
OTTER CREEK MINE
EXHIBIT 314B
HYDROLOGIC MONITORING AND QUALITY ASSURANCE PLAN

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1.0 PROJECT DESCRIPTION AND REGULATORY REQUIREMENTS

The Industrial Energy and Minerals Bureau (the Bureau) of the Montana Department of Environmental Quality (MDEQ) is responsible for administering regulations for surface and underground coal mining operations in the state of Montana. The Montana Strip and Underground Mine Reclamation Act (MSUMRA, 82-4-222 et seq.) requires that coal mine operators monitor and report on the quality and quantity of surface and groundwater, and assess and evaluate the probable hydrologic consequences of mining operations. Monitoring is conducted and the results are reported to the Bureau in the Annual Hydrology Report (AHR).

This document constitutes the Monitoring and Quality Assurance Plan (MQAP) for surface water and groundwater data collected at the Otter Creek Mine (Permit ID C2012018). The purpose of the MQAP is to document planning for data collection operations and to provide a plan for obtaining the type and quality of data needed to meet regulatory requirements. The MQAP integrates all planning, data collection, and reporting activities and specifies how quality assurance (QA) and quality control (QC) measures are applied to assure that the results obtained meet statutory requirements.

The MQAP, accompanied with the AHR, constitutes the quality assurance program for surface and groundwater data collected in accordance with 17.24.314, 17.24.633, 17.24.645, and 17.24.646, and meets the requirement that “sampling and analysis must include a quality assurance program acceptable to the department.” See ARM 17.24.645(6); 17.24.646(6).

Data collection consists of surface and groundwater quality and quantity at monitoring stations within and outside of the proposed Otter Creek Mine (Permit ID C2012018) permit boundary. Activities include water quality sampling of wells, streams, ponds and Montana Pollution Discharge Elimination System (MPDES) outfalls, monitoring of intermittent and ephemeral stream flows, monitoring of MPDES outfall flows, and monitoring of well and pond levels. Sampling locations, parameters, methods and other details regarding water monitoring design are in Section 2.0, Data Quality Objectives and Sampling Design.

This MQAP does not provide requirements for the collection and analysis of MPDES-mandated water quality and quantity data. Permitted discharges are regulated under the state's MPDES Program and administered by the Water Quality Protection Bureau at the MDEQ. Data collection and reporting activities mandated by MPDES permits must meet requirements established for MPDES data in accordance with ARM 17.24.633(4)&(5).

2.0 DATA QUALITY OBJECTIVES AND SAMPLING DESIGN

2.1 DATA QUALITY OBJECTIVES

Data quality objectives are established using a planning process designed to ensure that the type, quantity, and quality of environmental data used in decision making will be appropriate for its intended use. The intended use of data as prescribed in this MQAP is to inform decision-making regarding the following questions:

1. To what extent are impacts to the hydrologic balance occurring on or off the permit area as a result of mining or reclamation activity?
2. Is 'material damage' occurring as a result of mining or reclamation activity?

Data and information needed to answer these questions come from an approved network of representative surface and groundwater quality and quantity monitoring sites within and outside of the mine permit boundary (Section 2.2). The sampling design and analytical analyses ensure that data is of sufficient quality (Section 3.0) to allow meaningful comparisons to applicable water quality standards and to allow analysis of long and short term water quality and quantity changes or trends. This MQAP has been designed to meet these data quality objectives.

2.2 SURFACE AND GROUNDWATER MONITORING DESIGN

Surface and groundwater monitoring is conducted as required by statutory and administrative requirements (e.g. ARM 17.24.314, ARM 17.24.633, ARM 17.24.645, ARM 17.24.646) at approved surface and groundwater monitoring sites. This MQAP focuses on the Tract 2 mining area, and in particular, the areas that drain the proposed mining area to Otter Creek and Threemile Creek. Some monitoring will be conducted in the Tenmile Creek drainage and will provide baseline reference information for areas where disturbance is not currently planned. In the proposed mine area and on portions of Otter Creek, the groundwater relationship between overburden, the Knobloch coal seam and the Otter Creek alluvium will be monitored. In addition, hydrologic conditions in Tract 1 and Tract 3, and other adjacent

areas will be monitored to the extent appropriate to project cumulative impacts associated with mining Tract 2 and eventual mining of Tracts 1 and 3.

Groundwater and surface water monitoring described in this MQAP is intended to guide collection of water resources data to allow early detection of changes in quality or quantity. Further, data collected is expected to be sufficient to support evaluation of changes detected and potential relation to mining activities. The basis of the water resources monitoring program will be the network of wells and surface water sites that was established for collection of baseline data.

Groundwater and surface water monitoring associated with the Otter Creek Mine will consist of a network of sites positioned to allow early detection of changes in the hydrologic system near the mine and to monitor water levels and quality at distance from the mine in compliance with ARM 17.24.645 and ARM 17.24.646. Water quality and quantity sampling is conducted on the following surface and groundwater features:

- Streams
- Springs
- Ponds and impoundments
- Wells
- MPDES outfall stations

In addition to surface and groundwater sampling, precipitation/climate data is collected in support of hydrologic characterization.

Plate 1 shows the location of the current and proposed monitoring locations at the proposed Otter Creek Mine

2.3 SURFACE WATER MONITORING NETWORK

Twenty-four surface water monitoring locations were established along Otter Creek, Threemile Creek, and Tenmile Creek, as well as unnamed, representative ephemeral and/or intermittent drainages near the proposed mine, to collect baseline data. Ten of the sites established during baseline studies will continue to be monitored for surface water flow and

quality near the mine (Table 2-1). Two springs, Fortune Spring and Coal Creek Spring, will be monitored for water quality and flow (Table 2-2). Two ponds, located near the proposed mine, will be monitored for water quality and level (Table 2-3). The locations of all surface monitoring sites are shown on Plate 1.

2.3.1 Monitoring Schedule

Surface water monitoring will be conducted in accordance with the monitoring schedules shown on Tables 2-1 through 2-3.

2.3.2 Methods

Collection of surface water data will be conducted in accordance with standard field operating procedures contained in Appendix A. Methods used will be consistent with those used during baseline collection and in accordance with accepted industry standards.

2.3.3 Surface Water Level Monitoring

Stage height and flow will be measured at surface water sites that have a well-defined channel and sufficient surface flow for accurate measurement in accordance with methods HF-SOP-15 or HF-SOP-24, as appropriate. Surface water sites will be monitored for water levels and sampled for water quality twice a year.

Surface water sites along Otter Creek (SW-2, SW-16, SW-22 and SW-25) are equipped with stilling wells. Each site is instrumented with an electronic pressure transducer and datalogger. Each site has been surveyed. Electronic data will periodically be downloaded and compiled in the project database. Rating curves developed during the baseline period will be revised based on field measurement of flow at these sites. Recorded stage height will be converted to flow rate and recorded in the project database.

2.3.4 Seeps, Springs and Pond Monitoring

Springs and ponds will be monitored for water levels and sampled for water quality on a semi-annual basis. Survey benchmarks were established at each pond during the baseline

period to allow the ponded water surface elevation to be calculated. The calculated water elevation will be entered in the project database.

2.3.5 Surface Water Quality Sampling

Surface water quality samples will be collected from passive grab sample sites or during periods of ephemeral flow when feasible. Surface water sample collection is described in Appendix A. Samples will be placed on ice immediately after collection and transported to a certified analytical laboratory for analysis. Surface water samples will be analyzed for parameters listed in Table 2-4. Surface water will be analyzed for total recoverable metals. Results of the analysis will undergo a validation process (Section 3.0) to ensure data quality.

2.4 GROUNDWATER MONITORING NETWORK

Monitoring wells installed for baseline studies will be the foundation of groundwater monitoring at the Otter Creek Mine. In addition to using wells established for baseline monitoring, wells will be installed and incorporated into the monitoring program as mining progresses. Wells to be installed include a battery of wells on U.S. Forest Service property east of the mine. The battery will include one well installed into the overburden, Knobloch Coal, and the Knobloch Coal underburden. Additional wells may be installed if the coal is split at that location. One well battery was installed south east of the mine on U.S. Forest Service property in July 2014. Monitoring wells will be installed into the boxcut spoil at locations sufficient to monitor water quality across the length of the cut as soon as backfill is completed. Table 2-5 provides a list of wells that will comprise the groundwater monitoring program. Locations of these wells are shown on Plate 1.

Nomenclature used for monitoring well identification is as follows:

Hydrogeologic Unit	Designation	Completion Interval
Alluvium Alluvial Valley Floor	A-# AVF-#	Alluvium or wells completed as part of alluvial valley floor cross sections
Clinker (individual, well batteries, or AVF sections)	C#	Baked shale, clinker
Bedrock Monitoring Wells:	B#-	“B” designated battery of wells
Overburden (included in well batteries)	-O	Knobloch overburden, bedrock units
	-CO	Colluvial Overburden
Knobloch Coal	-K	Knobloch Coal
Knobloch Coal	LK	Lower Knobloch when split
Knobloch Coal	UK	Upper Knobloch when split
Underburden	-U	Knobloch Coal Underburden – first water below Knobloch Coal
Spoils	-SP	Backfilled spoils

2.4.1 Monitoring Schedule

Groundwater monitoring will be conducted in accordance with the monitoring schedule shown on Table 2-5. Samples collected for analysis will be analyzed at a certified laboratory for the analytical parameters shown on Table 2-6.

2.4.2 Groundwater Level Monitoring

Water levels in network wells will be monitored according to the schedule shown on Table 2-5. Water levels will be measured using electronic water level probes. Water level data will be entered into the project database so hydrographs, showing water level trends, may be developed.

2.4.3 Groundwater Quality Sampling

Groundwater quality data will be collected on either an annual or semi-annual basis as shown on Table 2-5. Samples will be collected, processed and analyzed in accordance with standard operating procedures described in Appendix A. Well purging and water quality sampling will be conducted using either submersible pumps or by bailing in accordance with methods described in Appendix A.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

3.1 QUALITY CONTROL

Quality control (QC) will be evaluated using field quality control samples (field blanks, rinsate blanks, duplicates), and laboratory control samples (matrix spikes, laboratory blanks, laboratory duplicates, and laboratory control samples). Surface water and groundwater QC samples will consist of one duplicate, one rinsate blank and one DI blank per 20 samples. Quality control will be used to evaluate precision and accuracy of the water quality analyses.

3.2 QUALITY ASSURANCE

Data obtained through field measurements and laboratory analyses will be entered into the project database. Information contained in the database will be validated by checking laboratory quality control results as well as results of field control samples. Data validation reports will be included in semi-annual reports to the MDEQ.

3.3 COMPILE AND EVALUATE DATA

Surface water and groundwater data, including water levels, flow and hydraulic parameters will be utilized to prepare a conceptual hydrologic model of the area for use in completion of the baseline monitoring report.

4.0 REPORTING

In accordance with ARM 17.24.645(8), results of water resource monitoring will be reported to the MDEQ on a semi-annual basis. Each report will contain a summary of monitoring activities during the previous six-month period, analytical results, and a description of any anomalies identified through the monitoring program.