

Jerry

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD

IN THE MATTER OF THE PETITION OF)
ROBERT AND MITZI SPEIRS AND E. AVERY)
TINDELL FOR REVIEW OF ORDERS)
NOS. 85-031 AND 85-032 OF THE)
CALIFORNIA REGIONAL WATER QUALITY)
CONTROL BOARD, CENTRAL VALLEY REGION)
NPDES NO. CA0081477)
OUR FILE NOS. A-375 and 375(a).)
_____)

ORDER NO. WQ 86-9

BY THE BOARD:

Petitioners Robert and Mitzi Speirs and E. Avery Tindell objected to the issuance of waste discharge requirements for the McLaughlin gold mining project at the junction of Napa, Lake, and Yolo Counties. Robert and Mitzi Speirs contend that the monitoring program is inadequate to detect enhanced concentrations of mercury in the Davis Creek drainage. E. Avery Tindell contends that the assurances of financial responsibility provided by Homestake are inadequate. Petitioners have asked the State Water Resources Control Board (State Board) to review the discharge requirements issued to Homestake by the California Regional Water Quality Control Board, Central Valley Region (Regional Board) and to amend the requirements to resolve the concerns expressed in the petitions. This Order concludes that the monitoring programs required for the McLaughlin mine are adequate, but that Orders Nos. 85-031 and 85-032 should be amended to require Homestake to submit all monitoring data related to water quality or aquatic life to the Regional Board. This Order also concludes that the financial responsibility provisions of Orders Nos. 85-031 and 85-032 are reasonable.

I. BACKGROUND

Homestake Mining Company of California (Homestake) is now operating a gold mine, called the McLaughlin Mine, at the junction of Napa, Lake, and Yolo Counties. The facility began producing gold in March 1985.

The open-pit mine lies along the Napa-Yolo County line and will ultimately be one mile long, one-half mile wide, and 400 feet deep. Higher grade ore-bearing rock is crushed, mixed with water, and ground adjacent to the mine in Napa County. The resulting slurry is transported by pipeline to the 35-acre mill site in Lake County, about four and one-half miles northwest of the mine. Gold is extracted from the slurry by a cyanide leaching process. Tailings (i.e., waste from the gold-extraction process) are discharged to the adjacent disposal facility in Lake County. The tailings are contained by a dam. Seepage is collected by a downstream sump and returned to the tailings disposal facility. Waste rock from the mine pit is transported to a 342-acre disposal site one mile south of the mine in Napa County. All mining activities which discharge to land are regulated by Order No. 85-032 of the Central Valley Regional Board.

Runoff from the waste rock disposal site, and other water which has come into contact with mine activities, is collected in sedimentation ponds. These ponds discharge into Hunting Creek and Knoxville Creek, both tributary to Putah Creek which flows into Lake Berryessa, and are regulated under a NPDES permit, Central Valley Regional Board Order No. 85-031.

The plant, tailings disposal facility, and waste rock disposal site are in the Hunting or Knoxville Creek watershed. The mine is approximately 80 percent in the Knoxville Creek watershed and 20 percent in the Davis Creek watershed. Runoff into and ground water from the mine drains

into the pit excavation where it is collected and used by Homestake for its operations. No runoff from the mine should enter the Davis Creek watershed.

Water for the mine is supplied from a reservoir on Davis Creek in Yolo County just north of the mine pit. The reservoir is the only facility constructed by Homestake in the Davis Creek watershed. Davis Creek flows into Cache Creek.

II. CONTENTIONS AND FINDINGS

1. Contentions of Robert and Mitzi Speirs

Petitioners Robert and Mitzi Speirs contend that the monitoring requirements in Order Nos. 85-031 and 85-032 will not detect increased pollution in the Knoxville, Hunting, and Davis Creek watersheds. Of particular concern to the petitioners is the potential for accumulation of mercury in the Davis Creek Reservoir. They contend that Homestake's mining and milling activities will generate mercury vapor and particulate matter containing mercury and other heavy metals and that these airborne pollutants will settle in nearby watersheds. They also contend that subsequent runoff will wash pollutants into creeks and Davis Creek Reservoir to the detriment of water quality. Specifically, the Speirs cite the lack of requirements regulating potential discharges to Davis Creek; the lack of sampling in Davis Creek during the summer (when the Creek is dry); reduced sampling during the mine's active life (compared to the sampling during the background-assessment period); and the lack of sediment sampling in Davis Creek Reservoir. They also contend that the Regional Board failed to consider the fact that organic conversion could generate methyl mercury, a more soluble and toxic form of mercury.

In addition, the Spiers note that the Davis Creek watershed drains areas which include the tailings dump of the Reid Mercury Mine. This mine is no longer operating, but it has been in intermittent operation for over 100 years. As a result of these concerns, petitioners are requesting that Orders Nos. 85-031 and 85-032 be amended to ensure that adequate monitoring of water, sediment, and fish flesh is conducted.

There are two fundamental questions raised by the petitioner.

1. Will Homestake's mining and milling activities cause an increase in the mercury load to nearby surface water bodies?
2. Will the present monitoring program detect a mercury pollution problem in a timely fashion?

Findings: In general, surface water quality in the vicinity of the mine is already poor. Surface water in the project area is unsuitable for drinking water supply. For example, during its background water sampling, Homestake has found mercury at a concentration of 10 parts per billion (ppb) in Knoxville Creek. Final Environmental Impact Report/Environmental Impact Statement, McLaughlin Gold Project, Napa County, CA, FEIR-048, FEIS-INT 83-30, (EIR). The Department of Health Services' (DHS) primary drinking water standard for mercury is 2 ppb^{1/}, and the EPA criteria for the protection of freshwater aquatic organisms and their uses are 0.012 ppb (four-day average) and 2.4 ppb (one-hour average). 50 Federal Register p. 30784, July 29, 1985.

^{1/} Primary drinking water standards are intended to protect human health from the effects of long-term exposure to pollutants.

The poor quality of surface water is due to naturally occurring mineralized soils found in the area. It should be noted that the McLaughlin gold mine is established in a region which has been the site of several mercury mines during the past 100 years. Tests of soil and overbearing rock have indicated that mercury is a consistent component. This point is illustrated by the fact that the overburden at the McLaughlin mine is estimated to contain 20 to 30 parts per million (ppm) of mercury (EIR, p. 4-21e). Also, the mine tailings may contain as much as 38 ppm of mercury (EIR, p. 2-17). The total threshold limit concentration (TTLIC) for mercury is 20 ppm. Wastes which contain mercury at concentrations in excess of the TTLIC are classified as hazardous by DHS regulations (22 CAC 66699).

The gold mining process will release two forms of mercury into the atmosphere. Mining and associated operations including ore processing generates approximately 2,000 pounds per day of airborne particulates containing mercury salts predominately in the +1 or +2 valence state. Also, ore processing releases approximately 1.5 pounds per day of gaseous mercury in the zero valence state. The effect of both of these sources on the surrounding area can be estimated and was considered by the Regional Board.

The McLaughlin Mine Environmental Impact Report states that most of the particulate deposition will occur in the immediate vicinity of the mine, but it can be conservatively assumed that there is complete and uniform deposition within a four-mile radius of the mine. (EIR, p. 4-21i). If it is further assumed that the particulate matter contains 25 ppm of mercury (an average value for particulate matter from the overburden), then the

particulate mercury emission is 18.25 pounds of mercury per year and the annual deposition rate is 64 micrograms per square meter. Considering the naturally occurring mercury loads in the area, this addition is negligible.

The second mercury source, 1.5 pounds per day of mercury vapor, is subject to the dispersal mechanisms of gases and should pose no significant water quality risk. This assessment is verified by a study which calculated the residence time of gaseous mercury in the atmosphere to be 5.7 years. M. Katsumiko, G. Takumi, "Mercury in the Air and Precipitation", Geochemical Journal, Volume 10, p. 107, 1976. Although not directly related to this petition or the gold mining process, it is of interest to compare anticipated mercury vapor emission from the McLaughlin mine with federal standards and rules. An EPA standard for mercury from mercury ore processing has been adopted as part of the National Emission Standards for Hazardous Air Pollutants (40 Code of Federal Regulations 61). This standard is approximately 5 pounds per day. In addition, Homestake has used the estimated mercury emission rate in an air quality model to predict air quality impacts. The maximum 24-hour average impact was calculated to be 0.16 micrograms per cubic meter. However, federal Prevention of Significant Deterioration rules exempt significant mercury sources from monitoring requirements if the predicted 24-hour impact is less than 0.25 micrograms per cubic meter.

On the basis of the above analysis, which reflects the best professional judgement of our technical staff, gaseous and airborne particulate mercury generated by the McLaughlin mine is not likely to pose a significant threat to water quality in the nearby watersheds.

There are two other discrete, identifiable sources of possible surface water mercury pollution in the vicinity of the McLaughlin mine: runoff to Hunting Creek from the waste rock disposal facility and runoff to Davis Creek from the Reid Mercury Mine tailings pile. Discharge from the waste rock disposal facility is regulated by Order No. 85-031. The effluent limitations for mercury are 1 ppb and 2 ppb for the 30-day average and daily maximum, respectively. These limitations are reasonable inasmuch as they are based on primary drinking water standards (2ppb) even though waters affected by the discharge from Homestake's waste rock facility are not suitable for use as drinking water. This is due, in part, to high natural concentrations of mercury (e.g., as high as 10 ppb in Knoxville Creek). The Regional Board did not consider runoff mercury from the Reid Mercury Mine to be a significant mercury source because of the low level of mercury (1-2 mg/kg) in sediment below the mine and the fact that this sediment will contribute only a fraction of the sediment entering Davis Creek Reservoir. W. H. Crooks, Central Valley Regional Board Memorandum dated July 31, 1985. This assessment is reasonable. Consequently, it can be concluded that neither of these sources poses a demonstrable threat to water quality.

While it has been concluded that no significant mercury pollution is threatened by Homestake's operations, it is necessary to implement an adequate monitoring program to verify this assessment.

Presently required chemical monitoring at surface water stations is extensive. Fourteen water quality monitoring stations have been established on Hunting, Putah, Knoxville, Davis, and Cache Creeks. Homestake must gather over 2,500 water quality data points per month prior to the beginning of operations, 300 data points during each day of surface discharge, and

1,250 data points each quarter during actual operations. A review of the sampling sites and frequencies is presented in Attachment 1.

The petitioners do not contest the adequacy of the surface water chemical monitoring. Their primary concern deals with the adequacy of the aquatic life monitoring program to detect mercury pollution in aquatic communities and sediment.

Mercury is a serious pollutant in the aquatic environment. Elemental mercury can be oxidized in sediment to divalent mercury, and both aerobic and anaerobic bacteria are capable of converting divalent mercury to methyl mercury in sediments. This methylated form is more water soluble and biologically active than elemental and divalent inorganic mercury. "Ambient Water Quality Criteria for Mercury", EPA 440/5-80-058, October, 1980. Once methylation takes place, uptake by aquatic life is extremely rapid and a bioconcentration factor (BCF) in excess of 80,000 has been recorded for some species. This extremely high BCF is largely the basis for the EPA recommendation that, if the four-day average concentration of mercury exceeds 0.012 ppb more than once in a three-year period, the edible portion of consumable species should be analyzed to determine whether the concentration of methylmercury in the tissue of edible aquatic organisms exceeds the Federal Drug Administration's action level of 1 ppm (50 Federal Register 30784, July 19, 1985).

Homestake and the Regional Board contend that mercury should not be a serious pollutant in this region because the predominate form, cinnabar (HgS), is inaccessible to methylation and is not soluble in water. While there is some evidence that cinnabar is not readily methylated, this point has not been proven. Therefore, because Homestake's mercury effluent limit of

0.2 ppb is higher than the EPA criterion, Homestake is required to supplement its chemical monitoring program with a monitoring program that includes samples of aquatic organisms. Also, it should be noted that aquatic-life-monitoring is desirable because organisms may respond to a disturbance which is not measured by chemical monitoring, accumulate pollutants from transient pulses over time, or respond to synergistic effects of multiple pollutants at concentrations below the recognized criteria or effluent limits.

During the first year of monitoring (intended to establish baseline data on background conditions), detailed sampling at six stations on Hunting Creek and one station on Knoxville Creek will be conducted. Benthic macroinvertebrate and fish samples will be analyzed for species composition, diversity, and abundance. In addition, fish will be sampled for concentrations of seven heavy metals: arsenic, chromium, copper, lead, mercury, nickel, and zinc. During subsequent years, only the two stations farthest downstream will be sampled, and fish will be analyzed for mercury concentrations only. This downstream aquatic-life-monitoring is a most efficient means of detecting cumulative impacts from upstream releases. We find this aquatic life monitoring program to be reasonable and adequate.

The petitioners' primary concern is the potential pollution of Davis Creek and Davis Creek Reservoir. Order No. 85-032 requires Homestake to sample and analyze not only water, but also sediment and fish flesh for mercury and other pollutants immediately upstream and downstream of the reservoir. In addition, Homestake's permit from Yolo County requires Dr. Charles Goldman, a limnologist at the University of California at Davis to carry out a research project, funded by Homestake, that includes analysis of aquatic life, sediment, and water in Davis Creek Reservoir and its watershed.

This work will include tissue analysis of fish, zooplankton, and benthic macroinvertebrates. Dr. Goldman's research will produce recommendations for a long-range monitoring program in the reservoir by late 1986.

Monitoring pursuant to the Goldman research contract has become a condition of Homestake's permit for diversion and use of water. Paragraph 23 of State Board Water Right Permit 19199 provides that the permittee shall comply with all monitoring required by the three counties and shall provide the results of all monitoring to the Regional Board upon request.

To conclude, we find the monitoring programs required in Orders Nos. 85-031 and 85-032, and in Water Right Permit No. 19199, are sufficient to detect any adverse consequences to water quality or beneficial uses attributable to discharges of mercury from the McLaughlin mine. Additional monitoring would be redundant. However, all monitoring data should be submitted to the Regional Board.

Although not requested by the petitioner, Homestake's waste disposal facilities were examined on our own motion in order to ascertain whether they met the State Board's regulations governing discharges of waste to land (23 California Administrative Code 2500-2601, "Subchapter 15"). This review indicated that Homestake is in compliance with all applicable provisions of Subchapter 15.

2. Contentions of E. Avery Tindell

Petitioner E. Avery Tindell contends that the financial assurances agreement approved by Homestake, the Regional Board, the Bureau of Land Management (BLM), and the counties of Lake, Napa, and Yolo is not adequate and limits Homestake's liability for cleaning up or abating pollution that may occur as a result of mining or milling operations at the McLaughlin Mine.

This agreement was a condition of Homestake's waste discharge requirement. Pursuant to the agreement, each year Homestake must provide an irrevocable letter of credit in an amount equal to the cost of reclamation of the entire McLaughlin project, assuming reclamation were to be undertaken in the same year. For example, the amount for 1986 is approximately \$5.25 million and for 1999, the year with the highest amount, it is \$8.45 million. Commencing in 1986, the amounts will be adjusted for inflation by use of the Gross National Product Implicit Deflator Index.

Under the agreement, the Regional Board has the unilateral right to draw upon \$3 million, as adjusted for inflation, from the letter of credit for cleanup and abatement. In addition, the Central Valley Regional Board may draw additional amounts in the reclamation fund with the consent of the counties and BLM. Homestake must replace any funds withdrawn within 30 days. However, any money used by the Regional Board for unilateral cleanup and abatement will no longer be available to the Regional Board on a unilateral basis (i.e., in any subsequent situation, this amount would be subtracted from the \$3 million).

The petitioner contends that a cumulative limit for cleanup and abatement work, as described above, is not in the public interest. Petitioner requests that the cumulative limit be deleted and any references to a limitation of Homestake's liability be eliminated. Instead, petitioner proposes that any money spent by the Regional Board, and replaced by Homestake, should still be unilaterally available to the Regional Board for

cleanup or abatement of future problems. Other funding strategies would be acceptable to petitioner as long as the cumulative limit on amounts available to the Regional Board is eliminated.

Findings: In Resolution No. 85-003, the Regional Board requested justification that a cumulative total of \$3 million, adjusted for inflation over the life of the project, would be adequate to provide for potential cleanup. The report submitted by Homestake in November 1984 outlined estimated costs of cleaning up seepage or spills from the tailings impoundment. The most expensive cleanup estimate assumes a failure of the tailings dam and release of approximately 250,000 cubic yards of tailings and 385 acre-feet of tailings water. This water volume represents the average amount that will be stored in the impoundment. Homestake estimates that the cost of undertaking a cleanup program under these circumstances is approximately \$1.5 million.

The petitioner does not dispute the accuracy of the cost estimates contained in the justification submitted by Homestake. Rather, petitioner contends that there are other possible spills, not considered by Homestake, whose cleanup would exhaust the \$3 million unilaterally available to the Regional Board. Extensive, initially undetected seepage to ground water or recurring spills could require cumulative expenditures in excess of \$3 million over the lifetime of the McLaughlin project. This possibility is unlikely. Furthermore, Homestake's letter of credit provides an additional \$5.45 million for reclamation which could be used by the Regional Board for cleanup or abatement with the consent of the counties and BLM. By the terms of the agreement Homestake is required to replace any amount spent within 30 days. Under these circumstances, the full amount needed for project reclamation

would be available for further withdrawal within 30 days of any governmental cleanup or abatement action. Such financial assurances appear to provide adequate funds to clean up reasonably foreseeable events.

Regardless of whether the agreement provides adequate funds for all potential cleanup costs, the agreement does not, as asserted by the petitioner, limit Homestake's liability in the event of a release affecting water quality. The agreement does not waive the remedies available to the Regional Board with respect to cleanup and abatement. Lastly, it should be noted that Homestake has stated that it intends to reclaim the McLaughlin project site and carry out any required cleanup without drawing upon the funds set aside by the agreement. The agreement was established to provide additional assurance that funds would be available if Homestake fails to undertake cleanup or abatement action pursuant to orders of the Regional Board.

III. CONCLUSIONS

1. The monitoring programs required for Homestake's, McLaughlin Mine are adequate to detect any adverse consequences to water quality, including impairment of beneficial uses, as a result of discharges of mercury and other metallic pollutants from Homestake's McLaughlin mine. The monitoring programs include adequate provision for sampling fish to detect bioaccumulation of mercury which might go undetected in water samples. Orders Nos. 85-031 and 85-032 of the Regional Board should require Homestake to submit all monitoring data relating to water quality or aquatic life to the Regional Board.

2. The Agreement whereby Homestake will provide an irrevocable letter of credit for the full amount of anticipated reclamation costs, as adjusted for inflation, and to replace any funds withdrawn, constitutes a reasonable form of assurance that Homestake will be financially responsible for reclamation or cleanup activities at the McLaughlin mine, regardless of developments which might affect Homestake's willingness or ability to undertake necessary actions. The Regional Board's ability to withdraw up to \$3 million (as adjusted for inflation) unilaterally, and to withdraw up to the entire amount of Homestake's irrevocable letter of credit with the concurrence of the other responsible agencies, ensures that the Regional Board should not need to expend government funds to cleanup or abate any pollution that might result from the McLaughlin mine.

IV. ORDER

IT IS HEREBY ORDERED THAT Orders Nos. 85-031 and 85-032 of the California Regional Water Quality Control Board, Central Valley Region be amended as follows:

1. Add the following paragraph to the "Reporting" provisions on page 4 of Monitoring and Reporting Program No. 85-031 immediately before the paragraph beginning "The Discharger shall implement...."

"If any additional monitoring activities are required as a condition of, or performed in conjunction with, any permit for Homestake's McLaughlin Mine in Hunting or Knoxville Creeks, or area, tributary to Hunting or Knoxville Creeks, including sediment sampling or "aquatic life" sampling, the results of such additional monitoring shall be submitted to the Board at the same time that the results are submitted to the agencies or entities which require such monitoring."

2. Add the following paragraph to the "Reporting" provisions on page 13 of Monitoring and Reporting Program No. 85-032 immediately before the paragraph beginning "The Discharger shall implement...."

"If any additional monitoring activities are required as a condition of, or performed in conjunction with, any permit for Homestake's McLaughlin Mine including sediment sampling or "aquatic life" sampling, the results of such additional monitoring shall be submitted to the Board at the same time that the results are submitted to the agencies or entities which require such monitoring."

CERTIFICATION

The undersigned, Executive Director of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 22, 1986.

Aye: W. Don Maughan
E. H. Finster
Danny Walsh

No: Darlene E. Ruiz

Absent: None

Abstain: Eliseo M. Samaniego



Raymond Walsh
Interim Executive Director

ENVIRONMENTAL MONITORING PLAN
SURFACE WATER MONITORING STATIONS AND
SAMPLING FREQUENCY

MONITORING STATION ⁽¹⁾	SAMPLING FREQUENCY ⁽²⁾		
	PRE-OPERATIONAL	OPERATIONAL	
		INITIAL THREE MONTHS	AFTER INITIAL THREE MONTHS
HUNTING CREEK			
HC-2	M	NA	NA
HC-5	M, SED	BW AND D (W-1)	M and D (W-1)
HC-7	M, SED	D (T-1)	D (T-1)
HC-9	M, SED	BW	M
HC-10 ⁽³⁾	M, SED	BW and D (W-1), SED	M and D (W-1), SED
HC-11	M	BW and D (T-1)	M and D (T-1)
HC-12	M	BW	M
HC-13	M	NA	NA
PUTAH CREEK			
PC-1	M	Q	Q
PC-2	M	Q	Q
KNOXVILLE CREEK			
KC-3	M, SED	BW and D (W-1), SED	M and D (W-1), SED
KC-6	M	NA	NA
KC-7	M	NA	NA
DAVIS CREEK			
DC-4	M	Q	Q
DC-5	M, SED	Q, SED	Q, SED
DC-6	M, SED	M, SED	M, SED
DAVIS CREEK RESERVOIR	NA	L	L
CACHE CREEK			
CC-1	M	Q	Q
CC-2	M	Q	Q
SODA CREEK			
SC-1	M	NA	NA
SC-2 ⁽⁴⁾	W	NA	NA
SC-3 ⁽⁴⁾	W	NA	NA
SEDIMENT POND AND DISCHARGE			
W-1	M, D	M, D	M, D
T-1	M, D	M, D	M, D
W-1A (Pond 7)	M, D	M, D	M, D
W-1B (Pond 1)	M, D	M, D	M, D
DISCHARGE TO⁽⁵⁾ TAILINGS POND	NA	M	M

(1) Refer to Figure 1 for monitoring station locations.

(2) Surface water sampling frequency:

W = Weekly

BW = Biweekly (every two weeks)

M = Monthly

L = Eight samples per year; monthly May through October, December, March

SED = Stream sediment sample collected semi-annually

Q = Quarterly (every three months)

D (W-1) = When sediment pond (pond number) is discharging, sample daily for period of discharge. Pond contents sampled monthly whether or not ponds are discharging.

NA = Not applicable/Not analyzed.

(3) During operations HC-10 is sampled continuously for free cyanide, specific conductivity, sodium, turbidity, temperature and pH and sampled quarterly for chrysotile asbestos.

(4) Sampled only before and during road construction.

(5) See Table 2.C.