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SUNOCO, INC.

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

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

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I. PETITION

Pursuant to California Water Code Section 13320 and Title 23 of the California Code of Regulations §§ 2050 *et seq.*, Petitioner Sunoco, Inc. ("**Sunoco**" or "**Petitioner**") hereby petitions the State Water Resources Control Board ("**State Board**") for review and rescission of the Cleanup and Abatement Order R5-2013-0701 issued pursuant to Sections 13267 and 13303 of the California Water Code regarding the Mount Diablo Mercury Mine, Contra Costa County, issued on April 16, 2013 ("**CAO**"), by the Regional Water Quality Control Board, Central Valley Region ("**Regional Board**").

II. PETITIONER

The name and address of Petitioner is:

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III. ACTION OF THE REGIONAL BOARD TO BE REVIEWED AND RESCINDED

Sunoco requests that the State Board review and rescind the Regional Board's CAO issued on April 16, 2013, and attached hereto as Exhibit 1 to the Declaration of Adam P. Baas In Support of Sunoco's Petition for Review and Petition for Stay of Action ("**Baas Decl.**"). The CAO names seven "**Dischargers**":

Jack and Carolyn Wessman; the Bradley Mining Co.; the United States Department of Interior; Mt. Diablo Quicksilver, Co., Ltd; Kennametal Inc.; the California Department of Parks and Recreation; and Sunoco. (Baas Decl. Exh. 1).

The CAO states that Sunoco has been named as a Discharger because the "U.S. EPA, Region IX, named Sunoco Inc. a responsible party for the Mount Diablo Mercury Mine in the Unilateral Administrative Order for Performance of a Removal Action, U.S. EPA Docket No. 9-2009-02, *due to its corporate relationship to the Cordero Mining Company*," and that "[t]he Cordero Mining Company operated the Mine Site from approximately 1954 to 1956, and was responsible for sinking a shaft, driving underground tunnels that connected new areas to pre-existing mine workings, and discharging mine waste." (Baas Decl. Exh. 1, p. 3)(italics added).

The CAO describes the Mount Diablo Mercury Mine site as an "inactive mercury mine ... located on the northeast slope of Mount Diablo in Contra Costa County. The Mine and historic working areas are on 80 acres southwest of the intersection of Marsh Creek Road and Morgan Territory Road. The Mine site is adjoined on the south and west by the Mount Diablo State Park and on the north and east by Marsh Creek Road and Morgan Territory Road" (hereinafter, the "**Site**"). (Baas Decl. Exh. 1, p. 1). The CAO further describes the Site as: "consist[ing] of an exposed open cut and various inaccessible underground shafts, adits, and drifts . . . [with] extensive waste rock piles and mine tailings cover[ing] the hill slope below the open cut, and several springs and seeps discharg[ing] from the tailings-covered area." (Id.)

The CAO requires the Dischargers to "investigate the discharges of waste, clean up the waste, and abate the effects of the waste, within 30 days," including:

(1) Submit the following reports:

a. by June 30, 2013, form a respondents group to manage and fund the remedial actions at the Site and submit a letter or report on any group agreement to the Regional Board;

b. by October 1, 2013, "submit a Work Plan and Time Schedule to close the mine tailings and waste rock piles ... and to remediate the [S]ite . . . to prevent future releases to surface and groundwater of mercury and other pollutants"; and

c. submit quarterly reports documenting the remedial actions.

(2) By December 31, 2015, complete all remedial actions and submit a final construction report.

(3) Provide a certification with all reports submitted.

(4) Reimburse the Regional Board for reasonable oversight costs.

(Collectively, the "**Work**").

IV. DATE OF THE REGIONAL BOARD ACTION

The Regional Board adopted the CAO on April 16, 2013.

V. STATEMENT OF REASONS WHY THE REGIONAL BOARD'S ACTION IS IMPROPER

The State Board should review and rescind the CAO, as it pertains to Sunoco and Cordero, because:

1. The California Corporations Code and a recent California Supreme Court decision dictate that the State Board must look to Nevada law to determine whether and to what extent the Cordero Mining Company ("Cordero"), a dissolved Nevada (foreign) corporation, can be sued as a discharger in California. Nevada law requires that any claim against Cordero must have been commenced within 2 years after the date of Cordero's November 18, 1975, dissolution, *i.e.* before Nov. 18, 1977. The Regional Board, however, waited until 2009, or over 30 years after Cordero was legally dead and gone, to make any claim against Cordero. As such, the Regional Board is barred from issuing a CAO or making any claim against

Cordero, a non-existent company.

2. The CAO lists Sunoco as a Discharger based solely on its relationship to Sun Oil Company, the former shareholder of Cordero. There is no legal support, however, for finding Sunoco liable for Cordero's historical activities. First, Sun Oil Company is a former shareholder of, not a successor-in-interest to, Cordero; second, there is no statutory liability for pre- or post-dissolution claims against a shareholder such as Sunoco unless that shareholder acted as the *alter ego* of the corporation; and, third, there is no evidence that Sun Oil Company acted as the *alter ego* of Cordero. As such, Sunoco cannot be held liable for the actions of Cordero as a matter of law, regardless of whether Cordero is deemed to be capable of being held responsible today.

3. In addition to arguments 1 and 2, which require rescission of the CAO, the factual record does not support allocating any responsibility to Cordero and/or Sunoco for the purported elevated contaminant levels on and/or emanating from the Site, and there is a reasonable basis for apportioning Cordero a *de minimis* share of the cleanup, and apportioning the remainder to other, far more culpable, Dischargers in light of the following: (i) Cordero was involved with the Site for a very short period of time on a small area of the Site, did not mill any ore or generate any tailings, and contributed only 1.2 percent (%) of the waste rock (as opposed to tailings) at the Site; (ii) 88% of the mercury sourced from the Site is linked to the mine tailings disposed of on the hillside of the Site by other Dischargers; (iii) the remaining mercury is sourced from groundwater seeping as a spring from a 165'-level adit constructed by a former Discharger and unrelated to Cordero's historical activities; and (iv) as a lessee, Cordero cannot be held liable for prior property owner/lessees' discharges.

A. FACTUAL BACKGROUND

1. Sunoco is a Successor to Sun Oil Company of Delaware, a Former Shareholder of Cordero Mining Company, a Dissolved Nevada Corporation with No Remaining Assets.

In 1941, Cordero was incorporated in Nevada, to "engage in the business of mining generally," with its principle office and place of business in McDermitt, Nevada. (Baas Decl. Exh. 2). At the time of incorporation, and at all relevant times thereafter, Sun Oil Company of Delaware ("**Sun Oil**") owned 100% of Cordero's common stock. (Id.) Cordero's Articles of Incorporation established a Board of Directors and By-laws, which were separate and apart from Sun Oil. (Id.) Cordero's initial capitalization came by way of a stock purchase agreement to Sun Oil for 750 shares @ $100/share, or $750,000, authorized by the Board of Directors on March 11, 1941. Also in March 1941, Cordero's Board of Directors instructed the treasurer to open a bank account "in the name of the Company with the First National Bank of Reno, Nevada … to carry on the operations of the Company [Cordero] in the State of Nevada." (Baas Decl. Exh. 3). The record shows that Cordero held regular board meetings, separate and apart from Sun Oil, as well as stockholder meetings during its entire time of existence. (Baas Decl. Exh. 4, sample set of Meeting Minutes). As such, all available evidence indicates that Cordero was a fully capitalized, independently operated company, with its own Board of Directors and assets separate and apart from Sun Oil.

In 1972, pursuant to the Agreement and Plan of Liquidation dated December 31, 1972, the officers of Cordero were directed to liquidate the company by selling or otherwise liquidating all remaining tangible assets of Cordero, providing for all proper debts of the corporation, and distributing all remaining assets (if any remained) to its sole shareholder, Sun Oil. (Baas Decl. Exh. 5). Included in the liquidation, and as required at the time to legally effectuate the dissolution, Sun Oil assumed the responsibility of the Cordero Retirement and Stock Purchase Plans. (Id.) On November 18, 1975, Cordero was legally dissolved as a corporate entity, as acknowledged by the Nevada Secretary of State. (Baas Decl. Exh. 6). In or around 1998, Sun Company, Inc. (f/k/a Sun Oil Company) changed its name to Sunoco, Inc. (Baas Decl. Exh. 7).

Sunoco has searched its historical files and public records for any evidence of Cordero's assets that may exist today, as well as any evidence of what assets (if any) may have been distributed by Cordero to Sun Oil at the time of Cordero's dissolution. After a reasonable and diligent search, Sunoco has been unable to identify any remaining assets. (Baas Decl. Exh. 8). Nor has Sunoco been able to locate any insurance policies held by Cordero during that time period, or other policies that would cover the CAO and/or time period at issue here. (Baas Decl. Exh. 9, letter from D. Chapman to R. Atkinson directing the Regional Board to insurance coverage of other PRPs). In addition, Cordero's federal dissolution tax form for the period ending December 31, 1972, appears to demonstrate that any assets (if any) distributed to Sun Oil by way of the dissolution in 1975 were offset by the limited liabilities assumed at that time – making Cordero's balance sheet as of December 31, 1972, zero (0) and the value of any distributed assets zero (0). (Baas Decl. Exh. 10).

2. Pre-1955 Operations at the Site, Before Cordero Leased the Site from the Mt. Diablo Quicksilver Mining Company.

The record demonstrates that a majority, if not all, of the mine waste rock and mill tailings currently present at the Site were generated prior to 1955. Mt. Diablo Quicksilver Mining Company ("**Mt. Diablo Quicksilver**") operated the Site for six years, between 1930 and 1936, producing approximately 739 flasks of mercury. (Declaration of Robert M. Gailey In Support of Sunoco's Petition for Review and Petition for Stay of Action ("Gailey Decl.") Exh. C, 2-1). Bradley

Mining Company ("**Bradley Mining**") then leased the Site from Mt. Diablo Quicksilver in 1936 and conducted extensive and invasive surface and underground mining operations at the Site over the next fifteen (15) years, producing over 10,000 flasks or 785,000 lbs of mercury and generated 91,561 tons of calcine. (Id.; Baas Decl. Exh. 15, p. 13). At the end of Bradley's operations, extensive underground mine workings existed at the Site, consisting of four levels in a steeply dipping shear zone, and large aboveground deposits of mine tailings on the southeastern hillside of the site (the "**Bradley Mine Tailings**"). (Id.) The Bradley workings were accessed by a main shaft (the "**Main Winze**") and had a drain or adit tunnel that exited to the north-facing hillside on the 165-foot level (**"Bradley's 165'-level Adit**") where Bradley's extensive mine tailings piles are located today. (Id.; See also, Gailey Decl. Exh. B).

In 1951, the Ronnie B. Smith partnership ("**Smith**") surface mined mercury ore until 1954, which they processed on Site to produce more flasks of mercury. (Gailey Decl. Exh. C, 2-1). Together these three owners and/or operators (Mt. Diablo Quicksilver, Bradley Mining, and Smith) extracted significant volumes - almost 11,000 flasks - of mercury. Smith, however, has not been named as a Discharger. (Id.)

During the Korean War, the United States Department of Interior ("**DOI**"), through its Defense Minerals Exploration Administration ("**DMEA**"), commenced the development of the "**DMEA Shaft**" in a further effort to extract mercury at the Site by granting Smith a loan to explore the deeper parts of a shear zone that Bradley previously explored. (Gailey Decl., Exh. C, p. 2-1; Baas Decl. Exhs. 11-13). Between August 1953 and January 1954, Smith excavated a 300-foot-deep shaft, but is not documented to have encountered any mercury ore. (Id.) The DMEA Shaft is located over 200 feet north of the open pit, shafts, adits, and drifts mined extensively by Mt. Diablo Quicksilver, Bradley Mining, and Smith.

In addition, under contract to DMEA, Smith constructed rail tracks for ore cars to dump waste rock from the DMEA Shaft to the north, across the road (away from the pre-existing Bradley Mine Tailings) to an "unlimited location," believed to be on the north-facing slope in the Dunn Creek watershed where geologist E. M. Pampeyan ("**Pampeyan**") of the California Division of Mines and Geology ("**CDMG**") mapped a large waste rock dump in 1963. (Gailey Decl. Exh. C, 2-1; Exh. D, the Declaration of Paul D. Horton in Support of Sunoco's Petition for Review and Rescission of Order, dated January 28, 2010 "**Horton Decl**"; Baas Decl. Exh. 14). In January 1954, Smith assigned his lease and DMEA contract to Jonas and Johnson, who extended the DMEA Shaft cross-cut to 120 feet, but ceased mining after encountering water and gas. (Id.) The DMEA Shaft and cross-cut flooded on February 18, 1954. (Id.)

During the 1952/53 time period, after the operations of Mt. Diablo Quicksilver and Bradley Mining had generated over a thousand tons of waste rock and mill tailings at the Site, but before Cordero appeared at the Site, Water Pollution Control Board #5 (predecessor to the Regional Board) received multiple complaints from neighboring property owners concerning downstream water quality. (Baas Decl. Exh. 15, pgs. 15, 19). On June 9, 1952, Water Pollution Control Board #5 issued the first waste discharge requirements for the mine discharge, Order No. 135. The Order was addressed to Smith. The Pollution Control Board later issued Resolution Number 53-71 on February 27, 1953. (Id.) The record is unclear as to what if any remedial action resulted from this Resolution. The next administrative order that appears in the record is Order No. 78-114 on September 8, 1978, issued to current Site owner Jack Wessman. (Id.)

Notably, in *circa* 1993, a three-year study of the Marsh Creek watershed was commissioned by Contra Costa County to determine the sources of mercury in the Marsh Creek watershed to which the Site is argued to be a contributor. The results of this independent study concluded that the pre-1955 (and pre-Cordero) operations at the Mt. Diablo Mine are the source of a majority, if not all, of the contamination that currently exists at the Site. (Baas Decl., Exh. 16, 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 Report**")). The Slotton Report concluded that the exposed mine tailings and waste rock (Bradley Mine tailings) above the existing onsite pond combined with acid discharge from the spring (Bradley's 165'-level Adit) emanating from the waste rock was the dominant source of mercury in the watershed. (Slotton Report at 61("[w]ith an estimated 88% of the currently exported mercury linked directly to the tailings piles themselves, mercury source mitigation work within the watershed would clearly be best directed toward this localized source [i.e. the Bradley Mine Tailings]"); Gailey Decl. Exh. C, pgs.6-2, 6-3).

3. Cordero's 14 Months of Prospecting Activities at the Site from November 1954 to December 1955.

In contrast to the extensive mining, milling, and tailings generation and disposal activities of three owner/operators between 1930 and 1951 (21 years), Cordero conducted sporadic underground mining activities, in a separate location (the DMEA Shaft), over approximately a one-year period (1954-55). (Gailey Decl., Exh. C, pgs. 2-1, 2-2). Moreover, there is no evidence that Cordero's activities included or otherwise resulted in the processing (milling) of any mercury ore, the production of any flasks of mercury, or the discharge of any mill tailings. (Id.; Horton Decl. ¶ 4)

Cordero leased the Site from Mt. Diablo Quicksilver on November 1, 1954. (Baas Decl., Exhs. 17). After reconditioning the flooded DMEA Shaft, Cordero drove a new series of cross-cut tunnels a total of 790 feet from the DMEA Shaft towards the shear zone previously mined by Bradley, but at a depth 200 feet below

Bradley's extensive workings. (Gailey Decl., Exh. C, p. 2-2, Figs. 3-1 to 3-4). Thereafter, Cordero intermittently used the DMEA Shaft for one year, from approximately December 1954-December 1955, and made only a single connection between its westernmost tunnel at the 360 foot level with the bottom of the vertical Main Winze shaft previously excavated by Bradley Mining. (Gailey Decl. Exh. C, pgs. 2-1, 3-1, Fig. 3-3; Exh. 10).

Aboveground, Cordero rehabilitated the furnace and constructed a trestle from the DMEA Shaft to the ore bin, near the furnace. (Gailey Decl., Exh. C, p. 4-2, Fig. 4-1). However, no records have been located indicating that Cordero ever used the furnace. Cordero also conducted water handling and treatment activities extending from the DMEA Shaft to a pond 1,350 feet to the west. Id. Water pumped to this location either evaporated or drained to Dunn Creek, to the satisfaction of the Water Pollution Control Board, which inspected and approved of Cordero's water handling facilities. (Id., pp. 5-2 – 5-4, Fig. 5-3; Baas Decl. Exhs. 18-22)(Gailey Decl. ¶ 8).

The total volume of waste rock generated by Cordero from its underground workings at the DMEA Shaft during its one year of intermittent use was approximately 1,228 cubic yards, using a 20% bulking factor. (Gailey Decl. Exh. C, p. 5-1). This is *de minimis* compared to the tailings piles and waste rock left by the three other owner-operators that pre-existed Cordero, which total approximately 105,848 cubic yards. (Id.; Horton Decl. ¶ 5).

Near the end of its one-year period, Cordero encountered small zones of ore from which it excavated approximately 100-200 tons of ore (about 50-100 cubic yards). Cordero stockpiled this ore for sampling and assaying. (Gailey Decl. Exh. C, p. 5-1). However, no evidence in the record indicates that Cordero milled any of the small amounts of ore it mined. Nor is there any evidence that Cordero generated any tailings, or added even a single rock to the pre-existing"[e]xtensive waste rock piles and mine tailings [that] cover the hill slope below the open cut," that are the focus of the Slotton Report and the CAO. (Baas Decl., Exh. 1; Gailey Decl. Exh. C, p. 3-1; Horton Decl. ¶¶ 4-5). In fact, the DMEA records reveal that Cordero's activities were unsuccessful, resulting in no mercury production. (Baas Decl. Exh. 23).

In 1956/57, following the mining by the DMEA contractors and Cordero, Pampeyan updated his topographical map by, in part, adding a pile of waste rock adjacent to the DMEA shaft. (Gailey Decl. Exh. C, p. 5-1, Fig. 5-2; Baas Decl. Exh. 11). The record shows that Cordero placed waste rock adjacent to the DMEA Shaft, and that current Site owner Jack Wessman used it to refill the shaft, or, it was placed in the Northern Dump, over the ridge, into the Dunn Creek drainage, using the rail track from the DMEA Shaft. (Gailey Decl. Exh. C, p. 5-1, Figs. 5-2 – 5-3; Baas Decl. Exhs. 11, 18; Horton Decl., ¶¶ 7-8). Waste rock now in that location is typical of the waste rock extracted from the DMEA Shaft. (Horton Decl. ¶ 8).

In December 1955, Cordero indefinitely suspended all mining activities due to heavy rainfall that flooded the mine to the 130-foot level. During the entire time it had any relationship to the Site, all available evidence demonstrates that Cordero was strictly prospecting. Indeed, the Regional Board admits that "[t]here is no record of mercury production for this time period and the amount of mercury production, if any, from this time period is unknown." (Baas Decl. Exh. 1, p.3)

Significantly, the Water Pollution Control Board (predecessor to the Regional Board) was monitoring the groundwater and surface water conditions, as well as Cordero's activities, at the Site during the relevant time. (see *e.g.* Baas Decl. Exh. 15). There is no evidence that Cordero was ever found to be non-compliant or issued an administrative order or other directive related to the Site from a state or federal agency. (Id.) As such, there were no known existing liabilities for which Cordero could be held responsible related to the Site prior to its dissolution in 1975.

The Site remained idle until March 1956, when the Cordero lease with Mt. Diablo Quicksilver was transferred to Nevada Scheelite, Inc. ("Scheelite"), which began dewatering the mine and conducted some basic prospecting activities. Scheelite was a subsidiary of named Discharger Kennametal Inc. The CAO contends that "Scheelite apparently operated an unidentified part of the mine from 1956 to 1958." (Baas Decl. Exh. 1, p. 3).

Notably, during the short period of time that Cordero was active at the Site, there is no evidence in the record that Sun Oil, Sun Company, or Sunoco ever directly owned, leased, operated, or otherwise had any direct contact with the Site. (Baas Decl. ¶ 42)

4. Sunoco's Investigation of the Site and Submissions to the Regional Board, State Board, and the EPA

Despite its non-liability as a successor to Cordero's shareholder, Sun Oil, Sunoco has been the only party to cooperate in good faith with both federal and state administrative orders which have been issued historically to investigate the Site.

In December 2008, in response to a Unilateral Administrative Order from the EPA, Sunoco commissioned work at the Site, without prejudice, to shore up the "toe" of the water impoundment ("**Lower Pond**") at the base of the Site. This work helped assure that Dunn Creek would not undercut the impoundment, potentially causing the release of mercury contaminated sediments. (Baas Decl. Exh. 24).

On March 25, 2009, the Regional Board issued an order to Sunoco directing it to submit a site investigation work plan and report to identify "at that Site the sources of mercury contamination to surface water and groundwater." (Baas Decl.

Exh. 25, "**March Order**") On April 24, 2009, Sunoco filed a Petition for Stay of the March Order. (Baas Decl. Exh. 26, "**2009 Petition**"). The 2009 Petition was held in voluntary abeyance while discussions were held between Sunoco and the Regional Board and was later voluntarily withdrawn without prejudice.

On June 30, 2009, the Regional Board issued a revised order to Sunoco. (Baas Decl. Exh. 27 "**June Order**"). In response, Sunoco submitted a Divisibility Position Paper ("**Divisibility Report**") to the Regional Board outlining the historical activities at the Site – highlighting: (i) the short period Cordero leased the Site (1954-1956); (ii) Cordero's use of less than 10% of the Site; and (iii) that Cordero's activities took place well after the open cut, shafts and adits were excavated, and well after extensive waste rock piles and mine tailings were discarded along the hillside by prior owners and operators. (Gailey Decl. Exh. C). Sunoco's Divisibility Report detailed numerous key findings based upon its technical consultant's review of historical records, maps and aerial photos that establish a reasonable basis for divisibility of Cordero's share of the cleanup.

In compliance with the June Order, in July 2009, Sunoco also submitted a voluntary Potentially Responsible Party Report ("**PRP Report**") to the Regional Board, wherein it identified more than 20 former owners and operators that the Regional Board had failed to name as dischargers on its June Order, including Bradley Mining – which as stated above, operated the Site from 1936-1951, producing over 10,000 flasks of mercury and a great majority of the waste rock and mine tailings at the Site. (Baas Decl. Exh. 28).

In October 2009, despite the detailed factual presentation set forth in the Divisibility and PRP Reports, the Regional Board issued its Divisibility Response, which stated that "Board staff disagree that there is a reasonable basis for apportioning liability." (Baas Decl. Exh. 29). The Regional Board then issued a Revised Order on December 30, 2009 ("**Revised Order**"), seeking to hold Sunoco jointly and severally liable to investigate and develop a remediation work plan for the entire Site – including the Bradley Mine Tailings. The Revised Order required the drafting of three reports: (i) Mining Waste Characterization Work Plan; (ii) Mining Waste Characterization Report; and (iii) Mine Site Remediation Work Plan. (Baas Decl. Exh. 30).

The Revised Order further identified three other "dischargers" required to prepare the same reports, none of whom took any such action: (i) Jack and Carolyn Wessman; (ii) Bradley Mining; and (iii) the United States Department of Interior ("**DOI**"). To Sunoco's knowledge, the Regional Board has not taken any enforcement action against these three PRPs for non-compliance with the Revised Order. (Id.) Indeed, the Regional Board issued a separate Order to a fourth PRP, Kennametal, Inc., on December 1, 2010, against which it also has not sought to enforce its order. Notably, the EPA has taken action against Bradley Mining in its bankruptcy proceeding to assure that at least some funds are earmarked for the Mt. Diablo Site remediation – recognizing Bradley Mining's culpability for the Site conditions. (Baas Decl. Exh. 1).

In January 2010, Sunoco submitted a Petition for Review and Stay of Action of the Revised Order to the State Board, with a copy to the Regional Board. (Baas Decl. Exh. 31, "**2010 Petition**"). The 2010 Petition sought rescission of the Revised Order because: (1) it was improperly vague and ambiguous in its description of the Mine Site; (2) it required Sunoco to conduct Work on large areas of the Mine Site where neither Cordero nor Sunoco were "dischargers," under established state and federal law; and (3) it violated CWC § 13267(b)(1) by failing to provide Sunoco "with a written explanation with regard to the need for the reports, and [fails to] identify the evidence that supports requiring [Sunoco] to provide the reports." (Id.) The 2010 Petition was held in voluntary abeyance for a period and was later voluntarily withdrawn without prejudice in anticipation of the current Petition before the State Board.

In compliance with the Revised Order, in August 2010, Sunoco submitted a Site Characterization Report to the Regional Board presenting evidence that: (i) the "My Creek" watershed was not contributing any mercury to Dunn Creek, which significantly reduces the scope of the area of concern at the Site, including areas that may have been utilized for waste rock disposal by Cordero; (ii) that a sample of water emanating from Bradley's 165'-level Adit collected after it passed through some of the tailings, was low in total mercury and contained no dissolved mercury; and (iii) instead, Bradley Mining's large tailings piles are the source of nearly all of the mercury-laden Site runoff. (Baas Decl. Exh. 32). On August 30, 2010, the Regional Board responded by requesting additional studies be performed. (Baas Decl. Exh. 33).

In December 2011, after having additional on-site investigative work performed, Sunoco submitted an Additional Characterization Report to the Regional Board, which concluded that: (1) the 360'-level Cordero workings have little to no impact on the flow of water from Bradley's 165'-level Adit workings; (2) water emanating from Bradley's 165'-level Adit contains mercury concentrations above freshwater Regional Board 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 Dunn Creek above these criteria are also present in background water samples above water quality criteria. (Gailey Decl. Exh. B). This additional data supports the conclusions reached by previous investigations (*i.e.* the Slotton Report) that the key remedial focus at the Site is mitigating rain water and spring water from contact with the Bradley Mining tailings piles through removal and/or capping, conditions that Cordero's mining activities did not cause or exacerbate, to any meaningful degree.

On January 20, 2012, in advance of an in-person meeting with the Regional Board on January 24, 2012, counsel for Sunoco, John Edgcomb, sent State Board Senior Staff Counsel, Julie Macedo, Esq. a letter, copying Regional Board representative, Victor Izzo, which outlined Sunoco's position of non-liability as a former shareholder of Cordero. The letter detailed Cordero's corporate history, its dissolution, and the argument that Cordero currently lacks the capacity to be sued under Nevada law. (Baas Decl. Exh. 34).

Nonetheless, in compliance with the Revised Order, and based upon the Site Characterization Reports, Sunoco submitted a Work Plan to the Regional Board on May 9, 2012, which presented a plan to mitigate the migration of particulate material and water potentially containing mercury from mine-related materials (e.g., waste rock, tailings, and spring/adit discharges) associated with the Site (but not Cordero's activities) that are potential sources of mercury to Dunn and Marsh Creeks. Examples of the proposed work included: the removal, consolidation, and capping of mine wastes of concern, the capture and re-routing of spring/adit discharges, and the restoration of the Dunn Creek Floodplain immediately below the Site. (Baas Decl. Exh. 35, "**Work Plan**").

On June 8, 2012, the Regional Board responded to Sunoco's submission of the Plan stating "[s]taff concurs with the remedial action approach proposed in the Work Plan and recognized that more detailed planning will occur at a later date. Water Board staff anticipates further enforcement to finalize the remedial action plan and require cleanup." (Baas Decl. Exh. 36).

Despite the factual and legal support presented to the Regional Board demonstrating Sunoco's non-liability as a former shareholder of a dissolved Nevada corporation, and the overwhelming technical evidence establishing a reasonable basis for Sunoco's divisibility, the Regional Board issued the CAO on April 16, 2013, seeking to impose joint and several liability on Sunoco for remediation of the entire Site.

B. LEGAL BASES FOR SUNOCO'S CHALLENGE TO THE CAO

1. Nevada law requires that any claim against Cordero must have been commenced within 2 years after the date of Cordero's Nov. 18, 1975 dissolution, i.e. before Nov. 18, 1977.

Federal Rules of Civil Procedure 17(b) provides that "the capacity of a corporation to sue or be sued shall be determined by the law under which it was organized." (Levin Metals v. Parr Richmond, 817 F.2d 1448, 1451 (9th Cir. 1987); Louisiana Pacific Corp. v. Asarco, Inc., 5 F.3rd 431 (9th Cir. 1993)(CERCLA's three-year statute of limitations does not pre-empt State law regarding the capacity of a dissolved corporation to be sued and related time periods).

Recently, the California Supreme Court confirmed this conclusion, holding that the capacity of a foreign corporation (such as Cordero) to be sued in the State of California shall be determined by the laws of the state in which the corporation was formed (here, Nevada). (Greb, et al. v. Diamond Intl. Corp., 56 Cal.4th 243 (Feb. 21, 2013).)

Nevada's corporate capacity statute provides that claims against a dissolved corporation relating to pre-dissolution acts survive only for a period of two years following the date of dissolution. NRS 78.595 ("The dissolution of a corporation does not impair any remedy or cause of action available to or against it or its directors, officers or shareholders arising before its dissolution and commenced within two years after the date of the dissolution.") Further, effective June 16, 2011, Section 15 of Nevada Senate Bill 405 enacted a provision reaffirming the limited liability of stockholders of a dissolved corporation:

> "2. A stockholder of a corporation dissolved pursuant to an NRS 78.580 or whose period of corporate existence has expired, the assets of which were distributed pursuant to an NRS 78.590, is not liable for

any claim against the corporation on which an action, suit or proceeding is not begun before the expiration of the period described in NRS 78.585."

As noted above, Cordero was dissolved as of November 18, 1975, and lacked the capacity to be sued two years later (November 18, 1977). Accordingly, Cordero cannot now be liable, as a matter of law, for the Site cleanup. Further, because any derivative liability of Sunoco for the activities of Cordero at the Site is, by its very terms, dependent upon the liability of Cordero, and because Sunoco could not have direct liability pursuant to Section 15 of Nevada Senate Bill 405, Sunoco cannot be held liable for Cordero's Site actions either.

2. The law does not impose liability on Sunoco solely in the capacity of being a successor in interest to Sun Oil, the former sole stockholder of Cordero.

a. Sunoco cannot be held liable as a matter of law as the "successor-in-interest" to Cordero.

In 1972, Cordero agreed to liquidate its remaining tangible assets, pay any existing debts, and distribute the remainder of its assets (if any) to Sun Oil. Under Nevada law, when a corporation sells or otherwise transfers its assets, the general rule is that the successor corporation is not liable for the acts of the predecessor corporation. (Village Builders 96, LP v. U.S. Labs, Inc. 112 P.3d 1082, 1087 (Nev. 2005) (citation omitted); see also, Lessard v. Applied Risk Mgmt., 307 F.3d 1020, 1027 (9th Cir. 2002) ("Ordinarily a corporation which purchases the assets of another corporation does not thereby become liable for the selling corporation's obligations…").) The exceptions to this general rule are: (1) where the purchaser expressly or impliedly agrees to assume such debts; (2) where the transaction is really a consolidation or a merger; (3) when the purchasing corporation is merely a continuation of the selling corporation; or (4) where the transaction was fraudulently made in order to escape liability for such debts. (Id.)

Identically, in California, "[w]hen a corporation has been duly and lawfully dissolved, its shareholders are not liable for debts of the corporation …, nor is the rule changed on account of the fact that the shareholder happens to be another corporation, that is, that the dissolved corporation was a wholly owned subsidiary of another corporation." (Potlatch Corp. v. Superior Court, 154 Cal. App. 3d 1144, 1151 (1984)(citations omitted).) The exceptions to this rule in California are similar to those in Nevada: (1) there is an express or implied agreement of assumption, (2) the transaction amounts to a consolidation or merger of the two corporations, (3) the purchasing corporation is a mere continuation of the seller, or (4) the transfer of assets to the purchaser is for the fraudulent purpose of escaping liability for the seller's debts. (Cleveland v. Johnson, 209 Cal. App. 1315, 1327 (1212).)

Here, none of the exceptions apply. First, it is clear from the record that, if any liabilities were assumed, Sun Oil only assumed the administration of Cordero's qualified Retirement and Stock Purchase Plans, together with all assets and liabilities related to such Plans. (Baas Decl. Exh. 5, 6, 8, 10) Under Nevada law, when a corporation is dissolved, the directors of the corporation become trustees of the corporate assets and the trustees have the obligation to pay or provide for payment of all existing liabilities of the corporation. (See NRS 78.590(1)([u]pon the dissolution of any corporation under the provisions of NRS 78.580, ... the directors become trustees thereof, with full power to settle the affairs, collect the outstanding debts, sell and convey property, real and personal, and divide the money and other property among the stockholders, after paying or adequately providing for the payment of its liabilities and obligations).) Thus, Cordero was required to either pay or provide for payment of the only known existing liability, its Retirement and Stock Purchase Plans, before dissolving its corporate existence.

Second, the record demonstrates that the liquidation was a dissolution, not a consolidation or merger of Cordero with Sun Oil. Evidence of this consists of Cordero filing a Certificate of Dissolution with the Department of State of Nevada, surrendering its charter, settling its affairs, liquidating its assets, and "ceas[ing] to be and exist as a corporation." (Baas Decl. Exhs. 2-8). Cordero transferred its one-known remaining liability at the time – the Retirement and Stock Purchase Plan – to Sun Oil along with any remaining assets, which may or may not have offset this liability, and ceased to exist. There is no evidence indicating otherwise.

Third, there is no evidence in the record that the activities of Cordero were continued after its dissolution in 1975.

Finally, there is no evidence (or allegation) that Cordero's dissolution was made for the purpose of escaping liability or effectuating a fraud. For example, there is no evidence that the Regional Board had asserted any site cleanup liability attributable to Cordero or Sunoco at or just before the time of Cordero's dissolution.

Therefore, Sunoco, as the successor to Sun Oil, cannot be held to be the successor in interest to Cordero and, more importantly, cannot be found liable for claims now made against Cordero, which were not in existence (and therefore could not have been expressly assumed) at the time of dissolution.

b. There is No Statutory Remedy to Hold Sunoco Liable as a Former Shareholder of a Dissolved Corporation, Since the Regional Board Cannot Demonstrate Sun Oil Acted as Cordero's *Alter Ego*.

Under Nevada Revised Statute ("NRS") 78.225, "[u]nless otherwise provided in the articles of incorporation, no stockholder of any corporation formed under the laws of this state is individually liable for the debts or liabilities of the corporation." Similarly, NRS 78.747 provides that "[e]xcept as otherwise provided by specific statute, no stockholder, director or officer of a corporation is individually liable for a debt or liability of the corporation, unless the stockholder, director or officer acts as the *alter ego* of the corporation."

By its own terms, the CAO alleges that the sole nexus between Sunoco and the Site is that the "U.S. EPA, Region IX, named Sunoco, Inc. a responsible party for the Mount Diablo Mercury Mine in the Unilateral Administrative Order for Performance of a Removal Action, U.S. EPA Docket No. 9-2009-02, due to its *corporate relationship to the Cordero Mining Company*." (Baas Decl., Exh. 1 p. 1)(italics added). Yet, Sunoco never had any direct "corporate relationship" to Cordero. Its only indirect "corporate relationship" to Cordero (if any), is through a name change from Sun Company, Inc. f/k/a Sun Oil, which formerly owned 100% of Cordero's common stock. Thus, Sunoco's predecessor was no more than a shareholder of Cordero; and all available evidence demonstrates that Sunoco's predecessor never owned, leased, or operated the Site. Consequently, Sunoco is immune from liability for the alleged actions of Cordero, a dissolved Nevada corporation, unless the Regional Board can demonstrate *alter ego* liability. (Id.) (see also, Robbins v. Blecher, 52 Cal. App. 4th 886, 892 (1997) (applying the same principles in California).

A 2011 decision by the United States District Court for the District of Nevada, Assurance Co. of Am. v. Campbell Concrete of Nev., Inc., 2011 U.S. Dist. LEXIS 145845 (D. Nev. Dec. 19, 2011)("Assurance"), confirms the conclusion that Sunoco has no liability for Cordero as the successor in interest to its former shareholder. (Baas Decl. Exh. 37). In Assurance, the court granted a motion to dismiss filed by a defendant shareholder of a dissolved corporation against whom post-dissolution claims had been asserted. In granting the motion, after surveying the Nevada statutes referenced above, the Assurance court found that "no [Nevada] statutory section provides for suit against a shareholder for post-dissolution claims for corporate funds distributed to the shareholder" and concluded that: "[a]lthough Nevada has not given clear guidance on the point, the Court concludes [defendant] is not liable as a shareholder for any post-dissolution claims that were unknown at the time the Nevada corporations were dissolved, as there is no statutory basis for such a claim and Assurance has not identified any case law showing Nevada has adopted the trust fund theory in the face of statutory provisions limiting shareholder liability." (Id. at *16, 18).

Notably, the Assurance court affirmed that the California Supreme Court reached a similar conclusion applying California statutory law to claims against the shareholders of dissolved corporations, concluding that California has interpreted its own law in exactly the same fashion. (Assurance, supra, at *16-17)(citing Penasquitos, Inc. v. Superior Ct., 53 Cal. 3d 1180, 1190-91, 283 Cal. Rptr. 135, 812 P.2d 154 (Cal. 1991).

c. There is no factual basis establishing that Sun Oil acted as Cordero's *alter ego*.

The Ninth Circuit's *alter ego* test considers: (1) the amount of respect given to the separate identity of the corporation by its shareholders; (2) the fraudulent intent of the incorporators; and (3) the degree of injustice visited on the litigants by recognition of the corporate entity. (See Basic Mgmt. v. United States, 569 F. Supp. 2d 1106, 1118 (D. Nev. 2008) (citing Ministry of Defense of the Islamic Republic of Iran v. Gould, Inc., 969 F.2d 764, 769 (9th Cir. 1992); see also Bd. of Trustees. v. Valley Cabinet & Mfg. Co., 877 F.2d 769, 772 (9th Cir. 1989).)

Nevada law regarding the establishment of *alter ego* liability is similar to the Ninth Circuit's analysis, and requires that: (1) the corporation is influenced and governed by the stockholder asserted to be its *alter ego*; (2) there must be such unity of interest and ownership that corporation and the stockholder are inseparable from each other; and (3) adherence to the corporate fiction of a separate entity would sanction fraud or promote a manifest injustice. (Basic Mgmt., supra, 569 F.

Supp. 2d 1106, 1117-1118, citing NRS § 78.747.); see also Sonora Diamond Corp. v. Sup. Ct., 83 Cal. App. 4th 523, 539 (Cal. Ct. App. 2000) (applying similar *alter ego* requirements in California).

Here, requirements 1 and 2 are clearly not met. The evidence demonstrates that Sun Oil and Cordero had separate Boards of Directors and Officers, separate headquarters, separate bank accounts, separate tax statements, and observed the required corporate formalities – such as regular shareholder and director meetings. (Baas Decl., Exhs. 2-8). In addition, the dissolution documents indicate that Sun Oil was a shareholder only, that Cordero's Board acted independently when determining its dissolution, and that no assets existed at the time of Cordero's dissolution in 1975. (Id.).

Likewise, requirement 3 has not been established. Unlike the case often relied upon by the Regional Board to impute liability on shareholder(s) of dissolved corporations, J.F. Katenkamp v. Superior Court, 16 Cal.2d 696 (1940), there is no evidence that Cordero was undercapitalized throughout the relevant time period; nor is there any evidence of fraudulent intent on the part of Sun Oil in maintaining Cordero as a separate corporate subsidiary between 1941 and 1975. Because there was no known claim, or even evidence of a violation of regulation or law, asserted by the Regional Board against Cordero related to cleanup prior to dissolution, a fundamental element of fraud (scienter or knowledge) is missing and, therefore, this matter is distinguishable from Katenkamp. (Id.)(holding a shareholder of a dissolved corporation responsible for the actions of the corporation where the original claim against the corporation was made *before* dissolution and the dissolution was performed *to effectuate a fraud and avoid liability*). Accordingly, Katenkamp is inapplicable and, based on the evidence, the Regional Board cannot establish *alter ego* liability of Sunoco for Cordero's actions at the Site.

The State Board has recognized this legal truism in prior rulings. In WQ 93-9, In Re Aluminum Co., the State Board (addressing a similar fact pattern to that presented here) considered petitioner Alcoa's contention that it could not be considered a discharger under a Waste Discharge Cleanup and Closure Order because: (1) Alcoa was never an owner or operator of the Leona Heights Sulfur Mine, and (2) it could not be considered liable as either the successor or *alter ego* of CDI or ACS (both subsidiaries of a subsidiary of Alcoa), each of which previously held ownership interests in the mine. (WQ 93-9, In the Matter of the Petitions of Aluminum Company of America, (et al.) 1993 Cal. ENV LEXIS 17, Baas Decl. Exh. 38)). After a review of the record searching for evidence indicating that Alcoa was in fact the successor or *alter ego* of CDI or ACS, the State Board concluded that there was insufficient evidence to hold Alcoa (a shareholder) liable for the actions of CDI or ACS on an *alter ego* basis. In reaching its conclusion, the State Board acknowledged the very limited circumstances where a parent corporation can be held liable for the actions of its subsidiary, holding:

> More is required ... than solely a parent-subsidiary corporate relationship to create liability of a parent for the actions of its subsidiary. Walker v. Signal Companies, Inc., 84 Cal.App.3d 982, 1001 (1978). Rather, *where, in addition to stock ownership, there is relatively complete management and control by the parent so 'as to make [the subsidiary] merely an instrumentality, agency, conduit, or adjunct of' the parent*, the *alter ego* doctrine will be applied. McLoughlin v. L. Bloom Sons Co., Inc., 206 Cal. App.2d 848, 851-852, (1962).

(WQ 93-9 at *7. (emphasis added).)

Similarly, there is no evidence that Cordero was merely an instrumentality, agency, conduit, or adjunct of Sun Oil. To the contrary, the record demonstrates that Cordero had its own independent Board of Directors; a separate management structure and staff; separate offices; etc. (see above). Therefore, there are no material facts that support piercing Cordero's corporate veil and find its shareholder, Sun Oil, liable for the alleged activities at the Site on an *alter ego* basis.

3. Cordero's share of liability for the mercury contamination is *de minimis* (at most) and, in any event, is divisible from the other culpable Dischargers.

a. Joint & Several Liability and Apportionment After the <u>Burlington Northern</u> Case.

The United States Supreme Court has held that the division of liability for site cleanup is appropriate where a party can show a reasonable basis for apportionment. (<u>Burlington No. & Santa Fe Ry. Co. et al. v. United States</u>, 556 U.S. 599, 129 S. Ct. 1870 (2009).) In <u>Burlington Northern</u>, 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 facility at issue there, although singular, was capable of apportionment. (<u>Id</u>. at 1881.) Thus, the issue before the Court was whether the record provided a "reasonable basis" for the District Court's conclusion that the railroad defendants were liable for only 9% of the harm caused by contamination at the facility. <u>Id</u>. Despite the parties' failure to assist the District Court in linking the evidence supporting apportionment to the proper allocation of liability, the District Court 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 (italics added).

Ultimately, the Burlington Northern District Court apportioned liability, assigning the railroad defendants 9% of the total remediation costs. (Id.) The District Court created an apportionment formula taking into account geographic, chronological, and volumetric percentages, based on its findings that the primary pollution at the facility was contained in an unlined sump and an unlined pond in the southeastern portion of the facility distant from the railroads' parcel, and that the spills of hazardous chemicals that occurred on the railroad parcel contributed to no more than 10% of the total facility contamination, some of which did not require remediation. (Id. at 1882-3) The Supreme Court concluded that the facts in the record reasonably supported the District Court's apportionment of liability, and stated 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 (italics added). Notably, although the evidence adduced by the parties did not allow the Court to calculate precisely the amount of hazardous chemicals contributed by the railroad 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 railroad parcel and that of those spills that occurred, not all were carried across the railroad parcel to the sump and pond from which most of the contamination originated. (Id.)

Since Burlington Northern, courts have articulated a two-step process for assessing whether a reasonable basis for apportionment exists based on the Restatement (Second) of Torts § 433A, which states that "when two or more persons acting independently cause a distinct or single harm for which there is a reasonable basis for division according to the contribution of each, each is subject to liability only for the portion of the total harm that he himself caused." First, a court must determine whether the harm is capable of apportionment; and second, if the harm can be apportioned, the court must determine how to apportion damages. It is the defendants' burden to demonstrate a reasonable basis for apportionment exists. Burlington Northern, at 129 S. Ct. at 1881.

The Restatement (Second) § 433A also provides that, "where two or more persons cause a single and indivisible harm, each is subject to liability for the entire harm." However, even where contamination is commingled in a single area, the comments to the Restatement suggest the harm can be divisible in terms of degree:

> Where two or more factories independently pollute a stream, the interference with the plaintiff's use of the water may be treated as divisible in terms of degree, and may be apportioned among the owners of the factories, on the basis of evidence of the respective quantities of pollution discharged into the stream.

(Restatement (Second) of Torts, § 433A, Comments c, d; see also Pentair Thermal Mgmt., LLC v. Rowe Indus., Case No. 06-cv-07164, 2013 U.S. Dist. LEXIS 47390 (N.D. Cal. Mar. 31, 2013)("A single harm also may be "divisible because it is possible to discern the degree to which different parties contributed to the damage," by looking to, for example, relative quantities of hazardous materials discharged"); 3000 E. Imperial, LLC v. Robertshaw Controls Co., Case No. CV 08-3985, 2010 U.S. Dist. LEXIS 138661, *25-26 (C.D. Cal. Dec. 29, 2010); In re Bell Petroleum Servs., Inc., 3 F.3d 889, 903 (5th Cir. 1993) (holding volume apportionment reasonable where only one single harm was detected even though it was not possible to determine with absolute certainty the amount of chromium each defendant released).

Here, as demonstrated below, Cordero's liability, if any, at the site is readily divisible and the facts support apportioning Cordero, at most, less than 5% share of the cleanup responsibility, if any cleanup is attributable to Cordero at all. First, there is an undisputable chronological record and overpowering geographic and volumetric bases for divisibility of the cleanup. Second, these bases provide clear evidence that Cordero did not cause any material part of the contamination in this matter, if any at all.

b. There Are multiple Grounds on Which the State Board Can reasonably Allocate Little or No Liability to Cordero.

i. The short time period (chronology) during which Cordero leased the Site and was active is readily known and distinguishable from the other, more culpable, Dischargers.

The chronology of operations at the Site alleged in the CAO generally fall into two categories, (1) consistent prospecting and mining operations from 1930 to 1958; and (2) sporadic and/or non-existent prospecting and mining operations from 1958 to the present. (Baas Decl. Exh. 1, 15; Gailey Decl. Exh. C). Within these time spans, Cordero was at the Site intermittently for one year. When comparing Cordero's short period spent prospecting at the Site to the period of years the Site was consistently in operation (28 years), Cordero's percentage of time at the Site is minimal – or 3.5%; and, when comparing Cordero's short period spent prospecting at the Site to the 83 years covered by the CAO, Cordero's percentage drops to <1%. Thus, from a purely temporal standpoint, Cordero's work at the Site accounts for between 1 and 3.5% of the historical mining activities alleged by the Regional Board to be the cause of the environmental conditions at the Site. (Baas Decl., Exh. 1, p. 2).

In <u>Burlington Northern</u>, the Supreme Court affirmed the use of time of ownership as a reasonable basis for divisibility where the District Court calculated that the railroad had leased its parcel to an operator for 13 years, which was 45% of the time the operator operated the facility. (Burlington Northern, 129 S. Ct. at 1882) Here, the time of ownership is even more definitive, since it is undisputed that Cordero never owned the Site and operated for no more than 1 year (in a distinct location, no less), while other more culpable Dischargers consistently operated the mining site for 27 years (over the entire portion of the Site that is of concern). Thus, the evidence for apportionment on a chronological basis for Cordero is even clearer and more favorable for Cordero than it was for the railroad in Burlington Northern.

ii. **The geographic area in which Cordero was active is readily known and distinguishable from the other, more culpable, Dischargers.**

The CAO states that the Site is comprised of approximately 80 acres and asserts that the Site consists "of an exposed open cut and various inaccessible underground shafts, adits and drifts. Extensive waste rock piles and mine tailings cover the hill slope below the open cut, and several springs and seeps discharge from the tailings-covered area." (Baas Decl., Exh. 1, at p. 1).

The historical mine plans, maps, aerial photographs and other records, however, demonstrate that Cordero was active on and under only a small portion of the Site and that Mt. Diablo Quicksilver, Bradley Mining, and Smith, excavated the "open exposed cut" portion of the mine referenced in the CAO, until landslides partially covered the area. (Gailey Decl. Exh. C; Baas Decl. Exhs. 15, 18-22). No evidence suggests that Cordero operated the open pit mine or discharged anything to the waste rock piles and mine tailings covering the hill slope below it, which the CAO identifies as significant areas of environmental concern. (Baas Decl. Exh. p. 1). Instead, the evidence shows that Cordero is known only to have been associated with the DMEA Shaft and related Cordero tunnels, refurbishing of the furnace, the waste rock pile formerly adjacent to the DMEA Shaft, the settling pond area approximately 1,350 feet north of the DMEA Shaft, and the Northern

Dump at the end of Smith's rail spur leading northerly away from the DMEA Shaft. (Gailey Decl. Exh. C; Gailey Decl. ¶ 8). Thus, Cordero had no involvement (0%) with any of the surface areas responsible for the ongoing releases of mercury at the Site, as described in more detail below.

In Burlington Northern, the Supreme Court affirmed the geographic basis for apportionment where the railroad's portion of the site was 19% compared with the total size of the liable operator's facility. Burlington Northern, 129 S. Ct. at 1882. Again, Cordero's argument is even stronger than the defendant railroad's position because there is no evidence demonstrating that Cordero operated on or contributed to the tailings and waste rock piles that are the source of releases of mercury discussed below – i.e. the Bradley Mine Tailings. (Horton Decl. ¶¶ 5-7).

iii. The estimated contribution (waste volume) of Cordero's activities at the Site (if any) is readily divisible.

The March 1996 Slotton Report titled "Marsh Creek Watershed 1995 Mercury Assessment Project – Final Report" supports the conclusion that the exposed mine tailings and waste rock (Bradley Mining Tailings) above the existing onsite pond is the dominant source of mercury in the watershed. (Baas Decl. Exh. 16; Gailey Decl Exh. C, pgs. 6-2:6-3). The Regional Board specifically recognizes the Slotton Report and its conclusions in the CAO. (Baas Decl. Exh. 1 p.4). Indeed, the Slotton Report estimated that 88% of the mercury emanating from the Site is linked directly to the Bradley Mining Tailings. (Baas Decl. Exh.16).

By comparison, the total volume of waste rock generated by Cordero from its underground workings at the DMEA Shaft during its one year of intermittent use was approximately 1,228 cubic yards, using a 20% bulking factor, which accounts for approximately 1.2% of the total volume of waste rock historically minted from the entire Site. (Horton Decl. ¶ 5; Gailey Decl. Exh. C, p. 5-1). This is *de minimis* compared to the tailings piles and waste rock left by the three other owner-operators that pre-existed Cordero, which total approximately 105,848 cubic yards. (Id.; Horton Decl. ¶ 5).

In addition, the evidence reasonably shows that Cordero did not generate any mill tailings and that Cordero did not deposit its waste rock on the extensive Bradley Mine Tailings that are the primary concern of the CAO. (Gailey Decl. Exh. C; Horton Decl. ¶¶ 4-6). Particularly, the relevant reports and related documents submitted to the Regional Board indicate that: (1) Cordero's waste rock was either piled adjacent to the DMEA Shaft or was taken by rail in the opposite direction of the preexisting open pit and tailings on the southern portions of the Site toward the Northern Dump area in the Dunn Creek drainage north of the DMEA Shaft (Baas Decl. Exh. 4, 5, 8 p. 5-1, 1; Horton Decl. 7, 8; Baas Decl. Exh. 14); (2) the current Site owner Jack Wessman acknowledges that he moved some or all of that adjacent waste rock pile back into the DMEA Shaft, which is consistent with the observation that the DMEA Shaft is now filled (Horton Decl. ¶ 7)(Sunoco's consultant observed waste rock at the area near the end of where the short line rail formerly existed that is typical of the mining waste excavated from the DMEA Shaft); and (3) the data indicate that, after contact with waste rock on the northern portion of the Site, the overland flow from rainwater: (a) contains no mercury or arsenic, (b) is not acidic and (c) has a different geochemical signature than the water collected in the central and southern portions of the Site and, therefore, there are no apparent environmental impacts associated with the northern portion of the Site. (Gailey Decl.).

Therefore, the record, witness testimony, and independent studies show that work conducted and materials generated during Cordero's one year of mining activity at the Site were not and are not related to the mercury-contaminated waters emanating from the Bradley Mine Tailings – which account for 88% of the mercury emanating from the Site. At most, even using a technically unsound approach equating unproven mercury releases from waste rock mined by Cordero with proven releases from ore tailings and waste rock mined by and milled by Bradley and others, Cordero's contribution to the entire mercury loading to the existing impoundments (including the Lower Pond) at the base of the Mine, or into Marsh Creek is "divisible" on an 88/12% basis..

iv. The connection (if any) between the Cordero workings and the Bradley 165'-level Adit is insignificant and there is no evidence that the Cordero workings contribute to the contaminants emanating from the Adit spring.

The Regional Board relied on two primary grounds when it rejected Sunoco's Divisibility Report in 2010. First, the Regional Board assumed, without any evidentiary basis, that the "790 feet of underground tunnels constructed by Cordero connect with, and thus contribute contaminated water to, the earlier underground tunnels [excavated by Bradley] via the Main Winze." (Baas Decl., Exh. 13, p. 1.) This contention has since been studied by Sunoco's consultant, resulting in the following findings:

> 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.

(Gailey Decl., ¶ 11)(italics added).

In summary, there is substantial evidence in the record on which to reasonably to apportion liability pursuant to Burlington Northern and the Restatement "by volumetric, chronological, or other types of evidence, including appropriate geographic considerations," in the following manner: (1) Cordero worked for less than 1-3.5% of the Site history; (2) Cordero conducted its activities on a small portion of the Site's geographic area and not at all where the established primary source of contamination is located; (3) Cordero is only responsible for 1.2% of the total volume of mine related waste at the Site; (4) Independent studies conclude that 88% of the mercury emanating from the Site is linked to the Bradley Mining Tailings, with which Cordero's activities have no causal relationship since Cordero's activities did not result in the processing of any mercury ore, meaning it generated no tailings, and there is no evidence that Cordero ever disposed of waste rock on or in the vicinity of the Bradley Mining Tailings; and, (5) the 360'-level Cordero workings have little to no impact on the flow of water from the Bradley 165'-level Adit, do not contain mercury and, in any event, the seep emanating from the Bradley 165'-level Adit does not contribute a significant enough flow into Dunn Creek to result in downstream concentrations above the criteria.

As a result, Cordero is, at most, responsible for less than 5% of any Site cleanup, while current and former owners and operators, especially Bradley, which benefited from extensive mercury mining and production, are responsible for at least the other 95%.

c. Cordero, as a lessee, is not liable for the discharges of prior property owners and/or lessees.

The CAO's requirement that Sunoco remediate the entire Site is substantially overbroad and inequitable, since Cordero's activities touched upon only a small portion of the Site during its one year of intermittent work and did not produce any mercury flasks or tailings. Sunoco should not be required to remediate areas on which it did not operate or cause any discharge to, which constitute the majority of the Site, including the open pit mining area to the south and southwest of the DMEA Shaft, and the related large tailings and waste rock piles on the southeast and south central portions of the Mine Site (Bradley Mining Tailings). (Baas Decl., Exh. 4, Fig. 5-1 (pre-Cordero tailings piles highlighted in blue).)

While the CAO generally references sections of the California Water Code, it does not specifically articulate any legal authority supporting the liability of Cordero as a lessee for the entire period of time that the Site operated historically. Under California law, subsequent *owners* may be liable for passive migration of a continuing nuisance created by another, but *lessees,* such as Cordero, cannot be held liable for those discharges. 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 therefore in

the same manner as the one who first created it." (Cal. Civ. Code § 3483)(emphasis added.)

Therefore, to the extent that the Regional Board seeks to hold Cordero liable for operations and activities that preceded its activities at the Site based on a continuing nuisance theory, there is no legal support.

VI. THE MANNER IN WHICH PETITIONER HAS BEEN AGGRIEVED

The Regional Board's actions have aggrieved Sunoco because the CAO is arbitrary and capricious, vague and ambiguous, overreaching, and unsupported by the facts or law. (See Section V above)

VII. STATE BOARD ACTION REQUESTED BY PETITIONER

Sunoco requests that the State Board immediately stay enforcement of the CAO and determine that the CAO is arbitrary and capricious or otherwise without factual or legal bases, and rescind it on the following grounds: (1) it is untimely under Nevada law regarding claims against dissolved corporations; (2) improperly names Sunoco as a Discharger when Sunoco, as a successor to a shareholder of Cordero, never owned or operated the Site and never acted as Cordero's *alter ego*; and (3) it improperly seeks to impose joint and several liability on Sunoco and fails to limit the scope of the CAO to at most areas where Cordero had activities at the Site and/or where the evidence demonstrates a nexus to Cordero's historical activities and any contamination at issue.

VIII. STATEMENT OF POINTS AND AUTHORITIES IN SUPPORT OF LEGAL ISSUES RAISED IN THE PETITION

For purposes of this protective filing, the Statement of Points and Authorities is subsumed in Sections V and VI of this Petition. Sunoco reserves the right to file a Supplemental Statement of Points and Authorities, including references to the complete administrative record and other legal authorities and factual documents and testimony, as well as to supplement its evidentiary submission.

IX. STATEMENT REGARDING SERVICE OF THE PETITION ON THE REGIONAL BOARD AND NAMED DISCHARGERS

A copy of this Petition is being sent to the Regional Board, to the Attention of Pamela C. Creedon, Executive Officer, by email and U.S. Mail. By copy of this Petition, Sunoco is also notifying the Regional Board of Sunoco's Petition and the concurrently filed Petition for Stay of Action. A copy of this Petition is also being sent by U.S. Mail to the six other dischargers named in the CAO.

X. STATEMENT REGARDING ISSUES PRESENTED TO THE REGIONAL BOARD/REQUEST FOR HEARING

Sunoco has raised all of the substantive issues and objections set forth in Section V and VI above with the Regional and/or State Board prior to submitting these Petition for Rescission and Stay. Sunoco requests a hearing in connection with this Petition.

For all the foregoing reasons, Sunoco respectfully requests that the State Board review the CAO and grant the relief as set forth above.

Respectfully submitted,

DATED: May 15, 2013

EDGCOMB LAW GROUP

By: ______________________

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STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

In the Matter of SUNOCO, INC., Petitioner, For Stay of Cleanup and Abatement Order No. R5-2013-0701, dated April 16, 2013, Pursuant To Water Code Section 13267, Mount Diablo Mine, Contra Costa County	PETITION NO. **SUNOCO, INC.'S PETITION FOR STAY OF CLEANUP AND ABATEMENT ORDER NO. R5-2013-0701**

Pursuant to California Water Code § 13321 and 23 Cal. Code of Regs. § 2053, Sunoco, Inc. ("**Sunoco**" or "**Petitioner**") hereby petitions the State Water Resources Control Board ("**State Board**") to stay implementation of Cleanup and Abatement Order R5-2013-0701 issued pursuant to Sections 13267 and 13303 of the California Water Code regarding the Mount Diablo Mercury Mine, Contra Costa County ("**Site**"), issued on April 16, 2013 ("**CAO**"), by the Regional Water Quality Control Board, Central Valley Region ("**Regional Board**").

Sunoco has concurrently filed a Petition for Review and Rescission of the CAO with this Petition for Stay of Action. (The Petition for Review and Rescission and accompanying declarations are hereby incorporated by reference.)

I. STANDARD OF REVIEW

Water Code § 13321 authorizes the State Board to stay the effect of Regional Board decisions. Title 23, Cal. Code of Regs. § 2053 requires that a stay shall be granted if a petitioner alleges facts and produces proof of:

1. Substantial harm to petitioner or to the public interest if a stay is not granted;
2. A lack of substantial harm to other interested persons and to the public if a stay is granted; and
3. Substantial questions of fact or law regarding the disputed action.

(23 CCR § 2053(a)).

Sunoco's stay request, as detailed below and in the accompanying Petition for Review and Rescission, satisfies all three elements. Therefore, the State Board should grant a stay of the CAO, including the prescription of any civil penalties, while the State Board determines the substantial questions of law and fact presented in Sunoco's Petition for Review and Rescission.

II. ARGUMENT IN SUPPORT OF STAY

The record on file with the State Board in relation to the concurrently filed Petition for Review contains the relevant supporting documents to this Petition for Stay of Action, which Sunoco reserves the right to supplement. Sunoco hereby incorporates all of the facts and arguments set forth in that Petition for Review and the accompanying Declarations of Adam P. Baas ("**Baas Declaration**") and Robert M. Gailey in Support of Petition for Review and Petition for Stay being filed herewith, including any and all supplemental submissions made by Sunoco in support of its Petition.

A. Petitioner is Likely to Incur Substantial Harm if a Stay of the CAO is Not Granted

If the State Board does not grant Sunoco's request to stay the implementation of the CAO, Sunoco will likely be substantially harmed because it would be forced effectively to choose between two equally unfair options, each with potentially irreparable consequences: comply with the CAO before the merits of its Petition for Review and Rescission of the CAO, which contains substantial f arguments strongly militating in favor of rescission, have been carefully considered **OR** violate the CAO. Sunoco should not be forced to make this choice before it exhausts its due process before a neutral arbiter.

Sunoco has filed a Petition for Review and Rescission of the CAO contending that it is not liable because: (1) its former subsidiary Cordero Mining Company ("**Cordero**") is no longer subject to suit, having dissolved in 1975; (2) it is a non-liable former shareholder of Cordero; and (3) it did not cause the environmental harm alleged, or at most has a divisible, *de minimis* share of liability. If Sunoco is successful in its Petition for Review and Rescission of the CAO, it would eliminate, or at least very substantially limit, Sunoco's responsibility to comply with the CAO and incur the associated costs. Yet, if this Petition for a Stay is not granted, it would effectively remove any possibility for Sunoco to avoid harm and require Sunoco to expedite the consequence of an otherwise undetermined issue at this point – Sunoco's responsibility to perform and pay for the cleanup. Moreover, if the stay is not granted and Sunoco is forced to choose, and Sunoco were to choose to comply with the CAO, Sunoco would have to bear the cost and burden of completing the investigation and remediating the Site while simultaneously opposing the CAO in another forum without likely full reimbursement later.

Once these costs have been unfairly imposed upon Sunoco, it will likely be unable to recovering them since the dischargers named in the CAO with primary liability for the past and ongoing discharges at the Site appear to be without sufficient financial resources for contribution or indemnity. For instance, the Bradley Mining Company ("Bradley Mining") – which is likely the most culpable

Discharger at the Site – has settled all of its liabilities associated with the Site *via* a settlement with the EPA related to its bankruptcy proceeding. (Baas Decl. Exh. 1, p. 3) (Bradley Mining agreed to pay just $50,000 and a small portion of likely, non-existent, future earnings in exchange for a release from its Site liabilities). In addition, The Mt. Diablo Quicksilver Mining Company ("Quicksilver Mining") – which owned the Site for decades and operated it for the second longest period – has dissolved. (Id.)

Indeed, Sunoco has previously expended considerable funds to investigate the Site and perform preliminary response actions, at the direction of the Regional Board and the United states Environmental Protection Agency, and it is likely that Sunoco will not be able to recoup these funds from the more culpable dischargers listed in the CAO. (See e.g. WQ 2012-0012, In Re: Ocean Mist Farms and RC Farms, et al., 2012 Cal. ENV. LEXIS 67 (Sept. 19, 2012) ("[a] substantial cost alone may meet the first prong of a stay determination if the requesting party shows that it constitutes substantial harm. Such a conclusion is consistent with the language of our [State Board] regulations, and the purposes of extraordinary, interim relief"). (Baas Decl., Exh. 39).

Accordingly, forcing Sunoco to incur these costs now or choose to violate the CAO despite being a good corporate citizen and the only cooperating party at this Site to date, as the CAO would do if a stay is not granted, with little possible means of reimbursement if the State Board or Superior Court later renders a decision in Sunoco's favor, will impose substantial and irreparable harm on Sunoco.

B. Other Interested Persons and the Public Will Not Incur Substantial Harm if a Stay is Granted

If the stay is granted, there may be some delay in performing any remaining investigation of the Site and commencing any remediation; however, any delay is limited to a finite period of time necessary to hear Sunoco's Petition for Review and Rescission of the CAO and, in any event, there is no indication that such a delay would cause harm or that it would rise to "substantial," given the totality of the circumstances.

Specifically, a stay is unlikely to cause substantial harm given that: (1) if the Regional Board's claims are accurate that the mercury contamination dates back to the 1960s, and well before that, then the Regional Board has been generally aware of the site conditions it now seeks to have remediated by Sunoco and others for 50 years or more; (2) yet, Sunoco is unaware of any previous Cleanup and Abatement Orders issued against it or Cordero with regard to the Site; (3) Sunoco has already gone above and beyond by bearing the costs to delineate the Site conditions and submit a Work Plan for the remediation of the Site to the Regional Board, which it preliminarily approved (Baas Decl., Exhs. 32, 36-37); (4) the Regional Board can, and should, given that apportionment of most of the liability to defunct or bankrupt corporations is reasonable here, itself take immediate action to implement the Work Plan and can, *via* the California Water Code Section 13443, apply for funds from the State Water Pollution Cleanup and Abatement Account to assist in responding to the water quality problem addressed by the CAO; and, (5) the public interest is well-served by demanding that only fair and just orders, supported by facts and law, are enforced.

Therefore, because a significant period of time has passed since the purported violations occurred, the Regional Board has not directed Sunoco to clean up the Site prior to this time, the Regional Board has other remedies available to it, and the public interest will be best served by granting the stay, the circumstances warrant such here when any harm is evaluated.

C. The Regional Board's Action Raises Substantial Questions of Law on Which Petitioners Are Likely to Prevail.

A Petition for Review of the CAO, incorporated herein by reference, has been filed contemporaneously with this Petition that delineates Sunoco's arguments regarding the legal questions on which Sunoco is likely to prevail – each of which presents a substantial question of law.

First, the California Corporations Code, as affirmed by a recent decision of the California Supreme Court, dictates that the State Board must look to Nevada law to determine whether and to what extent Cordero, a dissolved Nevada (foreign) corporation, can be sued as a Discharger in California. Nevada law requires that any claim against Cordero must have been commenced within 2 years after the date of Cordero's November 18, 1975, dissolution, *i.e.* before Nov. 18, 1977. The Regional Board waited until 2009, or over 30 years after Cordero was legally dead and gone, to make any claim against Cordero. As such, the Regional Board is barred from issuing a CAO or any other claim against Cordero, a non-existent company.

Second, the CAO lists Sunoco as a discharger based solely on its relationship to Sun Oil Company, the former shareholder of Cordero. There is no legal support, however, for finding Sunoco liable for Cordero's historical activities because: Sunoco is a former shareholder of, but not a successor-in-interest to Cordero; Sunoco has no statutory liability for pre- or post-dissolution claims against a shareholder such as Sunoco unless admissible evidence establishes that it acted as the alter ego of Cordero; and there is no admissible evidence establishing that Sun Oil Company acted as the alter ego of Cordero at any time. As such, Sunoco cannot be held liable for the actions of Cordero – regardless of whether Cordero exists today.

Third, notwithstanding these first two arguments, Cordero's contribution to the contamination on and emanating from the Site is *de minimis* (if any) and, in any event, there is a reasonable basis for apportioning Cordero a very small share of the liability, leaving the remainder with other, far more culpable, dischargers: (i)

Cordero prospected for mercury for a very short period of time on a small area of the Site (approximately one year), did not mill any ore or generate any tailings, and contributed only 1.2% of the waste rock (not tailings) at the Site; (ii) the vast majority of the mercury loading downgradient of the Site is sourced from the mine tailings disposed of on the hillside of the Site by other dischargers (primarily Bradley Mining); (iii) the remaining mercury is sourced from groundwater seeping as a spring from a 165'-level Adit constructed by Bradley Mining and largely unrelated to Cordero's historical operations; and (iv) as a lessee, Cordero cannot be held liable for discharges caused by prior property owners/lessees.

The State Board should therefore stay the effect of the CAO on Sunoco until these material and substantial legal issues are fully and finally resolved.

III. CONCLUSION

Sunoco will be substantially and irreparably harmed if it is required to fully implement the CAO before the substantial questions of fact or law regarding its liability under the CAO are resolved, which, upon review in accordance with the historical record, relevant law, and provisions of the California Water Code, are likely to be resolved in favor of Sunoco. Meanwhile, the other Dischargers and the public interest will not be substantially harmed by the temporary stay requested. Therefore, the State Board should issue a stay of the CAO.

Respectfully submitted,

DATED: May 15, 2013

EDGCOMB LAW GROUP

By: ____________________

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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.

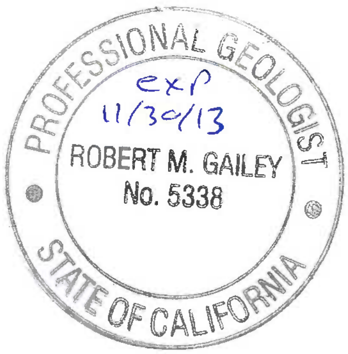
17) As set forth in the Divisibility Paper and the Horton Declaration, some of the waste rock in the northern portion of the Site may have been associated with Cordero operations. Therefore, there are no apparent environmental impacts associated with the portion of the second source of water (water sourced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



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 concern 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

Project No. 01-SUN-055

Prepared For:

SUNOCO

10 Industrial Highway, MS4
Lester, PA 19029

Prepared By:

SGI environmental THE SOURCE GROUP, INC.

3451-C Vincent Road
Pleasant Hill, California 94523

December 7, 2011

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Prepared For:

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10 Industrial Highway, MS4
Lester, PA 19029

Prepared By:

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3451C Vincent Road
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December 7, 2011

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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