

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM R5-2012-_____

FOR
HOMESTAKE MINING COMPANY OF CALIFORNIA

FOR
CLOSURE AND POST-CLOSURE MAINTENANCE
MCLAUGHLIN MINE
LAKE, NAPA, AND YOLO COUNTIES

This Monitoring and Reporting Program is issued to the Homestake Mining Company of California (hereafter referred to as "Discharger"). Compliance with this Monitoring and Reporting Program (MRP), and with the companion Standard Provisions and Reporting Requirements for Mining Wastes is ordered by Waste Discharge Requirements Order R5-2011-_____. Failure to comply with this Program, or with the Standard Provisions and Reporting Requirements for Mining Wastes dated February 2009, constitutes noncompliance with the WDRs and with the Water Code, which can result in the imposition of civil liability.

A. MONITORING

The Discharger shall comply with the monitoring program provisions of California Code of Regulations, title 27 ("Title 27") for groundwater in accordance with this MRP and the Monitoring Specifications in the Standard Provisions.

All point-of-compliance monitoring wells established for the detection monitoring program shall constitute the monitoring points for the groundwater Water Quality Protection Standard. All mine pit lakes and tailings impoundment monitoring locations; groundwater monitoring wells; pump-back system monitoring points; spring and seep monitoring locations and surface water monitoring locations shall be sampled and analyzed for monitoring parameters and constituents of concern as indicated and listed in the tables of this MRP.

The Discharger may, upon approval, use alternative analytical test methods, including new USEPA approved methods, provided the methods have method detection limits equal to or lower than the analytical methods specified in this Monitoring and Reporting Program. All metals analyses shall be for dissolved metals.

The Discharger shall conduct monitoring and inspections as described in the summary table below. Detailed monitoring and inspection requirements are provided in the following sections of this MRP.

Facility Monitoring and Inspection Summary		
Activity	Inspection/Monitoring Frequency	Notes
Monitoring		
Pit Lakes and Tailings Impoundment Monitoring	Monthly, Annually	See Section A.1
Groundwater Monitoring	Semiannually	See Section A.2
Pump back System	Monthly, Annually	See Section A.3
Surface water Monitoring	Semiannually	See Section A.4
Spring and Seep Monitoring	Semiannually, Annually	See Section A.5
Inspections		
Annual Facility Inspection	Annually	See Section A.6.a
Storm Events	Following Major Storm Event	See Section A.6.b

1. Pit Lakes and Tailings Impoundment

The North and South Mine Pit Lakes and the tailings impoundment samples shall be collected from the Mine Pit Lakes and the Tailings Impoundment in accordance with the table below and all annual samples shall be sampled in the Spring Quarter (April – June):

Table 1 – Pit Lakes and Tailings Impoundment		
<u>Parameters</u>	<u>Units</u>	<u>Frequency</u>
<u>Field Parameter</u>		
Freeboard	Feet & Tenths	Monthly
pH	pH number	Annually
Temperature	°C	Annually
Specific Conductance	µmhos/cm	Annually
<u>Monitoring Parameters</u>		
Total Dissolved Solids	mg/L	Annually
Total Hardness	mg/L	Annually
Bicarbonate	mg/L	Annually
Calcium	mg/L	Annually
Chloride	mg/L	Annually
Potassium	mg/L	Annually
Sulfate	mg/L	Annually
Sodium	mg/L	Annually
Metals (arsenic, boron, chromium, copper, mercury & nickel)	ug/L	Annually
Total Cyanide (tailings pond only)	ug/L	Annually

Results from annual sampling shall be reported with the Annual Monitoring Report, an evaluation of Mine Pit Lake and Tailings Impoundment water quality and any potential impacts on surface water quality shall be included in the Report. Metal analysis shall be reported as dissolved (filtered). Freeboard data shall be collected monthly and reported in the Semiannual Monitoring Report; water samples shall be collected at a convenient location at least 50 feet from the influent structure.

2. Groundwater

The Discharger shall operate and maintain a groundwater monitoring system that complies with the applicable provisions of Title 27, section 20415 in accordance with a Monitoring Program approved by the Executive Officer. The Discharger shall collect, preserve, and transport groundwater samples in accordance with the approved Sample Collection and Analysis Plan.

The groundwater monitoring system shall consist of the following wells:

Area	Monitor Wells
Mine Pit Lakes	S-01, S-02B and S-10
Waste Rock Facilities	S-05 and S-06
Tailings Impoundment Facility	N-1, N-2A, N-5, N-8A, N-8B, N-8C and N-12

Groundwater samples shall be collected in compliance with an approved groundwater monitoring plan. Samples shall be collected and analyzed for the monitoring parameters in accordance with the methods and frequency specified in Table 2. Metal analysis shall be reported as dissolved (filtered).

Table 2 - Groundwater Monitoring		
<u>Parameters</u>	<u>Units</u>	<u>Frequency</u>
Field Parameters		
Groundwater Elevation	Ft., & hundredths, MSL	Semi-annually
Temperature	°C	Semi-annually
Specific Conductance	µmhos/cm	Semi-annually
pH	pH number	Semi-annually
Monitoring Parameters		
Total Alkalinity	mg/L	Semi-annually
Carbonate Alkalinity	mg/L	Semi-annually
Bicarbonate Alkalinity	mg/L	Semi-annually
Hydroxide Alkalinity	mg/L	Semi-annually
Total Hardness	mg/L	Semi-annually
Total Dissolved Solids	mg/L	Semi-annually
Sulfate	mg/L	Semi-annually
Potassium	mg/L	Semi-annually
Sodium	mg/L	Semi-annually
Calcium	mg/L	Semi-annually
Magnesium	mg/L	Semi-annually
Chloride	mg/L	Semi-annually
Metals (arsenic, boron, copper, lead, mercury, manganese, nickel, & zinc)	µg/L	Semi-annually
Total Cyanide (N series wells only)	µg/L	Semi-annually

Notes: Total Cyanide is not required to be analyzed at Mine Pit area and Waste Rock area wells (S-01, S-02B, S-05, S-06 and S-10).

The groundwater monitoring parameters shall also be evaluated each reporting period with regards to the cation/anion balance, and the results shall be graphically presented using a Stiff diagram, a Piper graph or a Schueller plot.

3. Pump-Back System Monitoring

Samples shall be collected from each major waste rock facility leachate collection sump in the Pump-back System. The existing Pump-back System sampling points at sumps S-11, S-12 and S-13 are difficult to sample and present health and safety concerns to sampling personnel. Therefore, the Discharger shall propose and install if necessary new

monitoring points for each of the leachate collection sumps. Metal analysis shall be reported as dissolved (filtered). The Pump-back System shall be sampled and analyzed for the parameters specified in Table 3.

Table 3 – Pump-Back System Monitoring		
<u>Parameters</u>	<u>Units</u>	<u>Frequency</u>
Field Parameter (for all points)		
Flow Rate	gallons/month	Monthly
Temperature	°C	Annually
Specific Conductance	umhos/cm	Annually
pH	pH number	Annually
Monitoring Parameters		
Total Alkalinity	mg/L	Annually
Total Hardness	mg/L	Annually
Total Dissolved Solids	mg/L	Annually
Sulfate	mg/L	Annually
Sodium	mg/L	Annually
Metals (arsenic, boron, copper, lead, manganese, mercury and nickel)	ug/L	Annually

4. **Surface Water Monitoring**

Surface water monitor reports shall be submitted with the corresponding semi-annual groundwater monitoring report and shall include an evaluation of potential impacts of the facility on surface water quality and compliance with the Water Quality Protection Standard. All surface water samples shall be grab samples. The surface water sampling program shall consist of the following locations:

Hunting Creek 5 (HC-5)

On an east tributary to Hunting Creek in the SE1/4 of Section 2, T11N, R5W. This location is upgradient of the West Waste Rock Facility and acts as a background location.

Hunting Creek 9 (HC-9)

On a west tributary to Hunting Creek, draining Quarry Valley and parallel to the Old Morgan Valley Road. The station is south of the center of Section 28, T12N, R5W. The

location is north of the old Morgan Valley Road, west of a small bridge crossing Hunting Creek and south of a rock outcrop. A steel post is approximately 10 feet south of the location. This location monitors the Tailings Impoundment Facility.

Hunting Creek 10 (HC-10)

On the main channel of Hunting Creek located immediately below the concrete weir in the NE ¼ of Section 11, T11N, R5W. This location is downstream of the West Waste Rock Facility.

Knoxville Creek 3 (KC-3)

In the NW ¼ of Section 7, T11N, R4W, located upstream of the county road crossing and downstream of the Devils Head Road. This location is downstream of the East Waste Rock Facility and the North and South Mine Pit Lakes.

Surface water samples will be analyzed for the constituents listed in Table 4. Metal analysis shall be reported as dissolved (filtered).

Table 4 - Surface Water Monitoring		
<u>Parameters</u>	<u>Units</u>	<u>Frequency</u>
Field Parameter		
Flow (estimate)	gpm	Semi-annually
Temperature	°C	Semi-annually
Specific Conductance	umhos/cm	Semi-annually
pH	pH number	Semi-annually
<u>Monitoring Parameters</u>		
Total Alkalinity	mg/L	Semi-annually
Bicarbonate Alkalinity	mg/L	Semi-annually
Carbonate Alkalinity	mg/L	Semi-annually
Hydroxide Alkalinity	mg/L	Semi-annually
Total Hardness	mg/L	Semi-annually
Total Suspended Solids	mg/L	Semi-annually
Total Dissolved Solids	mg/L	Semi-annually
Chloride	mg/L	Semi-annually
Sodium	mg/L	Semi-annually
Potassium	mg/L	Semi-annually
Calcium	mg/L	Semi-annually
Magnesium	mg/L	Semi-annually
Sulfate	mg/L	Semi-annually
Ammonia	mg/L	Semi-annually
Metals (arsenic, boron, chromium, copper, mercury, nickel & zinc)	ug/L	Semi-annually
Total Cyanide (<u>HC-9 & HC-10 only</u>)	ug/L	Semi-annually

All surface water monitoring parameters shall be graphed to show historical trends at each sample location.

5. Spring and Seep Monitoring

Existing and any new springs and seeps immediately down gradient of the McLaughlin Mine Pit on the south and east sides shall be monitored to determine if the pit lake water is discharging. Existing springs are: 1420BS, 1450BS*, 1550KS, 1560KS, 1600SEEP, 1400KA(adit), 1550KA(adit), 1680DS, and 1590DS as shown and described in

“McLaughlin Reclamation Project, Annual Monitoring Summary Report”. Spring and seep monitoring shall consist of the parameters listed in Table 5.

Table 5. Spring and Seep Monitoring		
<u>New Springs & Seeps</u>	<u>Units</u>	<u>Frequency</u>
Visual Inspection to identify New Springs		Semi-Annually
<u>Existing Springs & Seeps</u>		
Field Parameters		
Flow Rate	gpm	Semi-annually
pH	pH units	Semi-annually
Electrical Conductivity	umhos/cm	Semi-annually
Temperature	°C	Semi-annually
Parameters		
Total Alkalinity	mg/L	Annually
Total Hardness	mg/L	Annually
Total Dissolved Solids	mg/L	Annually
Sulfate	mg/L	Annually
Bicarbonate	mg/L	Annually
Chloride	mg/L	Annually
Metals (arsenic, boron, sodium, chromium, copper, manganese, mercury, & nickel)	ug/L	Annually

* 1450BS shall be monitored for field parameters only.

Annual samples shall be collected during the Spring quarter (April – June).

6. Facility Monitoring

a. Facility Inspection

Annually, prior to the anticipated rainy season, but no later than **30 September**, the Discharger shall conduct an inspection of the facility. The inspection shall assess the status of the following:

Pump-Back System – collection pipes, sumps, discharge pipes and pumps.

Site Security – fences, gates and signs.

Precipitation and drainage Controls - for the Mine Pit Lakes, the Waste Rock Facilities and the Tailings Impoundment Facility.

Tailings Impound Facility Cover, East and West Waste Rock Facility Covers and Mine Pit Waste Rock Covers – settlement, subsidence, erosion, rilling, cracking, thin or poor vegetation cover and berms.

Tailings Impoundment Dam – rilling, erosion, poor vegetation cover, animal burrows, or other damage.

The inspection shall note damage to equipment or systems, (including wells, etc.), evaluate their continued ability to comply with Waste Discharge Requirements and shall include the Standard Observations contained in section F.4.f. of Standard Provisions and Reporting Requirements. Any necessary construction, maintenance, or repairs shall be completed by **31 October**. By **15 November** of each year, the Discharger shall submit an annual report describing the results of the inspection and the repair measures implemented, including photographs of the problem and the repairs.

b. Storm Events

The Discharger shall inspect all precipitation, diversion, and drainage facilities for damage **within 7 days** following *major storm events*. Necessary repairs shall be completed **within 30 days** of the inspection. The Discharger shall report any damage and subsequent repairs within 45 days of completion of the repairs, including photographs of the problem and the repairs.

B. REPORTING

The Discharger shall report all required monitoring data and information, and results of all required facility inspections **semiannually** as required in this Monitoring and Reporting Program and as required in the Standard Provisions. In reporting the monitoring data required by this program, the Discharger shall arrange the data in tabular form so that the date, the constituents, the concentrations, and the units are readily discernible. The data shall be summarized in such a manner so as to illustrate clearly the compliance with waste discharge requirements or the lack thereof. Historical and current monitoring data shall be graphed at least once annually. Graphs for the same constituent shall be plotted at the same scale to facilitate visual comparison of

monitoring data. A short discussion of the monitoring results, including notations of any water quality violations shall precede the tabular summaries. Data shall also be submitted in an acceptable digital format.

Method detection limits and practical quantitation limits shall be reported. Constituents of Concern that are identified at concentrations below the reporting limit but above the method detection limit shall be reported as an estimated concentration (J-flagged) . Field and laboratory tests shall be reported in the quarterly or semiannual monitoring reports. The results of any monitoring done more frequently than required at the locations specified herein shall be reported to the Central Valley Water Board.

As required by the California Business and Professions Code sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Professional Geologist and signed/stamped by the registered professional.

REQUIRED MONITORING REPORTS AND SUBMITTAL DATES:

1. Semiannual Groundwater, Surface Water and Spring and Seep Monitoring Reports

Results from the groundwater and surface water detection monitoring programs shall be submitted Semi-annually on **30 July and 30 January each year**. Results from the Spring and Seep monitoring program shall be reported Annually. The reports shall include all water quality data and observation collected during the reporting period. At a minimum Semi-annual Reports shall include sampling and data collection in Sections A.2 and A.4 of this Monitoring and Reporting Program; the information specified in Standard Provisions and Reporting Requirements for Mining Wastes (2009); and the information specified in the Waste Discharge Requirements shall be reported.

2. Annual Monitoring Summary Report

The Discharger shall submit an Annual Monitoring Summary Report to the Board covering the previous monitoring year on **30 July of each year**. The annual report shall include sampling and data collection in Sections A.1 through A.5 of this Monitoring and Reporting Program; and the information specified in Standard Provisions and Reporting Requirements for Mining Wastes (2009), Section VIII.B. of the *"Reports to be Filed with the Board."*

3. Facility Monitoring Report

Annually, prior to the anticipated rainy season, but no later than **30 September**, the Discharger shall conduct an inspection of the facility (Section A.6. of this Monitoring and Reporting Program). The inspection shall assess damage to the drainage control

system, groundwater monitoring equipment (including wells, etc.), and shall include the Standard Observations contained in Section XII.S. of Standard Provisions and Reporting Requirements for Mining Wastes (2009).

4. Response to a Release

If the Discharger determines that there is significant statistical evidence of a release (i.e. the initial statistical comparison or non-statistical comparison indicates, for any Constituent of Concern or Monitoring Parameter, that a release is tentatively identified), the Discharger shall immediately notify the Board verbally as to the Monitoring Point(s) and constituent(s) or parameter(s) involved. The Discharger shall provide written notification by certified mail within seven days of such determination and implement Response to Release section of the Standard Provisions and Reporting Requirements for Mining Wastes (2009).

5. Water Quality Protection Standard Report

Any proposed changes in a statistical method or concentration limits for a constituent of concern or monitoring parameter a Water Quality Protection Standard Report shall be submitted and include the information required in Section C.1. of this Monitoring Reporting Program. Any changes to Water Quality Protection Standards shall be approved by the Executive Officer in a Revised Monitoring and Reporting Program.

C. WATER QUALITY PROTECTION STANDARD

1. Water Quality Protection Standard

For each waste management unit (Unit), the Water Quality Protection Standard shall consist of all constituents of concern, the concentration limit for each constituent of concern, the point of compliance, and all water quality monitoring points. The Water Quality Protection Standard for naturally occurring waste constituents consists of the constituents of concern, the concentration limits, and the point of compliance and all monitoring points. The Discharger submitted a pre-mining Water Quality Protection Standard in 1984 and has updated the concentration limits as additional data is collected. Elements of the Water Quality Protection Standard are given in sections below.

If subsequent sampling of the background monitoring point(s) indicates significant water quality changes due to either seasonal fluctuations or other reasons unrelated to waste management activities at the site, the Discharger may request modification of the Water Quality Protection Standard.

2. Constituents of Concern

The constituents of concern include all the waste constituents, their reaction products, and hazardous constituents that are reasonably expected to be in or derived from waste contained in the Unit. The constituents of concern for the facility are pH, Total Dissolved Solids, hardness, total alkalinity, bicarbonate alkalinity, carbonate alkalinity, hydroxide alkalinity, sodium, potassium, calcium, magnesium, chloride, sulfate, arsenic, boron, total chromium, copper, lead, mercury, zinc, nickel and total cyanide.

3. Concentration Limits

For a naturally occurring constituent of concern, the concentration limit for each constituent of concern shall be determined as follows:

By calculation in accordance with a statistical method pursuant to Title 27, section 20415; or

By an acceptable alternate statistical method in accordance with Title 27, section 20415.

The Discharger submitted a proposed method for calculating concentration limits in the December 1984 *“Water Quality Statistical Evaluation Report of Background Water Quality Data”*. The Maximum Likely Concentration or upper 1-tailed prediction interval limit at the 95% confidence limit is calculated for the next ten samples for wells, or the next five samples for springs.

The Discharger shall report the concentration limits in each semiannual and annual monitoring report, and shall update them annually. Recently updated (using data up to June 2011) Maximum Likely Limits for groundwater wells are summarized in the tables below. These are to be updated annually as required in Section B.2 of this MRP.

Maximum Likely Concentrations for spring locations cannot be calculated due to the limited data population. The Discharger shall submit Maximum Likely Concentrations for spring locations when the data population reaches ten independent samples.

GROUNDWATER WELLS AT MINE PITS AND WASTE ROCK FACILITY
 Maximum Likely Concentrations – 95% Confidence Level

Constituent		<u>S-01</u>	<u>S-02B</u>	<u>S-03</u>	<u>S-05</u>	<u>S-06</u>	<u>S-10</u>
Alkalinity	mg/L	308	2468	832	529	829	2074
Hardness	mg/L	1149	6435	1650	642	8431	308
TDS	mg/L	2305	11499	2158	5498	10621	8276
Sulfate	mg/L	1340	6856	1011	188	7502	208
Calcium	mg/L	193	777	51	12	186	44
Bicarb	mg/L	396	3211	1214	778	1123	3162
Magnesium	mg/L	166	1123	367	145	1947	48
Chloride	mg/L	49	2279	67	3415	291	3454
Arsenic	ug/L	228	113	6	2	8	163
Boron	ug/L	4415	138910	844	5276	2857	141690
Copper	ug/L	14	79	99	27	213	98
Lead	ug/L	2	245	4	1	40	12
Manganese	ug/L	826	23330	63	62	498	184
Nickel	ug/L	2	663	33	14	83	15
Zinc	ug/L	0	79	403	16	276	30

GROUNDWATER WELLS AT TAILINGS IMPOUNDMENT FACILITY
 Maximum Likely Concentrations – 95% Confidence Level

Constituent		<u>N-01</u>	<u>N-2A</u>	<u>N-05</u>	<u>N-8A</u>	<u>N-8B</u>	<u>N-8C</u>	<u>N-12</u>
Alkalinity	mg/L	484	410	328	111	77	123	774
Hardness	mg/L	574	558	108	806	282	183	773
TDS	mg/L	1519	2366	4020	4753	3074	1410	1039
Sulfate	mg/L	297	2503	1236	511	22	258	127
Calcium	mg/L	133	20	34	116	35	34	34
Bicarb	mg/L	951	588	315	105	111	179	1163
Magnesium	mg/L	50	20	7	143	4	28	151
Chloride	mg/L	42	161	1791	2778	1268	892	33
Arsenic	ug/L	0	10	4	8	2	1	2
Boron	ug/L	783	27055	108120	2295	3113	2562	1136
Copper	ug/L	14	24	25	45	36	34	14
Lead	ug/L	6	0	11	12	13	8	4
Manganese	ug/L	494	49	37	89	68	103	320
Nickel	ug/L	7	3	14	23	24	81	7
Zinc	ug/L	177	34	27	114	81	66	38

MONITORING AND REPORTING PROGRAM ORDER _____
HOMESTAKE MINING CO. OF CALIFORNIA
CLOSURE AND POST CLOSURE MAINTENANCE
MCLAUGHLIN MINE
LAKE, NAPA AND YOLO COUNTIES

The Discharger shall implement the above monitoring program on the effective date of this Order.

Ordered by: _____
PAMELA C. CREEDON, Executive Officer

_____ (DATE) _____