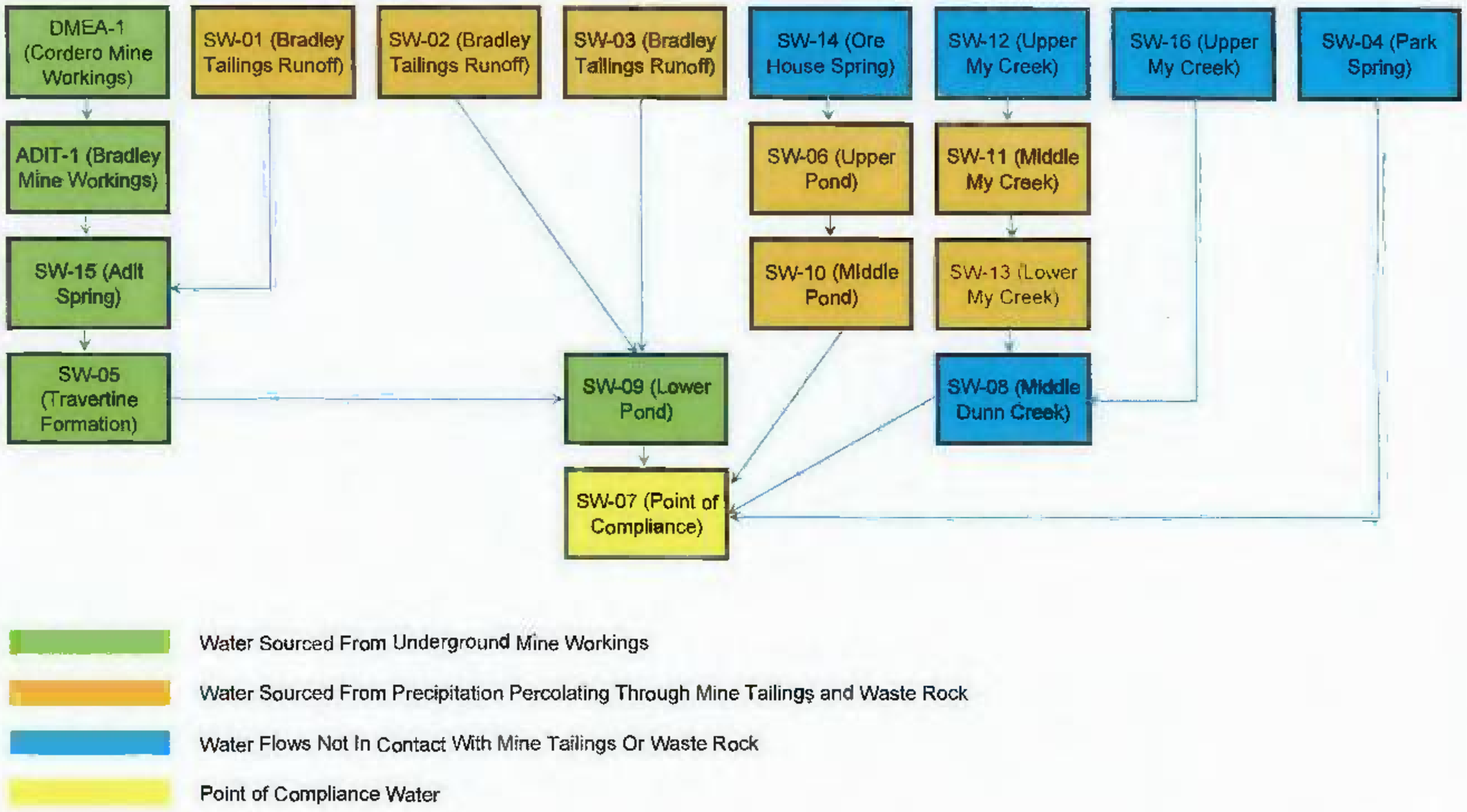
Figure 4-2
Site Water Flow Pathway Schematic



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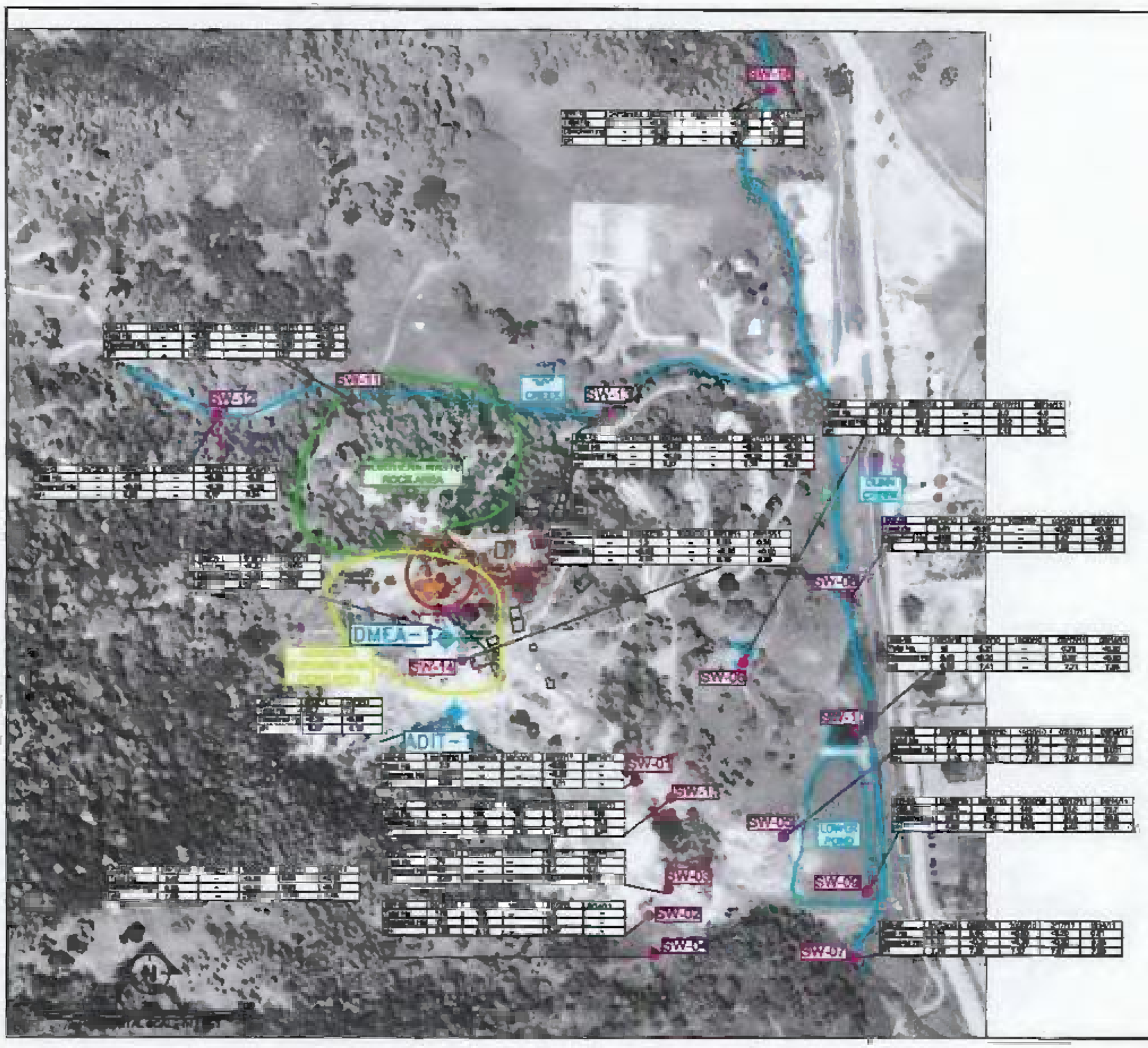


LEGEND

▱ Mine Structure (1953)

● Surface Water Sample Location

⊕ Monitoring Well Location

Hg	Mercury
<0.20	Analyte not detected at or above the laboratory reporting limit of 0.20 µg/L

NOTE

All concentrations reported in micrograms per liter (µg/L)

SURFACE WATER AND WELL SAMPLING RESULTS, MERCURY AND pH

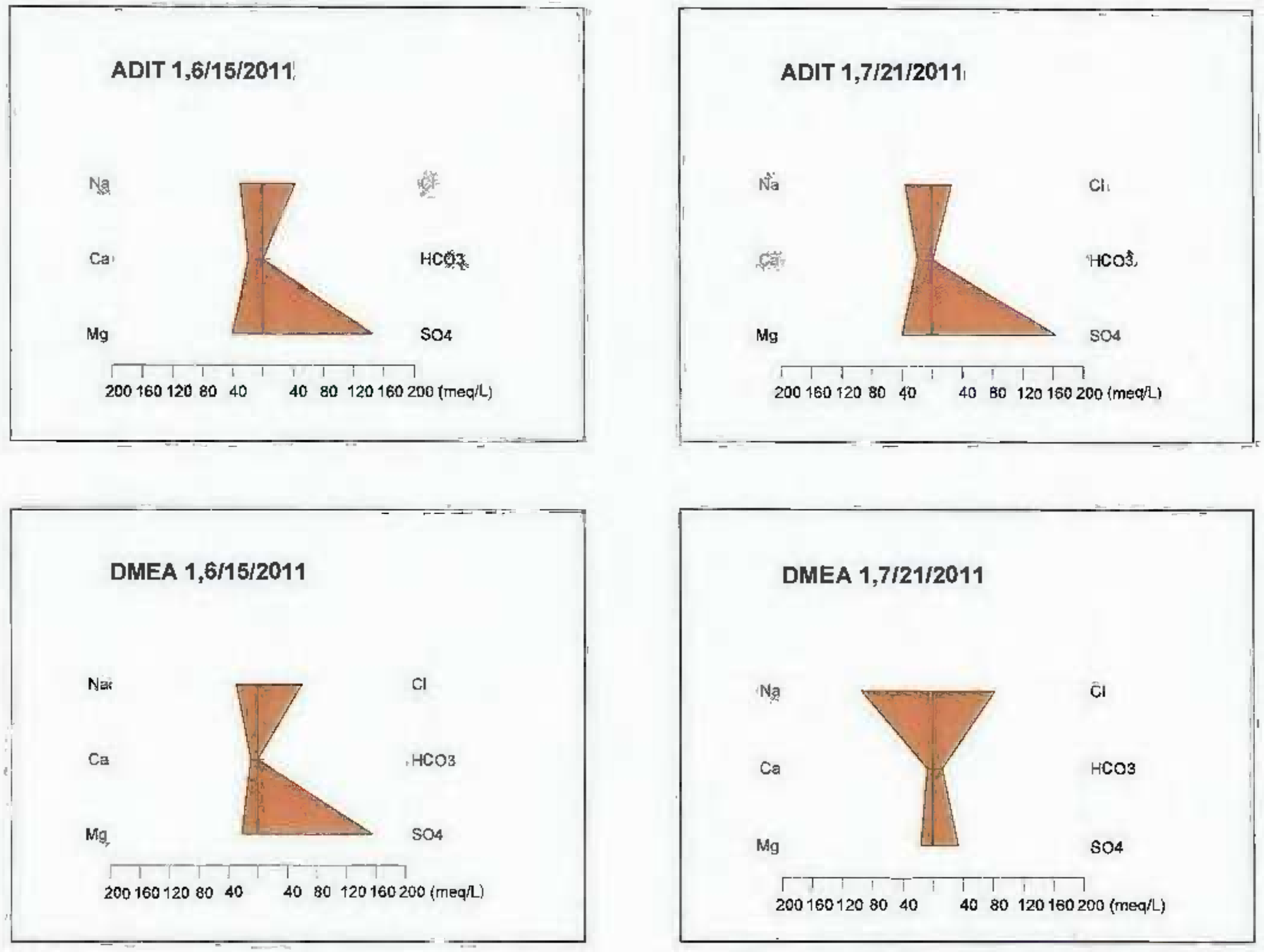
MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-SUN-009	8/10/10	JP	PH

Source Group, Inc.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

FIGURE
4-3

Figure 4-4
Monitoring Well Stiff Diagram Comparison



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TABLES

Table 2-1
Production Statistics
Mount Diablo Mercury Mine
Contra Costa County, California

PRODUCTION STATISTICS- MOUNT DIABLO MINE "MILL WORKINGS"					
Operator	**Date**	**Cubic Yards of Ore Milled**	**Waste rock from tunnels, crosscuts,raises,shafts and stopes (cubic yards)**	**Dewater volume (acre-feet)**	**Mercury Produced, flasks**
Welch	1863	shaft and placer	NA	none	NA
Unknown	1875-1877	NA	NA	NA	1000
Mt. Diablo Quicksilver MC, operator Ericson	1930-1936	NA	NA	NA	739
leased to Bradley MC	1936-1951	78,188(1)	24,815(2)	161(3)	10,455
leased Ronnie B. Smith	Sept 1951- June 1953	920(4)	NA	NA	125(5)
DMEA and Smith	June 1953 - Jan 1954	none	630(6)	minor	none
DMEA, Johnson and Jonas	Jan 1954 - Feb 1954	none	87(7)	NA	none
leased to Cordero MC	Nov 1954 - Dec 1955	none	1,228 (8)	19.5(9)	none
leased to Nevada Scheelite Corp.	1956	none	see note(10)	see note(10)	none
Total Cubic Yards of Material Taken Out			105,848 (11)		

Notes:

(1) Table 4, Ross 1958, reported 126,664 tons of ore milled. Converted here to cubic yards above based on conversion of 1.62 tons per cubic yard (cy)

(2) Total length of workings 4,570 ft (Pampeyan 1963. p 25) x 5 feet x 7 feet x bulking factor plus 20% = 7,108 cy less (2) and (3). Included 550 ft of shafts and raises (935 cy) and stopes of 19,000 cy (Pampeyan, Plate 5).

(3) Estimate 10 gpm for 10 years.

(4) Used the ratio of ore milled to flasks produced for Bradley to estimate the amount of ore milled by Smith.

(5) DMEA internal memo dated 2/4/57 ref doc no. 2:88/384

(5) 300-ft DMEA shaft 4.5 ft x 8.5 ft (Ross 1958) plus 77 ft of tunnel at 5 ft x 7 ft on the 360 level w/ bulking factor of 20%

(7) 43 ft of tunnel on the 360 level x 5 feet x 7 feet w/ bulking factor of 20%

(8) 790 ft of crosscuts and drifts on the 360 level (Pampeyan, and Sheahan 1957) x 5 feet x 7 feet w/ bulking factor of 20%.

(9) Best guess; 90 gpm for 27 days to dewater the mine (ref: DMEA payment records to Smith for same) and 200 days at 10 gpm.

(10) In 1956 the Nevada Scheelite Company leased the mine and installed a deep-well pump to remove water which had risen to a point 112 feet below the collar of the shaft. Since the downstream ranchers objected to the discharge of acid mine water into the creek this work was suspended. Attention was then directed to the open pit where some exploration was done using wagon drills. A small tonnage of retort-grade ore was developed. Since this was not sufficient to satisfy the requirements of the company the lease was relinquished (Division of Mines, 1958).

(11) Sum of Ore Milled and Waste Rock

Table 2-2
Summary of 1995 Mercury Data Collected by Slotton
Mount Diablo Mercury Mine
Contra Costa County, California

Site	Flow	Aqueous Total Mercury		Suspended Solids	
	(cfs)	Raw (µg/L)	Filtered (µg/L)	All (TSS) (mg/L)	Solids Hg (dry ppm)
Upper Dunn Creek	5.20	0.0036	0.00273	1.50	0.60
Upper Horse Creek	0.08	0.0255	0.016	1.10	8.64
"My" Creek	2.10	0.381	0.0284	10.90	32.41
OreHouse Spring	0.01	1.94	0.071	11.40	164.00
Trickle coming from tailings	0.03	58.4	54.1	77.20	56.37
South Pond outlet	0.05	59.1	59.1	26.10	0.00
Horse Creek at tailings	0.32	25	21.9	104.00	29.80
Dunn Creek below mine confluence	7.80	0.949	0.226	13.50	53.60

Notes:
Data from study and report by Slotton et.al. (2006).
cfs = cubic feet per second.
µg/L = micrograms per liter.
mg/L = milligrams per liter.
ppm = parts per million.

Table 3-1
2010/2011 Surface Water Sample Location Key
Mount Diablo Mercury Mine
Contra Costa County, California

Samples	Type	Location Description
SW-01	Precipitation Runoff	Precipitation runoff from Bradley tailings/waste rock piles
SW-02	Precipitation Runoff	Precipitation runoff from Bradley tailings/waste rock piles
SW-03	Precipitation Runoff	Precipitation runoff from Bradley tailings/waste rock piles
SW-04	Spring	Park Spring
SW-05	Surface Flow	Overland flow between Adit Spring and Lower Pond
SW-06	Surface Flow	Upper Pond
SW-07	Surface Flow	Dunn Creek downstream of Site (Point of Compliance Sampling Location)
SW-08	Surface Flow	Dunn Creek upstream of ponds, downstream of confluence with My Creek
SW-09	Surface Flow	Lower Pond
SW-10	Surface Flow	Middle Pond
SW-11	Surface Flow	My Creek adjacent to the Northern Waste Rock Area
SW-12	Surface Flow	Watershed runoff in My Creek upgradient of the Site (Background)
SW-13	Surface Flow	My Creek downstream of the Northern Waste Rock Area
SW-14	Spring	Ore House Spring
SW-15	Spring	Adit Spring (water effluent point from Bradley workings)
SW-16	Surface Flow	Watershed runoff in Dunn Creek upgradient of the Site (Background)

Table 3-2
Summary of Chemical Analyses Results
2010/2011 Surface Water Sampling
Mount Diablo Mercury Mine
Contra Costa County, California

			Water Quality Criteria[a]			Sample Location															
						Background		Springe			My Creek Runoff		Mid-Dunn Creek	Ponds			Surface Water Runoff				Downstream
				Human Health for Consumption of		My Creek	Dunn Creek	Park	Ore House	Adit	Pond	Weir		Upper	Lower	Middle	Bradley Tailings Piles			Adit Spring	Dunn Creek
Parameter	Unit	Date	Freshwater	Water + Organism	Organism Only	SW-12	SW-16	SW-04	SW-14	SW-15	SW-11	SW-13	SW-08	SW-06	SW-09	SW-10	SW-01	SW-02	SW-03	SW-05	SW-07
Mercury_total (Hg)	µg/L	4/12/2010	0.91	0.05	0.051	—	—	0.45	—	—	—	—	0.61	31.8	93.6	18	2.2	179	74	7.9	0.74
		5/27/2010				<0.20	<0.20	—	1.3	107	<0.20	<0.20	<0.20	22.4	88	0.21	—	161	—	66.3	0.84
		10/20/2010				—	—	<0.20	—	153	—	—	—	—	149	—	—	—	—	41.6	<0.20
		2/17/2011				<0.20	<0.20	0.83	0.36	8.8	<0.20	<0.20	<0.20	3.0	55.6	0.70	<0.20	9.6	6.8	108	<0.20
		6/14/2011				<0.20	<0.20	<0.20	0.39	100	<0.20	<0.20	<0.20	4.8	72.7	<0.20	—	—	34.6	49.3	0.51
Mercury_Dissolved (Hg)	µg/L	4/12/2010	0.77	0.05	0.051	—	—	0.33	—	—	—	—	<0.20	0.30	85.3	0.42	<0.20	175	35	9.4	0.24
		5/27/2010				<0.20	<0.20	—	<0.20	55.6	<0.20	<0.20	<0.20	13.8	55.1	<0.20	—	135	—	39.7	<0.20
		10/20/2010				—	—	<0.20	—	3.6	—	—	—	—	143	—	—	—	—	35.4	<0.20
		2/17/2011				<0.20	<0.20	0.51	<0.20	1.7	<0.20	<0.20	0.47	0.32	54.0	0.59	<0.20	5.3	5.4	5.0	<0.20
		6/14/2011				<0.20	0.31	<0.20	<0.20	19.2	<0.20	<0.20	<0.20	3.5	36.8	<0.20	—	—	6.5	33.1	0.28
Methyl Mercury	ng/L	4/12/2010	3[b]	0.3 mg/kg	0.3 mg/kg	—	—	0.328	—	—	—	—	0.389	0.350	0.523	0.480	0.061	0.876	0.398	1.04	0.736
		5/27/2010		(fish tissue)	(fish tissue)	0.104	0.0756	—	1.16	4.86	0.504	0.439	0.705	0.233	0.657	7.26	—	2.84	—	3.29	1.47
		10/20/2010				—	—	0.0615	—	1.57	—	—	—	—	0.721	—	—	—	—	0.841	6.56
		2/17/2011				0.36	0.98	0.31	2.70	0.90	0.70	0.30	2.5	1.4	0.87	0.65	0.65	0.86	1.6	4.0	1.3
		6/14/2011				0.13	0.11	0.82	4.1	5.7	1.3	0.36	0.96	0.56	0.48	1.70	—	—	0.26	0.96	0.68
pH	su	4/12/2010	6.5 - 9.0	5.0 - 9.0	—	—	—	7.69	—	—	—	—	7.73	8.08	4.50	6.83	3.95	2.60	2.23	7.16	7.76
		5/27/2010				8.20	7.75	—	5.94	4.36	6.27	8.37	7.91	4.48	4.52	7.41	—	3.13	—	7.18	7.69
		10/20/2010				—	—	7.98	—	3.90	—	—	—	—	6.33	—	—	—	—	7.56	7.27
		2/17/2011				8.17	9.47	7.79	6.16	3.92	8.27	6.36	7.55	5.13	3.93	7.71	5.11	3.87	3.04	7.04	7.57
		6/14/2011				8.34	7.72	7.66	6.36	9.28	8.35	8.36	7.82	4.24	3.90	7.96	—	—	2.05	7.50	7.68
Alkalinity, Bicarbonate	mg/L	4/12/2010	—	—	—	—	—	111	—	—	—	—	83.2	<5.0	<5.0	11.9	<5.0	<5.0	<5.0	127	77.4
		5/27/2010				223	139	—	39.6	<5.0	227	229	169	<5.0	<5.0	248	—	<5.0	—	187	179
		10/20/2010				—	—	932	—	<5.0	—	—	—	—	24	—	—	—	—	478	420
		2/17/2011				216	56.9	406	56.0	<5.0	220	215	54.0	<5.0	<5.0	82.0	<5.0	<5.0	<5.0	44.0	82.0
		6/14/2011				854	182	1,040	120	<5.0	848	247	216	<5.0	<5.0	212	—	—	<5.0	274	216
Alkalinity, Carbonate (CO3)	mg/L	4/12/2010	—	—	—	—	—	<5.0	—	—	—	—	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
		5/27/2010				<5.0	<5.0	—	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	—	<5.0	—	<5.0	<5.0
		10/20/2010				—	—	<5.0	—	<5.0	—	—	—	—	<5.0	—	—	—	—	<5.0	—
		2/17/2011				<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
		6/14/2011				<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	—	—	<5.0	<5.0	<5.0
Alkalinity, Total as CaCO3	mg/L	4/12/2010	20	—	—	—	—	111	—	—	—	—	83	<5.0	<5.0	12	<5.0	<5.0	<5.0	127	77
		5/27/2010				223	139	—	40	<5.0	227	233	169	<5.0	<5.0	248	—	<5.0	—	187	179
		10/20/2010				—	—	932	—	<5.0	—	—	—	—	24	—	—	—	—	478	420
		2/17/2011				216	56.9	406	56.0	<5.0	220	216	54.0	<5.0	<5.0	82.0	<5.0	<5.0	<5.0	44.0	62.0
		6/14/2011				854	182	1,040	120	<5.0	848	247	218	<5.0	<5.0	212	—	—	<5.0	274	218
Fluoride	mg/L	4/12/2010	—	—	—	—	—	<0.10	—	—	—	—	<0.10	<0.10	<0.50	0.12	<0.10	0.39	1.2	<0.50	<0.10
		5/27/2010				<0.10	<0.10	—	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	<0.50	<0.10	—	<0.10	—	<0.50	<0.10
		10/20/2010				—	—	2.8	<0.10	1.2	—	—	—	—	1.9	—	—	—	—	0.48	1.2
		2/17/2011				<0.10	0.11	<0.10	<0.10	<0.10	<0.10	0.16	0.11	0.13	<0.25	0.12	0.13	<0.10	<0.10	0.13	0.11
		6/14/2011				0.14	<0.10	<0.50	0.18	<0.50	0.13	0.15	<0.10	0.22	<0.50	0.14	—	—	4.2	<0.50	0.11
Dissolved Organic Carbon	mg/L	4/12/2010	—	—	—	—	—	8.3	—	—	—	—	8.8	4.6	25.7	4.6	2.4	4.6	7.6	2.6	8.3
		5/27/2010				2.6	4.2	—	3.7	11.3	2.4	2.6	4.1	6.1	2.7	5.2	—	8.2	—	5.6	4.3
		10/20/2010				—	—	5.1	—	7.7	—	—	—	—	1.8	—	—	—	—	3.4	6.5
		2/17/2011				2.8	11.6	5.2	4.2	3.2	2.8	3.3	9.8	6.0	2.6	6.1	5.9	2.2	3.3	2.0	8.5
		6/14/2011				1.4	2.2	3.3	3.4	3.9	1.7	1.8	2.6	5.3	1.7	6.3	—	—	14.5	2.8	3.3
Specific Conductivity	µmhos/cm	4/12/2010	—	—	—	—	—	466	—	—	—	—	212	346	8,050	422	341	5,160	9,710	9,220	236
		5/27/2010				494	335	—	414	11,400	494	526	414	2,430	8,810	711	—	3,860	—	14,200	774
		10/20/2010				—	—	19,100	—	12,100	—	—	—	—	30,100	—	—	—	—	17,400	22,200
		2/17/2011				485	216	6,350	450	653	492	498	205	880	8,800	1,080	404	269	1,530	2,300	364
		6/14/2011				550	444	16,200	537	8,360	543	592	588	2,380	8,890	1,400	—	—	17,000	14,900	2,640

Table 3-2
Summary of Chemical Analyses Results
2010/2011 Surface Water Sampling
Mount Diablo Mercury Mine
Contra Costa County, California

			Water Quality Criteria[a]			Sample Location															
				Human Health for Consumption of		Background		Springs			My Creek Runoff		Mid-Dunn Creek	Ponds			Surface Water Runoff				Downstream
						My Creek	Dunn Creek	Park	Ore House	Adit	Pond	Weir		Upper	Lower	Middle	Bradley Tailings Piles			Adit Spring	Dunn Creek
Parameter	Unit	Date	Freshwater	Water + Organism	Organism Only	SW-12	SW-16	SW-04	SW-14	SW-16	SW-11	SW-13	SW-05	SW-05	SW-09	SW-10	SW-01	SW-02	SW-03	SW-05	SW-07
Solids, Total Dissolved (TDS)	mg/L	4/12/2010	250	–	–	–	–	291	–	–	–	–	199	242	8,120	267	224	4,450	16,000	8,780	210
		5/27/2010				261	190	–	276	9,110	273	301	231	2,000	7,800	447	–	3,060	–	9,980	465
		10/20/2010				–	–	12,200	–	11,100	–	–	–	–	20,700	–	–	–	–	11,900	14,700
		2/17/2011				291	173	4,090	292	374	267	274	205	611	6,630	714	270	111	1,070	1,590	250
		6/14/2011				291	238	10,900	343	8,570	293	356	319	1,970	7,880	945	–	–	28,500	12,100	1,730
Turbidity	NTU	4/12/2010	–	–	–	–	–	49	–	–	–	–	190	160	14	125	13	7.7	84	127	178
		5/27/2010				1.5	46	–	5.6	2,650	2.7	3.0	27	1.0	18	7.1	–	261	–	298	13
		10/20/2010				–	–	<0.50	–	4,820	–	–	–	–	32	–	–	–	–	204	24
		2/17/2011				8.4	281	2.6	7.2	87.6	6.1	6.6	293	94.8	186	6.8	8.4	28.7	8.7	8.2	229
		6/14/2011				1.9	1.8	5.2	8.8	11.3	5.3	3.5	1.5	12.3	13.5	4.7	–	–	8.5	10.1	3.4
Hardness, Total as CaCD3	mg/L	4/12/2010	–	–	–	–	–	148	–	–	–	–	106	151	2,340	151	103	1.170	2,010	2,770	106
		5/27/2010				223	153	–	141	3,230	231	240	185	1,140	3,010	290	–	1,000	–	3,820	281
		10/20/2010				–	–	3,620	–	3,870	–	–	–	–	9,650	–	–	–	–	6,340	6,350
		2/17/2011				225	112	1,210	167	163	230	231	155	355	2,230	368	305	61.5	199	839	143
		6/14/2011				237	191	2,620	199	2,860	232	262	252	964	2,640	547	–	–	3,830	3,960	735
Silica, Dissolved (SiO2)	mg/L	4/12/2010	–	–	–	–	–	24.8	–	–	–	–	56.3	52	28	28.9	8.8	64	79.8	25.2	42.8
		5/27/2010				16.7	17.4	–	32.3	82.4	16.7	18.5	14.2	56	35.3	17	–	29.1	–	27.4	12.7
		10/20/2010				–	–	35.1	–	88.8	–	–	–	–	41.7	–	–	–	–	25.7	16.4
		2/17/2011				18.9	106	25.9	35.1	45.8	16.8	16.1	163	40.0	22.7	18.5	173	51.3	51.8	113	60.3
		6/14/2011				19.3	14.2	65.5	34.4	91.5	20.5	19.3	14.8	63.5	41.7	11.9	–	–	131	60.7	12.9
Chloride (Cl)	mg/L	4/12/2010	230	–	–	–	–	35.3	–	–	–	–	4.5	8.8	1,220	18.7	1.1	163	53.6	1,490	8.5
		5/27/2010				8.8	8.2	–	14.8	1,570	9.7	10.2	10.8	102	1,750	27.5	–	333	–	2,370	54
		10/20/2010				–	–	2,890	–	1,220	–	–	–	–	4,980	–	–	–	–	2,700	3,770
		2/17/2011				9.7	4.5	1,100	11.6	41.1	8.4	10.5	6.1	41.6	1,460	70.1	2	8.8	5.1	201	20.7
		6/14/2011				15.4	12.2	2,970	20.3	1,010	16.5	16.1	23.1	130	1,310	66	–	–	72.8	2,620	335
Bromide (Br)	mg/L	4/12/2010	–	–	–	–	–	<0.20	–	–	–	–	<0.20	<0.20	4.6	<0.20	<0.20	0.64	<0.40	6.7	<0.20
		5/27/2010				4.7	<0.20	–	<0.20	6.6	<0.20	<0.20	<0.20	0.38	6.9	<0.20	–	0.92	–	8.7	<0.20
		10/20/2010				–	–	10.5	–	4.3	–	–	–	–	17.8	–	–	–	–	8.7	12.4
		2/17/2011				<0.20	<0.20	3.4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	5.0	0.21	<0.20	<0.20	<0.20	0.77	<0.20
		6/14/2011				<0.20	<0.20	9.8	<0.40	3.7	<0.40	<0.20	<0.20	<1.0	4.7	0.4	–	–	<2.0	9.8	1.1
Nitrogen, Nitrate (NO3)	mg/L	4/12/2010	–	10	–	–	–	0.56	–	–	–	–	0.18	0.49	1.8	<0.10	<0.10	1.6	<0.20	4.2	0.28
		5/27/2010				<0.10	0.23	–	<0.10	<0.50	<0.10	<0.10	<0.10	<0.10	1.8	<0.10	–	1.3	–	6.7	<0.10
		10/20/2010				–	–	10.7	–	<0.50	–	–	–	–	4.1	–	–	–	–	4.7	<0.50
		2/17/2011				<0.10	1.2	10.9	<0.10	<0.10	<0.10	<0.10	1.2	0.18	2.0	<0.10	0.40	<0.10	<0.10	1.3	1.2
		6/14/2011				<0.10	<0.10	4.1	<0.10	0.54	<0.10	<0.10	<0.10	<0.10	1.5	<0.10	–	–	1.3	1.8	0.7
Sulfate (SO4)	mg/L	4/12/2010	–	–	–	–	–	68.3	–	–	–	–	11.8	134	6,620	149	191	4,570	13,400	3,040	18.4
		5/27/2010				29.5	18.3	–	136	5,340	31.4	39.2	32.4	1,610	4,310	101	–	3,450	–	3,840	123
		10/20/2010				–	–	3,170	–	6,170	–	–	–	–	7,890	–	–	–	–	3,640	5,280
		2/17/2011				27.6	6.7	1,240	133	245	30.4	37.7	11.7	346	3,260	312	159	66.8	1,020	767	63.3
		6/14/2011				39.8	27.6	3,050	166	4,320	39.4	49.5	54.2	1,750	3,310	381	–	–	39,800	4,290	598
Antimony (Sb)	µg/L	4/12/2010	–	5.6	640	–	–	<10	–	–	–	–	<10	61.5	<10	35.4	10.1	19.3	112	<10	<10
		5/27/2010				<10	<10	–	<10	62	<10	10.4	<10	<10	<10	<10	–	21.9	–	12	<10
		10/20/2010				–	–	<30	–	<150	–	–	–	–	<30	–	–	–	–	<30	<30
		2/17/2011				<30	<30	<30	<30	217	<30	<30	<30	55	<30	<30	<30	75.1	85.8	184	<30
		6/14/2011				<6.0	<6.0	<6.0	<6.0	<60	<6.0	<6.0	<6.0	24.8	<6.0	<6.0	–	–	<600	<60	<6.0
Arsenic (As)	µg/L	4/12/2010	150	0.018	0.14	–	–	<10	–	–	–	–	<10	53.2	<10	23.8	<10	119	530	<50	<10
		5/27/2010				<10	<10	–	<10	182	<10	<10	<10	<10	<10	<10	–	47.6	–	<10	<10
		10/20/2010				–	–	<30	–	<150	–	–	–	–	<30	–	–	–	–	<30	<30
		2/17/2011				<30	<30	<30	<30	184	<30	<30	<30	35.0	<30	<30	<30	81.0	162	282	<30
		6/14/2011				<10	<10	<10	<10	19	<10	<10	<10	12.8	<10	<10	–	–	1,570	31.5	<10

Table 3-2
Summary of Chemical Analyses Results
2010/2011 Surface Water Sampling
Mount Diablo Mercury Mine
Contra Costa County, California

			Water Quality Criteria[a]			Sample Location															
				Human Health for Consumption of		Background		Springs			My Creek Runoff		Mid-Dunn Creek	Ponds			Surface Water Runoff				Downstream
						My Creek	Dunn Creek	Park	Ore House	Adit	Pond	Weir		Upper	Lower	Middle	Bradley Tailings Piles			Adit Spring	Dunn Creek
Parameter	Unit	Date	Freshwater	Water + Organism	Organism Only	SW-12	SW-16	SW-04	SW-14	SW-15	SW-11	SW-13	SW-08	SW-06	SW-09	SW-10	SW-01	SW-02	SW-03	SW-05	SW-07
Beryllium (Be)	µg/L	4/12/2010	–	–	–	–	–	<5.0	–	–	–	–	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	8.3	<5.0	<5.0
		5/27/2010				<5.0	<5.0	–	<5.0	5.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	–	<5.0	–	<5.0	<5.0
		10/20/2010				–	–	<5.0	–	<25	–	–	–	–	<5.0	–	–	–	–	<5.0	<5.0
		2/17/2011				<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
		6/14/2011				<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	–	–	23.9	<5.0	<5.0
Boron (B)	µg/L	4/12/2010	–	–	–	–	–	2,680	–	–	–	–	226	712	73,500	1,350	72	13,900	2,660	86,700	304
		5/27/2010				941	171	–	751	98,900	671	953	486	6,660	86,800	1,920	–	16,000	–	139,000	3,120
		10/20/2010				–	–		–		–	–	–	–		–	–	–	–		
		2/17/2011				1,020	<200	66,300	606	2,550	1,000	964	183	2,640	76,200	4,870	108	505	296	20,900	1,020
		6/14/2011				1,190	268	183,000	849	65,000	1,220	1,270	913	8,780	79,000	6,460	–	–	4,500	170,000	20,000
Cadmium (Cd)	µg/L	4/12/2010	0.25	–	–	–	–	<2.0	–	–	–	–	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<6.0	<2.0	<2.0
		5/27/2010				<2.0	<2.0	–	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	–	<2.0	–	<2.0	<2.0
		10/20/2010				–	–	<2.0	–	10.5	–	–	–	–	4	–	–	–	–	<2.0	<2.0
		2/17/2011				<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<3.0	<20	<2.0	<2.0	<2.0	<2.0	<20	<2.0
		6/14/2011				<2.0	<2.0	<10	<2.0	<20	<2.0	<2.0	<2.0	<2.0	<10	<2.0	–	–	<100	<20	<2.0
Calcium (Ca)	µg/L	4/12/2010	–	–	–	–	–	23,600	–	–	–	–	21,700	16,900	319,000	20,200	16,700	130,000	124,000	449,000	22,100
		5/27/2010				47,100	38,200	–	22,600	357,000	48,300	49,700	41,400	133,000	409,000	55,900	–	178,000	–	549,000	52,000
		10/20/2010				–	–	250,000	–	372,000	–	–	–	–	763,000	–	–	–	–	792,000.0	401,000
		2/17/2011				47,700	20,000	160,000	27,700	23,000	48,300	48,000	24,800	43,200	273,000	63,900	51,800	10,900	16,300	207,000	25,800
		6/14/2011				48,500	48,400	309,000	36,600	312,000	47,100	52,800	54,700	114,000	386,000	85,900	–	–	239,000	614,000	113,000
Chromium (Cr)	µg/L	4/12/2010	74	–	–	–	–	16	–	–	–	–	31	53	26	25	12	770	2,790	11	22
		5/27/2010				<5.0	<5.0	–	<5.0	240	<5.0	<5.0	<5.0	<5.0	19	<5.0	–	309	–	28	<5.0
		10/20/2010				–	–	<5.0	–	91	–	–	–	–	<5.0	–	–	–	–	5	<5.0
		2/17/2011				<5.0	62.3	<5.0	<5.0	158	<5.0	<5.0	107	34.6	44.6	<5.0	188	132	364	266	28.6
		6/14/2011				<10	<10	<10	<10	65.4	<10	<10	<10	<10	53	<10	–	–	6,900	99.3	<10
Copper (Cu)	µg/L	4/12/2010	–	1300	–	–	–	6.9	–	–	–	–	33.6	33	50	15.6	12	235	632	21.6	22.6
		5/27/2010				<5.0	5.1	–	6.4	101	<5.0	<5.0	<5.0	34.2	43.2	<5.0	–	94.3	–	27.6	<5.0
		10/20/2010				–	–	<5.0	–	66.5	–	–	–	–	38.6	–	–	–	–	<5.0	<5.0
		2/17/2011				<5.0	78.5	<5.0	<5.0	36.4	<5.0	<5.0	123	26.0	36.2	<5.0	156	46.8	95.7	88.7	34.6
		6/14/2011				<10	<10	<10	<10	55.1	<10	<10	<10	42.2	77	<10	–	–	*1,470*	43.3	<10
Iron (Fe)	µg/L	4/12/2010	1000	–	–	–	–	6,840	–	–	–	–	16,500	22,900	13,400	9,830	2,140	382,000	1,600,000	16,300	13,200
		5/27/2010				<50	2,260	–	667	411,000	70	89.4	732	272	11,100	1,330	–	83,800	–	22,900	665
		10/20/2010				–	–	<250	–	1,090,000	–	–	–	–	5,350	–	–	–	–	32,300	6,210
		2/17/2011				1,040	42,900	4,060	679	73,800	321	304	75,200	12,100	21,700	1,140	116,000	53,900	189,000	233,000	22,400
		6/14/2011				<200	<200	5,390	1,190	257,000	595	<200	<200	3,460	17,300	2,060	–	–	3,350,000	103,000	1,050
Lead (Pb)	µg/L	4/12/2010	2.5	–	–	–	–	<5.0	–	–	–	–	5.8	6.8	<5.0	<5.0	<5.0	<10	<20	<25	<5.0
		5/27/2010				<5.0	<5.0	–	<5.0	13.4	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	–	7.8	–	<5.0	<5.0
		10/20/2010				–	–	<10	–	<50	–	–	–	–	<50	–	–	–	–	<10	<10
		2/17/2011				<10	13.0	<10	<10	<10	<10	<10	26.7	<10	<10	<10	46.5	<10	16.5	15.6	<10
		6/14/2011				<10	<10	<10	<10	10.6	<10	<10	<10	<10	<10	<10	–	–	64.5	<10	<10
Magnesium (Mg)	µg/L	4/12/2010	–	–	–	–	–	21,700	–	–	–	–	12,500	25,300	374,000	24,500	13,700	205,000	414,000	400,000	12,300
		5/27/2010				25.700	13,900	–	20,400	567,000	26,900	28,200	19,600	195,000	482,000	36,600	–	138,000	–	548,000	36,700
		10/20/2010				–	–	727,000	–	715,000	–	–	–	–	1,860,000	–	–	–	–	1,060,000	1,300,000
		2/17/2011				25,600	15,000	203,000	23,600	25,700	26,500	27,100	22,600	59,900	377,000	58,700	42,600	6,320	38,600	78,200	19,100
		6/14/2011				27,600	17,100	450,000	26,100	506,000	27,700	31,600	28,100	165,000	408,000	60,800	–	–	786,000	589,000	110,000
Manganese (Mn)	µg/L	4/12/2010	–	–	100	–	–	80	–	–	–	–	*388*	*648*	*5,630*	*554*	*584*	*5,720*	*13,000*	*6,350*	*280*
		5/27/2010				<5.0	90	–	*194*	*16,000*	12	5.6	71	*3,410*	*6,950*	*623*	–	3,410	–	*6,240*	*381*
		10/20/2010				–	–	94	–	*24,100*	–	–	–	–	*14,000*	–	–	–	–	3,770	*10,400*
		2/17/2011				19.6	*1,150*	*350*	*151*	*921*	12.7	14.6	*2,030*	*1,190*	*5,640*	*434*	2,310	*262*	*1,170*	*2,150*	*694*
		6/14/2011				<15	19.4	*2,150*	*221*	*19,500*	42.5	<15	*104*	*3,700*	*6,630*	*226*	–	–	*25,400*	*6,900*	*1,570*

Table 3-2
Summary of Chemical Analyses Results
2010/2011 Surface Water Sampling
Mount Diablo Mercury Mine
Contra Costa County, California

			Water Quality Criteria[a]			Sample Location															
						Background		Springa			My Creek Runoff		Mid-Dunn Creek	Ponds			Surface Water Runoff				Downstream
				Human Health for Consumption of		My Creek	Dunn Creek	Park	Ore House	Adit	Pond	Weir		Upper	Lower	Middle	Bradley Tailings Piles			Adit Spring	Dunn Creek
Parameter	Unit	Date	Freshwater	Water + Organism	Organism Only	SW-12	SW-16	SW-04	SW-14	SW-15	SW-11	SW-13	SW-08	SW-06	SW-09	SW-10	SW-01	SW-02	SW-03	SW-05	SW-07
Nickel (Ni)	µg/L	4/12/2010	52	610	4600	—	—	165	—	—	—	—	44.7	1,590	11,600	1,460	1,320	23,900	73,400	8,760	81.8
		5/27/2010				<5.0	<5.0	—	587	25,000	<5.0	6.2	9.5	16,600	16,000	263	—	11,000	—	9,060	345
		10/20/2010				—	—	349	—	37,700	—	—	—	—	23,900	—	—	—	—	4,650	635
		2/17/2011				7.4	62.5	387	524	1,530	<5.0	7.7	154	4,240	11,100	2,420	1,120	539	8,460	8,980	315
		6/14/2011				<5.0	<5.0	634	392	28,200	<5.0	8.1	8.8	11,700	17,900	279	—	—	168,000	12,500	986
Potassium (K)	µg/L	4/12/2010	—	—	—	—	—	4,120	—	—	—	—	4,170	4,690	36,000	3,860	1,850	8,690	2,730	43,500	3,720
		5/27/2010				717	1,600	—	2,080	53,300	808	898	1,560	10,600	47,000	2,120	—	14,500	—	68,300	3,140
		10/20/2010				—	—	117,000	—	68,300	—	—	—	—	154,000	—	—	—	—	95,300	73,200
		2/17/2011				1,030	8,530	43,400	2,320	8,070	827	965	11,400	8,690	43,300	4,850	14,600	8,120	6,990	18,600	7,630
		6/14/2011				<10,000	<10,000	99,700	<10,000	32,600	<10,000	<10,000	<10,000	11,300	41,200	<10,000	—	—	<20,000	79,700	10,300
Selenium (Se)	µg/L	4/12/2010	5.0	170	4200	—	—	<20	—	—	—	—	<20	<20	<20	<20	<20	<20	<60	<20	<20
		5/27/2010				<20	<20	—	<20	<40	<20	<20	<20	<20	<20	<20	—	<20	—	<20	<20
		10/20/2010				—	—	<30	—	<150	—	—	—	—	<30	—	—	—	—	<30	<30
		2/17/2011				<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<20	<30	<30
		6/14/2011				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	—	—	<100	<10	<10
Silicon (Si)	µg/L	4/12/2010	—	—	—	—	—	11,600	—	—	—	—	26,300	24,300	13,100	13,500	4,120	28,600	37,300	11,600	19,800
		5/27/2010				7,630	8,130	—	15,100	38,500	7,790	7,720	6,620	25,700	15,500	7,960	—	13,600	—	12,600	5,930
		10/20/2010				—	—	16,400	—	46,200	—	—	—	—	19,500	—	—	—	—	12,000	7,660
		2/17/2011				8,290	49,500	12,100	18,400	21,400	7,650	7,620	71,600	18,700	10,600	8,120	60,800	24,000	24,200	52,700	28,200
		6/14/2011				9,030	8,660	30,600	16,100	42,800	9,570	8,040	8,930	28,700	19,500	5,580	—	—	81,100	28,400	8,010
Silver (Ag)	µg/L	4/12/2010	—	—	—	—	—	<5.0	—	—	—	—	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<15	<5.0	<5.0
		5/27/2010				<5.0	<5.0	—	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	—	<5.0	—	<5.0	<5.0
		10/20/2010				—	—	<5.0	—	<25	—	—	—	—	<25	—	—	—	—	<25	<5.0
		2/17/2011				<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
		6/14/2011				<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	—	—	104	<5.0	<5.0
Sodium (Na)	µg/L	4/12/2010	—	—	—	—	—	37,600	—	—	—	—	8,110	11,400	969,000	18,200	1,670	186,000	34,600	1,190,000	8,320
		5/27/2010				17,400	10,700	—	20,800	1,290,000	18,000	18,200	18,100	134,000	1,260,000	37,300	—	251,000	—	1,760,000	56,000
		10/20/2010				—	—	3,100,000	—	1,120,000	—	—	—	—	4,070,000	—	—	—	—	5,220,000	2,990,000
		2/17/2011				18,600	7,150	961,000	22,100	36,000	18,700	18,300	9,120	44,700	1,040,000	76,600	9,630	9,300	8,280	212,000	23,000
		6/14/2011				22,000	16,700	2,380,000	27,100	888,000	22,200	23,600	24,900	136,000	833,000	85,100	—	—	58,400	1,860,000	247,000
Thallium (Tl)	µg/L	4/12/2010	—	0.24	0.47	—	—	<20	—	—	—	—	<20	<20	<20	<20	<20	<20	<60	<20	<20
		5/27/2010				<20	<20	—	<20	<20	<20	<20	<20	<20	<20	<20	—	<20	—	<20	<20
		10/20/2010				—	—	<30	—	<150	—	—	—	—	<150	—	—	—	—	<30	<3000
		2/17/2011				<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30	<30
		6/14/2011				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	—	—	<500	<10	<10
Zinc (Zn)	µg/L	4/12/2010	120	7400	26000	—	—	<10	—	—	—	—	48.7	78.1	335	52.1	28.2	646	2,160	205	33.8
		5/27/2010				<10	10.6	—	13.8	1,160	<10	<10	<10	245	368	<10	—	276	—	180	<10
		10/20/2010				—	—	<10	—	1,440	—	—	—	—	682	—	—	—	—	60.8	<10
		2/17/2011				<10	128	<10	15.4	87.6	<10	<10	221	122	307	25.1	293	36.8	196	406	69.8
		6/14/2011				<20	<20	<20	<20	975	<20	<20	<20	285	499	<20	—	—	4,640	489	<20

Notes:

Italic font indicates value is above the water quality criteria for human health for consumption of "water + organism" or "organism only".

Bold and font indicates value is above the water quality criteria for freshwater .

µg/L = microgram per liter. µmho/cm = micromhos per centimeter.

su = standard units NTU = nephelometric turbidity unit.

ng/L = nanogram per liter.

mg/L = milligram per liter.

a Values represent the lesser of the water quality criteria available from CRWQCB (2008b) and USEPA (2009).

b Value from CRWQCB – San Francisco Bay water quality criteria for methyl mercury in freshwater (CRWQCB, 2008a). Values were not available from CRWQCB (2008b) and USEPA (2009).

References:

CRWQCB. 2008a. Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater. Interim Final. May.

CRWQCB. 2008b. Central Valley Regional Water Quality Control Board, A Compilation of Water Quality Goals. July.

USEPA. 2009. National Recommended Water Quality Criteria. Office of Water. Office of Science and Technology.

Table 3-3
Monitoring Well Construction Details
Mount Diablo Mercury Mine
Contra Costa County, California

Well	Construction Date	Development Date	Survey Data[1]			Construction Details[2]		
			Northing	Easting	Top of Casing Elevation	Total Depth	Screen Interval	Top of Filter Pack
DMEA-1	5/6/2011	5/24/2011	2153804.33	6164062.04	331.50	275	240-265	NA
ADIT-1	5/5/2011	5/24/2011	2153602.60	6164086.06	332.02	85	65-80	56

Notes:

Wells were constructed of 4 - inch schedule 40 (ADIT-1) or schedule 80 (DMEA-1) PVC.
1 Elevations are in feet above mean sea level (msl).
2 Depths in feet below ground surface (bgs).

Table 3-4
Summary of Chemical Analyses Results-Monitoring Well Sampling
Mt. Diablo Mercury Mine
Contra Costa County, California

		Well ID	Water Quality Criteria^a			ADIT-1	DMEA-1
			Freshwater	Human Health for Consumption of			
				Water + Organism	Organism Only		
Mercury_total (Hg)	ug/l	6/15/2011	0.91	0.05	0.051	22.7	<0.20
		7/21/2011				7.4	<0.20
Mercury_Dissolved (Hg)	ug/l	6/15/2011	0.77	0.05	0.051	<0.20	<0.20
		7/21/2011				<0.20	<0.20
Methyl Mercury	ng/l	6/15/2011	3^b	0.3 mg/kg	0.3 mg/kg	0.35	<0.05
		7/21/2011		(fish tissue)	(fish tissue)	0.70	<0.05
pH	su	6/15/2011	6.5 - 9.0	5.0 - 9.0	--	5.47	4.63
		7/21/2011				6.19	6.74
Alkalinity, Bicarbonate	mg/l	6/15/2011	--	--	--	<5.0	<5.0
		7/21/2011				64.0	776
Alkalinity, Carbonate (CO3)	mg/l	6/15/2011	--	--	--	<5.0	<5.0
		7/21/2011				<5.0	<5.0
Alkalinity, Total as CaCO3	mg/l	6/15/2011	20	--	--	<5.0	<5.0
		7/21/2011				64.0	776
Fluoride	mg/l	6/15/2011	--	--	--	1.4	0.81
		7/21/2011				0.76	0.76
Dissolved Organic Carbon	mg/l	6/15/2011	--	--	--	2.6	1.4
		7/21/2011				2.4	1.4
Specific Conductivity	umhos/cm	6/15/2011	--	--	--	11,600	13,500
		7/21/2011				13,500	13,600
Solids, Total Dissolved (TDS)	mg/l	6/15/2011	250	--	--	12,600	9,960
		7/21/2011				12,700	6,320
Turbidity	NTU	6/15/2011	--	--	--	108	36.4
		7/21/2011				95.5	76.5
Hardness, Total as CaCO3	mg/l	6/15/2011	--	--	--	3,000	1,550
		7/21/2011				2,950	1,930
Silica, Dissolved (SiO2)	mg/l	6/15/2011	--	--	--	237	11
		7/21/2011				13.0	39.1
Chloride (Cl)	mg/l	6/15/2011	230	--	--	1,530	2,130
		7/21/2011				912	2,920
Bromide (Br)	mg/l	6/15/2011	--	--	--	2.4	7.5
		7/21/2011				3.3	10
Nitrogen, Nitrate (NO3)	mg/l	6/15/2011	--	10	--	<0.50	<0.50
		7/21/2011				<0.50	<0.50
Sulfate (SO4)	mg/l	6/15/2011	--	--	--	6,990	7,490
		7/21/2011				7,920	1,620
Antimony (Sb)	ug/l	6/15/2011	--	5.6	640	206	<12
		7/21/2011				<30	<16
Arsenic (As)	ug/l	6/15/2011	150	0.018	0.14	1,720	1,570
		7/21/2011				1,440	416
Dissolved Arsenic (As)	ug/l	6/15/2011	150	0.018	0.14	457	387
		7/21/2011				312	29.2
Beryllium (Be)	ug/l	6/15/2011	--	--	--	<25	<10
		7/21/2011				<25	<15
Boron (B)	ug/l	6/15/2011	--	--	--	89,000	143,000
		7/21/2011				99,200	169,000
Cadmium (Cd)	ug/l	6/15/2011	0.25	--	--	<40	<100
		7/21/2011				<10	33.7

Table 3-4
Summary of Chemical Analyses Results-Monitoring Well Sampling
Mt. Diablo Mercury Mine
Contra Costa County, California

		Well ID	Water Quality Criteria[a]			ADIT-1	DMEA-1
			Freshwater	Human Health for Consumption of			
				Water + Organism	Organism Only		
Calcium (Ca)	ug/l	6/15/2011	--	--	--	385,000	180,000
		7/21/2011				380,000	141,000
Chromium (Cr)	ug/l	6/15/2011	74	--	--	619	611
		7/21/2011				139	149
Copper (Cu)	ug/l	6/15/2011	--	1300	--	<50	<100
		7/21/2011				<100	<30
Iron (Fe)	ug/l	6/15/2011	1000	--	--	2,000,000	1,990,000
		7/21/2011				1,760,000	265,000
Lead (Pb)	ug/l	6/15/2011	2.5	--	--	<50	40.7
		7/21/2011				<50	30.4
Magnesium (Mg)	ug/l	6/15/2011	--	--	--	496,000	267,000
		7/21/2011				467,000	196,000
Manganese (Mn)	ug/l	6/15/2011	--	--	100	17,000	18,200
		7/21/2011				15,700	2,940
Nickel (Ni)	ug/l	6/15/2011	52	610	4600	33,000	31,300
		7/21/2011				23,600	9,640
Potassium (K)	ug/l	6/15/2011	--	--	--	<50,000	44,300
		7/21/2011				50,800	89,200
Selenium (Se)	ug/l	6/15/2011	5.0	170	4200	<50	<100
		7/21/2011				<50	<30
Silicon (Si)	ug/l	6/15/2011	--	--	--	5,690	5,150
		7/21/2011				6,100	6,090
Silver (Ag)	ug/l	6/15/2011	--	--	--	<100	<250
		7/21/2011				<130	<15
Sodium (Na)	ug/l	6/15/2011	--	--	--	677,000	662,000
		7/21/2011				814,000	2,170,000
Thallium (Tl)	ug/l	6/15/2011	--	0.24	0.47	<50	<20
		7/21/2011				<50	<30
Zinc (Zn)	ug/l	6/15/2011	120	7400	26000	680	1430
		7/21/2011				447	303

Notes:

[a] Values represent the lesser of the water quality criteria available from CRWQCB (2008b) and USEPA (2009).

[b] Value from CRWQCB – San Francisco Bay water quality criteria for methyl mercury in freshwater (CRWQCB, 2008a). Values were not available from CRWQCB (2008b) and USEPA (2009).

µg/L = microgram per liter.
su = standard units
ng/L = nanogram per liter.
mg/L = milligram per liter.
µmho/cm = micromhos per centimeter.
NTU = nephelometric turbidity unit.

References:

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CRWQCB. 2008b. Central Valley Regional Water Quality Control Board, A Compilation of Water Quality Goals. July.

USEPA. 2009. National Recommended Water Quality Criteria. Office of Water. Office of Science and Technology.

APPENDIX A

LABORATORY ANALYTICAL REPORTS

(PROVIDED IN ELECTRONIC FORMAT)

APPENDIX B

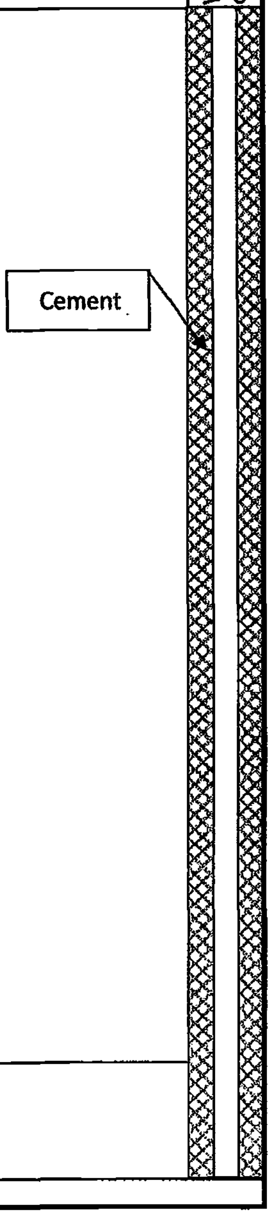
BORING/WELL LOGS

SGI environmental

THE SOURCE GROUP, INC.

BORING/WELL ID:	**ADIT-1**		
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA	**Project No.:** 01-SUN-055	
BORING LOCATION (AT SITE):		**Logged By:** Kristene Tidwell	
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE:	5/5/11	**FINISH DATE:**	5/6/11
FIRST WATER (BGS):	65'	**STABILIZED WATER LEVEL:**	65'
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	85'	**BORING DIAMETER/DEPTH:**	8" - 85'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			100	0		Weathered muddy sand, grey with red mottling. Mixture of sand, silt, gravel, clay; dry.	
			100	2			
			100	4			
			100	6			
			100	8		Color change to dark grey.	
			100	10			
			100	12			
			100	14			
			100	16		Dark grey, mudstone mixd with large chunks of silica carbonate.	
			100	18			
			100	20		Grey mudstone with pieces of silica carbonate.	
			100	22			
			100	24			
			100	26		No silica carbonate.	
			100	28			
			100	30			
			100	32			
			100	34			
			100	36		Weathered serpeninite, light grey in fine powder matrix.	
			100	38			
				40			



SGI environmental **THE SOURCE GROUP, INC.**

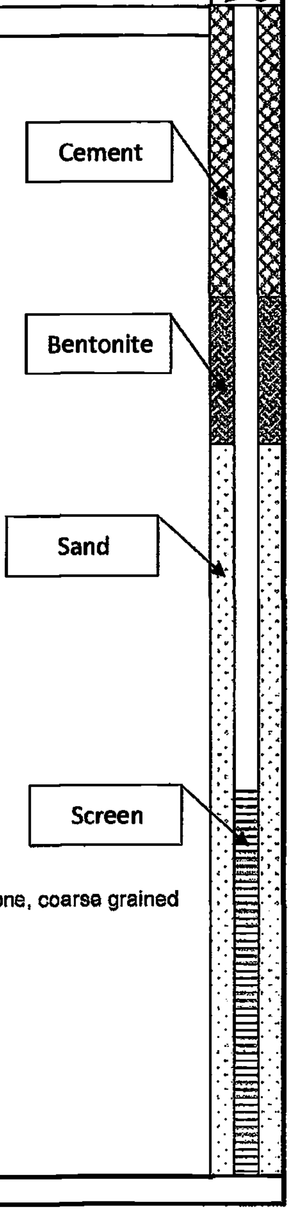
BORING/WELL ID:

ADIT-1

PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA		**Project No.:** 01-SUN-055
BORING LOCATION (AT SITE):			**Logged By:** Kristene Tidwell
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE:	5/5/11	**FINISH DATE:**	5/6/11
FIRST WATER (BGS):	65'	**STABILIZED WATER LEVEL:**	65'
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	85'	**BORING DIAMETER/DEPTH:**	8" - 85'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED
			100	40		Grey mudstone
			100	42		
			100	44		
			100	46		
			100	48		
			100	50		
			100	52		Some sheared pieces of serpeninite in mudstone matrix.
			100	54		Harder mudstone, possibly sheared.
			100	56		
			100	58		
			100	60		
			100	62		
	▼		100	64		Moist
			100	66		
			100	68		
			100	70		Rubble-muddy matrix with large cables composed of serpeninite, mudstone, coarse grained send, large pieces of serpeninite with evidence of metacinnabar, wet.
			100	72		
			100	74		
			100	76		
			100	78		Sepeninite rock, somewhat broken up with mud.
				80		

Well construction details



SGI environmental **THE SOURCE GROUP, INC.**

BORING/WELL ID:

ADIT-1

PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA		**Project No.:** 01-SUN-055
BORING LOCATION (AT SITE):			**Logged By:** Kristene Tidwell
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Cora Barrel	**MONITORING DEVICE:**	N/A
START DATE:	5/5/11	**FINISH DATE:**	5/6/11
FIRST WATER (BGS):	65'	**STABILIZED WATER LEVEL:**	65'
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	85'	**BORING DIAMETER/DEPTH:**	8" - 85'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			100	80		Sepeninite rock, somewhat broken up with mud.	Sand
			100	82			
			100	84			
						Bottom of Boring 85 feet	
				86			
				88			
				90			
				92			
				94			
				96			
				98			
				100			
				102			
				104			
				106			
				108			
				110			
				112			
				114			
				116			
				118			
				120			

SGI environmental **THE SOURCE GROUP, INC.**

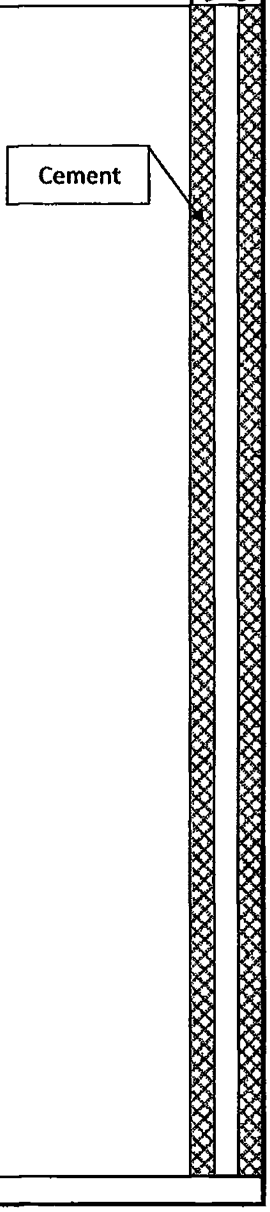
BORING/WELL ID:	**DMEA-1**		
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA	**Project No.:** 01-SUN-055	
BORING LOCATION (AT SITE):		**Logged By:** Kristene Tidwell	
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE/ (TIME):	5/2/11 14:15	**FINISH DATE/ TIME**	5/5/11
FIRST WATER (BGS):		**STABILIZED WATER LEVEL:**	
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	275'	**BORING DIAMETER/DEPTH:**	8" - 275'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			100	0		Fill dirt from earthwork. Sitstone with sand with gravel, (15,65,5,15), reddish brown, dry, low plasticity, low to moderate permeability, angular to subangular gravel, highly weathered mudstone.	▨ Cement
			100	2		Lesser clay content, more sand (0,50,35,15).	
			100	4			
			100	6			
			100	8			
			100	10		Slight moisture increase in gravel (0,50,15,55), increase in gravel size to 2" diameter, subangular gravel pieces.	
			100	12			
			100	14		Color change to greenish grey, increase in clay and silt, decrease of gravel and sand (20,60,5,15).	
			100	16		Reddish brown mottling, decrease in gravel and increase in Clay (25,60,5,10), decrease in gravel size, subrounded.	
			100	18		Greenish gray mottling.	
			100	20			
			100	22		Dacrease in gravel size.	
			100	24			
			100	26		Color change to grey, mudstone, no gravel (10,80,10,0), dry.	
			100	28			
			100	30			
			100	32			
			100	34			
			100	36			
			100	38			
				40			

THE SOURCE GROUP, INC.

BORING/WELL ID:	**DMEA-1**		
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA	**Project No.:** 01-SUN-055	
BORING LOCATION (AT SITE):		**Logged By:** Kristene Tidwell	
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE/ (TIME):	5/2/11 14:15	**FINISH DATE/ TIME:**	5/5/11
FIRST WATER (BGS):		**STABILIZED WATER LEVEL:**	
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	275'	**BORING DIAMETER/DEPTH:**	8" - 275'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			100	40			
			100	42		Looser, less consolidated, dry, color change to greyish brown.	
			100	44			
			100	46			
			100	48			
			100	50		Slight increase in clay, color change to grey.	
			100	52			
			100	54			
			100	56			
			100	58		Increase in sand and gravel in thin layers with moisture.	
			100	60			
			100	62		Dry, no sand/gravel, decrease in clay content.	
			100	64		Dry, no sand, remains grey mudstone.	
			100	66			
			100	68			
			100	70			
			100	72			
			100	74			
			100	76			
			100	78			
				80			



SGI environmental **THE SOURCE GROUP, INC.**

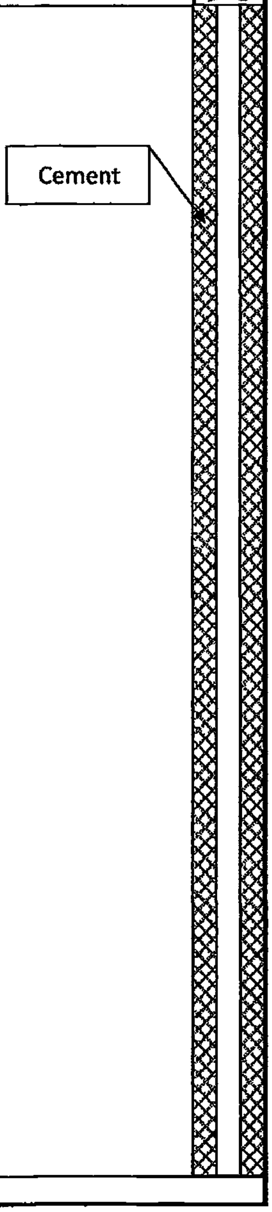
			BORING/WELL ID: **DMEA-1**
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA		**Project No.:** 01-SUN-055
BORING LOCATION (AT SITE):			**Logged By:** Kristene Tidwell
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE/ (TIME):	5/2/11 14:15	**FINISH DATE/ TIME:**	5/5/11
FIRST WATER (BGS):		**STABILIZED WATER LEVEL:**	
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	275'	**BORING DIAMETER/DEPTH:**	8" - 275'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			0	80			▨
			0	82			▨
			0	84			▨
			100	85			Cement
			100	88			▨
			100	90			▨
			100	92		Intermittent sandy/gravel zones from 93 - 98'. Interbedded with mudstone, moist.	▨
	▼		100	94			▨
			100	96			▨
			100	98		Mudstone as before, grey.	▨
			100	100			▨
			100	102			▨
			100	104		Thin gravel layer, rounded to subrounded gravel up to 1mm, well sorted, appears dry.	▨
			100	106		Mudstone as before. More competent.	▨
			100	108			▨
			100	110			▨
			100	112			▨
			100	114			▨
			100	116			▨
			100	118			▨
				120			▨

SGI environmental **THE SOURCE GROUP, INC.**

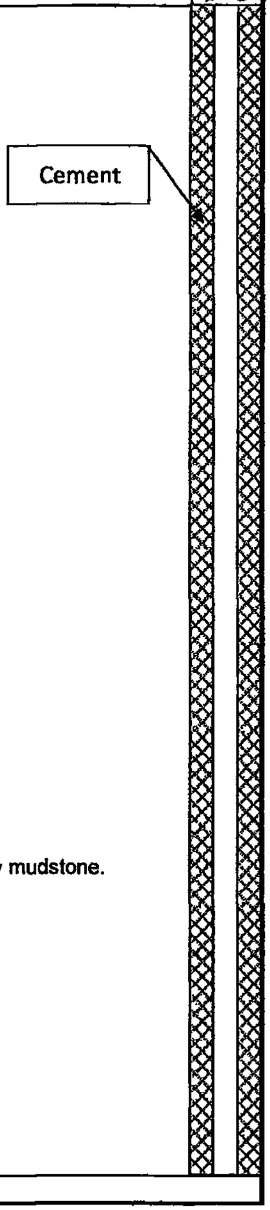
BORING/WELL ID:	**DMEA-1**		
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA	**Project No.:** 01-SUN-055	
BORING LOCATION (AT SITE):		**Logged By:** Kristene Tidwell	
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE/ (TIME):	5/2/11 14:15	**FINISH DATE/ TIME**	5/5/11
FIRST WATER (BGS):		**STABILIZED WATER LEVEL:**	
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	275'	**BORING DIAMETER/DEPTH:**	8" - 275'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			100	120		Mudstone as before.	
			100	122			
			100	124			
			100	126			
			100	128			
			100	130			
			100	132			
			100	134			
			100	136			
			100	138			
			100	140			
			100	142			
			100	144			
			100	146			
			100	148			
			100	150			
			100	152			
			100	154			
			100	156			
			100	158			
				160			



SGI environmental **THE SOURCE GROUP, INC.**		BORING/WELL ID: **DMEA-1**	
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA		**Project No.:** 01-SUN-055
BORING LOCATION (AT SITE):			**Logged By:** Kristene Tidwell
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE/ (TIME):	5/2/11 14:15	**FINISH DATE/ TIME**	5/5/11
FIRST WATER (BGS):		**STABILIZED WATER LEVEL:**	
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	275'	**BORING DIAMETER/DEPTH:**	8" - 275'

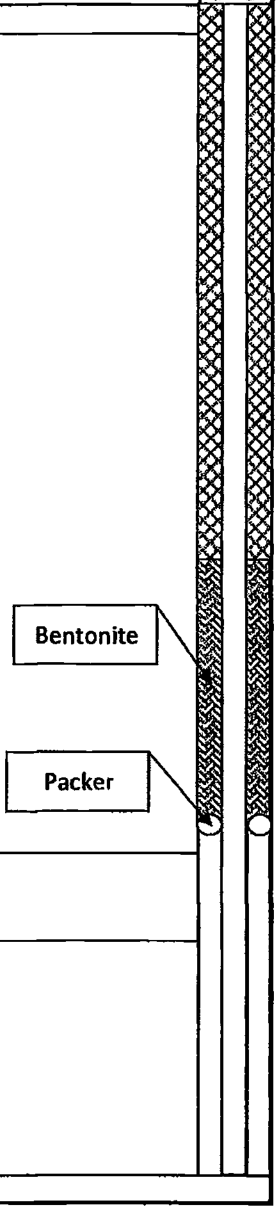
Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			100	160		Mudstone as before.	
			100	162			
			100	164			
			100	166			
			100	170			
			100	170			
			100	172			
			100	174		Color change to brownish grey.	
			100	176			
			100	178			
			100	180		Color change to grey.	
			100	182			
			100	184			
			100	186			
			100	188		Transitional fault zone, pieces of silica carbonate, angular with muddy grey mudstone.	
			100	190		Silica carbonate, white/grey with green mineralization.	
			100	192			
			100	194		Same as above.	
			100	196			
			100	198			
				200			



SGI environmental **THE SOURCE GROUP, INC.**

		BORING/WELL ID: **DMEA-1**	
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA	**Project No.:** 01-SUN-055	
BORING LOCATION (AT SITE):		**Logged By:** Kristene Tidwell	
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE/ (TIME):	5/2/11 14:15	**FINISH DATE/ TIME**	5/5/11
FIRST WATER (BGS):		**STABILIZED WATER LEVEL:**	
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	275'	**BORING DIAMETER/DEPTH:**	8" - 275'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
			100	200		Grey mudstone.	
			100	202			
			100	204			
			100	206			
			100	208			
			100	210			
			100	212			
			100	214			
			100	216			
			100	218			
			100	220			
			100	222			
			100	224			
			100	226			
			100	228		Medium to coarse sandstone.	
			100	230			
			100	232		Silica carbonate, same as 190', with mud stain at 233-240'.	
			100	234			
			100	236			
			100	238		Soft drilling at 240-244'.	
				240			



SGI environmental THE SOURCE GROUP, INC.

BORING/WELL ID:			**DMEA-1**
PROJECT NAME AND ADDRESS:	Mt. Diablo Mine, 2430 Morgan Territory Road, Clayton, CA		**Project No.:** 01-SUN-055
BORING LOCATION (AT SITE):			**Logged By:** Kristene Tidwell
CONTRACTOR AND EQUIPMENT:	Boart Longyear		
SAMPLING METHOD:	Core Barrel	**MONITORING DEVICE:**	N/A
START DATE/ (TIME):	5/2/11 14:15	**FINISH DATE/ TIME**	5/5/11
FIRST WATER (BGS):		**STABILIZED WATER LEVEL:**	
SURFACE ELEVATION:		**CASING TOP ELEVATION:**	
TOTAL BORING DEPTH(S):	275'	**BORING DIAMETER/DEPTH:**	8" - 275'

Time	Water Level	Sample Interval	Recovery (%)	Depth (feet)	Stratigraphy	LITHOLOGIC DESCRIPTION (classification, color, moisture, density, grain size/plasticity, other) ALL PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE STATED	Well construction details
14:30			100	240		Dark grey, very weak at 240-246'.	
			0	242		Lost all curculation at 243'.	
			0	244			
			0	246		247-266' total 9' recovery.	
			0	248		Grey mud, sand gravel poorly sorted, appears very disturbed, perhaps cave in.	
			0	250		Gravel pieces and cobbles, rounded to angular, consisting of mudstone and some silica carbonate.	
			0	252			
			0	254			
			0	256			
			0	258			
			0	260			
			0	262			
			0	264			
			100	266		Fractured silica carbonate, hard.	
			100	268			
			100	270			
			100	272		Less fractured.	
			100	274			
						Bottom of Boring 275 feet	
				276			
				278			
				280			

APPENDIX C

FIELD DATA SHEETS

Groundwater Monitoring Well
Field Sampling Form

SGI THE SOURCE GROUP, INC.

PROJECT NAME:
PROJECT NO.:
TASK NO.:
WELL ID: AOIT-1
PURGE DATE: ~~[illegible]~~ 7/21/11
SAMPLE TIME: 12 15
SAMPLE DATE: 7/21/11
PERSONNEL: ~~[illegible]~~ Kristene Tidwell
(circle)

INITIAL DTW (ft): 72.65
DEPTH TO BOTTOM (ft):
WELL DIAM. (in):
3 VOLUMES (gals):
h*3*0.064 (1.25"); h*3*0.16 (2"); h*3*0.26 (2.5")
h*3*0.38 (3"); h*3*0.65 (4"); h*3*1.5 (6")

PURGE LOG:

(check units!)

DTW	Time (24 hr)	No. Gallons	pH	EC (us/cm)	Temp. (C)	Disolved Oxygen (%)	REDOX ( )	Color	Turbidity	Other Observations
	1203	0	5.45	11518	24.15	0.29	-12.3	clr	42.1	
	1205	1	5.16	11903	23.40	0.81	-11.8	clr	34.8	
	1209	2	5.14	11695	23.41	0.99	-10.4	clr	39.2	
	1214	3	5.13	11058	23.43	0.96	-11.0	clr	40.8	

Total Gallons Purged: 3

Purging Method [✓ 2" Submersible Pump] 12 Volt Pump Peristaltic Pump Bailer

WELL SAMPLING:

DTW at Time of Sampling: 72.65

Sampling Method 2" Submersible Pump 12 Volt Pump Peristaltic Pump Bailer

SAMPLE ID: AOIT 1

QA/QC SAMPLING:

WAS QA/QC SAMPLE COLLECTED AFTER THIS WELL? YES / [✓ NO]

IF SO, SAMPLE ID:
TYPE: Rinsate Blank Duplicate Field Blank

PROPER DECON: Yes No

EQUIPMENT CALIBRATED: [✓ Yes] No

DRIFT: Yes No
(If YES, comment below)

COMMENTS:

Transducer - 5.769
DTW - Meter - 72.65

Groundwater Monitoring Well
Field Sampling Form

SGI The Source Group, Inc.

PROJECT NAME: ____________

PROJECT NO.: ____________

TASK NO.: ____________

WELL ID: OMEA-1

PURGE DATE: 7/21/11

SAMPLE TIME: ____________

SAMPLE DATE: 7/21/11

PERSONNEL: ~~Dean Kurtz~~ Kristee Tidwell (circle)

INITIAL DTW (ft): 99.63

DEPTH TO BOTTOM (ft): ____________

WELL DIAM. (in): 4"

3 VOLUMES (gals): ____________

h*3*0.064 (1.25"), h*3*0.16 (2"), h*3*0.26 (2.5")
h*3*0.38 (3"); h*3*0.65 (4"); h*3*1.5 (6")

PURGE LOG:

(check units!)

DTW	Time (24 hr)	No. Gallons	pH (6.10	EC ( )	Temp. ( )	Disolved Oxygen ( )	REDOX ( )	Color	Turbidity	Other Observations
	1026	0	[illegible]	13693	25.18	3.09	-71.0	clr	66.0	
	1028	1	6.12	13270	24.39	1.57	-68.5	clr	37.7	
	1033	2	6.08	13205	24.33	1.58	-64.0	clr	37.4	
	1038	3	6.07	13208	24.35	1.37	-63.0	clr	38.6	

Total Gallons Purged: 3

Purging Method: [✓ 2" Submersible Pump] 12 Volt Pump Peristaltic Pump Bailer

WELL SAMPLING:

DTW at Time of Sampling: 99.63

Sampling Method: [✓ 2" Submersible Pump] 12 Volt Pump Peristaltic Pump Bailer

SAMPLE ID: OMEA-1

QA/QC SAMPLING:

WAS QA/QC SAMPLE COLLECTED AFTER THIS WELL? YES / NO

IF SO, SAMPLE ID: ____________ TYPE: Rinsate Blank Duplicate Field Blank

PROPER DECON: Yes [✓ No]

EQUIPMENT CALIBRATED: Yes No DRIFT: Yes No (If YES, comment below)

COMMENTS:

Transducer depth - 10.11
DTW - 99.63

GROUNDWATER MONITORING WELL
FIELD SAMPLING FORM

JOB NAME: HAP
TSG JOB NO.: 01-SON-055
TASK NO.: 3
PERSONNEL: K Tidwell

WELL ID ADIT-1
PURGE DATE 6/15/11
SAMPLE TIME 1320
SAMPLE DATE 6/15/11

INITIAL DTW (ft) 71.12
DEPTH TO BOTTOM (ft) 90.05
WELL DIAM. (in)
3 VOLUMES (gals)
h*3*0.064 (1.25"); h*3*0.16 (2"); h*3*0.26 (2.5"); h*3*0.65 (4")
FINAL DTW (ft)

(check units!)

DTW	Time (24 hr)	No. Gallons	pH	EC ( )	Temp (°)	FL ( )	OX Redox ( )	DO ( )	Turbidity	Color	Other Observations
	1313	0	4.77	9299	27.20		23.1	6.15	128.0	clr	
	1315	0.5	4.75	9451	24.16		8.6	6.03	126.1	clr	
	1318	0.75	4.73	9475	24.17		8.1	6.05	120.0	clr	
	1320	1	4.79	9478	24.10		6.3	6.10	119.3	clr	
71.13	1322	1.25	4.80	9476	24.11		4.4	6.11	117.7	clr	

Totalizer End
Totalizer Start
Total Gallons 1.25

Purging Method [✓ 2" Submersible Pump] 12 Volt Pump Peristaltic Pump Bailer

Sampling Method [✓ 2" Submersible Pump] 12 Volt Pump Peristaltic Pump Bailer

WAS QA/QC SAMPLE COLLECTED AFTER THIS WELL? YES / NO
IF SO:

Sample ID

Type
Rinsate Blank
Duplicate
Field Blank

COMMENTS

GROUNDWATER MONITORING WELL
FIELD SAMPLING FORM

JOB NAME: Mt D
TSG JOB NO.: 01-SUN-055
TASK NO.: 3
PERSONNEL: E. Tidwell

WELL ID DMEA-1
PURGE DATE 6/15/11
SAMPLE TIME
SAMPLE DATE

INITIAL DTW (ft) 98.12
DEPTH TO BOTTOM (ft) 291.71
WELL DIAM. (in) 4"
3 VOLUMES (gals) NA - low flow
h*3*0.064 (1.25"), h*3*0.16 (2"), h*3*0.26 (2.5"); h*3*0.65 (4")
FINAL DTW (ft)

uS/cm 2

(check units!)

DTW	Time (24 hr)	No. Gallons	pH	EC ( )	Temp (°)	FL ( )	OX Redox ( )	DO ( )	Turbidity	Color	Other Observations
	1215	0	4.30	1284	[illegible]		16.5	[illegible]	39.1	clr	
	1228	0.5	4.31	12071	25.[illegible]		[illegible]	4.22	39.3	clr	
	1220	0.75	4.32	12054	25.20		16.10	4.23	37.13	clr	
	123[illegible]	1	4.33	12031	25.2[illegible]		16.25	4.33	40.1	clr	
98.18	1235	1.5	4.33	12023	25.21		16.05	4.32	42.1	clr	

Totalizer End
Totalizer Start
Total Gallons 1.5

Purging Method [✓ 2" Submersible Pump] 12 Volt Pump Peristaltic Pump Bailer

Sampling Method [✓ 2" Submersible Pump] 12 Volt Pump Peristaltic Pump Bailer

WAS QA/QC SAMPLE COLLECTED AFTER THIS WELL? YES [✓ NO]
IF SO:

Sample ID DMEA-1

Type Rinsate Blank
Duplicate
Field Blank

COMMENTS

APPENDIX D

SURVEYORS REPORTS

Virgil Chavez Land Surveying
721 Tuolumne Street
Vallejo, California 94590
(707) 553-2476 • Fax (707) 553-8698

April 15, 2011
Project No.: 3096-03

Kristene Tidwell
The Source Group, Inc.
3451-C Vincent Road
Pleasant Hill, Ca 94523

RECEIVED
APR 1 6 2011

Subject: Monitoring Well Survey
Former Morgan Territory Mine
2430 Morgan Territory Road
Clayton, CA

Dear Kristene:

This is to confirm that we have proceeded at your request to locate several points at the above referenced location. The survey was completed on April 7, 2011. The benchmark for this survey is known as PID AA3809, stamped PT 25 LS 5672 1990, located 0.15 Mi. southeast of the intersection of Marsh Creek Road and Morgan Territory Road. The latitude, longitude and coordinates are for top of casings and are based on the Calif. State Coordinate System, Zone III (NAD83). Benchmark Elev. = 781.00 feet (NAVD 88).

Latitude	Longitude	Northing	Easting	Elev.	Desc.
37.9011277	-121.8775226	2153508.40	6164223.50	---	ADIT2
37.9009353	-121.8768552	2153435.49	6164415.00	---	ADIT3
37.9019500	-121.8781100	2153810.28	6164058.44	900.22	DMEA2
37.9017800	-121.8779500	2153747.70	6164103.68	---	DMEA3
37.9017669	-121.8779376	2153742.87	6164107.19	875.72	6' O/S
37.9017153	-121.8790697	2153728.89	6163780.32	---	BLDG COR
37.9017675	-121.8790905	2153748.00	6163774.57	---	BLDG COR
37.9016821	-121.8792007	2153717.38	6163742.33	---	BLDG COR

LICENSED LAND SURVEYOR
VIRGIL D. CHAVEZ
No. 6323
Exp 12-31-12
STATE OF CALIFORNIA

Sincerely,

Virgil D. Chavez

Virgil D. Chavez, PLS 6323

Virgil Chavez Land Surveying
721 Tuolumne Street
Vallejo, California 94590
(707) 553-2476 • Fax (707) 553-8698

June 21, 2011
Project No.: 3096-03

RECEIV
JUN 27 2011
BY:

Kristene Tidwell
The Source Group, Inc.
3451-C Vincent Road
Pleasant Hill, Ca 94523

Subject: Monitoring Well Survey
Former Morgan Territory Mine
2430 Morgan Territory Road
Clayton, CA

Dear Kristene:

This is to confirm that we have proceeded at your request to perform a survey at your request at the above referenced location. The survey was completed on June 14, 2011. The benchmark for this survey is known as PID AA3809, stamped PT 25 LS 5672 1990, located 0.15 Mi. southeast of the intersection of Marsh Creek Road and Morgan Territory Road. The latitude, longitude and coordinates are for top of casings and are based on the Calif. State Coordinate System, Zone III (NAD83). Benchmark Elev. = 781.00 feet (NAVD 88).

Latitude	Longitude	Northing	Easting	Elev.	Desc.
				872.75	GRD ADIT-1
37.9013809	-121.8780037	2153602.60	6164086.06	875.70	TOC ADIT-1
				900.57	GRD DMEA-1
37.9019338	-121.8780972	2153804.33	6164062.04	902.98	TOC DMEA-1

VIRGIL D. CHAVEZ
No. 6323
Exp. 12-31-12

Sincerely,

Virgil D. Chavez

Virgil D. Chavez, PLS 6323

APPENDIX E

WASTE MANIFESTS

DJ3759671 SC PPW 3/3/2011

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~NONREQUIRED~~ CAC002675268

2. Page 1 of 1

3. Emergency Response Phone: (800)483-3718

4. Manifest Tracking Number: 003990850 FLE

5. Generator's Name and Mailing Address:
Former Mount Diablo Mercury Mine
2430 Morgan Territory Road
Clayton, CA 94517

Generator's Site Address (if different than mailing address): SAME

Generator's Phone: (925)944-2856

6. Transporter 1 Company Name: Clean Harbors Environmental Services Inc — U.S. EPA ID Number: MAD039322250

7. Transporter 2 Company Name: — U.S. EPA ID Number:

8. Designated Facility Name and Site Address:
Clean Harbors Buttonwillow LLC
2500 West Lokern Road
Buttonwillow, CA 93206

U.S. EPA ID Number: CAD980675276

Facility's Phone: (661)762-6200

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
	1. NON-RCRA HAZARDOUS WASTE, SOLID, (METALS)	01	CM	15	Y	611		
	2.							
	3.							
	4.							

14. Special Handling Instructions and Additional Information
L.CH502438E

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Kristene Tidwell — Signature: — Month 09 Day 08 Year 11

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Richard Blankenship — Signature: Richard Blankenship — Month 9 Day 8 Year 11
Transporter 2 Printed/Typed Name: — Signature: — Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H132			

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Ron E Johns — Signature: R E Johns — Month 09 Day 09 Year 11

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Clean Harbors has the appropriate permits for and will accept the waste the generator is shipping

Site Address : SAME

DJ3680187

SC PPW 3/3/2011 WORK ORDER NO. ~~DJ3680187~~

DOCUMENT NO. 405140 **STRAIGHT BILL OF LADING**

TRANSPORTER 1 Clean Harbors Environmental Services Inc VEHICLE ID # 4184

EPA ID # MAD039322250 TRANS. 1 PHONE (781) 792-5000

TRANSPORTER 2 VEHICLE ID #

EPA ID # TRANS. 2 PHONE

DESIGNATED FACILITY Clean Harbors San Jose LLC	SHIPPER Former Mount Diablo Mercury Mine
FACILITY EPA ID # CAD059494310	SHIPPER EPA ID # NONREQUIRED
ADDRESS 1021 Berryessa Road	ADDRESS 2430 Morgan Territory Road
CITY San Jose STATE CA ZIP 95133	CITY Clayton STATE CA ZIP 94517

CONTAINERS NO. & SIZE	TYPE	HM	DESCRIPTION OF MATERIALS	TOTAL QUANTITY	UNIT WT/VOL
1	TT		A. NON HAZARDOUS, NON D.O.T. REGULATED, (PURGE WATER)	01020	G
			B.		
			C.		
			D.		
			E.		
			F.		
			G.		
			H.		

SPECIAL HANDLING INSTRUCTIONS EMERGENCY PHONE #: (800) 483-3718 GENERATOR: Former Mount Diablo Mercury Mine
A.CH502434B
A. HOTT

SHIPPERS CERTIFICATION: This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

SHIPPER	PRINT Kristen Tidwell	SIGN	DATE 8/10/11
TRANSPORTER 1	PRINT Bert Wilson	SIGN Bert Wilson	DATE 8-10-11
TRANSPORTER 2	PRINT	SIGN	DATE
RECEIVED BY	PRINT Sonia C Hughes	SIGN Sonia C Hughes	DATE 8/10/11

1

CHI 107

Site Address : SAME

SC PPW 3/[illegible] ORDER NO. DJ3610693

DOCUMENT NO. 405567 **STRAIGHT BILL OF LADING**

TRANSPORTER 1 Clean Harbors Environmental Services Inc VEHICLE ID # T-08

EPA ID # MAD039322250 TRANS. 1 PHONE (781) 792-5000

TRANSPORTER 2 VEHICLE ID #

EPA ID # TRANS. 2 PHONE

DESIGNATED FACILITY Clean Harbors San Jose LLC	SHIPPER Former Mount Diablo Mercury Mine
FACILITY EPA ID # CAD059494310	SHIPPER EPA ID # NONREQUIRED
ADDRESS 1021 Berryessa Road	ADDRESS 2430 Morgan Territory Road
CITY San Jose STATE CA ZIP 95133	CITY Clayton STATE CA ZIP 94517

CONTAINERS NO. & SIZE	TYPE	HM	DESCRIPTION OF MATERIALS	TOTAL QUANTITY	UNIT WT/VOL
1	TT		A. NON HAZARDOUS, NON D.O.T. REGULATED, (PURGE WATER)	3733	G
			B.		
			C.		
			D.		
			E.		
			F.		
			G.		
			H.		

SPECIAL HANDLING INSTRUCTIONS **EMERGENCY PHONE #: (800) 483-3718** **GENERATOR: Former Mount Diablo Mercury Mine**
A.CH5024348

SHIPPERS CERTIFICATION: This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

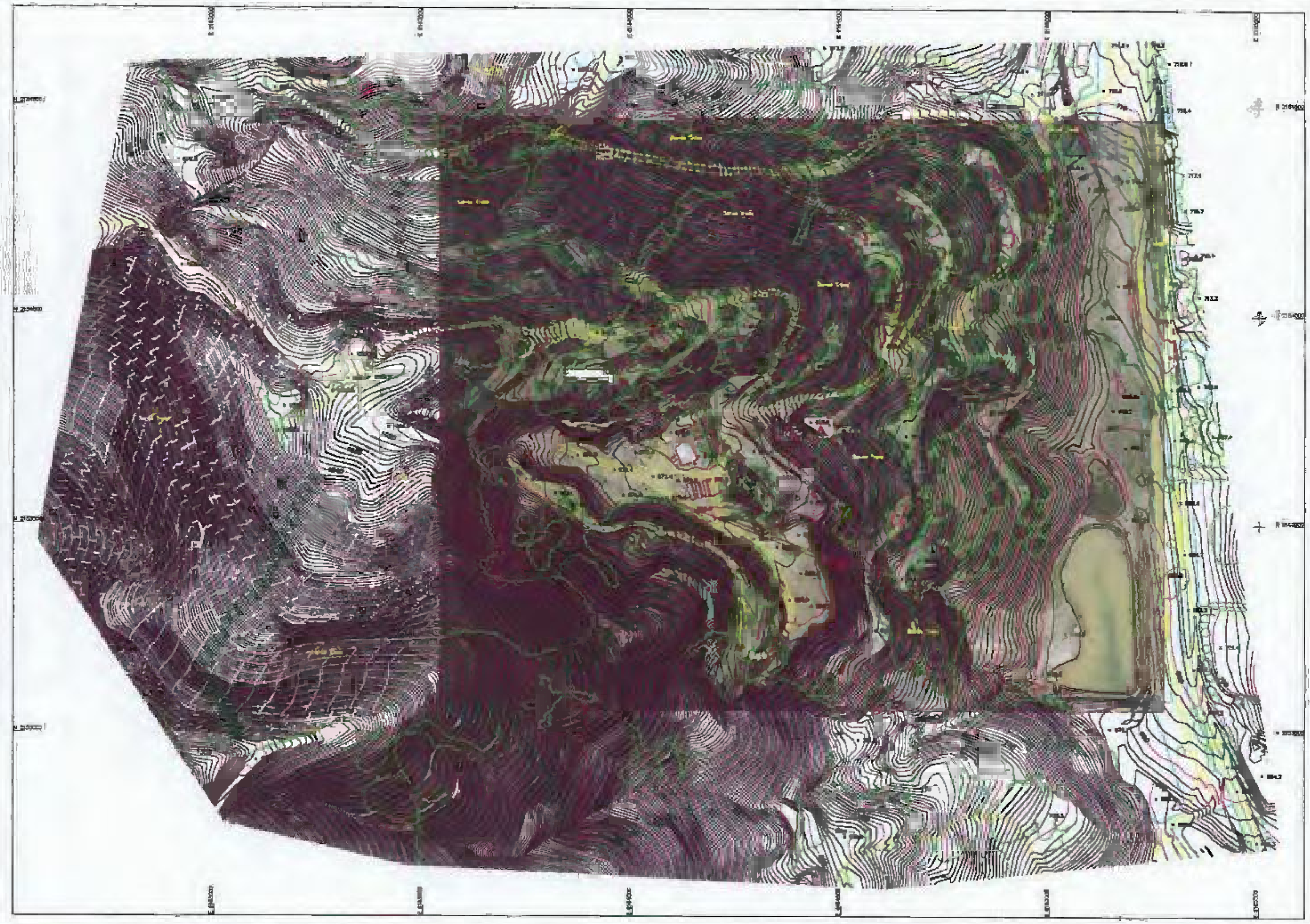
SHIPPER	PRINT Kristene Tidwell	SIGN	DATE 7-14-11
TRANSPORTER 1	PRINT Bert Wilson	SIGN Bert Wilson	DATE 7-14-11
TRANSPORTER 2	PRINT	SIGN	DATE
RECEIVED BY	PRINT Santa O. Hubuez	SIGN Santa O Hugez	DATE 7-14-11

1

CHI 107

APPENDIX F

TOPOGRAPHIC MAP



HJW geospatial

NOTE:

This map was prepared using computer assisted photogrammetric methods by HJW Geospatial, Inc., in Oakland California.
In areas of dense vegetation, accuracy of contours may deviate from accepted accuracy standards.
The grid is based on the California Coordinate System, Zone III, NAD 1983.
Control survey performed by The Source Group, Pleasant Hill, CA.

SCALE
100 0 100 200 300 Feet

GRID NORTH

CONTRA COSTA MINE SITE

PREPARED FOR : THE SOURCE GROUP

Map Scale: 1" = 100'
Date of Photography: 07-10-10
Contour Interval: 2 feet
Job Number: 10 - 083

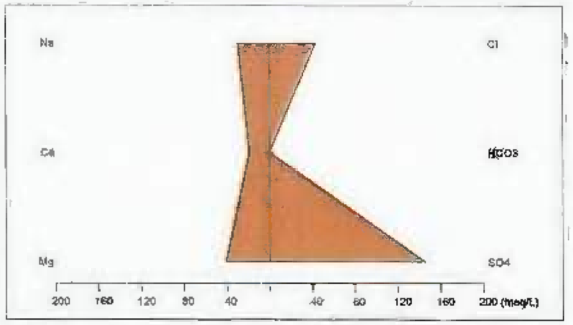
SHEET:
01 of 01

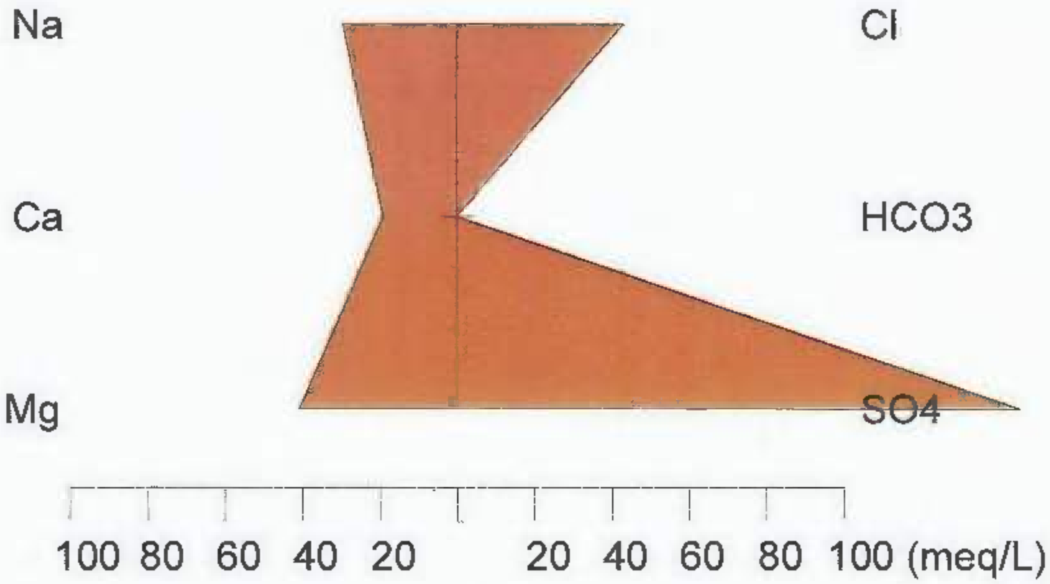
APPENDIX G

WATER QUALITY STIFF DIAGRAMS FOR 2010/2011 SAMPLING

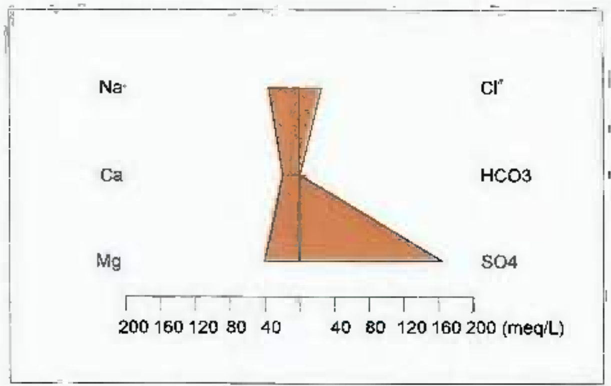
WATER SOURCED FROM UNDERGROUND MINE WORKINGS

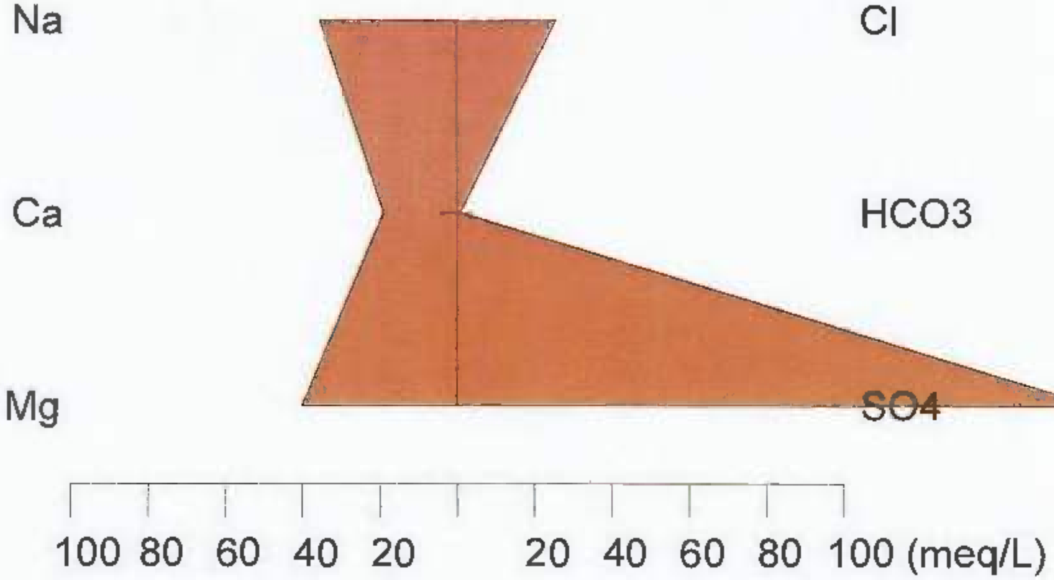
Stiff Diagram – ADIT-1
Collected June 2011



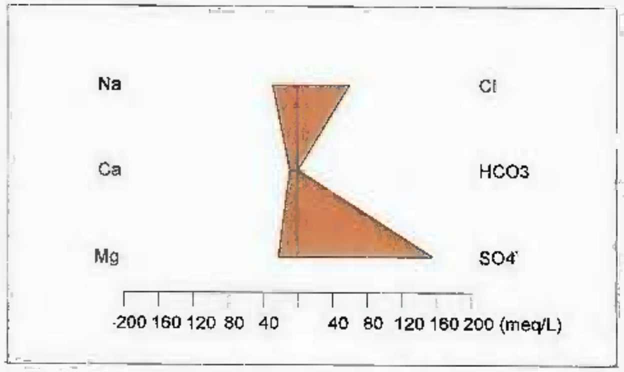


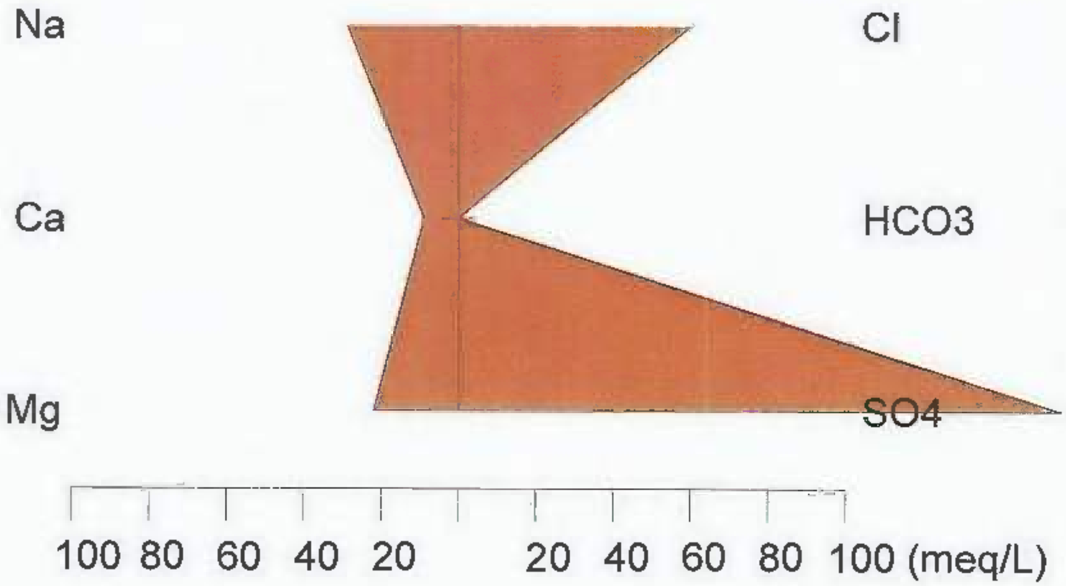
Stiff Diagram – ADIT-1
Collected July 2011



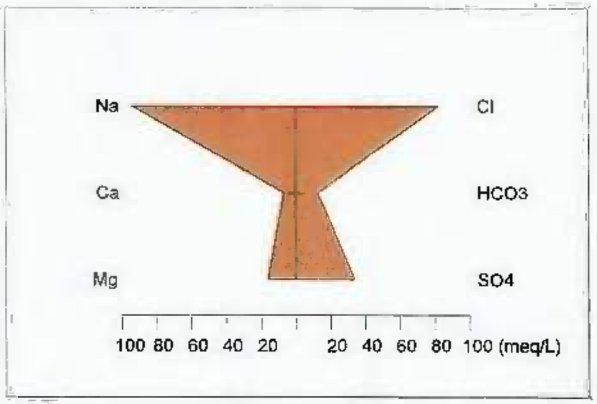


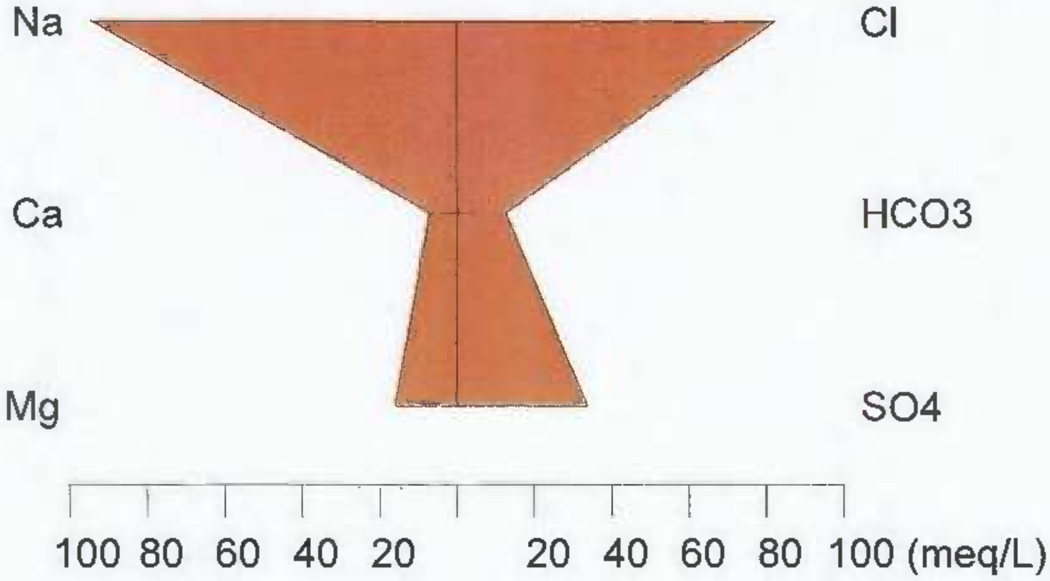
Stiff Diagram – DMEA-1
Collected June 2011



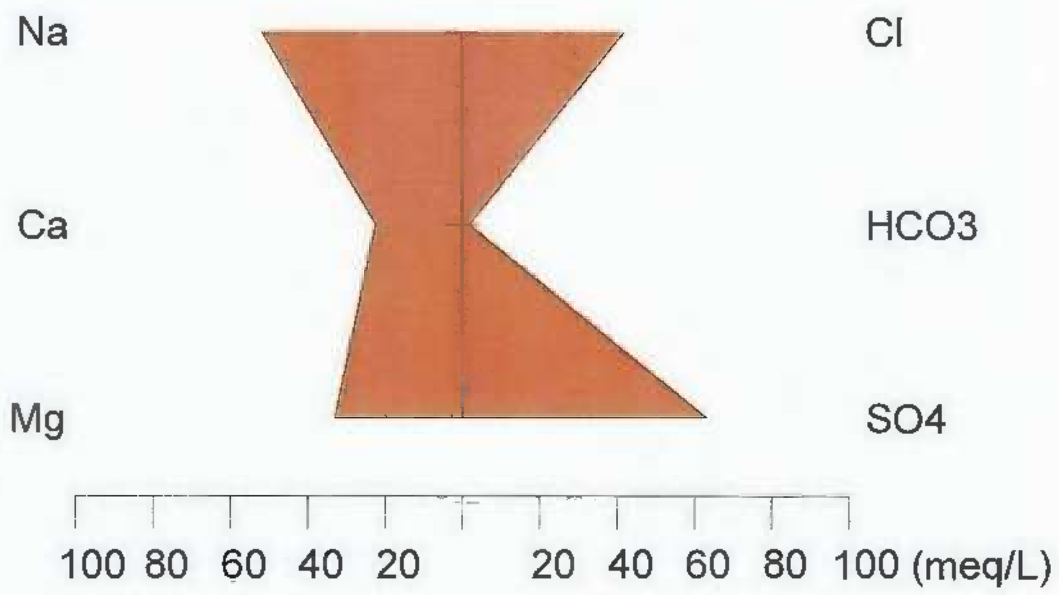


Stiff Diagram – DMEA-1
Collected July 2011

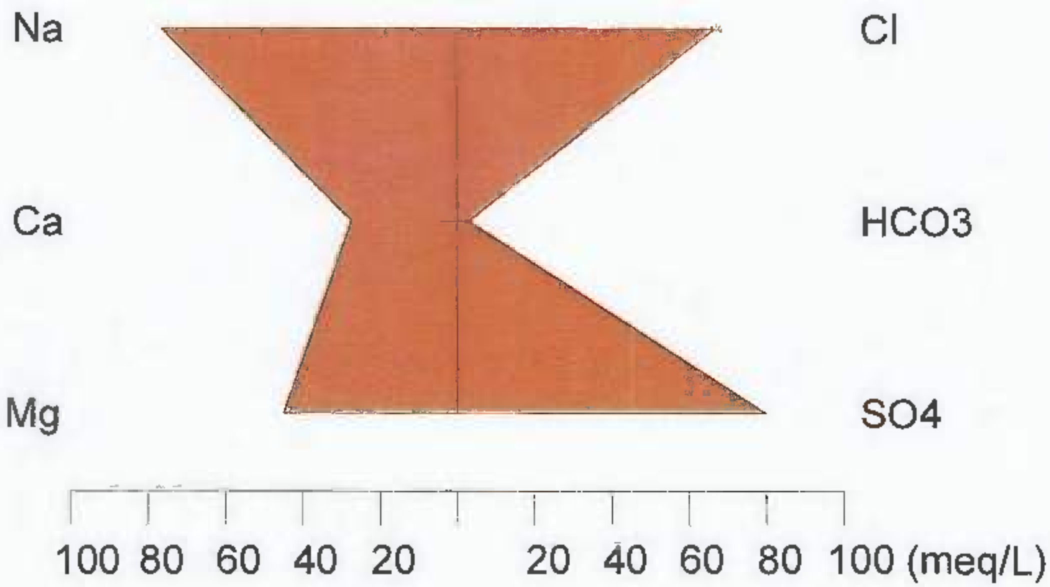




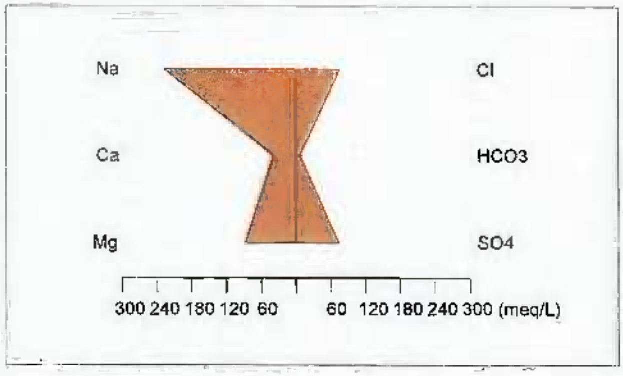
Stiff Diagram – SW-5
Collected April 2010
Altered Mine Waste Water
Mt. Diablo

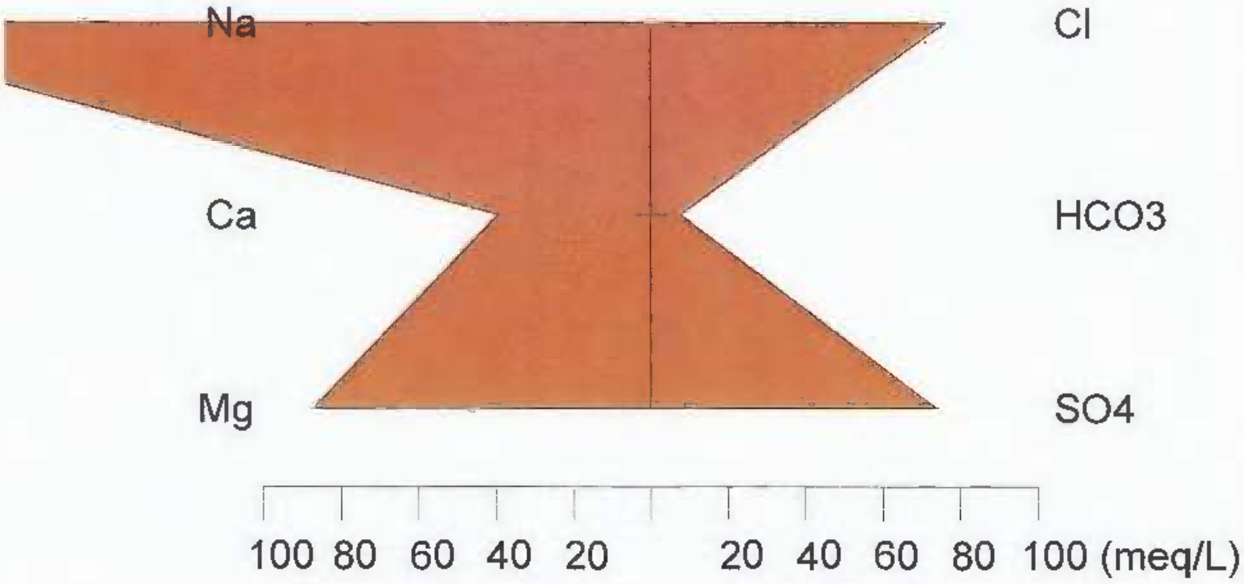


Stiff Diagram – SW-5
Collected May 2010
Altered Mine Waste Water
Mt. Diablo

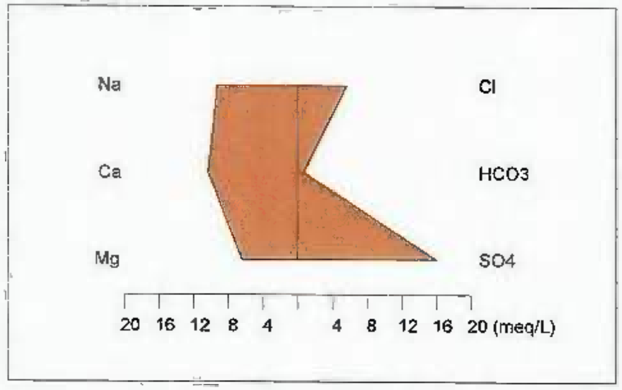


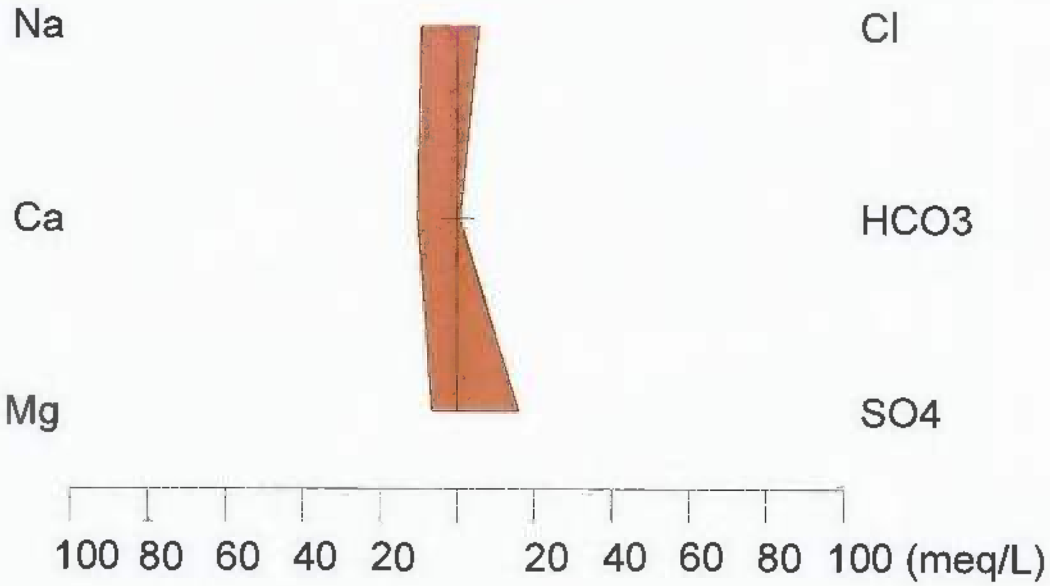
Stiff Diagram – SW-5
Collected October 2010



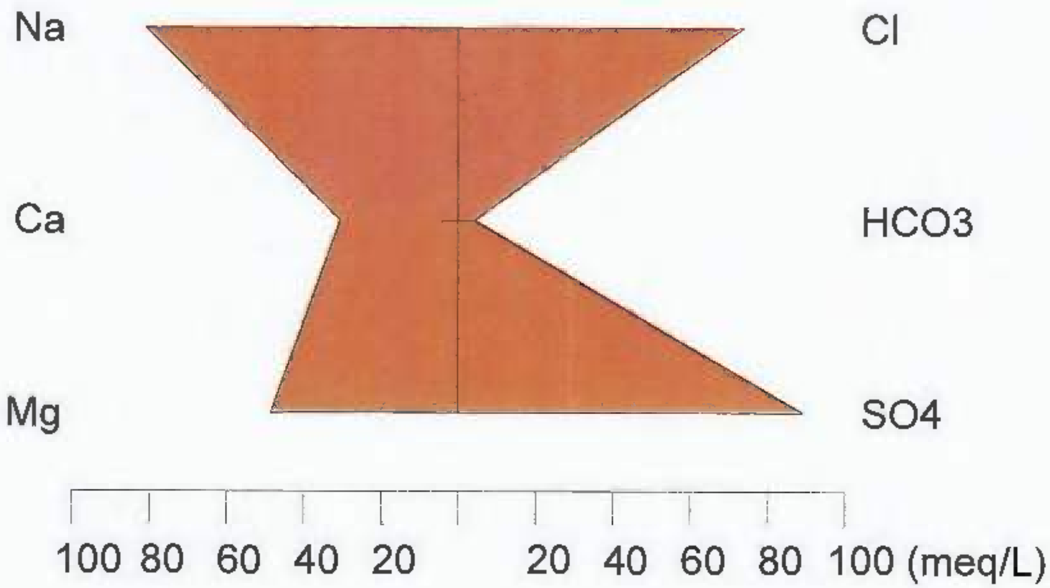


Stiff Diagram – SW-5
Collected February 2011

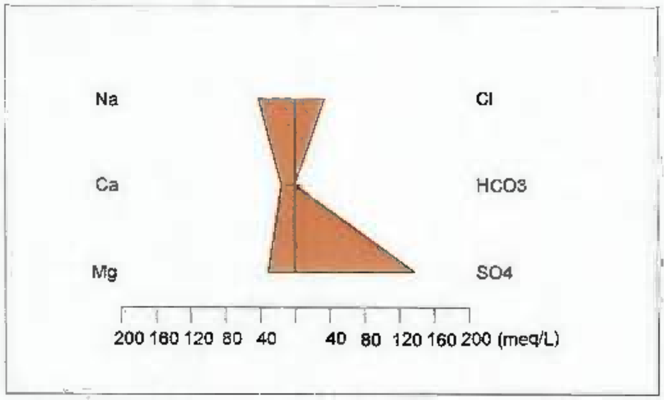


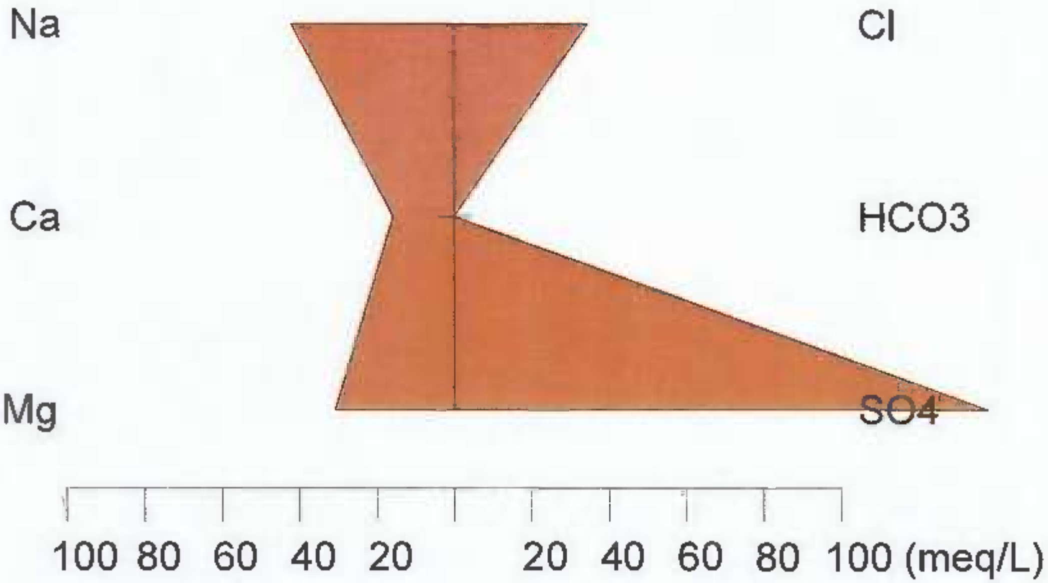


Stiff Diagram – SW-5
Collected June 2011

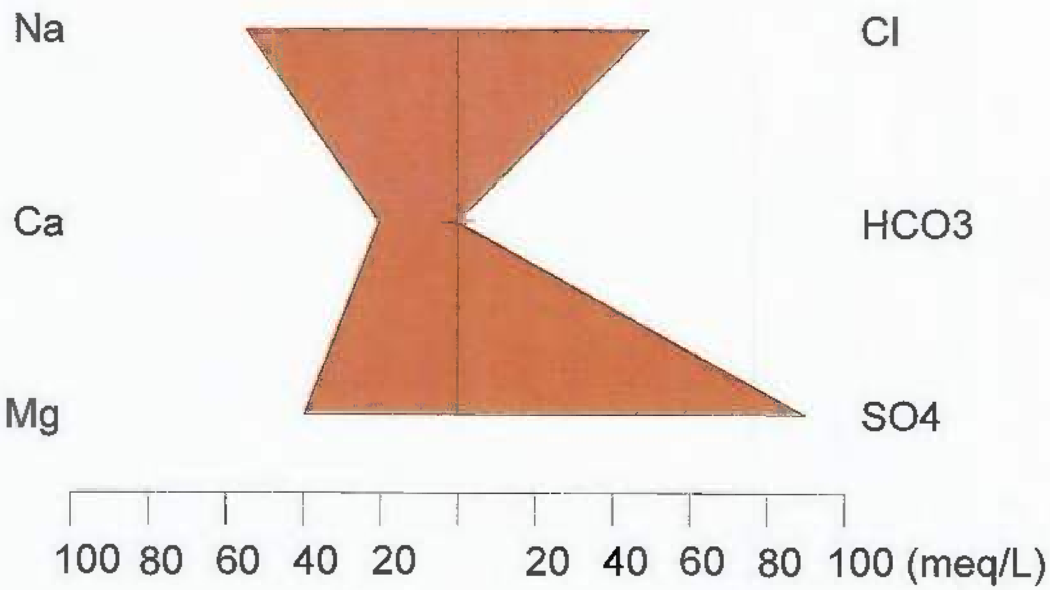


Stiff Diagram – SW-9
Collected April 2010
Altered Mine Waste Water
Mt. Diablo

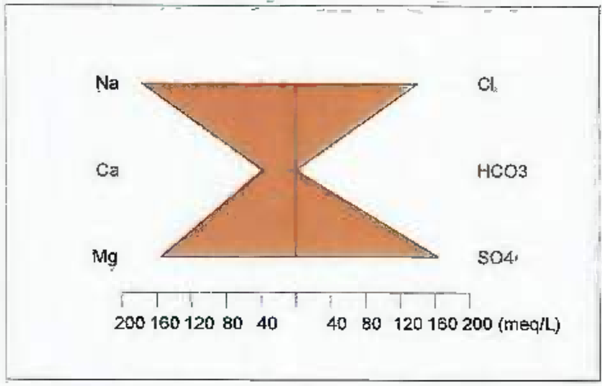


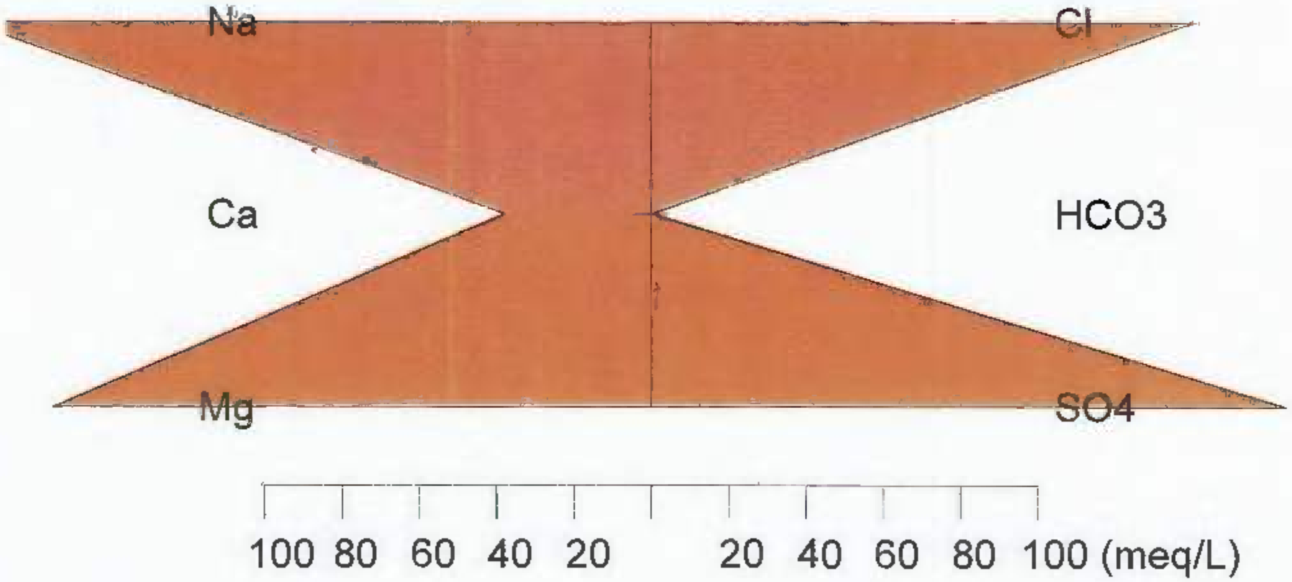


Stiff Diagram – SW-9
Collected May 2010
Altered Mine Waste Water
Mt. Diablo



Stiff Diagram – SW-9
Collected October 2010





Stiff Diagram – SW-9
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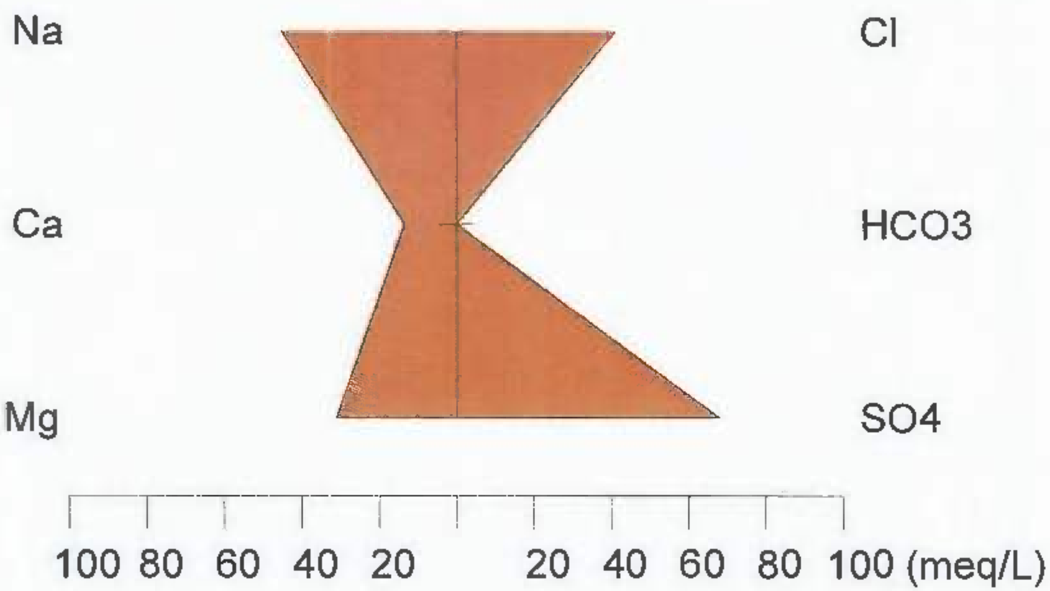
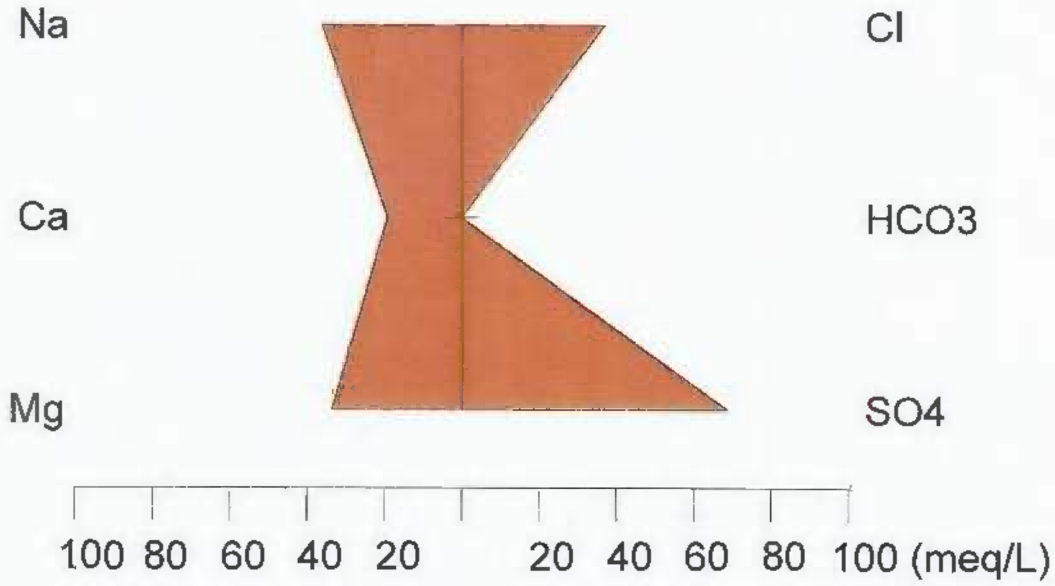
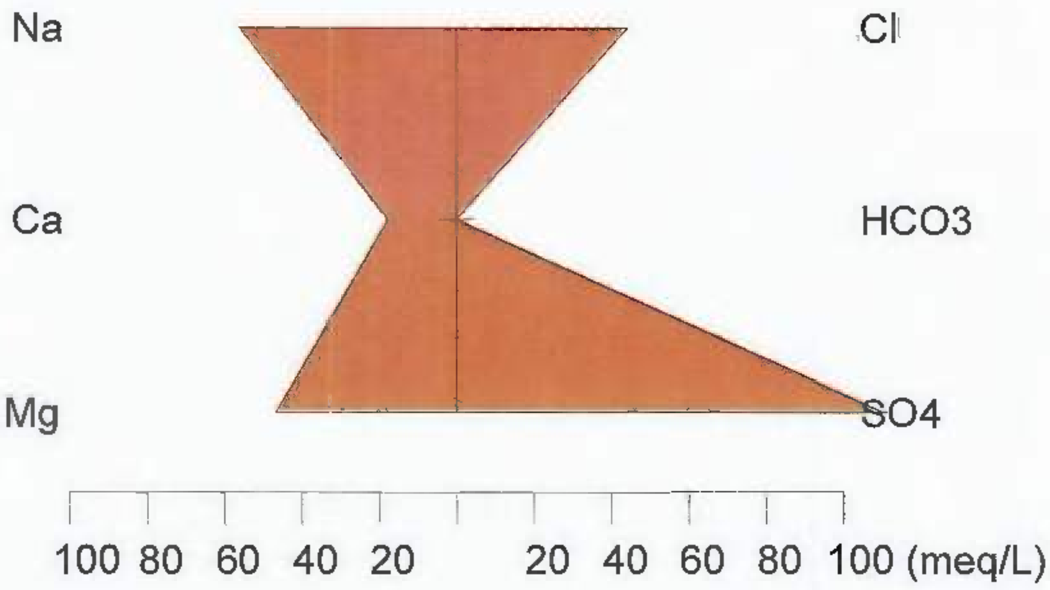


Stiff Diagram – SW-9
Collected June 2011



Stiff Diagram – SW-15
Collected May 2010
Altered Mine Waste Water
Mt. Diablo



Stiff Diagram – SW-15
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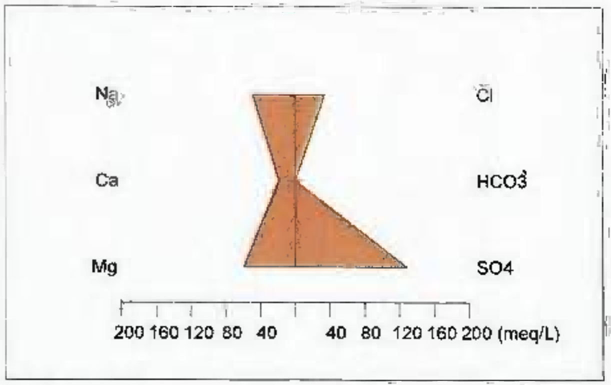
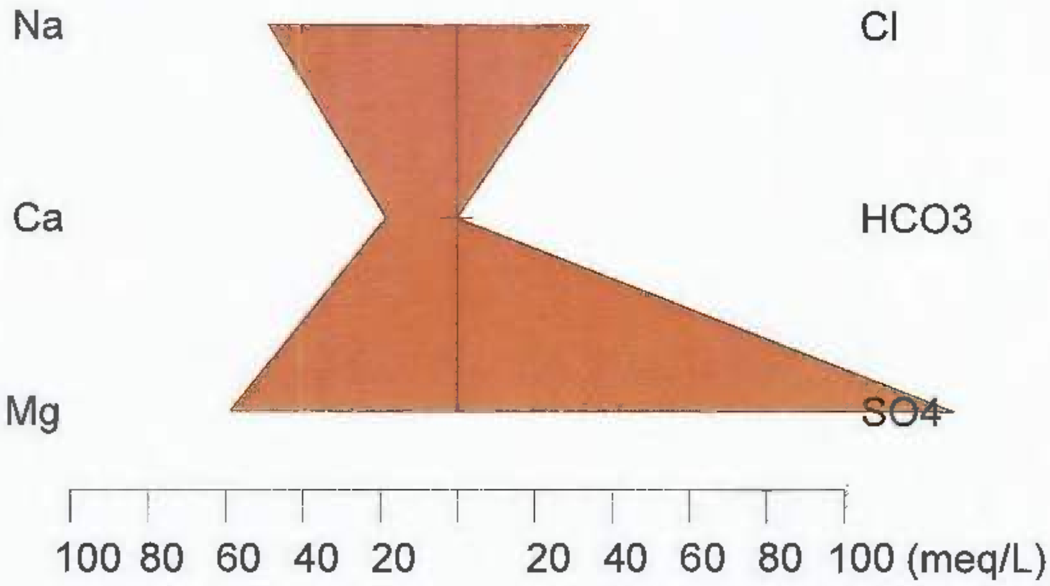
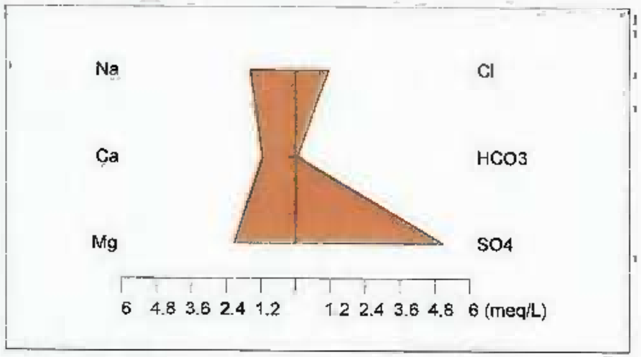
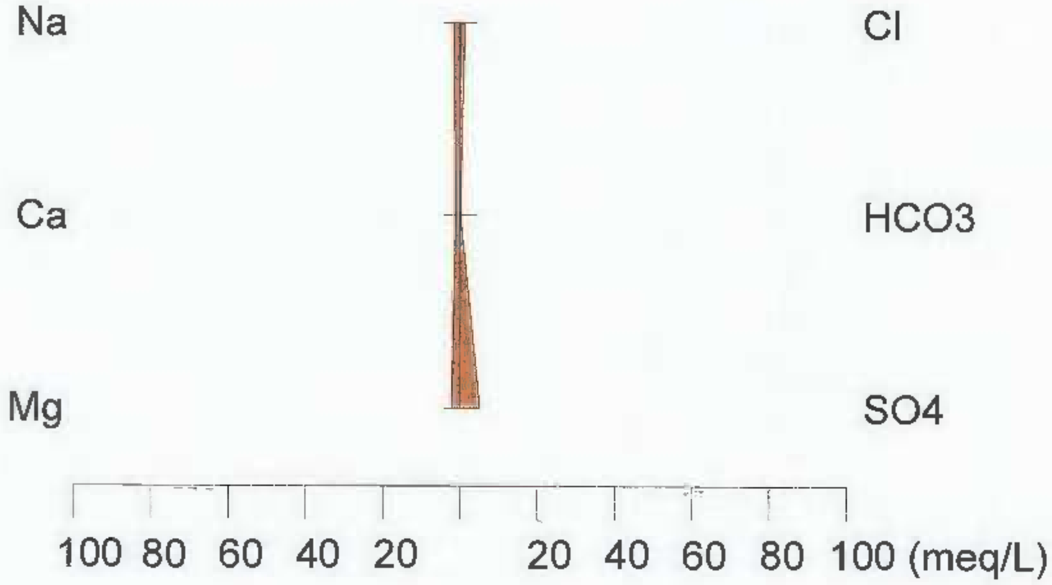




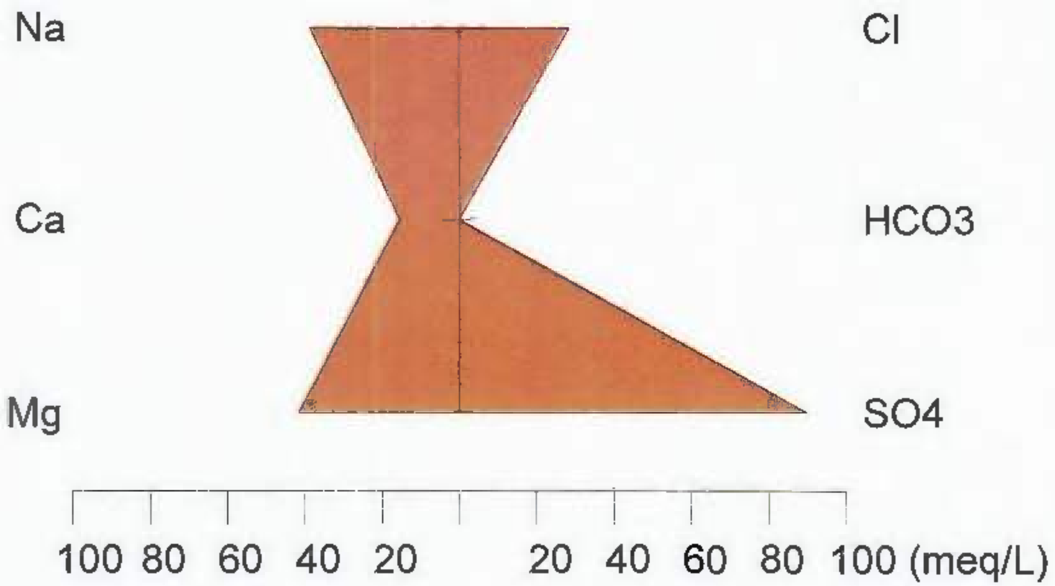
Stiff Diagram – SW-15

Collected February 2011



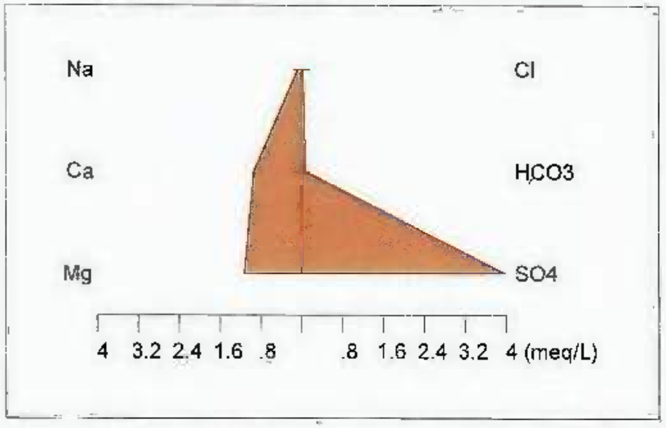


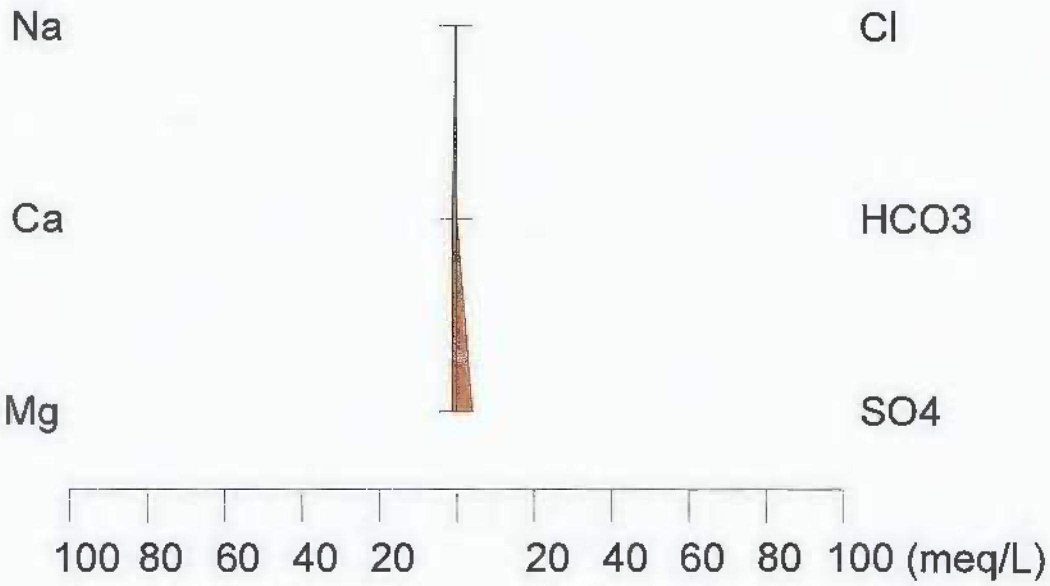
Stiff Diagram – SW-15
Collected June 2011



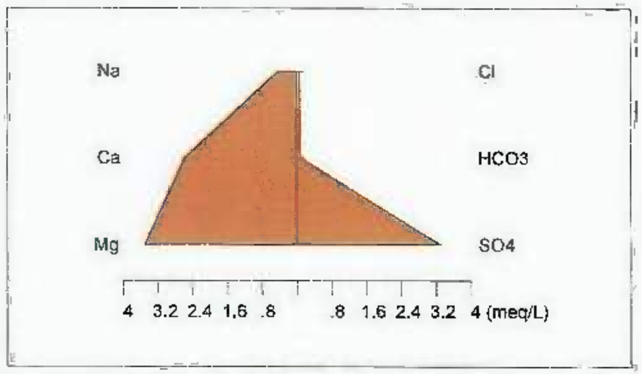
WATER SOURCED FROM PRECIPITATION – RUNOFF OVER AND THROUGH MINE TAILINGS AND WASTE ROCK

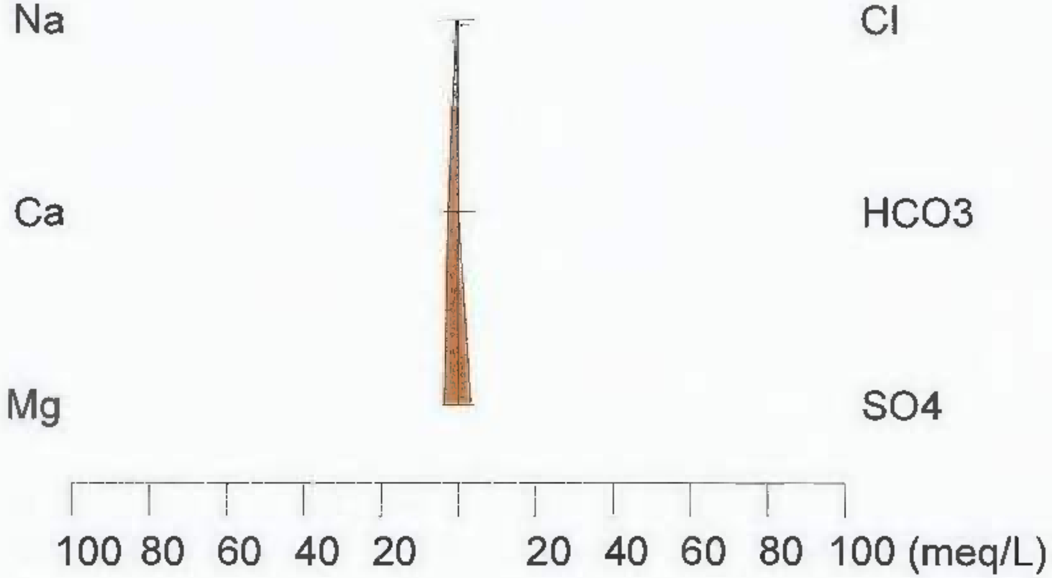
Stiff Diagram – SW-1
Collected April 2010
Mine Waste Source Water
Mt. Diablo



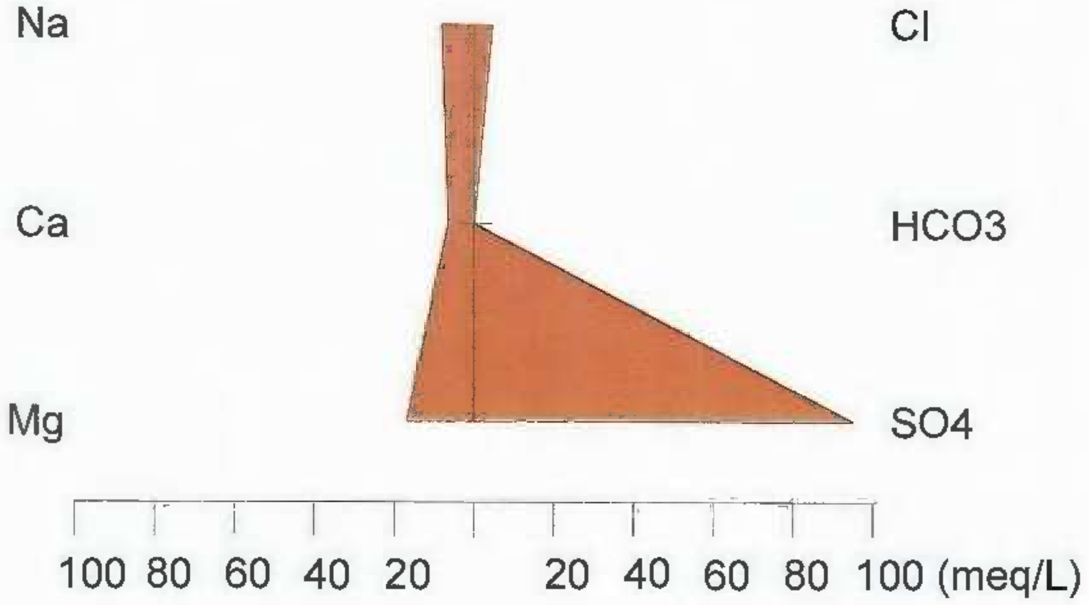


Stiff Diagram – SW-1
Collected February 2011

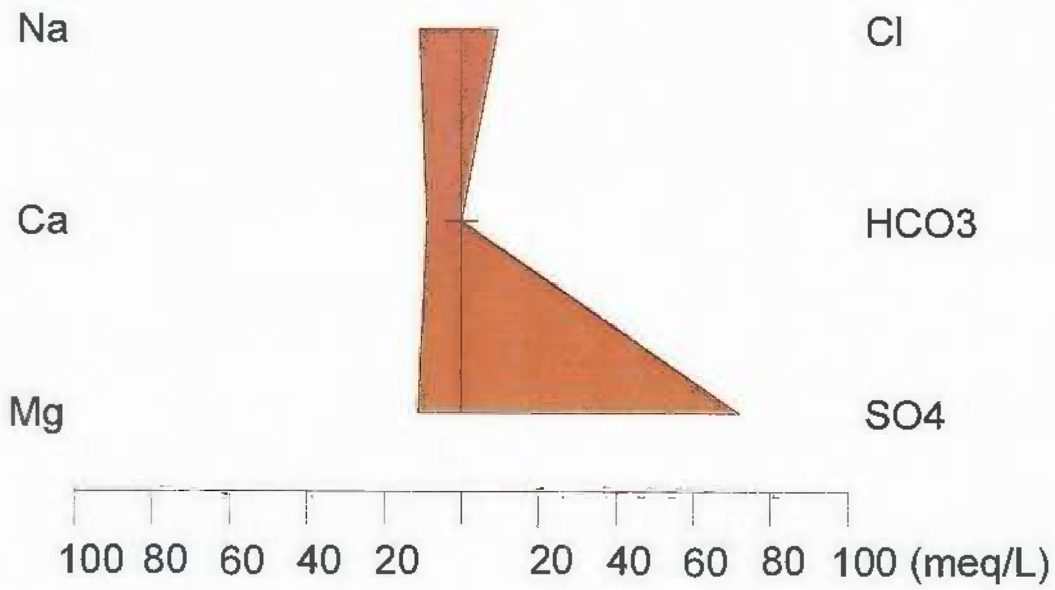




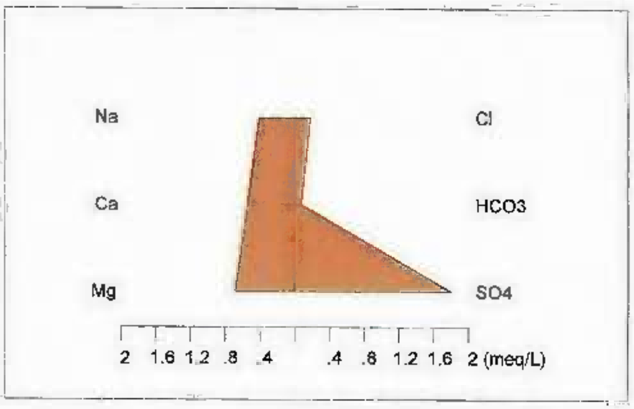
Stiff Diagram – SW-2
Collected April 2010
Mine Waste Source Water
Mt. Diablo

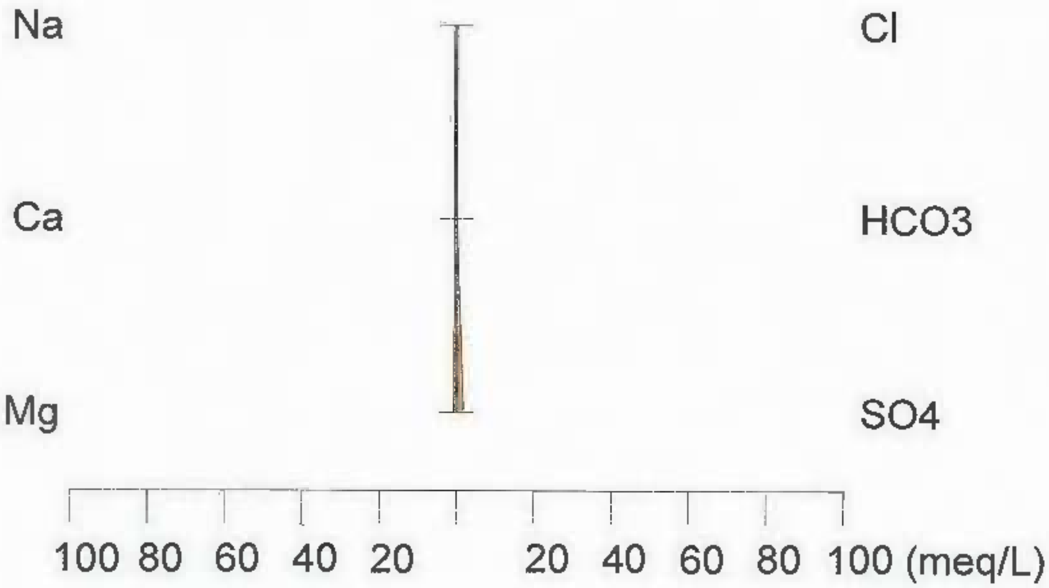


Stiff Diagram – SW-2
Collected May 2010
Mine Waste Source Water
Mt. Diablo

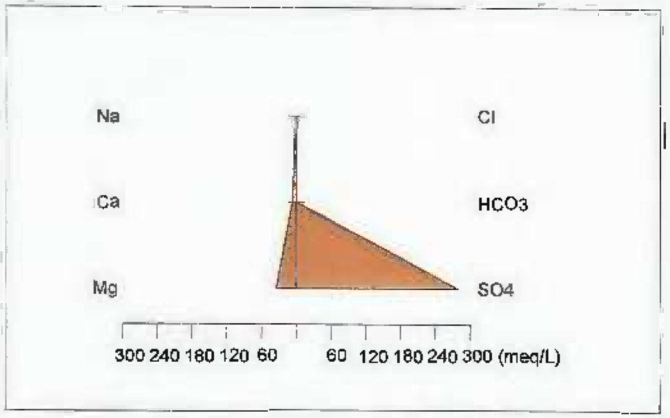


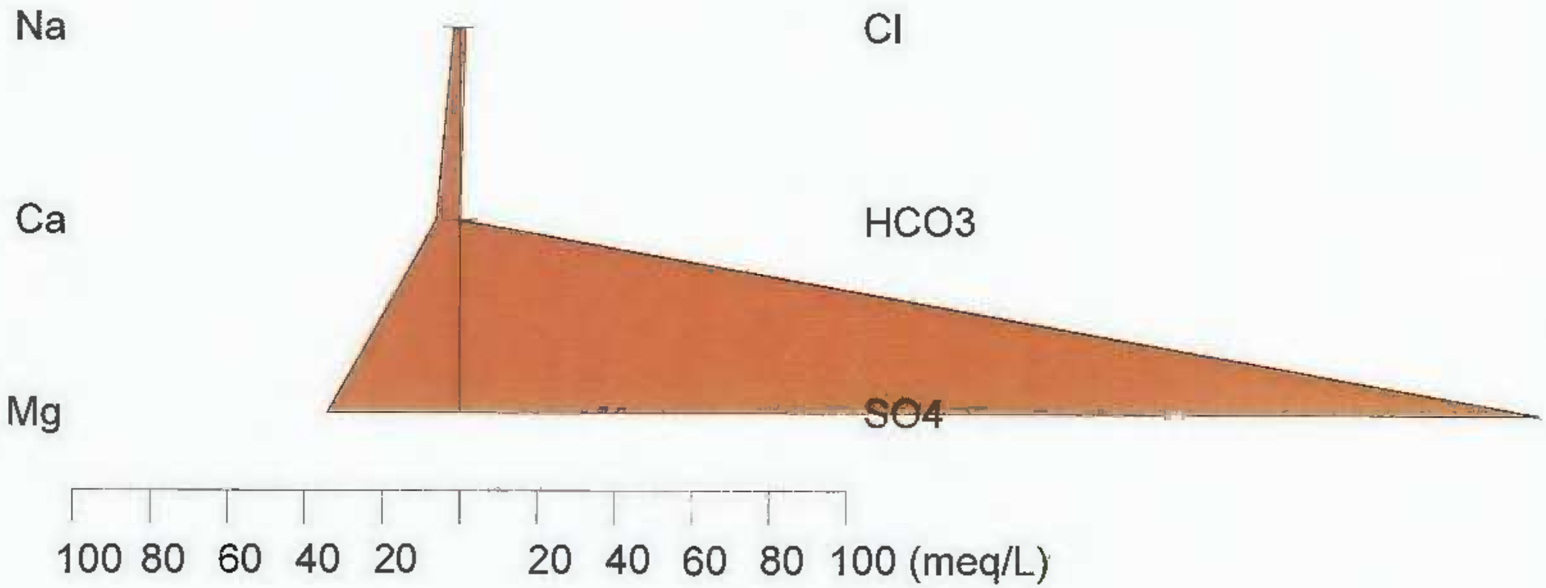
Stiff Diagram – SW-2
Collected February 2011



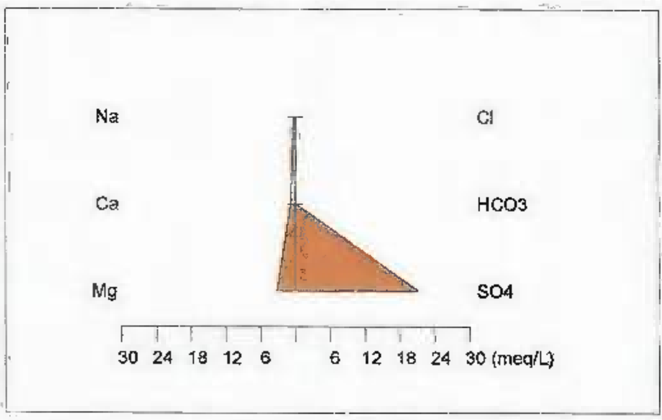


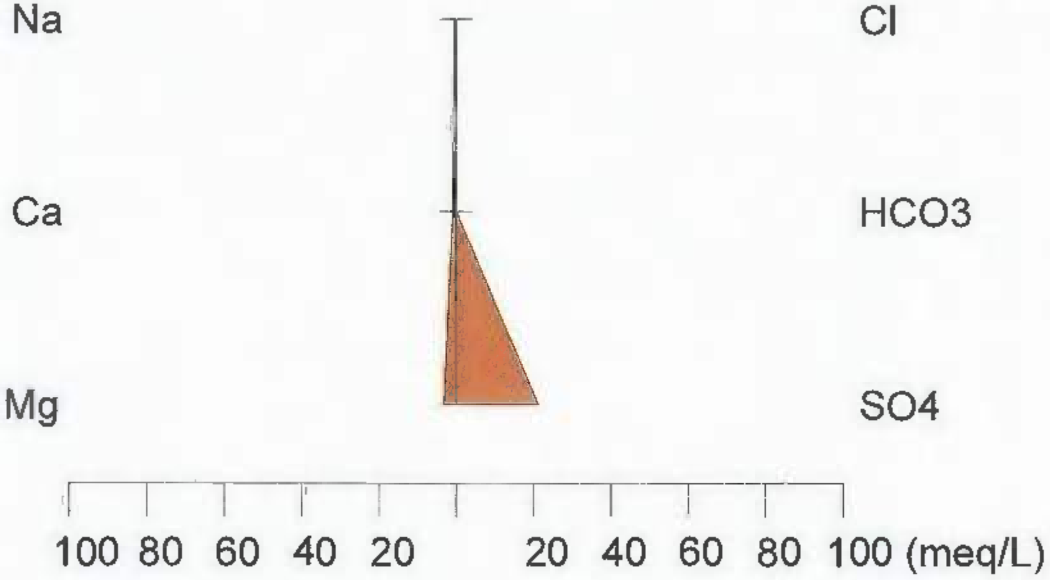
Stiff Diagram – SW-3
Collected April 2010
Mine Waste Source Water
Mt. Diablo



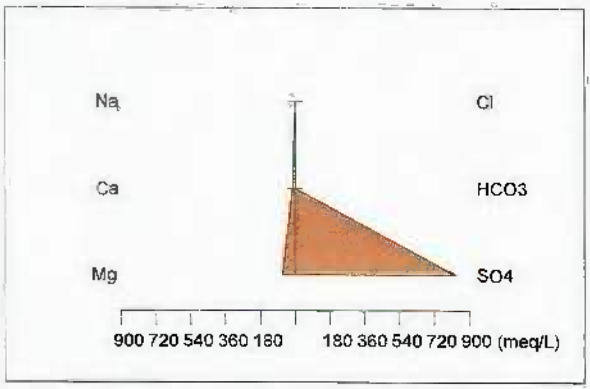


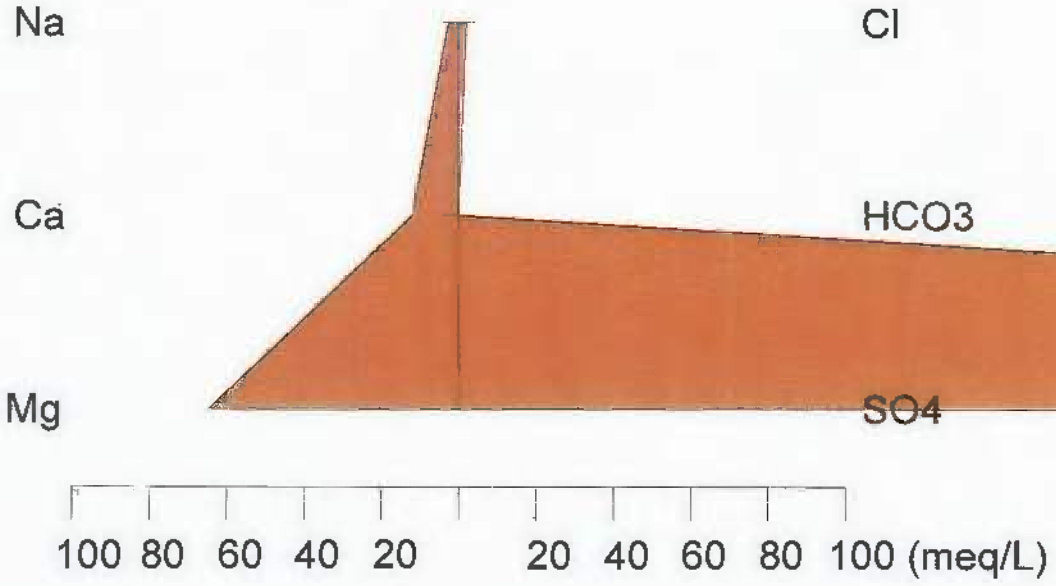
Stiff Diagram – SW-3
Collected February 2011



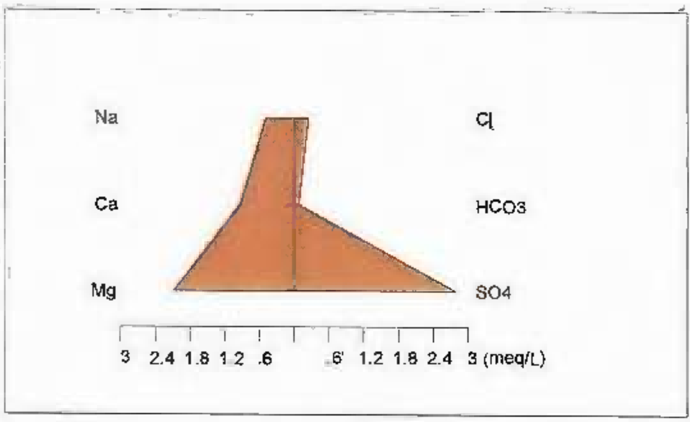


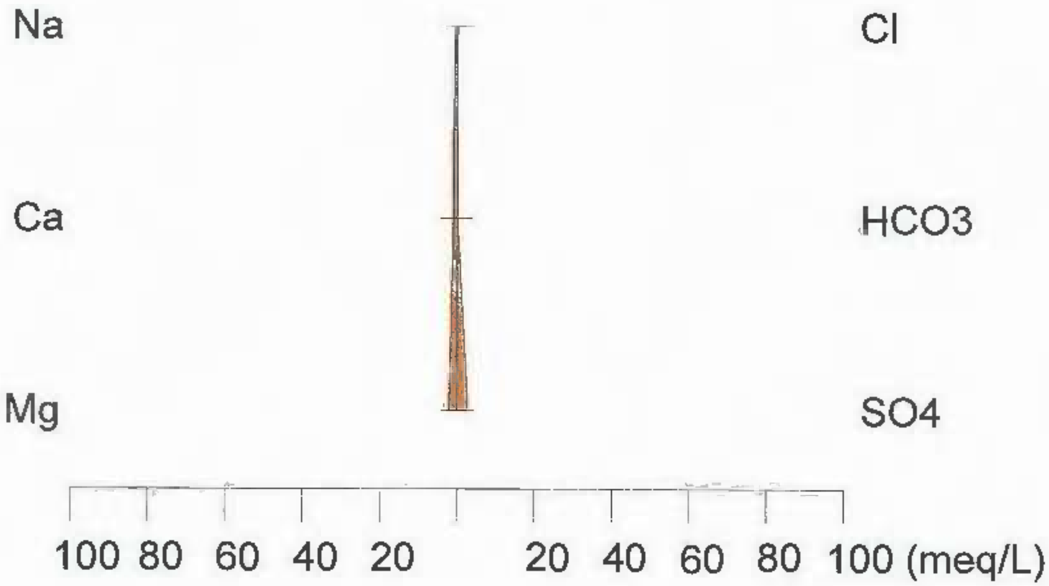
Stiff Diagram – SW-3
Collected June 2011



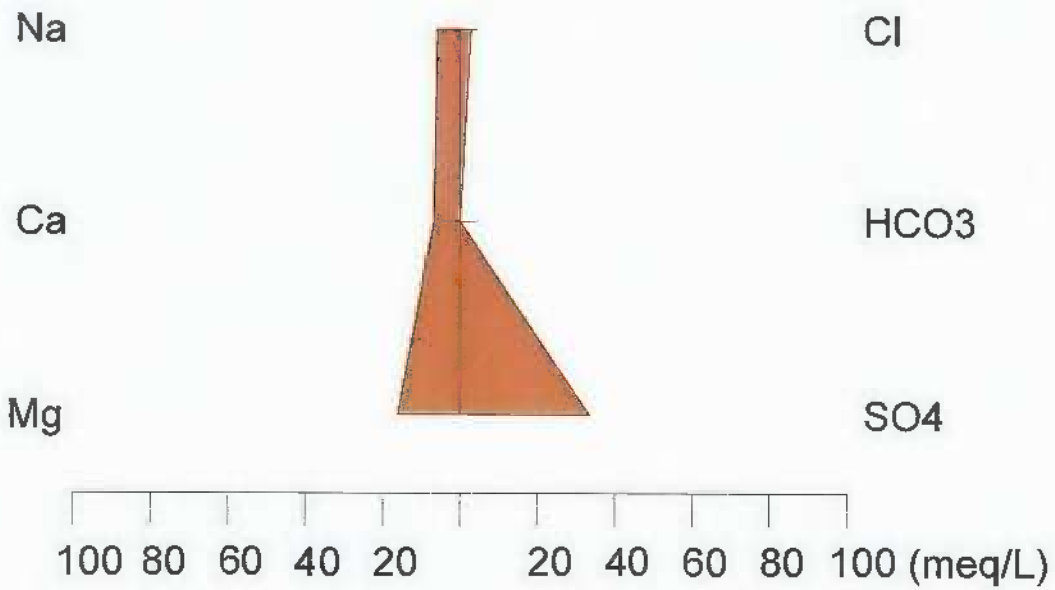


Stiff Diagram – SW-6
Collected April 2010
Mine Waste Source Water
Mt. Diablo

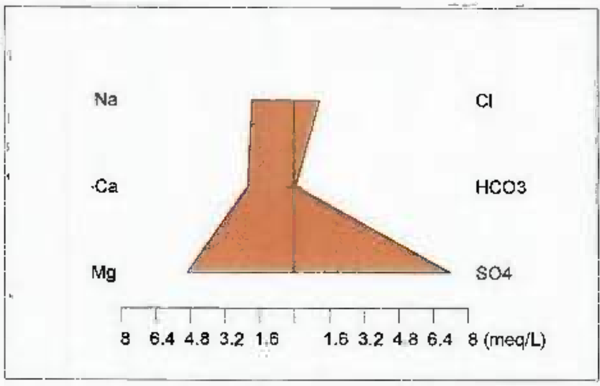


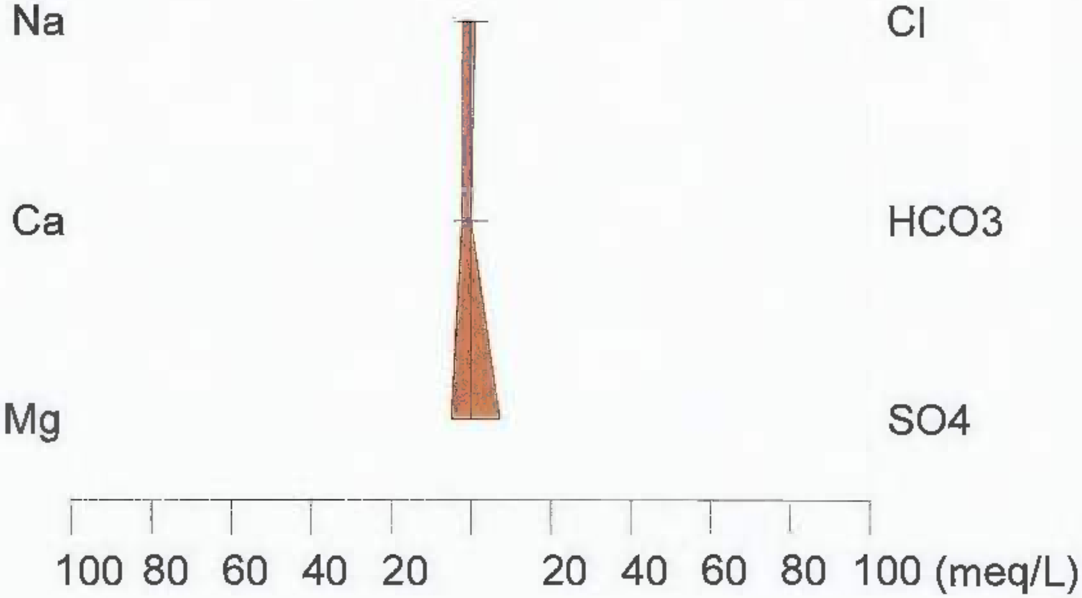


Stiff Diagram – SW-6
Collected May 2010
Mine Waste Source Water
Mt. Diablo

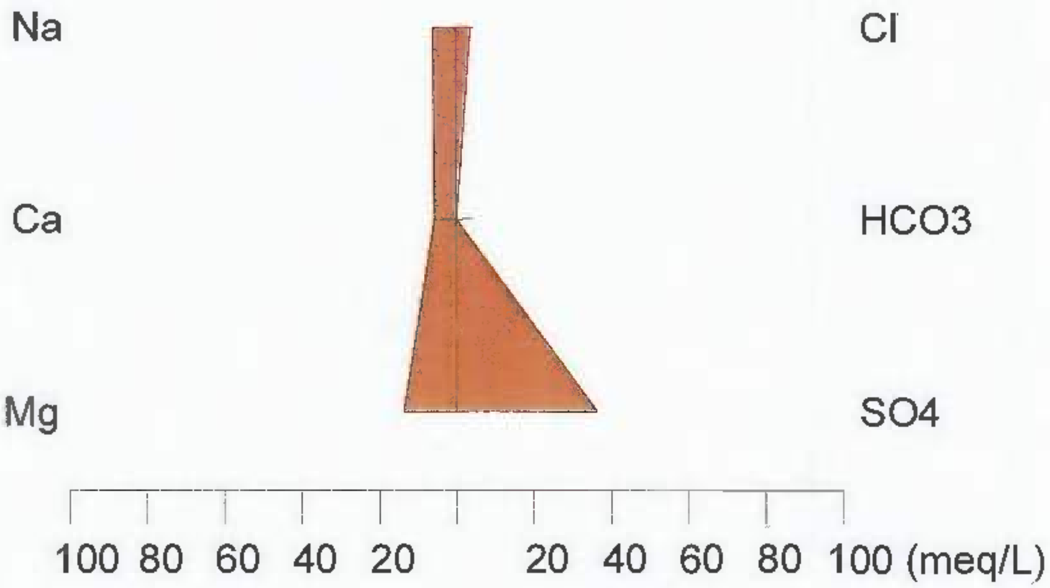


Stiff Diagram – SW-6
Collected February 2011

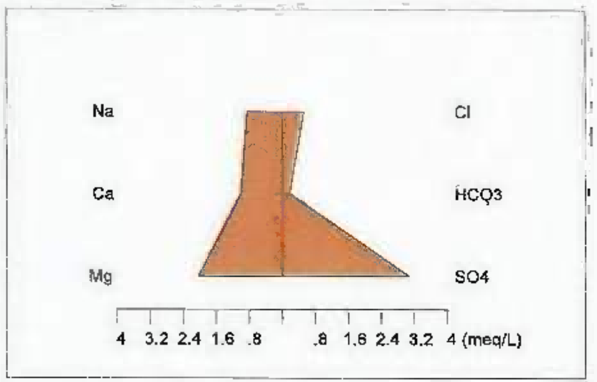


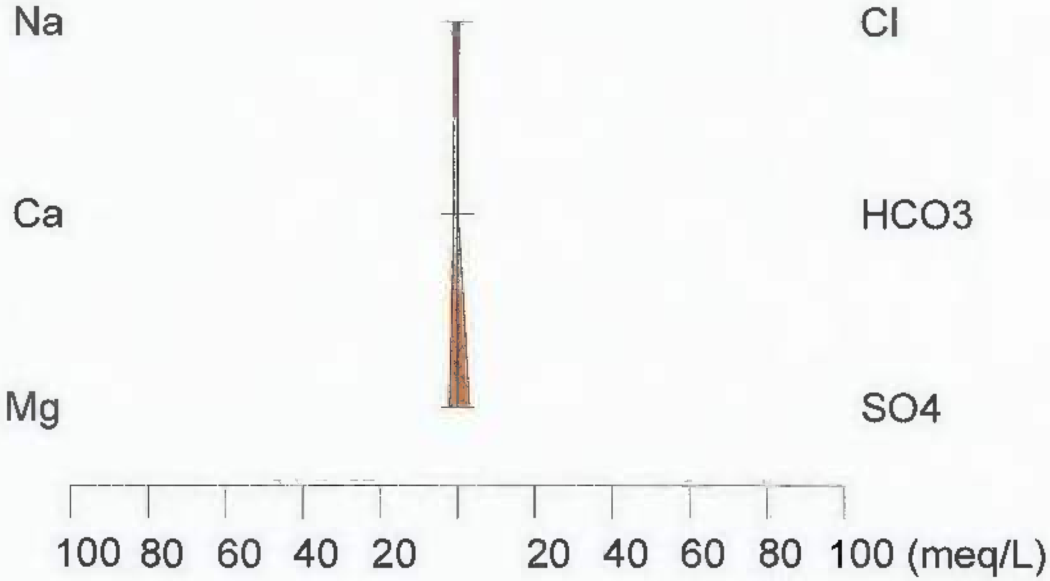


Stiff Diagram – SW-6
Collected June 2011

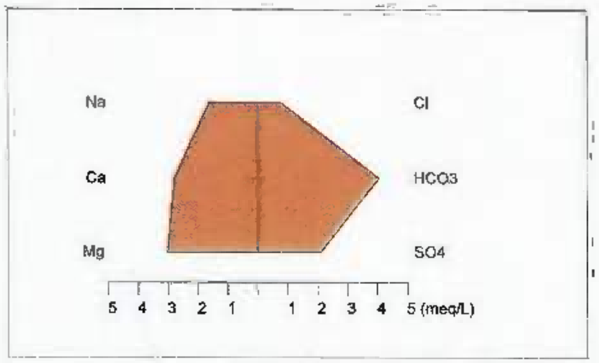


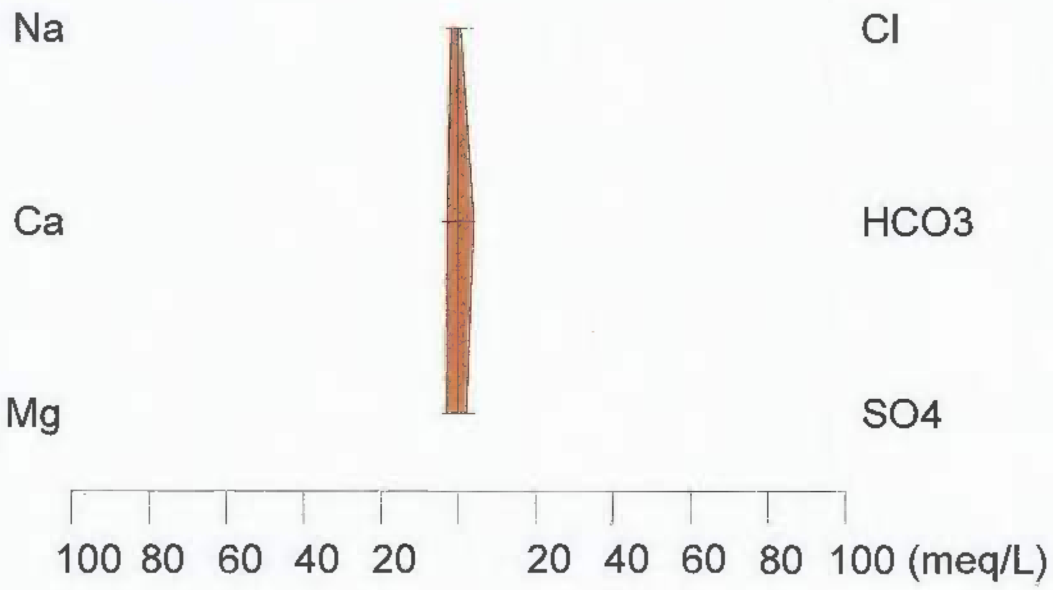
Stiff Diagram – SW-10
Collected April 2010
Mine Waste Source Water
Mt. Diablo





Stiff Diagram – SW-10
Collected May 2010
Background Water
Mt. Diablo





Stiff Diagram – SW-10
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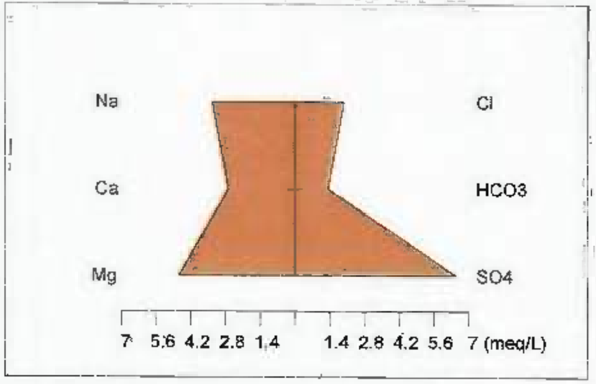
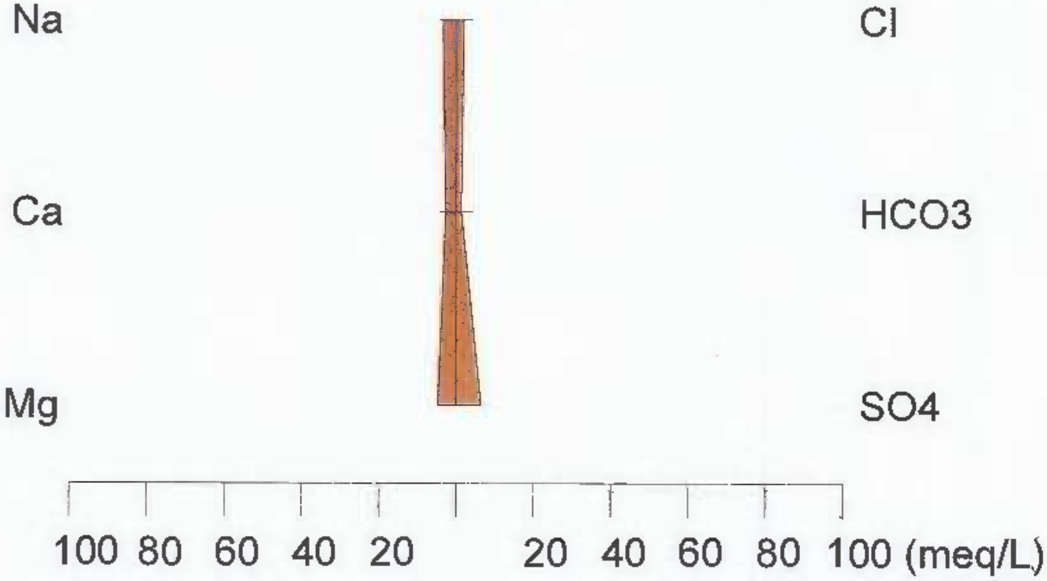
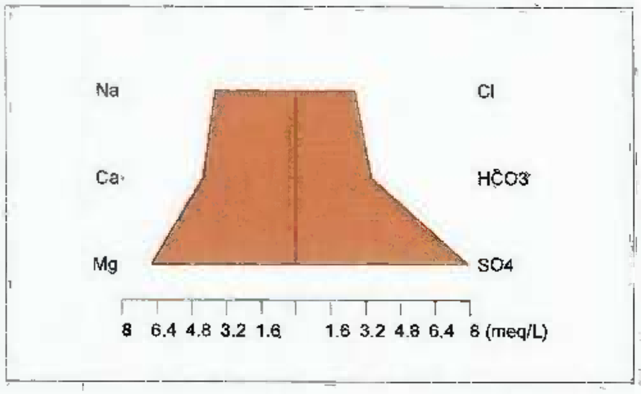
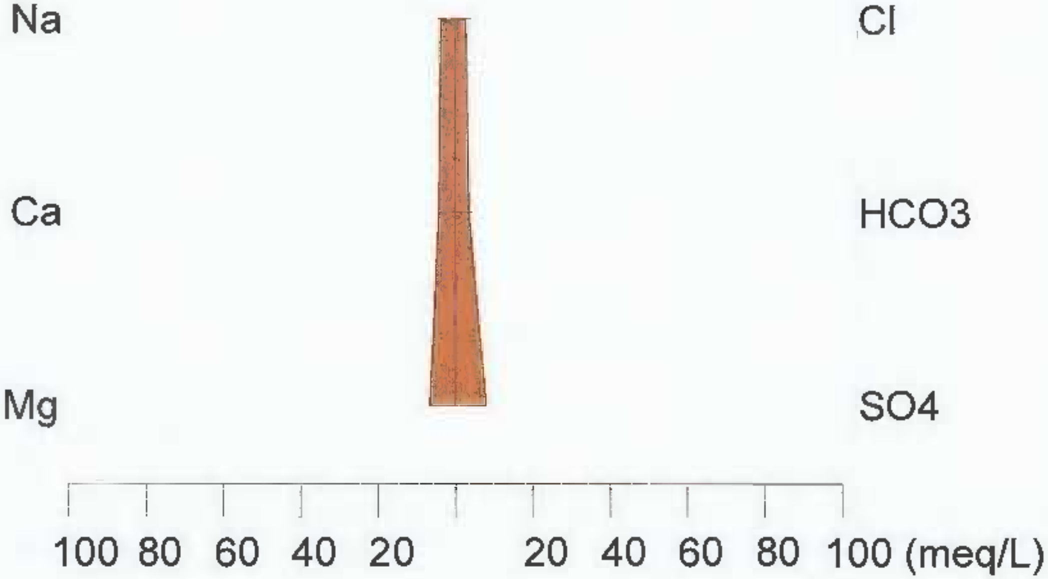


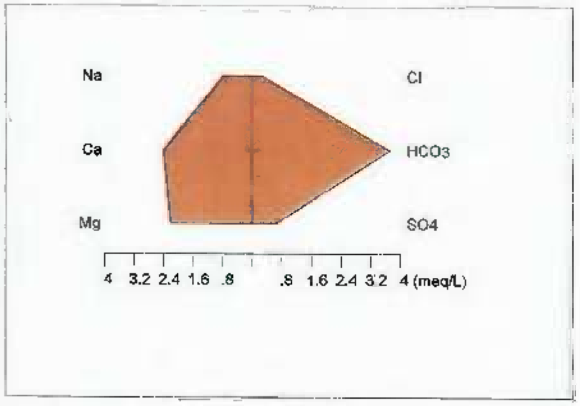


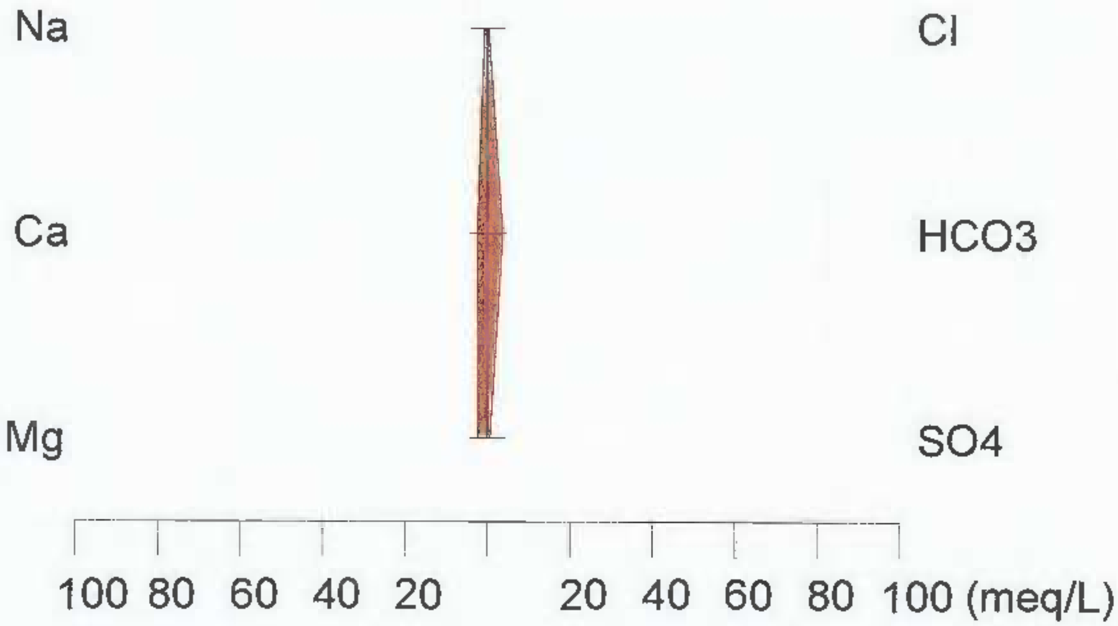
Stiff Diagram – SW-10
Collected June 2011



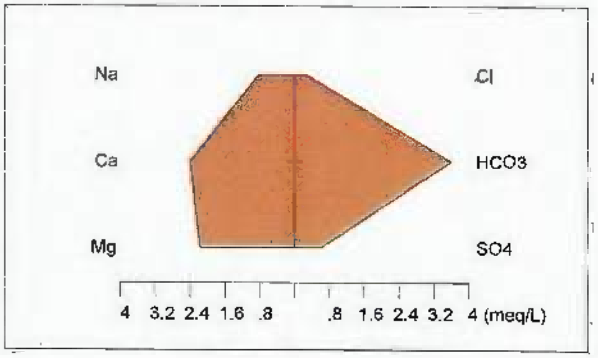


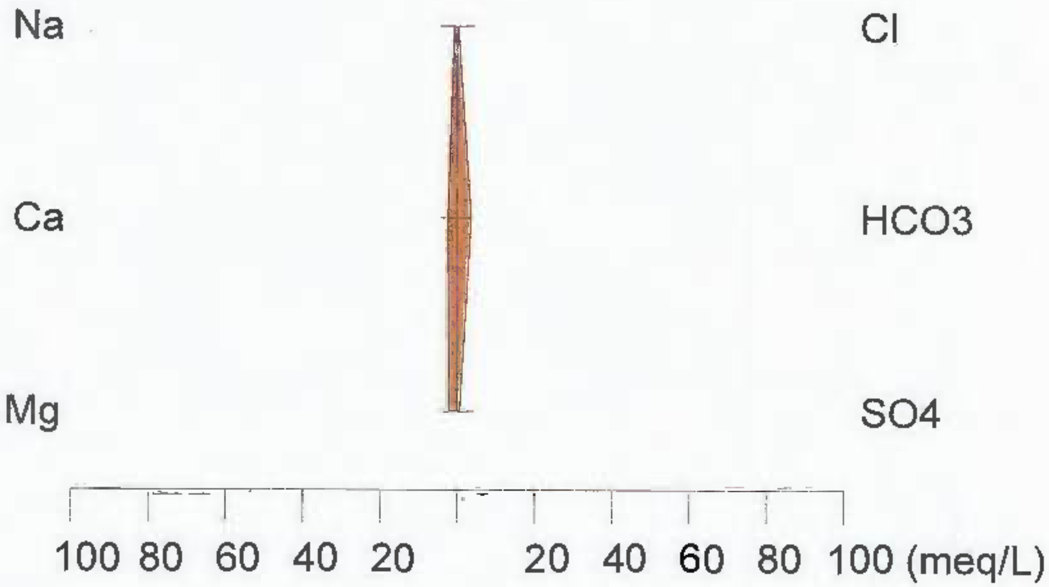
Stiff Diagram – SW-11
Collected May 2010
Background Water
Mt. Diablo



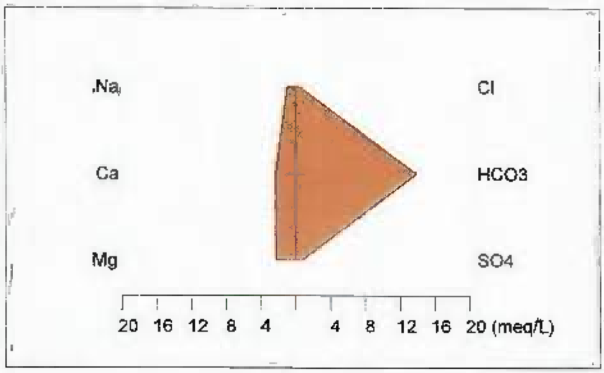


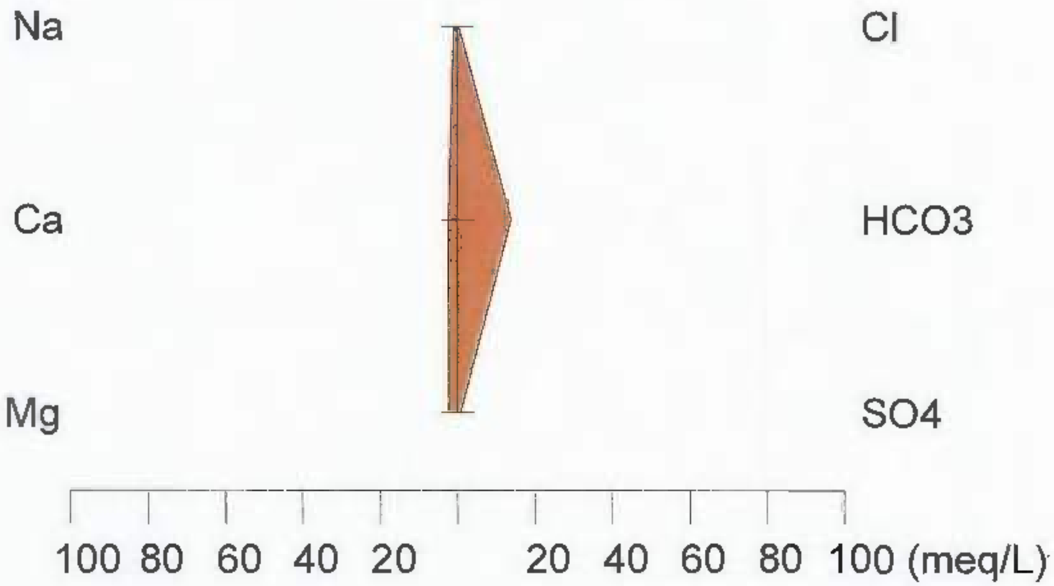
Stiff Diagram – SW-11
Collected February 2011



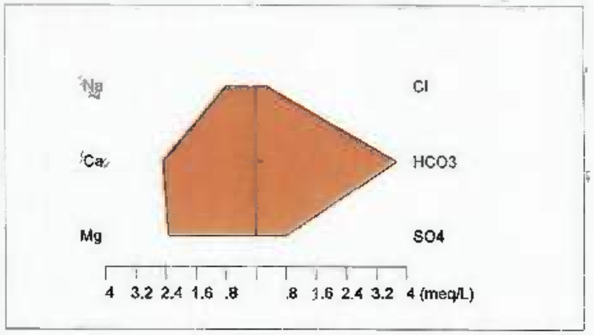


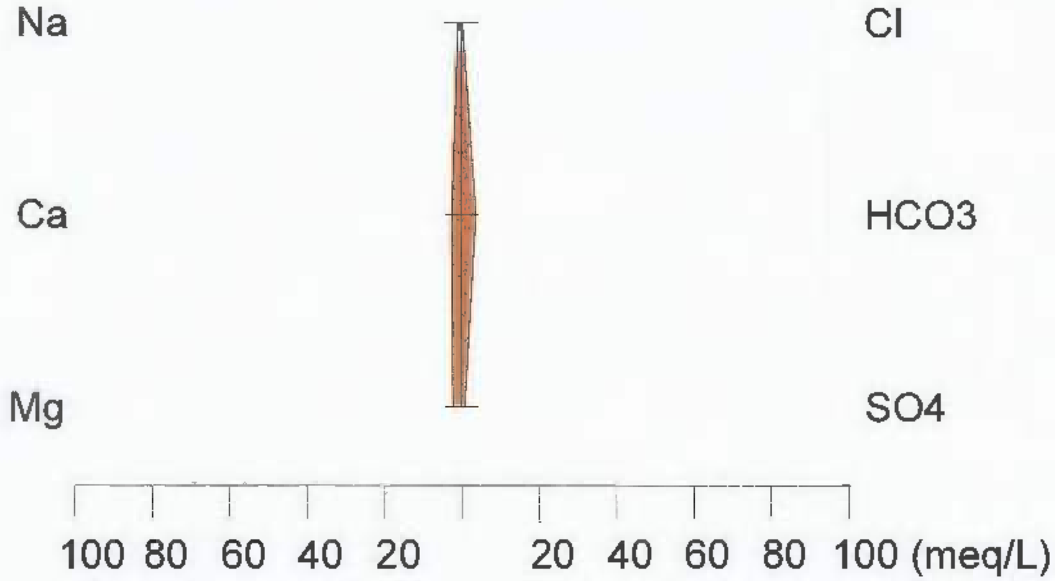
Stiff Diagram – SW-11 Collected June 2011



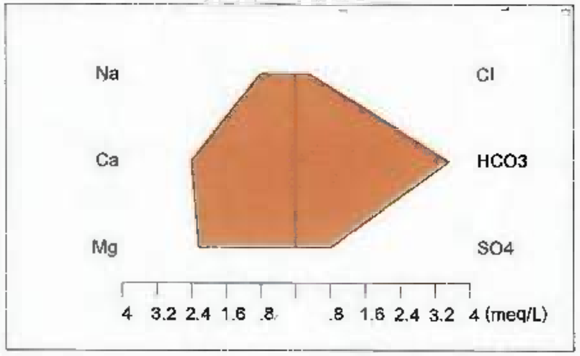


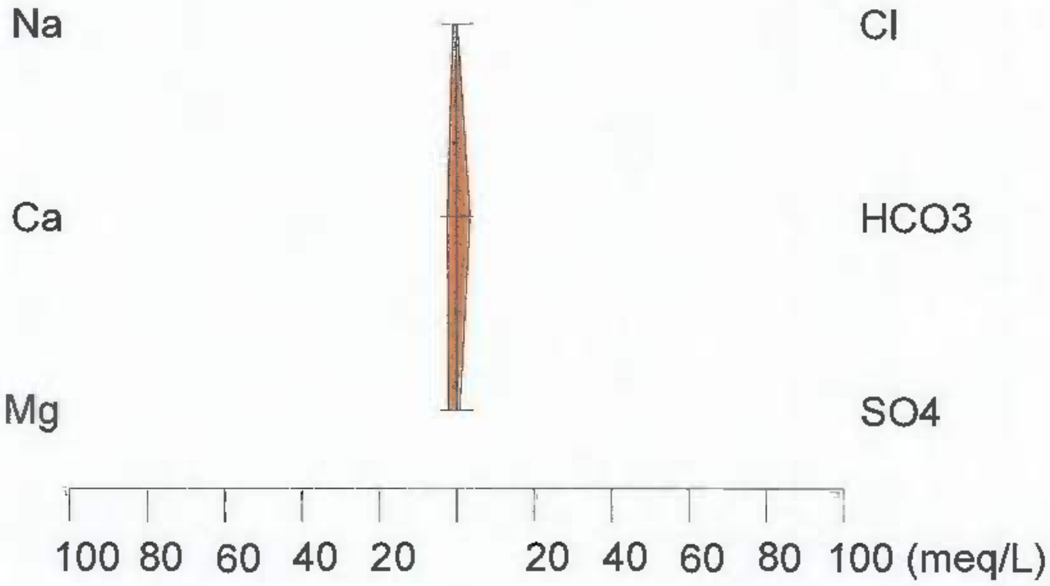
Stiff Diagram – SW-13
Collected May 2010
Background Water
Mt. Diablo



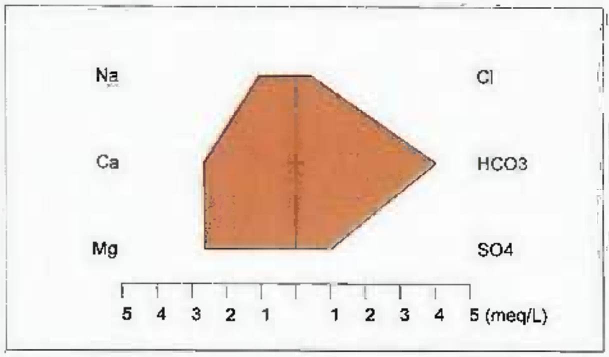


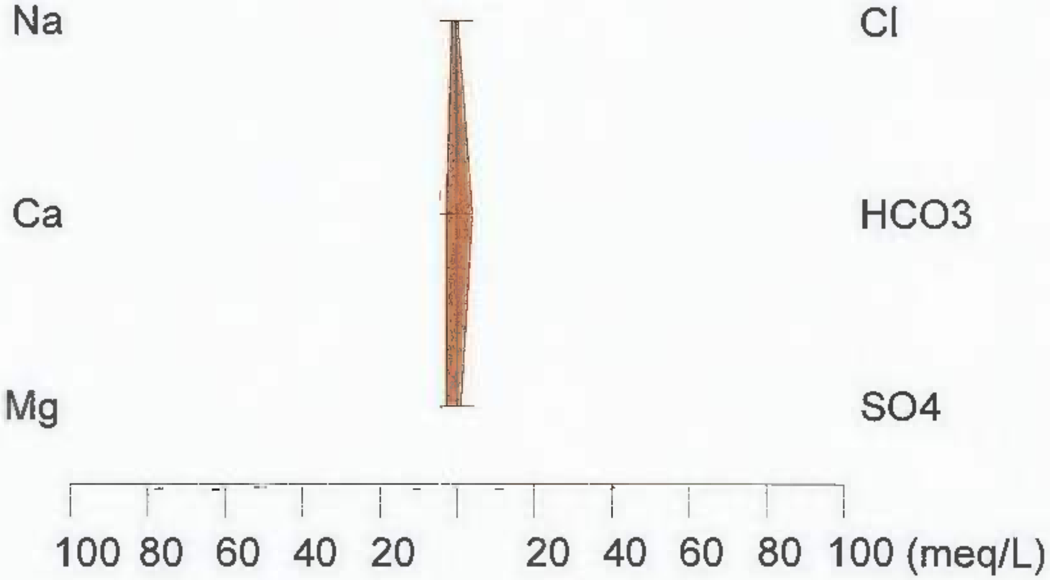
Stiff Diagram – SW-13
Collected February 2011





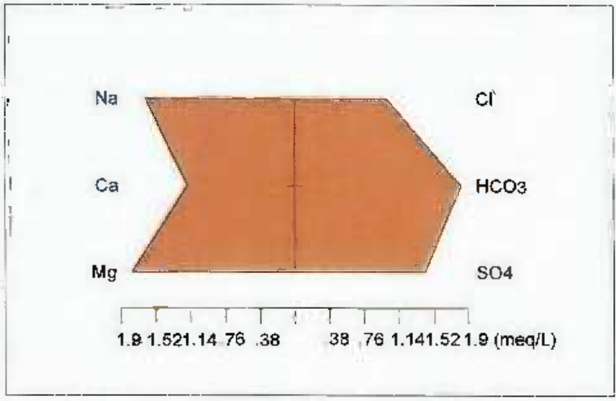
Stiff Diagram – SW-13
Collected June 2011

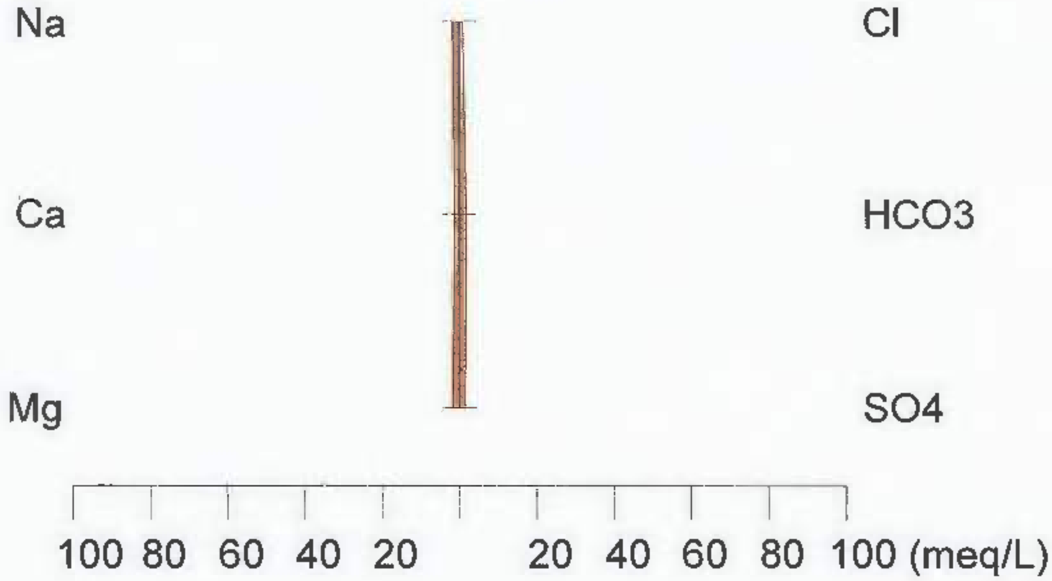




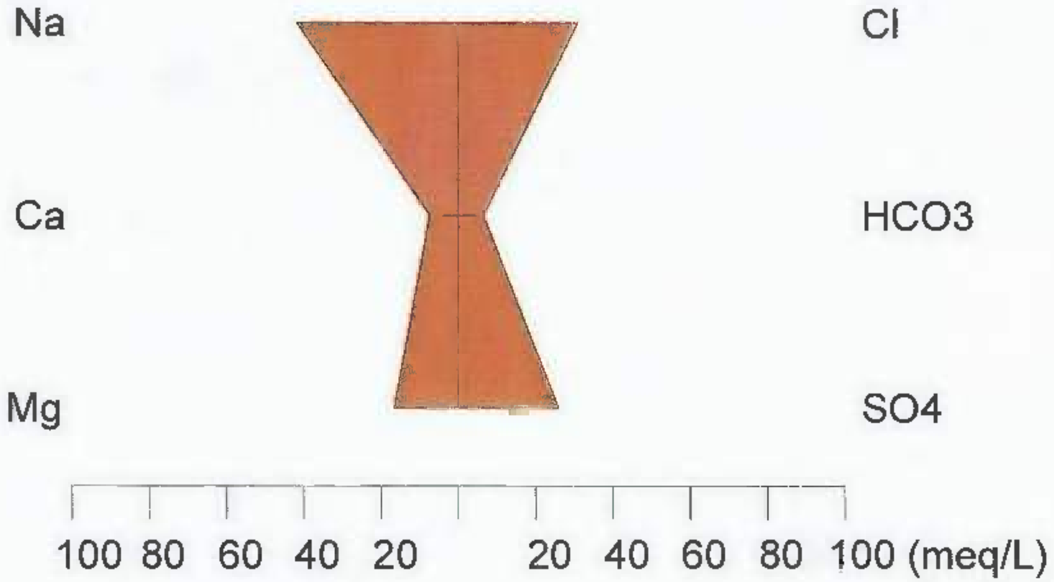
SURFACE WATER ON OR NEAR SITE – NO CONTACT WITH MINE TAILINGS OR WASTE ROCK

Stiff Diagram – SW-4
Collected April 2010
Background Water
Mt. Diablo





Stiff Diagram – SW-4
Collected February 2011



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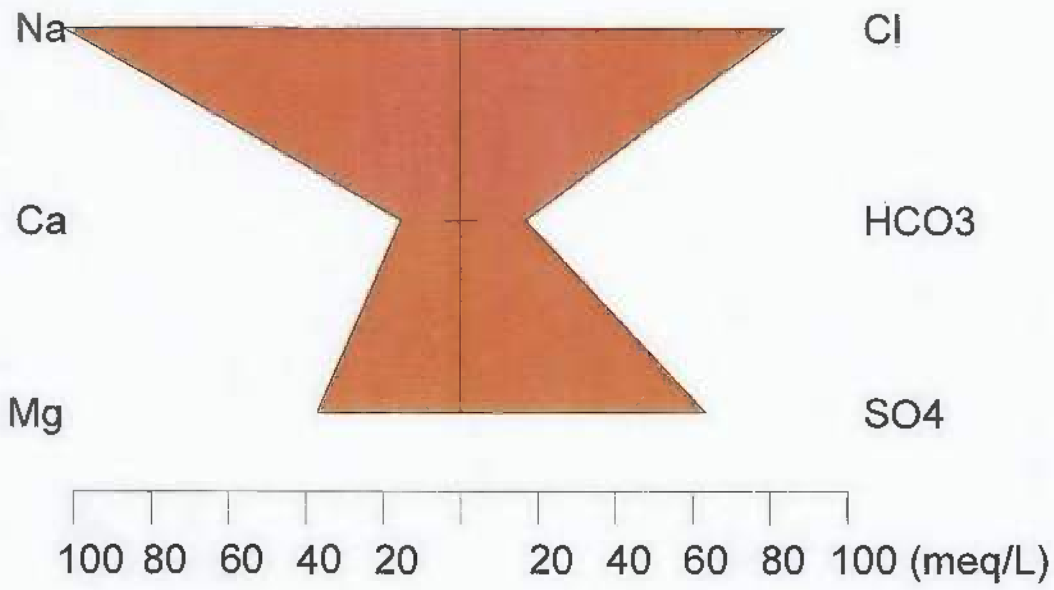

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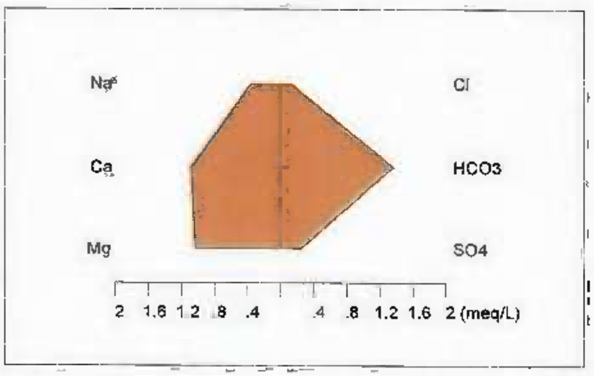
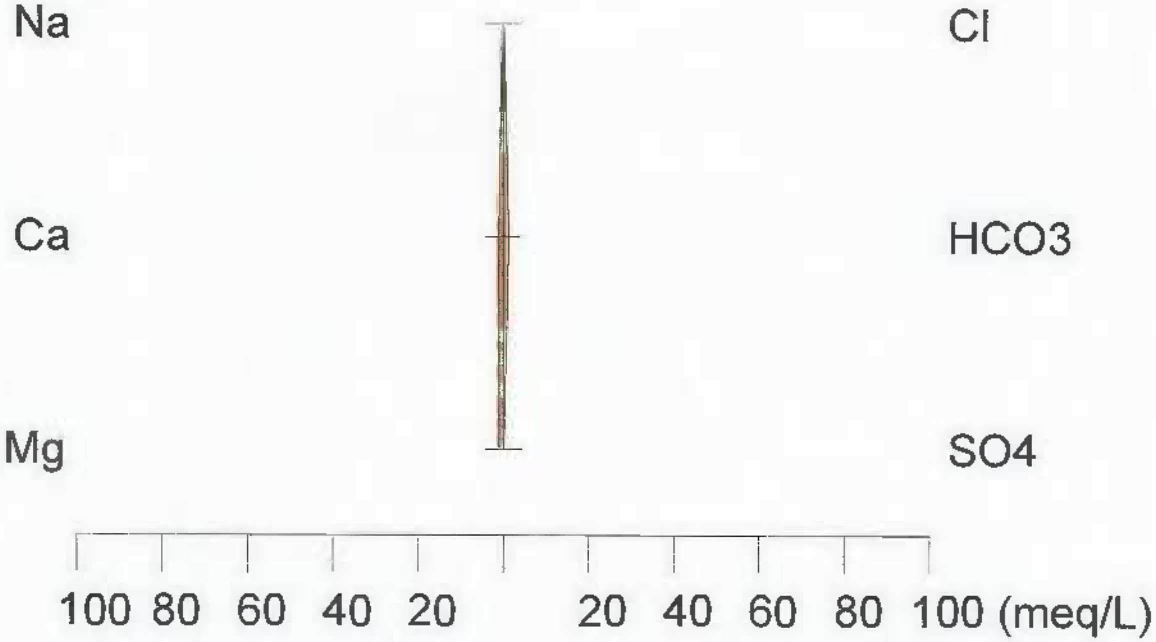
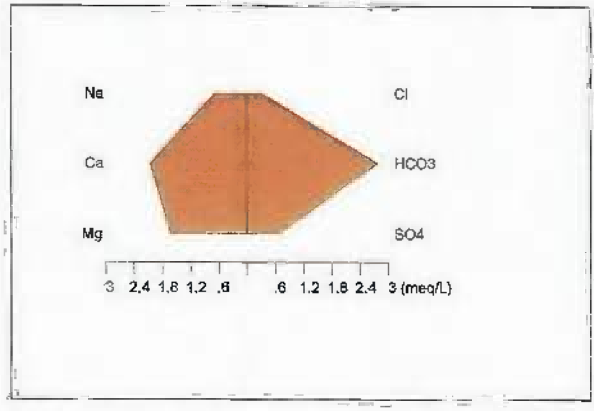
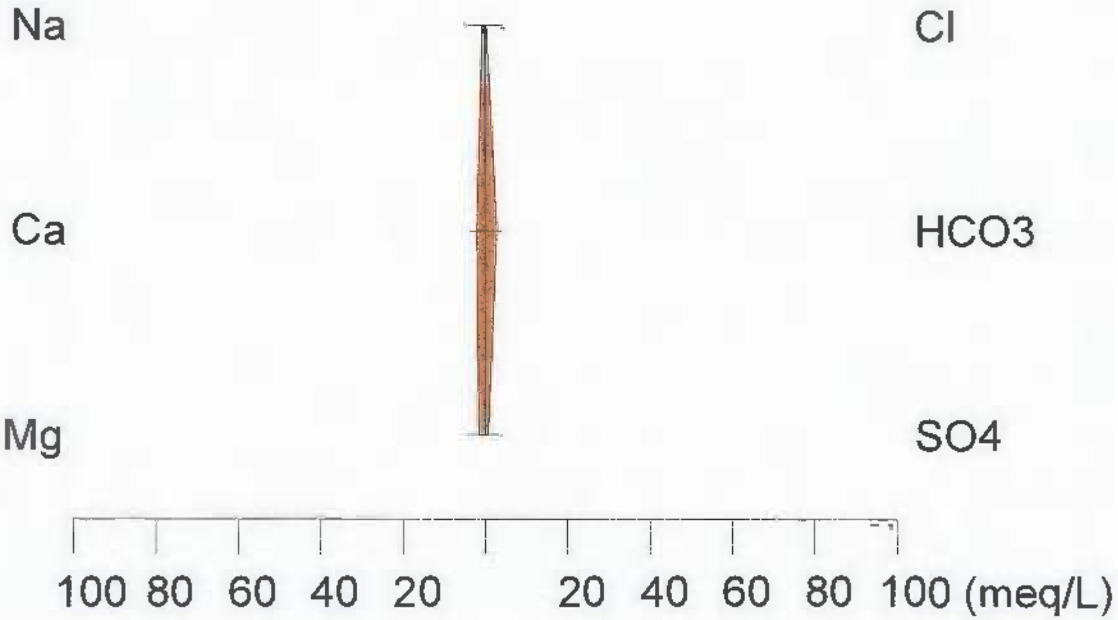
Collected April 2010
Background Water
Mt. Diablo





Stiff Diagram – SW-8
Collected May 2010
Background Water
Mt. Diablo





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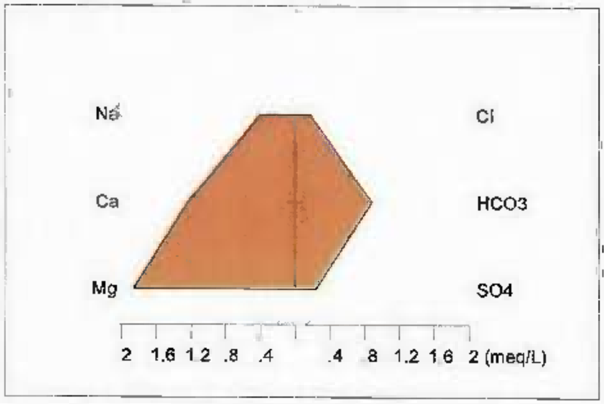

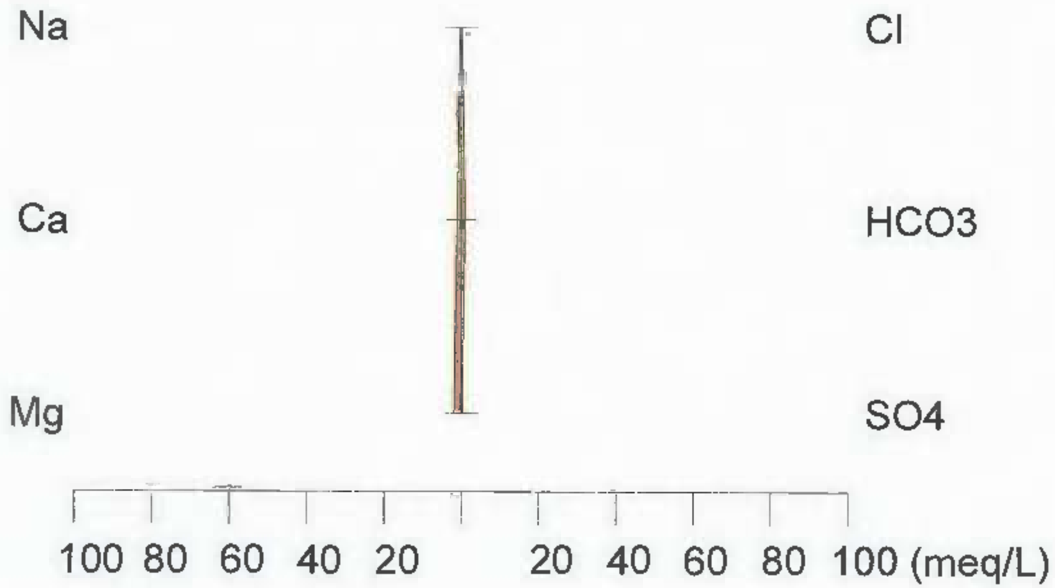

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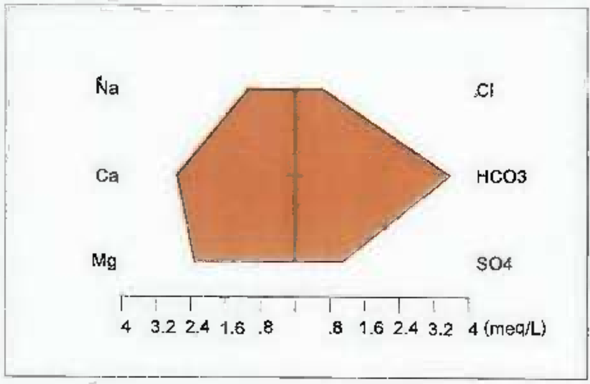

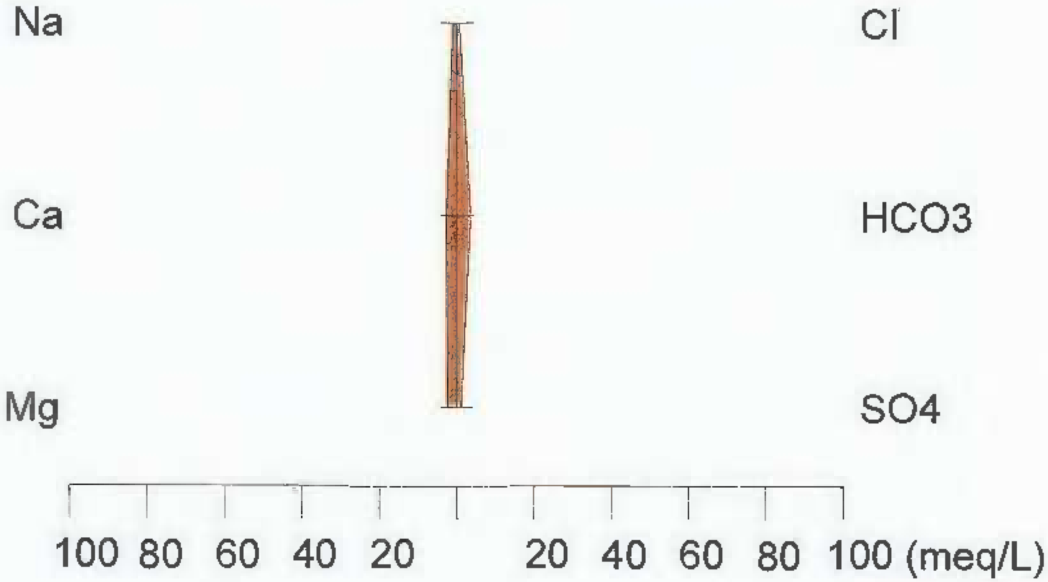

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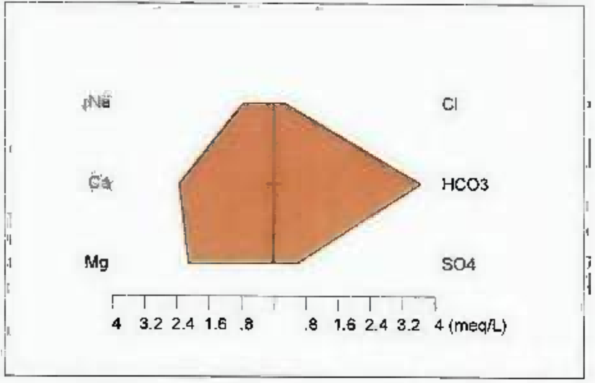
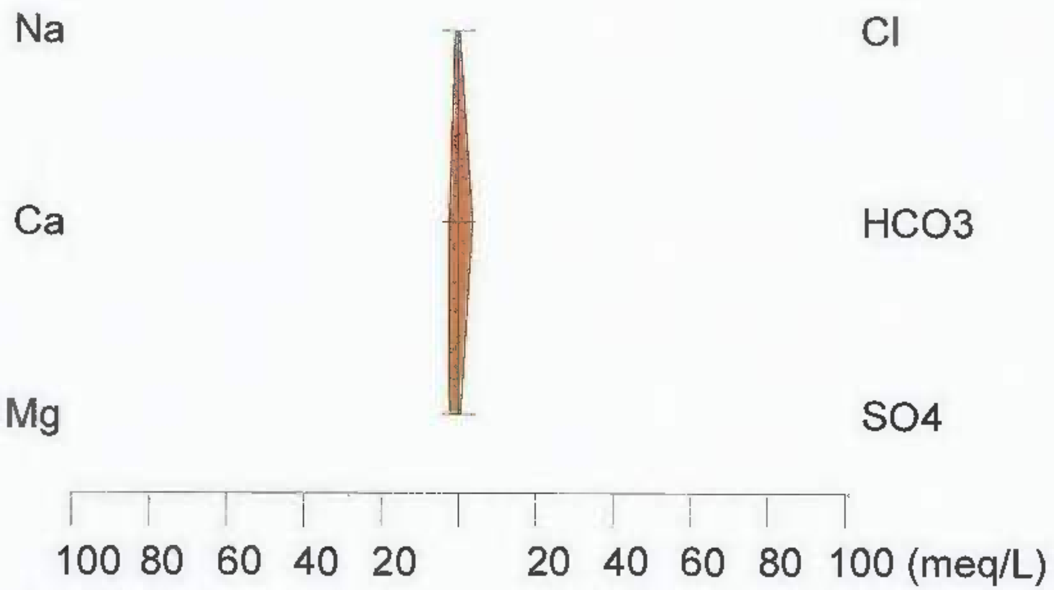
Background Water
Mt. Diablo





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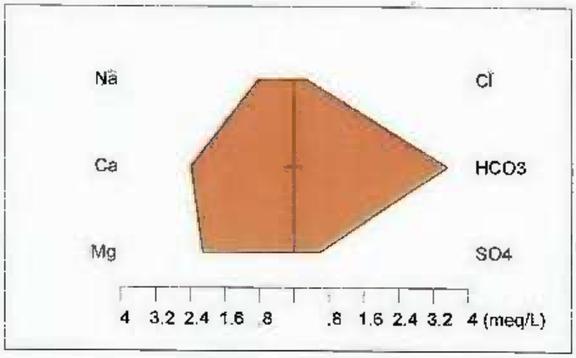

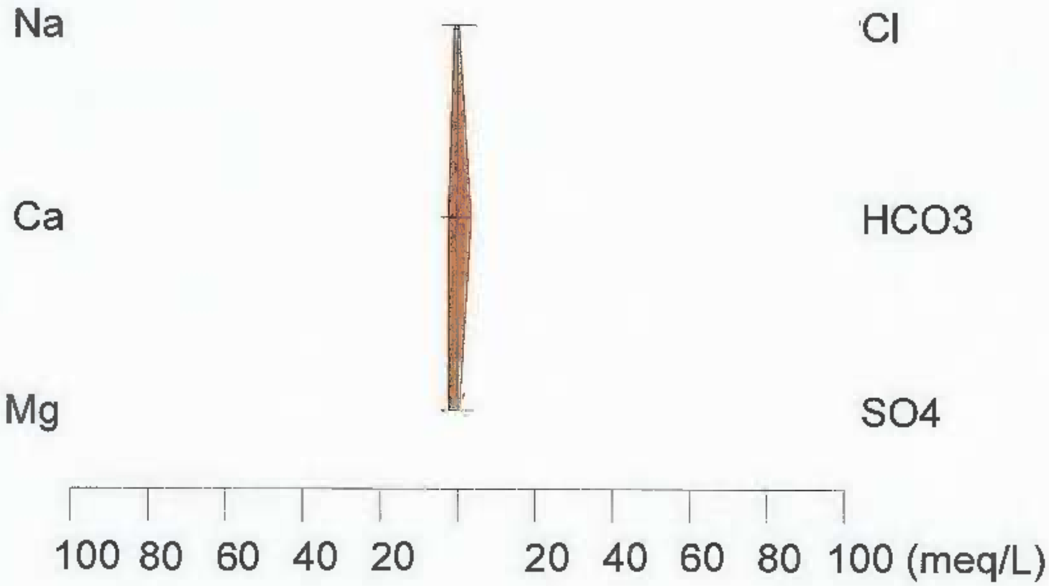

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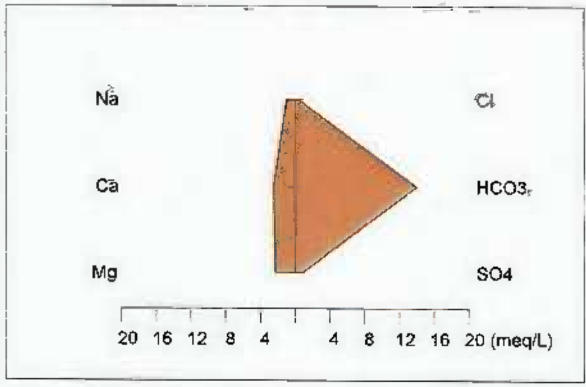
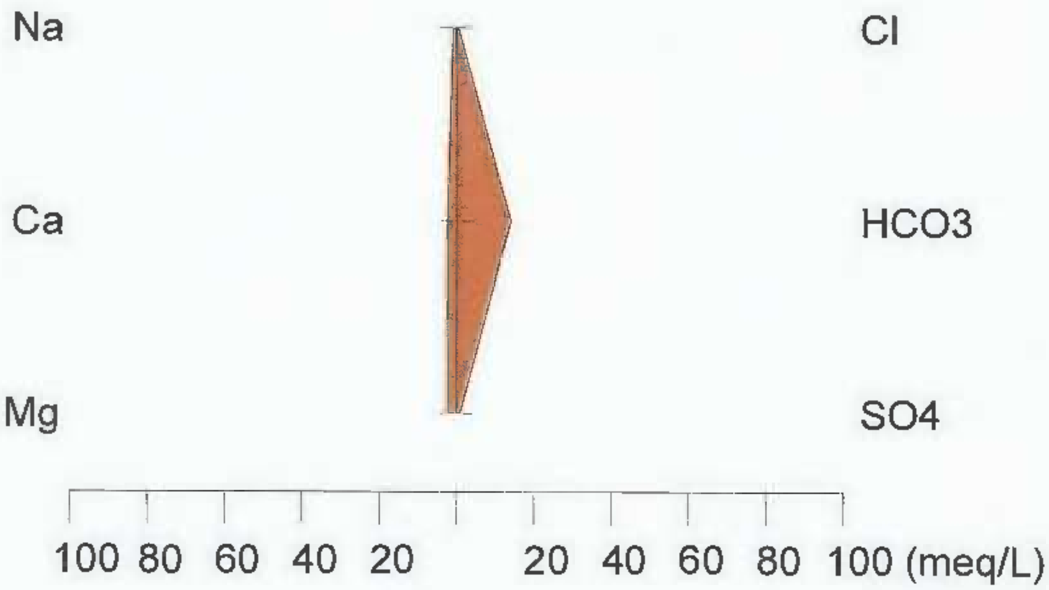
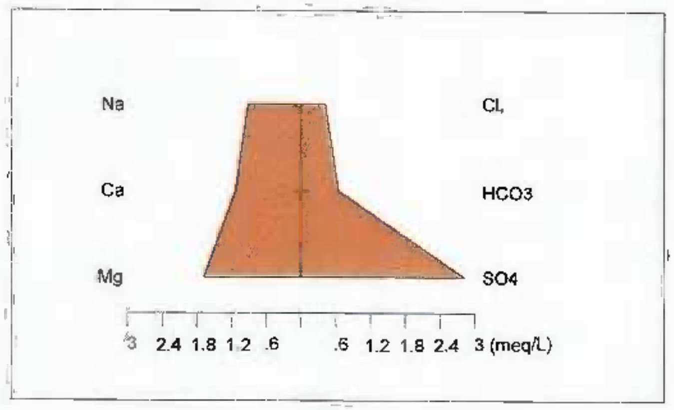
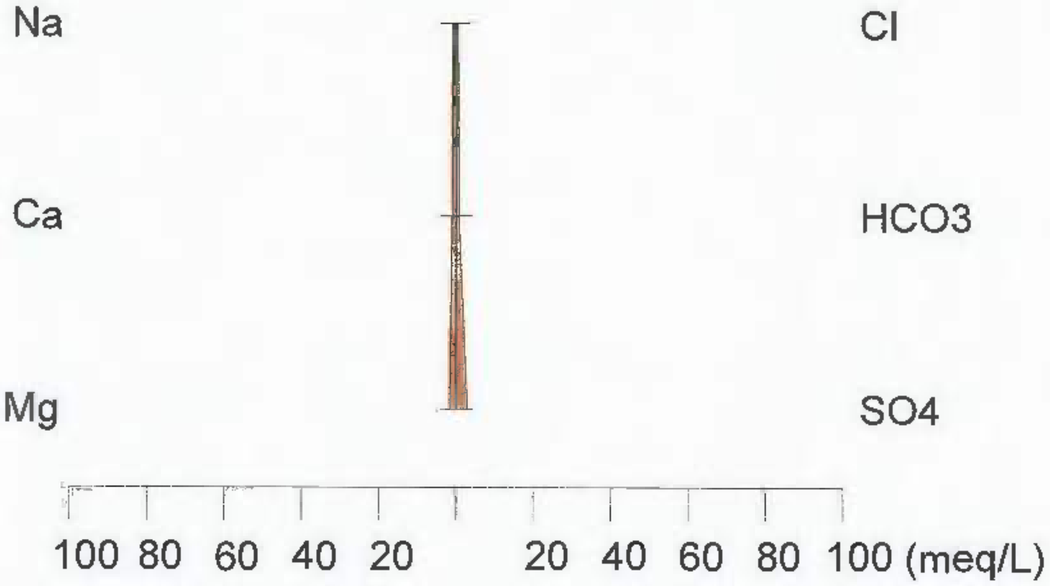




Stiff Diagram – SW-14
Collected May 2010
Mine Waste Source Water
Mt. Diablo





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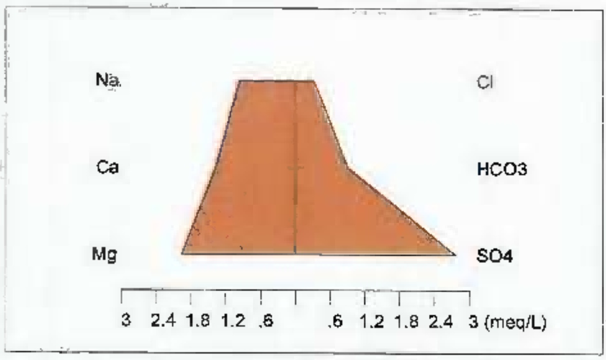

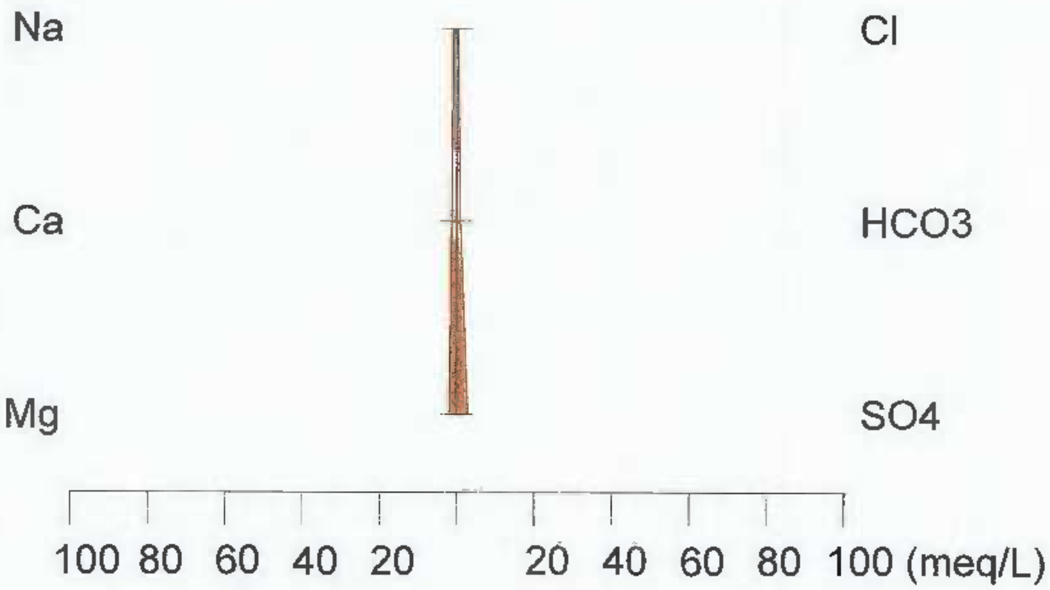

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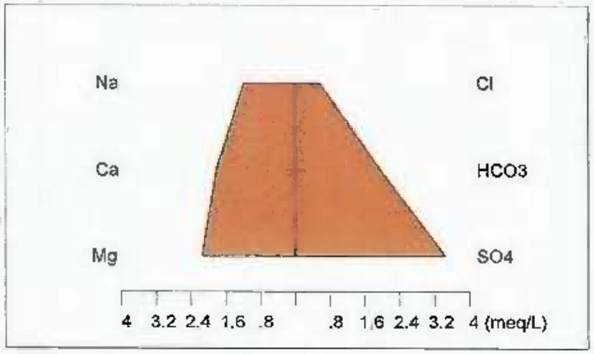
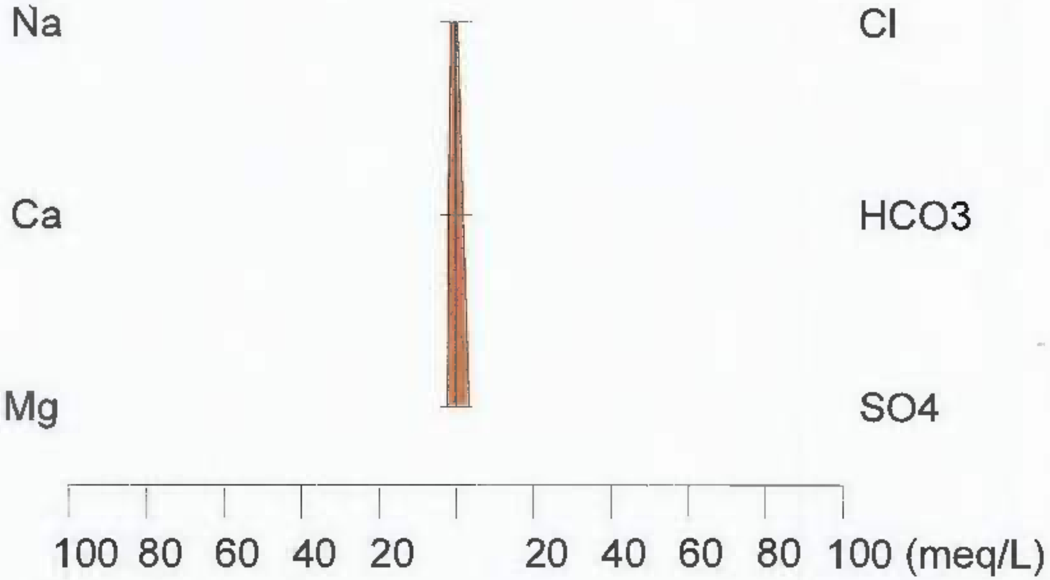
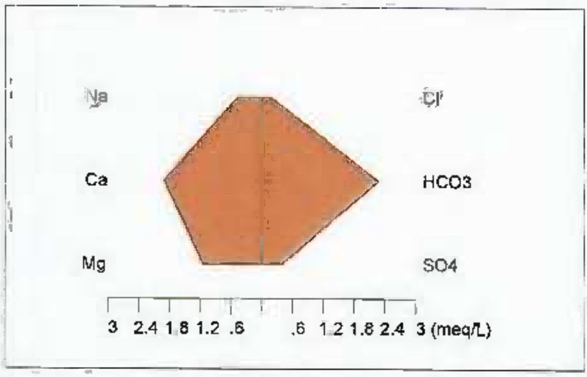
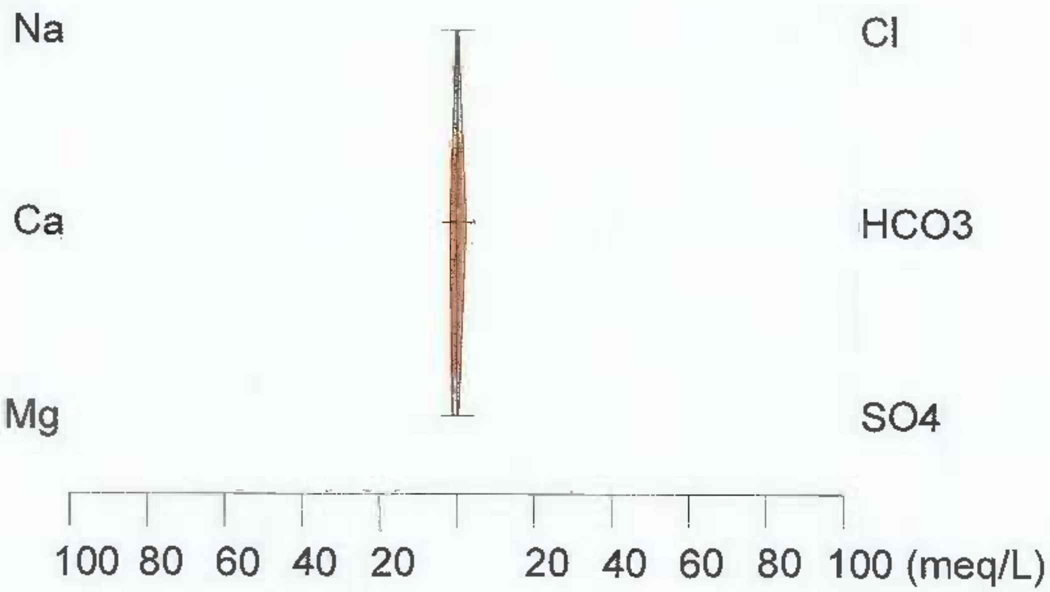




Stiff Diagram – SW-16
Collected May 2010
Background Water
Mt. Diablo





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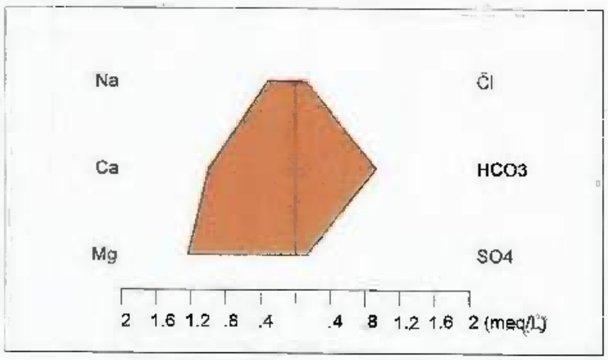

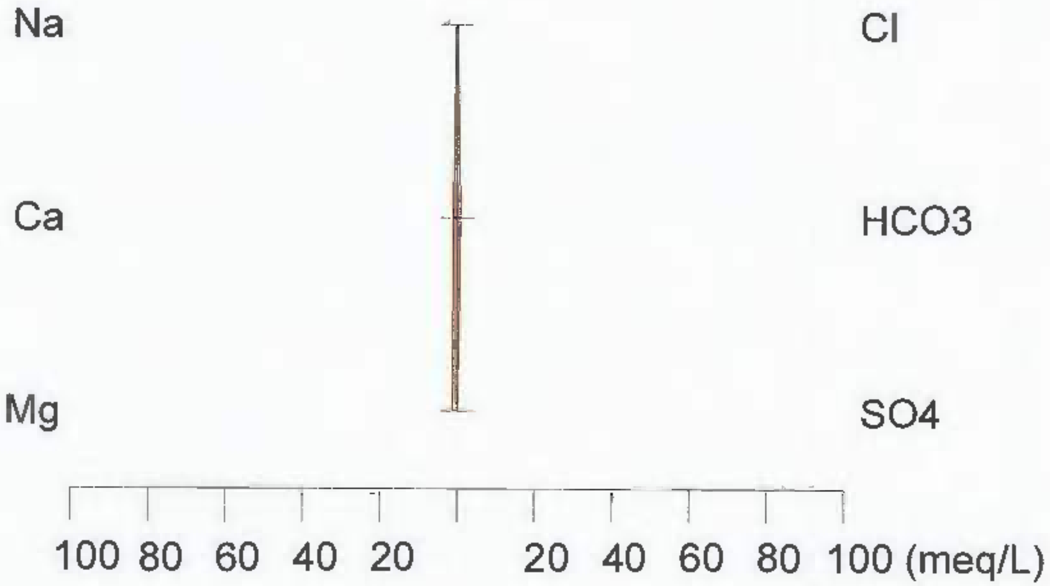

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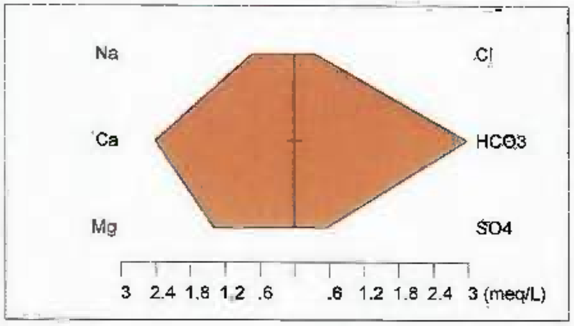
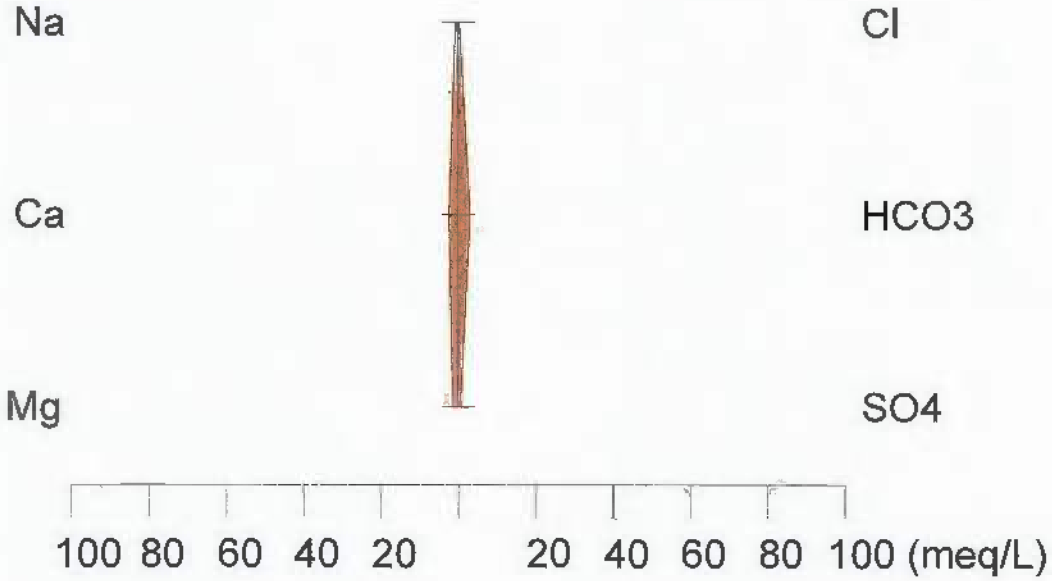
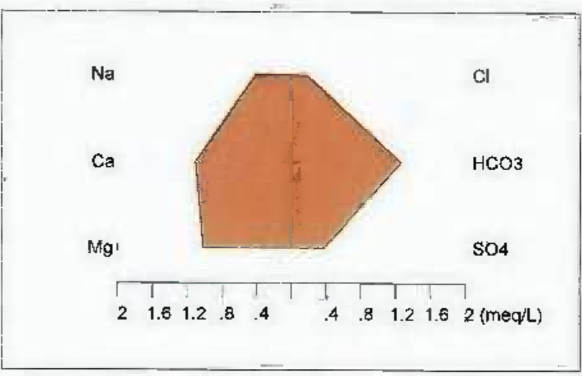
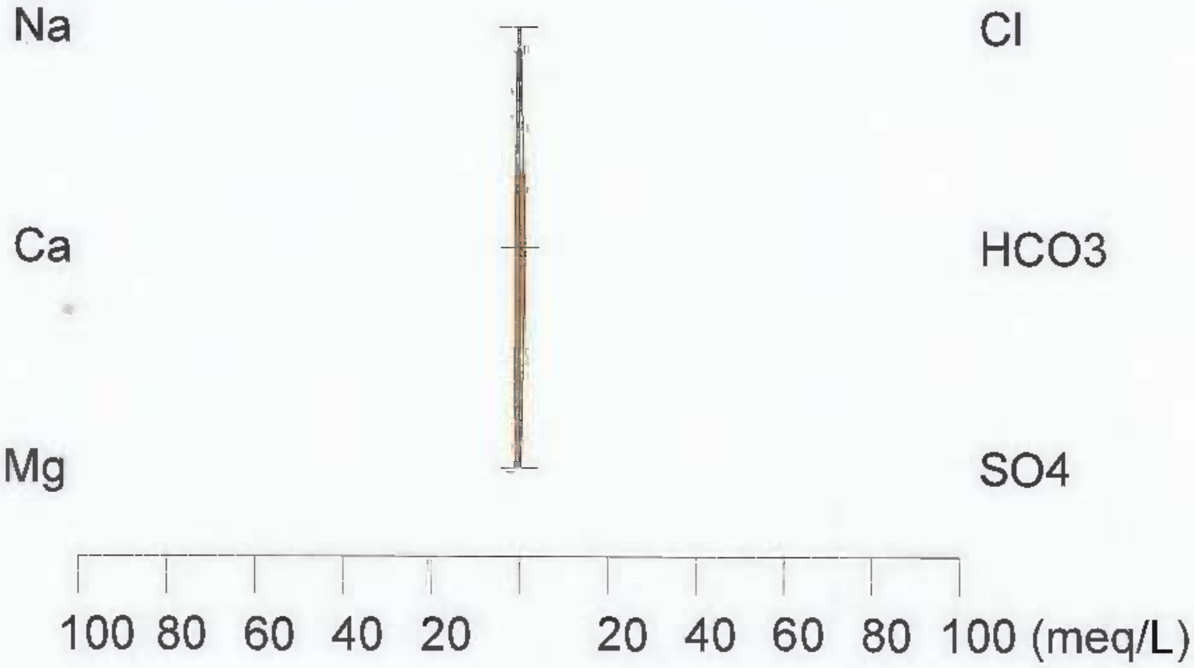




SITE EFFLUENT – POINT OF COMPLIANCE

Stiff Diagram – SW-7
Collected April 2010
Background Water
Mt. Diablo





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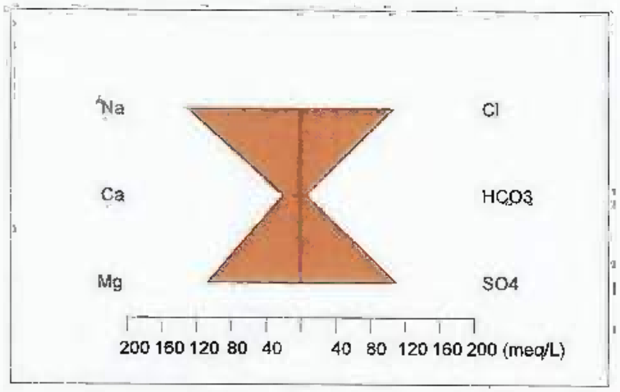

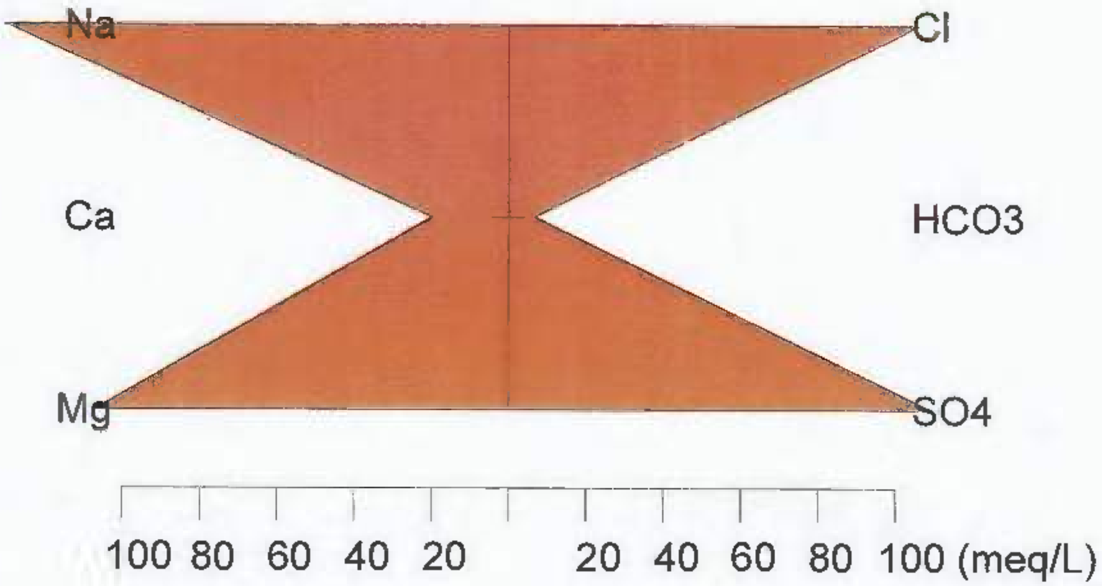

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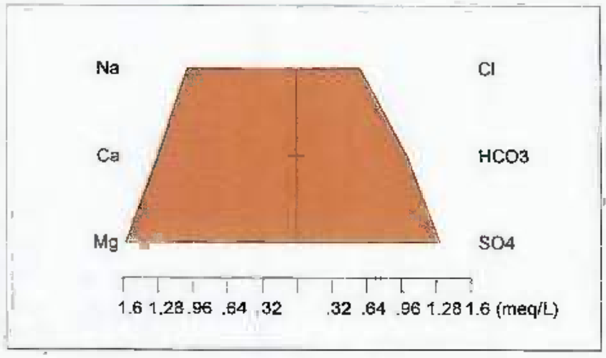

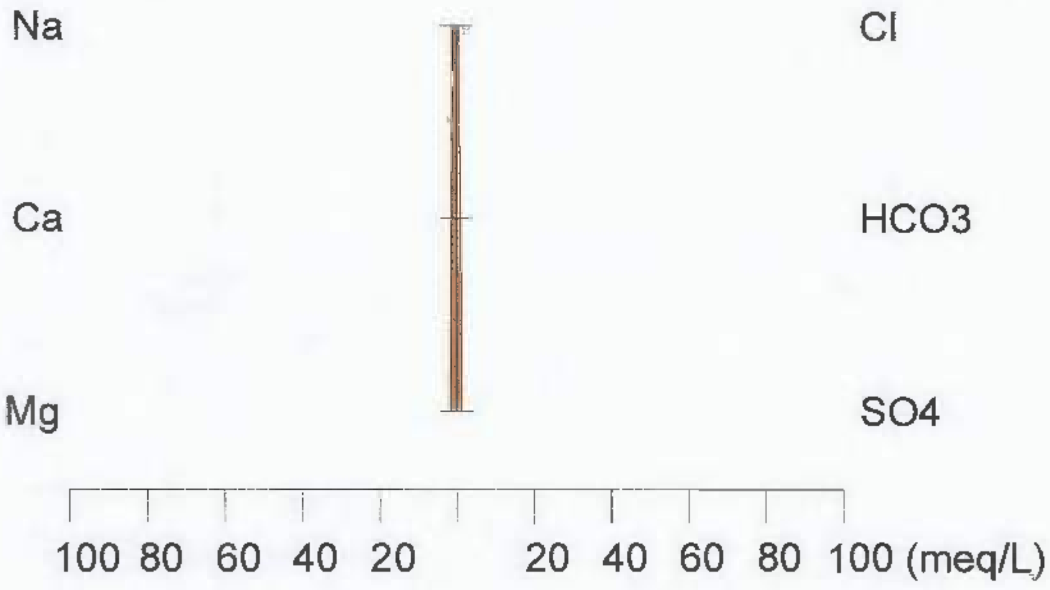

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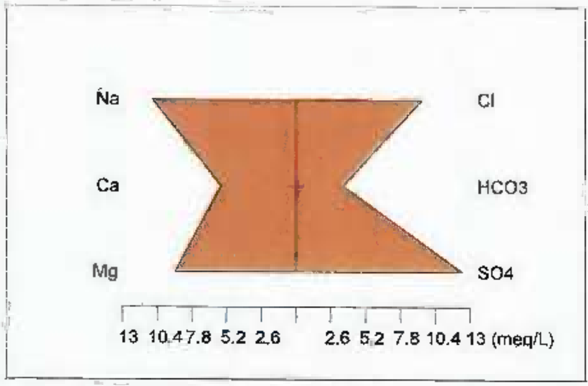

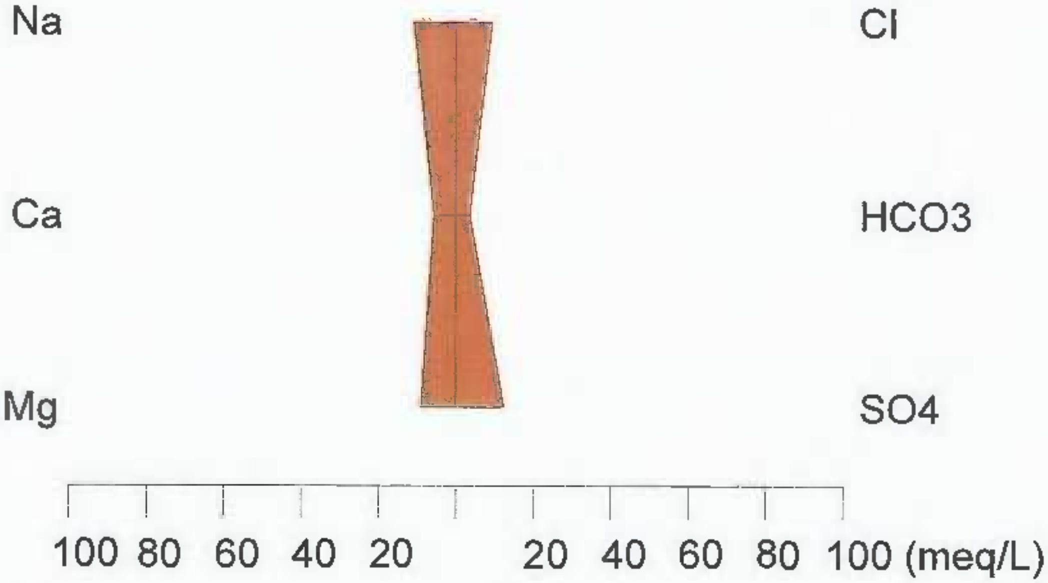

EXHIBIT C

DIVISIBILITY POSITION PAPER

Mt. Diablo Mercury Mine
Sunoco Inc. as Related to Cordero Mining Company

01-SUN-050

Prepared For:

Sunoco, Inc.
10 Industrial Highway MS4
Lester, PA 19029

Prepared By:

3451-C Vincent Road
Pleasant Hill, CA 94523

July 31, 2009

Prepared By:

Paul D. Horton

Paul D. Horton, P.G., C.Hg.
Principal Hydrogeologist

Jon R. Philipp

Jon R. Philipp, P.G., C.Hg.
Senior Hydrogeologist

A. Zdon

Andrew Zdon, P.G., C.Hg., C.E.G.
Principal Hydrogeologist

David R. Hinrichs, P.G.
New Fields Senior Geologist

LIST OF FIGURES

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APPENDICES

1.0 INTRODUCTION

This report is responsive to the California Regional Water Quality Control Board Central Valley Region (CRWQCB) Revised Order to Sunoco, Inc. to Submit Technical Reports in accordance with Section 13267 of the California Water Code, Mount Diablo Mercury Mine, Contra Costa County (Revised Order), dated 30 June, 2009. In relevant part, the Revised Order requires that:

> "2. – By 1 August 2009, Sunoco will submit a report that supports its "divisibility" contention including figures showing the area leased by Cordero, extent of operations, and proposed area of study under the Order. This shall include the total volume of rock removed from the underground working and an estimate of the total volume of broken rock discharged (use a realistic swell factor to calculate the volume of broken rock)."

Research conducted into the history of mining operations at the Mt. Diablo Mercury Mine (the Mine) provides a clear record of the limited involvement of the Cordero Mining Company (Cordero). This record allows a determination of how the work conducted by Cordero relates to the current and past condition of the Mine, and the historic and continuing release of contaminants into lower Dunn Creek and, ultimately, the Marsh Creek watershed. The record indicates that work conducted and materials generated during Cordero's operations were not and are not related to the past and continuing release of mercury laden waters into the existing impoundments at the base of the Mine, moving then into lower Dunn Creek and ultimately Marsh Creek. The Cordero work areas both above and below ground appear to be demonstrably separate and "divisible" from the existing piles of waste rock, tailings, impoundments, and springs that currently combine to create the condition of continuing impacts to the Marsh Creek watershed. The following sections of this report document the history and technical data that support this conclusion, followed by a legal analysis regarding divisibility.

2.0 THE CORDERO OPERATIONAL PERIOD

Cordero actively operated at the Mine from January 1955 into December 1955, a total of 12 months. This operational period is documented in multiple sources including lease documents, United States Defense Minerals Exploration Administration (DMEA) documents, as well as a complete history of the Mt. Diablo Mine written by Clyde P. Ross in the California Journal of Mine and Geology (Ross, 1958). As documented by Ross (1958) and supplemented with additional references, the context of the Cordero operation within the total history of activities at the Mine is summarized below:

The first shaft on what became the Mt. Diablo Mine site was sunk by a Mr. Welch in about 1863. Mr. Welch encountered ore at 37 feet below ground where "both cinnabar and native mercury could be obtained by panning the soil removed". After a short period of production between 1875 and 1877, the mine was relatively idle until 1930 when Mr. Vic Blomberg organized the Mt. Diablo Quicksilver Mining Company (Mt. Diablo Quicksilver), which operated the mine between 1930 until 1936 producing an estimated 739 flasks of mercury. Mt. Diablo Quicksilver then leased the property to the Bradley Mining Company (Bradley) from 1936 to 1951, during which time Bradley produced over 10,000 flasks of mercury. At the end of Bradley's operations, the underground mine workings consisted of four levels in a steeply dipping shear zone. The Bradley workings were accessed by a main shaft and a drain tunnel on the 165 foot level (Pampeyan, 1963).

Mt. Diablo Quicksilver next leased the mine to Ronnie B. Smith and partners (Smith et. al.) in 1951. Using surface (open pit) mining methods, Smith et. al. produced an estimated 125 flasks of mercury in a rotary furnace. In 1953 the United States Defense Minerals Exploration Agency (DMEA) granted Smith et.al. a loan to explore the deeper parts of the shear zone. With DMEA's grant money, and under the DMEA's supervision, Smith et. al. constructed a 300-foot-deep shaft (historically referred to as the DMEA Shaft) during the period August 15, 1953 to January 16, 1954. After completing the shaft, Smith turned southeast with a 77-foot-long crosscut in dry shale, in the direction of the shear zone mined by the Bradley Mining Company. At the surface, Smith constructed dump tracks north and across the road (away from the pre-existing Bradley waste at the southeast portion of the site) to an "unlimited location" (Schuette, 1954a), presumably on the north facing slope in the Dunn Creek watershed where a large waste dump is mapped by Pampeyan (1963). Smith et. al. assigned their lease and DMEA contract to J. L. Jonas and J. E. Johnson in January 1954. Jonas and Johnson extended the drift to 120 feet but stopped after encountering water and gas. The DMEA Shaft and workings flooded on February 18, 1954 to the level of the old drain tunnel on the 165 Level and, subsequently, Jonas and Johnson abandoned the project.

Cordero acquired a lease for the Mine site from Mt. Diablo Quicksilver dated November 1, 1954 and began working at the Mine in January 1955 to recondition the DMEA Shaft in order to access the 360 Level (Cordero and DMEA were unable to negotiate a contract, but records reveal that

Cordero ultimately completed the scope of the project proposed by the DMEA). Cordero replaced failed lagging, and mucked out and dewatered the DMEA Shaft, bypassing the Jonas and Johnson tunnel, and drove a series of crosscut and drift tunnels a total of 790 feet from the DMEA Shaft to the shear zone. Intense rain storms during December 1955 increased the normal flow of mine water beyond pumping capacity and resulted in re-flooding of the mine workings (Pampeyan and Sheahan, 1957). At this time, Cordero suspended operations. As a result of the re-flooding of the Mine, the total active mining operations by Cordero at the Mine are documented to be for just 12 months.

The Mine remained idle until March 1956, when the Cordero lease was transferred to Nevada Scheelite, Inc., which began dewatering with a 500 (gpm) pump. Nevada Scheelite apparently operated an unidentified portion of the Mine site from 1956-58. Downstream ranchers objected to the discharge of acid mine waters to the creek and the operation was suspended. The lease was relinquished after developing only a small tonnage of ore from the open pit. In June 1958, a CVRWQCB inspection report states the mine was leased to John E. Johnson and he was operating it, but he apparently died later that year and the Mine again ceased operation. Subsequent operations on an unidentified portion of the Mine site were conducted by Welty and Randall Mining Co. from approximately 1965-69. They apparently re-worked mine tailings at the Mine site, under a lease from Victoria Resources Company, which purchased the Mine from Mt. Diablo Quicksilver in May 1962.. On or about December 9, 1969, Guadalupe Mining Co. (Guadalupe) purchased the Mine from Victoria Resources. It is unclear whether any operations were conducted by Guadalupe. In June 1974, Jack and Carolyn Wessman and the Wessman Family Trust purchased the Mine site from Guadalupe. In 1977, the Wessmans sold the portion of the Mine site containing the settlement pond to Ellen and Frank Meyer, but subsequently repurchased it in 1989.

3.0 CORDERO MINING ACTIVITY

Cordero mining activity consisted of repairing lagging, and mucking out and de-watering of the existing DMEA Shaft beginning in January 1955, followed by driving a new crosscut and drifts from the shaft on the 360 foot level. Additionally, the existing furnace plant was repaired, and a trestle was constructed from the shaft to the ore bin (Sheahan, 1956). Cordero's workings totaled 790 feet and extended south from the DMEA Shaft and ultimately connected with the Main Winze of the Bradley workings (Pampeyan and Sheahan, 1957).

The Cordero tunnel system was mapped by investigators for the DMEA as documented in the Report of Examination by Field Team Region II, Final Report, and dated January 30, 1957 (Pampeyan and Sheahan, 1957). Figure 3-1 depicts the Cordero mine tunnels in plan view and their relationship to the DMEA Shaft and the originally flooded DMEA crosscut that was abandoned by Jonas and Johnson. Figure 3-2 shows the same plan view of the Cordero tunnel system and includes the Plan view of the entire pre-Cordero tunnel system located to the south. As noted above, the workings on the 360 Lever were connected to the Main Winze of the original workings at its northern terminus as shown on Figure 3-2. A cross section produced by the DMEA demonstrates the Pre-Cordero tunnel system as presented on Figure 3-3. The Cordero tunnels were advanced at the 360 Level which is below all of the workings depicted on Figure 3-3 and were connected to the bottom of the Pre-Cordero Main Winze via a 15 foot raise (Sheahan, 1956).

The plan view outlines of the Pre-Cordero and the Cordero workings are transposed on a current aerial photograph for perspective with the current condition of the Mine (Figure 3-4).

4.0 CORDERO LEASE AND WORK AREAS

The Cordero lease with Mt. Diablo Quicksilver (Cordero Mining Company, November 1, 1954) indicates the specific area for Cordero operational activities (Attached as Appendix A). The Cordero Mining lease covers an area of approximately 60 acres and its location as described in the lease document is excerpted as follows:

<u>DESCRIPTION</u>:

The northeast quarter of the southeast quarter of Section 29 and the south half of the southwest quarter of the northeast quarter of Section 29, Township 1 North, Range 1 East, Mount Diablo Base and Meridian, containing 60 acres more or less.

EXCEPTING THEREFROM: "That certain syphon pipe leading therefrom to a water trough on the northeast quarter of the southeast quarter of said Section Twenty-nine (29), which said water spring, trough, and pipe are excepted from this deed, "as provided for in the deed from Edward A. Howard and Daisy B. Howard, his wife, to Mount Diablo Quicksilver Company, Ltd., a corporation, dated 'December 29, 1933, and recorded Feb. 1, 1934 (File .No, 1060); And

The northwest quarter (N.W.1/4) of the southeast quarter (S.E.1/4) of Section 29, in Township 1 North of, Range 1 East, Mount Diablo Base and Meridian. Said property shall not include the following described property, to wit: that land beginning at the northwest corner of the northwest quarter of the southeast quarter of Section 29, Township 1 North, Range 1 East, Mount Diablo Base and Meridian; thence running southerly along the dividing line between the northeast quarter of the southwest quarter and the northwest quarter of the southeast quarter of said Section 29, a distance of 20 chains to the southwest comer of the northwest quarter of the southeast quarter of Section 29; thence running along the southerly line of the northwest quarter of the southeast quarter of Section 29, a distance of 2.924 chains; thence leaving said line, and running in a northerly direction a distance of 20.23 chains to the point of beginning.

EXCEPTING from the demised premises the house known as the Blomberg house together with the right to use such water as is necessary for domestic purposes. In the event the option to purchase is exercised then this exception will be without effect and title to the Blomberg house shall pass with the other property.

IN ADDITION Lessee shall have the right to any access road over which Lesser has control.

The Cordero lease area within the Mine site is graphically presented on Figure 4-1 which is overlain on the map of mining produced by the California Division of Mines and Geology (CDMG) in 1963. The lease area encompasses the historic mining operations areas, but notably excludes a significant portion of the easterly areas of exposed waste rock, the spring outflow area and the current waste and water impoundments below the Mine adjacent to Morgan Territory Road.

Cordero worked the DMEA Shaft and rehabilitated the furnace and constructed a trestle from the DMEA Shaft to the furnace location (Pampeyan and Sheahan, 1957). This area is highlighted on Figure 4-1, delineating the main surface work area for Cordero. Additional documentation indicates that Cordero conducted water handling and treatment operations extending from the DMEA Shaft to a location 1,350 feet to the west within the lease area (Sheahan, 1956 and WPCB, A.J. Inerfield, April 8, 1955 Activity Report).

The surface and below ground areas depicted on Figure 4-2 showing the DMEA Shaft and furnace area, the waste dump area, and the water disposal area west of the DMEA Shaft are the only documented work areas during Cordero's mining activities and represent the extent of known operations by Cordero.

5.0 CORDERO WASTE MANAGEMENT AND DISPOSITION

As documented in Section 3.0, the Cordero activities generated waste rock, a small amount of ore material, and water as a result of Mine de-watering before and during the mining activity. As discussed in detail below, based on documents produced by the DMEA, Regional Water Quality Control Board (RWQCB), and the California Division of Mines and Geology (CDMG), the ultimate disposition of these wastes can be effectively defined and related to the current condition of the Mine.

5.1 Waste Rock and Ore Generation and Disposition

The tunnels advanced by Cordero on the 360 Level totaled 790 feet as documented by Pampeyan and Sheahan (1957). The total volume of waste rock generated by Cordero during its 12 months of operation is calculated using a 20% bulking factor to be approximately 1,228 cubic yards (Table 1). Near the end of Cordero's operational period, Cordero encountered small zones of ore that resulted in the stockpiling of that ore for sampling and assay. The DMEA field team inspected the Mine and sampled the Cordero ore stockpile. The total ore generated by Cordero was estimated to be between 100 to 200 tons of ore with a grade of 3-10 lbs of mercury per ton (Pampeyan and Sheahan, 1957). This tonnage of ore translates to approximately 50 to 100 cubic yards of ore material.

The calculated total ore and waste rock generated by all documented mining activities prior to and including Cordero is calculated to be approximately 105,848 cubic yards as noted and referenced on Table 1. Based on these material calculations, waste rock and ore generated by the Cordero activities represents less than 1.2% of the estimated total volume of mined material at the entire Mine site.

The final disposition of the Cordero mined ore and waste rock can be ascertained through a review of before and after maps of the mine created by Pampeyan for the CDMG in 1954 and 1963 and on review of aerial photographs before and after the Cordero operational period. Pampeyan (CDMG, 1954) prepared maps of the underground mine workings, waste rock dumps and general mine information. Figure 5-1 illustrates the proposed location of the DMEA Shaft. In 1956/57, following mining by the DMEA and Cordero, Pampeyan updated this map as published in the document "CDMG, Special Report 80, Plate 3" dated 1963. The updated map is shown as Figure 5-2. A comparison of the maps shows the location of the DMEA Shaft and the addition of waste rock adjacent to the shaft that did not exist on the 1954 map as demonstrated on Figure 5-3. The map clearly shows that material generated by DMEA and Smith during the sinking of the DMEA Shaft was located at the Shaft. Site inspections in 2008 confirmed that the pile of waste rock adjacent to the DMEA Shaft on the 1956 map no longer exists (Figures 5-2 and 5-3). Based on interviews with the current property owner, Jack Wessman, it was ascertained that waste rock adjacent to the DMEA Shaft was used by Jack Wessman to re-fill the DMEA Shaft.

Additionally, the Pampeyan 1963 map depicts a large "waste dump" located north of the DMEA Shaft to the North (Figure 5-2). This waste dump is clearly seen in an aerial photograph from 1952 indicating that it appeared active at that time as shown on Figure 5-4. Dump tracks were extended north and across the road to an "unspecified location" (Schuette, 1954a) by Smith, presumably on the north facing slope in the Dunn Creek watershed where the large waste dump is mapped by Pampeyan (1963). Review of an aerial photograph from 1957 (Figure 5-5) also confirms the location of the large waste dump to the north of the DMEA Shaft, although the clarity of this photograph does not allow determination of changes as compared to the 1952 photo. The large waste dump north of the DMEA Shaft was inspected in 2008. The waste dump is on a steep slope and contains approximately 1.3 acres of large blocks of rock 2 to 10 feet in diameter that are now densely covered with vegetation. There was no indication of small amount of finer material that would have been extracted from the shaft. The current condition of the waste dump in 2008 can be seen on the aerial photo presented as Figure 5-6.

In summary, maps and aerial photos combined with anecdotal information from the current property owner indicate that material generated by Cordero in 1955 was hoisted out of the DMEA Shaft and placed adjacent to the Shaft in a waste pile that has subsequently been placed back into the Shaft. Additionally, most or all of any remaining waste rock, if any, generated by Cordero would have been disposed of in the large waste dump located immediately north of the DMEA Shaft via the dump tracks installed by Smith in 1954 expressly for this purpose (Schuette, 1954a).

5.2 De-Watering and Disposition of Waste Water

Records indicate that the first actions taken by Cordero at the Mine were to de-water and re-condition the DMEA Shaft as documented by Sheahan in his interim field report of March 6, 1956 (Sheahan, 1956). Sheahan notes in this report that *"Water from the 300 level was pumped to the surface and conveyed through two transite pipe lines to land northwest of the mine".* Sheahan (1956) goes on to state in the final paragraph of his report that *"A major contribution to the value of the property was the discovery by Cordero Mining Co. of a means for disposing of acid mine waters to the satisfaction of the State Water Pollution Board".*

Further elaboration on the disposition of water generated by Cordero was provided in the final DMEA field report (Pampeyan and Sheahan, 1957) as follows: *"A location for seepage ponds for disposing of acid mine water, heretofore a severe problem, was discovered by Cordero and met the requirements of the State Water Pollution Board."* This report also provides information on the typical pumping rate from the DMEA Shaft in the following quote: *"Intense rain storms during December 1955 increased the normal flow of mine water from about one hundred to several hundred gallons per minute and the workings were reflooded."* Thus, from these two field reports it is concluded that pumping from the mine shaft was on the order of 100 gallons per minute and the water was transported west to northwest of the Mine and the DMEA Shaft location, the opposite direction from existing ponds located on the eastern boundary of the Mine site (Figure 5-6).

These references to the pumping and transport of water from the Cordero shaft to a treatment and seepage location to the northwest are independently corroborated by inspection reports from the State Water Pollution Control Board (WPCB). On April 8, 1955, a field inspection was conducted by Arthur J. Inerfield (A.J.I.) and W.D.B. of the WPCB as documented in a short field memorandum. This memorandum provides additional detail on the disposition of water by Cordero as follows: *"Visited Mt. Diablo Mine and was shown the waste disposal installation. The water is pumped out of the shaft is aerated by passing over a few riffles and then goes to a shallow pond. Here some of the ion precipitates and settles. The supernatant is picked up and pumped through a 4" transite line 1350 ft. across the valley to the west onto a high hill where a sump has been excavated (The suction line of the pump is too low in the first pond and picks up too much sediment). On the hill the water passes over aerating riffles and goes to the excavated sump. The water percolates here to some extent."* (Field Inspection, April 8, 1955; emphasis added.)

It is clear from these inspection reports that water generated by Cordero was handled and treated in areas to the west and northwest of the DMEA Shaft. An additional site inspection was documented in an Activity Report by C.T.C. of the WPCB dated July 18, 1955, during the time of Cordero's operations, and provides further elaboration on Cordero's waste water management as follows: *"Drainage from the mine tunnels is pumped to a sump and then pumped to two disposal sites on the side of Mt. Diablo. One site receives 1/3 to 2/3 of the waste which flows into holding ponds on a flat area. Disposal is by percolation and evaporation... The percolating drainage waters are appearing in Dunn Creek which has quite good flow at the mine (probably 20-30 gallon per minute) for this time of year. Dunn Creek is usually dry now...Flow in Dunn Creek was clear and odorless. No drainage was entering the pond at the foot of the hill and there was no overflow from the pond to Dunn Creek below the mine. Present waste disposal methods are not causing nuisance downstream from the mine." (WPCB Activity Report, July 18, 1955.)*

The July 18, 1955 WPCB report quoted above further documents a key fact. Namely, the water treated by Cordero ultimately traveled into Dunn Creek, yet bypassed the existing ponds below the Mine site to the East.

The spatial relationship of the disposal program implemented by Cordero, as documented through the inspection reports referenced above, is depicted on Figures 5-2 and 5-6 demonstrating the interpreted disposal process extent and features. The notable conclusions that can be drawn from these first-hand field reports are as follows:

1. Cordero conducted water treatment in compliance with, direction from, and to the satisfaction of the WPCB;
2. The water generated was treated through small holding ponds and sumps located west to northwest of the DMEA Shaft location on the slope of Mt. Diablo;
3. The water treatment consisted of settling of solids, aeration and percolation, and mercury contamination was not a concern of the WPCB;

4. As a result of the water treatment methods, discharge by Cordero into Dunn Creek was clear and odorless and was considered to not be a nuisance;
5. The area for water disposal by Cordero is not connected to the exposed waste rock, tailings, ponds, and springs that historically and currently have negatively impacted the lower stretch of Dunn Creek and the general Marsh Creek Watershed; and
6. At no time during Cordero's leasehold or afterwards do documents indicate that the WPCB or any other regulatory agency request or Order Cordero to remove or abate any alleged nuisance concerning any mercury discharge or mercury contaminated water.

6.0 CURRENT CONDITION OF MINE SITE

The current condition of the Mine is shown on the attached 2004 aerial photograph (Figure 6-1). The aerial photo has been overlain with a mine features map taken from the CDMG 1963 publication to demonstrate the relevant position of pre- and post-Cordero mining features (CDMG 1963). The relevant features of note on Figure 6-1 are labeled and include the following; collapsed mine workings area, furnace and processing area, DMEA Shaft, northern waste dump, eastern tailings piles and waste rock piles, series of three ponds on the eastern part of the Mine adjacent to Morgan Territory Road, the locations of two springs, and the outline of underground workings.

Since the operations of Cordero in 1955, multiple operators and property owners have been involved in actions that have modified the physical features of the general Mine area. Most notably, the current property owner, Jack Wessman, over the period of his ownership since 1974, has conducted significant earth moving work at the Mine involving the importation of a significant quantity of fill material (reported by Jack Wessman to be on the order of 50,000 cubic yards) and the movement and grading of this fill material around the Mine site and area.

Based on discussions with Jack Wessman conducted during site inspections in 2008, this work has specifically included: 1) infilling of the original collapsed Mine workings located to the north of the DMEA Shaft and Cordero work area, 2) filling of the DMEA Shaft and filling and covering of waste rock below the shaft toward the furnace, 3) filling of a small pond located west of the DMEA Shaft, 4) grading of waste rock and tailings piles located to the east of and overlying the Mine workings as part of surface drainage control actions, and 5) installation of drains and drainage pipe for the purpose of redirecting surface rainfall runoff in the upper Mine area around the exposed tailings and waste rock into Dunn Creek directly bypassing flow through the lower collection pond.

The purpose of this earthwork and grading by Jack Wessman was to diminish the ability for surface water runoff to be channeled through the exposed waste rock and tailings such that the total loading of mercury and other contaminants to the Lower Pond, and ultimately Marsh Creek, was reduced. According to Jack Wessman, he conducted this work directly at the behest and generally under the direction and guidance of the CRWQCB, purportedly too reduce mercury and contaminant loading to Marsh Creek and environs.

As a result of the property modifications described above, the current condition of surface drainage across the Mine has been roughly interpreted and plotted on the attached Figure 6-2. This Figure demonstrates surface drainage as it exists related to the Cordero operations. As intended by the current property owner, current surface drainage for the upper Mine areas, including the Cordero operations around the DMEA Shaft area, is captured and routed around the exposed tailings and waste rock and around the Lower Pond emptying directly into Dunn Creek at a location up-gradient of the Lower Pond.

6.1 Mine Condition as It Relates to Sources of Current and Historic Pollution in Marsh Creek

The potential for contamination of Marsh Creek has long been of concern, resulting in considerable sampling of Marsh Creek, Dunn Creek, Horse Creek, pond effluent, etc., over the past 50+ years (WPCB Document Log). Generally, these sampling events have consisted of collecting grab samples under varying conditions (ranging from high runoff periods, to periods of little or no runoff). Sampling has usually been conducted by the RWQCB and its predecessor, the WPCB, as part of annual inspection visits to the mine that have occurred since the early 1950's. Indeed, the WPCB was involved prior to and during the Cordero operations period and issued an order regarding control of discharges to Marsh Creek from mining activities prior to Cordero's lease of part of the Mine site in November 1955. Compliance with this prior order was a stipulation in the Cordero Lease (Appendix A), and as discussed in Section 5.2, Cordero was in compliance with State Board requirements with respect to their water discharge.

Prior to the operational period of Cordero, sources of pollution of lower Dunn Creek and Marsh Creek included the continuous discharge of water produced from de-watering of the mine workings by previous operators and, the surface runoff across mine waste rock and tailings into the Lower Ponds and ultimately into Dunn Creek and the Marsh Creek Watershed.

Since the Cordero operational period, sources of pollution to Marsh Creek have been the movement of surface runoff over and through the eastern side of the Mine, consisting of Bradley's tailings and waste rock combined with the draining of acidic water from a spring located underneath the waste rock. This spring is interpreted to emit from the buried mine portal that was the only lateral tunnel exiting the pre DMEA/Cordero original mine workings (the 165 foot tunnel (Figure 3-3). This surface and spring/mine water drain directly into the Lower Pond. As the Lower Pond fills, it overflows out of its southwest corner and mixes with spring water from a nearby flowing spring on State Park land, moving into Dunn Creek and thence into Marsh Creek and the greater Marsh Creek watershed. These site features/conditions are demonstrated on Figure 6-2.

A three year study of the Marsh Creek Water shed was conducted by Contra Costa County to comprehensively determine the sources of mercury in the Marsh Creek watershed, both natural and anthropogenic. The results of this study are summarized in a March 1996, report titled "Marsh Creek Watershed 1995 Mercury Assessment Project – Final Report" prepared by Darell G. Slotton, Shaun M. Ayers, and John E. Reuter (Slotton et. al, 1996).

As part of this Mercury Assessment Project, sampling was conducted at the Mine area including the Lower Pond, the spring on State Park property, the spring emanating from the waste rock, and other locations upstream in Dunn Creek and downstream along Marsh Creek. Based on the results of the 3-year study and extensive sampling of the entire Marsh Creek watershed, the Slotton report concluded that the Mount Diablo Mercury Mine, and specifically the exposed tailings and waste rock (Bradley's waste) above the existing pond combined with acidic discharge from the spring emanating from the waste rock above the pond, was the dominant source of mercury in the watershed. Sampling of Dunn Creek above the Lower Ponds indicated minimal sourcing of mercury was occurring from the watershed immediately above the Lower Pond. The chemical results of the Slotton et. al. 1996 study in the Mine area are depicted graphically in Figure 6-3 excerpted from the Slotton Report.

As stated by Slotton et. al. (1996) the data indicates that *"the great majority of the mercury load emanating from the tailings is initially mobilized in the dissolved state. This dissolved mercury rapidly partitions onto particles as it moves downstream. The bulk of downstream mercury transport is thus particle-associated."* The Slotton report also states that *"...major mitigation focus should be directed toward source reduction from the tailings piles themselves, with subsequent containment of the remaining mobile mercury fraction being a secondary consideration."*

In summary, the results of years of sampling, numerous site inspections by the WPCB and the RWQCB, and the results of an extensive study of the Marsh Creek watershed, all indicate that the continuing source of mercury impact to lower Dunn Creek and Marsh Creek and its environs emanates from the Lower Pond that is filled via spring discharge and surface runoff that flows over Bradley's eastern tailings and waste rock piles at the Mine. These areas and the origin of these materials are separate in space and time from activities conducted by Cordero during its short period of operation at the Mine. Any residual waste rock and sediment from water treatment activities by Cordero exist, if at all, primarily in the northwestern portion of the Mine area that naturally drains into Dunn Creek at locations above and up-gradient of the identified sourcing area for mercury impacts to Marsh Creek. Sampling of Dunn Creek and "My" Creek above the Lower Pond indicates minimal to no mercury impact.

7.0 SUMMARY OF CORDERO DIVISIBILITY POSITION

Cordero mining activity occurred over 12 months from January to December 1955 and consisted of repairing lagging, and mucking and de-watering of the existing DMEA Shaft, followed by driving a new crosscut and drifts from the shaft at the 360 Level totaling 790 feet of new tunnel. The Cordero cross-cutting and drifting activities generated approximately 1,228 cubic yards of waste rock (less than 1.2% of material generated by others at the Mine) of which 50 to 100 cubic yards was considered low grade ore material. This waste rock and ore was ultimately used to backfull the DMEA Shaft and/or incorporated into the Waste dump located immediately north of the shaft. De-watering the Mine required a pumping rate on the order of 100 gallons per minute. The water was transported west to northwest of the Mine where it was treated via settlement of solids, aeration and percolation to the satisfaction of the WPCB (predecessor to the RWQCB).

Mining activities by Cordero were naturally confined to a small portion of the area Cordero leased from Mt. Diablo Quicksilver which, above-ground, encompasses the historic mining operations areas, but notably excludes the easterly areas of exposed waste rock, the spring outflow area and the current waste and water impoundments below the Mine adjacent to Morgan Territory Road. The results of years of sampling, site inspections by the WPCB and the RWQCB, and the results of an extensive study of the Marsh Creek watershed indicate that the continuing source of impact to lower Dunn Creek and Marsh Creek and its environs emanates from the Lower Pond that is filled via spring discharge and surface runoff that flows over Bradley's eastern tailings and waste rock piles at the Mine. These locations and the origin of these materials are outside the Cordero Lease area and are separate from activities conducted by Cordero during its short period of operation at the DMEA shaft location at the Mine. As a result of property modifications by the current property owner, current surface drainage for the upper Mine areas, including the former Cordero operations area, is captured and routed around these exposed source areas of tailings and waste rock, and around the Lower Pond, emptying directly into Dunn Creek and thus bypassing the current source of mercury to Marsh Creek.

The record shows that work conducted and materials generated during Cordero's mining activity were not and are not related to the past and continuing release of mercury-contaminated waters into the existing impoundments (including the Lower Pond) at the base of the Mine, or into Marsh Creek. The Cordero work areas both above and below ground are demonstrably separate and "divisible" from the existing piles of waste rock, tailings, impoundments, and springs that currently combine to create the condition of continuing impacts to the Marsh Creek watershed. Furthermore, the Slotton Report reveals that sampling data collected during the Marsh Creek watershed study indicate that surface drainage from the areas of Cordero work and waste materials do not contribute any significant mercury and contaminant loading to Dunn or Marsh Creeks.

8.0 PROPOSED AREA OF STUDY

Documents indicate that Cordero's operations were centered on the DMEA shaft and facilities/roads in the immediate area. The proposed area of study is recommended to be centered on the shaft and immediately around the shaft area. The study would be focused on an assessment of materials that may be related to Cordero activities and that may have the potential to produce negative contaminant impacts to Dunn and Marsh Creeks.

9.0 LEGAL BASES FOR DIVISIBILITY[1]

Any order requiring Sunoco to investigate and/or remediate the Mine site should be limited in scope because, as outlined in more detail below: (1) under well-established California law, lessees such as Cordero are not responsible for investigating or remediating continuing nuisances related to discharges by others, and (2) under federal law, the United States Supreme Court has recently held that divisibility is proper where a party such as Cordero can show that a reasonable basis for apportionment exists.

The Revised Order states that:

> "[a]' discharger has a legal obligation to investigate and remediate contamination. As described above, Sunoco, Inc. is subject to this Order because of its ownership interest in the Cordero Mining Company, which operated Mount Diablo Mercury Mine and discharged waste to waters of the state. Therefore, it is a 'person[s] who [have] discharged . . . waste' within the meaning of CWC section 13267.

While a discharger may have a legal obligation to investigate and remediate contamination they caused, no such obligation exists where another caused the contamination. This is particularly true of alleged dischargers who merely leased, but did not own, a site. Moreover, the Revised Order's reference to the "Mount Diablo Mercury Mine" is vague, and appears to suggest, without any evidentiary basis, that Cordero mined the entire underground workings and is somehow responsible for all waste mine rock and tailings in the area of the Mine, as well as for all historical discharges of mercury contaminated water to a settlement pond at the base of the site and into the Marsh Creek watershed generally. In this regard, the Revised Order appears to suggest that Sunoco is required to investigate waste and discharges known to have been caused by others (i.e., Bradley Mining Company). The Revised Order states:

> "[a]cid mine drainage containing elevated levels of mercury and other metals are being discharged to a pond that periodically overflows into Horse and Dunn Creeks" and that "[f]urther site investigation is required to assess the extent of pollution discharged from the mine site and to evaluate the remedial options to mitigate the discharge." (RO at p. 1.)

This Divisibility Report provides the legal and factual basis for limiting the scope of Sunoco's Site investigation and any potential subsequent remediation. The Regional Board has not articulated any legal or factual basis for requiring Sunoco to investigate or remediate areas of the Mine that were historically operated by other responsible parties, such as Bradley.

1. The Regional Board's Purported Theory of Liability – Passive Migration/ Continuing Nuisance

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[1] This section 9.0 was prepared by Edgcomb Law Group

i. In the Matter of the Petition of Zoecon Corporation

In discussions with Edgcomb Law Group (outside counsel for Sunoco) regarding Cordero's alleged liability, Patrick Pulupa, Staff Counsel, State Water Resources Control Board Office of Chief Counsel, stated that the Regional Board is basing Cordero's liability on a passive migration theory. According to this theory, Cordero's lease of a portion of the Mine site provided it with legal control sufficient to allow it to remediate continuing nuisances in the areas covered in the lease – including discharges caused by other parties. Under California law, however, while subsequent *owners* may be liable in some instances for passive migration of contaminants from a continuing nuisance created by a predecessor, lessees such as Cordero cannot be held liable for discharges of another. While the Revised Order generally references sections of the California Water Code, neither the Revised Order nor Mr. Pulupa have specifically articulated any legal authority that might support liability of a lessee under a passive migration theory, although it appears to be loosely and erroneously based on the State Water Resource Control Board decision In the Matter of the Petition of Zoecon Corporation, Order No. WQ 86-02 ("Zoecon").

Zoecon applies to site owners and former owners, but not to lessees such as Cordero. Under Zoecon, a current owner may face liability because it has the authority to abate a continuing nuisance resulting from the passive migration of contaminants, even where caused by a predecessor owner. However, nothing in Zoecon supports a finding of liability for former lessees such as Cordero, which neither caused any continuing nuisance resulting from the mining operations of others (i.e., Bradley), nor has any current authority to abate it. In Zoecon, the Regional Board concluded that the petitioner, the *current site owner*, was legally responsible for conducting the required investigation or remedial action. (Zoecon at p. 2.) The State Board based its decision on a passive migration, continuing nuisance theory, stating:

> "Therefore we must conclude that there is an actual movement of waste from soils to ground water and from contaminated to uncontaminated ground water at the site which is sufficient to constitute a "discharge" by the petitioner for purposes of Water Code §13263(a)." (Zoecon at p. 4.)
>
> Water Code §13263(a) provides:
>
> "(a) The regional board, after any necessary hearing, shall prescribe requirements as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge, except discharges into a community sewer system, with relation to the conditions existing in the disposal area or receiving waters upon, or into which, the discharge is made or proposed. The requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241." (CWC §13263(a).)

Zoecon also states, "...here the waste discharge requirements were imposed on Zoecon not because it had 'deposited' chemicals on to land where they will eventually 'discharge' into state waters, but because it ***owns*** contaminated land which is directly discharging chemicals into water." (Zoecon at p. 5; emphasis added.) Similarly, in Zoecon the Regional Board made the "determination that property ***owner*** is a discharger for purposes of issuing waste discharge requirements when wastes continue to be discharged from a site into waters of the state." (Id.; emphasis added.)

Later, Zoecon states, in explaining why a New Jersey court's conclusion regarding application of the common law nuisance doctrine would probably not be applied by a California court, that, "[t]his is because California Civil Code §3483 provides that every successive ***owner*** of property who neglects to abate a continuing nuisance upon, or in the use of, such property, created by a former owner, is liable therefore in the same matter as the one who first created it." (Zoecon at p. 10; emphasis added). Zoecon acknowledged that "[c]ommon law governs in California only to the extent that it has not been modified by statute." (Id. at p. 10, fn 6.) In this regard, Zoecon recognized that the California legislature specifically excluded lessees from liability in codifying nuisance law, since Civil Code §3483 only applies to "owners," and not lessees. Thus, Zoecon does not apply to lessees such as Cordero, and to the extent the Revised Order attempts to require Sunoco to investigate and remediate waste discharged by others such as Bradley, it is inappropriate and unsupported by the facts and law.

ii. Under California Civil Code §3483 Lessees Such As Cordero Are Not Liable For Nuisances Created Prior To The Leasehold.

California Civil Code §3483 assesses continuing nuisance liability only upon owners and former owners, not lessees. The plain language of §3483 reveals that the legislature explicitly excluded lessees from liability for continuing nuisance:

> "Every successive ***owner*** of property who neglects to abate a continuing nuisance upon, or in the use of, such property, created by a former owner, is liable therefor in the same manner as the one who first created it." (Cal. Civ. Code § 3483; emphasis added.)

Even if the Regional Board were to somehow find that Cordero was a constructive owner of the Site (which it was not), Cordero would still not face liability under California law, because it is well-established that "*. . .* ***there is no dispute in the authorities that one who was not the creator of a nuisance must have notice or knowledge of it before he can be held [liable].***" (Reinhard v. Lawrence Warehouse Co., 41 Cal.App.2d 741 (1940) (emphasis added), citing Grigsby v. Clear Lake Water Works Co., 40 Cal. 396, 407 (1870); Edwards v. Atchison, T. & S. F. R. Co., 15 F.2d 37, 38 (1926).) Moreover, "[i]t is a prerequisite to impose liability against a person who merely passively continues a nuisance created by another that he should have notice of the fact that he is maintaining a nuisance and be requested to remove or abate it, or at least that he should have knowledge of the existence of the nuisance." (Reinhard, supra, at 746.)

The Revised Order's allegation that "[a]cid mine drainage containing elevated levels of mercury and other metals are being discharged to a pond that periodically overflows into Horse and Dunn Creeks" (RO at p. 1), is insufficient to trigger liability on the part of Cordero since, in addition to it never having been an owner, no evidence is presented proving that Cordero was on notice of the fact that it was maintaining a nuisance and had been requested to remove or abate it, or that it had knowledge of the existence of the nuisance. Indeed, records indicate that during Cordero's leasehold, the SWPCB specifically noted that Cordero was not maintaining any nuisance related to soil or water discharge of any contaminant, and in fact commended Cordero for its beneficial water management practices. If the Regional Board was not aware of the nuisance at the time, there is no reason to believe that Cordero should have had knowledge that a continuing nuisance – created by it or any other lessee or owner of the Site – existed on its leased property at the time.

Simply put, the Regional Board fails to provide any legal or factual basis for the conclusion that Cordero has legal liability as an "owner" and, therefore, a discharger, under a passive migration/continuing nuisance theory. Thus, the Revised Order's attempt to name Cordero as a party responsible for the discharge(s) of others at the Mine site is unsupported by California law.

iii. Under Federal Law, Divisibility Is Proper Because Sunoco Can Show A Reasonable Basis For Apportionment

The United States Supreme Court recently held that divisibility is appropriate where a party can show a reasonable basis for apportionment. (Burlington Northern & Santa Fe Railway Co. et al. v. United States, (2009) 129 S. Ct. 1870.) In Burlington, neither the parties nor the lower courts disputed the principles that govern apportionment in CERCLA cases, and both the District Court and Court of Appeals agreed that the harm created by the contamination of the Arvin site, although singular, was theoretically capable of apportionment. (Id. at 1881.) Thus, the issue before the Court was whether the record provided a "reasonable basis" for the District Court's divisibility conclusion. (Id.) Despite the parties' failure to assist the District Court in linking the evidence supporting apportionment to the proper allocation of liability, the District Court ultimately concluded that this was "a classic 'divisible in terms of degree' case, both as to the ***time period in which defendants' conduct occurred***, and ownership existed, ***and as to the estimated maximum contribution of each party's activities that released hazardous substances that caused Site contamination***." (Id. at 1882; emphasis added.)

Consequently, the District Court apportioned liability, assigning one set of defendants 9% of the total remediation costs. (Id.) The Supreme Court concluded that the facts contained in the record reasonably supported the apportionment of liability, because the District Court's detailed findings made it abundantly clear that the primary pollution at the facility at issue was contained in an unlined sump and an unlined pond in the southeastern portion of the facility most distant from the defendants' parcel and that the spills of hazardous chemicals that occurred on that parcel contributed to no more than 10% of the total site contamination, some of which did not require remediation. (Id. at 1882-3) Thus, the Supreme Court recognized that ". . . ***if adequate***

information is available, divisibility may be established by 'volumetric, chronological, or other types of evidence,' including appropriate geographic considerations" (Id. at 1883; emphasis added.) Although the evidence adduced by the parties did not allow the court to calculate precisely the amount of hazardous chemicals contributed by the parcel to the total site contamination or the exact percentage of harm caused by each chemical, the evidence did show that fewer spills occurred on the parcel and that of those spills that occurred, not all were carried across the parcel to the sump and pond from which most of the contamination originated. (Id.) Because the District Court's ultimate allocation of liability was supported by the evidence and comported with general apportionment principles, the Supreme Court reversed the Court of Appeals' conclusion that the defendants are subject to joint and several liability for all response costs arising out of the contamination of the facility. (Id.)

It is well-established that "litigants may not invoke state statutes in order to escape the application of CERCLA's provisions in the midst of hazardous waste litigation." (Fireman's Fund Insurance Company v. City of Lodi, 303 F.3d 928, 947 n. 15 (9th Cir. 2002).) Similarly, because "[f]ederal conflict preemption [exists] where 'compliance with both the federal and state regulations is a physical impossibility,' or when the state law stands as an 'obstacle to the accomplishment and execution of the full purposes and objectives of Congress'" (Id. at 943), the Regional Board may not – in an attempt to assess joint and several liability – assert any state law provisions that would be inconsistent with Burlington, and applying its holding to the facts outlined herein related to Cordero's operations at the Mine site, apportionment is appropriate and there is no basis for the Regional Board to find Cordero jointly and severally liable for mercury contamination caused by any other discharger at the Site based solely on a former lease.

Specifically, Cordero can show adequate information to support divisibility "by volumetric, chronological, or other types of evidence, including appropriate geographic considerations." Cordero can make a reasonable showing based on records of its operations produced by the United States Geological Survey ("USGS"), that: (1) Cordero is only responsible for 1% of the total volume of mine related waste at the Site; (2) Cordero's operations did not result in the processing of any mercury ore, which means that it generated no calcine tailings, unlike the extensive tailings generated by Bradley and others; (3) Cordero discharged or otherwise treated its mine water to the satisfaction of the SWPCB (which specifically did not find any nuisance) and disposed of it to the west of the Mt. Diablo Mine Site, which drained into the Dunn Creek watershed – which is unrelated to areas of concern identified in the *Marsh Creek Watershed 1995 Mercury Assessment Project – Final Report* ("Slotton Report"); and (4) Cordero dumped its waste mine rock to the north of the DMEA mine site, away from the Bradley waste rock and tailings (which the Slotton Report identify as the source of mercury contamination) on the eastern side of the site. Thus, based on all relevant facts, Cordero has demonstrated a reasonable basis for apportionment and divisibility, and should not be required under state or federal law to investigate or remediate any continuing nuisance caused by other lessees, owners, or operators of the Mine site.

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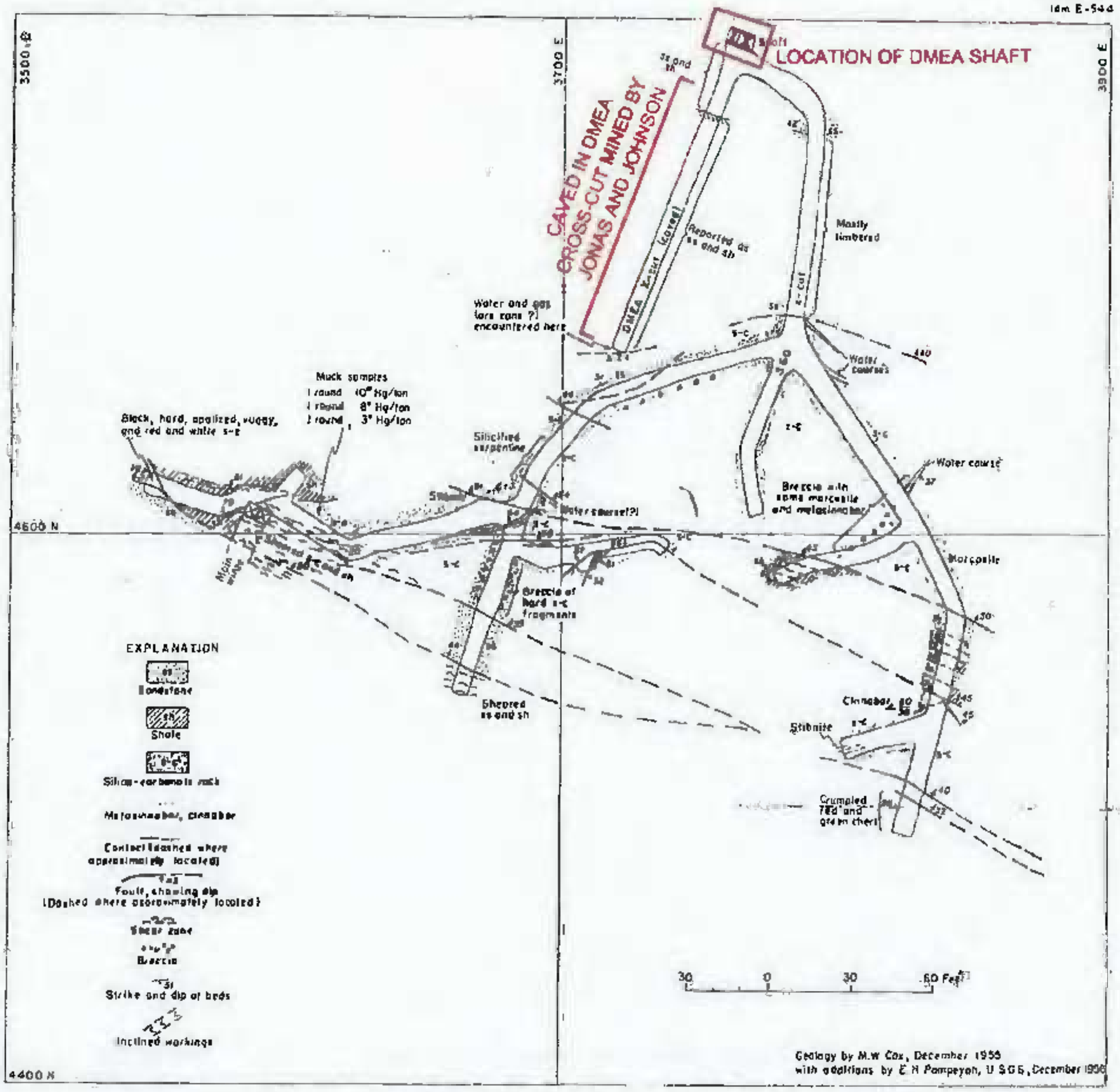
FIGURES

2/108-284

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DMEA 2448
(MERCURY)
Idm E-544



Geology by M.W Cox, December 1955
with additions by E H Pampeyan, U S G S, December 1956

Figure 3. GEOLOGIC PLAN OF 360 LEVEL, MT DIABLO QUICKSILVER MINE
CONTRA COSTA COUNTY, CALIFORNIA

THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

PROJECT NO.:	DATE:	DR.BY:	APP. BY:
01-SUN-050	07/16/09	JP	PH

0 60 120
HORIZONTAL SCALE IN FEET

PLAN VIEW OF CORDERO TUNNEL SYSTEM

N

FIGURE:
3-1

3- 90/597

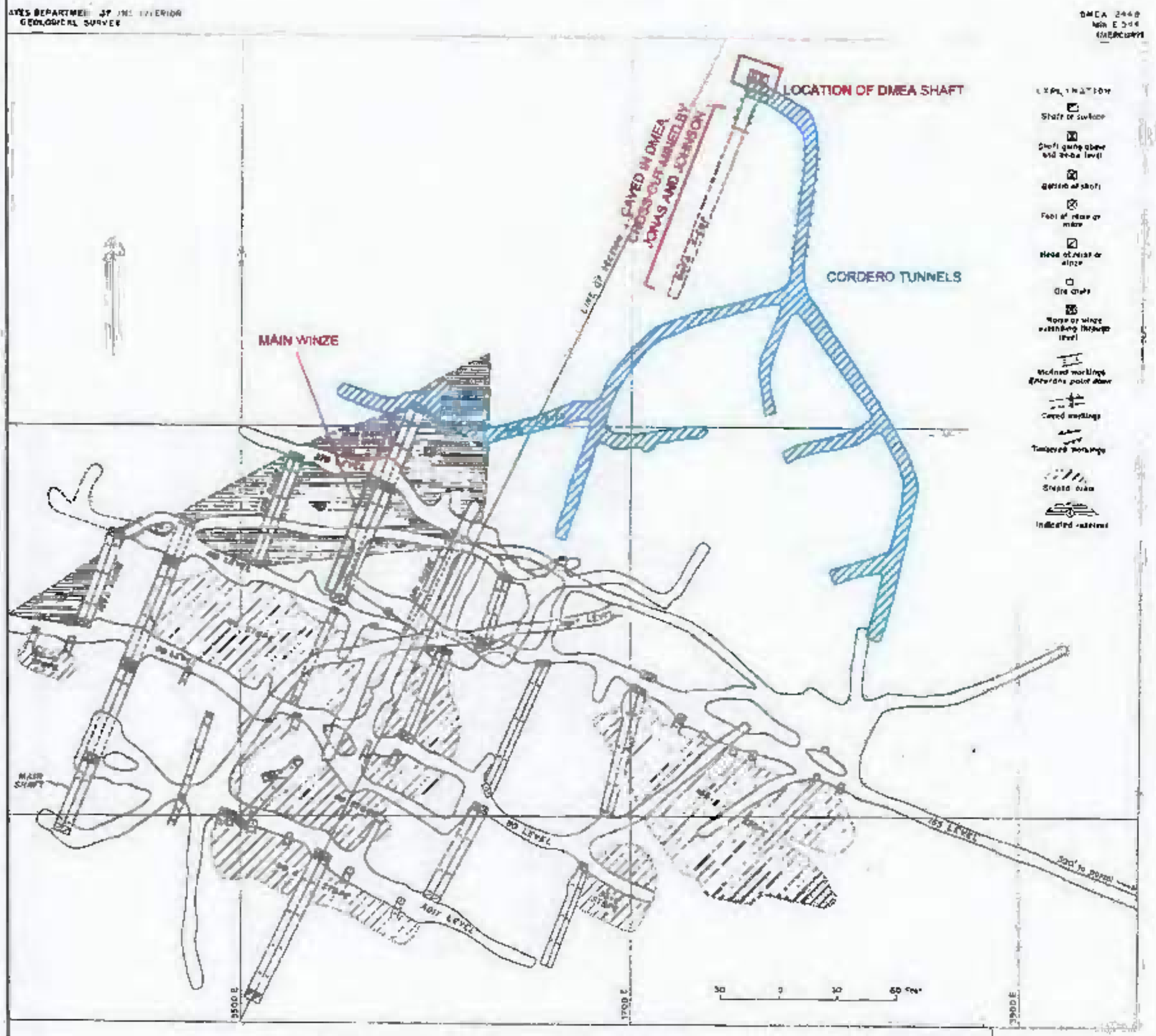


Figure 4 COMPOSITE MAP OF MILL WORKINGS, MT DIABLO MINE
CONTRA COSTA COUNTY, CALIFORNIA

LEGEND

▨ Cordero Workings

PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-SUN-050	07/16/09	JP	PH

0 60 120
HORIZONTAL SCALE IN FEET

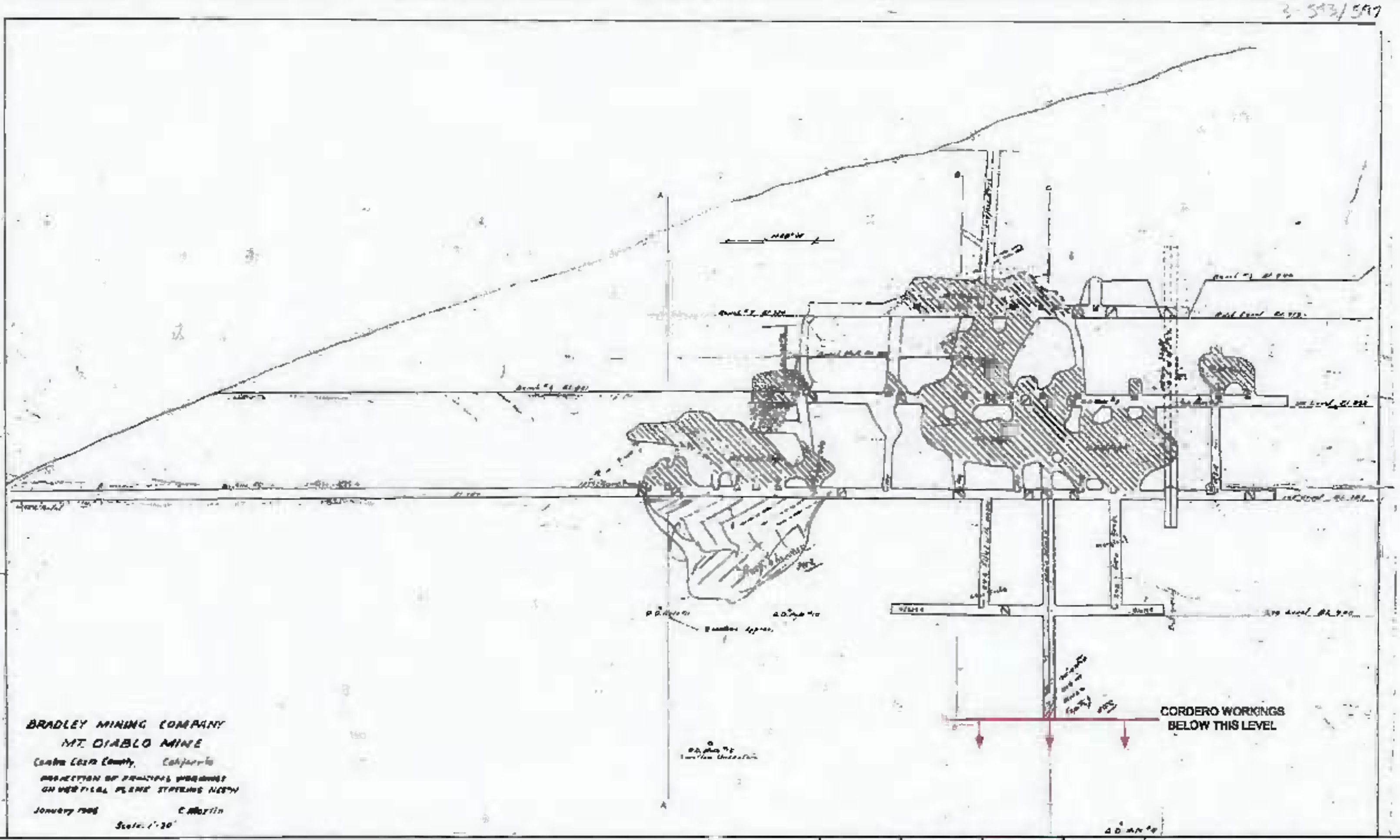
PLAN VIEW OF CORDERO TUNNEL SYSTEM WITH PRE-CORDERO TUNNELS

SGI environmental THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE:
3-2

3-553/597



LEGEND

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-050	07/27/09	JP	PH

NA NA NA
HORIZONTAL SCALE IN FEET

CROSS SECTION OF PRE-CORDERO TUNNEL SYSTEM

THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE:
3-3

LEGEND

- Mine Structure (1953)
- ▲ Spring
- Pond (2004 Outline)
- DMEA/Cordero Waste Rock
- Main Winze, Sub-Vertical Connector

Underground Workings

- Adit Level
- 80-ft Level
- 165-ft Level
- 270-ft Level
- 360-ft Level (Cordero)

SGI environmental

THE SOURCE GROUP, INC.
3451C VINCENT ROAD
PLEASANT HILL, CA 94523

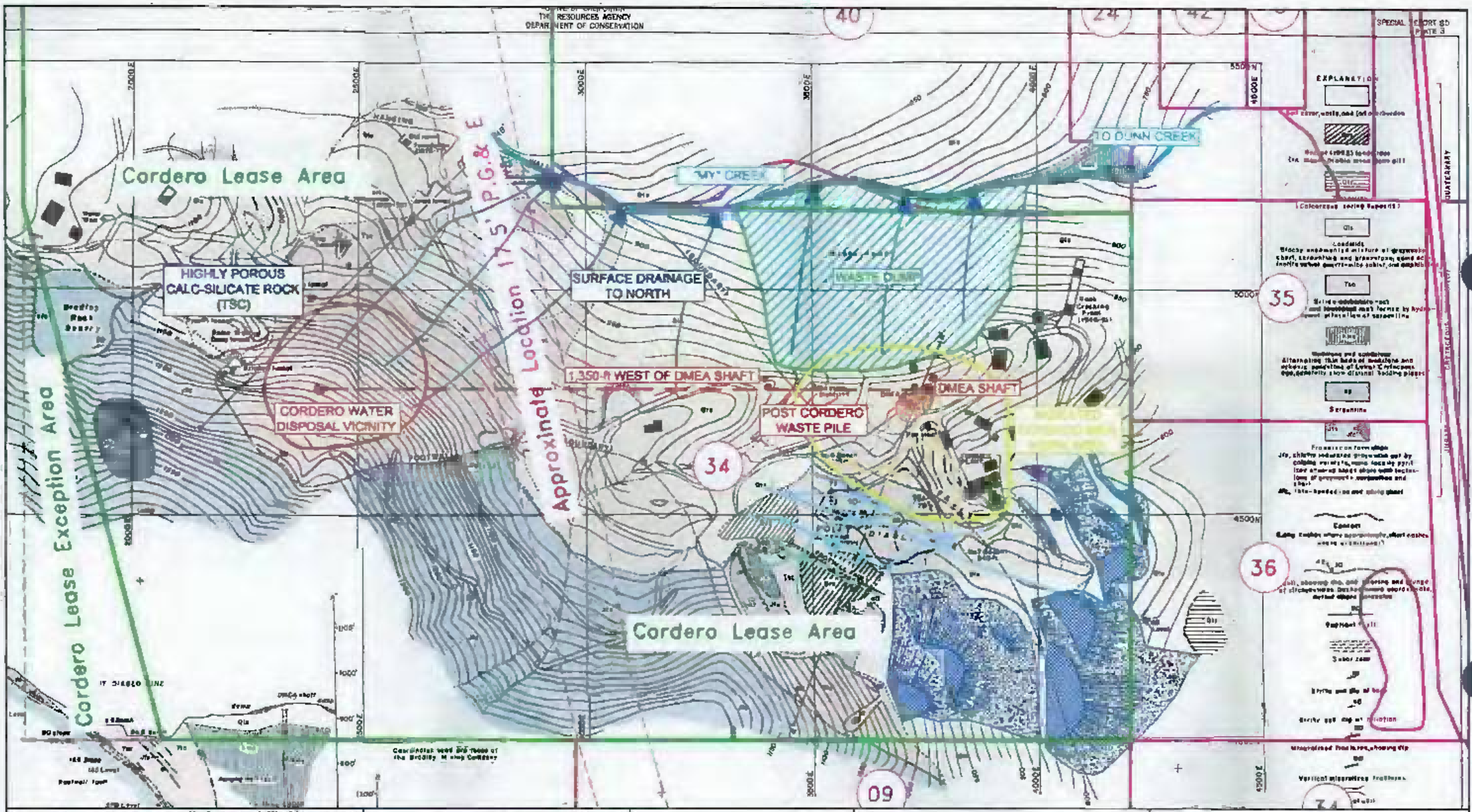
SCALE

0 150 300
SCALE IN FEET

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

2004 AERIAL PHOTO WITH PRE- AND POST- DMEA/CORDERO MINE FEATURES

FILE NAME	DATE	DR. BY	APP. BY	PROJECT NO.	FIGURE NO.
Mine Features Map.dwg	5/4/09	JP	PH	01-SUN-050	3-4



LEGEND

▱ Mine Structure (1953)

Tailings/Waste Rock (Pre Cordero)

Waste Rock (DMEA/Cordero)

Underground Workings

Adit Level

80–ft Level

165–ft Level

270–ft Level

360–ft Level (Cordero)

SGI environmental THE SOURCE GROUP, INC.
3451C VINCENT ROAD
PLEASANT HILL, CA 94523

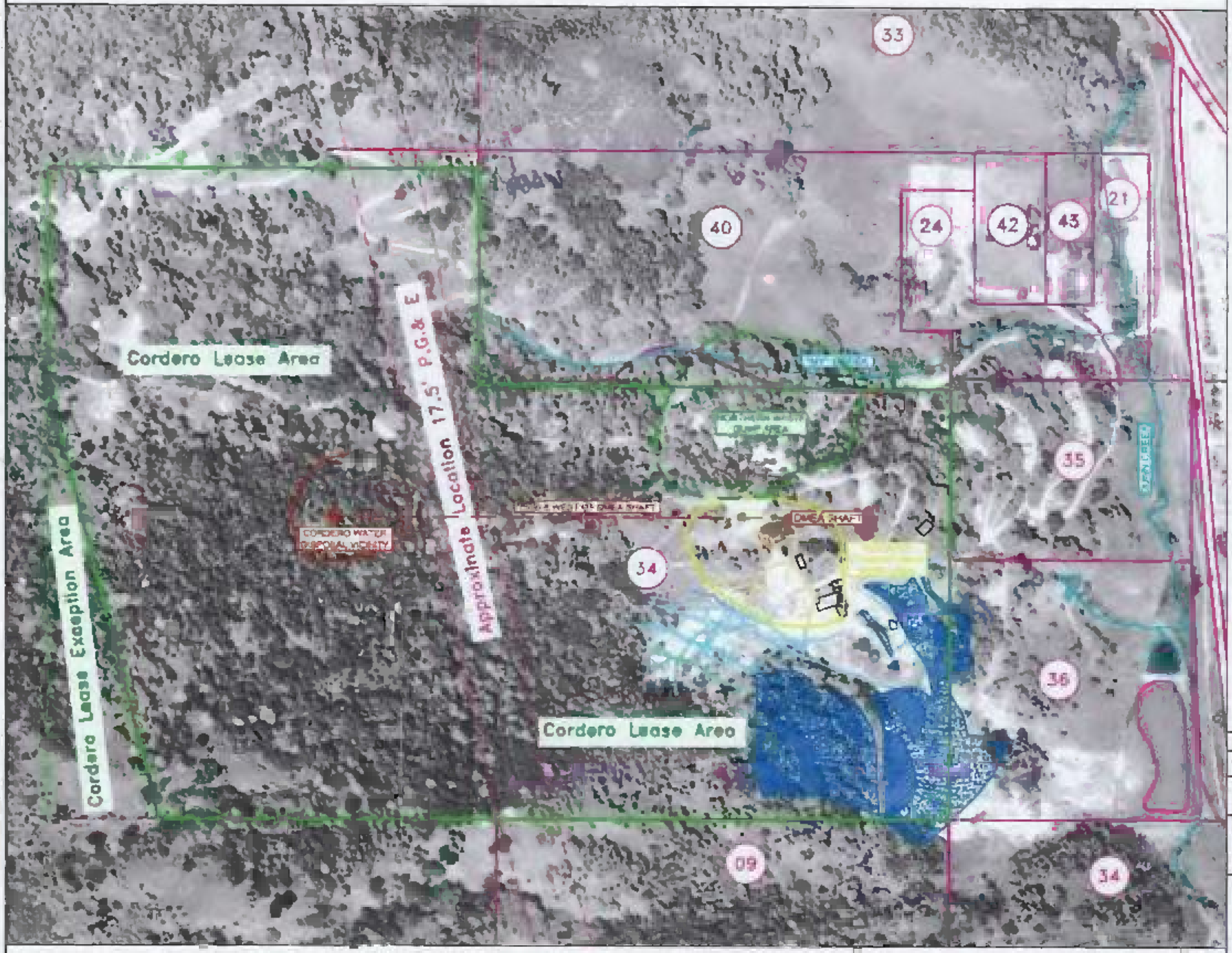
SCALE

0 200 400
SCALE IN FEET

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

DMEA MAP SHOWING PRE- AND POST- DMEA/CORDERO MINE FEATURES

FILE NAME	DATE	DR. BY	APP. BY	PROJECT NO.	EXHIBIT
Mine Features Map.dwg	4/14/09	JP	PH	01-SUN-050	4-1



LEGEND

Mine Structure (1953)

Tailings/Waste Rock (Pre Cordero)

Waste Rock (DMEA/Cordero)

Underground Workings
- Adit Level
- 80-ft Level
- 165-ft Level
- 270-ft Level
- 360-ft Level (Cordero)

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-050	07/17/09	JP	PH

0 300 600

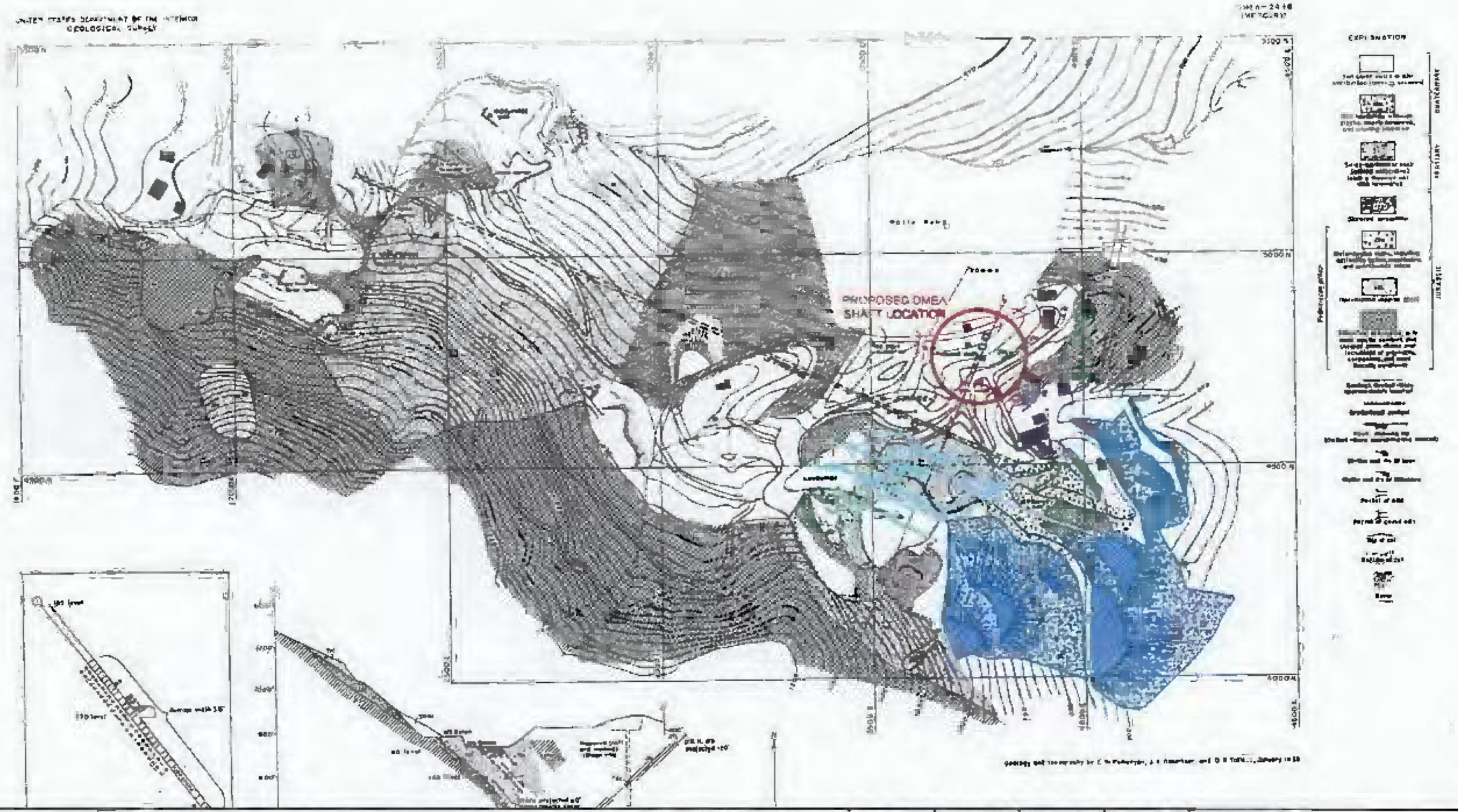
HORIZONTAL SCALE IN FEET

2004 AERIAL PHOTO SHOWING PARCEL AND CORDERO LEASE BOUNDARIES

SGI THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE: 4-2



LEGEND

▭	Mine Structure
▨	Pre-Cordero Tailings and Waste Rock

Underground Workings (Pre Cordero)
- Adit Level
- 80-ft Level
- 165-ft Level
- 270-ft Level

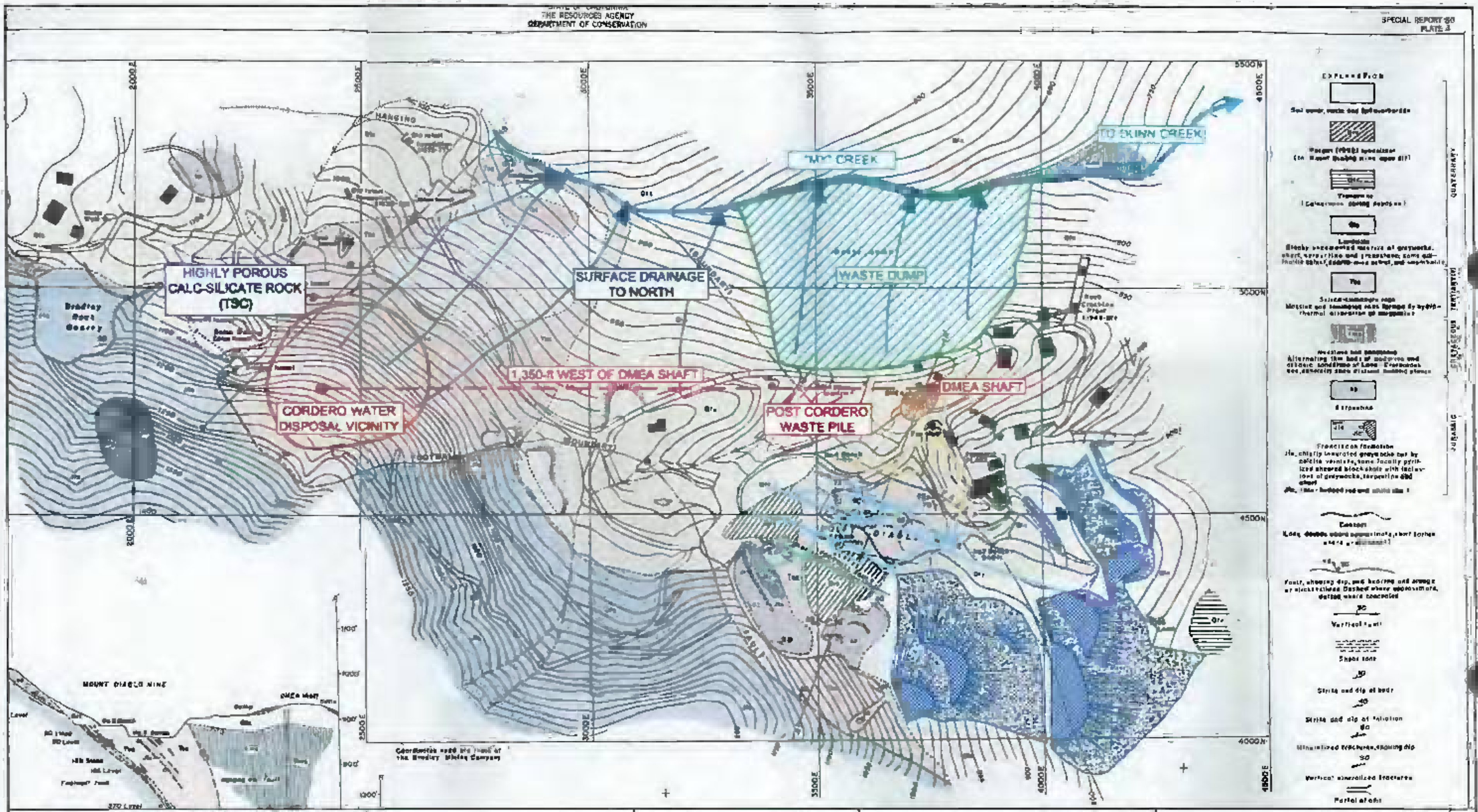
PROJECT NO.	DATE	DRAWN BY:	APP. BY:
01-SUN-050	07/16/09	JP	PH

0 250 500
HORIZONTAL SCALE IN FEET

USGS DMEA MAP SHOWING PROPOSED DMEA SHAFT LOCATION

SGI environmental THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

FIGURE:
5-1



LEGEND

Mine Structure (1953)

Tailings/Waste Rock (Pre Cordero)

Waste Rock (DMEA/Cordero)

Underground Workings

Adit Level

80-ft Level

165-ft Level

270-ft Level

360-ft Level (Cordero)

THE SOURCE GROUP, INC.
3451C VINCENT ROAD
PLEASANT HILL, CA 94523

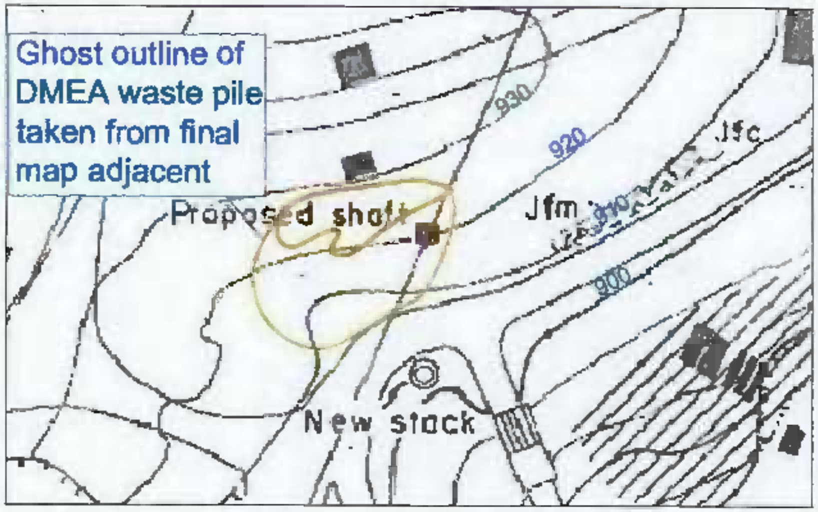
SCALE
0 200 400
SCALE IN FEET

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

USGS DMEA MAP SHOWING PRE- AND POST- DMEA/CORDERO MINE FEATURES

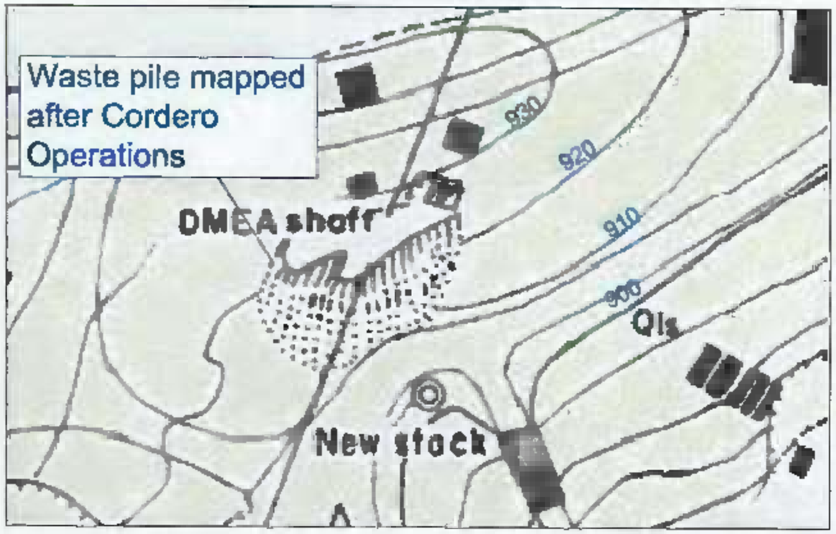
FILE NAME	DATE	DR. BY	APP. BY	PROJECT NO.	EXHIBIT
Mine Features Map.dwg	4/14/09	JP	PH	01-SUN-050	5-2

Pre-DMEA Shaft



Ghost outline of DMEA waste pile taken from final map adjacent

Post-DMEA Shaft



Waste pile mapped after Cordero Operations

LEGEND

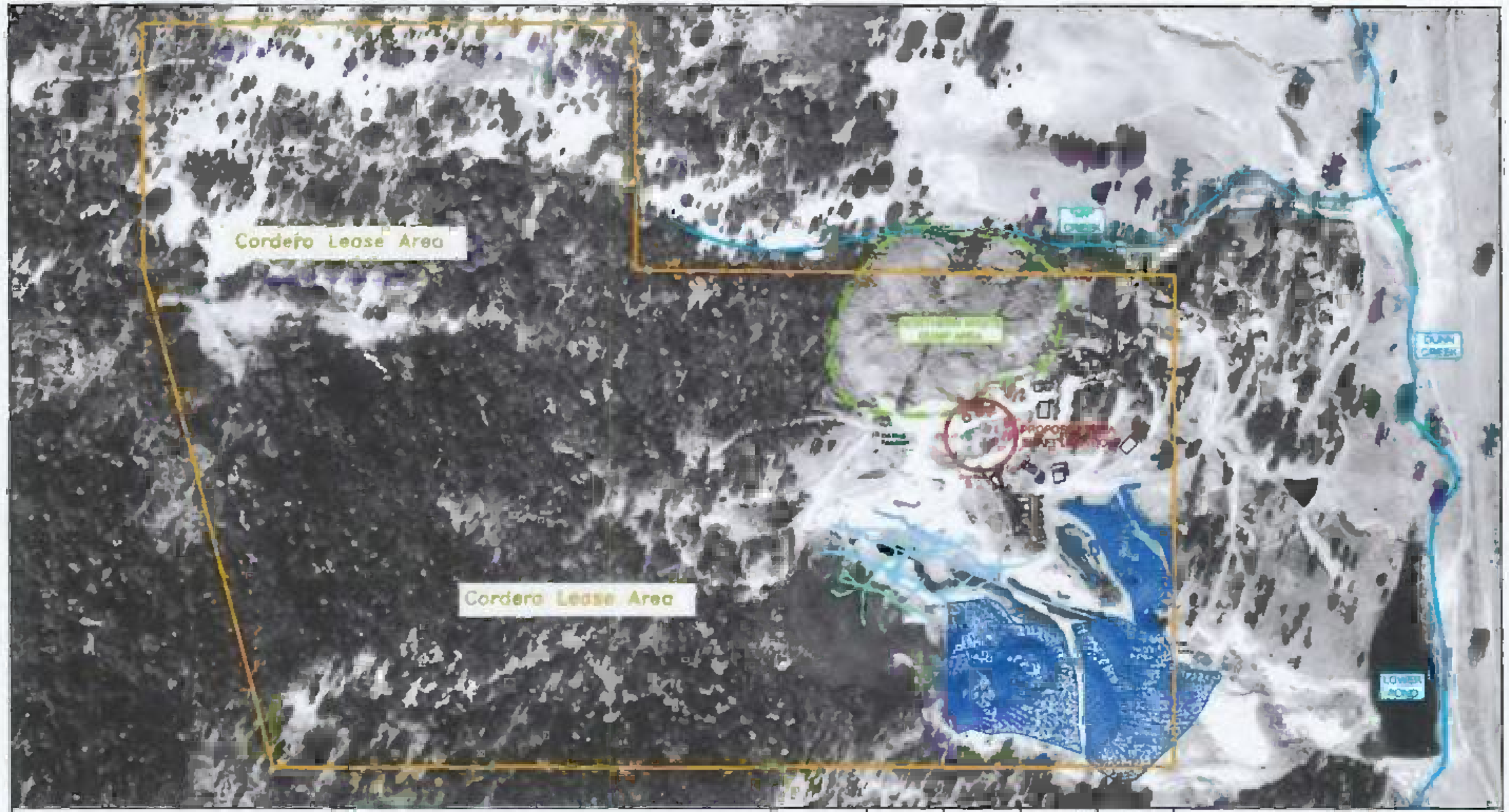
SGI THE SOURCE GROUP, INC.
5451C VINCENT ROAD
PLEASANT HILL, CA 94523

SCALE
0 50 100
SCALE IN FEET

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA

DMEA WASTE PILE COMPARISON
CLOSE UP VIEW

FILE NAME	DATE	DR. BY	APP. BY	PROJECT NO.	EXHIBIT
Mine Features Map.dwg	5/4/09	JP	PH	01-SUN-050	5-3



LEGEND

▱ Mine Structure

▨ Pre-Cordero Tailings and Waste Rock

Underground Workings (Pre Cordero)
- Adit Level
- 80-ft Level
- 165-ft Level
- 270-ft Level

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-050	07/16/09	JP	PH

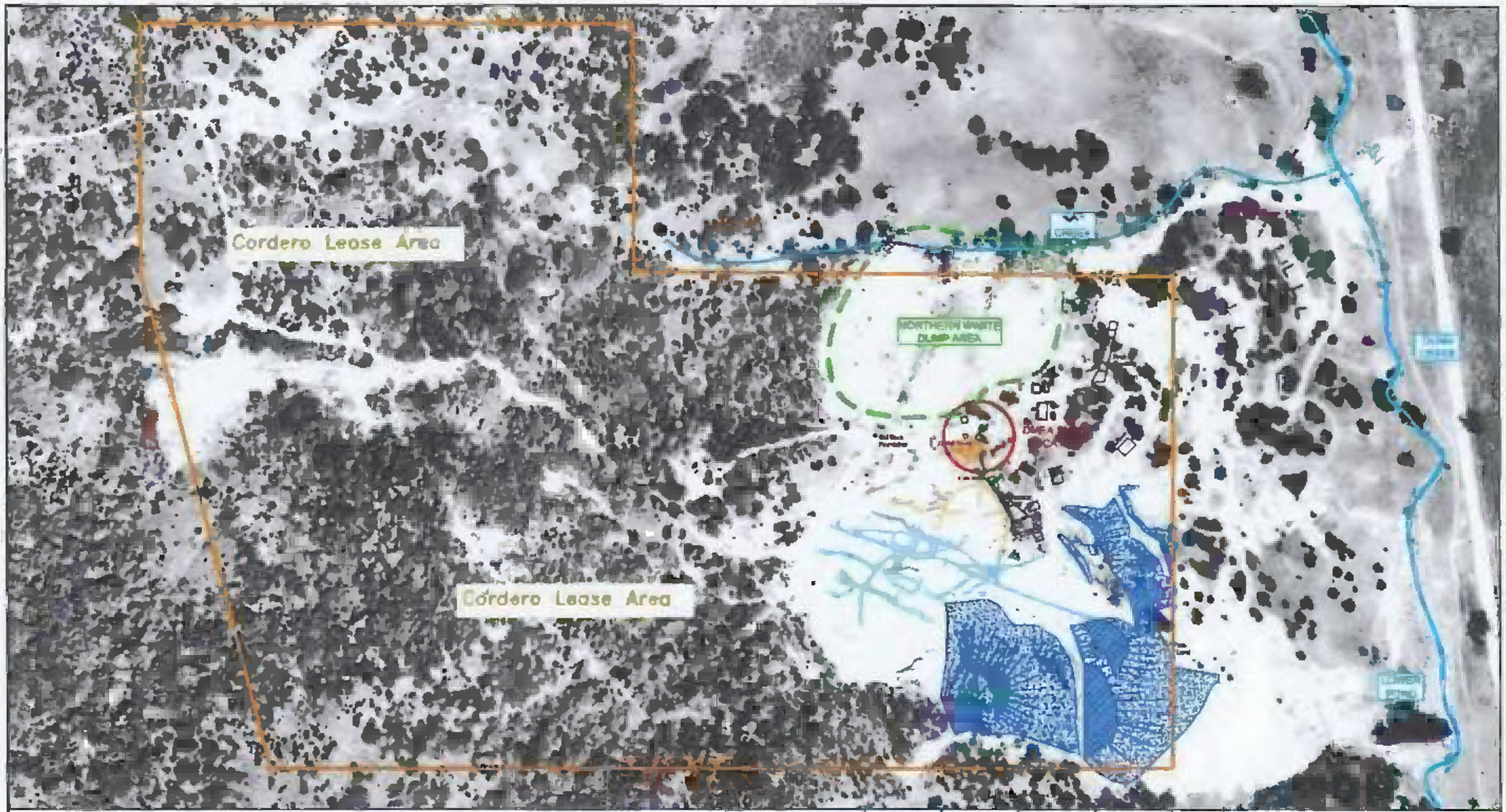
0 250 500
HORIZONTAL SCALE IN FEET

PRE-CORDERO CONDITION
1952 AERIAL PHOTOGRAPH

SGI environmental
THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE:
5-4



LEGEND

- Mine Structure (1953)
- Tailings/Waste Rock (Pre Cordero)
- Waste Rock (DMEA/Cordero)

Underground Workings

- Adit Level
- 80-ft Level
- 165-ft Level
- 270-ft Level
- 360-ft Level (Cordero)

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-050	07/16/09	JP	PH

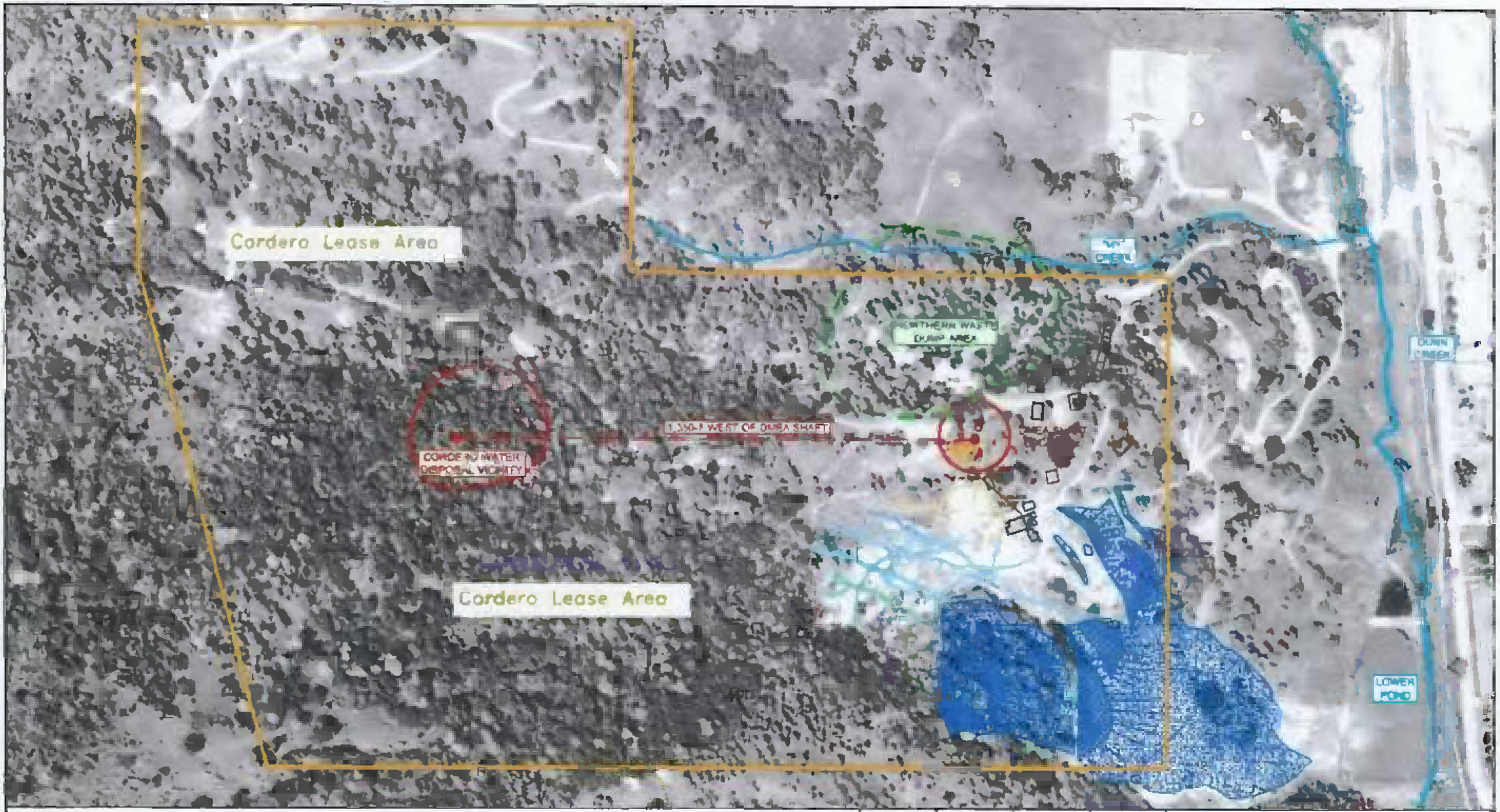
0 250 600
HORIZONTAL SCALE IN FEET

POST CORDERO CONDITION
1957 AERIAL PHOTOGRAPH

SGI environmental
THE SOURCE GROUP, INC.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE:
5-5



LEGEND

- Mine Structure (1953)
- Tailings/Waste Rock (Pre Cordero)
- Waste Rock (DMEA/Cordero)

Underground Workings

- Adit Level
- 80–ft Level
- 165–ft Level
- 270–ft Level
- 360–ft Level (Cordero)

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-050	07/16/09	JP	PH

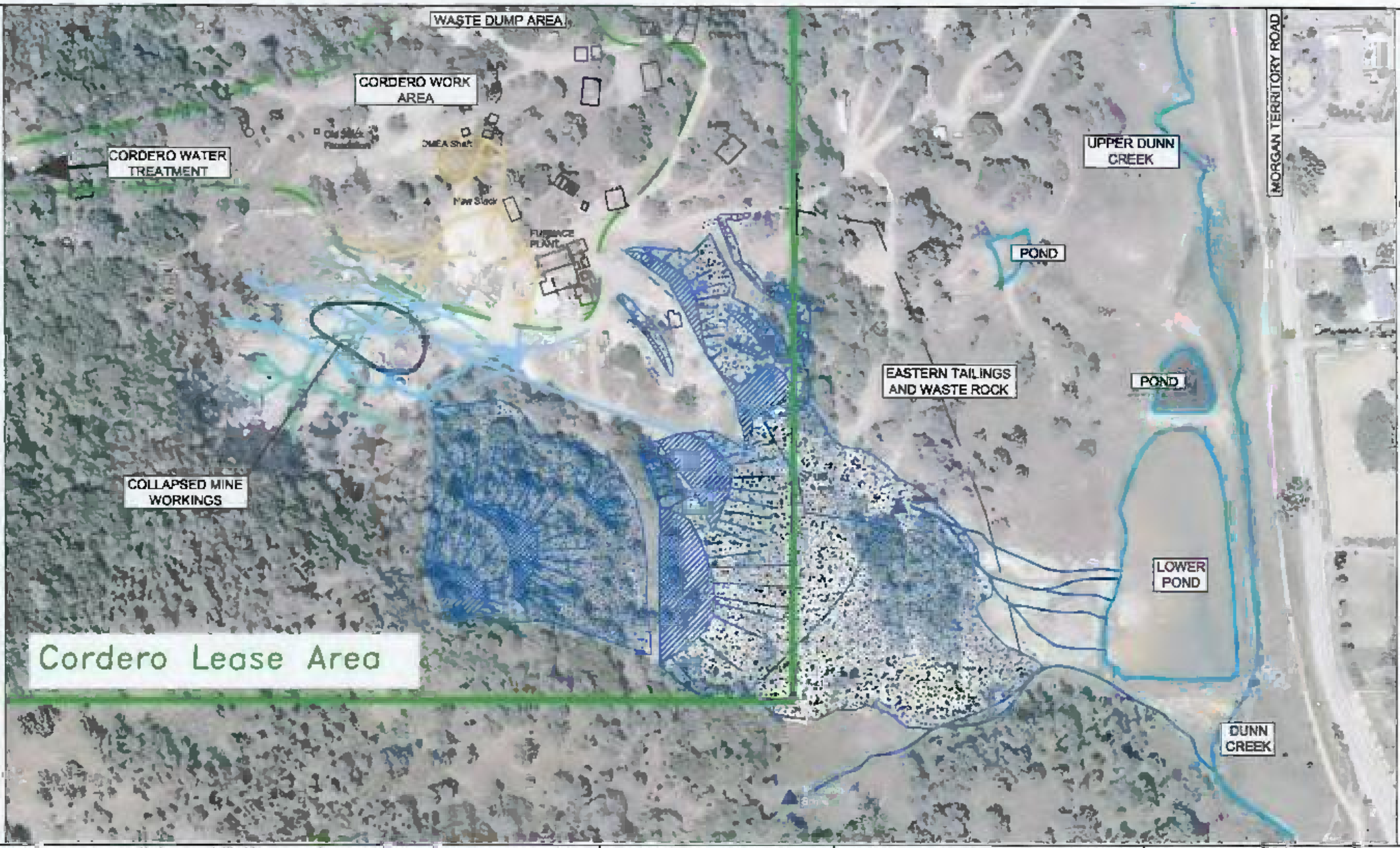
0 250 500
HORIZONTAL SCALE IN FEET

MT. DIABLO MERCURY MINE CONDITION
2004 AERIAL PHOTOGRAPH

SGI environmental
THE SOURCE GROUP, Inc.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE:
5-6



LEGEND

- ▱ Mine Structure (1953)
- ▲ Spring
- ○ Pond (2004 Outline)
- Tailings/Waste Rock (Pre Cordero)
- Waste Rock (DMEA/Cordero)

Underground Workings

- Adit Level
- 80-ft Level
- 165-ft Level
- 270-ft Level
- 360-ft Level (Cordero)

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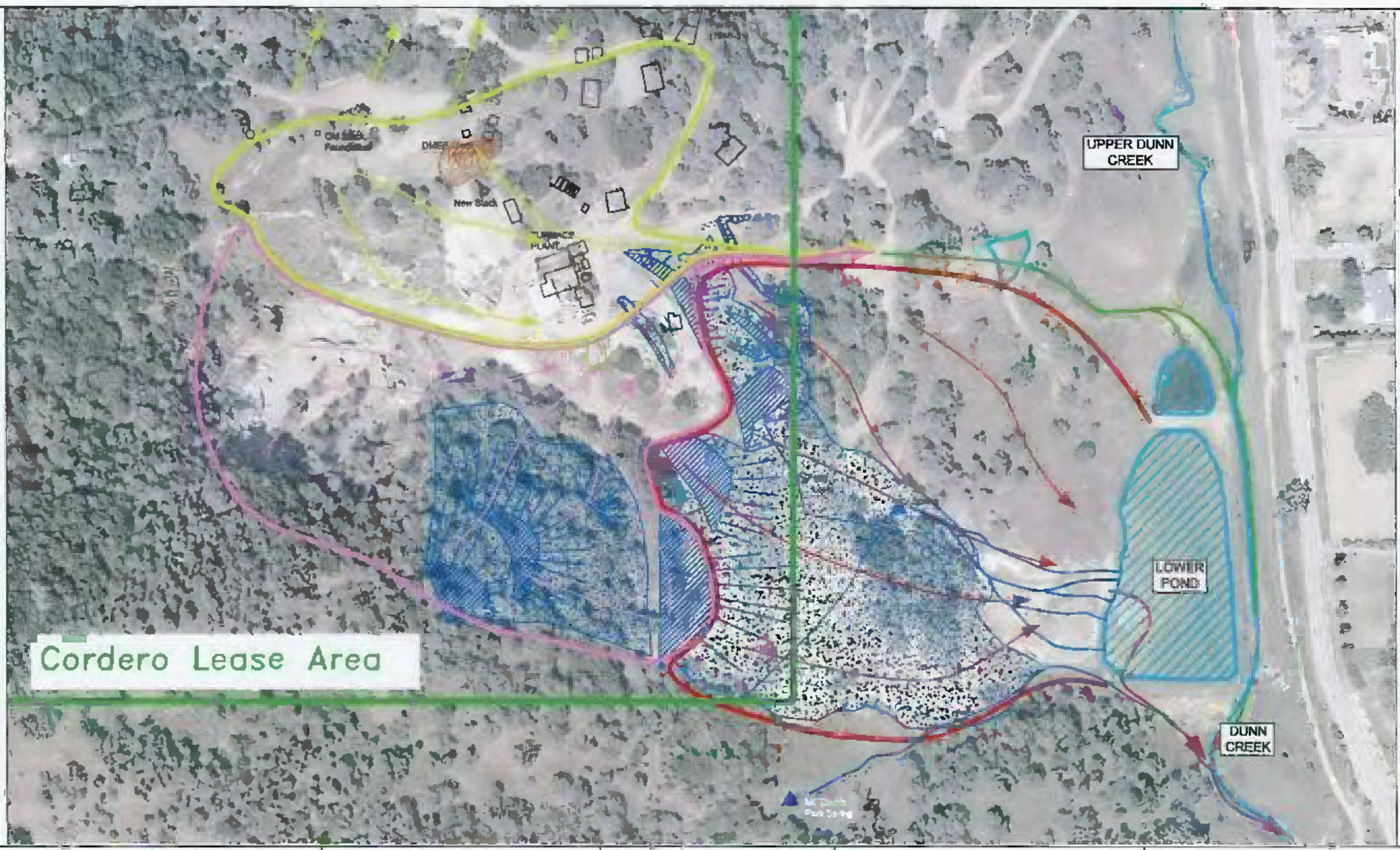
THE SOURCE GROUP, INC.
3451C VINCENT ROAD
PLEASANT HILL, CA 94523

SCALE
0 150 300
SCALE IN FEET

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

2004 AERIAL PHOTO WITH
PRE- AND POST- DMEA/CORDERO
MINE FEATURES

FILE NAME	DATE	DR. BY	APP. BY	PROJECT NO.	FIGURE NO.
Mine Features Map.dwg	5/4/09	JP	PH	01-SUN-050	6-1



LEGEND

▱	Mine Structure
▲	Spring
▨	Pond (2004 Configuration)
→	Cordero Work Area Drainage
→	Mine Workings Area Drainage
→	Eastern Tailings Area Drainage
▨	Tailings/Waste Rock (Pre Cordero)
▨	Waste Rock (DMEA/Cordero)

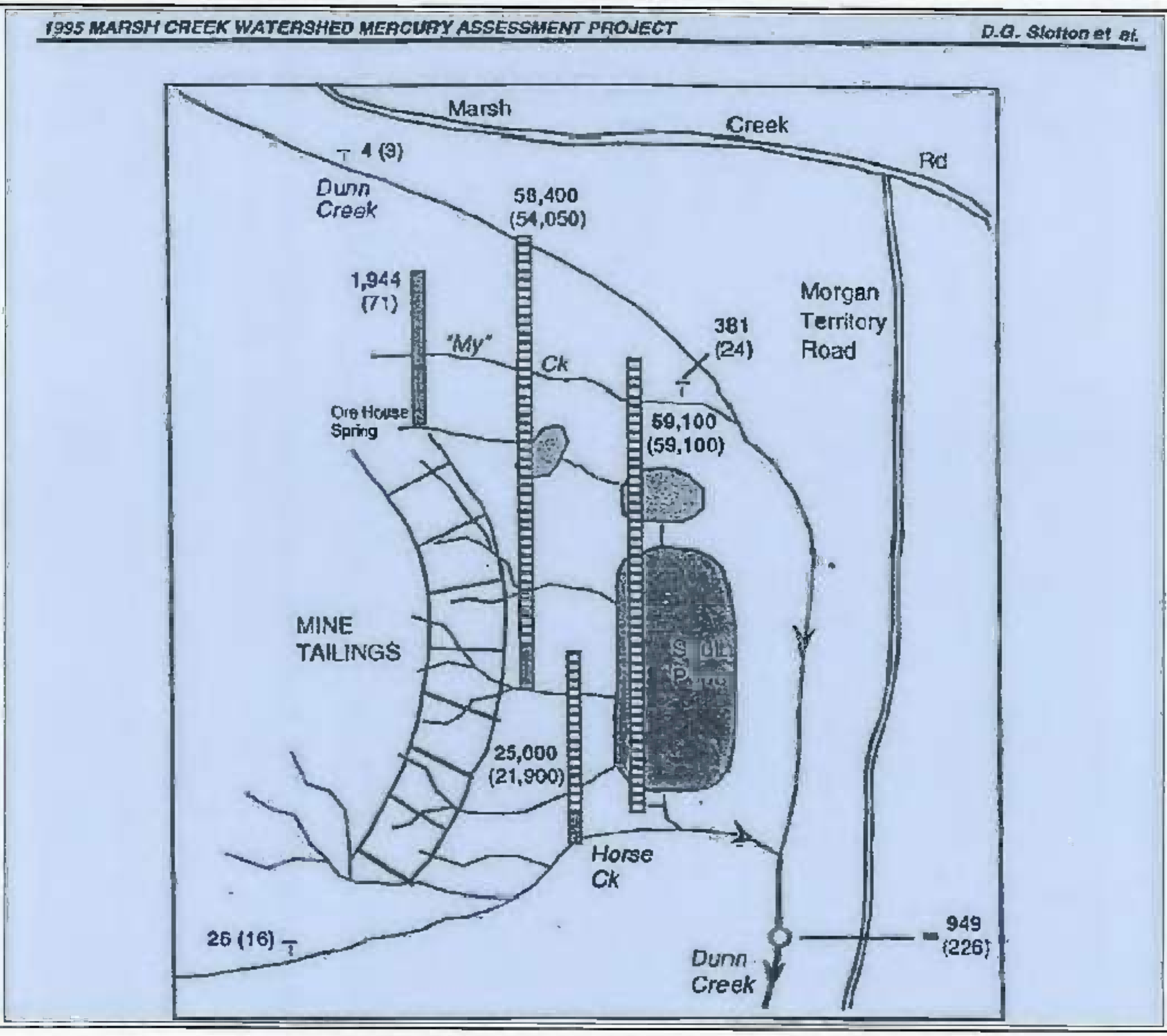
SGI environmental THE SOURCE GROUP, INC.
3451C VINCENT ROAD
PLEASANT HILL, CA 94523

SCALE
0 150 300
SCALE IN FEET

MT. DIABLO MERCURY MINE
CONTRA COSTA COUNTY, CALIFORNIA
(2004 AERIAL)

2004 AERIAL PHOTO WITH
SURFACE DRAINAGE FEATURES

FILE NAME	DATE	DR. BY	APP. BY	PROJECT NO.	FIGURE NO.
Mine Features Map.dwg	5/3/09	JP	PH	01-SUN-050	6-2



LEGEND

Mercury Units in Parts Per Trillion

PROJECT NO.	DATE:	DRAWN BY:	APP. BY:
01-SUN-001	07/17/09	JP	PH

NA NA NA
HORIZONTAL SCALE IN FEET

SLOTTON 1995 MERCURY DATA
MT. DIABLO MERCURY MINE

SGI The Source Group, Inc.
3451-C VINCENT ROAD
PLEASANT HILL, CA 94523

N

FIGURE:
6-3

TABLE

PRODUCTION STATISTICS- MOUNT DIABLO MINE "MILL WORKINGS"

Operator	Date	Cubic Yards of Ore Milled	Waste rock from tunnels, crosscuts,raises,shafts and stopes (cubic yards)	Dewater volume (acre-feet)	Mercury Produced, flasks
Welch	1863	shaft and placer	NA	none	NA
Unknown	1875-1877	NA	NA	NA	1000
Mt. Diablo Quicksilver MC, operator Ericson	1930-1936	NA	NA	NA	739
leased to Bradley MC	1936-1951	78,188(1)	24,815(2)	161(3)	10,455
leased Ronnie B. Smith	Sept 1951- June 1953	920(4)	NA	NA	125(5)
DMEA and Smith	June 1953 - Jan 1954	none	630(6)	minor	none
DMEA, Johnson and Jonas	Jan 1954 - Feb 1955	none	67(7)	NA	none
leased to Cordero MC	Feb 1955 - Dec 1956	none	1,228 (8)	19.5(9)	none
leased to Nevada Scheelite Company	1956	none	none	minor	none
Total Cubic Yards of Material Taken Out			105,848 (10)		

(1) Table 4, Ross 1958, reported 126,664 tons of ore milled. Converted here to cubic yards above based on conversion of 1.62 tons per cubic yard (cy)

(2) Total length of workings 4,570 ft (Pampeyan 1963. p 25) x 5 feet x 7 feet x bulking factor plus 20% = 7,108 cy less (2) and (3). Included 550 ft of shafts and raises (935 cy) and stopes of 19,000 cy (Pampeyan, Plate 5).

(3) Estimate 10 gpm for 10 years.

(4) Used the ratio of ore milled to flasks produced for Bradley to estimate the amount of ore milled by Smith.

(5) DMEA internal memo dated 2/4/57 ref doc no. 2:88/384

(6) 300-ft DMEA shaft 4.5 ft x 8.5 ft (Ross 1958) plus 77 ft of tunnel at 5 ft x 7 ft on the 360 level w/ bulking factor of 20%

(7) 43 ft of tunnel on the 360 level x 5 feet x 7 feet w/ bulking factor of 20%

(8) 790 ft of crosscuts and drifts on the 360 level (Pampeyan, and Sheahan 1957) x 5 feet x 7 feet w/ bulking factor of 20%.

(9) Best guess; 90 gpm for 27 days to dewater the mine (ref: DMEA payment records to Smith for same) and 200 days at 10 gpm.

(10) Sum of Ore Milled and Waste Rock

APPENDIX A

CORDERO LEASE WITH VIC BLOMBERG FOR MT. DIABLO MERCURY MINE

THIS AGREEMENT, entered into this 1st. day of November, 1954, between MT. DIABLO QUICKSILVER COMPANY, LTD., a Nevada corporation, hereinafter referred to as "Lessor", and CORDERO MINING COMPANY, a Nevada corporation, hereinafter referred to as "Lessee",

WITNESSETH:

WHERRAS, Lessor is the owner of the following described mine and mining property, together with all appurtenances:

DESCRIPTION:

The northeast quarter of the southeast quarter of Section 29 and the south half of the southwest quarter of the northeast quarter of Section 29, Township 1 North, Range 1 East, Mount Diablo Base and Meridian, containing 60 acres, more or less;

EXCEPTING THEREFROM: "That certain syphon pipe leading therefrom to a water trough on the northeast quarter of the southeast quarter of said Section Twenty-nine (29), which said water spring, trough, and pipe are excepted from this deed," as provided for in the deed from Edward A. Howard and Daisy B. Howard, his wife, to Mount Diablo Quicksilver Company, Ltd., a corporation, dated December 29, 1933, and recorded Feb. 1, 1934 (File No. 1060);

And

The northwest quarter (N.W.1/4) of the southeast quarter (S.E.1/4) of Section 29, in Township 1 North of Range 1 East, Mount Diablo Base and Meridian. Said property shall not include the following described property, to wit: that land beginning at the northwest corner of the northwest quarter of the southeast quarter of Section 29, Township 1 North, Range 1 East, Mount Diablo Base and Meridian; thence running southerly along the dividing line between the northeast quarter of the southwest quarter and the northwest quarter of the southeast quarter of said Section 29, a distance of 20 chains to the southwest corner of the northwest quarter of the southeast quarter of Section 29; thence running along the southerly line of the northwest quarter of the southeast quarter of Section 29, a distance of 2.924 chains; thence leaving said line, and running in a northerly direction, a distance of 20.23 chains to the point of beginning.

EXCEPTING from the demised premises the house known as the Blomberg house together with the right to use such water as is necessary for domestic purposes. In the event the option to purchase is exercised then this exception will be without effect and title to the Blomberg house shall pass with the other property.

IN ADDITION Lessee shall have the right to any access road over which Lessor has control.

And

WHEREAS, the Lessee desires to lease and to acquire an option to purchase the whole of said mining property above described, which the Lessor is willing to grant upon the terms and subject to the conditions hereinafter set forth,

NOW, THEREFORE, in consideration of the premises and the sum of One Dollar ($1) paid by the Lessee to the Lessor, receipt of which is hereby acknowledged, the Lessor hereby grants and leases to Lessee the above-described property for the purpose of investigating, exploring, prospecting, drilling, mining, producing, milling, and removing ores, metals, minerals, and values of every kind, and for the purpose of erecting thereon mills, plants and other structures in connection with said purposes, for the term of Ten (10) years from the date hereof with right to renew, upon a sixty (60) day prior written notice to Lessor, for an additional Ten (10) years on the same terms, including the right to apply payments made during the first Ten (10) years on the purchase price if said option to purchase is exercised during the second ten (10) years. These rights shall remain in effect during the period of the lease unless sooner terminated as hereinafter provided.

In consideration of said lease, IT IS HEREBY MUTUALLY

AGREED AS FOLLOWS:

1. RENTAL AND ROYALTY: The Lessee shall pay to the Lessor monthly, as rental for said property, a percentage of the proceeds resulting from the operation of said property by Lessee. This percentage shall be ten per cent (10%) of the money received for ores, metals, minerals, and values mined, saved and sold less freight, insurance, and brokerage, or Two Hundred Dollars ($200) per month, whichever is greater.

Unless notified as hereafter set forth, Lessee shall sell all flasks of quicksilver produced from the premises; provided, however, that Lessor shall have the option to receive its percentage royalties in kind, i.e. in flasks of quicksilver -- upon Lessor's giving Lessee a ninety (90) day prior written notice of exercise of such option. Similarly Lessor shall have the option by such a 90-day notice to have Lessee resume the sales of all production. Delivery in kind to Lessor shall be f.o.b. the mining property. Lessee agrees to store for Lessor's account any production taken by Lessor as royalty in kind without charge -- title, however, to such flasks of quicksilver for delivery in kind shall be deemed to pass to Lessor at the time Lessor receives royalty statements therefor from Lessee (for insurance and other purposes). Lessee shall supply Lessor with full and complete supporting data with regard to deliveries in kind.

2. OPTION: The Lessor shall and does hereby give and grant unto the Lessee the sole, exclusive and irrevocable right and option to purchase and acquire the whole of the said mining

property above described, upon the payment of the option price, on or before the termination of this lease, and any renewal, and in the manner and upon the due performance of the covenants to be kept and performed by the Lessee, all as herein provided.

3. PURCHASE PRICE: The Lessee, upon the exercise of said option, shall pay the Lessor as a total purchase price for the above-described property, the sum of One Hundred Seventy Thousand Dollars ($170,000) lawful money of the United States of America. All rental and royalty payments made to Lessor hereunder shall be credited on the purchase price. The balance of the purchase price shall be paid in full upon the exercise of said option and delivery of a good and sufficient deed as herein provided.

For the purpose of crediting royalty payments on the purchase price, in connection with deliveries in kind, the credits shall be based upon the average proceeds per flask sold by Lessee in the particular month involved; provided, however, that if no sales are made by Lessee during any such month, royalty payments as well as credits on the purchase price shall be determined by taking the average of the weekly low quotations for the particular month as set forth in the E. & M. J. Metal and Mineral Markets Magazine (less freight, insurance and brokerage); provided further, that such method shall be applied for the purpose of computing royalties or for any other purpose applicable to the provisions of this agreement.

4. MANNER OF PAYMENT: The royalty payable to Lessor hereunder, shall be payable in monthly installments commencing

on the 15th day of December 1954, and continuing on the 15th day of each and every month thereafter until the expiration of the term hereof or the earlier termination of this lease. Royalty payments shall be based on receipts from sales of the previous month, on the basis provided for in Paragraph 1 above. Notwithstanding anything to the contrary contained herein, it is agreed that each monthly installment shall be not less than Two Hundred Dollars ($200). The Lessee shall transmit with the royalty check a full and true statement of the production and sales receipts of the previous month. A representative of the Lessor shall at all times have the right during regular business hours to examine the underground operations and the furnace plant.

5. MINING METHODS AND CONDITIONS: Lessee shall be sole judge as to methods of mining and milling, what constitutes ore, when and if ore is extracted or milled and all other phases of operating the property. All operations conducted by the Lessee upon the property shall be performed in accordance with the laws and regulations of the United States and the State of California and in accordance with good practices in workmanship, mining and milling, particularly with regard to the safety and welfare of workers. The Lessee shall at all times during the existence of this lease maintain a watchman on the premises.

6. POSSESSION: Lessee, its agents, representatives or employees may enter in and upon and take possession of the whole or any part of the property above described, at once; and, may then and there commence any work to explore or mine the property,

in keeping with the tenor of this agreement, that it may deem advisable, and for that purpose, may use any buildings, equipment or mining facilities which may now be situated on the premises, and owned by Mt. Diablo Quicksilver Company, Ltd., with the exception of that certain house noted in the above description of the premises.

The Lessee may use, in working on the demised premises, all supplies now on the demised premises, but, in the event he should remove or dispose of said supplies otherwise than in developing the demised premises, he shall pay the Lessor the reasonable value thereof. During the term of this lease the Lessee may use all tools, machinery and equipment of the Lessor now on the demised premises for the purpose of developing the same and operating and maintaining the same, and shall have the privilege of replacing or remodeling the same, and any structures on the demised premises. An inventory enumerating such tools, machinery or equipment and structures, is attached hereto, marked Exhibit "A" and made a part hereof. Lessee shall maintain the same and replace any that are broken, damaged or worn out, normal wear and tear excepted. Such replacements shall become the property of the Lessor. At the expiration of this lease or in the event of the Lessee vacating the demised premises for any reason, Lessee may remove, as provided in Paragraph 14, any portable tools, machinery, or equipment which Lessee has placed upon the property, or any portable structures which Lessee may have placed upon the property, but Lessee may not remove any permanent structures or any repairs or replacements to units of equipment or machinery now on the property.

7. INDUSTRIAL INSURANCE: Lessee shall comply with the laws of the State of California for the protection of employees against injury and disease and, in that connection, shall save harmless the Lessor against any damage by reason of such claims. Lessee shall provide and maintain at Lessee's expense fire insurance and other appropriate casualty insurance on all of the structures, machinery, equipment and tools covering the full appraised insurable value thereof for the maximum protection of both Lessor and Lessee, as their interests may appear, and Lessee shall furnish to Lessor certificates of such insurance if required, and the same shall be subject to the approval of Lessor for adequacy of protection.

8. PUBLIC LIABILITY: Lessee shall save Lessor harmless from any liability for property damage, personal injury or death arising from the work, mining or acts performed by Lessee and its employees in connection with the lease and option.

9. LIENS: Lessee shall save Lessor harmless from all liens upon the property made or suffered by Lessee, and in that connection shall post the property in accordance with law, noticing owner's (Lessor's) non-responsibility, before commencing any work.

10. TAXES: Lessee agrees to pay, prior to delinquency, all taxes and assessments, including personal property taxes and

net proceeds of mine taxes, to State, County or School District, or any other government subdivision, with the exception of taxes on royalties paid to Lessor. Taxes shall be prorated as of the date hereof.

11. DEFAULT: Time shall be of the essence of this agreement. In the event of default of any of the payments or covenants herein contained, by Lessee, this lease shall terminate, at the option of the Lessor. If Lessor elects to terminate this agreement by reason of Lessee's default, Lessor shall serve notice of his intention by registered mail, or personal service upon Lessee or its duly authorized agent for service of process. Upon service of notice, Lessee shall have sixty (60) days in which to cure said default. If within said sixty (60) day period the default has not been cured, Lessor may terminate this agreement by giving Lessee notice of such termination, and at that time this agreement and all of the rights of Lessee hereunder shall terminate.

12. PURPOSE: This agreement is a lease and option only, and the Lessee shall have the right to surrender this contract and to discontinue any and all work and payments hereunder at any time, without liability therefor, upon giving Lessor thirty (30) days' prior written notice of intention to so terminate, except that Lessee shall be liable for royalties and amounts due and payable at the date of such termination. Upon demand after surrender, Lessee shall execute and deliver to Lessor a good and sufficient surrender, and release of all rights hereunder.

Lessee shall control the discharge of water from the mine properties in such manner as not to pollute any of the wells on any of the adjoining property or the waters of Marsh Creek or Dunn Creek. Lessee is advised of that certain decision and order of the Water Pollution Control Board of the State of California, dated December 14, 1953, and Lessee agrees to comply in all respects with said order, as the same may be modified, amended or altered from time to time, and with any and all other orders, rules and regulations of any governmental authority in respect of discharge of water from the mine properties.

13. INSPECTION: The owner (Lessor) or his duly authorized agents or representatives shall have the right at all reasonable times to enter upon the said property and inspect the work conducted by the Lessee thereon, or records of the production of the mine.

14. REMOVAL OF EQUIPMENT: In the event of termination of this contract, by surrender or default as provided, the Lessee may, within a period of ninety (90) days thereafter, remove any and all machinery, power plant, equipment, building, track, tools, and supplies placed thereon by Lessee except as provided in Paragraph 6 above. In the event of termination Lessee shall provide Lessor with copies of any mine maps of this property which it may have.

15. ASSIGNMENT: Lessee shall not assign this lease or any interest therein and shall not sublease or underlet the premises, or any part thereof, or any right or privilege appurtenant thereto without the written consent of the Lessor -- and such consent shall not be unreasonably withheld. Notices required

hereunder shall be deemed to be completed when made in writing, deposited in the United States mail, registered, postpaid, addressed to

Lessor: MT. DIABLO QUICKSILVER COMPANY, LTD.
Clayton, California

Lessee: CORDERO MINING COMPANY
131 University Avenue
Palo Alto, California

16. On the exercise of the option herein granted to Lessee to purchase certain property, and the payment of the further purchase price therefor, as hereinabove provided, Lessor shall convey said property to Lessee by grant deed. There has been exhibited to Lessee, and Lessee is fully advised of, that certain preliminary title report of California Pacific Title Insurance Company on said property dated October 28, 1954 (Order No. 190821). It is understood and agreed that at any time after the expiration of three (3) years from the date hereof, or upon payment by Lessee to Lessor of one-half (1/2) of the said purchase price -- whichever event is earlier -- on demand by Lessee to Lessor, Lessor shall take such steps and commence such legal proceedings as it may be advised necessary to clear the title of said land of the exceptions appearing on said title report, and Lessor shall thereafter prosecute said proceedings with all reasonable diligence.

IN WITNESS WHEREOF, Lessor and Lessee have caused these presents to be executed by their officers thereunto duly authorized, the day and year first above written.

MT. DIABLO QUICKSILVER COMPANY, LTD.

By Vic Blomberg
Vic Blomberg
President

By Harold Blomberg
Harold Blomberg
Secretary

(Corporate Seal)

LESSOR

CORDERO MINING COMPANY

By S. H. W
S. H. Williston
Vice President

(Corporate Seal)

E A Williston
Asst. Secretary

LESSEE

EXHIBIT D

Edgcomb Law Group
JOHN D. EDGCOMB (SBN 112275)
DAVID T. CHAPMAN (SBN 207900)
115 Sansome Street, Suite 700
San Francisco, California 94104
Telephone: (415) 399-1555
Facsimile: (415) 399-1885
jedgcomb@edgcomb-law.com

Attorneys for Petitioner
SUNOCO, INC.

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In the Matter of

SUNOCO, INC.,

Petitioner,

For Review of Order To Submit Investigative Reports Pursuant To Water Code Section13267, Mount Diablo Mercury Mine, Contra Costa County, dated December 30, 2009

PETITION NO.

DECLARATION OF PAUL D. HORTON IN SUPPORT OF SUNOCO, INC.'S PETITION FOR REVIEW AND RESCISSION OF REVISED TECHNICAL REPORTING ORDER NO. R5-2009-0869 AND SUNOCO, INC.'S PETITION FOR STAY OF REVISED TECHNICAL REPORTING ORDER NO. R5-2009-0869

I, the undersigned Paul D. Horton, declare as follows:

1. I am a professional geologist registered with the State of California. I am the Secretary & Vice President of The Source Group, Inc., ("SGI") an environmental consulting firm that has been retained by Sunoco, Inc. ("Sunoco") to provide technical consulting services related to the historical mining operations of Cordero Mining Company ("Cordero") at the Mount Diablo Mercury Mine Site ("Site"). I have over 23 years of professional experience in both the technical and management aspects of environmental projects. As an expert hydrogeologist, I have over 20 years of experience in the application of numerical and analytical groundwater flow and contaminant transport model, the design, implementation, and analysis of aquifer tests, and the general evaluation of site-specific

hydrogeologic conditions. I frequently provide evaluations of complex hydrogeologic systems, and the effectiveness and efficacy of remedial action programs. I have personal knowledge of the facts set forth herein or am familiar with such facts from my visits to the Site and review of historical records related to the Site. Attached as **Exhibit A** is a true and correct copy of my current curriculum vitae.

2. This declaration is in support of Sunoco, Inc.'s Petition for Review and Rescission of the Revised Technical Reporting Order R5-2009-0869, ("Rev. Order"), adopted by the California Regional Water Quality Control Board, Central Valley Region ("CVRWQCB") on December 30, 2009, which is directed, in part, to Sunoco. This declaration is also being filed in support of Sunoco, Inc's Petition for Stay of Revised Technical Reporting Order R5-2009-0869, being filed concurrently by Sunoco, Inc. "

3. Based on my review of Site records and my Site visits, Cordero had limited involvement at the Site in terms of time, geographical extent of operations, and environmental impact.

4. SGI, in conjunction with Sunoco's outside counsel Edgcomb Law Group ("ELG"), prepared and submitted to the CVRWQCB on July 31, 2009, a Divisibility Position Paper ("Divisibility Report") which outlined the history and technical data, along with legal analysis prepared by ELG, supporting the divisibility of Cordero's operations from those of other Potentially Responsible Parties ("PRPs") at the Mount Diablo Mercury Mine Site. Attached hereto as **Exhibit B** is a true and correct copy of the Divisibility Report. Based on the evidence set forth in the Divisibility Report, in my opinion the historical record indicates that Bradley Mining Company ("Bradley") and Cordero had geographically distinct mercury mining operations at the Mount Diablo Mercury Mine Site, both in terms of underground workings as well as above-ground waste

rock and tailings piles. In particular, the large tailings piles on the eastern slope of the Site resulted from Bradley's operations, with possible smaller contributions from other former operators, but not Cordero. Those tailings piles are indicated in blue coloring on Exhibit 4-1 to the Divisibility Report.

I am aware of no evidence indicating that Cordero processed any of the ore it mined on the Site. Nor is there any evidence that Cordero contributed any tailings to the onsite tailings piles. My review of site documents indicates that Cordero did not contribute any waste to the pre-existing Bradley tailings piles during Cordero's approximately one-year of mining activity at the Site.

5. On November 1, 1954, Cordero acquired a lease for a portion of the Site from Mt. Diablo Quicksilver. Thereafter, Cordero conducted exploratory tunneling. Cordero is reported to have extracted approximately 1,228 cubic yards of waste rock from underground workings (Pampeyan and Sheahan, 1957), which accounts for approximately 1.2% of the total volume of waste rock historically mined from the entire Site. Cordero's waste rock, which consisted mainly of shale and sandstone with some low-grade unprocessed ore, would not likely make any significant contribution to the acid mine drainage from the Site. I am aware of no evidence indicating that any Cordero waste rock was discharged to the onsite tailings piles highlighted in blue on Exhibit 4-1 to the Divisibility Report.

6. Based on my review of historical documents concerning Cordero's operations at the Site, the area Cordero used for water disposal was located 1,500 to the north of the DMEA shaft and water pumped there either evaporated or would have drained into the My Creek drainage in the manner reflected in Fig. 4-1 to the Divisibility Report.

7. In 2008, I inspected the Site and observed that the waste rock pile originally depicted by Pampeyan adjacent to the DMEA shaft was no longer present. Mr. Jack Wessman, who was present, told me that he used the waste rock formerly

adjacent to the DMEA shaft to re-fill that shaft. Mr. Wessman's representation is consistent with my observation that the DMEA shaft has been filled.

8. Additional rock extracted from the DMEA Shaft, if any, was likely dumped on the north facing slope ("Northern Dump") in the Dunn Creek watershed, using the dump tracks that Mr. Ronnie B. Smith constructed from the DMEA shaft, according to historical records that I have reviewed and that are cited in the Divisibility Report. During a 2009 Site visit, I observed waste material on the Northern Dump typical of the mining waste that could have been transported from the DMEA shaft via Mr. Smith's short rail line.

9. I am aware of no evidence that Cordero's connection to the Main Winze in 1955 exists today, or that it existed for any duration post-1955, since such mine shafts are prone to collapse without periodic rehabilitation. Similarly, I am aware of no evidence that water in the 360 foot level Cordero tunnels was contaminated with significant amounts of mercury, or that it has ever traveled 200 feet upwards through the Main Winze and then several hundred feet horizontally out of the drainage portal adit at 165 foot level adit. Records I have reviewed, however, do indicate that water emanated from the 165 foot level adit before Cordero operated on the Site.

10. The Rev. Order states that the Site is comprised of approximately 109 acres, but based on conservative estimates I have made, Cordero appears to have operated on less than 10% of that area.

I declare under penalty of perjury under the laws of the State of California and the United States of America that the foregoing is true and correct. Executed this 28th day of January, 2010 in Concord, California.

By: ______________________
Paul D. Horton

PAUL D. HORTON
No. 5435