

APPENDIX B

COMPLIANCE AND OPERATIONAL MONITORING PLAN

GROUND WATER DISCHARGE PERMIT

PERMIT NO. UGW350011

(April 2013)

1.0 INTRODUCTION

This plan presents the sampling, analyses, and quality guidelines for the sampling of operational process discharges to the Tailings Impoundment. Sampling is being performed to assure that the tailings inflows and interstitial water within the impoundment are consistent with the Best Available Technology (BAT) performance standards approved in the Tailings Impoundment Ground Water Discharge Permit No. UGW350011. This document satisfies the requirements of Part 1.E.2a and 2b of the permit. This monitoring plan complements the plan for Assessment of Acidification Potential (Appendix A) prepared to satisfy the requirements of Part I.H.1b of the permit.

2.0 MONITORING

Tailings water to be monitored under this plan will characterize the interstitial waters (within the tailings), and seeps. Groundwater monitoring wells located around the perimeter of the impoundment will be monitored to observe trends in local groundwater and determine compliance. Table 1 details the locations and frequency of required monitoring points described in this section. Tailings slurry solids will also be monitored.

2.1 Tailings Water Samples

Tailings water samples will be collected from surface water sites and wells completed within the tailings footprint.

2.1.1 Surface Water Sites

Surficial tailings water samples will be collected from the following locations:

- Clarification Canal (sampling site CLC452) – This site will be sampled quarterly and was selected to show the quality of the tailings water as it returns from the top of the Tailings Impoundment. This location is unaffected by other discharges to the clarification canal and represents nearly the entire return flow from the impoundment. Additionally, this site has a sampling history dating back to 1991.

- Toe Collection Ditch (sampling sites TLP1436, and TLP1469) - Will be sampled quarterly. Site TLP1436 is located in the toe collection ditch near the 007 UPDES Outfall and site TLP1469 is located adjacent to the Gypstack.
- Seeps (sampling sites TLS1426) – These seeps are located on the Tailings Impoundment embankment and have been sampled intermittently since 1985. Samples of these seeps will be collected twice per year, once in the spring and in the late summer or early fall. Some of these seeps will eventually be covered with tailings; sampling will be discontinued at that time. The discovery of any new seeps within the tailings embankment should also be sampled and reported in the annual report.
- Waste Water Treatment Plant (sampling point WTS1489) – This site no longer discharges water to the Tailings Impoundment. Should discharges from this site resume, grab samples will be collected from this site quarterly as long as the effluent from the WWTP is discharged directly to the Tailings Impoundment.

The locations of these sampling sites are shown on Figure 1. Samples will be collected using the procedures provided in Kennecott's Standard Operating Procedures for Water Sampling. Protocols for handling samples and obtaining analyses will be as specified for ground water samples in the Ground Water Characterization and Monitoring Plan (GCMP).

2.1.2 Tailings Wells

Tailings wells TLT887, TLT2452, TLT2575A, TLT2575B and NET2596 will be sampled semi-annually. These wells are constructed within the tailings and were selected to include wells located in various portions of the impoundment, both laterally and vertically. The locations of these wells are shown on Figure 1.

Samples collected from these wells will be collected using sampling methods and protocols specified in the GCMP. New well construction will be done as specified in the GCMP.

2.1.3 Compliance Wells

Compliance wells will be sampled according to the schedule listed in Table 1. The compliance wells are located around the perimeter of the Tailings Impoundment complex and are completed in the aquifer system that ranges from Class II to Class IV ground water. Additional monitoring and reporting requirements for non-compliance conditions are described in Part I, Section H of the permit. If the concentration of any pollutant exceeds the Compliance Limit in any compliance monitoring well, Kennecott will initiate monthly sampling for the well(s) that have exceeded the Compliance Limit. Monthly sampling will continue for two months or until the compliance of the facility can be determined.

Notification to the Executive secretary will be made in the corresponding semi-annual report.

Compliance monitoring wells will be analyzed for those constituents listed in section 2.1.4 below. However, compliance will be determined based on the following parameters: pH, arsenic, barium, cadmium, chromium, copper, lead, selenium, zinc, sulfate and TDS.

2.1.4 Analytes and Analytical Methods

All surface and tailings well samples will be analyzed for pH, conductivity, temperature, Total Dissolved Solids (TDS), sulfate, chloride, alkalinity, sodium, potassium, magnesium, calcium, arsenic, barium, cadmium, chromium, copper, lead, selenium, silver, and zinc. Water levels will be measured immediately prior to purging and collection of samples from the tailings wells.

The methods used for analyses will be those specified in Table QAPP-2 of the Quality Assurance Project Plan for the Ground Water Characterization and Monitoring Plan (QAPP-GCMP).

2.1.5 Quality Assurance

The quality assurance program for these samples will be as specified in the QAPP-GCMP. This requires a minimum of 20% duplicate, spike, spiked duplicate, equipment and trip blanks. The precision and accuracy objectives will be those specified in Table QAPP-1 of the QAPP-GCMP.

2.2 Solid Samples

2.2.1 Sample Collection

Solid samples will be collected semi-annually to characterize the metals content and metals solubility of materials discharged to the Tailings Impoundment. A total of five samples will be analyzed every six months and two samples will be analyzed every three months as follows:

- West cyclone underflow tailings (TLP1485 - quarterly)
- West cyclone overflow tailings (TLP1486 - semiannual)
- East cyclone underflow tailings (TLP1487 - quarterly)
- East cyclone overflow tailings (TLP1488 - semiannual)
- Smelter slag/hydromet tailings (TLP2593 - semiannual)

The North Tailings embankment is constructed of coarse underflow material from two cyclone stations (designated East and West Cyclones). The fine-grained overflow material is placed in the interior of the impoundment. The East Cyclone station currently receives material only from the Copperton Concentrator. The West Cyclone Station currently receives Copperton tailings, Power Plant fly ash

and smelter slag/hydromet tailings. In the future, Smelter process waters may be directed to the West Cyclone station as well.

2.2.2 Analysis and Analytical Methods

All of the solid samples will be analyzed for the following constituents:

- Total Metals – As, Cd, Cr, Cu, Pb, Se and Zn,
- SPLP – As, Cd, Cr, Cu, Pb, Se and Zn.

Total metals analysis will be conducted according to EPA SW846 Method 6010 or 6020. SPLP analysis will be conducted according to EPA SW846 Method 1312.

2.2.3 Quality Assurance

The quality assurance program for these samples will require a minimum rate of 20% for duplicate, spike, spiked duplicate, and blank samples. The precision objectives will require duplicate samples to have Relative Percent Differences (RPD) of less than 25%. Accuracy objective will be spike recoveries between 65% and 135%. Blank samples will show no concentrations above the detection limit. The completeness goal is 100%.

3.0 REPORTING

Results of the water samples and the solid sampling will be reported in the annual monitoring report required and described in Appendix A.

APPENDIX B
COMPLIANCE MONITORING PLAN
TABLE 1
SAMPLE SCHEDULE AND WELL CONSTRUCTION DETAILS

Description	Sample Location Identification	Sample Frequency	Northing	Easting	Ground Surface Elevation (Ft AMSL)	Well Casing Top Elevation (Ft AMSL)	Casing Diameter (Ft)	Screen Top (Ft)	Screen Bottom (Ft)	Well Depth (Ft)
Surface Water	CLC452	quarterly	7431098.763	1477627.026	4236.745	NA	NA	NA	NA	NA
Toe Ditch	TLP1436	quarterly	7448657.891	1475500.588	4213.644	NA	NA	NA	NA	NA
	TLP1469	quarterly	7441822.072	1454049.978	4217.548	NA	NA	NA	NA	NA
Seeps	TLS1426	semiannual (if flowing)	7431247.082	1468939.158	4241.533	NA	NA	NA	NA	NA
Tailings Wells	NET2596	semiannual	7432842.004	1475151.88	4391.111	4392.82	0.208	123.0	133.0	135.00
	TLT887	semiannual	7436977.784	1456314.392	4401.823	4402.31	NA	NA	NA	NA
	TLT2575B	semiannual	7435235.015	1462330.623	4446.748	4448.723	0.208	233.0	245.0	247.00
	TLT2575A	semiannual	7435221.193	1462334.962	4446.893	4449.235	0.333	171.0	181.0	177.15
	TLT2452	semiannual	7437684.781	1476549.873	4407.503	4408.038	0.000	19.0	0.0	201.00
Compliance Wells	NEL532A	semiannual	7434092.934	1477917.371	4229.578	4231.417	0.130	11.0	16.0	19.43
	NEL532B	semiannual	7434091.206	1477910.979	4230.047	4231.951	0.130	38.0	43.0	46.00
	NEL536A	annual	7431250.503	1477963.928	4234.612	4236.084	0.130	10.3	15.3	17.55
	NEL536B	annual	7431251.504	1477957.872	4234.414	4236.473	0.130	34.7	39.7	41.60
	NED604A	semiannual	7430046.865	1470551.826	4254.494	4256.819	0.170	15.0	25.0	26.42
	NED604B	semiannual	7430041.37	1470541.413	4254.495	4257.068	0.170	65.0	80.0	79.95
	NET646A	semiannual	7447418.839	1457511.362	4216.136	4218.493	0.170	5.0	15.0	17.93
	NET646B	semiannual	7447423.34	1457514.227	4215.937	4218.62	0.170	39.6	49.6	51.73
	NEM1387	semiannual	7429854.378	1474135.24	4244.877	4247.571	0.208	10.0	20.0	21.00
	NET1380A	semiannual	7437102.682	1454699.634	4225.739	4227.211	0.208	13.5	23.5	24.50
	NET1380B	annual	7437098.49	1454703.717	4225.51	4227.251	0.208	54.0	64.0	65.00
	NET1381A	semiannual	7443041.228	1479773.311	4219.361	4221.454	0.208	25.0	35.0	36.00
	NET1381B	semiannual	7443040.648	1479779.414	4219.259	4221.438	0.208	44.0	54.0	55.00
NEL1382A	semiannual	7438541.705	1478982.913	4223.973	4225.585	0.208	10.0	20.0	21.00	

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TABLE 1**

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Description	Sample Location Identification	Sample Frequency	Northing	Easting	Ground Surface Elevation (Ft AMSL)	Well Casing Top Elevation (Ft AMSL)	Casing Diameter (Ft)	Screen Top (Ft)	Screen Bottom (Ft)	Well Depth (Ft)
Compliance Wells (cont.)	NEL1382B	semiannual	7438545.766	1478984.052	4224.167	4226.41	0.208	29.0	39.0	40.00
	NEL1382C	semiannual	7438550.199	1478984.747	4224.192	4226.222	0.208	88.0	98.0	100.00
	NET1383A	semiannual	7449891.765	1472993.932	4214.667	4216.952	0.208	14.0	24.0	25.00
	NET1383B	semiannual	7449891.675	1473000.303	4215.073	4217.187	0.208	34.0	44.0	45.00
	NET1384A	semiannual	7449876.864	1465846.49	4216.049	4217.85	0.208	13.0	23.0	25.00
	NET1384B	semiannual	7449881.878	1465844.42	4216.178	4218.056	0.208	49.0	59.0	60.00
	NET1385A	semiannual	7446894.687	1476726.326	4214.988	4217.494	0.208	14.5	24.5	25.00
	NET1385B	semiannual	7446898.159	1476718.97	4214.99	4217.181	0.208	60.0	70.0	71.00
	NET1386A	annual	7442034.805	1453574.393	4216.379	4218.221	0.208	29.0	39.0	40.00
	NET1386B	annual	7442031.393	1453571.739	4216.493	4218.389	0.208	61.0	71.0	72.00
	NET1393A	semiannual	7444066.516	1454571.437	4218.168	4219.962	0.208	29.0	39.0	40.00
	NET1393B	semiannual	7444059.728	1454567.254	4218.239	4220.23	0.208	58.0	68.0	70.00
	NET1490	semiannual	7432494.375	1459144.501	4333.459	4334.644	0.208	105.4	124.9	130.00
	NET1491	semiannual	7432964.615	1459178.086	4341.192	4343.219	0.208	125.8	145.0	149.93
NET1492	semiannual	7433411.604	1459252.599	4339.828	4341.573	0.208	107.4	127.2	128.98	

amsl = above mean sea level

ft = feet

NA = not applicable

-- = not available

Notes:

1. Surveying was conducted in January and March 2012.
2. Northing and Easting (N/E) Coordinates are relative to State Plane NAD83 (2007). The N/E was surveyed at the point that well casing top was surveyed.
3. Elevations are relative to NGVD88.
4. The well casing top elevation was surveyed at the point where depth to groundwater is measured. If a mark was located on the well casing top, this mark was surveyed. If there was no mark, the casing top was surveyed on the north side. For wells with a permanent valve system (flowing wells) and/or dedicated pumps, the well casing top was surveyed at the top of the valve on the north side.
5. All samples will be analyzed for pH, conductivity, temperature, TDS, sulfate, chloride, alkalinity, sodium, potassium, magnesium, calcium, arsenic, barium, cadmium, chromium, copper, lead, selenium, silver, and zinc.

App B map here