



**GUADALUPE RUBBISH
DISPOSAL CO., INC.**

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April 28, 2011

Via Courier signature required (data disc only)

Carrie M. Austin
Environmental Engineer
Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay St., Suite 1400
Oakland, CA 94612

**Re: Water Code Section 13267 Technical Report Requirement on Erosion of Mercury;
Response to RWQCB Request and Addendum to December 23, 2010 Technical
Report on Erosion of Mercury Mining Waste, Guadalupe Recycling and Disposal
Facility**

Dear Ms. Austin:

This letter responds to yours dated February 23, 2011, in which you provided comments and requested further action in connection with the *Technical Report on Erosion of Mercury Mining Waste, Guadalupe Recycling and Disposal Facility*, dated December 23, 2010 ("Stantec Report"), submitted previously by Guadalupe Rubbish Disposal Company, Inc. ("GRDC"). Specifically, you found the Stantec Report to be incomplete with respect to its analysis of historic mercury mining-related activities conducted in areas of GRDC's property outside the boundaries of the area addressed by the Stantec Report, particularly the operations of the New Idria Mining and Chemical Company ("NIMCCO") circa 1969-1970.

Following receipt of your February 23rd letter, GRDC researched a variety of different sources to address your concerns. These sources include the following, which are discussed further below:

- Review of numerous volumes of the Minerals Yearbook ("Yearbook"), an annual publication of the U.S. Department of the Interior's Bureau of Mines;
- Review of a website maintained by the New Idria Historical Preservation Project, Inc.;
- Visit to the Almaden Quicksilver Mining Museum, including discussion with museum curator;
- Review of a book entitled *Quicksilver – The Complete History of Santa Clara County's New Almaden Mine*;
- Contact with various units within the California Department of Conservation;

- Review of historical activities within the area of the former Guadalupe Mine, performed by a third party archaeological consultant retained by GRDC (Holman & Associates); and
- Evaluation of areas identified in Holman & Associates' survey by a third party environmental consultant retained by GRDC (Stantec Consulting Corp.).

1. Minerals Yearbook

The following information about the nature and scope of NIMCCO's mercury mining activities at the former Guadalupe Mine site from 1968 through 1973 was obtained from review of various volumes of the Yearbook:

- (a) 1967: The Yearbook notes that NIMCCO was the largest individual domestic producer of mercury and that Santa Clara County was a major source of such mercury. (*See* 1967 Yearbook, Vol. III, p. 162; attached here as Exhibit A.) However, although NIMCCO was identified as conducting mining operations in San Benito County, it was not identified as an operator in Santa Clara County. (*See id.* at p. 169.) Instead, the operator listed as conducting mercury mining operations in Santa Clara County (the precise mine(s) were not identified) was "Almaden Property Holders" in Los Gatos, California. (*Id.*)

The Guadalupe Mine reportedly produced between 500 and 1,000 flasks of mercury in 1967. (*See* 1967 Yearbook, Vol. I-II, p. 722; attached here as Exhibit B.)

- (b) 1968: NIMCCO "purchased the New Almaden properties, optioned or leased part of the Guadalupe holdings in the same area of Santa Clara County, and began to explore and reopen sections of extensive old workings for development." (1968 Yearbook, Vol. III, p. 149; attached here as Exhibit C.)

Two entities were listed as conducting mercury mining operations in Santa Clara County in 1968: NIMCCO and Guadalupe Mining Co. (*See id.* at pp. 153-54.)

- (c) 1969: The Yearbook notes that mercury production increased at the Guadalupe Mine. (*See* 1969 Yearbook, Vol. III, p. 155; attached here as Exhibit D.) As in 1968, the two entities listed as conducting mercury mining operations in Santa Clara County were NIMCCO and Guadalupe Mining Co. (*See id.* at p. 161.)

The Yearbook also notes that a “60-ton-per-day rotary furnace¹ was scheduled for installation at the Guadalupe mine,” but does not identify the entity performing that work. (*Id.* at p. 156.)

Finally, development continued on properties acquired by NIMCCO in the “Almaden area of Santa Clara County, southwest of San Jose” and that a new 100-ton-per-day rotary furnace was being installed and was due for operation in early 1970. (*Id.*) Presumably, these last comments referenced NIMCCO’s activities at the New Almaden Mine, and not the Guadalupe Mine.

- (d) 1970: The Guadalupe Mine reportedly produced 1,000 or more flasks of mercury in 1970. (*See* 1970 Yearbook, Vol. I, p. 706; attached here as Exhibit E.) The “Old Guadalupe” Mine in Santa Clara County reportedly produced between 100 and 499 flasks of mercury that same year. (*Id.*) Additionally, it was noted that operation of a new furnace at the New Almaden Mine increased capacity by approximately 200 flasks of mercury per month. (*See id.*)

NIMCCO and Guadalupe Mining Co. remained the two entities listed as conducting mercury mining operations in Santa Clara County. (*See* 1970 Yearbook, Vol. II, p. 151; attached here as Exhibit F.)

- (e) 1971: NIMCCO and Guadalupe Mining Co. remained the two entities listed as conducting mercury mining operations in Santa Clara County. (*See* 1971 Yearbook, Vol. II, p. 163; attached here as Exhibit G.)

The 1971 Yearbook contains somewhat contradictory information about NIMCCO’s mercury mining operations that year: The 1971 Yearbook references construction was underway on an 80-ton-per-day rotary furnace (which is inconsistent with the 60-ton-per day furnace mentioned in the 1970 Yearbook). (*See* 1971 Yearbook, Vol. I, p. 732; attached here as Exhibit H.) The 1971 Yearbook also states that the Guadalupe Mine showed “significantly higher production.” (*Id.*) However, the 1971 Yearbook also reports that in March 1971, NIMCCO “temporarily closed the New Almaden and Guadalupe mines . . . because of continued weakening of the mercury price.” (*Id.* at Vol. II, pp. 157-58.)

¹ The reference to tonnage refers to the amount of raw material going into the furnace, not the amount of mercury produced by the furnace.

Finally, the Guadalupe Mine reportedly produced 1,000 or more flasks of mercury in 1970, while the New Almaden Mine reportedly produced between 500 and 999 flasks of mercury that year. (*See* 1971 Yearbook, Vol. I, p. 732.)

- (f) 1972: The 1972 Yearbook noted a continuing decline in mercury mining activity due to reduced demand and pricing. (*See* 1972 Yearbook, Vol. II, p. 136; attached here as Exhibit I.) As such, both the Guadalupe and the New Almaden Mines produced between 100 and 499 flasks of mercury, representing significant reductions from 1971. (*See* 1972 Yearbook, Vol. I, p. 773; attached here as Exhibit J.)

Importantly, Guadalupe Mining Co. was listed as the operator of the Guadalupe Mine, and Santa Clara Quicksilver Co. was listed as the operator of the New Almaden Mine. (*See* 1972 Yearbook, Vol. II, p. 137.) NIMCCO was only listed as the operator of the New Idria Mine in San Benito County. (*See id.*) Moreover, with respect to the Guadalupe Mine, it was reported that a new 100-ton-per-day furnace was in operation, but that “intermittent operation [was performed] by lessee on a royalty basis.” (*Id.*) Presumably the “lessee” referred to in this comment was the Guadalupe Mining Co.

- (g) 1973: Mercury mining activity and output continued to decline. (*See* 1973 Yearbook, Vol. II, p. 126; attached here as Exhibit K.) As in 1972, Guadalupe Mining Co. was listed as the operator of the Guadalupe Mine, and Santa Clara Quicksilver Co. was listed as the operator of the New Almaden Mine. (*See id.*) Also as in 1972, both the Guadalupe and the New Almaden Mines produced between 100 and 499 flasks of mercury. (*See* 1973 Yearbook, Vol. I, p. 759; attached here as Exhibit L.)

At the New Almaden Mine, NIMCCO sold all of its equipment at auction and sold six parcels of its 3,500-acre site to Santa Clara County. (*See id.*) NIMCCO retained three parcels on which the Santa Clara Quicksilver Co. operated a mine and a 30-ton-per-day furnace. (*See id.*) Similarly, NIMCCO retained the reduction plant at its New Idria Mine in San Benito County, but sold all of its equipment there. (*See id.*)

- (h) 1974-1975: Amidst continuing decline in mercury mining and production, both the Guadalupe and the New Almaden Mines were noted as having produced mercury in these years, but the amounts were not reported in the available materials. (*See* 1974 Yearbook, Vol. I, p. 800; attached here as Exhibit M.; 1975 Yearbook, Vol. I, p. 894; attached here as Exhibit N.)

In 1974, NIMCCO put the entire town of Idria in San Benito County up for sale at public auction, including the mercury mine, mill and all the land. (See 1974 Yearbook, Vol. II, p. 137; attached here as Exhibit O.)

1975 is the last year that the Guadalupe Mine was listed in the Mineral Yearbooks.

2. Website Maintained by the New Idria Historical Preservation Project, Inc.

The New Idria Historical Preservation Project, Inc. (the "Preservation Project") is a nonprofit organization that promotes the environmental cleanup and preservation of historic resources associated with the former mining operations of NIMCCO. Although these efforts are focused primarily on the former town of New Idria and the New Idria Quicksilver Mine located in San Benito County, California, some relevant information concerning NIMCCO's mining operations in Santa Clara County, including at the Guadalupe Mine, is available on the Preservation Project's website (www.new-idria.org/).

Specifically, the Preservation Project's website includes a timeline that contains useful information about NIMCCO's mining operations in the relevant time period of 1968-1973. This timeline is available at www.new-idria.org/timeline/t1940.html and is reproduced in relevant part below:

1968: NIMCCO purchased the New Almaden Mine and the Guadalupe Mine in Santa Clara County.

April 1972: NIMCCO shut down the mines with the hope of reopening them again in 1973, but falling quicksilver prices and new environmental standards made reopening the mines unlikely.

May 1973: NIMCCO declared its 4,200 acres of land at the New Almaden Mine as surplus property.

November 1973: NIMCCO held public auctions to sell its equipment at both the New Idria and New Almaden mines, which included more than 1,300 pieces of machinery valued at \$725,000.

3. Visit to the Almaden Quicksilver Mining Museum

Members of GRDC's staff visited the Almaden Quicksilver Mining Museum on March 18, 2011 to review materials that discussed the mercury mining activities associated with the Guadalupe Mine. However, the museum had recently relocated to a new building and as a result, its historical archives were not accessible at the time of GRDC's visit. Additionally, although we spoke with two of the museum's historians, Mary Berger and John Slenter, they were not able to

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provide any useful information concerning former mercury mining activities at the Guadalupe Mine post World War II.

4. Review of a book entitled *Quicksilver – The Complete History of Santa Clara County's New Almaden Mine*

The book entitled *Quicksilver – The Complete History of Santa Clara County's New Almaden Mine* was reviewed to determine whether it contains any useful information concerning the mercury mining activities formerly conducted at the Guadalupe Mine. However, as its name suggests, the primary focus of the book is the New Almaden Mine, and thus, it contains little useful information about the Guadalupe Mine.

5. Contact with various units within the California Department of Conservation

Staff at various units within the California Department of Conservation (“Department”) – which oversee the use and conservation of California’s energy, land and mineral resources – were contacted in GRDC’s efforts to obtain additional information about mercury mining operations at the Guadalupe Mine. A Public Records Act request was sent to the Department’s Office of Mine Reclamation (“OMR”), but the response indicated that OMR’s records only go back to approximately 1972, when California’s Surface Mining and Reclamation Act took effect. Several conversations followed with John Clinkenbeard, a Mineral Resources Supervisor at the Department’s Geological Survey unit. Although Mr. Clinkenbeard expended significant time and effort discussing potential sources of information about mining operations at the Guadalupe Mine, with a focus on NIMCCO’s operations, he was ultimately unable to provide any new substantive information or sources of information beyond what GRDC had already discovered through other means.

6. Survey by Archaeological Consultant

GRDC engaged a third party archaeological consultant, Holman & Associates, to review historical activities conducted within the former mining area on GRDC’s property. Holman & Associates prepared a survey summarizing its findings entitled *Archaeological Survey of an 100-Acre Southern Portion of 15999 Guadalupe Mines Road Near San Jose, Santa Clara County, California*, dated April 2011 (“Holman Survey;” attached here as Exhibit P).

Preparation of the Holman Survey included researching: (a) records at the Northwest Information Center of the California Historical Resources Information System located at Sonoma State University; (b) Historic American Buildings Survey Photos at the Library of Congress; (c) collections at the Bancroft Library at University of California, Berkeley; (d) historical mining and topographic maps; and (e) online publications from Archive.org and Google books. Holman & Associates also visited research facilities in connection with this project, including the: (i) Bancroft Library at University of California, Berkeley; (ii) California Room at San Jose Public

Library; and (iii) Department of Special Collections and University Archives at Stanford University Libraries.

The Holman Survey provides a detailed historical summary of mercury mining activities conducted at the Guadalupe Mine, including during the period from 1948 to 1973. (*See* Holman Survey, pp. 10-19.) Research materials obtained in connection with this survey indicate that “minor intermittent [mining] operations were carried out from 1930 to the early 1950s, [that] in 1956 the mine area was sold for residential development, and [that] in 1964 it was sold again.” (Exhibit Q.) Other records indicate that minor exploration of previously-abandoned areas of Guadalupe Mine was conducted in the 1960s by a group of seven families living there at the time. (Exhibit R.) However, there is no mention of large-scale mining operations at the Guadalupe Mine, or of the development of new, previously unexplored areas.

The Holman Survey also identified numerous physical features related to historic mercury mining operations, almost all of which are located within the Stantec Report’s study area. (*See* Holman Survey, pp. 20 (map), 21-34.) However, two additional areas were noted outside the Stantec Report’s study area where mining activities may have occurred – described as Locus 36 and Locus 43 – both of which are located at the western edge of GRDC’s property. (*See id.* at p. 20 (map).) These two areas are described as follows:

- (a) Locus 36: “[A] mining area that spans both sides of the main road with a possible shaft or tunnel uphill that has been covered. Brown’s 1874 map shows this as the general vicinity of the Santa Bererco (or Benenco) old shaft.” (*Id.* at p. 32.)
- (b) Locus 43: “[A] large borrow pit or gravel area that was mined into the hills. . . . It might be associated with the asphalt operations that operated here since the pit does not appear on any historic-era map.” (*Id.* at p. 34.)

Based on the Holman Survey’s identification of these two features potentially related to historic mining operations located outside the Stantec Report’s study area, Stantec was consulted and evaluated those areas in a letter report dated April 18, 2011 (“Stantec Addendum Report,” attached here as Exhibit S.)

7. Stantec’s evaluation of areas identified in Holman Survey

Please consider the attached Stantec Addendum Report as an addendum to the original Stantec Report, which provides supplemental information concerning the two features identified in the Holman Survey, Locus 36 and Locus 43. As previously recognized by the Regional Board, the U.S. Geological Survey map used to study former mercury mining activities on GRDC’s property, referred to as Plate 14, illustrates the principal mining features on that property. Thus, GRDC has focused its attention on studying those areas included within Plate 14. However, the identification of two former mining features outside the boundaries of Plate 14 prompted GRDC

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and its consultant, Stantec, to assess the erodibility of any mercury mining wastes at those features as well.

Stantec's evaluation of these two features confirmed that one of the two – Locus 36, which consists of two adits and a vegetated waste pile – is related to historic mercury mining operations. (*See* Stantec Addendum Report, pp. 1-2.) However, Stantec's evaluation determined that no evidence of erosion or stormwater drainage towards Guadalupe Creek existed in the area of Locus 36. (*See id.* at p. 2.) Additionally, the Stantec Addendum Report noted that potential stormwater runoff from Locus 36 would be intercepted by two unpaved roads that pass between the elements of Locus 36 and the creek, such that any runoff would be reduced or eliminated before reaching the creek. (*See id.*) Based on these observations, Stantec concluded that the erosion potential and associated bioavailability of mercury mining waste at Locus 36 are "low." (*Id.*)

With respect to Locus 43, Stantec confirmed that the "borrow pit" at this location was not associated with mercury mining operations, and instead, was possibly related to asphalt production. (*Id.*)



In sum, the available records indicate that mining operations conducted at the Guadalupe Mine during the 1950s and 1960s consisted of small-scale, intermittent re-exploration of previously developed areas, rather than major exploration of new areas. The records also establish that NIMCCO either optioned or leased the Guadalupe Mine property from 1968 until 1972 to explore and reopen previously mined areas for additional development. Thus, if NIMCCO's operations consisted of reworking of previously mined areas (as opposed to exploring new areas), those areas were already analyzed in the Stantec Report, with the possible exception of Locus 36 discussed above.

Although the conclusions concerning NIMCCO's operations are drawn only from descriptions of operations and no actual maps were found, they are consistent with various sources describing the state of mercury mining during this time period – mercury mining was declining due to falling mercury prices and environmental concerns, such that the minimal profits no longer supported new exploration. Instead, it makes sense that the mercury mining activity occurring during this period focused on making cost-effective use of new technology to rework previously mined areas and materials.

Thank you for your time and attention to this matter. We trust the information provided above addresses the concerns you raised in your February 23rd letter. Please feel free to contact me at your convenience to discuss further.

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Sincerely,

A handwritten signature in black ink, appearing to read 'William Spence', with a long horizontal line extending to the right.

William Spence

Exhibits (A-S)

bcc: Todd O. Maiden
Eric McLaughlin

EXHIBIT A

Minerals Yearbook

1967

Volume III

AREA REPORTS: DOMESTIC



Prepared by staff of the
BUREAU OF MINES

Table 23.—Mine production of gold, silver, copper, lead, and zinc in 1967, by classes of ore or other source materials in terms of recoverable metals

Source	Number of mines ¹	Material sold or treated (short tons)	Gold (troy ounces)	Silver (troy ounces)	Copper (pounds)	Lead (pounds)	Zinc (pounds)
Lode ore:							
Gold.....	17	2,093	1,204	254	-----	-----	-----
Gold-silver.....	1	1,660	87	3,618	200	1,300	1,200
Silver.....	1	8	-----	166	100	-----	-----
Copper and tungsten ore.....	2	15	42	20,733	1,553,700	-----	-----
Lead.....	5	3,317	42	64,769	4,700	2,774,100	153,800
Lead-silver.....	1	43	29	3,181	500	4,900	100
Lead-zinc.....	2	7,860	85	49,796	16,800	689,700	726,800
Total.....	29	14,996	1,489	142,517	1,576,000	3,470,000	882,000
Other lode material: Old tailings.....	(²)	32	73	8	-----	-----	-----
Total lode material.....	29	15,028	1,562	142,525	1,576,000	3,470,000	882,000
Placer.....	25	(³)	39,008	1,990	-----	-----	-----
Total all sources.....	54	15,028	40,570	144,515	1,576,000	3,470,000	882,000

¹ Detail will not necessarily add to total, because some mines produce more than one class of material.

² Tungsten-ore tonnage not included.

³ From property not classed as a mine.

⁴ 4,408,458 cubic yards. Does not include material washed at commercial gravel plants to produce 2,393 ounces of byproduct gold and 1,119 ounces of byproduct silver included in placer totals.

cement facility. Concentrate produced by American Exploration & Mining Co. at its Iron Age mine, San Bernardino County, was shipped to domestic steel plants and to customers for use in cement manufacture and for heavy aggregate. The Kaiser Steel Corp. Silver Lake mine, San Bernardino County, was idle in 1967 but shipments were made from stockpile to the company's integrated iron and steel facility at Fontana.

Lead.—As in preceding years, lead production came principally from Inyo County. Five mines—the Columbia (Shoshone) and Darwin groups of lead-zinc claims, and the Jubilee, Queen of Sheba, and Santa Rosa lead mines—yielded 94 percent of the total lead recovered. The Darwin property was not in production in 1966. About 240 tons less lead was recovered from all ores than in 1966, partly because of labor strikes at nonferrous smelters.

Mercury.—Mercury production rose by only 315 flasks despite a higher average unit value but shipments were up 13 percent from 1966, reflecting a liquidation of producer inventories. Although 78 mercury mines and prospects were active all or part of the year, only 17 properties yielded more than 100 flasks each. These

17 mines produced over 96 percent of the State total. The three major producers—New Idria Mining and Chemical Co., San Benito County; Buena Vista Mines, Inc., San Luis Obispo County; and Sonoma International, Inc., Sonoma County—recovered 66 percent of the mercury produced and made 67 percent of the shipments. New Idria continued as the largest individual domestic producer. Of the 82 operators reporting production and shipments, 15 used furnaces, or both furnaces and retorts, to recover the metal; 65 used retorts only, and two recovered the metal using placering methods in the vicinity of the old Oat Hill recovery plant, Napa County. Most of the mining activity and production was in the three counties where the major producers were located with 13 active properties in Sonoma County, 11 in San Luis Obispo County, and 10 in San Benito County representing 72 percent of the total output. Santa Clara County, where Guadalupe and Almaden mines are located, was the only other county where combined recoveries even approached 1,000 flasks of mercury.

Two new discoveries were made in 1967, both in the Basin Range province of eastern California. One, the Last Chance mine north of the Crater sulfur claims, Inyo County, was opened by El

Capitan Mining Co. The ore was trucked to and stockpiled at a plant near Keene, Kern County, where furnacing was to begin early in 1968. The other, the Chiefs mine near Bridgeport, Mono County, was producing ore and plans were made for treatment in a custom furnace in Aurora Canyon to be operated by American Mining and Chemical Co.

In June, Sonoma International, Inc., announced it would develop the Altoona mercury mine, Trinity County. Earlier the company had discontinued work at the Baker mine, Lake County.

Molybdenum.—Union Carbide Corp. recovered molybdenite and powellite as byproducts (as sulfide and oxide concentrates, respectively) in the treatment of tungsten ores from its Pine Creek mine, Inyo County. Molybdenite production was lower than in 1966 but shipments more than doubled. The reverse was true of powellite as production rose slightly and shipments dropped nearly 40 percent. All shipments were consigned to domestic customers.

Pig Iron, Sinter, and Ferrous Scrap.—Kaiser Steel Corp. produced all the State's pig iron in blast furnaces at

Fontana, San Bernardino County. The furnaces used 14 percent less ore (concentrate) but 15 percent more agglomerate (sinter and pellets) in producing 1 percent less pig iron. The output was 95 percent basic pig iron and 5 percent direct castings. Kaiser steel furnaces consumed 23 percent more ore (concentrate), 91 percent less agglomerate, 2 percent less pig iron (hot metal), and 5 percent more scrap (home and purchased) than in 1966. United States Steel Corp. at Torrance, Los Angeles County, was the only other steel producer using pig iron in addition to scrap. All others operated on scrap alone. Overall consumption of ferrous scrap and pig iron was down 1 percent from 1966 while use at steel furnaces was virtually unchanged.

Platinum.—Byproduct platinum-group metals were recovered from stream and ancient riverbed gravels and from old tailings at the bucketline gold dredging operation of Yuba Consolidated Gold Fields on the Yuba River, Yuba County. The output was the only reported recovery of platinum in the State. The quantity recovered was 46 percent below that in 1966.

Table 24.—Mercury production, by methods of recovery

Year	Operating mines	Recovery method				Total	Value ³		
		Furnaced ¹		Retorted				Unclassified	
		Ore treated (short tons)	76-pound flasks	Ore treated (short tons)	76-pound flasks			76-pound flasks ²	76-pound flasks
1963	31	61,595	13,273	4,068	303	16	13,592	\$2,575,004	
1964	39	89,630	8,949	12,595	1,334	8	10,291	3,239,504	
1965	84	137,079	11,219	21,060	2,168	17	13,404	7,650,333	
1966	72	136,693	13,714	16,292	2,344	12	16,070	7,100,047	
1967	78	184,656	13,942	67,895	2,438	5	16,385	8,018,164	

¹ Includes ore and mercury from dumps not separable.

² Includes mercury recovered from miscellaneous dump material, placer, and cleanup operations.

³ Value calculated at average New York price.

Table 25.—Ferrous scrap and pig iron consumption

(Thousand short tons)

Year	Ferrous scrap	Pig iron
1963	2,415	1,891
1964	2,575	2,250
1965	2,829	2,319
1966	2,991	2,267
1967	2,960	2,245

Rare-Earth Minerals. — Molybdenum Corporation of America (Molycorp) stated in its annual report that 25.5 million pounds of rare-earth oxides were contained in concentrates produced in its Mountain Pass, Calif., mine and mill in 1967 compared with 25.2 million pounds in 1966. Sales of rare-earth products rose about 2 percent. Over 8 million pounds of rare-earth oxides were shipped

Magnesium compounds:									
FMC Corp.	P.O. Box 344 Newark, Calif. 94560								2 plants at Newark and Chula Vista.
Kaiser Aluminum & Chemical Corp.	Moss landing, Calif. 95039								
Merck & Co., Inc.	Rahway, N. J., 07065								
Almaden Property Holders.	16294 Ridgecrest Ave. Los Gatos, Calif. 95030								Furnaces and retorts.
Buena Vista Mines, Inc.	P.O. Box 753 Paso Robles, Calif. 93446								Furnaces.
Knoxville Exploration & Mining.	Box 2655 San Francisco, Calif. 94126								Furnaces and retorts.
W. C. McCulloch.	P.O. Box 305 Middletown, Calif. 95461								Furnaces.
New Idria Mining & Chemical Co.	Idria, Calif. 95027								Do.
Sonoma International, Inc.	P.O. Box 226 Guerneville, Calif. 95446								Do.
Mica: Western Industrial Minerals.	Box 681 Winterhaven, Calif. 92283								Also grinding plant.
Molybdenum: Union Carbide Corp., Mining & Metals Division.	270 Park Ave., 38th Floor New York, N.Y. 10017								Byproduct of tungsten production.
Natural gas:									
Amerada Petroleum Corp.	Box 417 Idro Vista, Calif. 94571								Petroleum.
Buttes Gas & Oil Co.	2150 Franklin St. Oakland, Calif. 94612								do.
Cameron Oil Co.	110 Kernac Bldg. Oklahoma City, Okla. 73102								1 producing field.
Great Basins Petroleum Co.	1011 Gateway West, Century City Los Angeles, Calif. 90067								2 producing fields.
Phillips Petroleum Co.	3887 State St. Santa Barbara, Calif. 93109								Do.
Natural gas liquids:									
The Atlantic Refining Co.	555 South Flower St. Los Angeles, Calif. 90017								Petroleum.
Getty Oil Co.	4201 Wilshire Blvd. Los Angeles, Calif. 90005								4 plants.
Mobil Oil Co.	P.O. Box 2122, Terminal Annex Los Angeles, Calif. 90054								3 plants.
									Do.

See footnote at end of table.

EXHIBIT B

Minerals Yearbook

1967

Volume I-II

METALS, MINERALS, AND FUELS



Prepared by staff of the
BUREAU OF MINES

Mercury

By John G. Parker¹

Decreased imports, especially from Italy and Mexico, and lower consumption characterized the U.S. mercury industry in 1967. Production from 122 mines was higher than the previous year, principally because of increased output from Nevada.

Secondary production, including Government releases of surplus mercury, provided

32 percent of the mercury for U.S. consumption compared with about 23 percent in 1966.

Foreign mercury production, mainly that of Spain, was considerably lower despite an increased price for the metal (average was \$489.36 per flask at New York in 1967).²

Table 1.—Salient mercury statistics

	1963	1964	1965	1966	1967
United States:					
Producing mines.....	48	72	149	130	122
Production.....flasks..	19,117	14,142	19,582	22,008	23,784
Value.....thousands..	\$3,623	\$4,452	\$11,176	\$9,722	\$11,639
Exports.....flasks.....	187	188	7,543	357	2,627
Reexports.....do.....	40	196	494	476	475
Imports:					
For consumption.....do....	42,872	41,153	16,238	31,864	24,348
General.....do.....	43,126	41,107	17,838	34,757	23,899
Stocks Dec. 31.....do.....	12,181	17,362	20,386	20,076	18,243
Consumption.....do.....	77,963	81,354	73,560	71,509	69,517
Price: New York, average per flask	\$189.45	\$314.79	\$570.75	\$441.72	\$489.36
World:					
Production.....flasks.....	239,652	254,973	267,713	264,959	242,042
Price: London, average per flask	\$171.42	\$282.25	\$607.85	\$447.68	\$499.36

Legislation and Government Programs.—Through the Office of Mineral Exploration (OME) of the Geological Survey, the Federal Government offered financial aid to qualified applicants searching for mercury. The offering of 50 percent of total allowable exploration costs at eligible domestic mercury deposits, in effect since 1957, was raised in September to 75 percent.

The stockpile objectives for mercury, which had been changed during 1966 to 200,000 flasks for conventional war and

8,600 flasks for nuclear war, remained the same in 1967. As of September 30, 1967, there were 200,365 flasks in the stockpile. Total releases of surplus mercury by General Services Administration (GSA) during 1967 were 11,454 flasks, leaving a surplus of 22,935 flasks for disposal at yearend. This material came from stocks previously transferred by the Atomic Energy Commission (AEC) to GSA. In 1965 AEC had offered 38,000 flasks to GSA but withdrew the offer in 1966 and instead offered 20,000 surplus flasks.

DOMESTIC PRODUCTION

In response to higher average prices for mercury in 1967, compared with those of 1966, primary mercury production in the United States increased 8 percent

¹ Commodity specialist, Division of Mineral Studies.

² Flasks as used in this chapter refers to a 76-pound flask.

above that of 1966. In 1967 the ore processed averaged 4.1 pounds of mercury per ton. Of 122 operations, the 78 in California, where output rose slightly, produced nearly 70 percent of the Nation's mercury. Output from 25 operations in Nevada increased 40 percent and output from Oregon was 35 percent greater than

in 1966. A major producer, the Bretz mine in Oregon, closed in September 1966 because of ore depletion.

The quantity of secondary mercury, produced from battery scrap, reclaimed dental amalgams, sludges, and other sources, increased. The secondary figures as shown include GSA releases.

Properties producing 1,000 flasks or more:

State:	County	Mine
California	San Luis Obispo	Buena Vista.
Do	Sonoma	Mt. Jackson.
Do	San Benito	New Idria.
Nevada	Humboldt	Cordero.

Properties producing 500 to 1,000 flasks:

State:	County	Mine
California	Lake	Helen.
Do	Napa	Knorville.
Do	Santa Clara	New Almaden.
Idaho	Washington	Idaho-Almaden.
Nevada	Esmeralda	B&B.
Do	Pershing	Red Bird.
Oregon	Lane	Black Butte.

Properties producing 100 to 500 flasks:

State:	County	Mine
Alaska	Aniak	White Mountain.
Arizona	Maricopa	Pine Mountain.
Arkansas	Pike	Great Southwestern Mining.
California	Trinity	Altoona.
Do	Napa	Corona.
Do	Sonoma	Crystal.
Do	Marin	Gambonini.
Do	Santa Barbara	Gibraltar.
Do	Santa Clara	Guadalupe.
Do	Lake	Konocti.
Do	San Luis Obispo	La Libertad.
Do	Kings	Little King.
Do	Fresno	Mercy.
Do	Sonoma	Socrates.
Oregon	Lake	Glass Butte.
Texas	Brewster	Study Butte.
Do	Presidio	Fresno.

Table 2.—Mercury produced in the United States, by States

Year and State	Pro- ducing mines	Flasks	Value ¹ (thou- sands)
1966:			
Arizona	7	363	\$160
California	71	16,070	7,100
Idaho	2	1,134	501
Nevada	29	3,355	1,482
Oregon	8	700	309
Alaska, Arkansas, Texas	13	386	170
Total	130	22,008	9,722
1967:			
California	78	16,385	8,018
Idaho	2	898	439
Nevada	25	4,703	2,301
Oregon	6	943	461
Alaska, Arizona, Arkansas, Texas	11	855	420
Total	122	23,784	11,639

¹ Value calculated at average New York price.

Table 3.—Mercury ore treated and mercury produced in the United States ¹

Year	Ore treated (short tons)	Mercury produced	
		Flasks	Pounds per ton of ore
1963	113,539	19,101	12.8
1964	149,907	14,115	7.2
1965	339,124	19,353	4.3
1966	321,080	21,993	5.2
1967	439,753	23,767	4.1

¹ Excludes mercury produced from placer operations and from cleanup at furnaces and other plants.

Table 4.—Production of secondary mercury in the United States

Year:	Flasks ¹
1963	10,520
1964	24,519
1965	46,670
1966	16,400
1967	22,150

¹ Includes GSA releases.

EXHIBIT C

Minerals Yearbook

1968

Volume III

AREA REPORTS: DOMESTIC



Prepared by staff of the
BUREAU OF MINES

Table 17.—Mine production of gold, silver, copper, lead and zinc in 1968, by counties, in terms of recoverable metals

County	Mines producing ¹		Gold (lode and placer)		Silver (lode and placer)		
	Lode	Placer	Troy ounces	Value (thousands)	Troy ounces	Value (thousands)	
Fresno.....		(²)	654	\$26	96	(³)	
Inyo.....	6		699	27	563,523	\$1,209	
Mariposa.....	2	(²)	87	3	10	(³)	
Merced.....		(²)	23	1	27	(³)	
Nevada.....		1	59	2	3	(³)	
Plumas.....	1	2	137	5	571	1	
San Benito.....	1				530	1	
San Diego.....	1	(²)	2	(³)	1	(³)	
San Joaquin.....	1	(²)	867	34	85	(³)	
Sierra.....	3	1	1,708	67	365	1	
Tuolumne.....	1	1	17	1			
Yuba.....	1	1	9,971	391			
Undistributed ⁴	18	5	1,473	58	32,750	70	
Total ⁵.....	34	11	15,682	616	597,961	1,282	

	Copper		Lead		Zinc		Total value (thousands)
	Thousand pounds	Value (thousands)	Thousand pounds	Value (thousands)	Thousand pounds	Value (thousands)	
Fresno.....						\$26	
Inyo.....	2,318	\$970	7,642	\$1,010	7,013	\$947	4,162
Mariposa.....							3
Merced.....							1
Nevada.....							2
Plumas.....	14	6					12
San Benito.....							1
San Diego.....							(³)
San Joaquin.....							34
Sierra.....							68
Tuolumne.....							1
Yuba.....							391
Undistributed ⁴	32	14	360	48	37	5	194
Total ⁵.....	2,364	989	8,002	1,057	7,050	952	4,896

¹ Excludes itinerant prospectors, "snipers," "high-graders," and others who gave no evidence of legal right to property.

² From property not classed as a mine.

³ Less than 1/2 unit.

⁴ Includes Alpine, Amador, Butte, El Dorado, Imperial, Kern, Los Angeles, Mono, Placer, Sacramento, San Bernardino, Santa Clara, Shasta, Siskiyou, and Trinity Counties.

⁵ Data may not add to totals shown because of independent rounding.

Mountain) declined. Pacific Western Industries, Kern County, produced ore for use in its cement plant. American Exploration & Mining Co. produced and shipped concentrate from its Iron Age mine in San Bernardino County to domestic cement, pig iron, and steel producers. The Kaiser Steel Corp. Silver Lake mine was idle, and no shipments were made from stockpile.

Lead.—Production of lead more than doubled in quantity and value, primarily because of increases in output at the Darwin, Jubilee, and Santa Rosa mines, all in Inyo County. The increases were partly due to settlement of the copper strike which had shut down smelters from July 1967 through March 1968.

Mercury.—Expanded activity at the State's leading mercury mine, the New Idria, in San Benito County, was an important factor in the increase of 5,032 flasks over total California production in 1967. Although overall output rose 31 percent, shipments were only 24 percent higher, resulting in an increase in stocks. Of 53 mines and prospects active, 25 fewer than in 1967, 17 yielded over 100 flasks of mercury each, and of these, seven produced over 1,000 flasks each. Mines producing over 100 flasks accounted for 97 percent of total production, compared with 96 percent in 1967. The four leading producers supplied nearly two-thirds of total production: New Idria Mining & Chemical

Table 19.—Mine production of gold, silver, copper, lead, and zinc, in terms of recoverable metals¹

Year	Mines producing ²		Material sold or treated ³ (thousand short tons)	Gold (lode and placer)		Silver (lode and placer)	
	Lode	Placer		Troy ounces	Value (thousands)	Troy ounces	Value (thousands)
1964-----	43	39	16	71,028	\$2,486	171,621	\$222
1965-----	51	27	20	62,885	2,201	196,787	254
1966-----	52	25	25	64,764	2,267	189,989	246
1967-----	29	25	15	40,570	1,420	144,515	224
1968-----	34	11	76	15,682	616	597,961	1,282
1848-1968-----	NA	NA	NA	106,250,359	2,420,933	120,607,637	99,505

	Copper		Lead		Zinc		Total value (thousands)
	Short tons	Value (thousands)	Short tons	Value (thousands)	Short tons	Value (thousands)	
1964-----	1,035	\$675	1,546	\$405	143	\$39	\$3,827
1965-----	1,165	825	1,810	565	225	66	3,911
1966-----	1,073	780	1,976	597	335	97	3,987
1967-----	788	602	1,735	486	441	122	2,854
1968-----	1,182	989	4,001	1,057	3,525	952	4,896
1848-1968-----	646,096	213,539	275,767	55,784	155,345	36,845	2,826,556

NA Not available.

¹ Includes recoverable metal content of gravel washed (placer operations); ore milled; old tailings or slimes retreated; tungsten ore; and ore, old tailings, slag, flue dust, and pyritic ore residue shipped to smelters during calendar year indicated.² Excludes itinerant prospectors, "snipers," "high-graders," and others who gave no evidence of legal right to property.³ Does not include gravel washed.Table 20.—Mine production of gold, silver, copper, lead, and zinc in 1968, by types of material processed and methods of recovery, in terms of recoverable metals¹

Type of material processed and method of recovery	Gold (troy ounces)	Silver (troy ounces)	Copper (thousand pounds)	Lead (thousand pounds)	Zinc (thousand pounds)
Lode:					
Amalgamation and cyanidation: Ore....	873	838	-----	-----	-----
Concentration and smelting of concentrates: Ore ²	1,016	500,757	2,303	4,450	6,554
Direct smelting: Ore.....	650	96,045	61	3,552	496
Placer.....	13,143	321	-----	-----	-----
Total.....	15,682	597,961	2,364	8,002	7,050

¹ Includes gold recovered as "natural gold."² Includes tungsten-ore concentrate.

Co., San Benito County; Buena Vista Mines, Inc., San Luis Obispo County; El Capitan Mining Co., Inyo County; and Sonoma Mines, Inc. (name changed from Sonoma International, Inc., in late 1968), Sonoma County. Companies with furnace operations alone totaled 11, retort operations 38, and combination furnace and retort operations four. A few flasks of mercury were recovered by reworking tailings or mine dumps in Lake, Napa, and San

Benito Counties and from a gold placer operation in Trinity County. Producing properties of record were distributed as follows, by counties: San Luis Obispo, nine; Lake, eight; San Benito, six; Sonoma, six; Fresno, two; Marin, four; Napa, three; Santa Clara, three; Kings, three; Santa Barbara, two; Trinity, two; Colusa, one; Contra Costa, one; Inyo, one; Mendocino, one; and Yolo, one.

Table 21.—Mine production of gold, silver, copper, lead, and zinc in 1968, by classes of ore or other source materials in terms of recoverable metals

Source	Number of mines ¹	Material sold or treated (short tons)	Gold (troy ounces)	Silver (troy ounces)	Copper (thousand pounds)	Lead (thousand pounds)	Zinc (thousand pounds)
Lode ore:							
Gold.....	15	3,265	1,574	530	-----	-----	-----
Gold-silver.....	2	3,075	152	21,673	(²)	2	1
Silver.....	4	271	56	8,017	2	1	(²)
Copper and tungsten ore	5	³ 119	185	69,379	2,162	-----	-----
Lead.....	6	6,361	79	86,108	26	3,541	498
Lead-zinc.....	1	63,297	498	411,654	174	4,457	6,548
Zinc.....	1	12	-----	279	-----	1	2
Total.....	34	76,400	2,539	597,640	2,364	8,002	7,050
Placer.....	11	(⁴)	13,143	321	-----	-----	-----
Total all sources.....	45	76,400	15,682	597,961	2,364	8,002	7,050

¹ Detail does not necessarily add to total, because some mines produce more than 1 class of material.

² Less than ½ unit.

³ Tungsten ore tonnage not included.

⁴ 3,038,544 cubic yards. Does not include material washed at commercial gravel plants to produce 2,568 ounces of byproduct gold and 318 ounces of byproduct silver included in placer totals.

El Capitan's relatively new operation in the Last Chance Mountains of Inyo County, north of Scotty's Castle, Death Valley, became a major producer during 1968. A sizable tonnage of rich ore was mined by open-pit methods and trucked several hundred miles for processing in a plant near Keene in Kern County. Shafts were excavated, and late in the year a change to underground mining was in progress.

New Idria Mining & Chemical purchased the New Almaden properties, optioned or leased part of the Guadalupe holdings in the same area of Santa Clara County, and began to explore and reopen sections of extensive old workings for

development. The New Almaden, active only on a limited scale in recent years, was once the State's largest producer and has produced over 1 million flasks. Mill and furnace facilities were to be expanded in 1969. Also the company planned extensive exploration at its New Idria mine with assistance from the U.S. Geological Survey's Office of Minerals Exploration.

Sunbird Mines, Inc., with its Gibraltar (or Sunbird) open-pit deposit in Santa Barbara County, rose to the rank of producers of 1,000 flasks or more, and the Altoona mine of Altoona Mine, Inc., Trinity County, became a producer of over 500 flasks. At the Juniper mine, San Benito County, Cal-Merc Mining Co. de-

Table 22.—Mercury production, by method of recovery

Year	Operating mines	Recovery method					Total	
		Furnaced ¹		Retorted		Unclassified (76-pound flasks) ²	76-pound flasks	Value ³
		Ore treated (short tons)	76-pound flasks	Ore treated (short tons)	76-pound flasks			
1964.....	39	89,630	8,949	12,695	1,334	8	10,291	\$3,239,504
1965.....	84	137,079	11,219	21,060	2,168	17	13,404	7,650,333
1966.....	72	136,693	13,714	16,292	2,344	12	16,070	7,100,047
1967.....	78	184,656	13,942	67,895	2,438	5	16,385	8,018,164
1968.....	53	176,502	19,494	38,959	1,918	5	21,417	11,470,089

¹ Includes ore and mercury from dumps not separable.

² Includes mercury recovered from miscellaneous dump material, placer, and cleanup operations.

³ Value calculated at average New York price.

veloped a sizable ore reserve and was installing a 75-ton-per-day rotary kiln, due for startup in March 1969. Mt. Konocti Mining Co.'s furnace plant burned in the latter part of 1968. Buttes Gas and Oil Co. operated a new 75-ton rotary kiln at its Gambonini property in Marin County, and ore discoveries were reported near Petaluma at the Red Jacket mine, where a small treatment plant was in operation. A furnace in Aurora Canyon, near Bridgeport, Mono County, was reported to have been moved into Nevada to serve other mercury sources. Exploration was carried on at the Oat Hill mine, once a large producer in Napa County, and geophysical exploration was conducted at the Reed mine in Yolo County. A new rotary kiln operated at the Knoxville mine, Napa County, where development beneath an existing open pit was being considered. In the same area, a mill was installed at the Harrison mine and exploration proceeded at the Manhattan mine.

Molybdenum.—Union Carbide Corp. recovered molybdenite and powellite as by-products in the treatment of tungsten ores at its Pine Creek mine, Inyo County. Production of molybdenite increased, but shipments of both byproducts were very much lower. All shipments were consigned to domestic customers.

Pig Iron, Sinter, and Ferrous Scrap.—Kaiser Steel Corp. produced all the State's pig iron at its Fontana blast furnace, San Bernardino County. The furnace consumed 6 percent more concentrate and 3 percent less sinter, in producing 3 percent more pig iron. The output was 94 percent basic pig iron and 6 percent direct castings. Kaiser Steel furnaces consumed 10 percent less ore (concentrate), 4 percent more pig iron (hot metal), and 4 percent more scrap (home and purchased and slag scrap) than in 1967. The other large steel producer, United States Steel Corp. at Torrance, Los Angeles County, used pig iron and scrap.

Platinum.—Byproduct platinum-group metals were recovered from stream and ancient riverbed gravels in the Hammon-ton area, Yuba County. Production of these metals in California ceased on October 1, when the gold dredge, Old Yuba 21, was shut down.

Rare-Earth Minerals.—Molybdenum Corporation of America (Molycorp) stated in its annual report that 22.8 million pounds of rare-earth oxides was contained in bastnaesite concentrates produced in its Mountain Pass, Calif., mine and mill. The decline from the reported 1967 high of 25.5 million pounds was attributed to a leveling off of the exceptionally rapid growth of rare-earth consumption. Although production was slightly lower than in 1967, sales rose 4 percent.

Silver.—Inyo County accounted for 94 percent of the total State silver output. The largest producers were Darwin (primarily a lead-zinc mine), Jubilee (lead), Pine Creek (tungsten), and Santa Rosa (lead). These mines, and the Zaca (gold-silver) mine in Alpine County, all increased their output and were responsible for a fourfold increase in the ounces of silver produced.

Tin.—No tin was produced in 1968.

Tungsten.—Pine Creek mine, Inyo County, of Union Carbide Corp. continued to produce a high percentage of the State's tungsten ore and concentrate. Union Carbide also purchased concentrates from producers or former producers in California, Arizona, Idaho, Montana, Nevada, New York, Pennsylvania, and Utah, and from the Government stockpile. Part of the produced and purchased concentrates were converted to paratungstate at the Pine Creek plant, and both concentrates and paratungstate were shipped to customers in other States.

New Idria Mining & Chemical Co., Madera County, and Mines Exploration, Inc., San Bernardino County, were the only other sizable producers of the 28 companies that reported production of tungsten ore or concentrate.

The average price for tungsten concentrate increased \$1.57 per short ton unit.

Zinc.—Production of zinc increased almost eightfold in value and quantity, primarily because of expanded output from the Darwin mine, Inyo County. Production also increased several fold at the Santa Rosa mine, Inyo County, the second largest zinc producer.

Table 23.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Gypsum:			
C. L. Fannin Agricultural Gypsum.	Route 1, Box 7, Famosa Hwy. Wasco, Calif. 93280	Open-pit mine	Kern.
H. M. Holloway, Inc.	714 Sixth St. Wasco, Calif. 93280	do	Do.
Monolith Portland Cement Co.	Box 65677 Glassell Station Los Angeles, Calif. 90065	do	Ventura.
Superior Gypsum Co.	2150 Franklin St. Oakland, Calif. 94612	do	Kern, San Luis Obispo.
Tembler Gypsum Co.	Carrisa Plains, Star Route Box 80 Santa Margarita, Calif. 93453	do	Kern.
United States Gypsum Co.	101 South Wacker Drive Chicago, Ill. 60606	do	Imperial.
Iron ore:			
American Exploration & Mining Co.	Twentynine Palms, Calif. 92277	do	San Bernardino.
Kaiser Steel Corp.	P.O. Box 158 Eagle Mountain, Calif. 92241	do	Riverside.
Lead:			
Paul Bare.	P.O. Box 538 Lone Pine, Calif. 93545	Underground	Inyo.
Monte Cristo Mining Corp.	P.O. Box 218 Las Vegas, Nev. 89101	Underground mine	Inyo.
West Hill Exploration, Inc., T.A.C. Mines Dept.	Lone Pine, Calif. 93545	do	Do.
Lime:			
American Crystal Sugar Co.	Box 419 Denver, Colo. 80201	Shaft kiln	Yolo.
Diamond Springs Lime Co.	P.O. Box 407 Diamond Springs, Calif. 95619	Rotary kiln and continuous hydrator	El Dorado.
The Flintkote Co.	P.O. Box 57367 Flint Station Los Angeles, Calif. 90057	Shaft and rotary kilns, continuous hydrator.	Contra Costa, Tuolumne.
FMC Corp.	P.O. Box 344 Newark, Calif. 94560	Rotary kiln	Alameda.
Holly Sugar Corp.	Box 1052 Colorado Springs, Colo. 80901	Shaft kilns and continuous hydrators.	Glenn, Imperial, Orange, San Joaquin.
Kaiser Aluminum & Chemical Corp.	Moss Landing, Calif. 95039	Rotary kiln and continuous hydrator.	Monterey.
Chas. Pfizer & Co., Inc.	P.O. Drawer AD Victorville, Calif. 92392	Fluidized-bed kiln and continuous hydrator.	San Bernardino.
Spreckels Sugar Co.	2 Pine St. San Francisco, Calif. 94111	Shaft and rotary kilns.	Monterey, San Joaquin, Yolo.
Stauffer Chemical Co.	636 California St. San Francisco, Calif. 94119	Rotary kiln and continuous hydrator.	San Bernardino.
Union Sugar Division.	230 California St. San Francisco, Calif. 94111	Shaft kiln	Santa Barbara.
Lithium minerals:			
American Potash & Chemical Corp.	P.O. Box 2294 Terminal Annex Los Angeles, Calif. 90054	Dry lake brines	San Bernardino.
Magnesium compounds:			
FMC Corp.	P.O. Box 344 Newark, Calif. 94560	Salt works bitterns.	Alameda, San Diego.
Kaiser Aluminum & Chemical Corp.	Moss Landing, Calif. 95039	Seawater processing	Monterey.
Merck & Co., Inc.	Rahway, N.J. 07065	do	San Mateo.
Mercury:			
Altoona Mine, Inc.	P.O. Box 226 Guerneville, Calif. 95446	Underground mine	Trinity.
Buena Vista Mines, Inc.	P.O. Box 753 Paso Robles, Calif. 93446	do	San Luis Obispo.
Buttes Gas and Oil Co.	2150 Franklin St. Oakland, Calif. 94612	Open-pit mine	Marin.
El Capitan Mining Co.	Route 4, Box 7L Bishop, Calif. 93514	do	Inyo.
Guadalupe Mining Co.	14900 Guadalupe Mine Road San Jose, Calif. 95120	do	Santa Clara.
International Resources, Inc.	2225 Hillside Drive Santa Rosa, Calif. 95404	Underground mine	Lake.
L. W. Knepper	Idria, Calif. 95027	Open-pit mine	Fresno, San Benito.
Knorrville Exploration & Mining.	Box 2655 San Francisco, Calif. 94126	do	Napa.

Table 23.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Mercury—Continued			
Mt. Konocti Mining Co.	P.O. Box 566 Kelseyville, Calif. 95451	Open pit mine.....	Lake.
New Idria Mining & Chemical Co.	Idria, Calif. 95027.....	Underground and open-pit mines.	San Benito, Santa Clara.
Sonoma Mines, Inc.....	P.O. Box 226 Guerneville, Calif. 95446	Underground mine..	Sonoma.
Sulphur Creek Mining..	202 Ridge Road Ukiah, Calif. 95482	.....do.....	Do.
Sunbird Mines, Ltd.....	1018-A Anacapa St. Santa Barbara, Calif. 93101	Open-pit mine.....	Santa Barbara.
Vallejo Quicksilver....	5741 Florin-Perkins Road Sacramento, Calif. 95828	Underground mine..	Napa.
Mica:			
Rockton Mining & Manufacturing, Inc.	4760 Valley Blvd. Los Angeles, Calif. 90032	Open-pit mine.....	Los Angeles.
Molybdenum:			
Union Carbide Corp., Mining & Metals Division.	270 Park Ave., 38th Floor New York, N.Y. 10017	Underground mine..	Inyo.
Natural gas:			
Amerada Petroleum Corp.	550 South Flower St. Los Angeles, Calif. 90017	Gasfield.....	Contra Costa, Sacramento, San Joaquin, Solano.
Atlantic Oil Co.....	523 West 6th St., Rm. 116 Los Angeles, Calif. 90014	.....do.....	Colusa, Glenn, Sutter, Yolo.
Buttes Gas & Oil Co...	2150 Franklin St. Oakland, Calif. 94612	.....do.....	Butte, Colusa, Glenn, Sutter, Tehama.
Cameron Oil Co.....	110 Kermac Bldg. Oklahoma City, Okla. 73102	.....do.....	Colusa, Sutter.
Great Basins Petroleum Co.	1011 Gateway West Century City, Los Angeles, Calif. 90067	.....do.....	Colusa, San Joaquin.
Superior Oil Co.....	Box 1031 Bakersfield, Calif. 93302	.....do.....	Butte, Glenn, Kern, Sacramento, Solano, Tehama.
Transco Oil Co.....	500 South Main St., Suite 920 Orange, Calif. 92668	.....do.....	Kings.
Natural gas liquids:			
Atlantic Richfield Co..	445 South Figueroa St. Los Angeles, Calif. 90054	Natural gasoline plants.	Kern, San Luis Obispo, Santa Barbara, Ventura.
Getty Oil Co.....	4201 Wilshire Blvd. Los Angeles, Calif. 90005	.....do.....	Kern, Ventura.
Mobil Oil Co.....	P.O. Box 2122 Terminal Annex Los Angeles, Calif. 90054	.....do.....	Fresno, Los Angeles.
Shell Oil Co.....	1008 West 6th Street Los Angeles, Calif. 90054	.....do.....	Kern, Los Angeles, Orange, Santa Barbara, Ventura.
Standard Oil Co. of California.	225 Bush St. San Francisco, Calif. 94120	.....do.....	Kern, Kings, Orange, Los Angeles, Santa Barbara, Ventura.
Texaco Inc.....	3850 Wilshire Blvd. Los Angeles, Calif. 90005	.....do.....	Los Angeles, Santa Barbara, Ventura.
Union Oil Co. of California	P.O. Box 7600 Los Angeles, Calif. 90054	.....do.....	Fresno, Kern, Los Angeles, Santa Barbara, Ventura.
Peat:			
Peter J. Gambetta.....	Route 1, Box 78 Brentwood, Calif. 94513	Reed-sedge bog....	Contra Costa.
R. W. McClellan, Jr....	151 Commercial Way Costa Mesa, Calif. 92627	Humus bog.....	Orange.
Vita-Peat Co., Inc.....	P.O. Box 428 Bethel Island, Calif. 94511	Reed-sedge bog....	Contra Costa.
Perlite:			
American Perlite Co....	11831 Vose St. North Hollywood, Calif. 91605	Open-pit mine.....	Inyo.
Petroleum:			
Atlantic Richfield Co..	445 South Figueroa St. Los Angeles, Calif. 90054	Oilfields.....	Kern, Los Angeles, Monterey, Orange, Santa Barbara, Ventura.
Belridge Oil Co.....	1300 West 4th St. Los Angeles, Calif. 90017	.....do.....	Kern, Santa Barbara.
Chanslor-Western Oil & Development Co.	4549 Produce Plaza Los Angeles, Calif. 90058do.....	Kern, Los Angeles, Orange, Ventura.

EXHIBIT D

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Volume III

AREA REPORTS: DOMESTIC



Prepared by staff of the
BUREAU OF MINES

Table 20.—Mine production of gold, silver, copper, lead, and zinc in 1969, by types of material processed and methods of recovery, in terms of recoverable metals

Type of material processed and method of recovery	Gold (troy ounces)	Silver (troy ounces)	Copper (thousand pounds)	Lead (thousand pounds)	Zinc (thousand pounds)
Lode:					
Amalgamation: Ore.....	1,869	418	-----	-----	-----
Concentration and smelting of concentrates:					
Ore ¹	1,860	449,657	2,239	3,512	6,206
Tailings.....	-----	122	-----	2	(²)
Total ³	1,860	449,779	2,239	3,514	6,207
Direct smelting:					
Ore.....	1,508	41,011	15	1,063	435
Cleanup and old slag.....	22	383	4	460	12
Total.....	1,525	41,394	19	1,523	447
Placer:	2,650	336	-----	-----	-----
Grand total³:	7,904	491,927	2,258	5,036	6,654

¹ Includes tungsten ore concentrates.² Less than ½ unit.³ Data may not add to totals shown because of independent rounding.

Table 21.—Mine production of gold, silver, copper, lead, and zinc in 1969, by classes of ore or other source materials in terms of recoverable metals

Source	Number of mines	Material sold or treated (short tons)	Gold (troy ounces)	Silver (troy ounces)	Copper (thousand pounds)	Lead (thousand pounds)	Zinc (thousand pounds)
Lode ore:							
Dry gold and dry gold-silver ¹	12	6,252	4,787	15,953	2	7	2
Dry silver.....	4	165	3	679	-----	1	1
Total.....	16	6,417	4,740	16,632	2	8	3
Copper, lead, and lead-zinc ²	10	104,463	393	425,985	187	4,567	6,639
Other lode material:							
Gold cleanup, lead cleanup, lead slag, and tungsten ³	(⁴) 1	⁵ 555	121	48,852	2,070	460	12
Lead tailings.....	-----	50	-----	122	-----	2	(⁶)
Total.....	1	605	121	48,974	2,070	462	12
Total lode material ⁷	27	111,485	5,254	491,591	2,258	5,036	6,654
Placer:	14	(⁸)	2,650	336	-----	-----	-----
Total all sources.....	41	111,485	7,904	491,927	2,258	5,036	6,654

¹ Combined to avoid disclosing individual company confidential data.² 11 gold mines and 1 gold-silver mine.³ 2 copper mines, 7 lead mines, and 1 lead-zinc mine.⁴ From properties not classed as mines; excludes one tungsten mine from which gold, silver, and copper were recovered as a byproduct.⁵ Excludes tungsten ore tonnage.⁶ Less than ½ unit.⁷ Data may not add to totals shown because of independent rounding.⁸ 122,529 cubic yards. Does not include material washed at commercial gravel plants to produce 2,174 ounces of byproduct gold and 290 ounces of byproduct silver included in placer totals.

Mercury.—Production declined at the New Idria mine, the largest producer of mercury in the State and Nation because lower grade ores were encountered. California production, totaling 18,480 flasks, was 2,937 flasks lower than in 1968, a decline of 14 percent; the value decreased 19 percent. Declines took place despite an increase from 53 to 72 in the number of

mines reporting. Most of the additional mines were producers of only a few flasks each employing simple retorts for processing.

The most important increases were at the Abbott, Gibraltar, Guadalupe, and Culver-Baer mines, while significant decreases were reported at the Altoona, El Capitan (Last Chance), Knoxville, and

New Idria mines. The drop at the Altoona was the result of development work on a shaft that interfered with normal production, but production recovery was expected to increase in 1970 with an expansion scheduled in output. The El Capitan mine was operated under lease by a Spokane, Wash., firm for most of the year. During the year, the average ore grade declined to where it became unprofitable to haul by truck to the furnace plant, which was located some distance away alongside State Highway 58, west of Tehachapi, Calif. At the Knoxville mine, a labor dispute reportedly disrupted operations for much of the year.

Six California mines produced 1,000 flasks or more in 1969, two produced 500 to 1,000 flasks each, and 11 produced 100 to 500 flasks each. Mines producing 100 flasks or more accounted for all but 4 percent of total California output. The six leading producers, with combined outputs comprising nearly three-fourths of the total production were: New Idria Mining & Chemical Co., San Benito County; Buena Vista Mines, Inc., San Luis Obispo County; Sonoma Mines, Inc., (Mt. Jackson mine) Sonoma County; Guadalupe Mining Co., Santa Clara County; Sunbird Mines, Inc. (Gibraltar mine), Santa Barbara County; and Buttes Gas and Oil Co. (Gambonini mine), Marin County. The Abbott mine of International Resources, Inc., in Lake County rose to the rank of producers of between 500 and 1,000 flasks. If the several separate smaller mines, which fed into the company's furnacing plant, were counted together, International Resources ranked among producers of 1,000 flasks or more for the year.

Production by furnacing alone was reported at 17 mines, by retorting alone at 51 mines, and by both furnacing and retorting at three mines. Some mercury was recovered from mine dumps during the year, either by flotation of cinnabar and retorting or by direct furnacing of the low-grade material. Producing properties of record were distributed by counties, as follows: Lake (eight); San Luis Obispo and Sonoma (seven each); Napa and San Benito (five each); Santa Clara (four); Colusa and Marin (three each); Inyo, Santa Barbara, and Trinity (two each); Contra Costa, Fresno, Kings, Mendocino, Monterey, San Mateo, Solano, Stanislaus, and Yolo

(one each). Locations of 15 other properties remained undetermined.

Development continued on properties acquired by New Idria Mining & Chemical Co. in the Almaden area of Santa Clara County, southwest of San Jose. A new 100-ton-per-day rotary furnace being installed was due for operation early in 1970. Work was nearly complete on an exploration project at the New Idria mine conducted under an Office of Minerals Exploration loan. Development was underway at the Sulphur Bank mine, on the shores of Clear Lake in Lake County, and at the Reed mine, in Yolo County, in joint programs by Franciscan Mining Co. and Earth Resources Co. The One Shot Mining Co. brought a new furnace plant and its Manhattan and One Shot Mines, north of the Knoxville mine, Napa County, into production, and produced nearly 100 flasks of mercury. Phelan Sulphur Co. explored the Little King mine in Kings County. Sovereign Industries, Inc., worked the Harrison mine in Yolo County, processed low-grade surface ore for part of the year, and then discontinued operations. Corduroy belt concentrators were employed at the Harrison mine and at the Manzanita mine, Colusa County. A new mill and rotary furnace were planned at the Chileno Valley mine in Marin County. The Up-and-Down mine, several miles south of the El Capitan mine, in the Last Chance Range north of Death Valley, operated on a small scale, with ore trucked to a Nevada mill for processing. A 60-ton-per-day rotary furnace was scheduled for installation at the Guadalupe mine.

Molybdenum.—Molybdenite and powellite were recovered by Union Carbide Corp. as byproducts in the processing of tungsten ores from the Pine Creek underground mine, Inyo County. Recovery of both oxides (powellite) and sulfides (molybdenite) was lower than in 1968. Shipments of oxides more than doubled those of 1968 but shipments of sulfides were much lower. Total shipments, all to domestic consumers, increased 76 percent in quantity and 88 percent in value.

Pig Iron and Ferrous Scrap.—Four blast furnaces at the Kaiser Steel Corp. integrated steel plant near Fontana, San Bernardino County, produced all of the State's pig iron. Production was slightly above that of 1968. Plants of United States Steel

Table 23.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Lead:			
Bare & Sherrod.....	P.O. Box 538 Lone Pine, Calif. 93545	Underground mine.....	Inyo.
Monte Cristo Mining Corp..	P.O. Box 218 Las Vegas, Nev. 89101	.....do.....	Do.
West Hill Exploration Inc., T. A. C. Darwin Mines Dept.	Lone Pine, Calif. 93545	.....do.....	Do.
Lime:			
American Crystal Sugar Co..	Box 419 Denver, Colo. 80201	Shaft kiln.....	Yolo.
Diamond Springs Lime Co....	P.O. Box 407 Diamond Springs, Calif. 95619	Rotary kiln and continuous hydra- tor.	El Dorado.
The Flintkote Co.....	P.O. Box 57867 Flint Station Los Angeles, Calif. 90057	Shaft and rotary kilns, continuous hydrator.	Contra Costa, Tuolumne.
Holly Sugar Corp.....	Box 1052 Colorado Springs, Colo. 80901	Shaft kilns and continuous hydra- tor.	Glenn, Imperial, Orange, San Joaquin.
Kaiser Aluminum & Chem. Corp.	Moes Landing, Calif. 95039	Rotary kiln and continuous hydra- tor.	Monterey.
Chas. Pfizer & Co., Inc.....	P.O. Drawer AD Victorville, Calif. 92892	Fluidized-bed kiln and continuous hydrator.	San Bernardino.
Spreckels Sugar Co.....	2 Pine St. San Francisco, Calif. 94111	Shaft and rotary kilns.	Monterey, San Joaquin, Yolo.
Stauffer Chemical Co.....	636 California St. San Francisco, Calif. 94119	Rotary kiln and continuous hydra- tor.	San Bernardino.
Union Sugar Division.....	230 California St. San Francisco, Calif. 94111	Shaft kiln.....	Santa Barbara.
Lithium minerals:			
American Potash & Chem- ical Corp.	OMB-508, Kerr-McGee Bldg. Oklahoma City, Okla. 73102	Dry lake brines.....	San Bernardino.
Magnesium compounds:			
FMC Corp.....	P.O. Box 344 Newark, Calif. 94560	Salt works bitterns....	San Diego.
Kaiser Aluminum & Chem. Corp.	Moes Landing, Calif. 95039	Sea water processing..	Monterey.
Merck & Co., Inc.....	Rahway, N. J. 07065	.....do.....	San Mateo.
Mercury:			
Buena Vista Mines, Inc.....	P.O. Box 753 Paso Robles, Calif. 93446	Underground mine.....	San Luis Obispo.
Buttes Gas & Oil Co.....	2150 Franklin St. Oakland, Calif. 94612	Open pit mine.....	Marin.
Floyd Edwards.....	9516 Graton Road Sebastopol, Calif. 95472	Underground mine.....	Do.
Guadalupe Mining Co.....	14900 Guadalupe Mine Road San Jose Calif. 95120	.....do.....	Santa Clara.
Hugh C. Ingle, Jr.....	P.O. Box 553 Middletown, Calif. 95461	Open pit and under- ground mines.	Napa.
International Resources Inc.	2225 Hillside Drive Santa Rosa, Calif. 95404	.....do.....	Colusa, Lake, Sonoma.
Knoxville Exploration & Mining.	P.O. Box 2655 San Francisco, Calif. 94126	Open pit mine.....	Napa.
New Idria Mining & Chem. Co.	3457 So. Cedar Fresno, Calif. 93745	Open pit and under- ground mines.	San Benito, Santa Clara.
New Klau Mining & Con- struction Co.	Adelaide Road Paso Robles, Calif. 93446	Open pit mine.....	San Luis Obispo.
Quad Metals Corporation....	827 Lincoln Building Spokane, Wash. 99201	Underground mine.....	Inyo.
Sonoma Mines, Inc.....	P.O. Box 226 Guerneville, Calif. 95446	.....do.....	Sonoma.
Sulphur Creek Mining.....	201 Ridge Road Uliah, Calif. 95482	.....do.....	Do.
Sunbird Mines, Ltd.....	1018-A Anacapa St. Santa Barbara, Calif. 93101	Open pit mine.....	Santa Barbara.
Molybdenum:			
Union Carbide Corp., Mining & Metals Div.	270 Park Ave., 38th Floor New York, N. Y. 10017	Underground mine.....	Inyo.
Natural gas:			
Amerada Div. Amerada Hess Corp.	Box 417 Rio Vista, Calif. 94571	Gasfield.....	Contra Costa, Sacramento, San Joaquin, Solano.
Occidental Petroleum Corp.	10889 Wilshire Blvd. Los Angeles, Calif. 90024do.....	Colusa, Contra Costa, Sacra- mento, San Joaquin, Solano, Sutter, Yolo.

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Volume I

METALS, MINERALS, AND FUELS



Prepared by staff of the
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favorable market conditions. Total releases were 703 flasks, 701 of which were commercial sales. The stock remaining to be sold at the end of 1970 was about 13,500 flasks. In January mercury was sold for an

average price of \$486.42; in June the average selling price was \$411.00.

The depletion allowance for mercury remained at 22 percent for domestic deposits and 14 percent for foreign deposits.

DOMESTIC PRODUCTION

Because of low prices and soft demand, the number of operating mines in 1970 decreased to 79 from 110 in 1969. Many of the mines that became inactive were small producers who found it uneconomical to produce mercury at prevailing prices during the year. Some exploration and development work continued, however. Some of the large producing mines that ceased operations during 1970 included the Juniper, El Capitan, and Gambonini in California, and the Quinn River, Goldbanks, and B &

B in Nevada. The number of mines reporting outputs of 1,000 flasks or more increased by one over 1969. Properties producing 500 to 999 flasks increased from three to five. The number reporting 100 to 499 flasks decreased to 10 from 15 in 1969. Of the total production, 75 percent came from producers of 1,000 flasks or more, 11 percent from producers of 500 to 999 flasks, and 10 percent from producers of 100 to 499 flasks. Principal mines in 1970 were as follows:

State	County	Mine
Properties Producing 1,000 Flasks or More		
Alaska	Aniak District	Red Devil.
California	Lake	Abbott.
Do	San Luis Obispo	Buena Vista.
Do	Sonoma	Culver-Baer.
Do	Santa Barbara	Gibraltar.
Do	Santa Clara	Guadalupe.
Do	Sonoma	Mt. Jackson.
Do	Santa Clara	New Almaden.
Do	San Benito	New Idria.
Idaho	Washington	Idaho-Almaden.
Nevada	Humboldt	Quinn River (Cordero).
Do	do	Ruja.
Properties Producing 500 to 999 Flasks		
Alaska	Kuskokwim River Region	Cinnabar Creek.
California	Trinity	Altoona.
Do	Marin	Gambonini.
Do	Napa	Manhattan-One Shot.
Nevada	Esmeralda	B & B.
Properties Producing 100 to 499 Flasks		
Alaska	Kuskokwim River Region	White Mountain.
California	Napa	Aetna.
Do	Marin	Chileno Valley.
Do	Napa	Corona.
Do	San Luis Obispo	Klau.
Do	Santa Clara	Old Guadalupe.
Nevada	Lander	Basic McCoy.
Do	Fershing	Goldbank.
Oregon	Douglas	Elkhead.
Texas	Brewster	Study Butte.

California continued to be the major producing State, contributing 68 percent of the prime virgin mercury compared with 62 percent in 1969. Although 21 fewer mines were operating in the State in 1970, total output was maintained by increased production from the Abbott, Aetna, Altoona, Culver-Baer, Manhattan-One Shot, New Almaden, and Old Guadalupe mines. Op-

eration of new furnace at the New Almaden mine site increased mercury capacity by approximately 200 flasks per month.

Nevada produced 18 percent of the total mercury with 11 fewer mines than in 1969. The shutdown of the famous Quinn River (Cordero) mine was permanent with regard to underground mining, but the company is weighing the possibility of

strip mining. The Ruja mine, which adjoins the Quinn River mine, is now the State's largest producer.

The Idaho-Almaden mine in Idaho continued production at the 1969 level. Four mines were active in Alaska. The Red Devil mine, reopened by Alaska Mines and Minerals, Inc., has contracted to sell to Japan all concentrates from its 100-ton-per-day flotation mill during the first year of operation. The Elkhead mine accounted for the bulk of the increased output from Oregon. No production was reported from Arizona and only minor quantities from Arkansas and Washington.

The St. Joe Minerals Corp. recovered by-product mercury from zinc concentrates at its smelter in Monaca, Pa. Most of the zinc concentrate comes from the company's mines in New York. Mercury recovery in 1969 was 280 flasks.

Secondary production of mercury decreased by 41 percent. While much of this decline was due to a lower rate of release from Government stockpiles, slack demand during the year generated less scrap. Dental amalgams, scrap batteries, various types of sludges, and discarded mercury-containing instruments were sources of secondary mercury.

Table 2.—Mercury produced in the United States, by States

Year and State	Producing mines	Flasks	Value ¹ (thousands)
1969			
California.....	72	18,480	\$9,333
Idaho.....	1	1,012	511
Nevada.....	24	8,165	4,124
Oregon.....	4	43	22
Alaska, Arizona, New York, Texas.....	8	r 1,940	r 979
Total.....	109	r 29,640	r 14,969
1970			
California.....	51	18,593	7,582
Idaho.....	1	1,038	423
Nevada.....	13	4,916	2,005
Oregon.....	5	274	112
Alaska, Arkansas, New York, Texas, Washington.....	9	2,482	1,012
Total.....	79	27,303	11,134

^r Revised.

¹ Value calculated at average New York price.

Table 3.—Mercury ore treated and mercury produced in the United States¹

Year	Ore treated (short tons)	Mercury produced	
		Flasks	Pounds per ton of ore
1966.....	321,080	21,993	5.2
1967.....	439,753	23,767	4.1
1968.....	434,193	28,857	5.1
1969.....	432,591	28,552	5.0
1970.....	424,595	26,802	4.8

¹ Excludes mercury produced from old surface ores, dumps, placers, and as a byproduct.

Table 4.—Production of secondary mercury in the United States

Year	Flasks ¹
1966.....	16,400
1967.....	22,150
1968.....	34,380
1969.....	13,650
1970.....	8,051

¹ Includes GSA releases.

CONSUMPTION AND USES

Consumption decreased to 61,503 flasks, the lowest level since 1961. All categories except amalgamation and mildew proofing for paint showed decreases. The largest use of mercury was for electrical apparatus, which accounted for 26 percent of the

total, followed by electrolytic preparation of chlorine and caustic soda with 24 percent.

In 1970 an estimated 9.7 million tons of chlorine was produced, with 27.6 percent coming from mercury cells. Although chlo-

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Prepared by staff of the
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Table 21.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Feldspar:			
Wedron Silica Co.....	P.O. Box 150 Pacific Grove, Calif. 93950	Open pit mine.....	Monterey.
Owens-Illinois Glass Co.....	P.O. Box 1035-1036 Toledo, Ohio 43601	---do.....	Do.
Gold:			
Dickey Exploration Co.....	Alleghany, Calif. 95901.....	Underground mine.....	Sierra.
Heavy Metals Tech. Corp.....	406 Wilshire Blvd., Suite 204 Santa Monica, Calif. 90401	---do.....	San Bernardino.
Claude B. Lovestedt.....	P.O. Box 1496 Carson City, Nev. 89701	---do.....	Alpine.
West Hill Exploration, Inc., T.A.C. Darwin Mines Dept.	Long Pine, Calif. 93545.....	---do.....	Inyo.
Gypsum:			
H.M. Holloway, Inc.....	714 6th St. Wasco, Calif. 93280	Open pit mine.....	Kern.
Tembler Gypsum Co.....	Carrisa Plains, Star Rte. Box 80 Santa Margarita, Calif. 93453	---do.....	Do.
United States Gypsum Co....	101 South Wacker Dr. Chicago, Ill. 60606	Open pit mine and calcining plant.	Imperial.
Iron Ore: Kaiser Steel Corp.....	P.O. Box 158 Eagle Mtn., Calif. 92241	---do.....	Riverside.
Lead:			
Bare & Sherrod.....	P.O. Box 538 Lone Pine, Calif. 93545	Underground mine....	Inyo.
West Hill Exploration Inc., T.A.C. Darwin Mines Dept.	Lone Pine, Calif. 93545.....	---do.....	Do.
Lime:			
American Crystal Sugar Co....	Box 419 Denver, Colo. 80201	Shaft kiln.....	Yolo.
Diamond Springs Lime Co....	P.O. Box 407 Diamond Springs, Calif. 95619	Rotary kiln and continuous hydrator.	El Dorado.
The Flintkote Co.....	P.O. Box 57367 Flint Station Los Angeles, Calif. 90057	Shaft and rotary kilns, continuous hydrator.	Contra Costa and Tuolumne.
Holly Sugar Corp.....	Box 1052 Colorado Springs, Colo. 80901	Shaft kilns and continuous hydrator.	Glenn, Imperial, Orange, San Joaquin.
Kaiser Aluminum & Chemical Corp.	Moss Landing, Calif. 95039..	Rotary kiln and continuous hydrator.	Monterey.
Chas. Pfizer & Co., Inc.....	P.O. Drawer AD Victorville, Calif. 92392	Fluidized-bed kiln and continuous hydrator.	San Bernardino.
Spreckels Sugar Co.....	2 Pine St. San Francisco, Calif. 94111	Shaft and rotary kilns.	Monterey and Yolo.
Stauffer Chemical Co.....	636 California St. San Francisco, Calif. 94119	Rotary kiln and continuous hydrator.	San Bernardino.
Union Sugar Div.....	230 California St. San Francisco, Calif. 94111	Shaft kiln.....	Santa Barbara.
Lithium minerals:			
Kerr-McGee Chemical Corp..	OMB-508, Kerr-McGee Bldg. Oklahoma City, Okla. 73102	Dry lake brines.....	San Bernardino.
Magnesium compounds:			
FMC Corp.....	P.O. Box 344 Newark, Calif. 94560	Salt works bitterns...	San Diego.
Kaiser Aluminum & Chemical Corp.	Moss Landing, Calif. 95039..	Sea water processing..	Monterey.
Merck & Co., Inc.....	Rahway, N.J. 07065.....	---do.....	San Mateo.
Mercury:			
Buena Vista Mines, Inc.....	P.O. Box 753 Paso Robles, Calif. 93446	Underground mine....	San Luis Obispo.
Buttes Gas & Oil Co.....	2150 Franklin St. Oakland, Calif. 94612	Open pit mine.....	Marin.
Guadalupe Mining Co.....	14900 Guadalupe Mine Rd. San Jose, Calif. 95120	Underground mine....	Santa Clara.
Hugh C. Ingle, Jr.....	P.O. Box 553 Middletown, Calif. 95461	Open pit and under- ground mines.	Napa.
International Resources, Inc..	2225 Hillside Dr. Santa Rosa, Calif. 95404	---do.....	Colusa, Lake, Sonoma.
Lansdowne Mining & Manufacturing Co.	P.O. Box 144 Lower Lake, Calif. 95457	Open pit mine.....	Napa.
Mercury Fox, Ltd.....	415 7th St. Petaling, Calif. 94952	---do.....	Marin.
New Idria Mining & Chem. Co.	3457 South Cedar Fresno, Calif. 93745	Open pit and under- ground mines.	San Benito and Santa Clara.
New Klau Mining & Con- struction Co.	Adelaide Rd. Paso Robles, Calif. 93446	Open pit mine.....	San Luis Obispo.
One-Shot Mining Co.....	755 Mathilda Ave. Sunnyvale, Calif. 94086	---do.....	Napa.

Table 21.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Mercury—Continued			
Quad Metals Corp.....	827 Lincoln Bldg. Spokane, Wash. 99201	Underground mine....	Inyo.
Sonoma Mines, Inc.....	P.O. Box 226 Guerneville, Calif. 95446	....do.....	Sonoma.
Sulphur Creek Mining.....	201 Ridge Rd. Ukiah, Calif. 95482	....do.....	Do.
Sunbird Mines, Ltd.....	1018-A Anacapa St. Santa Barbara, Calif. 93101	Open pit mine.....	Santa Barbara.
Molybdenum:			
Union Carbide Corp., Mining & Metals Div.	270 Park Ave., 38th Floor New York, N.Y. 10017	Underground mine....	Inyo.
Natural gas:			
Amerada Div. Amerada Hess Corp.	Box 417 Rio Vista, Calif. 94571	Gasfield.....	Contra Costa, Sacramento, San Joaquin, Solano.
Occidental Petroleum Corp....	10889 Wilshire Blvd. Los Angeles, Calif. 90024	....do.....	Colusa, Contra Costa, Sacramento, San Joaquin, Solano, Sutter, Yolo.
Shell Oil Co.....	1008 West 6th St. Los Angeles, Calif. 90017	....do.....	Contra Costa, Fresno, Kern, Kings, Madera, Santa Barbara, Solano, Tulare, Yolo.
Signal Oil and Gas Co.....	1010 Wilshire Blvd. Los Angeles, Calif. 90017	....do.....	Contra Costa, Sacramento, San Joaquin, Solano, Yolo.
Standard Oil Co. of California.	225 Bush St. San Francisco, Calif. 94120	....do.....	Butte, Contra Costa, Glenn, Kern, Kings, Los Angeles, Sacramento, San Joaquin, Santa Barbara, Solano, Sutter, Tulare, Ventura, Yolo.
Texaco, Inc.....	3350 Wilshire Blvd. Los Angeles, Calif. 90005	....do.....	Fresno, Glenn, Humboldt, Kern, Madera, Sacramento, San Joaquin, Santa Barbara, Solano, Sutter, Tehama.
Union Oil Co. of California....	461 South Boylston Los Angeles, Calif. 90017	....do.....	Contra Costa. Kern, Sacramento, San Joaquin, Solano.
Natural gas liquids:			
Atlantic Richfield Co.....	445 South Figueroa St. Los Angeles, Calif. 90054	Natural gasoline plants.	Kern, Santa Barbara, Ventura.
Getty Oil Co.....	P.O. Box 54050 Los Angeles, Calif. 90005	....do.....	Kern and Ventura.
Mobil Oil Co.....	612 South Flower St. Los Angeles, Calif. 90054	....do.....	Los Angeles.
Shell Oil Co.....	1008 West 6th St. Los Angeles, Calif. 90054do.....	Kern, Los Angeles, Santa Barbara, Ventura.

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Prepared by staff of the
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international lead-zinc research organization, under contract to Kettering Institute, Cincinnati, Ohio. According to the Clear Creek editors, representative measurements of atmospheric lead rose from an average of 2.29 micrograms per cubic meter in 1961-62, to 3.58 micrograms in 1968-69.

For the second consecutive year, the State Senate Transportation Committee killed a bill to remove lead from gasoline sold in California. Assembly Bill 399 would have required reduction of the lead content of regular and premium gasolines to specified standards within certain time limits in the Bay Area, Southern California, and the Central Valley.

Mercury.—Mining was in a downward trend during the year, owing to the depressed market and softening prices for mercury. Widespread publicity on contami-

nation by mercury, the banning of mercury for certain uses, and the efforts of users to find substitutes for mercury were significant factors in the weak market. Compared with 1970, production was reduced 29 percent in terms of quantity and 49 percent in terms of value. Shipments totaled 13,335 flasks in 1971, compared with 17,112 flasks in 1970. Mercury was produced in 12 counties; three counties (San Benito, Sonoma, and Santa Clara) accounted for nearly three-fourths of the total output.

Several mines were closed during the year and, at yearend, the number of active properties had been reduced by nearly one-half from those active in 1969. A number of these listed as active were operated at partial capacity or on a standby basis. In March, New Idria Mining & Chemical

Table 21.—Mercury production, by method of recovery

Year	Operating mines	Recovery method						Total Value *
		Furnaced ¹		Retorted		Unclassified (76-pound flasks) ²	76-pound flasks	
		Ore treated (short tons)	76-pound flasks	Ore treated (short tons)	76-pound flasks			
1967.....	78	184,656	13,942	67,895	2,438	5	16,385	\$3,018,164
1968.....	53	176,502	19,494	40,380	1,918	5	21,417	11,470,089
1969.....	72	215,495	16,093	37,199	2,387	W	18,480	9,333,139
1970.....	51	222,495	17,587	15,005	547	459	18,593	7,581,668
1971.....	38	129,399	12,697	16,704	536	W	13,233	3,869,462

² Revised. W Withheld to avoid disclosing individual company confidential data; included with "Furnaced."

¹ Includes ore and mercury from dumps not separable.

² Includes mercury recovered from old surface ores, dumps, and placers.

³ Value calculated at average New York price.

Table 22.—Principal producing mercury mines in 1971 ¹

County	District	Operator	Mine	Ore treatment method	Remarks
San Benito.....	New Idria.....	New Idria Mining and Chemical Co.	New Idria....	Rotary furnace	Underground and surface mining. Output reduced steadily during year.
Santa Barbara..	Los Prietas.....	Sunbird Mines, Ltd.	Gibraltar....	do.....	Open pit mine.
Santa Clara.....	New Almaden.....	Guadalupe Mining Co.	Guadalupe....	do.....	Underground mining by lessee; royalty basis.
Sonoma.....	Western Mayacmas.	Sulfur Creek Mining Co.	Culver-Baer..	do.....	Surface mining on Little Sulfur Creek; ore trucked to Big Sulfur Creek.
Do.....	Guerneville.....	Sonoma Mines Inc.	Mt. Jackson..	do.....	Underground mining; mining curtailed in lower levels.

¹ Mines producing more than 1,000 flasks per year. In addition, seven mines were in the 100- to-1,000-flask class and about 10 were in the less-than-100-flask class.

Source: California Department of Conservation, Division of Mines and Geology.

Co., the State's principal producer, temporarily closed the New Almaden and Guadalupe mines, near San Jose, Santa Clara County because of continued weakening of the mercury price. In July, two former workers leased the New Almaden mine from the company and operated the smaller of two furnaces at about half capacity.

Quicksilver Products Inc. (QPI), San Francisco, which buys and sells prime virgin mercury and also distills to higher purity, closed its Precision Chemical Co., which manufactured mercurials, owing to the poor market. QPI continued to provide a redistillation service on a toll basis.

Late in the year, decisions by two major out-of-State companies to close mercury-cell soda plants would probably generate a larger mercury surplus and lead to further curtailment of mercury mining operations in California.

A report, *Distribution of Mercury in Surface Sediments in San Francisco Bay Estuary*, issued as Basic Data Contribution 14 of the San Francisco Bay Region Environment and Resources Planning Study, was issued in June. It was prepared jointly by the U.S. Geological Survey and the Research and Technology Group, Department of Housing and Urban Development. Based on a conservative average concentration of 0.25 part per million, it was estimated that a layer of sediments 1 foot thick in the floor of the estuary, which is 430 square miles in area, would contain 113 tons of mercury.

Another report, *Mercury in the California Environment*, compiled by the Interagency Committee on Environmental Mercury and published under the Department of Public Health's Environmental Health and Consumer Protection Program, indicated that although fish from both fresh and estuarine waters in California contain mercury, no direct evidence was found that California residents were adversely affected by these residues.

SB 309 (Chap. 1669), enacted into law during the year, directed the Secretary of the Resources Agency to conduct a study of the use of mercury and mercury compounds and their effects on humans and the environment, the disposal of mercury-bearing wastes, and to submit a report on the findings to the Legislature on or before June 30, 1973.

Late in the year, EPA proposed emission standards for furnace plants at mercury mines. Most operators were of the opinion that large capital outlays for new equipment would be necessary to meet these standards.

Molybdenum.—Shipments of molybdenum contained in concentrates was nearly 39 percent higher than in 1970, in terms of quantity, although value was lower because of depressed prices. The only producer, Union Carbide Corp. at the Pine Creek mine, Inyo County, marketed molybdenum concentrate as a coproduct of tungsten ores containing an average of 0.02 percent MoS₂.

Nickel.—There was renewed interest in nickel prospects when Hanna Mining Co. purchased the lateritic deposits at Red Mountain and Little Red Mountain, near Leggett, Mendocino County. Ore reserves were estimated at 35 million tons at 0.79 percent nickel. The lateritic material reportedly is leachable and may have potential despite the low grade.

Rare-Earth Minerals.—Molybdenum Corp. of America (Molycorp), the only producer of the rare-earth minerals in California and the world's leading producer, reported an increase of 60 percent in sales over those in 1970, reaching \$11,972,000 in 1971.²⁴ Production of bastnäsite at Mountain Pass, San Bernardino County, increased 8 percent, reaching 10,828 tons rare-earth oxides (REO). The improved position in production and sales of rare-earth minerals and metals was attributed to continued diversification of applications for rare-earth products. However, operations at the Mountain Pass mine, concentrating mill, and chemical products plant remained at about 45 percent of annual capacity of 450,000 tons of ore and 25,000 tons REO. During 1971, 181,000 tons of ore was processed through the mill. About 2,500 tons REO, or 23 percent of the output, was exported in bastnäsite concentrate. In addition to REO, the facilities produced cerium hydrate, europium oxide, lanthanum oxide, and gadolinium-samarium carbonate. According to company sources, reserves of bastnäsite at a 4-percent REO and 15-foot thick cutoff, as of October 1971, were 6.4 million tons.

Silver.—Output of both lode and placer

²⁴ Molybdenum Corporation of America. 1971 Annual Report. Apr. 12, 1972, p. 2.

Table 23.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Lime—Continued			
Pfizer Inc.....	P.O. Drawer AD Victorville, Calif. 92392	Fluidized-bed kiln and con- tinuous hy- drator.	San Bernardino.
Spreckels Sugar Co.....	2 Pine St. San Francisco, Calif. 94111	Shaft and rotary kilns.	Monterey and Yolo.
Stauffer Chemical Co.....	636 California St. San Francisco, Calif. 94119	Rotary kiln and continuous hydrator.	San Bernardino.
Union Sugar Div.....	230 California St. San Francisco, Calif. 94111	Shaft kiln.....	Santa Barbara.
Lithium minerals:			
Kerr-McGee Chemical Corp.....	OMB-508, Kerr-McGee Bldg. Oklahoma City, Okla. 73102	Dry lake brines.	San Bernardino.
Magnesium compounds:			
FMC Corp.....	P.O. Box 344 Newark, Calif. 94560	Salt works bitterns.	San Diego.
Kaiser Aluminum & Chemical Corp.	Moss Landing, Calif. 95039.....	Sea water processing.	Monterey.
Merck & Co., Inc.....	Rahway, N.J. 07065.....	.....do.....	San Mateo.
Mercury:			
Buena Vista Mines, Inc.....	P.O. Box 753 Paso Robles, Calif. 93446	Underground mine.	San Luis Obispo.
Buttes Gas & Oil Co.....	2150 Franklin St. Oakland, Calif. 94612	Open pit mine..	Marin.
Guadalupe Mining Co.....	14900 Guadalupe Mine Rd. San Jose, Calif. 95120	Underground mine.	Santa Clara.
Hugh C. Ingle, Jr.....	P.O. Box 553 Middletown, Calif. 95461	Open pit and underground mines.	Napa.
International Resources Inc.....	2225 Hillside Dr. Santa Rosa, Calif. 95404	.....do.....	Colusa, Lake, Sonoma.
Lansdowne Mining & Manu- facturing Co.	P.O. Box 144 Lower Lake, Calif. 95457	Open pit mine..	Napa.
Mercury Fox, Ltd.....	415 7th St. Petaluma, Calif. 94952	.....do.....	Marin.
New Idria Mining & Chemical Co.	3457 South Cedar Fresno, Calif. 93745	Open pit and underground mines.	San Benito and Santa Clara.
New Klau Mining & Construction Co.	Adelaide Rd. Paso Robles, Calif. 93446	Open pit mine..	San Luis Obispo.
One-Shot Mining Co.....	755 Mathilda Ave. Sunnyvale, Calif. 94086	.....do.....	Napa.
Quad Metals Corp.....	827 Lincoln Bldg. Spokane, Wash. 99201	Underground mine.	Inyo.
Sonoma Mines, Inc.....	P.O. Box 226 Guerneville, Calif. 95446	.....do.....	Sonoma.
Sulphur Creek Mining.....	201 Ridge Rd. Ukiah, Calif. 95482	.....do.....	Do.
Sunbird Mines, Ltd.....	1018-A Anacapa St. Santa Barbara, Calif. 93101	Open pit mine..	Santa Barbara.
Molybdenum:			
Union Carbide Corp., Mining & Metals Div.	270 Park Ave., 38th Floor New York, N.Y. 10017	Underground mine.	Inyo.
Natural gas:			
Amerada Div., Amerada Hess Corp.	Box 417 Rio Vista, Calif. 94571	Gasfield.....	Contra Costa, Sacramento, San Joaquin, Solano.
Occidental Petroleum Corp.....	10889 Wilshire Blvd. Los Angeles, Calif. 90024	.....do.....	Colusa, Contra Costa, Sacra- mento, San Joaquin, Solano, Sutter, Yolo.
Shell Oil Co.....	1008 West 6th St. Los Angeles, Calif. 90017	.....do.....	Contra Costa, Fresno, Kern, Kings, Madera, Santa Barbara, Solano, Tulare, Yolo.
Signal Oil and Gas Co.....	1010 Wilshire Blvd. Los Angeles, Calif. 90017do.....	Contra Costa, Sacramento, San Joaquin, Solano, Yolo.

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India. The GSA stock available for disposal at the end of 1971 was 7,723 flasks.

As of December 31, 1971, total strategic stockpile accumulations from all programs

stood at 200,105 flasks.

The depletion allowance for mercury remained at 22 percent for domestic deposits and 14 percent for foreign deposits.

DOMESTIC PRODUCTION

Mine closings were the dominant feature of the industry during 1971. A total of 55 mines reported production, down from 79 in 1970, although by yearend only 22 remained operative. Significant producing mines that closed during the year included the Red Devil in Alaska, the Abbott, Altoona, Buena Vista, Klau, and Alpha-Guadalupe in California, the Ruja in Nevada, and the Study Butte and Whit-Roy in Texas. The low price for mercury made mining uneconomical for most producers. Some exploration and development work

was conducted at several small properties. The number of mines reporting outputs of 1,000 flasks or more decreased from 12 in 1970 to 6 in 1971. Properties producing 500 to 999 flasks increased by one, and properties producing 100 to 499 flasks decreased by one. Of the total production, 65 percent came from producers of 1,000 flasks or more, 20 percent from producers of 500 to 999 flasks, and 11 percent from producers of 100 to 499 flasks. Principal mines in 1971 were as follows:

State	County	Mine
PROPERTIES PRODUCING 1,000 FLASKS OR MORE		
California	Sonoma	Culver-Baer.
Do.	Santa Barbara	Gibraltar.
Do.	Santa Clara	Guadalupe.
Do.	Sonoma	Mt. Jackson.
Do.	San Benito	New Idria.
Idaho	Washington	Idaho-Almaden.
PROPERTIES PRODUCING 500 TO 999 FLASKS		
California	Lake	Abbott.
Do.	Napa	Manhattan-One Shot.
Do.	Santa Clara	New Almaden.
Nevada	Humboldt	Quinn River (Cordero).
Do.	Do.	Ruja.
Texas	Brewster	Study Butte.
PROPERTIES PRODUCING 100 TO 499 FLASKS		
Alaska	Kuskokwim River Region	Alice & Bessie.
Do.	Do.	Schaefer (Cinnabar Creek).
California	Trinity	Altoona.
Do.	Marin	Chileno Valley.
Do.	Napa	Corona.
Do.	San Luis Obispo	Klau.
Do.	Napa	Oat Hill.
Nevada	Pershing	Red Bird.
Texas	Presidio	Whit-Roy.

California, with 13 fewer mines than in 1970, increased its share of total mercury production from 68 percent in 1970 to 75 percent in 1971. Two mines, Guadalupe and Oat Hill, showed significantly higher production. At the Guadalupe mine, construction was underway on an 80-ton-per-day rotary furnace.

Two of California's largest producers, New Idria Mining and Chemical Co. (New Idria) and Sonoma Mines, Inc. (Mt. Jackson), decreased their dependence on mercury mining by diversifying into nonmining business activities.

Nevada produced 9 percent of the total mercury with 5 fewer mines than in 1970. The Ruja mine, the State's largest producer, closed in June. At the same time, Sierra Mineral Management of Tucson, Ariz., leased the Cordero mine and began milling and furnacing the ore at the adjacent Ruja site. By yearend this operation had shut down. The Carlin Gold Mining Co., which recovered mercury as a byproduct from its gold mine in Eureka County, remained as the only continuing producer of mercury in Nevada.

The Idaho-Almaden mine in Idaho con-

tinued production at the 1970 level. Alaskan production of mercury metal was confined to the Alice & Bessie and Schaefer mines. Concentrate from the Schaefer mine was transported to California for retorting. Some concentrate was reportedly shipped to Japan and Hong Kong from several other Alaskan mines. Minor production was reported from Arkansas and Oregon.

The St. Joe Minerals Corp. continued to recover byproduct mercury from its zinc smelter at Monaca, Pa. The zinc concentrate originated from the company's zinc mine in New York.

The average grade of all ore processed in 1971, increased to 5 pounds of mercury per ton. More of the major producers treated higher grade ore than that of 1970. Data from selected mines indicated that ore grade at open pit operations ran about 3 pounds per ton, whereas underground ore was about 7 pounds.

Secondary production of mercury was about double that of 1970; this was due primarily to GSA releases and the closing of several chlor-alkali plants. Dental amalgams, scrap batteries, various types of sludges, and discarded mercury-containing instruments were other sources of secondary mercury.

Table 2.—Mercury produced in the United States, by State

Year and state	Pro- ducing mines	Flasks	Value ¹ (thou- sands)
1970			
California.....	51	18,593	\$7,582
Idaho.....	1	1,038	423
Nevada.....	13	4,909	2,001
Oregon.....	5	274	112
Alaska, Arkansas, New York, Texas, Wash- ington.....	9	2,482	1,012
Total.....	79	27,296	11,130
1971			
California.....	38	13,233	3,869
Idaho.....	1	1,057	309
Nevada.....	8	1,589	465
Alaska, Arkansas, New York, Oregon, Texas..	8	1,748	511
Total.....	55	17,627	5,154

¹ Revised.

¹ Value calculated at average New York price.

Table 3.—Mercury ore treated and mercury produced in the United States ¹

Year	Ore treated (short tons)	Mercury produced	
		Flasks	Pounds per ton of ore
1967.....	439,753	23,767	4.1
1968.....	434,193	28,857	5.1
1969.....	432,591	28,552	5.0
1970.....	424,510	26,795	4.8
1971.....	261,684	17,188	5.0

¹ Revised.

¹ Excludes mercury produced from old surface ores, dumps, placers, and as a byproduct.

Table 4.—Production of secondary mercury in the United States

Year	Flasks ¹
1967.....	22,150
1968.....	34,380
1969.....	13,650
1970.....	8,051
1971.....	16,666

¹ Includes GSA releases.

CONSUMPTION AND USES

Consumption suffered another setback in 1971, decreasing to 52,475 flasks. Although increased consumption was noted for electrical apparatus and antifouling paint, consumption in dental preparations, general laboratory, industrial and control instruments, and pharmaceuticals remained at 1970 levels. With the discontinuance of the mercury amalgamation process for gold recovery by the Homestake Mining Co., Lead, S. Dak., almost no mercury was consumed for this use. Use of mercury in

paper and pulp manufacture was negligible. Mercury needed to increase the capacity of existing mercury-cell chlor-alkali plants was much less than that used in 1970. The largest uses of mercury were electrical apparatus, 32 percent; electrolytic preparation of chlorine and caustic soda 23 percent; and mildew proofing for paint, 16 percent.

Total chlorine production decreased about 5 percent from that of 1970 to an estimated 9.3 million tons. Of this total,

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pounding industries. The expansion included facilities for in-process recycling and conversion of recovered solids to useful raw materials.

Iron and Steel.—Production of crude steel and mill products by Kaiser Steel Corp. at Fontana, San Bernardino County was affected by a strike involving 6,800 production and maintenance workers from February 1 to March 15, 1972. According to the company's annual report for 1972, annual steelmaking capacity was increased from 2.9 million to 3.4 million tons, largely by increasing the ratio of pellets (from the Eagle Mountain mine) to other ores and concentrates. Relining of the four blast furnaces, which was started in 1971, was completed. Modern hot-strip coil loading facilities were installed for servicing trains transporting coils to General Motors Corp. under a contract effective in April. Later in the year, Kaiser Steel approved a \$2.5 million program to rebuild and modernize the two oldest of seven coke-oven batteries at Fontana, enabling the company to maintain or improve control of emissions. At yearend, the corporation was operating on variances, granted by the San Bernardino County Pollution Control District, for its coke ovens and basic oxygen steelmaking plant.

United States Steel Corp. announced a major expansion and modernization of its rod mill at Pittsburg, Contra Costa County. Annual capacity was to be increased 30%.

Slag.—Kaiser Steel announced 100% utilization of blast furnace slag, formerly stockpiled at Fontana. International Mill Services used this material in producing crushed and screened, iron-free chip for landscaping and roofing granule, railroad ballast, and standard aggregate. The production rate was 1.5 million tons per year, and expansion was underway.

Scrap.—In mid-year the ferrous scrap market in the San Francisco Bay Area was weak, and there was little export activity. No. 1 heavy melting scrap was selling for \$26–\$27 per ton. As the year progressed, the market improved steadily and prices strengthened. At yearend, there was a new wave at Japanese buying, and the price for No. 1 heavy melting scrap reached \$38–\$41 per ton, with some sales of premium grades at \$43–\$44 per ton. A prevailing shortage of rail cars for transport of scrap to docks had a dampening effect on the market. The Los Angeles market was parallel to that in

San Francisco but at slightly lower quoted prices.

Lead-Zinc.—Production was curtailed substantially, compared with that of 1971, owing to closure of the Darwin mine, Inyo County, in April. The Thompson mine workings above the 400 level and mill tailings in the Darwin area were leased by Montecito Minerals Corp., which planned to produce a bulk sulfide flotation concentrate, containing lead and zinc, for shipment to American Smelting and Refining Co. (ASARCO) at El Paso, Tex., from a new mill under development.

The equipment and buildings of the ASARCO lead smelter at Selby, Contra Costa County, which was closed at the end of 1971, were sold at public auction in April. The company also sought a buyer for the land, which borders on San Pablo Bay, a part of San Francisco Bay.

Manganese.—Ocean Mining Div., Hughes Tool Co., in conjunction with Lockheed Missiles and Space Co., established a research plant at Redwood City, San Mateo County, for development of a manganese nodule mining operation from the ocean floor.

Mercury.—A continuing decline in mercury-mining activity was attributed to reduced demand and soft prices caused by environmental problems and the banning of mercury for certain uses. There were 14 producing mines, only five of which remained active at yearend. The eight principal producers (Table 23) accounted for 95% of total output during 1972.

In May, the price for mercury, per 76-pound flask, had declined to \$150, compared with a high price of \$520 in 1970. Later in the year, the price strengthened, reaching \$285 in December.

Rare-Earth Minerals.—According to the annual report of Molybdenum Corp. of America (Molycorp), production of rare-earth oxides (REO) in bastnaesite concentrate at Mountain Pass, San Bernardino County, increased to 23.6 million pounds, 9% higher than that of 1971. This increased output was attributed to growing demand for the rare-earth elements, particularly for alloying in high-strength steels for oil and gas pipelines. During 1972, an expansion program at the bastnaesite concentrating plant, Mountain Pass, included new flotation cells and a new barite circuit. Late in the year, Molycorp announced plans for

Table 22.—California: Mercury production, by method of recovery

Year	Operating mines	Recovery method				Unclassified (76-pound flasks) ¹	76-pound flasks	Total Value ² (thousands)
		Furnaced		Retorted				
		Ore treated (short tons)	76-pound flasks	Ore treated (short tons)	76-pound flasks			
1968	53	176,502	19,494	40,380	1,918	5	21,417	\$11,470
1969	72	215,495	16,093	37,199	2,387	W	18,480	9,333
1970	51	222,495	17,587	15,005	547	459	18,593	7,582
1971 ^r	39	131,120	12,485	19,089	698	306	13,489	3,944
1972	14	53,228	5,788	W	W	W	5,788	1,263

^r Revised. W Withheld to avoid disclosing individual company confidential data; included with "Furnaced."

¹ Includes mercury recovered from old surface ores, dumps, and placers.

² Value calculated at average New York price.

³ Includes ore and mercury from dumps not separable.

Table 23.—California: Principal producing mercury mines in 1972

County	Operator	Mine	Remarks
Marin	Mercury Fox, Ltd.	Chileno Valley	Mine operated intermittently; shaft entry to workings at 125 level and below.
Napa	Morgan North Mine Management Co.	Knoxville	30-ton-per-day furnace. Leading producer in 1972. Shipments from new open pit and stockpile.
San Benito	New Idria Mining and Chemical Co.	New Idria	Underground and surface mining. Mine closed end of May after nearly continuous operation since 1854; placed on standby basis.
San Luis Obispo	Buena Vista Mines, Inc.	Buena Vista	30-ton-per-day furnace. Underground mine.
Santa Clara	Guadalupe Mining Co.	Guadalupe	New 100-ton-per-day furnace. Underground mine; intermittent operation by lessee on royalty basis.
Do	Santa Clara Quicksilver Co.	New Almaden	Intermittent underground mining by lessee in several areas; also processed mine dump material.
Sonoma	Sonoma Mines, Inc.	Mt. Jackson	100-ton-per-day furnace. Underground operation; mine closed in March.
Do	Sulphur Creek Mining Co.	Culver-Baer	Surface mining.

continuing expansion to 60 million pounds REO per year in 1973.

Silver.—Production was reduced substantially, compared with that of 1971. The Darwin mine, Inyo County, a major producer, was closed in April. Later in the year, sections of the Thompson workings of this mine above the 400 level were leased to Montecito Minerals Corp., which conducted studies on processing the ore, was building a 200-ton-per-day mill, and planned to ship a bulk sulfide flotation concentrate to ASARCO at El Paso, Tex. Other major producers were Union Carbide Corp. at its Pine Creek custom mill, Inyo County, and Santa Rosa Mining Association at the Santa Rosa mine, also in Inyo County.

Exploration and development continued at the Zaca mine, Alpine County, leased from Siskon Corp., Reno, Nev., by C. B. Lovestadt, who stockpiled and shipped precious metal ores.

Tungsten.—Tungsten production was slightly above that of 1971. There were only 12 producing companies, compared with 29 in 1971. California continued as the principal producing State, accounting for 76% of U.S. output. Union Carbide Corp. reported increased output during the year and again produced a large share of total State output at its Pine Creek mine, Inyo County. Union Carbide was engaged in environmental improvements to meet State Water Quality Control Board regulations. A water-clarifying chemical system, in which a flocculant-coagulant causes settling of solid materials in mine water effluent to Pine Creek, went on-stream late in the year, and a new plant for recovery of sodium sulfate and other dissolved solids from ammonium paratungstate circuit effluents was under construction. An environmental monitoring system was maintained

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eliminate all pollutant discharges by 1985. Title 3, Section 301, states that by July 1977 effluent limitations will be developed requiring best practicable control currently

available, and by July 1983 best available technology economically achievable will be required. Chlor-alkali plants using the mercury cell would be affected by this law.

DOMESTIC PRODUCTION

The largest producer, New Idria Mining and Chemical Co., closed its New Idria mine in San Benito County, Calif., in May, but retained the mine on a standby basis for the balance of the year. Other large producing mines that closed during the year included the Corona, Gibraltar, and Mt. Jackson in California, and the Idaho-Almaden in Idaho. A total of 21 mines reported production, down from 56 in 1971. By yearend less than six remained active. In the first quarter production was about 3,200 flasks, but as mines closed or curtailed production, it fell to about 600 flasks in the fourth quarter.

Low prices and slackened demand were cited as reasons for the closures. Some exploration and development work was conducted by several small operators. The number of mines reporting outputs of 1,000 flasks or more decreased from six in 1971 to one in 1972. Properties producing 500 to 999 flasks decreased from six to four, and properties producing 100 to 499 flasks decreased from nine to seven. Of the total production of 7,286 flasks, 69% came from producers of 500 flasks or more and 26% from producers of 100 to 499 flasks. The remaining 5% came from other producers. Principal mines in 1972 were as follows:

State	County	Mine
PROPERTIES PRODUCING 1,000 FLASKS OR MORE		
California	Napa	Knoxville.
PROPERTIES PRODUCING 500 TO 999 FLASKS		
California	San Luis Obispo	Buena Vista.
Do	Sonoma	Culver-Baer.
Do	San Benito	New Idria.
Nevada	Pershing	Red Bird.
PROPERTIES PRODUCING 100 TO 499 FLASKS		
Alaska	Kuskokwim River Region	White Mountain.
California	Marin	Chileno Valley.
Do	Santa Clara	Guadalupe.
Do	Napa	Manhattan-One Shot.
Do	Sonoma	Mt. Jackson.
Do	Santa Clara	New Almaden.
Idaho	Washington	Idaho-Almaden.

Although there were 25 fewer mines in California in 1972 than in 1971, the State increased its share of total mercury production from 75% to 79%. A significant amount of mercury metal was produced at the Buena Vista mine from ore that was stockpiled during the past several years. The Knoxville mine, which had been closed for several years, produced a substantial quantity of metal from stockpiled ore and ore mined in 1972. The Santa Clara Quicksilver Co., which operated the New Almaden mine under lease from New Idria Mining, treated ore from underground workings and old mine dumps.

Nevada, with only three mines operating compared with eight in 1971, produced

11% of the total mercury. Near Lovelock, Pershing County, the Golden Cycle Technology Corp. produced cinnabar concentrate from the Pershing mine for export to the Republic of Korea and Taiwan, and also recovered a small amount of metallic mercury. The Carlin Gold Mining Co., which recovered mercury as a byproduct from its gold mine in Eureka County, was the only continuous producer of mercury in Nevada.

The Idaho-Almaden mine in Idaho, which accounted for 2% of the total U.S. production, closed in February. The White Mountain mine in Alaska shipped most of its cinnabar concentrate to Oregon for re-torting, but exported a small quantity to

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Gold.—Gold production was mainly from placer operations, including recovery from 15 sand-gravel washing operations. Because of prevailing high prices for gold, interest continued strong in prospecting and exploration throughout the State. According to the Office of Minerals Exploration (OME), U.S. Geological Survey, at Menlo Park, numerous applications were made for exploration assistance. The California Department of Fish and Game reported a large increase in permits for suction dredges. Discoveries of large nuggets were reported.

An OME-assisted project continued at the Brown Bear mine of American Primary Resources Co. near Lewiston, Trinity County. This mine has 20 miles of underground workings. Exploratory drilling was scheduled at 15 sites. OME projects were also underway at the Rex Montis mine, Mono County, and the Lucky Jack mine, Plumas County.

Alhambra-Atlanta Gold Mining Co. was rehabilitating the Yellowjack mine, near Kelsey, in the Mother Lode area. Homestake Mining Co. was conducting exploratory drilling programs at the Mountain King and Royal mines, Calaveras County.

Iron Ore and Concentrate.—Production increased 25%, following the reduced operations of 1972. Kaiser Steel Corp. reported record shipments of 2,497,000 long tons from the Eagle Mountain mine, Riverside County, and the other producer, Standard Slag Co., continued to expand operations following initial production in 1972 at the Beck mine, San Bernardino County. Kaiser shipped a 57% iron concentrate and a 63% iron agglomerate to its steelworks at Fontana, San Bernardino County. Early in the year, the company ordered a new 17-cubic-yard power shovel for use at Eagle Mountain. A modular hoist would permit removal of the hoist assembly as a unit, saving on downtime cost. Standard Slag marketed a 57% iron direct shipping ore and a 60% iron concentrate.

Iron and Steel.—Kaiser Steel Corp. reported new production and shipment records for crude steel at its Fontana steelworks.¹⁵ Production of crude steel was 3,168,000 tons, and shipments totaled 2,381,000 tons. Mill production was 2,225,000 tons.

In August, Kaiser announced a \$6 million program for design and construction of new air pollution control facilities at Fontana in order to meet emission standards. The program includes installation of afterburners on five coke-oven battery stacks, supplementary hoods and ducts at two oxygen steel furnaces, smoke collection and control devices in the oxygen steel and open hearth shops, and emission control devices at scrap preparation facilities.

Slag.—One million tons of blast furnace slag from Kaiser's Fontana steelworks was reclaimed by International Mill Services, Inc., for use in highway construction. Metallic content was recovered by magnetic separation and returned to Kaiser under a contractual agreement. Since 1968, 7 million tons of this slag has been recovered for use in road building, railroad ballast, filter media, roofing and landscaping, and concentrate aggregate.¹⁶

Scrap.—Demand for steel scrap was high in the Los Angeles and bay area markets, and prices were raised throughout the year. In the Los Angeles market, No. 1 heavy melting scrap was \$40 per ton at the beginning of the year and about \$60 per ton late in the year. In the bay area, prices were somewhat higher—about \$50 per ton in January and \$70, or more, at yearend. Exports to the Far East, mainly Japan, continued strong on contracts concluded early in the year. A price freeze and temporary export controls tended to cause uncertainty in the market.

Mercury.—Mining activity and output continued in a decline. Output was only 1,219 flasks, whereas in 1970, the annual rate had exceeded 18,000 flasks. Production was intermittent from 19 properties, many of which produced only a few flasks. The leading producers, both in Santa Clara County, were Guadalupe Mining Co., lessee at the Guadalupe mine, and Santa Clara Quicksilver Co., lessee at the neighboring New Almaden mine. At the latter, a limited exploration program was conducted at two underground locations. The Culver-Baer mine, near The Geysers geothermal field in Sonoma County, was sold to Pacific Energy Corp.

¹⁵ Kaiser Steel Corp. 1973 Annual Report 1973. P. 2.

¹⁶ Skillings' Mining Review. Million Tons of Slag for Building Freeway. V. 62, No. 47, Nov. 24, 1973, p. 25.

Table 21.—Principal producers.

Commodity and company	Address	Type of activity	County
Asbestos:			
Atlas Asbestos Co -----	P.O. Box 805 Coalinga, Calif. 93210	Open pit mine	Fresno.
Coalinga Asbestos Co -----	P.O. Box 1045 Coalinga, Calif. 93210	--- do -----	Do.
Pacific Asbestos Corp -----	P.O. Box 127 Copperopolis, Calif. 95223	--- do -----	Calaveras.
Union Carbide Corp -----	P.O. Box K King City, Calif. 93930	--- do -----	San Benito.
Barite: Industrial Minerals Co --	1057 Commercial St. San Carlos, Calif. 94070	--- do -----	Shasta.
Boron minerals and compounds:			
Kerr-McGee Chemical Corp --	OMB-508, Kerr-McGee Bldg. Oklahoma City, Okla. 73102	Dry lake brines	San Bernardino.
Stauffer Chemical Co -----	636 California St. San Francisco, Calif. 94119	--- do -----	Do.
Tenneco, Inc -----	Tenneco Bldg. Houston, Tex. 77002	Open pit mine	Inyo.
United States Borax & Chemical Corp.	P.O. Box 75128 Stanford Station Los Angeles, Calif. 90005	--- do -----	Inyo and Kern.
Bromine and compounds: Kerr- McGee Chemical Corp.	OMB-508, Kerr-McGee Bldg. Oklahoma City, Okla. 73102	Dry lake brines	San Bernardino.
Calcium-magnesium chloride:			
Leslie Salt Co -----	P.O. Box 364 Newark, Calif. 94560	--- do -----	Do.
National Chloride Co. of America.	Suite 803, Wilflower Bldg. 615 South Flower St. Los Angeles, Calif. 90017	--- do -----	Do.
Carbon dioxide: Standard Oil Co --	225 Bush St. San Francisco, Calif. 94120	Natural gasoline processing plant.	Kern.
Cement:			
Amcord Inc -----	610 Newport Center Drive Newport Beach, Calif. 92660	Dry process portland cement plants.	Riverside and San Bernardino.
Calaveras Cement Div., The Flintkote Co.	215 Market St. San Francisco, Calif. 94104	Wet and dry process port- land cement plants.	Calaveras and Shasta.
California Portland Cement Co.	800 Wilshire Blvd. Los Angeles, Calif. 90017	Dry process portland ce- ment plants.	Kern and San Bernardino.
Ideal Cement Co., a division of Ideal Basic Industries, Inc.	420 Ideal Cement Bldg. Denver, Colo. 80202	Wet process portland ce- ment plants.	San Benito and San Mateo.
Kaiser Cement & Gypsum Corp.	300 Lakeside Dr. Oakland, Calif. 94612	--- do -----	San Bernardino and Santa Clara.
Monolith Portland Cement Co	3326 San Fernando Rd. Los Angeles, Calif. 90065	Wet process portland ce- ment plants.	Kern.
Lone Star Industries, Inc --	400 Alabama St. San Francisco, Calif. 94110	--- do -----	Santa Cruz.
General Portland, Inc -----	3810 Wilshire Blvd. Los Angeles, Calif. 90005	--- do -----	Kern.
Southwestern Portland Cement Co.	1034 Wilshire Blvd. Los Angeles, Calif. 90017	Wet and dry process port- land cement plant.	San Bernardino.
Clays and shale:			
Ancor, Inc., Riverside Cement Co.	P.O. Box 832 Riverside, Calif. 92501	Open pit mine	Orange, River- side, San Bernardino.
Basalt Rock, Co., Inc -----	Eighth and River Sts. Napa, Calif. 94458	--- do -----	Napa.
Calaveras Cement Div., The Flintkote Co.	San Andreas, Calif. 95249	--- do -----	Amador, Cala- veras, Shasta.
Crestlite Inc., a division of Susquehanna Corp.	Camino De Estrella San Clemente, Calif. 92672	--- do -----	Orange.
Homestake Mining Co -----	650 California St. San Francisco, Calif. 94108	--- do -----	Contra Costa.

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The regulations require that an existing plant must comply with the standard within 90 days after promulgation, unless a waiver is granted. If the Administrator of EPA grants a waiver, a period of up to 2 years for compliance is allowed.

Also, EPA issued a proposed list of toxic pollutants as required by the Federal Water Pollution Control Act Amendments of 1972. Mercury and all its compounds were included. The proposed standards applicable to industrial point sources were designed to protect a variety of water uses.⁵ Final guidelines establishing test procedures for the analysis of pollutants were issued by EPA.⁶ The approved analytical method for mercury, flameless atomic absorption, must be used when applying for discharge permits or certification by a State. A daily maximum of 0.00014 pound of mercury per 1,000 pounds of product was the proposed limitation set by EPA for the amount of

mercury that could be discharged from a mercury-cell chlor-alkali plant after application of the best practicable technology currently available.⁷ Another regulation by EPA prohibited the dumping or transportation for dumping of wastes containing more than trace concentrations of toxic materials including mercury and its compounds.⁸

⁵ Federal Register. Proposed Toxic Pollutant Effluent Standards. V. 38, No. 247, Dec. 27, 1973, pp. 35388-35395.

⁶ Federal Register. Guidelines Establishing Test Procedures for Analysis of Pollutants. V. 38, No. 199, Oct. 16, 1973, pp. 28758-28760.

⁷ Federal Register. Proposed Environmental Protection Agency Effluent Limitations Guidelines and Standards of Performance and Pretreatment for Inorganic Chemicals Manufacturing Point Source Category. V. 38, No. 196, Oct. 11, 1973, pp. 28174-28194.

⁸ Federal Register. Environmental Protection Agency Interim Criteria for Evaluation of Permit Applications for Ocean Dumping. V. 38, No. 94, May 16, 1973, pp. 12872-12877.

Table 1.—Salient mercury statistics

	1969	1970	1971	1972	1973
United States:					
Producing mines -----					
Production -----	109	79	56	* 37	24
Value -----					
Production -----	29,640	27,296	17,883	* 7,333	2,171
Exports -----	\$14,969	\$11,130	\$5,229	* \$1,601	\$621
Reexports -----	507	4,653	7,232	400	342
do -----	108	50	--	563	--
Imports:					
For consumption -----					
General -----	31,924	21,972	28,449	28,834	46,026
do -----	30,848	21,672	29,750	29,179	46,076
Stocks Dec. 31 -----	22,692	16,554	16,862	15,708	17,946
Consumption -----	77,372	61,503	52,257	52,907	54,283
Price: New York, average per flask -----	\$505.04	\$407.77	\$292.41	\$218.28	\$286.23
World:					
Production -----	289,267	284,014	* 300,634	277,584	276,203
Price: London, average per flask -----	\$536.41	\$411.45	\$282.46	\$203.01	\$273.54

* Revised.

DOMESTIC PRODUCTION

Production came from 24 mines in 1973, down from 37 in 1972. Revisions for 1972 added 16 producers to the 21 previously reported in 1972. The additional producers accounted for an increase of 47 flasks in 1972 production; none of the 16 produced more than 10 flasks.

By yearend 1973, six of the largest operations remained active and were expected to continue into 1974. Seven mines reported production exclusively from dumps, cleanup operations, or as a byproduct. An

additional 7 mines each showed production of 10 flasks or less. Some exploration and development work was conducted by several small operators. The number of mines reporting outputs of 500 to 999 flasks decreased from four to one, and properties producing 100 to 499 flasks decreased from seven to four. Of the total production of 2,171 flasks, 83% came from producers of over 100 flasks. Principal mines in 1973 were as follows:

State	County	Mine
Properties producing 500 to 999 flasks		
Nevada	Pershing	Red Bird.
Properties producing 100 to 499 flasks		
Alaska	Kuskokwim River Region	White Mountain.
California	Sonoma	Culver-Baer.
Do	Santa Clara	Guadalupe.
Do	do	New Almaden.

California produced 56% of the total mercury production, down from 80% in 1972. New Idria Mining and Chemical Co. sold all its equipment but retained the reduction plant at the New Idria mine in San Benito County, Calif. Until its closing in 1972, the mine was one of the largest producers of mercury with employment of about 160. At the New Almaden property, the company sold all its equipment at auction, and sold six parcels of its 3,500-acre site to Santa Clara County. The company retained three parcels of land on which the Santa Clara Quicksilver Co. operated a mine and a 30-ton-per-day furnace. At the Knoxville mine ore was stockpiled and a small amount of metal was produced from dump material. The Culver-Baer mine closed early in the year and sold its property.

Nevada, with only three mines operating, produced 32% of the total mercury, mostly from the Red Bird mine. In addition, the Carlin Gold Mining Co. continued to recover mercury as a byproduct at its gold mine in Eureka County.

The White Mountain mine in Alaska shipped most of its cinnabar concentrate to Oregon for retorting, but exported a small quantity to the Orient. The Whit-Roy mine in Texas was active for a short time.

The average grade of all ore processed in 1973, including ore treated in concentrators, decreased to 5.9 pounds of mercury per ton. Because of the insufficiency of reported data in 1973, the amount of ore treated and ore grade were based to a large extent on knowledge of producing areas and their historical data.

In spite of a higher level of GSA releases, secondary production of mercury fell to 10,329 flasks from 12,651 flasks in 1972. Dental amalgams, scrap batteries, various types of sludges, mercury from a dismantled chlor-alkali plant, and discarded mercury-containing instruments were the major sources of secondary mercury.

Table 2.—Mercury produced in the United States, by State

Year and State	Pro- ducing mines ¹	Flasks	Value ² (thou- sands)
1972			
California ^r	30	5,835	\$1,274
Idaho	1	161	35
Nevada	3	810	177
Alaska, New York, Texas	3	527	115
Total ^r	37	7,333	1,601
1973			
California	18	1,219	349
Nevada	3	698	200
Alaska, Oregon, Texas	3	254	72
Total	24	2,171	621

^r Revised.

¹ Mercury mines only.

² Value calculated at average New York price.

Table 3.—Mercury ore treated and mercury produced in the United States¹

Year	Ore treated (short tons)	Mercury produced	
		Flasks	Pounds per ton of ore
1969	432,591	28,552	5.0
1970	424,510	26,795	4.8
1971	265,790	17,444	5.0
1972	^r 82,580	^r 7,004	6.5
1973	26,257	2,045	5.9

^r Revised.

¹ Excludes mercury produced from old surface ores, dumps, and as a byproduct.

Table 4.—Production of secondary mercury in the United States

Year	(Flasks)		
	Industrial production	GSA releases	Total
1969	10,573	3,077	13,650
1970	7,348	703	8,051
1971	10,899	5,767	16,666
1972	12,139	512	12,651
1973	7,746	2,583	10,329

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pounds of product for new sources.³ EPA proposed an amendment to the emission standards for hazardous air pollutants which would limit mercury emissions from the incineration and drying of waste water treatment plant sludges to a maximum of 3,200 grams per day.⁴ In addition, the National Institute for Occupational Safety and Health submitted criteria for a recommended limit of 0.05 milligram of mercury per cubic meter on the occupational exposure to inorganic mercury.⁵

The Commissioner of Food and Drugs proposed to establish an action level for mercury in fish and shellfish of 0.5 part per million.⁶ This level gave a tenfold margin of safety to the vast majority of the U.S. population.

EPA opened hearings in October on the cancellation of biocidal uses of mercury, including mildewcides in paint. The hearings were recessed until February 1975 when witnesses for the registrants were scheduled to appear.

Table 1.—Salient mercury statistics

	1970	1971	1972	1973	1974	
United States:						
Producing mines	79	56	37	24	12	
Production	flasks	27,296	17,883	7,349	2,227	2,189
Value	thousands	\$11,130	\$5,229	\$1,604	\$637	\$617
Exports	flasks	4,653	7,232	400	342	466
Reexports	do	50	—	563	—	—
Imports:						
For consumption	do	21,972	28,449	28,834	46,026	52,180
General	do	21,672	29,750	29,179	46,076	52,102
Stocks, Dec. 31	do	16,554	16,862	15,708	17,946	19,877
Consumption	do	61,503	52,257	52,907	54,283	59,479
Price: New York, average per flask		\$407.77	\$292.41	\$218.28	\$286.23	\$281.69
World:						
Production	flasks	284,014	300,634	278,968	268,265	262,286
Price: London, average per flask		\$411.45	\$282.46	\$203.01	\$273.54	\$267.94

^r Revised.

DOMESTIC PRODUCTION

Production of 2,189 flasks came from 12 mines in 1974, down from 24 in 1973. Many of the very small operations closed in 1974. A significant portion of the production, as byproduct mercury, came from a zinc smelter. Some exploration and development work was conducted by several small operations. Of the total production, 91% came from producers of over 100 flasks. Principal mines (properties producing 100 to 499 flasks) in 1974 were as follows:

State	County	Mine
Alaska	Kuskokwim River Region.	White Mountain.
California	Marin	Chileno Valley.
Do	Napa	Manhattan-One Shot.
Do	do	Oat Hill.
Do	Santa Clara	Guadalupe.
Do	do	New Almaden.
Nevada	Pershing	Red Bird.

California provided 60% of the total mercury production, up from 55% in 1973. The Red Bird mine was responsible for most of Nevada's production. In addition, the Carlin Gold Mining Co. con-

tinued to recover mercury as a byproduct at its gold mine in Eureka County. The White Mountain mine in Alaska shipped most of its cinnabar concentrate to Oregon for retorting, but exported the equivalent of about 54 flasks to the Orient.

Placer Amex Inc. began construction of a new flotation concentrator, and a furnace and condenser system at its open pit mine near the site of the old Cordero mine in Humboldt County, Nev. Reserves were estimated at 3 million tons of ore averaging 10 pounds of mercury per ton, about 15% to 25% of which is in the chloride mineral corderoite. The mill was designed to process about 100 tons of ore per day to produce a 60% concentrate feed for a Herreshoff furnace. The offgases were to

³ Federal Register. Inorganic Chemicals Manufacturing Point Source Category. V. 39, No. 49, Mar. 12, 1974, pp. 9612-9623.

⁴ Federal Register. Asbestos and Mercury—Proposed Amendments to National Emission Standards. V. 39, No. 208, Oct. 25, 1974, pp. 38063-38073.

⁵ Federal Register. Occupational Exposure to Inorganic Mercury. V. 39, No. 13, Jan. 18, 1974, pp. 2271-2274.

⁶ Federal Register. Action Level for Mercury in Fish and Shellfish. V. 39, No. 236, Dec. 6, 1974, pp. 42738-42740.

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\$500,000 but fines of more than \$5,000 would be applied only if gross negligences were proven. Additional penalties would be applied for failures to notify EPA or local authorities of such discharges. The new regulations do not apply to companies having discharge permits issued by EPA or State authorities.

On March 14, EPA proposed National Interim Primary Drinking Water Regulations and held hearings, thereafter, on the proposed regulations. In addition, comments and information were received from representatives of State agencies, public interest groups, and others. The regula-

tions proposed maximum contaminant levels in public drinking water and set the mercury level at 0.002 milligram per liter.

EPA published a study intended to determine the amount of mercury entering the environment and the manner in which it is redistributed, particularly with regard to its introduction into man's food chain.³

Congress has taken no action on authorizing the release of the 157,405 flasks of surplus mercury in the strategic stockpile. As of December 31, 1975, total strategic stockpile accumulations from all programs remained at 200,062 flasks.

Table 1.—Salient mercury statistics

	1971	1972	1973	1974	1975
United States:					
Producing mines -----	56	37	24	12	12
Production ----- flasks -----	17,883	7,349	2,227	2,189	7,366
Value ----- thousands -----	\$5,229	\$1,604	\$637	\$617	\$912
Exports ----- flasks -----	7,282	400	342	466	839
Reexports ----- do -----	--	563	--	--	155
Imports:					
For consumption ----- do -----	28,449	28,834	46,026	52,180	43,865
General ----- do -----	29,750	29,179	46,076	52,102	44,472
Stocks, Dec. 31 ----- do -----	16,862	15,703	17,946	19,377	25,549
Consumption ----- do -----	52,257	52,907	54,283	59,479	50,838
Price: New York, average per flask -----	\$292.41	\$218.28	\$286.23	\$281.69	\$158.12
World:					
Production ----- flasks -----	300,634	278,963	* 270,014	* 260,964	251,226
Price: London, average per flask -----	\$232.46	\$203.01	\$273.54	\$267.94	\$130.11

* Revised.

DOMESTIC PRODUCTION

Production of primary mercury amounted to 7,366 flasks. Twelve mines recorded production in 1975, the same number as in 1974. Byproduct mercury continued to be produced at a gold mine in Nevada and a zinc smelter in New York. Mercury mine production was reported from California and Nevada only. Mines known to have produced mercury in 1975 included the Guadalupe, Manhattan-One Shot, the Oat Hill, the Knoxville, and the New Almaden in California and the Red Bird and McDermitt in Nevada.

On June 2, Placer Amex, Inc. formally opened its new McDermitt open pit mine near the site of the old Cordero mine in Humboldt County, Nev. The new mining facility has a designed production capacity of 20,000 flasks per year and a reserve of about 400,000 flasks in ore averaging about 10 pounds of mercury per ton. The plant has been carefully designed to comply with EPA's mercury emission standard of 5.1

pounds per day. Disposal of tailings in an environmentally acceptable manner is accomplished by impoundment behind impervious dams in ponds with impervious bottoms. The company is required to maintain monitoring wells to determine if any mercury escapes from the ponds.

The results of an examination of the Kolmakof mercury deposit in Southwestern Alaska were published.⁴ Although the possibility of significant mineralization exists in the area, it was concluded that the Kolmakof deposit was small.

The average grade of all ore processed in 1975, including ore treated in concen-

³ U.S. Environmental Protection Agency. Materials Balance and Technology Assessment of Mercury and Its Compounds on National and Regional Bases. EPA-560/3-75-007, 1975, 400 pp.

⁴ Merrill, C. W. Jr., and R. P. Maloney. Kolmakof Mercury Deposits. BuMines OFR 21-75, 1975, 21 pp.; available for consultation at the Bureau of Mines Library in Juneau, Alaska; the Central Library, U.S. Department of the Interior, Washington, D.C.; and the National Technical Information Services, Springfield, Va., PB 226 723.

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AREA REPORTS: DOMESTIC



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Because of increased demand, by April the price for No. 1 scrap had risen to almost \$100 per ton, where it remained until it declined to the \$80 level in early November. Because of sharply lessening demand, it closed out the year weakly at the \$65 to \$70 range for No. 1 heavy-melting scrap. Shipments to Japan, which at mid-year had been estimated to be 150,000 to 160,000 tons per month, declined to practically nothing at yearend.

Lead-Zinc.—Production was substantially below that of 1973. Most of the lead (recoverable) came from the Santa Rosa mine in Inyo County operated by the Brownstone Mining Co., and most of the zinc (recoverable) came from the Darwin mine in Inyo County operated by Montecito Minerals Co. Smaller quantities of lead and zinc were recovered from the Boomerang dump (San Bernardino County) by Great Western Gold Co., and from the Zaca mine (Alpine County) by Claude B. Lovstedt.

Mercury.—Mercury mining activity continued to be curtailed in the State because of reduced demand and soft prices caused by environmental problems and the ban-

ning of mercury used for certain purposes. However, about 60% of the total U.S. production was provided by California producers. The State's output increased 8% compared with that of 1973, but value increased only 6% because of reduced prices. Production was reported from 9 mines in 1974; there were 18 in 1973. The largest producers were, in descending order of output, the Chileno Valley mine (Marin County), the Manhattan-One Shot and Oat Hill mines (Napa County), and the Guadalupe and New Almaden mines (Santa Clara County).

New Idria Mining and Chemical Co. put the entire town of Idria (San Benito County), including the New Idria mercury mine, the mill, 3,700 acres of land, 48 houses, a church, a school, garages and shops, up for sale at public auction in August. The mine was the Country's largest mercury producer until it was shut down in 1972. The town was offered as an ideal campground or recreational facility, but the highest bid of \$105,000 for the entire town was not accepted by the company.

Table 23.—California: Mercury production, by method of recovery

Year	Recovery method							Total 76-pound flasks	Value ² (thou- sands)
	Furnaced		Retorted		Unclas- sified (76-pound flasks) ¹	76-pound flasks			
	Oper- ating mines	Ore treated (short tons)	76-pound flasks	Ore treated (short tons)			76-pound flasks		
1970	51	\$222,495	17,587	15,005	547	459	18,598	\$7,582	
1971	39	\$181,120	12,485	19,089	698	306	13,489	3,944	
1972	30	58,942	5,835	W	W	W	5,835	1,274	
1973	18	14,280	1,133	W	W	86	1,219	349	
1974	9	13,108	1,123	12,465	164	24	1,311	370	

W Withheld to avoid disclosing individual company confidential data; included with "Furnaced."

¹ Includes mercury recovered from old surface ores, dumps, and placers.

² Value calculated at average New York price.

³ Includes ore and mercury from dumps not separable.

Molybdenum.—Output of molybdenum declined about 50%. The molybdenum was in the form of oxide and sulfide concentrates recovered as a byproduct of treating tungsten ore from the Pine Creek mine (Inyo County) by Union Carbide Corp. This was mainly due to a lowering of the ore grade.

Nickel.—The Bureau of Mines Albany (Oregon) Metallurgy Research Center has been conducting research to develop a process of selectively recovering nickel

and cobalt from a low-grade laterite deposit; namely, the Pine Flat deposit occurring in northern California and southern Oregon. The process involves reduction of the ore followed by an oxidizing ammonium hydroxide-ammonium sulfate leach with countercurrent solvent extraction and electrowinning. The initial results are encouraging.

One of the Bureau's long-range programs is to complete an up-to-date computerized information bank on all domestic mineral

Table 24.—Principal producers—Continued

Commodity and company	Address	Type of activity	County
Lime:			
Amstar Corp -----	50 California St. San Francisco, Calif. 94106	Plants -----	Monterey and Yolo.
Holly Sugar Corp -----	Box 1052 Colorado Springs, Colo. 80901	do -----	Glenn, Imperial, Orange, San Joaquin.
Kaiser Aluminum & Chemical Corp. ⁹	Moss Landing, Calif. 95039	Plant -----	Monterey.
Pfizer, Inc. ¹⁰ -----	Box 558 Lucerne Valley, Calif. 92356	do -----	San Bernardino.
Magnesium compounds:			
FMC Corp -----	P.O. Box 344 Newark, Calif. 94560	do -----	San Diego.
Merck & Co., Inc -----	Rahway, N.J. 07065	do -----	San Mateo.
Mercury:			
Floyd Edwards -----	415 7th St. Petaluma, Calif. 94952	Underground mine.	Marin.
Guadalupe Mining Co -----	14900 Guadalupe Mine Rd. San Jose, Calif. 95120	do -----	Santa Clara.
W. T. Kritikos -----	1036 Reislung Dr. Pleasanton, Calif. 94566	do -----	Napa.
Santa Clara Quicksilver Co	21731 Almaden Rd. San Jose, Calif. 95120	do -----	Santa Clara.
Natural gas liquids:			
Atlantic Richfield Co. ¹¹ -----	445 South Figueroa St. Los Angeles, Calif. 90054	Plants -----	Kern, Santa Barbara, Ventura.
Union Oil Co. of California ¹¹ -----	P.O. Box 7600 Los Angeles, Calif. 90054	do -----	Various.
Peat:			
Delta Humus Co -----	P.O. Box 89 Holt, Calif. 95234	Bog -----	San Joaquin.
Peter J. Gambetta -----	Route 1, Box 78 Brentwood, Calif. 94513	Bog -----	Contra Costa.
Radel, Inc -----	P.O. Box 7075 Reno, Nev. 89502	Bog -----	Modoc.
Perlite (crude): American Perlite Co.	11831 Vose St. North Hollywood, Calif. 91605	Open pit mine --	Inyo.
Perlite (expanded):			
Harborlite Corp -----	P.O. Box 458 Escondido, Calif. 92025	Plant -----	San Diego.
Paramount Perlite Co., Inc	P.O. Box 83 Paramount, Calif. 90723	do -----	Los Angeles.
Redco, Inc -----	11831 Vose St. North Hollywood, Calif. 91605	do -----	Do.
Petroleum and natural gas:¹²			
Pumice:			
Cinder Products Co -----	3450 Lakeshore Ave. Oakland, Calif. 94610	Open pit mine --	Lake.
Glass Mountain Block, Inc	Redding Highway Alturas, Calif. 96101	do -----	Siskiyou.
Red Lava Products of California.	Star Route Clearlake, Calif. 95423	Plant -----	Lake.
Shastalite Cinder Co -----	P.O. Box 341 Weed, Calif. 96094	do -----	Siskiyou.
Rare-earth minerals: Molyb- denum Corp. of America	Nipton, Calif. 92366	Open pit mine --	San Bernardino.
Salt: Leslie Salt Co. ¹³ -----	505 Beach St. San Francisco, Calif. 94111	Open pit mines and evaporators.	Alameda, Napa, San Bernar- dino, San Mateo.
Sand and gravel:			
Conrock Co -----	Box 2950, Terminal Annex Los Angeles, Calif. 90051	Pits -----	Los Angeles, Orange, San Bernardino.
Kaiser Industries Corp. ⁸ ---	300 Lakeside Dr. Oakland, Calif. 94612	do -----	Alameda, Contra Costa, Glenn, Santa Clara, Santa Cruz, Sonoma.

See footnotes at end of table.

**ARCHAEOLOGICAL SURVEY OF AN
100-ACRE SOUTHERN PORTION OF
15999 GUADALUPE MINES ROAD NEAR SAN JOSE
SANTA CLARA COUNTY, CALIFORNIA**



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CONFIDENTIAL:

This report contains confidential cultural resources location information; report distribution should be restricted to those with a need to know. Cultural resources are nonrenewable, and their scientific, cultural, and aesthetic values can be significantly impaired by disturbance. To deter vandalism, artifact hunting, and other activities that can damage cultural resources, the locations of cultural resources should be kept confidential. The legal authority to restrict cultural resources information is in California Government Code 6254.1 and the National Historic Preservation Act of 1966, Section 30.



Inside photo: Ingersoll-Rand Imperial Type XB air compressor at Loci 27.

Cover photo: Overview of eastern portion of the study area with the miner's cabin in the far right, the brick warehouse/office in center right, terraformed hillside in foreground not surveyed. In the far center left are water tanks at the edge of where ore processing was once refined into mercury. View to southeast.

SUMMARY OF FINDINGS

On 9 and 10 December 2010, Holman & Associates conducted an approximately 100-acre archaeological survey of the southern portion of Guadalupe Rubbish Disposal Company's 15999 Guadalupe Mines Road parcel. The proposed project involves stabilization of soils in particular areas on the banks of Guadalupe Creek within the property limits, however, given the history of this parcel the entire southern portion was surveyed. A requirement of a U.S. Corps of Engineers permit has initiated this cultural resources investigation to address regulations detailed in Section 106 of the National Historic Preservation Act.

Native American consultation consisted of contacting the Native American Heritage Commission. Their response included a list of individuals/groups that were also contacted. Two of their comments are noted. Three local historical groups and two historians were also contacted.

Forty-six discrete loci and features associated with Guadalupe Mines and the company town of Guadalupe were recorded as a cultural resources district and assigned the state primary number of P-43-2400 and the state trinomial of CA-SCL-891H. Along with 21 mining areas and abandoned ore chutes and hoists, 10 historic-era or potentially historic-era standing buildings and structures, and 20 short sections of roads also comprise this cultural resource.

Project specific and long-term recommendations are presented in the report's conclusion.

Summary

Forty six mining areas or discrete loci were identified including 21 mining areas, 10 historic-era or potentially historic-era standing buildings and structures and 20 short sections of roads. All of these were recorded as part of a cultural resource district on DPR forms (Appendix C) that incorporates buildings, structures, objects, and archaeological remains. This district was assigned the state primary number of P-443-2400 and the state trinomial CA-SCL-891H. The original boundaries of the various mining activities and residential use of the Guadalupe Mines extend beyond the present study area: to the south were three additional locations noted on Map 3; and to the north additional mining shafts and tunnels might extended along the ridgeline and down the other side of the hill (see sketch map in Appendix C). These features and loci are the remains from over 150 years of mercury mining and remining of this area. Many areas such as those where mining material was processed into mercury and tailings has been so drastically altered that no remains from these activities are visible. Mining shafts and tunnels have been covered for safety reasons; sometimes this has obliterated most mining indications.

Only a few buildings and structures date from or are likely from the 1800s, when the mines were there most prolific. These include the superintendent's house, the wooden building behind it, the miner's cabin, the brick warehouse and store (and later office), and possibly the wooden structure at Feature 27 by the shaft entrance. Early drift mining along Guadalupe Creek has been obliterated by remining efforts and periodic flooding. Discrete mining areas were recorded with most of the Guadalupe Creek bank likely assessed and drift mined, but these efforts have been obscured by later mining efforts, demolition of various aspects of the mining pursuits and features of the town, and flooding.

RECOMMENDATIONS

Approximately 100 acres of the southern portion of 15999 Guadalupe Mines Road were investigated as part of this project, almost all of which was recorded as a cultural resources district of Guadalupe Mines and the town of Guadalupe. Areas south of the main road along side Guadalupe Creek that were not recorded as discrete site loci or features and that lie within the general site boundaries depicted on the district sketch map in Appendix C, can be stabilized without additional archaeological work. If proposed stabilization areas are enlarged or moved to encompass any of these designated features and loci, then additional archaeological work is recommended to more fully research and document the range of buildings, structures, objects, and archaeological features within each designated area. This recommendation is limited to the following loci south of the main road: 25, 27, 32, 33, 35, and 37.

Long-term recommendations for proposed improvements to the historical Guadalupe Mines and town of Guadalupe/CA-SCL-891H that lie within the study area are as follows. Prior to demolition any of the standing buildings or structures, these must be fully documented by an architectural historian to determine its age, construction details, general history, to describe additions and modifications, and to evaluate the building or structure to the California Register of Historical Resources or the National Register of Historic Places depending on any future proposed improvements or remediation. New Almaden County Park expressed an interest in accepting buildings, structures, or objects that might need to be removed. Prior to any other proposed improvements that are within or directly adjacent to recorded features or loci, a historical archaeologist will need to conduct a more detailed recording and historical research to evaluate these particular areas either to the California Register of Historical Resources or the National Register of Historic Places.

If any Native American cultural materials once existed in the study area, mining activities have erased all indications. If previously unidentified cultural materials are unearthed during proposed stabilization of soil, then work in that area must halt until a qualified archaeologist can assess the significance of the find.

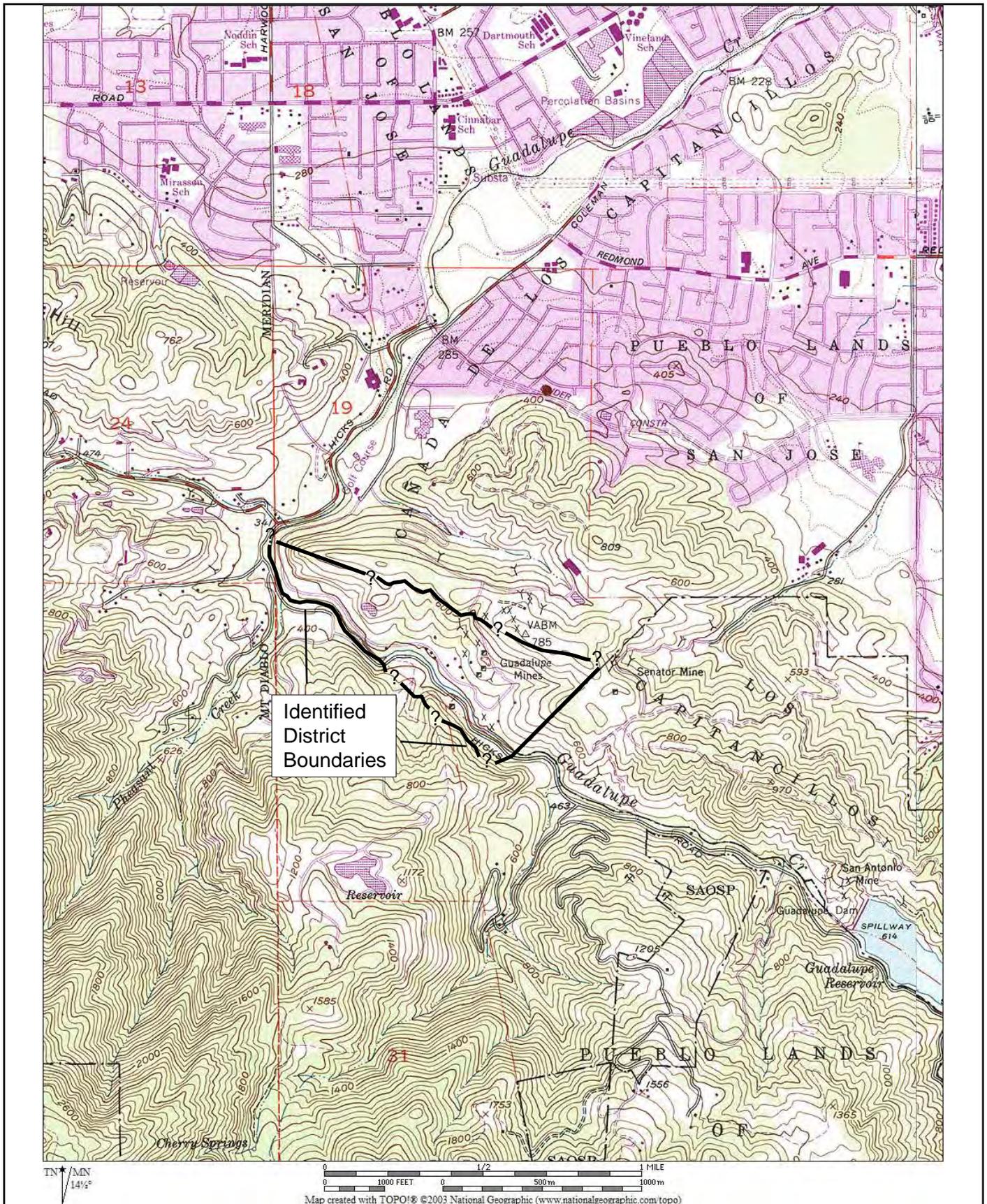
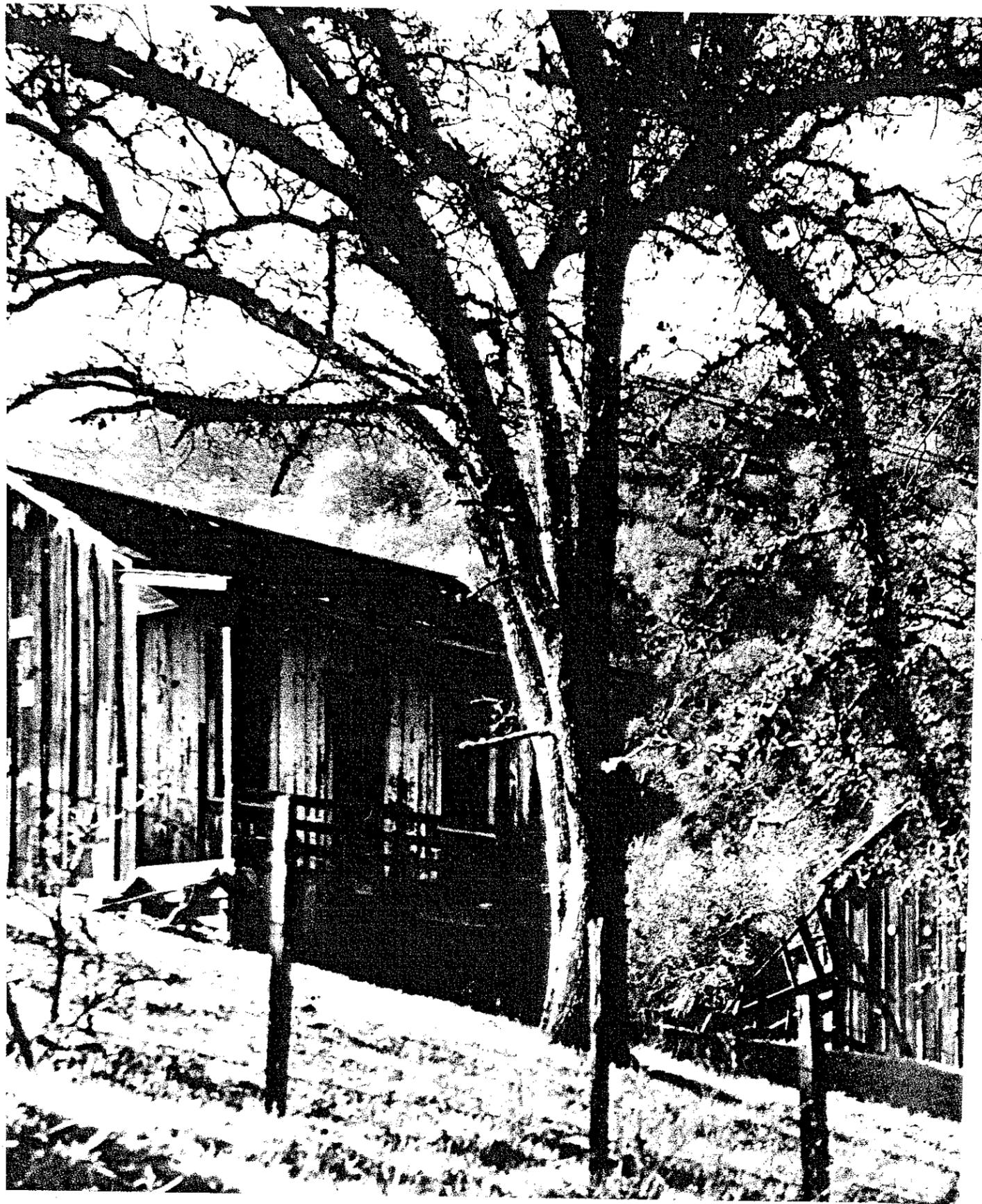


EXHIBIT Q



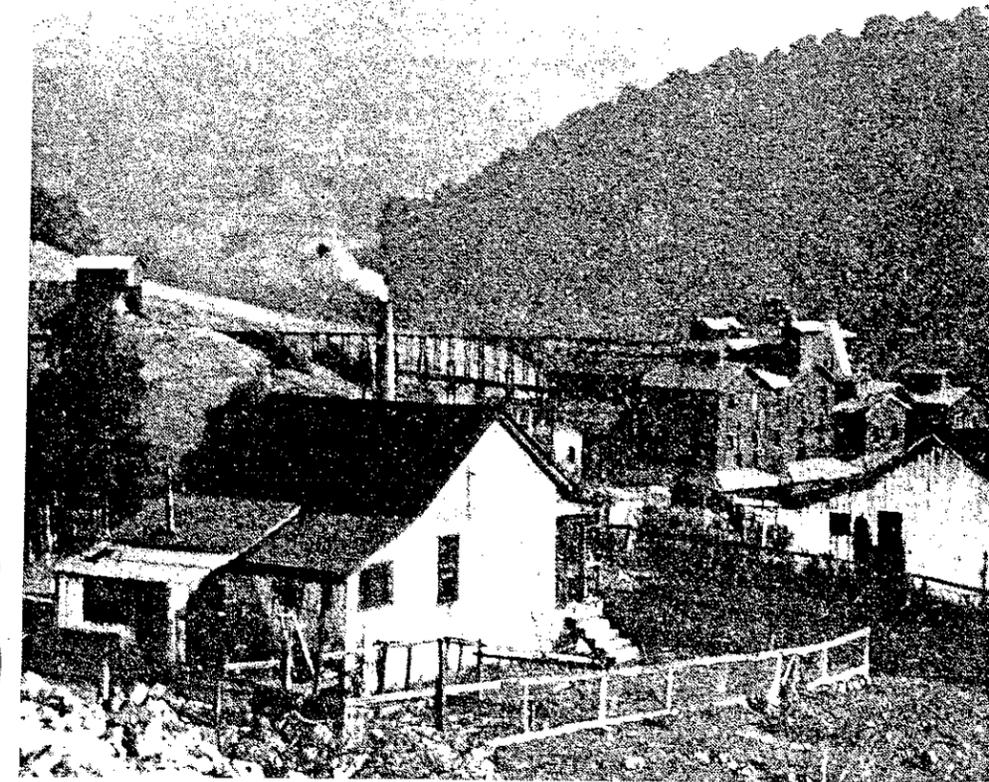
Guadalupe

Miners' cabins at the Guadalupe Mine. Though not as productive as New Almaden, the Guadalupe Mine had a long history of operation. About 20,000 flasks of quicksilver were produced there between 1856 and 1875.

Guadalupe was a popular place name in early California. It was frequently mentioned in Spanish documents pertaining to the Santa Clara Valley, and it appeared in a 1777 map of the San Francisco Bay region drawn by Father Font. The original Spanish name for the city of San Jose was El Pueblo de San José de Guadalupe.

The word *Guadalupe* is not, however, of Spanish origin. The initial "Guad" comes from the Arabic *wadi* meaning river or stream, and some writers believe that the entire word means "Wolf River."

The name is also connected with the important mercury industry in the Santa Clara Valley. The quicksilver deposit near the river on Rancho de los Capitancillos was called Guadalupe Mine. This mine was discovered shortly after the more spectacular discovery at New Almadén in the 1840s. The Guadalupe Mine had a long history of operation. The Santa Clara Mining Association of Baltimore, Maryland, operated the mine from 1856 to 1875, producing about 20,000 flasks of quicksilver. (By contrast, the New Almadén Mine produced over 47,000 flasks of mercury in just one year, 1865.) In 1875 the Guadalupe Mine was sold to the Guadalupe Mining Company of Santa Clara County, and this company operated the mine profitably until 1886, when litigation closed it. It reopened 14 years later, but a lawsuit again closed the mine in the 1920s. Minor intermittent operations were carried out from 1930 to the early 1950s. In 1956 the mine area was sold for residential development, and in 1964 it was sold again.



The reduction plant at the Guadalupe Mine. The view looks southwest. In 1956 the mine area was sold for residential development.

16
From CSMB
1921 P. 210
both detail in
what photo

*Santa Teresa Laboratory: A Place in History
Benjamin R. Gilbert*

EXHIBIT R

Historic San Jose Mine Still Yields Mercury

By VERN KROGH

Few are the residents of San Mateo county who realize that the "mother" of the Mother Lode country is less than an hour's driving time from their doors.

Here in a small area west of San Jose and south of Los Gatos are the oldest ghost towns in the state—either the forgotten cities of the Sierras or the strongholds of the "robber barons" of Comstock Lode of Nevada. These are the old quick-silver mining communities of Guadalupe and New Almaden.

According to Mrs. Constance B. Perham, curator of the New Almaden museum, operations of the Almaden mine began in 1845—three years before John Marshall's discovery of gold on the American river brought on the Forty-Nine gold rush to California.

The Guadalupe mine, according to its present superintendent, John N. Gargan, began operations about five years later—around 1850.

While the New Almaden mine, named after an ancient and still active mine in Spain, has become somewhat of a tourist attraction during recent years, the Guadalupe mine is almost unknown except to nearby residents.

To reach this once thriving community of more than 1500 persons, the San Mateo county resident should head for Saratoga. Passing through Los Gatos, he should continue on past both the Santa Cruz and San Jose freeway until reaching the end of the road, where he should turn east on the old Los Gatos-San Jose highway.

Travelling on until he reaches the Paul Swanson Ford agency, the Peninsulan turns right on Blossom Hill road, continuing on until reaching the end of the thoroughfare, where a right turn will bring him onto Hick's road. At the end of Hick's road he should bear right, where he will see signs leading toward Guadalupe Dam. A few miles further on the right will come into view the century old buildings, now decaying and in a state of collapse, which once housed a thriving community. Buildings still there include an old church, a former school yard, homes

and an old commissary building which many years ago housed the "dancing girls" who entertained the boistering male miners. After a U-turn at Guadalupe Dam, the motorist retraces his route until he again reaches Hick's road. Instead of turning back toward Los Gatos, however, if he continues on, the tourist will eventually wind up in the second of these towns of yesterday—New Almaden.

While the Guadalupe mine might rightly be termed a ghost community, it is yet far from dead. Seven families now living there are preparing for its renaissance.

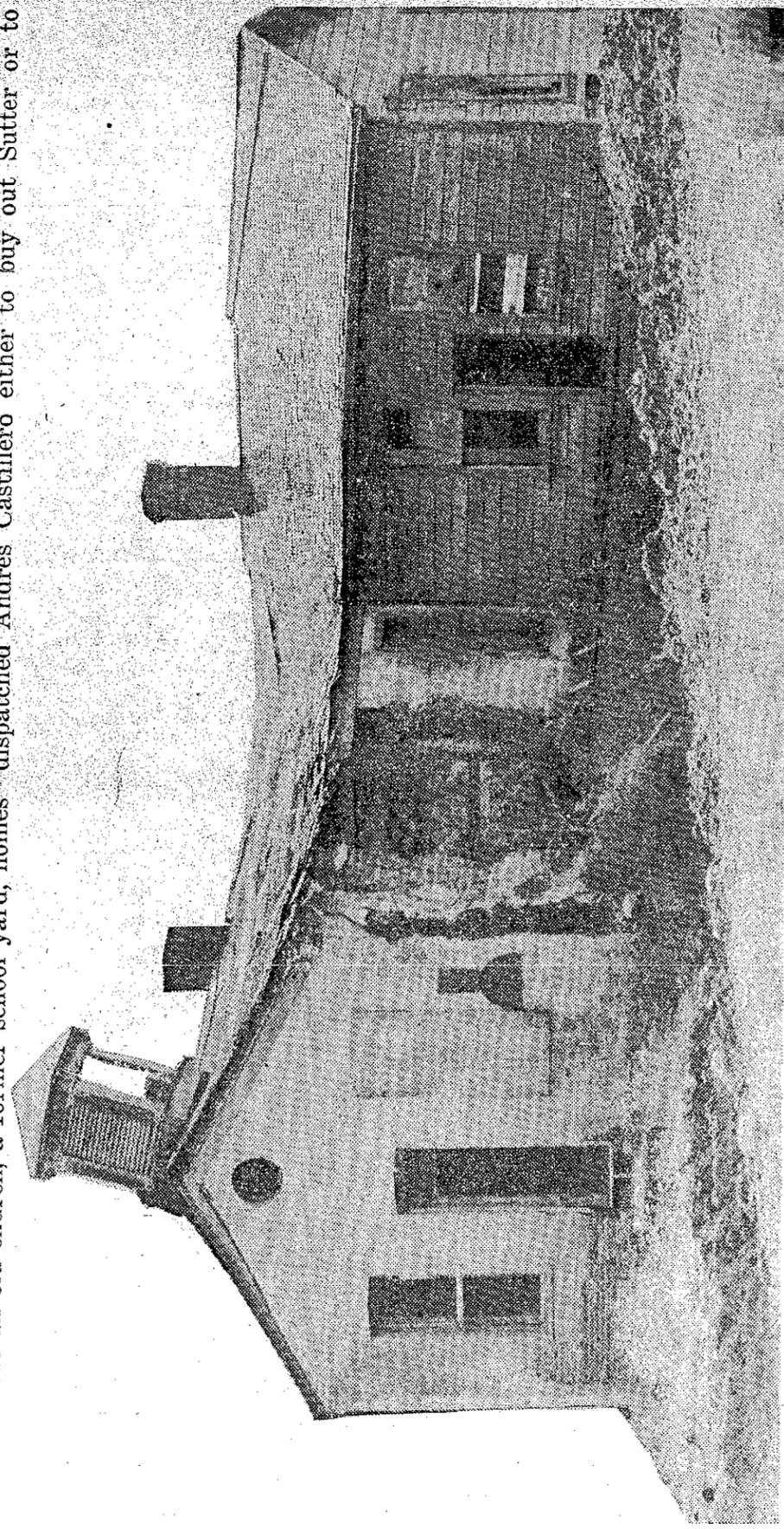
Gargan said his crews are now digging in, attempting to locate deep old diggins once worked by Chinese coolie labor and which have been lost since they closed down in 1905. What secrets these long abandoned tunnels hold cannot be known until their locations are re-discovered sometime during the coming year and modern day miners enter the old shafts which have disappeared completely since they were closed more than a half-century ago.

While the Guadalupe mine was worked by Chinese miners, the New Almaden mine, one of the deepest mines in the United States, were mostly developed by Cornish miners from the British Isles. It was here that John McClaren, developer of Golden Gate Park in San Francisco got his start. McClaren came from his native Scotland to find employment in the mines, but he soon discovered he was too frail for the heavy work. It was in Almaden that he learned the basic skills that eventually developed him into the West's master landscape artist.

Darius Ogden Mills, whose Mills Estate was one of the last, great estates on the Peninsula, also was employed here as an agent for the Virginia and Truckee Railroad, a railroad that was built with \$1,500,000 lent by the owners of the New Almaden mine.

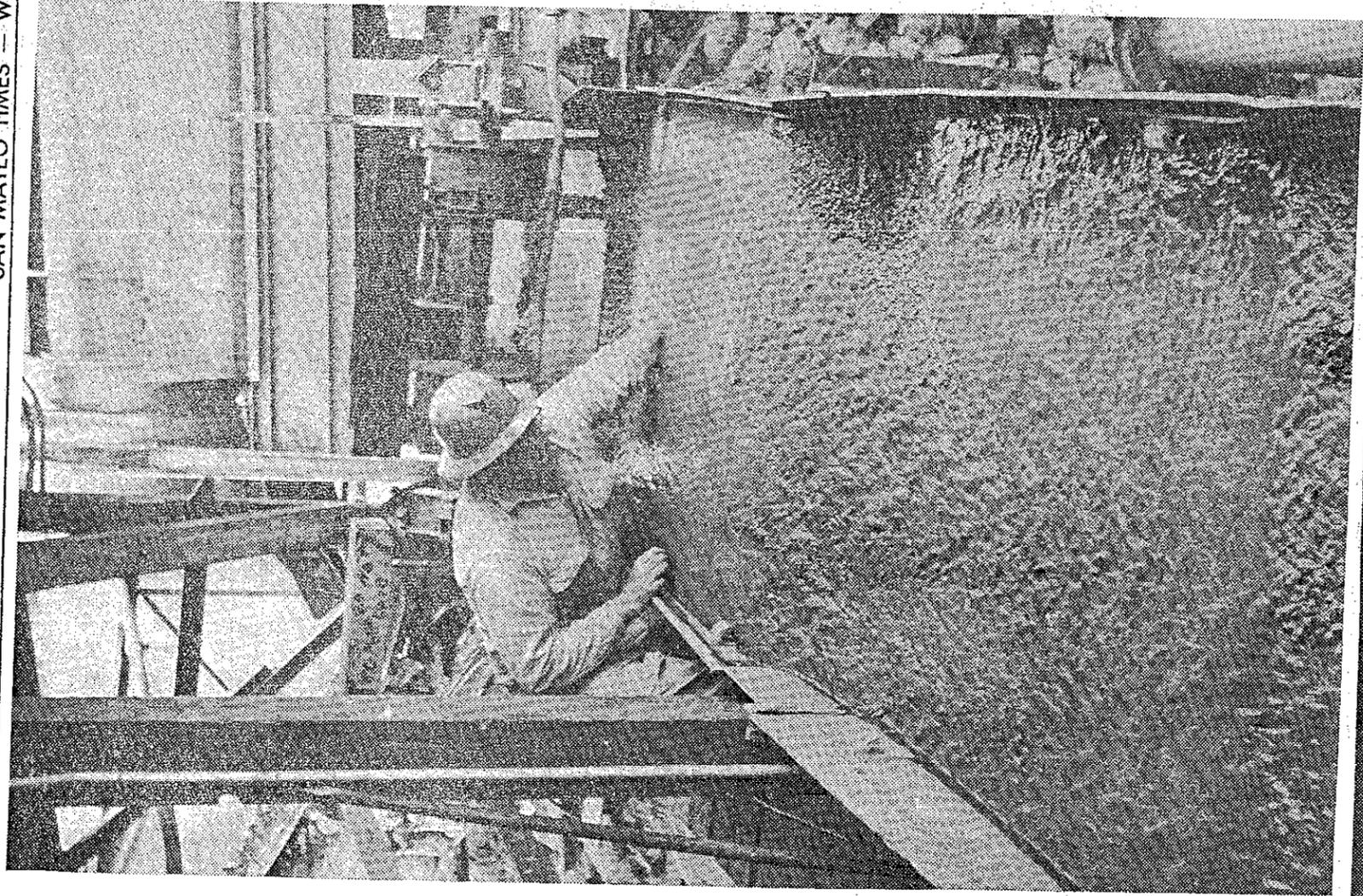
According to Mrs. Perham, General John A. Sutter was indirectly responsible for opening this first mine in California.

Becoming worried about the success of Sutter's baronial holdings near Sacramento in 1845, the Mexican government dispatched Andres Castillero either to buy out Sutter or to



The reduction works of the New Almaden Mine are now tumbling and near collapse. But they are symbols of what once

was the deepest and most worked mine in California.



persuade him to leave. Castillero, however, stopped by the Santa Clara mission to visit a padre who was a friend of his. Castillero noticed Indians coming down from nearby hills were painted with a red pigment. He immediately recognized it as cinnabar, the ore of mercury or quicksilver, and rushed immediately to the Pueblo de San Jose to file a mining claim. His mission to Sutler was forgotten.

Castillero worked his claim for about a year before returning to Mexico. The records of the mine from 1846 to 1850 are still in Tepic, Mexico, according to Mrs. Perham.

During the Civil War, Mrs. Perham reports, all miners were required to give 10 per cent of their earnings to help the Union wage the war.

Because mercury was

needed to process both gold ore in the Mother Lode and silver ore for the Comstock Lode, it was necessary to open the local quicksilver mines before the gold rush could truly begin, Gargen explains. When stamp mills crushed the ore of the two metals it was necessary to pass it over amalgamation plates coated with mercury to remove the precious metals.

Thus, this neighboring area of San Mateo county was truly the "mother" of the Mother Lode.

Although the actual diggings of the New Almaden mine, which are now being worked by about 40 miners on a percentage basis, are closed to the public, Gargen says he is willing to conduct organizations through the Guadalupe diggings on a tour basis.

John N. Gargen, superintendent of the Guadalupe mine, tests samples of ore. The mine, located south of Los Gatos, once was one of the largest in the state. Then it was almost abandoned, but now is undergoing a renaissance.

Part of the old reduction works at the New Almaden mine west of San Jose remind one of the crumbling buildings of the Mother Lode country. Actually these buildings were built previous to the 49er Gold Rush and antedate the Sierra's ghost towns by at least a score of years. Bars in windows were to keep people out—not prisoners in. For the valuable mercury ore was stored here.

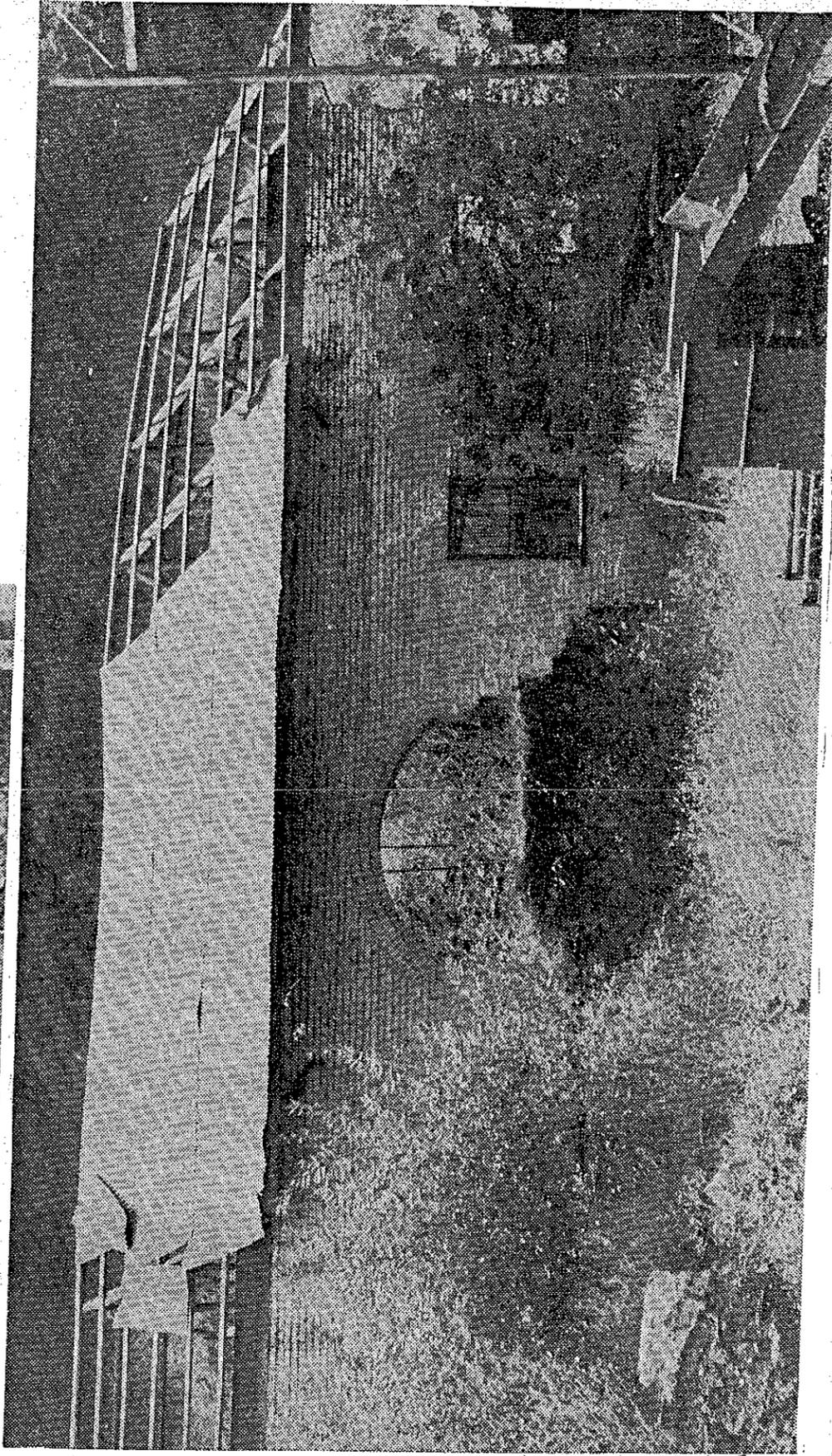


EXHIBIT S



Stantec

Stantec Consulting Corporation
15575 Los Gatos Boulevard Building C
Los Gatos CA 95032
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April 18, 2011

Ms. Carrie Austin
Project Manager
Regional Water Quality Control Board, San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Ms. Austin:

**Subject: Addendum to December 23, 2010 Technical Report;
Evaluation of Mining Waste Erodibility, Unnamed Prospect
Guadalupe Mines Road, Guadalupe Recycling and Disposal Facility
Santa Clara County**

**Reference: Archaeological Survey of an 100-Acre Southern Portion of 15999 Guadalupe Mines Road
Near San Jose, Santa Clara County, California, Holman & Associates, March 2011**

Introduction

Stantec Consulting Corporation (Stantec) has prepared this letter-report to present the results of a geologic evaluation of an unnamed mining prospect located along Guadalupe Mines Road, northwest of the historic Guadalupe Mine. The subject feature was identified as Locus 36 in the referenced cultural resources survey report by Holman & Associates and is beyond the boundaries of the study area investigated in Stantec's December 23, 2010 *Report on Erosion of Mercury Mining Waste*. The primary objective of this phase of work was to evaluate the surface distribution of residual mining waste at the identified mining feature and the potential for erosion of mining waste and transport to Guadalupe Creek. This information is intended to address comments received from the California Regional Water Quality Control Board, San Francisco Bay Region (Water Board) in a letter to Guadalupe Rubbish Disposal Company, Inc. (GRDC) dated February 23, 2011.

Mining Feature Location and Description

The former mining feature of interest is located on the east side of the original Guadalupe Mines Road, approximately 0.35 miles southwest of the entrance gate to the GRDC facility. At this location, the now blocked Guadalupe Mines Road has been divided into two one-way dirt roads which follow the eastern bank of Guadalupe Creek and lead upstream to the Guadalupe Mine site. Guadalupe Creek is located approximately 150 feet west of the mining feature.

The mining prospect at this location is not identified on the historic USGS topographic maps prepared between 1919 and 1980 and reviewed by Stantec. However, Stantec observed this feature during site visits conducted in 2009. Site photographs taken by Stantec are attached. Geologically, the former mining feature occurs within a large exposure of silica-carbonate rock situated at the western terminus of Capitancillos Ridge, the primary topographic feature associated with historic mercury mining in the New Almaden District. At this location, the ridge

has been truncated by Guadalupe Creek, exposing a near vertical outcrop of altered Franciscan Formation rock (Photo 1). Two adits, one completely blocked and the other partially open, are situated at the base of the outcrop (Photos 2 and 3). Located west of the adit portals, between the two one-way segments of Guadalupe Mines Road, is a vegetated waste pile associated with the underground workings (Photo 6).

Mining Waste Evaluation

The interior dimensions of the underground workings and the estimated volume of rock removed could not be determined. Observations made from the portal of the open adit indicate that the workings remain open for an undetermined distance into the hillside (Photos 4 and 5). The open workings observed were dry and no seeps or vegetation indicative of seepage were noted at the portals. The area located between the unpaved road and the base of the outcrop was vegetated with grass and chaparral.

The mining waste pile located downhill of the adits was characterized by stable slopes and was well vegetated with grasses. No erosion features, such as drainage gullies, or evidence of mass wasting, such as slumps or landsliding, was noted at the location of the former prospect. Stormwater drainage direction at this location would be westerly toward Guadalupe Creek, but no evidence of actual stormwater drainage from the former prospect towards the creek was observed. Potential stormwater runoff from the portal area of the adits would be intercepted by the northbound unpaved road segment, which would also serve to reduce or eliminate potential stormwater run-on to the vegetated waste pile below. Potential runoff from the waste pile would be intercepted by the lower, southbound unpaved road segment which passes between the waste pile and the banks of the creek.

Other Historic Cultural Features

In the referenced archaeological survey, Holman & Associates identified a large borrow pit, designated as Feature 43, located between the 2010 study area investigated by Stantec and the mining prospect described above. Field observations made by Stantec during site visits in 2009 suggested that the borrow pit was not associated with mercury mining. Stantec notes that this feature first appears on the USGS topographic maps as a 1973 photo-revision to the 1968 map edition, which supports Holman & Associates' conclusion that the feature was possibly related to asphalt operations rather than associated with historic mercury mining activities.

Summary and Conclusions

In summary, a former mining prospect not previously described is located on GRDC property to the northwest of the former Guadalupe Mine. The ground conditions at the location of the former mining prospect were observed to be stable and well vegetated. Exposure of disturbed geologic materials (mining waste) was limited to the immediate location of the adit portals. Based on the surface conditions observed at this location, the erosion potential and associated bioavailability of mercury mining waste at this feature are considered to be low.

Stantec

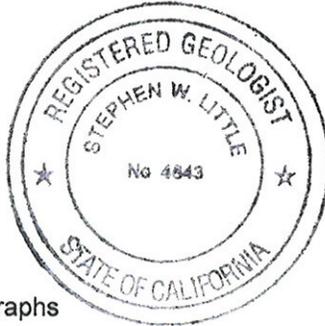
Ms. Carrie Austin
April 18, 2011
Page 3

It is hoped that this information will be of assistance. Please contact the undersigned should you wish to discuss these findings in greater detail.

Sincerely,

STANTEC CONSULTING CORPORATION

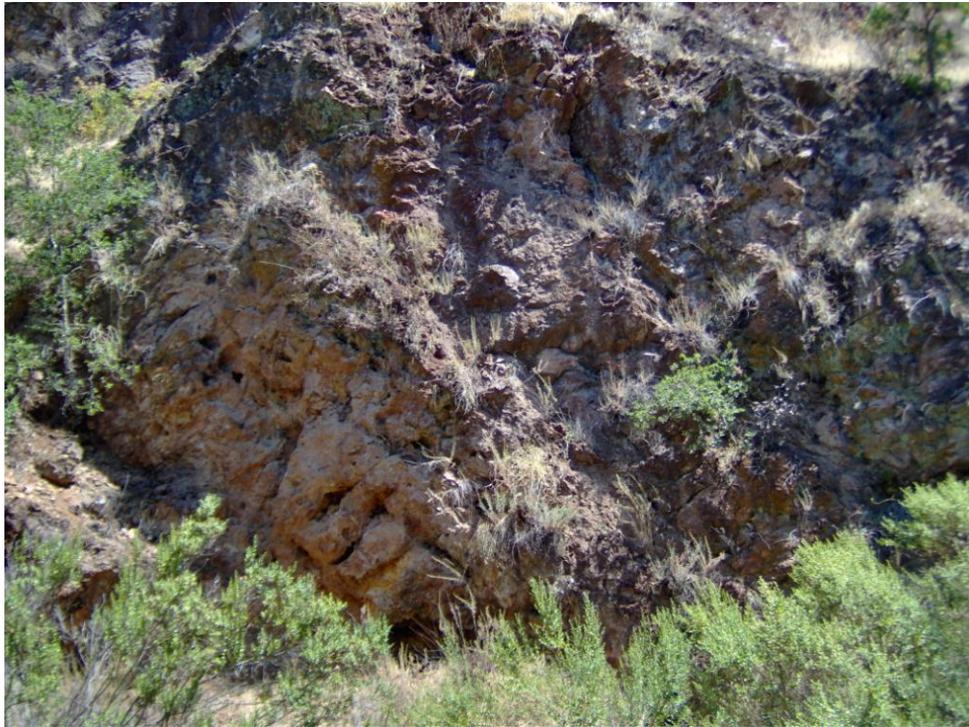

Steve Little, PG, CHG
Senior Geologist




Jack Hardin, REA
Managing Principal

Attachments: Site Photographs

ATTACHMENTS



1. Outcrop of silica carbonate rock along Guadalupe Mines Road with two adits.



2. Partially blocked portal to adit at base of outcrop.

Mining Waste Evaluation	Site Photographs	
Guadalupe Recycling and Disposal Facility Santa Jose, California	Western Terminus Capitancillos Ridge Guadalupe Mines Road	



3. Partially open adit at base of outcrop and minor dump material.



4. View from adit portal of the open mine workings.

Mining Waste Evaluation	Site Photographs	 Stantec
Guadalupe Recycling and Disposal Facility Santa Jose, California	Western Terminus Capitancillos Ridge Guadalupe Mines Road	



5. View farther inward of open adit showing timbers used for bracing.



6. View of mining waste dump from adits showing vegetation establishment.

Mining Waste Evaluation	Site Photographs	
Guadalupe Recycling and Disposal Facility Santa Jose, California	Western Terminus Capitancillos Ridge Guadalupe Mines Road	