



2016 ANNUAL ACTIVITY AND MONITORING REPORT

SUMITOMO METAL MINING POGO LLC

Submitted To:

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List of Acronyms

- ADEC:** Alaska Department of Environmental Conservation
- ADNR:** Alaska Department of Natural Resources
- ADF&G:** Alaska Department Fish & Game
- APDES:** Alaska Pollutant Discharge Elimination System
- APMA:** Alaska Placer Mining Application
- BMP:** Best Management Plan
- BOD:** Biological Oxygen Demand
- CIP:** Carbon in Pulp
- CISWI:** Commercial and Industrial Solid Waste Incineration
- COBC:** Compliance Order by Consent
- COE:** Corp of Engineers
- CRC:** Cultural Resources Consultants
- DMR:** Discharge Monitoring Report
- DSTF:** Dry Stack Tailing Facility
- EPA:** Environmental Protection Agency
- GPM:** Gallons per Minute
- ISO14001:** International Standard Organization, Environmental Management
- MDL:** Method Detection Limit
- ORTW:** Off River Treatment Works
- QAP:** Quality Assurance Plant
- ROW:** Right of Way
- RTP:** Recycle Tailing Pond
- SHPO:** State Historical Preservation Office
- SRCE:** Standardized Reclamation Cost Model
- STP:** Sewage Treatment Plant
- TDS:** Total Dissolved Solids
- TKN:** Total Kjeldahl Nitrogen (ammonia)
- TSS:** Total Suspended Solids
- TU_c:** Toxicity Units, chronic
- TWUP:** Temporary Water Use Permits
- WAD:** Weak Acid Dissociable (cyanide)
- WET:** Whole Effluent Toxicity test
- MWTP:** Mine Water Treatment Plant

1. INTRODUCTION

Sumitomo Metal Mining Pogo LLC (Pogo) prepared this report to fulfill the requirements of the *Alaska Department of Environmental Conservation (ADEC) APDES Permit AK005334-1 (5/1/11)*, *Alaska Department of Environmental Conservation (ADEC) Waste Management Permit 2011DB0012 (2/7/2012)*, *Alaska Department of Natural Resources (ADNR) Pogo Mine Millsite Lease ADL416949 (3/9/04)*, and *ADNR Plan of Operations Approval F20129500 (2/7/2012)*. This report covers the period from January 1, 2016 through December 31, 2016. A General Location Map can be found in **Figure 1, Appendix A**.

2. 2016 MONITORING

A prescriptive program of environmental monitoring is conducted as required by Pogo's permits and in accordance with Pogo's approved *Pogo Mine Monitoring Plan* and *Quality Assurance Plan (QAP)*.

The objectives of Pogo's monitoring programs are to:

- Monitor the water quality of the effluent discharged from the facility,
- Monitor water quality changes in the Goodpaster River and in the groundwater below the facility that may occur as a result of mining activities or discharges from the facility,
- Monitor the CIP Tailings Processes associated with the underground paste backfill, and
- Monitor the Flotation Tailings and the materials placed in the Dry Stack Tailings Facility.

Samples collected from Mine Water Treatment Plant (MWTP) #3 (located near the 1525 portal), groundwater stations, surface water stations, the sewage treatment plant (STP) and the Off River Treatment Works (ORTW) effluent were submitted to Energy Laboratories, Inc. Pollen Environmental Laboratories, Inc. analyzes sewage treatment plant samples. Samples collected from PC002 to monitor mineralized waste rock and PC003 flotation tailings were analyzed by ALS Chemex. Annual WET Test samples were submitted to TRE Environmental Laboratory and CH2MHill Laboratory. Annual fish tissue samples were analyzed by Test America Laboratory, Tacoma.

2.1 ANNUAL VERIFICATION OF LABORATORY SPECIFIC MDL STUDY

ADEC Waste Management Permit 2011DB0012 (2/7/12), Section I.3.1.4, 1.7.3

Laboratories perform lab quality assurance and quality control procedures at regular intervals to verify the accuracy of the established MDLs. EPA-accredited laboratories' routinely spike and run replicate samples once or twice a year to either confirm or re-establish laboratory MDLs. A copy of the most recent MDL studies from the laboratories listed in Section 2 above are provided in **Appendix D**.

2.2 SUMMARY

A summary of the 2016 monitoring results show:

APDES Permit:

- **Outfall 011:** Pogo reported several minor pH excursions and two potential iron exceedances during 2016. Refer to **Section 2.3.1** for more detail.
- **Outfall 001:** Pogo reported two potential WAD cyanide exceedances in April and a copper exceedance in November during 2016. Refer to **Section 2.3.2** for more detail.
- **Outfall 002:** Pogo reported no exceedances during 2016, however discharge ceased during the first quarter. Refer to **Section 2.3.3** for more detail.
- **Whole Effluent Toxicity (WET):** WET testing took place in June with two laboratories concurrently. All final test results were within the permit limits. Refer to **Section 2.3.4** for more detail.
- **Surface Water:** No adverse trends were observed in the surface water samples collected during 2016. Refer to **Section 2.4.1** for more detail.
- **Fish Tissue:** Annual fish tissue sampling was completed during September. No adverse trends were observed. Refer to **Section 2.4.2** for more detail.

Groundwater:

- **2011 Series Wells:** Two wells are located below the Drystack Tailings Facility (DSTF),

MW11-001A and MW11-001B. The wells monitor groundwater downstream of the DSTF and upstream of the Recycled Tailings Pond (RTP). Refer to **Section 2.5.1** for more detail.

- **500 Series Wells:** Three wells are located below the Recycled Tailings Pond (RTP) Dam (MW12-500, MW12-501, and MW12-502). The wells monitor groundwater downstream of the RTP seepage collection system. Chloride, Sodium, Nitrate were detected above the trigger limits in all of the wells. Refer to **Section 2.5.3** for more detail.
- **200 Series Wells:** Two wells, MW04-213 and MW11-216, are located downgradient of the ore body to monitor groundwater quality. No adverse trends were observed. Refer to **Section 2.5.4** for more detail.
- **LL Series Wells:** LL04-031 and LL04-032 are located downgradient of the ORTW to monitor groundwater between the ORTW and Goodpaster River. Samples were collected during the third quarter. No adverse trends were observed. Refer to **Section 2.5.5** for more detail.
- **2012 Series Wells:** Two wells are located adjacent to the Pogo Airstrip, MW12-001A and MW12-001B. Refer to **Section 2.5.6** for more detail.

Process Control:

- **PC001:** PC001 monitors CIP tails prior to use in paste backfill. All samples are within limits and conditions set forth within the permit. Refer to **Section 2.6.4** for more detail.
- **PC002, PC003 Solids:** PC002 samples monitor mineralized waste rock that is placed within the Drystack Tailings Facility (DSTF). PC003 Solids samples monitor flotation tailings that are placed within the DSTF. No adverse trends were observed. Refer to **Sections 2.6.5 and 2.6.6** for more detail.
- **PC003 Liquid:** PC003 Liquid samples monitor interstitial water pressed from the flotation tailings prior to placement within the DSTF. Selenium values are trending downward. Refer to **Section 2.6.7** for more detail.

A discussion of the results for each sampling program is provided below. Time series graphs are provided in **Appendix C**.

2.3 TREATED EFFLUENT MONITORING

ADEC APDES AK0053341 (5/1/11), Appendix A, 3.0

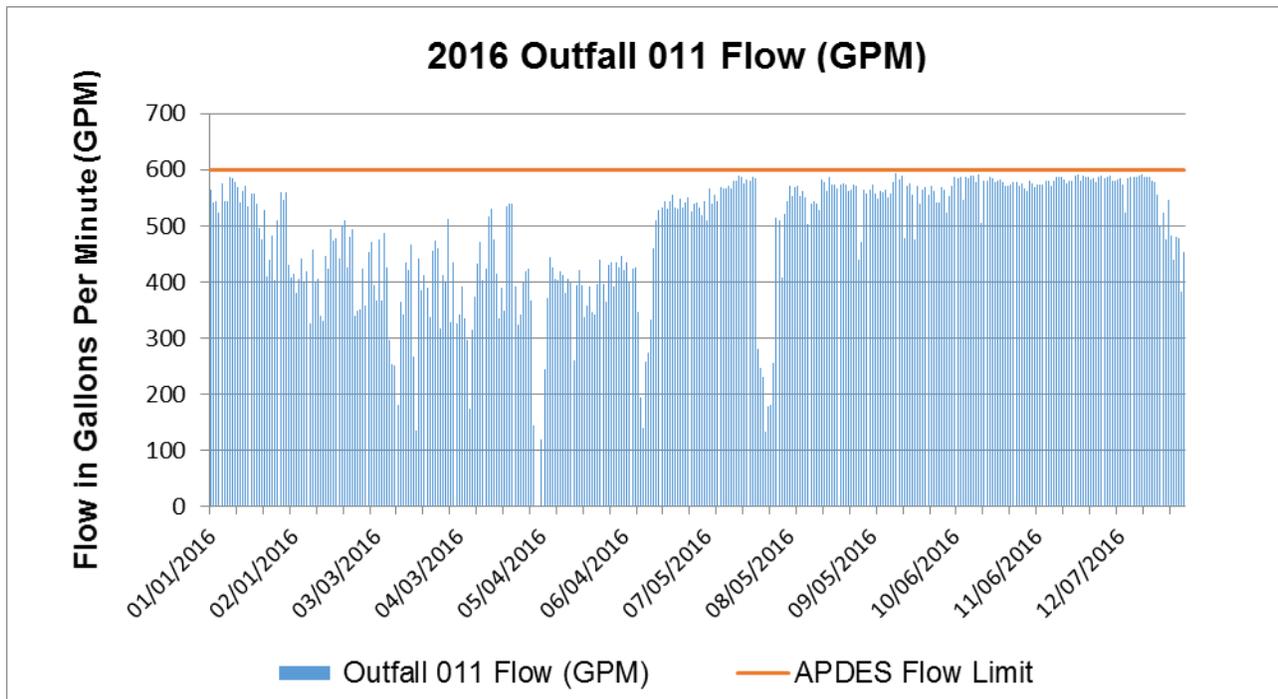
Treated effluent data were previously submitted to ADEC via copies of the Discharge Monitoring Reports (**DMRs**) under the APDES Permit. The monitoring locations for treated effluent are shown on **Figure 2 in Appendix A**.

2.3.1 Outfall 011- Treated Effluent from Mine Water Treatment Plant

ADEC APDES AK0053341

Groundwater and drill water collected from the underground workings, surface runoff and groundwater collected in the RTP and mine seepage water are sent to the MWTP#3, treated and then discharged to the ORTW or directed to the mill for use as process water. Discharge to the ORTW occurred throughout the year. The volume of water discharged from Outfall 011 in 2016 is shown below in **Chart 1**.

Chart 1: 2016 Water Treatment Plant #2 & #3 Outfall 011 Discharge to ORTW



Continuous pH data is collected at Outfall 011 along with weekly and quarterly laboratory samples for metals, Total Suspended Solids (TSS), Hardness, Weak-Acid Dissociable (WAD) Cyanide, Anions, Cations, and Total Dissolved Solids (TDS).

Pogo reported a potential exceedance of the daily maximum effluent limit for iron on the June DMR for Outfall 011. The sample collected on June 15, 2016 reported an iron concentration of 2,200 µg/L. A duplicate sample was also collected and reported an iron concentration of 2,240 µg/L. Pogo also reported a potential exceedance of the monthly average and daily maximum effluent limit for iron on the July DMR for Outfall 011. Pogo investigated the exceedances and believes the elevated iron was due to elevated turbidity within the MWTP#3 clarifier overflow and Micro-Filter feed. Pogo implemented corrective actions including testing during treatment and establishing trigger levels if elevated iron or turbidity concentrations are observed.

In August 2016, there were three pH excursions reported at Outfall 011. The excursions fall under the continuous pH monitoring exemption under 40 CFR § 401.17 (single incidences less than 60 minutes, and monthly cumulative total less than 7 hours and 26 minutes).

On August 5, the continuous monitor, Meter A, recorded a pH level above the 9.0 su permit level for 1 minute; the maximum pH was reported at 9.15 su. On August 6, the continuous monitor, Meter A, recorded a pH level above the 9.0 su permit level for 3 minutes; the maximum pH was

reported at 9.50 su. On August 6, the continuous monitor, Meter B, recorded a pH level above the 9.0 su permit level for 4 minutes; the maximum pH was reported at 9.41 su.

Except as noted above, all results are within the limits and conditions set forth within the permit. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.3.2 Outfall 001 – Discharge from Off River Treatment Works

ADEC APDES AK0053341 (5/1/11), 1.1

Treated effluent from MWTP#3 is sent to the ORTW. After mixing in the ORTW, water flows over the weir of Pond 2 (Outfall 001) and into the Goodpaster River. The sampling location is at the weir.

Continuous turbidity data and twice-daily pH readings are collected along with weekly laboratory samples for metals, WAD Cyanide, TDS, Turbidity, Sulfate, and Hardness at Outfall 001. In addition, daily field parameters and weekly samples required by the permit, (Lead, Mercury, and Turbidity) and other parameters, were collected upstream from the discharge point (NPDES001B) to determine background water quality of the Goodpaster River.

Pogo reported two potential WAD cyanide exceedances on the April DMR for Outfall 001. The sample collected on April 6, 2016 reported WAD cyanide at 24 µg/L. The sample collected on April 13, 2016 reported WAD cyanide at 23 µg/L. Pogo believes the reported WAD cyanide concentrations may not be representative. Samples collected at Outfall 011 on the same days reported WAD cyanide concentrations of 39 µg/L and 15 µg/L. The monthly average for WAD cyanide at Outfall 011 was 25.33 µg/L. The ORTW pumps were properly functioning and average dilution was measured at 17. The corresponding concentration of WAD cyanide at Outfall 001 should have been below Pogo's site specific method detection and reporting limits for WAD cyanide. In addition, samples taken of the Goodpaster River reported WAD cyanide levels of 3 µg/L on April 6 and 16 µg/L on April 13 which is unusual. Pogo believes the Goodpaster River's turbid and tannic water characteristic of spring runoff potentially caused inference with the WAD cyanide analytical method resulting in positive results.

Pogo reported a potential exceedance of the daily maximum limit for copper on the November DMR for Outfall 001. The sample collected on November 16, 2016 reported a copper concentration of 6.0 ug/L. Pogo investigated the potential exceedance. No direct cause has been

found. Subsequent samples have not detected copper above the permit limits.

Except as noted above, all results were within the limes and conditions set forth within the permit. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.3.3 Outfall 002 – Treated Effluent from Sewage Treatment Plant

ADEC APDES AK0053341 (5/1/11), 1.3

The STP operated throughout 2016 with discharge flows ranging between 10,000 and 20,000 gallons per day. Daily field parameters were collected to assess quality of treated effluent prior to discharge in the mixing zone in the Goodpaster River. Weekly samples were also collected for Biological Oxygen Demand (BOD5), TSS, Fecal Coliform, Nitrates, and Chlorine. Influent data from STP002 were collected for BOD5 and TSS on a monthly basis to determine quarterly percent removal.

At the end of the first quarter of 2016, Pogo ceased discharging at Outfall 002. Throughout the remainder of 2016, treated effluent has been hauled to the RTP for treatment in MWTP#3 and then discharged to the ORTW or directed to the mill for use as process water.

All results were within the limits and conditions set forth within the permit. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.3.4 Whole Effluent Toxicity

ADEC APDES Permit AK-005334-1 (5/1/11), 1.4

The annual Whole Effluent Toxicity test was conducted June 14 through June 21, 2016 by CH2M Hill's Aquatic Toxicology Laboratory in Corvallis, Oregon. A split of the same sample was also sent to TRE Environmental Strategies in Fort Collins, CO. Results from both laboratories are presented in Appendix B, Table 1. All results were within the limits and conditions set forth within the permit. Laboratory reports are provided in Appendix E.

2.4 SURFACE WATER MONITORING

2.4.1 Goodpaster River

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.6.2.2 & 1.6.4; ADEC APDES AK0053341 (5/1/11), 1.5; Pogo Mine Monitoring Plan (6/13) 5.0

Five surface water stations are monitored to evaluate water quality along the Goodpaster River. An additional sampling site upstream of the ORTW, SW49, has been added in 2016 to monitor background water quality. Previously established sampling locations are: SW01 located upstream of the Pogo Mine, SW41 located downstream of Outfall 001, SW42 downstream of Outfall 002, and SW15 located downstream from all Pogo facilities.

Surface water samples are analyzed for WAD cyanide, ionic balance, major cations and anions, and total and dissolved metals. Physical and aggregate properties of ammonia, conductivity, hardness, nitrates, pH, TDS, TSS, Turbidity, TKN, and Temperature are also measured.

Surface water samples were collected on March 1, May 19, June 14, August 2, September 20, and December 6, 2016. Fish Tissue samples were collected in conjunction with the September 20, 2016 sampling event. Results of the fish tissue sampling are provided in the **Section 2.4.2**.

All surface water sampling results were within the limits and conditions set forth within the permit. The locations of the surface water monitoring stations are shown in **Appendix A, Figure 2**. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.4.2 Fish Tissue

ADEC APDES Permit AK-005334-1 (5/1/11), 1.5.5

In order to assess long term trends in Goodpaster River quality, annual whole body analysis of juvenile Chinook salmon are required at monitoring sites both upstream (SW01) and downstream (SW12) from the project facilities. Juvenile Chinook salmon were collected from these stations on September 20, 2016.

The juvenile Chinook were collected at both locations, SW01 and SW12. Metals analysis was conducted on individual Chinook and a composite sample of fish for each location was also analyzed. As required by **Fish Resource Permit SF2016-204** a report of collecting activities and

data submission form was submitted to ADF&G on October 26, 2016.

All results are consistent with historical data. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.5 GROUNDWATER QUALITY MONITORING

Groundwater samples are analyzed for WAD cyanide, ionic balance, major cations and anions, and total and dissolved metals. Physical and aggregate properties of ammonia, conductivity, hardness, nitrates, pH, TDS, TSS Turbidity, TKN, and Temperature are also measured.

The locations of the groundwater monitoring stations are shown in **Appendix A, Figure 2**.

2.5.1 Downgradient of DSTF

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.1.4, 1.2.7, 1.6.4; Pogo Mine Monitoring Plan (6/13), 6.0

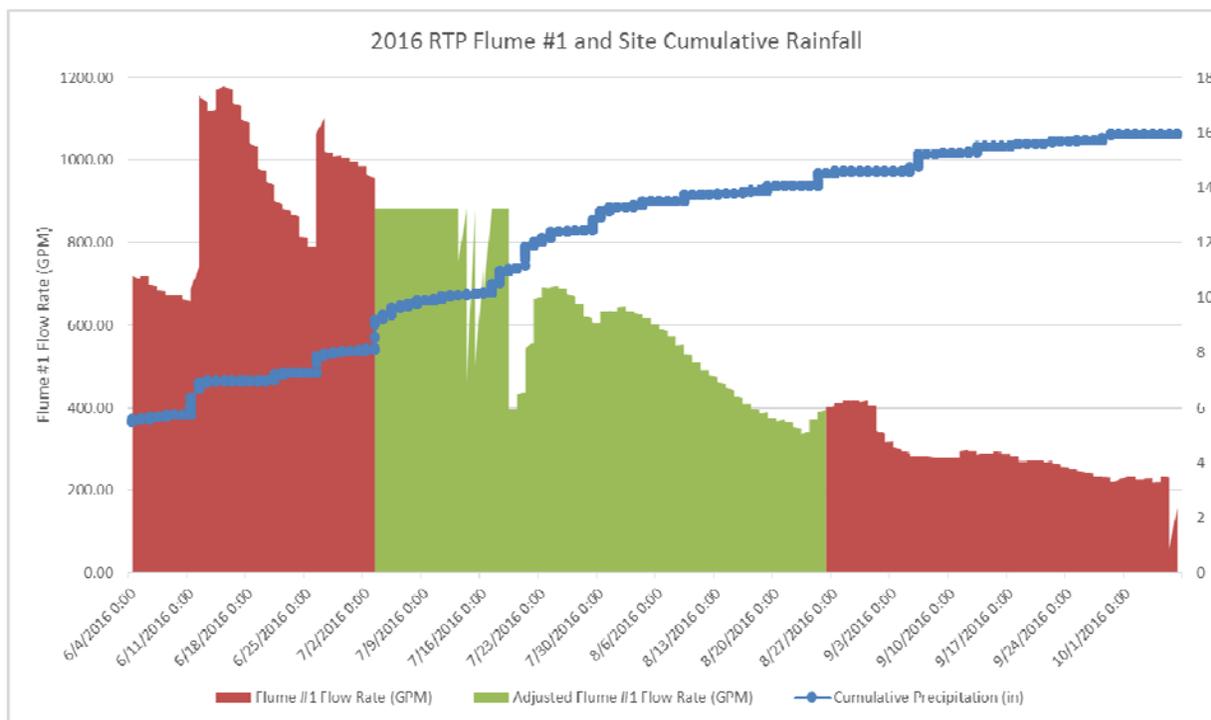
MW11-001A and MW11-001B provide information on water quality trends down-gradient from the DSTF and up-gradient of the RTP. MW11-001A is an alluvial well and MW11-001B is a bedrock well. MW11-001A and MW11-001B both had water present during the sampling events that occurred August 15, September 12 and October 11. MW11-001B was also sampled earlier on February 16 and April 26.

Cadmium, Copper and TDS concentrations in MW11-001A have increased. TDS concentrations in MW11-001B have also increased. Nitrate concentrations in MW11-001A and MW11-001B continued to fluctuate with no apparent trend. Piezometer well LT99-099 below the drystack is monitored for water elevation on a quarterly basis. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.5.2 Liese Creek Flumes

Four flumes were installed in Liese Creek in 2012. **Chart 2** provides flow data for Flume #1 (near the toe of the DSTF) versus precipitation rate in 2016.

Chart 2: 2016 Liese Creek Flume #1 Flow Rate vs. Precipitation



On July 3rd at approximately 20:00, Pogo experienced a significant precipitation event. High flows at Flume #1 caused the piezometer to drop out of calibration until the piezometer was recalibrated on August 26th at approximately 12:00. Adjusted values in this chart were estimated by comparing piezometer readings against manual readings taken by staff during routine inspections.

2.5.3 Downgradient of RTP Dam

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.1.4, 1.2.6, 1.6.4, Pogo Mine Monitoring Plan (6/13), 6.0

Three wells located below the RTP Dam, MW12-500, MW12-501, and MW12-502 monitor groundwater downstream of the RTP seepage collection system. Samples for these wells were collected quarterly throughout 2016 (provided sufficient water was available). Trigger limits for groundwater monitoring at these locations are set forth in Pogo’s ADEC Waste Management Permit 2011DB0012 and Pogo Mine Quality Assurance Project Plan.

Five sampling events occurred in 2016 for MW12-500. Chloride, Nitrate were detected above the trigger limits on all sampling events.

Five sampling events occurred in 2016 for MW12-501. Chloride was detected above the trigger limits in three of the five sampling events. Nitrate was detected above the trigger limits on four of the five sampling events. Sodium was detected above the trigger limits on all sampling events.

Five sampling events occurred in 2016 for MW12-502. Chloride was detected above trigger limits in three of the five sampling events. Nitrate was detected above the trigger limits on four of the five sampling events. Sodium was detected above the trigger limits on all sampling events. Other parameters are also analyzed and compared to the Water Quality Standards. Pogo continues to monitor the parameters and evaluate trends.

Except as noted above, all results are within the limits and conditions set forth within the permit. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.5.4 Downgradient of Ore Zone

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.1.4, 1.2.7, 1.6; Pogo Mine Monitoring Plan (6/13), 6.0

Monitoring wells MW04-213 and MW11-216 provide information on water quality trends down-gradient from the ore zones. Samples are collected semi-annually at MW04-213 and MW11-216, an extra sample was collected at each monitoring well in 2016. Samples were collected from MW04-213 on May 24, August 15, and October 11, 2016. Samples were collected from MW11-216 on March 15 August 30, and October 25, 2016. Slightly elevated concentrations of arsenic and manganese were detected in the August 15 and October 11, 2016 sample collected from MW04-213. Except as noted, no other adverse trends were observed.

Piezometer well MW99-216 is monitored quarterly for water elevation. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.5.5 Downgradient of ORTW

Not required by permit.

Monitoring stations LL04-031 and LL04-032 are sampled annually and provide information on ground water quality trends between the ORTW and the Goodpaster River. Samples were

collected June 14, 2016. No adverse trends were observed. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.5.6 Goodpaster River Area

Not required by permit.

MW12-001A and MW12-001B were established in support of the hydrogeologic study that was initiated during 2012. Dedicated pumps were installed in 2013 and samples were collected monthly during the entire year to establish background water quality data and continued through 2016, quarterly. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.6 PROCESS CONTROL MONITORING

Process facilities are monitored as follows.

2.6.1 Water Balance

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.6.2.4; Pogo Plan of Operations (11/1/2011), 8.0; Water Rights LAS 24611 – LAS 24617

At the beginning of the 2016, RTP reservoir volume was 16.7 million gallons. The ending RTP volume was 12.2 million gallons.

Added to RTP

- 101.7 million gallons of runoff and seepage water was collected in the RTP; and
- 8.3 million gallons of treated water was recycled to the RTP distribution system.

Removed from RTP distribution system

- 8.7 million gallons were pumped from the RTP for underground drill water;
- 81.9 million gallons were pumped from the RTP to the mill process; and
- 45.0 million gallons were pumped from the RTP to the MWTP#2 / MWTP#3.

Recycled Treated Water

- 138.9 million gallons were recycled at the Mill from Water Treatment Plant; and
- 7.2 million gallons were recycled to the RTP distribution system from the Water Treatment Plant.

Discharge to ORTW

- 254.4 million gallons were treated and discharged via the ORTW.

2.6.2 Permits to Appropriate Water and Temporary Water Use Permit Summary

ADNR Permits to Appropriate Water, LAS 24616, 24613, 24611, 24612 Condition 6; ADNR Temporary Water Use Authorization TWUP F2011-131, F2011-76, F2011-130, F2013-023, F2013-143, Condition 14. A summary of water usage for Permits to Appropriate Water and Temporary Water Use Permits is provided in **Table 3** and **Table 4**.

Table 3: Permits to Appropriate Water 2016 Monthly Total Flows

Month	LAS 24616 Surface Water Collected in Recycle Tailings Pond (RTP)	LAS 24617 Groundwater from Underground Mine Discharged to ORTW and Recycled Underground	LAS 24613 Goodpaster River ORTW Influent	LAS 24611 Drinking Water Wells DW02 & DW03	LAS 24612 Gravel Pit Pond*
	(gallons)	(gallons)	(gallons)	(gallons)	(gallons)
January	1,592,959	25,668,927	366,363,675	812,408	0
February	1,330,419	19,753,699	303,348,148	813,291	84,604
March	1,263,961	20,661,259	270,663,224	831,153	606,344
April	2,334,056	20,850,039	305,068,730	844,586	290,476
May	8,717,733	19,561,670	353,508,514	881,715	69,973
June	14,047,900	22,568,472	354,252,542	699,694	572,000
July	17,388,690	25,343,887	352,994,553	654,554	164,000
August	30,402,748	27,174,359	392,312,949	728,354	256,000
September	11,494,362	25,524,542	379,441,006	731,884	0
October	7,704,257	28,255,454	418,785,403	754,893	0
November	3,189,865	27,325,266	426,775,371	727,879	0
December	2,253,662	26,236,201	372,665,175	174,552	0
Total (gallons)	100,799,412	288,923,775	4,296,179,289	8,654,962	2,043,396
Total in Acre-ft	309.34	887	13,184.37	26.56	6.27
Permit Limit Acre-ft	387.12		24,195.11	81.77	241.95

* includes water used for Mill make-up and for road dust control

** Please refer to TWUP F2013-023 to cover over use LAS24617

Table 4: Temporary Water Use Permits 2016 Monthly Total Flows

Month	TWUP F2011-131 RTP Seepage Collection System Wells	TWUP F2011-76 Rosa Creek, Caribou Creek, Gilles Creek, Shaw Creek	TWUP F2011-130 Diversion Ditches	TWUP F2013-023 Underground Water Recycle	TWUP F2013-143 2150 portal Underground Workings *
	(gallons)	(gallons)	(acre-feet)	(gallons)	(gallons)
January	4,820,848	0	Annual Calculated Amount	25,547,098	0
February	2,589,232	0		25,031,745	0
March	2,167,971	0		24,172,287	0
April	1,882,042	148,000		23,719,475	0
May	1,933,075	348,000		22,110,208	0
June	2,648,545	188,800		21,530,351	0
July	4,386,608	212,000		20,170,139	0
August	5,557,630	0		22,677,237	0
September	5,694,319	0		16,186,284	0
October	6,146,104	0		26,590,012	0
November	5,878,737	0		26,171,916	0
December	5,079,966	0		25,327,180	0
Total Gallons	48,785,075	896,800	415,506,964	279,233,931	0
Total Acre-feet	148	2.8	1,464	856.9	0
Permit Limit	1,945,000,000 gals	14,400,000 gals	1460 acre-ft	1613.3 acre-ft	646.97 acre-ft
*note: TWUP F23013-143 no longer in use, line decommissioned.					

2.6.3 CIP Tailings Cyanide Destruction

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.2.3, 1.6.2.3; Pogo Mine Monitoring Plan (6/13), 4.2

After cyanide destruction, the CIP tailings are stored in the CIP tank prior to being mixed with cement and used as backfill in the mine. Pogo's Mine Monitoring Plan requires grab samples at station PC001 (CIP Stock Tank), which is located directly after the cyanide destruction circuit. Pogo collects a daily sample during a paste pour. The Waste Management Permit 2011DB0012 requires that samples contain less than 10 mg/kg of WAD Cyanide as a monthly average with no samples can contain more than 20 mg/kg of WAD cyanide. During 2016, 100% of the monthly averages of the PC001 samples measured less than 10 mg/kg WAD Cyanide and no samples were greater than 20 mg/kg WAD cyanide. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.6.4 Mineralized Development Rock Geochemistry

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.2.1, 1.6.2.6; Pogo Mine Monitoring Plan (6/13) 4.1.1, Appendix A

Samples of mineralized waste rock placed in the DSTF (PC002) are collected monthly and composited to form a quarterly sample which is then analyzed. Quarterly samples were analyzed and showed no adverse trends for 2016.

Appendix B, Table 2, shows selected parameters for the PC002 mineralized waste rock samples. Monitoring and historic data are provided in **Appendix G**.

2.6.5 Flotation Tailings Geochemistry

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.6.4; Pogo Mine Monitoring Plan (6/13) 4.0

Flotation tailings geochemistry solid samples were collected on March 16, June 22, September 28, and December 2, 2016 at PC003, the underflow of the filter-feed tank at the end of the mill circuit, prior to disposal on the DSTF. No adverse trends were observed. **Appendix B, Table 3**, shows

selected parameters for the PC003 Solid flotation tailings samples. Monitoring and historic data are provided in **Appendix G**.

2.6.6 Flotation Tailings Interstitial Water Chemistry

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.6.4; Pogo Mine Monitoring Plan (6/13) 4.0

The interstitial water from the tailings samples was collected at PC003 on March 14, June 19, September 25, and December 18, 2016. Pogo transitioned to a low selenium mill reagent (Copper Sulfate) during the first quarter of 2014. Selenium concentrations continue to be observed below the action limits in 2016. Arsenic and copper concentrations also decreased during the second half of 2016. Mercury concentrations increased. Pogo believes the fluctuations are due to variation in ore chemistry. Time series graphs are provided in **Appendix C**. Monitoring and historic data are provided in **Appendix G**.

2.7 VISUAL MONITORING

2.7.1 Facility Inspection

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.6.2.1, 1.6.9.3, 1.6.9.4; Pogo Mine Monitoring Plan (6/13) 2.0, 3.1; Pogo RTP Operating and Maintenance Manual (10/13), 4.0.

Visual inspections of the DSTF, RTP Dam, and monitoring wells were completed throughout 2016. No cracks, bulging, settlement, geotechnical concerns, erosion or damage were observed.

2.7.2 Biological Survey

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.6.2.5; Pogo Mine Monitoring Plan (6/13) 2.4

The objective of the visual biological survey program is to monitor wildlife interaction with the surface waste disposal facilities.

No wildlife issues with the surface waste disposal facilities occurred during 2016.

2.8 DEVELOPMENT ROCK SEGREGATION AND STORAGE

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.2.1, 1.6.2.6; Pogo Mine Monitoring Plan (6/13), 4.1.1, Appendix A

During 2016, 1,406 rounds were blasted underground and sampled in accordance with the Rock Segregation Procedure. Three hundred and forty rounds (24%) exceeded either the Arsenic threshold of 600 mg/l or the Sulfide threshold of 0.5% and these were encapsulated in the DSTF. One hundred and seventy-eight rounds were not sampled due to operational challenges and these rounds were also placed internally in the DSTF.

2.9 WASTE DISPOSAL

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.2.1, 1.5.4

During 2016, 651,188 dry tons of flotation tailing, 165,188 tons of mineralized rock, and 181,082 tons of non-mineralized rock were placed in the DSTF. Also during 2016, 151,929 dry tons of CIP Tailing and 168,142 tons of filtered flotation tailings were placed underground as paste backfill.

The quantities of miscellaneous waste materials placed either into the DSTF or underground during the year are shown in **Table 5**.

Table 5: Miscellaneous Waste Disposal in DSTF and Underground in 2016

Material	Disposal Location	Quantity	unit
Grinding Media Flotation Debris Screen Residue	DSTF	229	tons
Filter Press Waste	DSTF	53	yds
Filter Press Waste	Underground	32	yds
Water Treatment Plant Sludge	Underground	440	yds
Lab Ore Samples	DSTF	68	lbs

2.10 SPILL REPORTING

ADEC APDES AK0053341 (5/1/11), Appendix A, 1.14; ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.5.10

During 2016, there were a total of 363 spills reported. Pogo initiated an underground spill prevention plan on February 1, 2016. A total of 343 spills occurred underground and 20 on the surface.

Please see Table 6 below for underground spills and Table 7 for surface spills.

Table 6: 2016 Underground Reportable Spills

Number of Spills	Spill Location	Volume (gallons)	Material	Responsible Party	Equipment	Cause	Cleanup Measures	Disposal	Spill Location
310	Underground	1-10	Hydraulic Fluids, Oils, Coolant	Pogo	Various Underground	Commonly Hoses	Spill Kits with Absorbents and Boom	Pogo Incinerator or Offsite	Underground
33	Underground	1-10	Hydraulic Fluids, Oils, Coolant	Contractors	Various Underground	Commonly Hoses	Spill Kits with Absorbents and Boom	Pogo Incinerator or Offsite	Underground

Table 7: 2016 Reportable Spills

Date	Time	Location	Material	Responsible Party	Quantity	Area	Equipment	Cause	Cleanup Measures	Disposal
1/26/16	10:00	Air Strip across from Met Station	Hydraulic Oil	Pogo	2 gallons	45 ft ²	Zoom Boom	Failed hose	Absorbs used to soak up free glycol, contaminated ice and snow material was shoveled up.	Absorbs will be incinerated on-site, contaminated ice and snow deposited in wash bay to go through oil/water separator.
2/1/16	6:00	#2 Paste Line from Plant to 2150 Portal	Paste	Pogo	3,500 gallons	24 ft ²	Paste Line	Line break into containment area	Removed from containment area.	Disposed of underground into backfill.

Date	Time	Location	Material	Responsible Party	Quantity	Area	Equipment	Cause	Cleanup Measures	Disposal
2/3/2016	12:00	MMWTP #3	Ferric Chloride	Pogo	1 ounce	1 ft ²	IBC Tote	Loose Lid	Cleaned up with Acid Absorbents	Shipped off-site as HW disposal.
2/16/2016	4:00	Mill Bench – Ball Mill	Delcor Trash Grind Waste	Pogo	1 gallon	200 ft ²	---	Dropped bag of wet trash.	Shoveled/scooped up material.	Material contaminated with process water returned to Mill process.
3/1/2016	19:00	Roads 3 & 4	Hydraulic Oil	Pogo	30 gallons	10,000 ft ²	Haul Truck #3	Hydraulic Brake Line	Absorbs used to soak up free hydraulic oil, contaminated ice and snow material was shoveled up.	Absorbs will be incinerated on-site, contaminated ice and snow deposited in wash bay to go through oil/water separator.
3/5/2016	16:00	Road 1, bottom of	Coolant	Pogo	10 gallons	ft ²	Haul Truck #3	Fan broke and blade hit radiator	Duck pond used to catch free product.	None hit the ground.
3/15/2016	9:30	Road 1 near Blue Tube	Coolant	Pogo	10 gallons	200 ft ²	Volvo Loader #2	Failed hose	Absorbs used for free product, contaminated soil containerized.	Absorbs incinerated on site. Soil to be incinerated at OIT.
3/20/2016	10:30	Incinerator	Scrubber Water	Pogo	500 gallons	500 ft ²	Tank	Overflowing tank	---	---
3/24/2016	15:39	Pogo Rd Mile 41	Diesel	Crowley	8 gallons	3 ft ²	Semi-tractor	Compromised saddle tank	Absorbs used on free product. Shoveled up contaminated soil and containerized.	Contaminated absorbs and soil to be incinerated off-site.
4/8/2016	21:00	Mill Bench CIP Tank	CIP Tails Slurry	Pogo	1,500 gallons	850 ft ²	Recirculating drain valve and sump pump	Drain valve malfunction	Cleaned up	Returned to process.

Date	Time	Location	Material	Responsible Party	Quantity	Area	Equipment	Cause	Cleanup Measures	Disposal
5/5/16	16:30	Lower Camp Fuel Island	Diesel	Crowley	5 gallons	3 ft ²	Fill Line – AST #3	Hose Failure	Absorbs used on free product. Shoveled up contaminated soil.	Absorbs incinerated on site. Contaminated soil to be incinerated off-site.
7/29/2016	16:00	Tire Yard	Antifreeze	Lynden	2 gallons	4 ft ²	Semi-tractor	Failed hose	Absorbs used on free product. Shoveled up contaminated soil.	Absorbs incinerated on site. Contaminated soil to be incinerated off-site.
8/21/2016	10:30	1875 Fuel Island	Diesel	Pogo	15 gallons	600 ft ²	UG Haul Truck	Automatic nozzle did not shut off	Absorbs used on free product. Shoveled up contaminated soil.	Absorbs incinerated on site. Contaminated soil to be incinerated off-site.
9/23/2016	12:00	Intersection at D-Wing & Laydown	Antifreeze	Pogo	2 gallons	25 ft ²	VHT #?	Ruptured coolant line	Absorbs used on free product. Shoveled up contaminated soil.	Absorbs incinerated on site. Contaminated soil to be incinerated off-site.
10/9/2016	10:00	1875 Fuel Island, Road 1, Road 6	Diesel	Pogo	3 gallons	90 ft ²	Unknown	Open fuel tank – no cap	Contaminated soil shoveled into container.	Contaminated soil to be incinerated at OIT.
10/25/2016	18:40	Mill Floatation Tails Thickener	Grind Water	Pogo	5 gallons	4 ft ²	Floatation Tails Thickener	Discharge pump blocked – led to overflow	Shoveled up contaminated soil.	Returned to Mill process.
10/26/2016	7:00	Admin. Office front entrance area	Sewer Water	Pogo	10 gallons	4 ft ²	Sewer Line	Frozen sewer line	Shoveled up spilled material. Lime spread over entire spill area.	Spilled material taken to Sewage Treatment Plant & put into process.
11/29/2016	10:00	Road 4 to Drystack	Diesel	Pogo	3 gallons	3 ft ²	VHT 03	Fuel spilled during process of up-righting	Absorbs used on free product. Shoveled up contaminated soil.	Absorbs incinerated on site. Contaminated soil to be incinerated at OIT.
12/2/2016	11:15	MMWTP 2	Ferric Chloride	Pogo	10.04 gallons	3 ft ²	IBC Tote	Ruptured container	Washed area down with water to MWTP #2	Washed area down with water to MWTP #2

Date	Time	Location	Material	Responsible Party	Quantity	Area	Equipment	Cause	Cleanup Measures	Disposal
12/22/16	11:00	Road #2 by Round-a-bout	Motor Oil & Hydraulic Oil	Pogo	52 gallons	533 ft ²	VHT 05	Oil Pan & Hydraulic Pump damaged	Absorbs & Duck ponds used on free product. Contaminated soil scraped up.	Absorbs incinerated on site. Contaminated soil to be incinerated at OIT.

2.11 GEOTECHNICAL MONITORING

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.5.3, 1.5.3.4; Pogo Mine Plan of Operations F20129500 (11/3/11) Appendix F: Pogo DSTF Construction and Maintenance Plan

No shell construction took place at the DSTF during 2016; therefore, no geotechnical monitoring took place. Currently there are no plans to continue shell construction in 2017.

3. 2016 AS-BUILT REPORTS AND MAPS

Pogo Mine Site 2016 As-built maps are located in **Appendix A. Figure 3** provides an overview of all facilities within the Pogo Millsite lease boundary at end of 2016. **Figures 3a through 3d Appendix A** provide additional detail for the major areas of the mine.

4. RECLAMATION AND FINANCIAL RESPONSIBILITY

ADEC Waste Management Permit 2011DB0012 (2/7/12), 1.11, 3. ADNR Plan of Operations Approval F20129500 (2/7/12), pg. 3, 9; ADNR Pogo Mine Millsite Lease ADL416949 (3/9/04), Section 8

The Pogo Mine reclamation and closure bond is currently \$52.29 million (refer to Table 7). The road/transmission line reclamation and closure cost estimate is currently at \$4.8 million. Neither Bond changed during 2016 (refer to Table 8).

In 2016, SRK consulting was contracted to convert the current bond to a Standardized Reclamation Cost Estimator (SRCE) model for the renewal of the *ADEC Waste Management Permit 2011DB0012 (2/7/12)* and *ADNR Plan of Operations Approval F20129500 (2/7/12)*. The SRCE model was submitted with the renewal applications in 2017.

Table 8: Summary of Mine Reclamation and Closure Cost Estimates as of December 2012

SUMMARY OF ESTIMATED RECLAMATION AND CLOSURE COSTS-POGO MINE SITE								
Item Description	1 year holding cost	Phase I	Phase II	Phase III	Phase IV Water Treatment	Phase IV Reclamation	Phase V	Total
Direct Cost	\$ 812,700	\$ -	\$ 952,400	\$ 10,819,000	\$ 6,298,300	\$ 3,686,000	\$ 109,500	\$ 22,677,900
Site Management Cost	\$ 1,221,900	\$ -	\$ 27,800	\$ 2,953,800	\$ 5,374,833	\$ 2,001,700	\$ -	\$ 11,580,033
Subtotal Direct Cost	\$ 2,034,600	\$ -	\$ 980,200	\$ 13,772,800	\$ 11,673,133	\$ 5,687,700	\$ 109,500	\$ 34,257,933
Indirect Costs % of Subtotal								
Mobilization/Demobilization	5.0%	\$ -	\$ 49,010	\$ 688,640	\$ -	\$ 284,385	\$ 5,475	\$ 1,027,510
Subtotal		\$ 2,034,600	\$ 1,029,210	\$ 14,461,440	\$ 11,673,133	\$ 5,972,085	\$ 114,975	\$ 35,285,443
Contractor Overhead and Profit	15.0%	\$ 305,190	\$ 154,382	\$ 2,169,216	\$ 1,750,970	\$ 895,813	\$ 17,246	\$ 5,292,816
Subtotal		\$ 2,339,790	\$ 1,183,592	\$ 16,630,656	\$ 13,424,103	\$ 6,867,898	\$ 132,221	\$ 40,578,259
Performance Bond	3.0%	\$ 70,194	\$ 35,508	\$ 498,920	\$ 402,723	\$ 206,037	\$ 3,967	\$ 1,217,348
Insurance	1.5%	\$ 35,097	\$ 17,754	\$ 249,460	\$ 201,362	\$ 103,018	\$ 1,983	\$ 608,674
Subtotal		\$ 2,445,081	\$ 1,236,853	\$ 17,379,036	\$ 14,028,187	\$ 7,176,953	\$ 138,171	\$ 42,404,281
Contract Administration	4.0%	\$ 97,803	\$ 49,474	\$ 695,161	\$ 561,127	\$ 287,078	\$ 5,527	\$ 1,696,171
Engineering Re-Design	3.0%	\$ -	\$ 37,106	\$ 521,371	\$ -	\$ 215,309	\$ 4,145	\$ 777,930
Contingency	15.0%	\$ 366,762	\$ 185,528	\$ 2,606,855	\$ 2,104,228	\$ 1,076,543	\$ 20,726	\$ 6,360,642
Total Indirects		\$ 875,046	\$ 528,761	\$ 7,429,623	\$ 5,020,410	\$ 3,068,183	\$ 59,069	\$ 16,981,092
Total Direct + Indirect		\$ 2,909,646	\$ 1,508,961	\$ 21,202,423	\$ 16,693,543	\$ 8,755,883	\$ 168,569	\$ 51,239,025
Inflation Proofing	2.06%	\$ 59,926	\$ 31,078	\$ 436,676	\$ 343,813	\$ 180,332	\$ 3,472	\$ 1,055,297
Total Closure Cost		\$ 2,969,572	\$ 1,540,039	\$ 21,639,099	\$ 17,037,356	\$ 8,936,215	\$ 172,041	\$ 52,294,322
							Rounded	\$ 52,294,000

Table 9: Summary of Pogo Access Road/Transmission Line Reclamation and Closure Cost Estimates as of December 2012

Pogo Access Road and Transmission Line - Estimated Closure Cost								
	Phase I	Phase II	Phase III	Phase IV	Phase V	Total		
Direct Cost	\$ -	\$ 13,666	\$ -	\$ 2,478,500	\$ -	\$ 2,492,167		
Site Management Cost	\$ -	\$ 128	\$ -	\$ 582,645	\$ -	\$ 582,773		
Subtotal Direct Cost	\$ -	\$ 13,794	\$ -	\$ 3,061,145	\$ -	\$ 3,074,940		
Indirect Costs % of Subtotal								
Mobilization/Demobilization	6.5%	\$ -	\$ 897	\$ -	\$ 198,974	\$ 199,871		
Subtotal		\$ -	\$ 14,691	\$ -	\$ 3,260,119	\$ 3,274,811		
Contractor Overhead and Profit	15.0%	\$ -	\$ 2,204	\$ -	\$ 489,018	\$ 491,222		
Subtotal		\$ -	\$ 16,895	\$ -	\$ 3,749,137	\$ 3,766,032		
Performance Bond	3.0%	\$ -	\$ 507	\$ -	\$ 112,474	\$ 112,981		
Insurance	1.5%	\$ -	\$ 253	\$ -	\$ 56,237	\$ 56,490		
Subtotal		\$ -	\$ 17,655	\$ -	\$ 3,917,849	\$ 3,935,504		
Contract Administration	4.0%	\$ -	\$ 706	\$ -	\$ 156,714	\$ 157,420		
Engineering Re-Design	4.0%	\$ -	\$ 706	\$ -	\$ 156,714	\$ 157,420		
Contingency	10.0%	\$ -	\$ 1,766	\$ -	\$ 391,785	\$ 393,550		
1 year holding cost			\$ 41,000			\$ 41,000		
Total Indirects		\$ -	\$ 48,038	\$ -	\$ 1,561,916	\$ 1,609,955		
Total directs and indirects		\$ -	\$ 61,833	\$ -	\$ 4,623,061	\$ 4,684,894		
Inflation Proofing	2.66%	\$ -	\$ 1,645	\$ -	\$ 122,973	\$ 124,618		
Total Closure Cost		\$ -	\$ 63,478	\$ -	\$ 4,746,035	\$ 4,809,513		
							Rounded	
								\$ 4,810,000

4.1 REVEGETATION TEST TRIAL PROGRAM AT THE POGO MINE

Based on the *Revegetation Test Trial Program for Reclamation at Pogo Mine* submitted May 1, 2012, native seed collection, and purchase of grass seed, for the revegetation trials began in the summer and fall of 2013. The fourth and last test plot was developed during 2015 for mesic and xeric alpine meadow establishment on shell 2 of the drystack, against the south diversion ditch wall.

Willow cuttings were also collected and planted in in spring of 2016 in the alluvial shrub and wetland plots. The application of fertilizer and agrotain took place in the spring of 2016 for the mesic and xeric alpine meadow plots. All plots were monitored and percent cover and plant species was documented and photographed in late summer.

Photo 1 through **Photo 5** shows trial plot growth in 2016.



Photo 1: Wetland Plots 2016, two years after seeding.



Photo 2: Willow cuttings, 2016.



Photo 3: Alluvial Shrub plots 2016, after second year of growth.



Photo 4: Broadleaf Forest plots 2016, after second year of growth.



PHOTO 5: ALPINE MEADOW PLOTS 2016, AFTER ONE YEAR OF GROWTH.

4.2 POGO MILLSITE LEASE

ADNR Pogo Mine Millsite Lease ADL416949 (3/9/04), Section 23 Modifications

5. PERMIT ACTIVITIES

5.1 2016 PERMIT ACTIVITIES

Permitting activities conducted during 2016 included:

Title V Air Quality Operating Permit Number AQ0406TVP01: On January 12, 2016, ADEC issued Operating Permit No. AQ0406TVP01 Revision 1 to the Pogo Mine under AS 46.14 and 18 AAC 50. Revision 1 modifies Pogo's Title V Air Quality Operating Permit to add Pogo's small remote incinerator as required by EPA's Commercial Industrial Solid Waste Incinerator Rule, 60 CFR § 60.2000 *et seq.* Revision 2 was issued by ADEC on September 29, 2016 to clarify the dates in Condition 46 for submitting the renewal application.

Performance testing for the refinery emission units covered under Pogo's Title V Air Quality Operating Permit was completed on June 13, 2016. Performance Test results were submitted to EPA and ADEC on August 12, 2016, as required by Pogo's Title V Air Quality Operating Permit. Pogo was not required to perform source testing in 2016 for small, remote incinerator covered under Pogo's Title V Air Quality Operating Permit. Performance tests for the refinery emission units and the small, remote incinerator will be completed in 2017.

Inspection for Pogo Mine Certificate to Operate a Dam: was carried out on June 14, 2016. On August 10, 2016 ADNR issued a 90 day extension to the Certificate of Approval to Operate a Dam pursuant to 11 AAC 93.173(f). The expiration date for COA FY2014-15-AK00304 was extended 90 days from August 17, 2016 to November 15, 2016. The final permit was granted to Pogo on December 22, 2016.

5 Year Environmental Audit was carried out from July 14-16, 2016, as required by the Plan of Operations Approval (F20129500), Waste Management Permit (Permit Number 2011DB0012) and the Millsite Lease (ADL 416949). The final Environmental Audit was issued to ADNR and ADEC on December 22, 2016.

Toxic Release Inventory (TRI) Report was submitted under the Emergency Planning and Community Right to Know Act on June 29, 2016.

Toxic Substance Control Act (TSCA) Report was submitted under the Chemical Data Reporting (CDR) Rule, issued under the Toxic Substances Control Act (TSCA), on October 26, 2016. EPA extended the date for filing the CDR report to October 31, 2016.

5.2 FUTURE PERMIT ACTIVITIES

Title V Permit Number AQ0406TVP01: Pogo's Title V Air Quality Operating Permit expires September 4, 2017. Pogo's renewal application is due March 4, 2017..

Plan of Operations Renewal: Pogo submitted its renewal application on January 6, 2017 and supplemented the application on February 15, 2017. On January 3, 2017, ADNR administratively extended Pogo's Plan of Operations Approval to June 11, 2017.

Waste Management Permit Renewal: Pogo submitted its renewal application on January 6, 2017 and supplemented the application on February 15, 2017. On January 10, 2017, ADEC administratively extended Pogo's Waste Management Permit until a replacement permit is issued.

Alaska Pollutant Discharge Elimination System Renewal: On October 30, 2015, Pogo submitted an application to renew its APDES Permit. Approval is pending.

US Army COE Section 404 Permit A-1996-0211-M11 Renewal: Pogo will renew permit application which is due by December 13, 2017