

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2003-0001

NPDES NO. CA0084905

WASTE DISCHARGE REQUIREMENTS
FOR
U.S. BUREAU OF RECLAMATION
SLIGER MINE
EL DORADO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds that:

1. The U.S. Bureau of Reclamation (hereafter Discharger) submitted a Report of Waste Discharge, dated 24 August 1999, and applied for a permit to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the Sliger Mine.
2. The Discharger owns the Sliger Mine. The mine is in Sections 35 and 36, T13N, R9E, MDB&M, at Latitude 38°56'27.58'' N and Longitude 120°55'57.97'' W, as shown on Attachment 1, which is part of this Order. Wastewater is continuously discharged from a mine portal to the Middle Fork of the American River, a water of the United States.
3. The Sliger Mine is located in the El Dorado County, approximately nine miles northeast of the intersection of Interstate 80 and State Route 49 and six miles northeast of the City of Cool. The mine is on steep banks above the Middle Fork of the American River. The mine was acquired by the U.S. Bureau of Reclamation as part of the land for the proposed Auburn dam site.

The Sliger Mine was founded in 1864. In the 1870s, the ore was crushed in a five-stamp mill. During the early work at the mine, a 300-foot shaft produced approximately \$250,000 worth of gold. The milling process consisted of two-stage crushing, flotation, and gravity concentration. The table tailing was sent to a conditioner and treated by flotation. The mine was closed for a period and was inactive until 1922, when the Sliger Gold Mining Company took over the operation. During this time, the shaft was deepened to approximately 2,000 feet and a 15-stamp mill was added. In 1934, the Middle Fork Gold Mining Company took over operation of the mine. In 1937, the Mountain Copper Company leased the mine and did some exploration. From 1938 until 1942, when the mine became finally inactive, the mine was operated by the Middle Fork Gold Mining Company. From 1932 through 1942, 309,000 tons of ore were mined from which \$2,625,000 of gold was recovered. By 1953, most of the surface equipment had been sold.

The ore zone consists of numerous quartz veinlets averaging 30 feet in width with 40% free gold as pure as 92.5% fineness. The quality of gold did not change from the 300-foot level down to the bottom of the 2,000-foot shaft to which the mine was ultimately developed.

The ore was mined in open stopes that were refilled with mine tailings. The inactive mine contains an adit that used to function as a ventilation shaft. The remaining portion of the old stamp mill is located approximately two miles from the adit. Mine tailings were observed trailing down from the old stamp mill site along the steep terrain, which leads to the Middle Fork of the American River. The terrain is steep and covered in heavy vegetation.

The Sliger mine is at a fault contact with black slate on the footwall and ankerite and serpentine, followed by a gabbro dike on the hanging wall, all enclosed in amphibolite schist. The principle ore body was on the footwall side and is highly silicified, with some carbonates, and is thickly impregnated with fine disseminated crystals of sulfite, mostly pyrite. Ore in the mine is grouped into two categories: black slate or schist ore and gray schist ore. Most of the gold is in the sulfides that make up 3.7 % of the ore.

4. The Report of Waste Discharge and additional samplings describe the portal discharge as follows:

<u>Constituents</u>	<u>Concentration</u>
Flow	0.10 cubic feet per second (cfs, 0.0646 mgd)
Temperature (summer)	58.64°F (14.8°C)
Arsenic (Total)	67 µg/l
Copper (Total)	2 µg/l
Iron (Total)	260 µg/l
Nickel (Total)	6.0 µg/l
Mercury (Total)	0.01 µg/l
Manganese (Total)	31,000 µg/l
Molybdenum (Total)	2.6 µg/l
Barium (Total)	75 µg/l
Chromium (Total)	2.0 µg/l
Hardness (as CaCO ₃)	122 mg/l
pH	7.66 (pH units)
Electrical conductivity (EC)	482 µmhos/cm

5. The U.S. Environmental Protection Agency (EPA) and the Regional Board have classified this discharge as a minor discharge.

6. The Regional Board adopted a *Water Quality Control Plan for the California Water Quality Control Board, Central Valley Region, the Sacramento River Basin and the San Joaquin River Basin, Fourth Edition* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.
7. U.S. EPA adopted the *National Toxics Rule* on 5 February 1993 and the *California Toxics Rule* on 18 May 2000. These Rules contain water quality standards applicable to this discharge. The State Water Resources Control Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan or SIP), which contains guidance on implementation of the *National Toxics Rule* and the *California Toxics Rule*.
8. The Basin Plan on page IV-24.00 prohibits the direct discharge of municipal and industrial wastes into the American River from Folsom Dam to mouth of Sacramento River, including Lake Natoma. The mine discharge enters the Middle Fork of the American River, which is upstream from the prohibited discharge area.
9. This Order regulates the discharge of liquid wastes from the portal discharge only. The Discharger has other regulatory requirements for stormwater and solid wastes, which must be covered under waste discharge requirements. Mines are industrial facilities as defined under the Federal Stormwater Regulations, 40 CFR Parts 122, 123 and 124. The mine site has a significant amount of tailings exposed to stormwater flows. The State Water Resources Control Board has adopted General Waste Discharge Requirements for industrial stormwater activities. The direct discharge of storm water from the mine site to surface waters is prohibited, except as allowed by the General Permit for Discharges of Storm Water associated with Industrial Activities, or an equivalent NPDES permit.

California Code of Regulations (CCR), Title 27, Chapter 7, Subchapter 1, requires that Dischargers submit a Report of Waste Discharge (RWD) to the Regional Board for mine sites for control of the solid waste material. This Order requires the Discharger submit RWDs in accordance with State and Federal Regulations.

BENEFICIAL USES OF THE RECEIVING STREAM

10. The Basin Plan states, on page II-1.00, “Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning” and “...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses.” The existing and potential beneficial uses that currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1 of the Basin Plan. The beneficial uses of the American River, downstream of the discharge, as identified in Table II-1 of the Basin Plan, are municipal and domestic supply,

agricultural irrigation, agricultural stock watering, hydro power generation, body contact water recreation, canoeing and rafting, other non-body contact water recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, cold spawning habitat, and wildlife habitat. Additional beneficial uses listed on pages II-1.00 and II-2.00 that apply to the American River are groundwater recharge and freshwater replenishment.

11. The beneficial uses of the underlying ground water are municipal and domestic, industrial service, industrial process, and agricultural supply.
12. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on existing water quality will be insignificant.

EFFLUENTS LIMITATIONS AND REASONABLE POTENTIAL

13. Effluent limitations, and toxic effluent standards established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 304 (Information and Guidelines), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.
14. The Code of Federal Regulations, 40 CFR 122.44 (d)(1)(iii), states: “...a discharge causes, has a reasonable potential to cause, or contribute to an in-stream excursion above allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant.” The Basin Plan requires, on page III-3.0: “At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of maximum contaminant levels (MCLs) specified in... Title 22 of the California Code of Regulations, which are incorporated by reference into this plan...” Municipal and domestic water supply is designated as beneficial use of the American River, which contains discharges from the Sliger Mine. Based on information submitted as part of the application and in studies, the Regional Board finds that the discharge does have a reasonable potential to cause or contribute to an in-stream excursions above water quality standards for the following constituents:

a) Arsenic

The Report of Waste Discharge for the Sliger Mine indicates the discharge contains an arsenic concentration of 0.067 mg/l. Using the flow of 0.1 cfs (0.0646 mgd) provided by the Discharger in the Report of Waste Discharge and the concentration of 0.067 mg/l, the approximate mass of arsenic discharged daily is 0.0362 lbs/day.

Arsenic is a toxic substance that is known to cause adverse human health effects. Exposure to arsenic at high levels poses serious health effects, as it is a known human carcinogen. Studies have shown that prolonged arsenic exposure significantly increases the risk of contracting various forms of cancer. In addition, it has been reported to affect the vascular system in humans and has been associated with the development of diabetes.

On 31 October 2001, U.S. EPA adopted a new drinking water standard for arsenic. The new Primary Maximum Contaminant Level (MCL) for arsenic is 10 µg/l. The current U.S.EPA National Recommended Ambient Water Quality Criteria to protect freshwater aquatic life are 150 µg/l as a four-day average and 340 µg/l as a one-hour average. The drinking water standards and human health criteria for arsenic are lower than the aquatic life criteria. Therefore, to protect the municipal and domestic beneficial uses, the drinking water standards or human health criteria shall be used to establish effluent limitations.

While it is possible that there is hydraulic assimilative capacity for the discharge, there is no information for regarding available dilution for arsenic. Therefore, it must be assumed that no dilution exists, and the effluent limitation for arsenic in this Order will be established as an end-of-pipe limitation at the MCL.

This Order contains a concentration-based Effluent Limitation of 10 µg/l as a Monthly Average. In addition, the proposed Order contains a mass-based Effluent Limitation of 0.00539 lbs/day, calculated using the average flow of 0.1 cfs (or 0.0646 mgd).

b) Iron

The maximum detected concentration of iron in the discharge from the mine is 0.26 mg/l. Using the reasonable potential analysis recommended in the TSD, the projected Maximum Effluent Concentration (MEC) of iron is 1.09 mg/l. The current secondary MCL for iron is 0.3 mg/l. The U.S. EPA National Recommended Ambient Water Quality Criteria for the protection of human health and welfare based on the taste and odor or welfare is 0.3 mg/l. The Agricultural Water Quality Goal for iron is 5.0 mg/l.

The projected MEC of iron exceeds the secondary MCL and the Ambient Water Quality Criterion. To protect the municipal and domestic beneficial use, this Order includes a concentration-based Effluent Limitation for iron based on the secondary MCL of 0.3 mg/l. In addition, this Order contains a mass-based Effluent Limitation of 0.162 lbs/day, calculated using the average flow of 0.1 cfs (0.0646 mgd).

c) Manganese

The maximum detected concentration of manganese in the discharge from the mine is 0.031 mg/l. Using the reasonable potential analysis recommended in the TSD, the projected MEC of manganese is 0.12 mg/l. U.S.EPA established the secondary MCL of 0.05 mg/l for manganese. The U.S. EPA's Integrated Risk Information System (IRIS) includes a reference dose of 0.33 mg/l as a drinking water level for manganese. The Agricultural Water Quality Goal for manganese is 0.2 mg/l. U.S. EPA established the Ambient Water Quality Criteria for the protection of human health and welfare for manganese. The non-cancer health effects criterion for waters that are not sources of drinking water, but from which aquatic organisms may be consumed is 0.1 mg/l. The criterion for taste and odors or welfare is 0.05 mg/l.

The projected MEC of manganese exceeds the secondary MCL and the criterion for taste and odors or welfare. To protect the municipal and domestic beneficial use, this Order includes a concentration-based Effluent Limitation for manganese based on the secondary MCL of 0.05 mg/l. In addition, this Order contains a mass-based Effluent Limitation of 0.0269 lbs/day, calculated using the average flow of 0.1 cfs (0.0646 mgd).

d) Boron

Using the reasonable analysis, the projected MEC of boron is 0.84 mg/l. U.S. EPA's Integrated Risk Information System (IRIS) toxicological database includes a reference dose as a drinking water level of 0.63 mg/l for boron. The Agricultural Water Quality Goal for boron is 0.7 mg/l. The recommended lowest observed toxicity effect level for boron is 1.0 mg/l. U.S.EPA recommends no-adverse-response levels (SNARLs) for toxicity other than cancer risk of 0.6 mg/l for boron.

The projected MEC of boron exceeds the Agricultural Water Quality Goal. Agricultural irrigation is designated as a beneficial use of the receiving stream. Therefore, to protect the agricultural beneficial use, this Order includes a quarterly average concentration-based Effluent Limitation of 0.7 mg/l for boron. In addition, this Order contains a quarterly average mass-based Effluent Limitation of 0.38 lbs/day, calculated using the average flow of 0.1 cfs (0.0646 mgd), provided by the Discharger in the Report of Waste Discharge, and the Agricultural Water Quality Goal of 0.7 mg/l.

GENERAL INFORMATION

15. Monitoring is required by this Order for the purpose of assessing compliance with permit limitations and water quality objectives and gathering information to evaluate the need for additional limitations.

16. The Regional Board has considered the information in the attached Fact Sheet in developing the findings of this Order. Monitoring and Reporting Program No. R5-2003-0001, Attachments 1, and the Fact Sheet are part of this Order.
17. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000, et seq.), requiring preparation of an environmental impact report or negative declaration in accordance with Section 13389 of the California Water Code.
18. The Regional Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
19. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.
20. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect upon the date of hearing, provided EPA has no objections.

IT IS HEREBY ORDERED that U.S. Bureau of Reclamation, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of mine drainage at a location or in a manner different from that described in the Findings is prohibited.
2. The discharge shall not create a nuisance as defined in Section 13050 of the California Water Code.
3. The direct discharge of storm water, from the mine site, to surface waters is prohibited, except as allowed by the General Permit for Discharges of Storm Water associated with Industrial Activities.
4. The discharge or storage of waste classified as “hazardous” or “designated”, as defined in Section 2521(a) and 2522(a) of Title 27, is prohibited.

B. Effluent Limitations:

1. Effluent shall not exceed the following limits:

<u>Constituents</u>	<u>Units</u>	<u>Average Monthly</u>
Arsenic	mg/l	0.01
	lbs/day ¹	0.00539
Iron	mg/l	0.3
	lbs/day ¹	0.162
Manganese	mg/l	0.05
	lbs/day ¹	0.0269
Boron	mg/l	0.7
	lbs/day ¹	0.38

¹ Mass based effluent limitations are estimated based upon an average flow rate of 0.0646 mgd (64,600 gallons/day)

2. The discharge shall not have a pH less than 6.5 nor greater than 8.5.
3. Survival of aquatic organisms in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassay -----70%
Median for any three or more consecutive bioassays ---- 90%

C. Receiving Water Limitations:

Receiving Water Limitations are based upon water quality objectives contained in the Basin Plan. As such, they are a required part of this permit.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 7.0 mg/l. The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of saturation in the main water mass, and the 95th percentile concentration shall not fall below 75 percent of saturation in the main water mass.
2. Oils, greases, waxes, sediments, fine sediments, or other materials to form a visible film or coating on the water surface or on the stream bottom.
3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

4. Esthetically undesirable discoloration.
5. Fungi, slimes, or other objectionable growths.
6. The turbidity to increase as follows:
 - a. More than 1 Nephelometric Turbidity Units (NTUs) where natural turbidity is between 0 and 5 NTUs.
 - b. More than 20 percent where natural turbidity is between 5 and 50 NTUs.
 - c. More than 10 NTUs where natural turbidity is between 50 and 100 NTUs.
 - d. More than 10 percent where natural turbidity is greater than 100 NTUs.
7. The ambient pH to fall below 6.5, exceed 8.5, or change by more than 0.5 units.
8. The ambient temperature to increase more than 5°F.
9. Deposition of material that causes nuisance or adversely affects beneficial uses.
10. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.
11. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.
12. Violation of any applicable water quality standard for receiving waters adopted by the Regional Board or the State Water Resources Control Board pursuant to the CWA and regulations adopted thereunder.
13. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.

D. Groundwater Limitations:

1. The discharge from the mine shall not cause the underlying groundwater to be degraded.

E. Provisions:

1. The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger initiate a Toxicity Identification Evaluation (TIE) to identify the causes of toxicity. Upon completion of the TIE, the Discharger shall submit a workplan to conduct a Toxicity Reduction Evaluation (TRE) and, after Board evaluation, conduct the TRE. This Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if a new chronic toxicity water quality objective is adopted by the State Water Resources Control Board, this Order may be reopened and a limitation based on that objective included.
2. There are indications that the discharges from the mine may contain mercury and molybdenum that may have a potential to cause or contribute to an exceedance of a water quality standard. The Discharger shall comply with the following time schedule in conducting a study of quarterly monitoring of the discharge and the potential effects of these constituents in the receiving water:

<u>Task</u>	<u>Compliance Date</u>
Begin Study	1 March 2003
Complete Sampling	1 January 2004
Submit Study Report	1 March 2004

On or before each compliance date, the Discharger shall submit to the Regional Board the specified document or a written report detailing compliance or noncompliance with the specific date and task. If noncompliance is reported, the Discharger shall state the reasons for noncompliance and include an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Regional Board by letter when it returns to compliance with the time schedule.

If, after review of the study results, it is determined that the discharge has a reasonable potential to cause or contribute to an exceedance of a quality standard, this Order will be reopened and effluent limitations will be added for the subject constituents. If a new water quality objective for the subject constituents is adopted, this Order will be reopened and effluent limitations for these constituents will be modified or added.

3. The Discharger shall apply for a General Waste Discharge Requirements Permit for industrial stormwater activities from the State Water Resources Control Board regarding the discharges of mine tailings to the stormwater within six months of adoption of this Order.

4. A Report of Waste Discharge shall be submitted to the Regional Board regarding the discharges of solid waste materials associated with the mine in accordance with California Code of Regulations (CCR), Title 27, Chapter 7, Sub-chapter 1 within six months of adoption of this Order.
5. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are parts of this Order. This attachment and its individual paragraphs are referred to as "Standard Provisions."
6. The Discharger shall comply with Monitoring and Reporting Program No. R5-2003-0001, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.
7. When requested by U.S.EPA, the Discharger shall complete and submit Discharge Monitoring Reports. The submittal date shall be no later than the submittal date specified in the Monitoring and Reporting Program for Discharger Self Monitoring Reports.
8. This Order expires on **30 January 2008** and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 180 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.
9. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of, or clearance from the State Water Resources Control Board (Division of Water Rights).
10. In the event of any changes in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.

To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, address and telephone number of the persons responsible for contact with the Regional Board and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

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SLIGER MINE
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I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 30 January 2003.

THOMAS R. PINKOS, Executive Officer

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO.R5-2003-0001

NPDES NO. CA0084905

FOR
U.S. BUREAU OF RECLAMATION
SLIGER MINE
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The Discharger shall not implement any changes to this Program unless and until the Regional Board or Executive Officer issues a revised Monitoring and Reporting Program. Specific sample station locations shall be established under direction of Regional Board's staff, and a description of the stations shall be attached to this Order.

EFFLUENT MONITORING

When discharging, effluent samples shall be collected downstream from the last connection through which wastes can be admitted into the receiving water. Effluent samples should be representative of the volume and quality of the discharge. Time of collection of samples shall be recorded. Effluent monitoring shall include at least the following:

<u>Constituents-Parameters</u>	<u>Unit</u>	<u>Type of Sample</u>	<u>Sampling Frequency</u>
Flow	mgd	Measure	Quarterly
pH	number	Grab	Quarterly
Temperature	°F	Grab	Quarterly
Dissolved Oxygen	mg/l	Grab	Quarterly
Electrical Conductivity @25°C	µmhos/cm	Grab	Quarterly
Arsenic	mg/l, lb/day ¹	Grab	Quarterly
Iron	mg/l, lb/day ¹	Grab	Quarterly
Manganese	mg/l, lb/day ¹	Grab	Quarterly
Boron	mg/l, lb/day ¹	Grab	Quarterly
Acute Toxicity ²	% Survival	Grab	Quarterly
Priority Pollutants ^{3,4}	mg/l	Grab	Once in the lifetime of the permit

¹ The mass shall be calculated using the flow data from the date of sample collection, as follows:

$$X \frac{lbs}{day} = Concentration \frac{mg}{l} \times 0.001 \frac{g}{mg} \times 3.79 \frac{l}{gal} \times Flow \frac{gals}{day} \times 0.0022 \frac{lbs}{g}$$

² The acute bioassays samples shall be analyzed using EPA/600/4-90/027F, Fourth Edition, or later amendment with Regional Board staff's approval. Temperature and pH shall be recorded at the time of bioassay sample collection.
Test species shall be fathead minnows (*Pimephales promelas*), with no pH adjustment unless approved by the Executive Officer.

³ Priority Pollutants are listed in the National Toxics Rule and California Toxics Rule.

⁴ Hardness, pH, and temperature data shall be collected at the same time and on the same date as the Priority Pollutant samples.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the Discharger shall monitor and record data for all of the constituents listed above, after which the frequencies of analysis given in the schedule shall apply for the duration of each such intermittent discharge. In no event shall the Discharger be required to monitor and record data more often than twice the frequencies listed in the schedule.

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples. Receiving water monitoring shall include at least the following:

<u>Station</u>	<u>Description</u>
R-1	50 feet upstream from the point of discharge
R-2	100 feet downstream from the point of discharge

<u>Constituents</u>	<u>Unit</u>	<u>Sampling Station</u>	<u>Sampling Frequency</u>
Flow	mgd	R-1	Quarterly
pH	number	R-1, R-2	Quarterly
Turbidity	NTU	R-1, R-2	Quarterly
Temperature	°F	R-1, R-2	Quarterly
Dissolved Oxygen	mg/l	R-1, R-2	Quarterly
Electrical Conductivity @25°C	µmhos/cm	R-1, R-2	Quarterly

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions throughout the reach bounded by Stations R-1 and R-2. Attention shall be given to the presence or absence of:

- | | |
|---------------------------------|--|
| a. Floating or suspended matter | e. Visible films, sheens or coatings |
| b. Discoloration | f. Fungi, slimes, or objectionable growths |
| c. Bottom deposits | g. Potential nuisance conditions |
| d. Aquatic life | |

Notes on receiving water conditions shall be summarized in the monitoring report.

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing toxicity to the receiving water. The testing shall be conducted as specified in EPA 600/4-91/002. Chronic toxicity samples shall be collected at the discharge of the outfall prior to its entering the

Middle Fork of the American River. Grab samples shall be representative of the volume and quality of the discharge. Time of collection samples shall be recorded. Dilution and control waters shall be obtained immediately upstream of the discharge from an area unaffected by the discharge in the receiving waters. Standard dilution water can be used if the receiving water source exhibits toxicity and is approved by the Executive Officer. The sensitivity of the test organisms to a reference toxicant shall be determined concurrently with each bioassay and reported with the test results. Both the reference toxicant and effluent test must meet all test acceptability criteria as specified in the chronic manual. If the test acceptability criteria are not achieved, then the Discharger must re-sample and re-test within 14 days. Chronic toxicity monitoring shall include the following:

Species: *Pimephales promelas, Ceriodaphnia dubia, and Selenastrum capricornutum*
 Frequency: Once per year
 Dilution Series:

	<u>Dilutions (%)</u>					<u>Controls</u>	
	<u>100</u>	<u>50</u>	<u>25</u>	<u>12.5</u>	<u>6.25</u>	Receiving Water	Lab Water
% Effluent	100	50	25	12.5	6.25	0	0
% Dilution Water*	0	50	75	87.5	93.75	100	0
% Lab Water	0	0	0	0	0	0	100

* Dilution water shall be the receiving water from the Middle Fork of the American River taken upstream from the discharge point.

REPORTING

Quarterly and annual monitoring results shall be submitted by the **first day of the second month following each calendar quarter and year**, respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **30 January** of each year, the Discharger shall submit a written report to the Executive Officer containing the names and telephone numbers of persons to contact regarding the mine for emergency and routine situations.

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The Discharger may also be requested to submit an annual report to the Regional Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered by: THOMAS R. PINKOS, Executive Officer

30 January 2003

(Date)

FACT SHEET

ORDER NO. R5-2003-0001
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EL DORADO COUNTY

BACKGROUND INFORMATION

The Sliger Mine is located in the El Dorado County, California, approximately nine miles northeast of the intersection of Interstate 80 and State Route 49 and six miles northeast of the City of Cool. The mine is on steep banks above the Middle Fork of the American River. The mine was acquired by the U.S. Bureau of Reclamation as part of the land for the proposed Auburn dam site.

The Sliger Mine was founded in 1864. In the 1870s, the ore was crushed in a five-stamp mill. During the early work at the mine, a 300-foot shaft produced approximately \$250,000 worth of gold. The milling process consisted of two-stage crushing, flotation, and gravity concentration. The table tailing was sent to a conditioner and treated by flotation. The mine was closed for a period and was inactive until 1922, when the Sliger Gold Mining Company took over the operation. During this time, the shaft was deepened to approximately 2,000 feet and a 15-stamp mill was added. In 1934, the Middle Fork Gold Mining Company took over operation of the mine. In 1937, the Mountain Copper Company leased the mine and did some exploration. From 1938 until 1942, when the mine became finally inactive, the mine was operated by the Middle Fork Gold Mining Company. From 1932 through 1942, 309,000 tons of ore were mined from which \$2,625,000 of gold was recovered. By 1953, most of the surface equipment had been sold.

The ore zone consists of numerous quartz veinlets averaging 30 feet in width with 40% free gold as pure as 92.5% fineness. The quality of gold did not change from the 300-foot level down to the bottom of the 2,000-foot shaft to which the mine was ultimately developed. The ore was mined in open stopes that were refilled with mine tailings. The inactive mine contains an adit that used to function as a ventilation shaft. The remaining portion of the old stamp mill is located approximately two miles from the adit. Mine tailings were observed trailing down from the old stamp mill site along the steep terrain, which leads to the Middle Fork of the American River. The terrain is steep and covered in heavy vegetation.

The Sliger mine is at a fault contact with black slate on the footwall and ankerite and serpentine, followed by a gabbro dike on the hanging wall, all enclosed in amphibolite schist. The principle ore body was on the footwall side and is highly silicified, with some carbonates, and is thickly impregnated with fine disseminated crystals of sulfite, mostly pyrite. Ore in the mine is grouped into two categories: black slate or schist ore and gray schist ore. Most of the gold is in the sulfides that make up 3.7 % of the ore.

BENEFICIAL USES OF RECEIVING WATER

Mine drainage is discharged from a portal of the Sliger Mine to the Middle Fork of the American River.

The Basin Plan on page IV-24.00 prohibits the direct discharge of municipal and industrial wastes into the American River from Folsom Dam to mouth of the Sacramento River, including Lake Natoma. The mine discharge enters the Middle Fork of the American River, which is upstream from the prohibited discharge area. Therefore, the discharge does not violate the Basin Plan prohibition.

The Basin Plan states, on page II-1.00, "Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning" and "...disposal of wastewaters is [not] a prohibited use of waters of the State; it is merely a use which cannot be satisfied to the detriment of beneficial uses." The existing and potential beneficial uses that currently apply to surface waters of the basins are presented in Figure II-1 and Table II-1 of the Basin Plan. The beneficial uses of the American River, downstream of the discharge, as identified in Table II-1 of the Basin Plan, are municipal and domestic supply, agricultural irrigation, agricultural stock watering, hydro power generation, body contact water recreation, canoeing and rafting, other water non-contact recreation, warm freshwater aquatic habitat, cold freshwater aquatic habitat, cold spawning habitat, and wildlife habitat. Additional beneficial uses, listed on pages II-1.00 and II-2.00 that apply to the American River are groundwater recharge and freshwater replenishment.

REASONABLE POTENTIAL ANALYSIS AND EFFLUENT LIMITATIONS CTR CONSTITUENTS

Arsenic

Arsenic is a toxic substance that is known to cause adverse human health effects. Exposure to arsenic at high levels poses serious health effects as it is a known human carcinogen. Studies have shown that prolonged arsenic exposure significantly increases the risk of contracting various forms of cancer. In addition, it has been reported to affect the vascular system in humans and has been associated with the development of diabetes.

Arsenic is a naturally occurring element widely distributed in the earth's crust. Accordingly, there are natural sources of exposure. These include weathering of rocks and erosion depositing arsenic in water bodies and uptake of the metal by animals and plants.

Arsenic appears in several allotropic forms. The stable form is a silver-gray, brittle crystalline solid that tarnishes rapidly in air. At high temperatures, it burns to form a white cloud of arsenic

trioxide. A yellow crystalline form and a black amorphous form are also known. Arsenic can combine with other elements to form inorganic and organic arsenicals. In the environment, arsenic combines readily with many elements to form inorganic compounds: with hydrogen to form arsine, an extremely poisonous gas; with oxygen to form a pentoxide and the above-mentioned trioxide (As_2O_3 or As_4O_6), a deadly poison also called arsenic (III) oxide, arsenious oxide, white arsenic, or, simply, arsenic; with the halogens; and with sulfur. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds. Organic arsenic compounds are less toxic than inorganic arsenic compounds. While food contains both inorganic and organic arsenicals, primarily inorganic forms are present in water. Exposure to high levels of some organic arsenic compounds may cause similar effects as inorganic arsenic.

The Report of Waste Discharge indicates the discharge from the Sliger mine contains an arsenic concentration of 0.067 mg/l. Using the flow of 0.1 cfs (0.0646 mgd) provided by the Discharger in the Report of Waste Discharge and an arsenic concentration of 0.067 mg/l, the approximate mass of arsenic discharged daily is 0.0362 lbs/day.

Municipal and domestic water supply is designated as a beneficial use of the American River, which contains discharges from the Sliger Mine. For beneficial uses that are designed as municipal water and domestic water supply, the Basin Plan prohibits the discharge that contains chemicals in concentrations that exceed California drinking water Maximum Contaminant Levels (MCLs) and toxic substances in toxic amounts. While it is likely that there is hydraulic assimilative capacity for the discharge, there is no information for regarding available concentration dilution for arsenic. Therefore, it must be assumed that no dilution exists, and the effluent limitation for arsenic in this Order will be established as an end-of-pipe limitation at the appropriate concentration. On 31 October 2001, U.S. EPA adopted a new drinking water standard for arsenic. The new Primary MCL for arsenic is 10 $\mu\text{g}/\text{l}$. The Basin Plan states, on page III-3.0: *“At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of maximum contaminant levels (MCLs) specified in...Title 22 of the California Code of Regulations, which are incorporated by reference into this plan...”* The current U.S.EPA National Recommended Ambient Water Quality Criteria to protect freshwater aquatic life are 150 $\mu\text{g}/\text{l}$ as a four-day average and 340 $\mu\text{g}/\text{l}$ as a one-hour average. The drinking water standards and human health criteria for arsenic have concentrations lower than the Ambient Water Quality Criteria. Therefore, to protect the municipal and domestic beneficial uses, the drinking water standards or human health criteria shall be used to establish effluent limitations. For waters with beneficial use of municipal and domestic supply (MUN), applicable water quality objectives include both the Chemical Constituents objective and the Toxicity objective. The Chemical Constituents objective requires that water not exceed California MCLs. The Toxicity objective prohibits toxic substances in toxic amounts. Since arsenic is a naturally occurring element, natural background concentrations of arsenic in most locations are expected to exceed the water quality criteria or objectives. Where natural background levels exceed water quality objectives, the Regional Water Boards do not have the authority to require that water quality objectives be met.

However, in such cases, controllable water quality factors, such as the discharge of waste, are not permitted to cause natural concentrations to increase.

The Code of Federal Regulations, 40 CFR 122.44 (d)(1)(iii), states: "...a discharge causes, has a reasonable potential to cause, or contribute to an in-stream excursion above allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant."

The detected concentration of arsenic exceeds the current Primary MCL and other water quality criteria. Based on the above considerations, the proposed Order contains a concentration based Effluent Limitation of 10 µg/l as a Monthly Average. In addition, the proposed Order contains a mass based Effluent Limitation of 0.00539 lbs/day, calculated using the average flow of 0.1 cfs (0.0646 mgd), provided by the Discharger in the Report of Waste Discharge, and the concentration based Effluent Limitation of 10 µg/l. The calculation for mass based Effluent Limitation is demonstrated as follows:

$$0.1 \frac{ft^3}{s} = 0.0646 \text{ million gallons per day} = 64,600 \text{ gallons per day} \left(\frac{gals}{day} \right)$$
$$10 \frac{\mu g}{l} \times 10^{-6} \frac{g}{\mu g} \times 3.79 \frac{l}{gal} \times 64,000 \frac{gals}{day} \times 0.0022 \frac{lbs}{g} = 0.00539 \frac{lbs}{day}$$

Mercury

Mercury is used in the amalgamation process, which is a process to extract gold from ores. The ore is crushed and treated with mercury, in which the metal dissolves. The amalgam is heated and the mercury evaporates, leaving pure gold.

Mercury is a neurotoxin, meaning it affects the nervous system. The three most common forms of mercury are elemental, inorganic and methylmercury. Mercury combines with other elements, such as chlorine, sulfur, or oxygen, to form inorganic mercury compounds or "salts," which are usually white powders or crystals. Mercury also combines with carbon to make organic mercury compounds. The most common form of mercury is methylmercury. Methylmercury is produced mainly by microscopic organisms in the water and soil. More mercury in the environment can increase the amounts of methylmercury that these small organisms make. The three forms of mercury can all produce adverse health effects at sufficiently high doses. U.S.EPA has determined that mercuric chloride and methylmercury are possible human carcinogens. Methylmercury and metallic mercury vapors are more harmful than other forms, because more mercury in these forms reaches the brain. Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Effects on brain functioning may result in irritability, shyness, tremors, changes in vision or hearing, and memory problems. Short-term exposure to high levels of metallic mercury vapors may cause effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation. U.S. EPA has

determined that eating mercury-contaminated fish is the primary route of exposure to mercury for most people.

The current Primary MCL for mercury is 2 µg/l. The current U.S.EPA National Recommended Ambient Water Quality Criteria to protect freshwater aquatic life as a four-day average and one-hour average are 0.77 µg/l and 1.4 µg/l, respectively. U.S.EPA established California Toxics Rule (CTR) criteria of 0.05 µg/l (for drinking water sources for consumption of water and aquatic organisms) and 0.051 µg/l (for waters that are not sources of drinking water, but from which the aquatic organisms may be consumed) to protect human health based on a 30-day average. These criteria are derived from data for inorganic mercury but it is applied to total mercury. If a substantial portion of the water column is methylmercury, this criterion will probably be under protective. In the CTR, U.S.EPA reserved the mercury criteria for fresh water and aquatic life and may adopt new criteria at a later date.

Mercury was detected in the discharge from the mine at a concentration of 0.01 µg/l. The detected concentration of mercury is very close to the CTR human health criteria. Based on these considerations, this Order contains a Provision that requires the Discharger to conduct a one-year study of quarterly monitoring to determine if a reasonable potential exists for mercury to exceed a water quality standard. In addition, “clean techniques” are required to use at the laboratories to reduce interference with the analyses. The Provision also allows the Regional Board to reopen the Order to add Effluent Limitations for mercury based on the information provided in the study conducted by the Discharger. If a new water quality objective for mercury is adopted, this Order will be reopened and effluent limitations for mercury will be modified or added.

Copper

Copper was detected in the discharge from the mine at a concentration of 2.0 µg/l. U.S. EPA developed hardness-dependent California Toxics Rule criteria for the protection of freshwater aquatic life for copper. The California Toxics Rule Criteria for copper are presented in dissolved concentrations. U.S. EPA recommended conversion factors to translate dissolved concentrations to total concentrations. The conversion factor for copper in fresh water is 0.960 for both the acute and chronic criteria. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for copper are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Copper (µg/l) (Total)	Hardness (mg/l as CaCO ₃)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
13 May 1999	<1.0	122	12.0	18.0
26-27 July 1999	2.0	139	13.0	20.0

$$CCC = e^{\{0.8545[\ln(\text{hardness})]-1.702\}}$$

$$CMC = e^{\{0.9422[\ln(\text{hardness})]-1.700\}}$$

where

CCC = criteria continuous concentration (four-day average)
 CMC = criteria maximum concentration (one-hour average)

U.S.EPA also established California Toxic Rules criterion of 1300 µg/l to protect human health based on a 30-day average for copper. The Agricultural Water Quality Goal for copper is 200 µg/l. The primary and the secondary MCLs for copper are 1300 and 1000 µg/l, respectively. The California Office of Environmental Health Hazard Assessment (OEHHA) established a public health goal of 170 µg/l in drinking water for copper.

The detected concentration of copper is below all water quality criteria. Therefore, no effluent limitation for copper is included in this Order.

Nickel

Nickel was detected in the discharge from the mine at a concentration of 6.0 µg/l. U.S. EPA developed hardness-dependent California Toxics Rule criteria for the protection of freshwater aquatic life for nickel. U.S.EPA recommended conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for nickel in fresh water are 0.998 and 0.997 for the acute and chronic criteria, respectively. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for nickel are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Nickel (µg/l) (Total)	Hardness (mg/l as CaCO ₃)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
13 May 1999	3.2	122	62	556
26-27 July 1999	6.0	139	69	621
2 October 2002	<2.0	122	62*	556*
28 October 2002	2.7	122	62*	556*
8 November 2002	3.5	122	62*	556*

$$CCC = e^{\{0.846[\ln(\text{hardness})]+0.0584\}}$$

$$CMC = e^{\{0.846[\ln(\text{hardness})]+2.255\}}$$

where

CCC = criteria continuous concentration (four-day average)
 CMC = criteria maximum concentration (one-hour average)

* = calculated using the hardness of 122 mg/l (of CaCO₃) of receiving stream at the critical low flow.

U.S.EPA also established CTR criteria of 610 µg/l (for drinking water sources for consumption of water and aquatic organisms) and 4600 µg/l (for waters that are not sources of drinking water but from which aquatic organisms may be consumed) to protect human health based on a 30-day average. The Agricultural Water Quality Goal for nickel is 200 µg/l. The current primary MCL for nickel is 100 µg/l. The U.S. EPA's Integrated Risk Information System (IRIS) includes a reference dose of 140 µg/l for nickel in drinking water. The California Office of Environmental Health Hazard Assessment (OEHHA) established a health goal criterion of 1.0 µg/l in drinking water. The recommended lowest observed toxicity effect level for nickel is 100 µg/l.

Detected concentrations of nickel do not exceed a water quality standard or objective except the health goal criterion established by the OEHHA by a relatively small amount for nickel. Based on these considerations, an effluent limitation for nickel is not proposed in this Order.

Zinc

Zinc was detected in the discharge from the mine at a concentration of 6.0 µg/l. U.S. EPA developed hardness-dependent California Toxic Rules criteria for the protection of freshwater aquatic life for zinc. U.S.EPA recommended conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for zinc in fresh water are 0.978 and 0.986 for the acute and chronic criteria, respectively. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for zinc are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Zinc (µg/l) (Total)	Hardness (mg/l as CaCO ₃)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
13 May 1999	<5.0	122	144	145
26-27 July 1999	6.0	139	161	162

$$CCC = e^{\{0.8473[\ln(\text{hardness})]+0.884\}} \qquad CMC = e^{\{0.8473[\ln(\text{hardness})]+0.884\}}$$

where

CCC = criteria continuous concentration (four-day average)

CMC = criteria maximum concentration (one-hour average)

U.S. EPA established the Ambient Water Quality Criteria for the protection of human health and welfare for zinc. The non-cancer health effects criterion for sources of drinking water for consumption of water and aquatic organisms for zinc is 9,100 µg/l. The non-cancer health effects criterion for waters that are not sources of drinking water, but from which aquatic organisms may be consumed is 69,000 µg/l. The Agricultural Water Quality Goal for zinc is 2,000 µg/l. U.S. EPA's Integrated Risk Information System (IRIS) includes a reference dose of

2,100 µg/l as a drinking water level for zinc. U.S.EPA included the Drinking Water Health suggested no-adverse-response level of 2,000 µg/l for toxicity other than cancer risk for zinc. The secondary MCL for zinc is 5,000 µg/l.

The detected concentration of zinc is below water quality criteria. Therefore, no effluent limitation for zinc is included in this Order.

Chromium

Chromium is a naturally occurring element found in rocks, animals, plants, soil, and in volcanic dust and gases. Total chromium measures the combined levels of trivalent chromium (chromium III) and hexavalent chromium (chromium VI). Chromium (III) occurs naturally in the environment and is an essential nutrient. Chromium (VI) is generally produced by industrial processes, such as chrome plating, dyes and pigments, leather tanning, and wood preserving. There is evidence to suggest that chromium (VI) may be converted to chromium (III) in the human body; particularly in the acidic environment of the digestive system. In addition, chromium (VI) is most likely to convert to chromium (III) due to the elevated concentrations of dissolved oxygen in the American River, which contains discharges from the Sliger Mine. Based on these considerations, water quality standards for chromium (III) are used to evaluate whether the detected concentration of chromium in the discharge from the mine cause or contribute to an exceedance of a water quality standard.

Chromium was detected in the discharge from the mine at a concentration of 2.0 µg/l. U.S. EPA developed hardness-dependent California Toxic Rules criteria for the protection of freshwater aquatic life for chromium. U.S.EPA recommended conversion factors to translate dissolved concentrations to total concentrations. The conversion factors for chromium (III) in fresh water are 0.316 and 0.860 for the acute and chronic criteria, respectively. The continuous concentration (four-day average) and the maximum concentration (one-hour average) criteria for chromium are presented in total concentrations. These criteria are presented as follows:

Sampling Dates	Reported Concentrations of Chromium (µg/l) (Total)	Hardness (mg/l as CaCO ₃)	CCC (µg/l) (Total)	CMC (µg/l) (Total)
13 May 1999	2.8	122	283	6,467
26-27 July 1999	2.0	139	315	7,196

$$CCC = e\{0.819[\ln(\text{hardness})]+1.561\}$$

$$CMC = e\{0.819[\ln(\text{hardness})]+3.688\}$$

where

CCC = criteria continuous concentration (four-day average)

CMC = criteria maximum concentration (one-hour average)

The California Office of Environmental Health Hazard Assessment (OEHHA) established a health goal criterion of 200,000 µg/l in drinking water. U.S. EPA's IRIS includes a reference dose of 10,500 µg/l as a drinking water level for chromium. The detected concentration of chromium is below water quality criteria. Therefore, no effluent limitation for chromium is included in this Order.

**REASONABLE POTENTIAL ANALYSIS AND EFFLUENT LIMITATIONS -
 NON-CTR CONSTITUENTS**

Sampling activities were conducted by the Discharger in May and July of 1999 and October and November of 2002. The reported results are used to perform the reasonable potential analysis for constituents that are not included in the CTR. The analysis assists to determine whether the discharge may: (1) cause, (2) have a reasonable to cause, (3) or contribute to an exceedance of any water quality criteria or objectives. The reasonable analysis is included in the *U.S.EPA Technical Support Document for Water Quality-Based Toxics Control*. All detectable sampling results for non-CTR constituents are summarized in the Table 1 below:

Table 1. Detectable Results (mg/l)

Constituents	5/13/1999	7/26- 7/27/1999	10/2/2002	10/28/2002	11/8/2002	11/19/2002
Hardness (as CaCO ₃)	122	139	--	--	--	--
Boron (Total)	--	0.07	0.17	0.17	0.20	--
Strontium	--	0.29	--	--	--	--
Ammonia (as N)	--	0.1	--	--	--	--
Nitrate-Nitrite (as N)	--	0.3	--	--	--	--
Sulfate (as SO ₄)	35.0	42.0	38.4	37.1	35.5	36.4
Barium (Total)	--	0.042	0.072	0.072	0.075	--
Iron (Total)	0.08	0.19	0.12	0.07	0.26	--
Molybdenum (Total)	--	0.002	0.0025	0.0026	0.0025	0.0025
Manganese (Total)	0.018	0.017	0.019	0.015	0.031	0.026
Titanium (Total)	--	0.003	--	--	--	--
Magnesium (Total)	11.6	10.4	--	--	--	--

Table 2. Projected Maximum Effluent Concentrations (mg/l)

Constituents	Projected MEC ¹	Note
Boron (Total)	0.84	See discussion for boron below
Strontium	3.83	See discussion for strontium below
Ammonia (as N)	1.32	See discussion for ammonia below
Nitrate-Nitrite (as N)	3.96	See discussion for nitrate below
Sulfate (as SO ₄)	160	See discussion for sulfate below
Barium (Total)	0.35	See discussion for barium below
Iron (Total)	1.09	See discussion for iron below
Molybdenum (Total)	0.01	See discussion for molybdenum below
Manganese (Total)	0.12	See discussion for manganese below
Titanium (Total)	0.0396	No applicable criteria
Magnesium (Total)	85.8	No applicable criteria

¹ The projected MEC (maximum effluent concentration) is determined by multiplying the maximum detected concentration with a reasonable potential multiplying factor that accounts for statistical variation. The multiplying factor (for 99% confidence level and 99% probability basis) is dependent on the coefficient of variation (CV) and number of reported effluent results. For less than 10 effluent data, CV is estimated to equal 0.6. The multiplying factors are 13.2 (for one sample), 7.4 (for two samples), 4.7 (for four samples), 4.2 (for five samples), and 3.8 (for six samples).

-- No sampling result available.

The Code of Federal Regulations, 40 CFR 122.44 (d)(1)(iii), states: "...a discharge causes, has a reasonable potential to cause, or contribute to an in-stream excursion above allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, the permit must contain effluent limits for that pollutant." The Basin Plan requires, on page III-3.0: "At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of maximum contaminant levels (MCLs) specified in...Title 22 of the California Code of Regulations, which are incorporated by reference into this plan..." Municipal and domestic water supply is designated as a beneficial use of the American River, which contains discharges from the Sliger Mine.

Boron

In addition to the mineral elements N, P, K, S, Ca, and Mg, defined as macronutrients, plants require other mineral elements, which are generally described as micronutrients; due to the relatively small amounts required. Boron is one of the most important of the essential micronutrients for crops. Because of its high potency, even in small quantities, boron was regarded as a "poisonous element". Of all micronutrients, boron has the narrowest range between deficiency and toxicity.

The EPA, the Department of Health and Human Services, and the International Agency for Research on Cancer have not classified boron as a human carcinogen. Using the reasonable analysis, the projected MEC of boron is 0.84 mg/l. U.S. EPA's Integrated Risk Information System (IRIS) toxicological database includes a reference dose as a drinking water level of 0.63 mg/l for boron. The Agricultural Water Quality Goals criterion for boron is 0.7 mg/l. The recommended lowest observed toxicity effect level for boron is 1.0 mg/l. U.S.EPA recommends no-adverse-response levels (SNARLs) for toxicity other than cancer risk of 0.6 mg/l for boron.

The projected MEC of boron exceeds the Agricultural Water Quality Goal. Agricultural irrigation is designated as a beneficial use of the receiving stream. Therefore, to protect the agricultural beneficial use, this Order includes a quarterly average concentration-based Effluent Limitation of 0.7 mg/l for boron. In addition, this Order contains a quarterly average mass-based Effluent Limitation of 0.38 lbs/day, calculated using the average flow of 0.1 cfs (0.0646 mgd), provided by the Discharger in the Report of Waste Discharge, and the Agricultural Water Quality Goal of 0.7 mg/l. The calculation for mass-based Effluent Limitation is demonstrated as follows:

$$0.1 \frac{ft^3}{s} = 0.0646 \text{ million gallons per day} = 64,600 \text{ gallons per day} \left(\frac{gals}{day} \right)$$

$$0.7 \frac{mg}{l} \times 10^{-3} \frac{g}{mg} \times 3.79 \frac{l}{gal} \times 64,600 \frac{gals}{day} \times 0.0022 \frac{lbs}{g} = 0.38 \frac{lbs}{day}$$

Strontium

Using the reasonable analysis, the projected MEC of strontium is 0.29 mg/l. The U.S. EPA's Integrated Risk Information System (IRIS) includes a reference dose of 4.2 mg/l as a drinking water level for strontium. U.S.EPA and the National Academy of Science recommended the Drinking Water Health for no-adverse-response level of 4.0 mg/l and 8.4 mg/l (based on a 7-day exposure) for toxicity other than cancer risk for strontium.

The projected MEC of strontium is below water quality criteria. Therefore, no effluent limitation for strontium is included in this Order.

Ammonia

Ammonia was detected in the discharge from the mine at a concentration of 0.1 mg/l. Using the reasonable potential analysis, the projected MEC of ammonia is 1.32 mg/l. U.S.EPA developed the Ambient Water Quality Criteria for ammonia to protect freshwater aquatic life based on pH and temperature. The 30-day average and one-hour average concentrations for ammonia are calculated using the following equations:

$$CCC = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) \times MIN \left(2.85, 1.45 \times 10^{0.028 \times (25-T)} \right)$$

$$CMC = \left(\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}} \right)$$

where

CCC = criteria continuous concentration (30-day average)

CMC = criteria maximum concentration (one-hour average)

Because both warm and cold freshwater aquatic habitat are designated as beneficial uses of the American River, which contains discharges from the Sliger Mine, the criteria for waters based on the presence of the salmonids fish and fish early life stages are used. Using the two equations above, the 30-day average and one-hour average concentrations for ammonia are estimated at 4.37 and 10.3 mg N/l, respectively. U.S.EPA recommended the Drinking Water Health for no-adverse-response level of 30 mg/l for toxicity other than cancer risk for ammonia.

The projected MEC of ammonia is below water quality criteria. Additionally, ammonia is not a suspected constituent from mine drainage. Therefore, ammonia is not likely to have a reasonable potential to cause or contribute to an exceedance of a water quality criterion or objective. Based on these considerations, no effluent limitation for ammonia is included in this Order.

Nitrate

Using the reasonable potential analysis, the projected MEC of nitrate is 3.96 mg/l. The U.S. EPA's Integrated Risk Information System (IRIS) includes a reference dose of 11.0 mg/l as a drinking water level for nitrate. The primary MCL for drinking water for nitrate is 10.0 mg/l. U.S.EPA recommended the Drinking Water Health suggested no-adverse-response level of 10.0 mg/l (based on a 10-day exposure) for toxicity other than cancer risk for nitrate. The California Office of Environmental Health Hazard Assessment (OEHHA) established a health goal criterion of 10.0 µg/l in drinking water. U.S. EPA National Recommended Ambient Water Quality Criteria for the protection of human health and welfare. The non-cancer health effects criterion for sources of drinking water for consumption of water and aquatic organisms is 10.0 mg/l.

The projected MEC of nitrate is below water quality criteria. Therefore, no effluent limitation for nitrate is included in this Order.

Sulfate

Using the reasonable potential analysis, the projected MEC of sulfate is 160 mg/l. The current primary and secondary MCLs for sulfate are 500 mg/l and 250 mg/l, respectively. U.S. EPA National Recommended Ambient Water Quality Criteria for the protection of human health and welfare based on the taste and odor or welfare for sulfate is 250 mg/l.

The projected MEC of sulfate does not exceed any water quality criteria. Therefore, no Effluent Limitation for sulfate is included in this Order.

Barium

Barium is a silvery-white metal found in nature. It occurs combined with other chemicals such as sulfur or carbon and oxygen. The health effects of the different barium compounds depend on how well the compound dissolves in water. Those barium compounds that dissolve well in water may cause harmful health effects in people. Ingesting high levels of barium compounds that dissolve well in water over the short term has resulted in difficulties in breathing, increased blood pressure, brain swelling, muscle weakness, and damage to the liver, kidney, heart, and spleen.

Using the reasonable potential analysis, the projected MEC of barium is 0.35 mg/l. U.S.EPA and the Department of Health Service established the primary MCL of 2.0 mg/l and 1.0 mg/l for barium, respectively. The U.S. EPA IRIS included a reference dose of 0.49 mg/l as a drinking water level for barium. U.S.EPA and the National Academy of Science recommended the Drinking Water Health suggested no-adverse-response levels (SNARLs) of 2.0 mg/l and 4.7 mg/l for toxicity other than cancer risk for barium. U.S.EPA established the National Recommended Ambient Water Quality Criteria for the protection of human health and welfare of 1.0 mg/l. This criterion is based on the non-cancer health effects for sources of drinking water for the consumption of water and aquatic organisms.

The projected MEC of barium does not exceed any water quality criteria. Therefore, no Effluent Limitation for barium is included in this Order.

Iron

Iron is an abundant element in the earth's crust. It is believed to be the major component of the earth's core. It is rarely found uncombined in nature except in meteorites, but iron ores and minerals are abundant and widely distributed. Several studies have shown that high iron content in the body linked to cancer and heart disease. Iron can be poisonous and if too much is taken over a long period could result in liver and heart damage, diabetes and skin changes.

Using the reasonable potential analysis, the projected MEC of iron in the mine discharge is calculated at 1.09 mg/l. The current secondary MCL for iron is 0.3 mg/l. U.S. EPA National Recommended Ambient Water Quality Criteria for the protection of human health and welfare based on the taste and odor or welfare is 0.3 mg/l. The Agricultural Water Quality Goal criterion for iron is 5.0 mg/l.

The projected MEC of iron exceeds the secondary MCL and the Ambient Water Quality Criterion. To protect the municipal and domestic beneficial use, this Order includes a concentration based Effluent Limitations for iron based on the secondary MCL of 0.3 mg/l. In addition, this Order contains a mass based Effluent Limitation of 0.162 lbs/day, calculated using the average flow of 0.1 cfs (0.0646 mgd), provided by the Discharger in the Report of Waste Discharge, and the concentration based Effluent Limitation of 0.3 mg/l. The calculation for mass based Effluent Limitation is demonstrated as follows:

$$0.1 \frac{ft^3}{s} = 0.0646 \text{ million gallons per day} = 64,600 \text{ gallons per day} \left(\frac{gals}{day} \right)$$

$$0.3 \frac{mg}{l} \times 0.001 \frac{g}{mg} \times 3.79 \frac{l}{gal} \times 64,600 \frac{gals}{day} \times 0.0022 \frac{lbs}{g} = 0.162 \frac{lbs}{day}$$

Molybdenum

Using the reasonable potential analysis, the projected MEC of molybdenum is 0.01 mg/l. The U.S. EPA IRIS includes a reference dose of 0.035 mg/l as a drinking water level for molybdenum. U.S.EPA recommended the SNARLs of 0.04 mg/l for toxicity other than cancer risk in drinking water for molybdenum. The Agricultural Water Quality Goal for molybdenum is 0.01 mg/l.

Molybdenum was detected in the mine discharge at a maximum concentration of 0.00264 mg/l. The projected MEC of molybdenum equals to the Agricultural Water Quality Goal. Therefore, it is confirmed that the discharge from the mine may have a reasonable potential to cause or contribute to an exceedance of the Agricultural Water Quality Goal. Based on this consideration, a one-year study, of quarterly sampling, is being required. The study will be used to determine if a reasonable potential exists for molybdenum to exceed a water quality standard, in which case, the permit may be reopened and an effluent limit added for molybdenum. If a new water quality objective for molybdenum is adopted, this Order will be reopened and effluent limitations for molybdenum will be modified or added.

Manganese

Manganese is a naturally occurring metal that is found in many types of rocks. Pure manganese is silver-colored, but does not occur naturally. It combines with other substances such as oxygen, sulfur, or chlorine. Manganese can also be combined with carbon to make organic manganese compounds.

Exposure to excess levels of manganese may occur from breathing air, from drinking water, and eating food. At high levels, it can cause damage to the brain, liver, kidneys, and the developing fetus. Some individuals exposed to very high levels of manganese for long periods of time in their work developed mental and emotional disturbances and slow and clumsy body movements. This combination of symptoms is a disease called "manganism." Manganism occurs because too much manganese injures a part of the brain that helps control body movements. Exposure to high levels of airborne manganese can affect motor skills such as holding one's hand steady, performing fast hand movements, and maintaining balance. Exposure to high levels of the manganese may also cause respiratory problems.

Using the reasonable potential analysis, the projected MEC of manganese is 0.12 mg/l. U.S.EPA established the secondary MCL of 0.05 mg/l for manganese. The U.S. EPA's Integrated Risk Information System (IRIS) includes a reference dose of 0.33 mg/l as a drinking water level for manganese. The Agricultural Water Quality Goal for manganese is 0.2 mg/l. U.S. EPA

established Ambient Water Quality Criteria for the protection of human health and welfare for manganese. The non-cancer health effects criterion for waters that are not sources of drinking water, but from which aquatic organisms may be consumed is 0.1 mg/l. The criterion for taste and odors or welfare is 0.05 mg/l.

The projected MEC of manganese exceeds the secondary MCL and the criterion for taste and odors or welfare. To protect the municipal and domestic beneficial use, this Order includes a quarterly average concentration-based Effluent Limitation for manganese based on the secondary MCL of 0.05 mg/l. In addition, this Order contains a quarterly average mass-based Effluent Limitation of 0.0269 lbs/day, calculated using the average flow of 0.1 cfs (0.0646 mgd), provided by the Discharger in the Report of Waste Discharge, and the concentration based Effluent Limitation of 0.05 mg/l. The calculation for mass based Effluent Limitation is demonstrated as follows:

$$0.1 \frac{ft^3}{s} = 0.0646 \text{ million gallons per day} = 64,600 \text{ gallons per day} \left(\frac{gals}{day} \right)$$
$$0.05 \frac{mg}{l} \times 0.001 \frac{g}{mg} \times 3.79 \frac{l}{gal} \times 64,600 \frac{gals}{day} \times 0.0022 \frac{lbs}{g} = 0.0269 \frac{lbs}{day}$$

pH

For all surface water bodies in the Sacramento River and San Joaquin River basins, the Basin Plan includes a water quality objective for pH in surface waters, which states “*The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh water with designated COLD and WARM beneficial uses.*” Due to the lack of dilution data from the receiving stream, no credit for receiving water dilution is available. Therefore, the effluent limitation for pH in this Order will be based on the water quality objective described in the Basin Plan.

Toxicity

The Basin Plan states that “All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances.” The Basin Plan requires that “as a minimum, compliance with this objective...shall be evaluated with a 96-hour bioassay.” Order No. R5-2003-0001 requires both acute and chronic toxicity monitoring to evaluate compliance with this water quality objective. The Basin Plan also states: “...effluent limits based upon acute biotoxicity tests of effluents will be prescribed...” Effluent limitations for acute toxicity are included in the Order.

RECEIVING WATER LIMITATIONS AND MONITORING

Dissolved Oxygen

Cold freshwater aquatic habitat has been designated as a beneficial use of the American River. For water bodies designated as having cold freshwater aquatic habitat as a beneficial use, the Basin Plan includes a water quality objective of maintaining a minimum of 7.0 mg/l of dissolved oxygen. Therefore, this Order contains a receiving water limitation of 7.0 mg/l for dissolved oxygen.

For surface water bodies outside of the Delta, the Basin Plan requires that “...*the monthly median of the mean daily dissolved oxygen (DO) concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation.*” This objective is included as a receiving water limitation in the Order.

pH

For all surface water bodies in the Sacramento River and San Joaquin River basins, the Basin Plan includes a water quality objective for pH in surface waters, which states “*The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh water with designated COLD and WARM beneficial uses.*” Both cold and warm freshwater aquatic habitat have been designated as beneficial uses of the American River; therefore, this Order includes receiving water limitations for pH based on the water quality objective described in the Basin Plan.

Temperature

The Basin Plan includes the following objective: “*At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F above natural receiving water temperature.*” Since both cold and warm freshwater aquatic habitat have been designated as beneficial uses of the American River; therefore, this Order includes receiving water limitations for temperature based on the water quality objective described in the Basin Plan.

Turbidity

The Basin Plan states that: “*Waters shall be free of changes in turbidity that cause nuisance or adversely effect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:*

- *Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU.*
- *Where natural turbidity is between 5 and 10 NTUs, increases shall not exceed 20 percent.*
- *Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTU.*

- *Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.”*

This Order includes receiving water limitations for turbidity based on the water quality objective described in the Basin Plan.

