

# 2013 Pogo Plan of Operations

Submitted to:

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Division of Water  
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Fairbanks, Alaska 99709

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## **1.0 APPLICANT INFORMATION**

### **1.1 Claim names**

The Pogo Mine property consists of 1,281 state mining claims covering an area approximately 41,880 acres. The Pogo claim block lies in Sections 13, 14, 22-27, and 34-36 within T5S, R14E, Sections 18, 19, and 29-34 within T5S, R15E, Sections 1-3, 10-15, and 36 within T6S, R14E, and Sections 3-11, 14-23, and 29-32 within T6S, R15E, Fairbanks Meridian. The claim names, claim types, and claim owners for claims associated directly with Pogo Mine are listed in **Appendix A**.

### **1.2 Individual Completing Application**

As the Reclamation Plan is incorporated into the Plan of Operations, the signature below fulfills the requirement of Alaska Administrative Code 11 AAC 97.310(a).

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Chris Kennedy, General Manager, Pogo Mine

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Date

### **1.3 Business Address**

Sumitomo Metal Mining Pogo LLC  
P.O. Box 145  
Delta Junction, Alaska 99737

### **1.4 Business Telephone**

Phone: (907) 895-2834  
Fax: (907) 895-2866

### **1.5 Corporate Information**

Sumitomo Metal Mining Co., Ltd.  
Tokyo, Japan  
Sumitomo Corporation  
Tokyo, Japan

**Table 1.1: Revisions**

<b>2012 Plan of Operations Revisions</b>			
<b>Revision #</b>	<b>Date</b>	<b>Change</b>	<b>By</b>
1	February 2012	Addition to D-Wing Dorm at Lower Camp	Pogo
2	March 2012	DSTF Expansion and New Diversion Ditch	Pogo
3	May 2012	Extension to MWTP#2 for 2 New Sand Filters	Pogo
4	October 2012	Upgrade Section of ORTW Pipeline	Pogo
5	December 2012	East Deep Expansion Power Distribution System	Pogo
6	June 2013	Begin Mining East Deep Ore Zone	Pogo

**Table 1.2: Table of Significant Changes**

Revision #	Change Requested By	Description	Affected Section
1	Pogo	Add Dorm to Lower Camp	Section 4.6 Figure 1.3a
2	Pogo	Expand DSTF to 20 Mton capacity, build new diversion ditch and haul road, and close existing diversion ditch. Updated cost model.	Sections 4.6, 7.2.1, 7.2.2, and 12, Appendix B: Figures 1.3, 1.3a, 1.3b, 1.3d and 7.1
3	Pogo	Add extension to MWTP#2 for two new sand filters.	Section 1
4	Pogo	Upgrade section of ORTW pipeline from six inch to ten inch diameter line.	Section 1
5	Pogo	Extend existing power distribution system in preparation for East Deep expansion.	Section 1
6	Pogo	Begin mining East Deep ore zone	Sections 3,4,5,7,8,9,12, and 13 and Appendices B,C & D
7			
8			
9			
10			



## 2.0 SITE ACCESS

### 2.1 Location

Sumitomo Metal Mining Pogo LLC (Pogo) is the operator of the Pogo gold mine, located 38 miles northeast of Delta Junction, Alaska (see **Figure 1.1**). This Plan of Operations (POO) outlines Pogo Mine activities through June 2010 and reflects site experience gained since operations began in 2005. Where appropriate, it builds upon the documents used for project permitting, including the 2002 Water Management Plan and Appendices, the 2003 Plan of Operations, and the 2003 Reclamation and Closure Plan. Where appropriate and where new information is available, this plan of operations supersedes any prior documents.

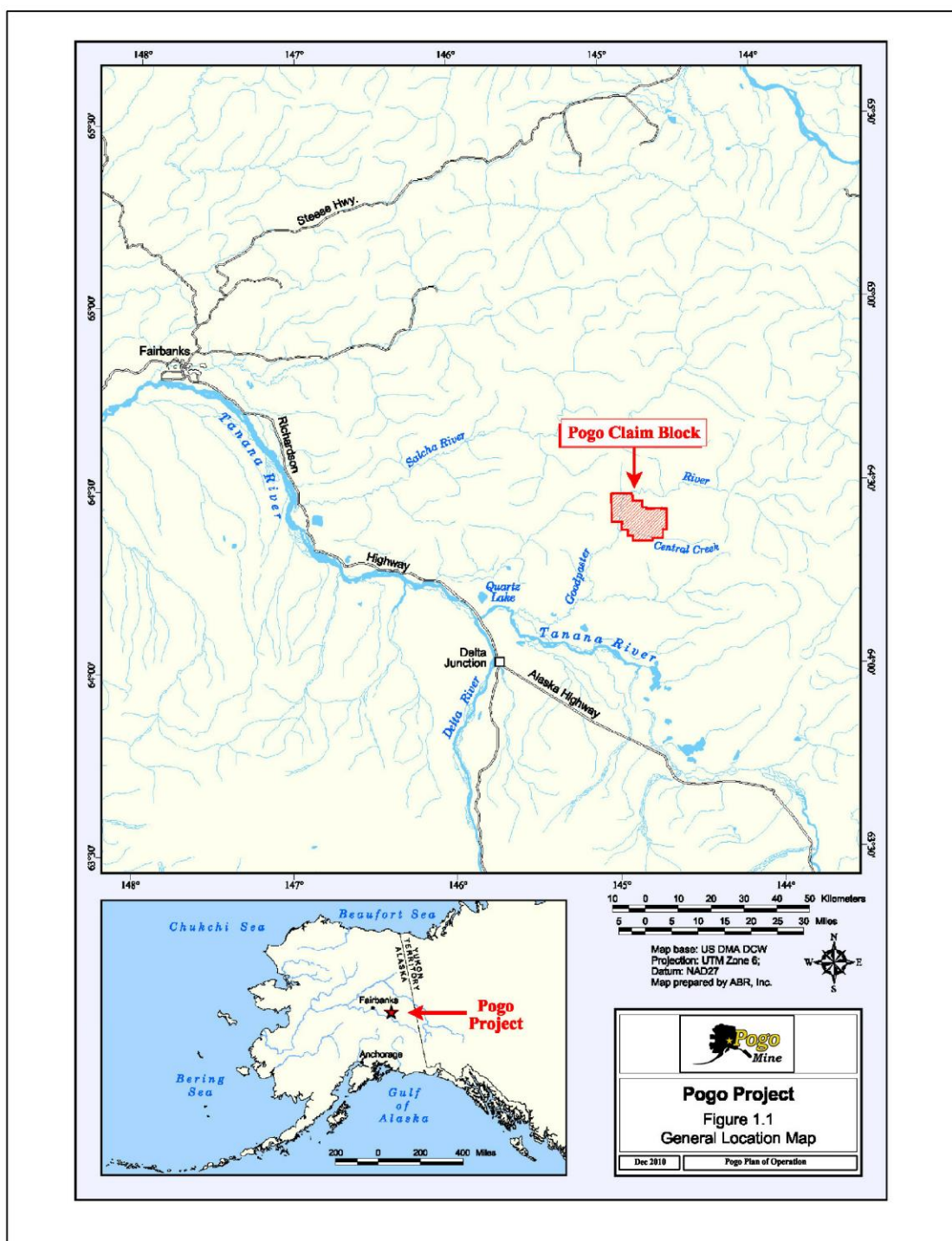
### 2.2 Access to Site

A 49 mile long, all-season road constructed along the Shaw Creek hillside route provides safe, reliable access to the Pogo property. Access is gained from the end of Shaw Creek Road, two miles from the Richardson Highway. The road crosses over the Trans-Alaska Pipeline System (TAPS), 2.5 miles from the Shaw Creek Road. There are four single-span bridges over creeks along the route, and one four span bridge crossing the Goodpaster River. All bridges are single lane with a maximum axle load rating of 60 tons and a posted maximum speed of 10 miles per hour (mph). The road and power transmission line routes are shown in **Figure 4.1**.

The access road is a controlled access industrial road. A security gate near the departure point at the end of Shaw Creek Road provides access control. A large sign stating the road is “private” and therefore closed to unauthorized traffic is posted at the security gate and at the TAPS crossing.

The design speed limit for the all-season road is 35 to 45 mph. The highest elevation along the road is 3,300 feet above mean sea level (ft amsl); the lowest 970 ft amsl. Roadside berms and guardrails are installed where appropriate. Radio contact is maintained between all vehicles and mine security.

**Figure 1.1: General Location Map**



All drivers undergo a road safety briefing prior to driving on the Pogo access road, and regular bus drivers are trained in first aid, emergency response. Buses carry emergency response equipment. Properly trained and qualified emergency response personnel will respond to accidents and medical emergencies on the access road. An environmental response team will respond to help, coordinate and cleanup spills as necessary.

Employees are transported onto the mine site by bus or appropriate company vehicles.

Summer and fall road maintenance includes grading and repairing of potholes, ruts and washboards, replacing damaged markers and signs, and maintaining drainage and sediment control structures. Winter and spring maintenance includes snow removal, road scarifying for improved traction, and drainage maintenance. Emergency maintenance is provided as necessary. Dust is minimized by enforcing low traffic speeds and using water or suppressing agents as needed.

Additional details on construction, operation, and reclamation of the access road is contained in the right-of-way application.

## **2.3 Mine Security**

The mine security plan includes a combination of measures such as security personnel, closed-circuit television surveillance, security lighting, and fencing to ensure personnel and product security.

Security is provided at the main entrance gate from 6 am to 8 pm each day; all traffic on the road is monitored from the gate. Mine site security personnel monitor the remote security gate and road transport after hours (8 pm to 6 am) each day.

## 3.0 OPERATING PLAN / FACILITY DESCRIPTION

### 3.1 Facility Activity

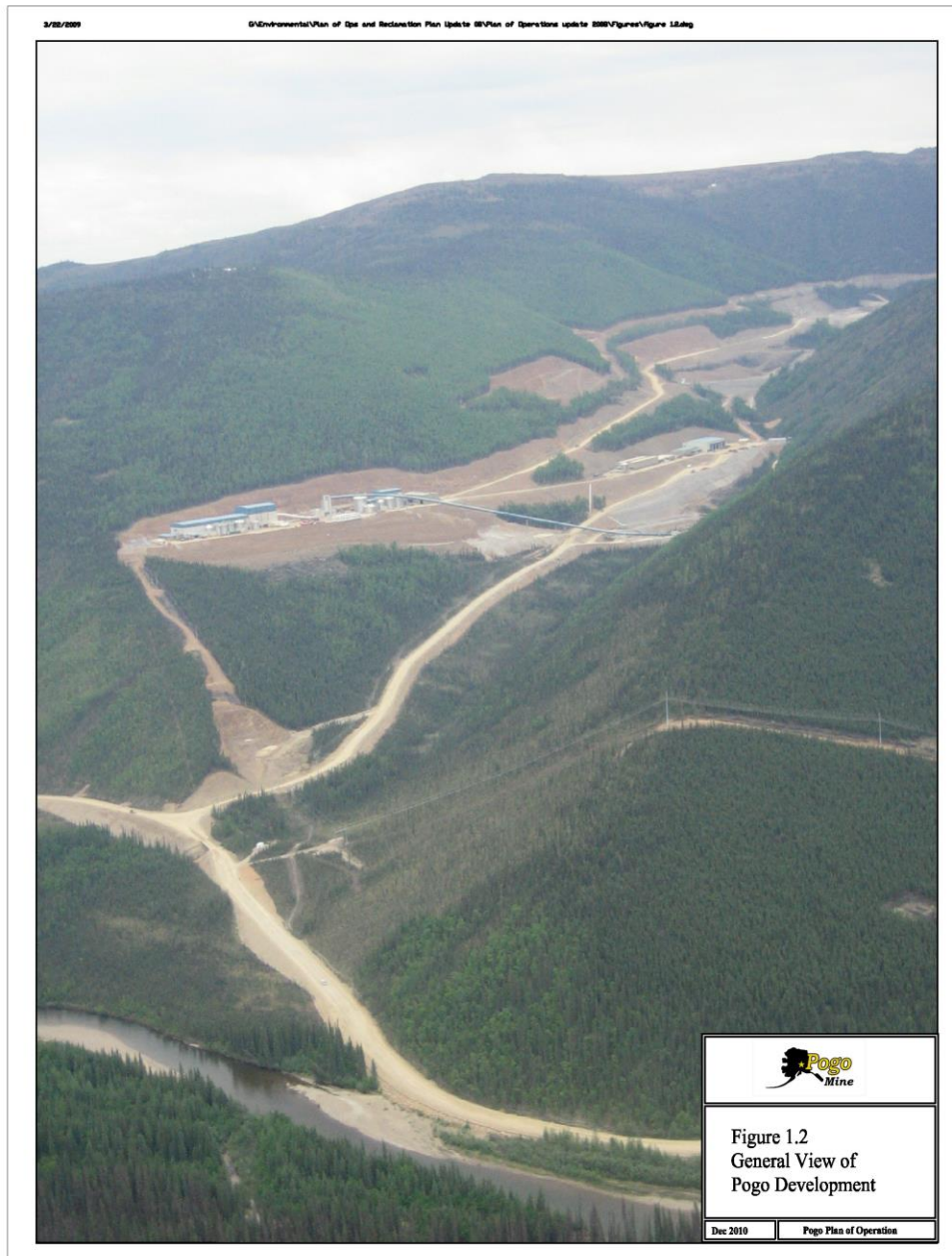
Pogo Mine is an underground mine that feeds gold ore to the mill at a rate of approximately 3,000 tons per day (tpd) and is permitted to feed gold ore at a rate of up to 3,500 tpd. The property produces between 380,000 to 400,000 ounces of gold annually.

The mine consists of the following major elements:

- Underground cut-and-fill mining with conveyor access for transfer of ore to the surface;
- Surface gold mill for gold recovery through gravity concentration, flotation and cyanide leaching;
- Tailings preparation facilities, including cyanide detoxification and filtration, to produce paste backfill for the underground mine workings and dewatered tailings material suitable for placement in a drystack facility on the surface;
- Drystack tailings facility (DSTF) to disposed the dewatered tailings materials and waste rocks and the recycle tailings pond (RTP) to collect the seepage and runoff water from the drystack tailing facility;
- 249 person upper camp and 203 person lower camp with recreation and catering facilities for each;
- Transmission line along the Shaw Creek Hillside route, and on-site electrical distribution system;
- 49 mile all-season road constructed along the Shaw Creek Hillside route; and
- A water management system that maximizes recycling and treats all waters affected by the project in accordance with applicable federal and state legislation.

An aerial photo of the mine is provided on **Figure 1.2**, As-built drawings are **Figures 1.3 – 1.3d** in **Appendix B** for the project facilities.

**Figure 1.2: General View of Pogo Development**





## 3.2 General Operating Criteria

Some general operating criteria for the mine are outlined below.

### Milling Rate

- Average operating production ..... 3,000 tpd
- Average eventual production..... 3,500 tpd

Mining Rate (Ore)..... same as milling rate

Current projected mine life @ 3,000 tpd..... 7 years

Development rock to surface for remaining 7 years of mine life..... 2.9 million tons

Flotation tailing to surface for remaining 7 years of mine life.....3.3 million tons

### Employees and contractors required to operate facility

- @ 3,000 tpd..... 297
- @ 3,500 tpd..... 360

### Energy requirements for mine operation

- @ 3,000 tpd..... 10 mega watts (MW)
- @ 3,500 tpd..... 14 MW

## 3.3 Environmental Management

### 3.3.1 Environmental, Health and Safety Policy

Pogo Gold Mine is located northwest of Delta Junction, Alaska. The Mine is operated by Sumitomo Metal Mining Co., Ltd. and is a Joint Venture between Sumitomo Metal Mining Co., Ltd. and Sumitomo Corporation.

Pogo Mine recognizes Environment, Health and Safety management as a core competency and value and is committed to protecting employees, contractors and visitors from safety and health hazards and minimizing environmental impact arising from the Operation. The full commitment and active participation of all employees, contractors and visitors is required in achieving this goal.

To meet this commitment, Pogo Mine will:

1. Strive to achieve a goal of zero workplace injuries;
2. Meet or exceed all Environment, Health and Safety regulations, laws, permits and voluntary commitments to which Pogo has subscribed;
3. Identify hazards and mitigate risk through proactive elimination or control;
4. Reduce waste and pollution through prevention or control measures;
5. Train employees in safe work procedures and standards and highlight the personal commitment and responsibility of each employee to work safely and prevent injury to themselves and others and to safeguard the assets of Pogo;
6. Train employees on environmental policies and guidelines and emphasize the responsibility of each employee to act as good stewards and to safeguard the environment;
7. Ensure that all contractors, suppliers, visitors and other third parties understand and adhere to the Pogo Mine Environment, Health and Safety policy, standards, procedures and guidelines;
8. Ensure transparency by effectively communicating to all stakeholders our performance on the Environment, Health, Safety and Operational aspects of our Business; and
9. Strive to continually improve our management and performance in the Environment, Health and Safety areas.

Measurement of our performance in Environment, Health and Safety will be tracked against established goals and key performance indicators; these goals will be reviewed on a regular basis to promote continuous improvement.

## **4.0 ANCILLARY FACILITIES**

### **4.1 Power Supply & Backup**

Power is supplied to the mine via a 50 mile long, 13.8 kilo volt (kV), three phase transmission line constructed along the Shaw Creek Hillside access route (see **Figure 4.1** in **Appendix B**). The transmission line is constructed of wooden H-poles with horizontal conductors. The Pogo transmission line is connected to Golden Valley Electric Association's, Alaska (GVEA's) Fairbanks to Delta Junction transmission line at a substation on the west end of the project near the trans-Alaska pipeline north of Shaw Creek. The terminus substation is located adjacent to the mill building in the Liese Creek Valley.

At the end of mine life, the transmission line will be removed and the right-of-way reclaimed. Additional details on the power line construction, operation and reclamation are contained in the right-of-way application that is part of this project documentation series.

Site backup power is supplied by one 350, two 1,000, and one 2000 kilo watt (kW) generators at the mill, paste backfill plant and upper/lower camps. This is sufficient to power key motors, pumps, water treatment, and lighting both underground and on surface on an emergency basis.

### **4.2 Maintenance/Warehouse Complex/Administration**

#### **4.2.1 Maintenance Facility**

The maintenance area contains three maintenance bays, a welding bay and wash bay. Major repairs and rebuilds are performed at this facility. Firewall protection between adjoining walls of the complex has been installed. The maintenance facility also has tool storage areas and offices for administrative groups.

#### **4.2.2 Warehouse**

A warehouse facility with heated storage inside and cold storage outside is adjoined to the maintenance facility with firewalls between. The warehouse includes offices for the warehouse supervisor, inventory buyer and inventory control and provides delivery access and unloading points for vendor supplies. Two smaller warehouses located in



the lower camp, as well as a number of lower yard locations are utilized for the storage of warehouse inventory items.

#### **4.2.3 Administration Building**

The main administration building is a two-story, clad, modular structure containing the following:

- Offices and cubicles for senior staff, administrative, supervisory and technical personnel;
- Reception area;
- Conference rooms;
- Lunch and training room;
- Print and photocopy room;
- Washrooms;
- Clean and dirty locker and shower facilities;
- Communications room; and
- Miscellaneous storage areas.

### **4.3 Communications System**

The two major components of the Pogo communications system are a microwave-based telephone system and a local radio repeater system. These are described below. Also, in case of a loss of the microwave based communication system, the site utilizes satellite telephones in such emergency situations.

#### **4.3.1 Microwave Telephone System**

The microwave telephone system combines secure voice, fax, Internet and computer networking into a single network infrastructure that accesses telephone and Internet gateways.

#### **4.3.2 Radio System**

A radio repeater system enables omni-directional, two-way communication within an approximate 15 mile radius. The repeater works in conjunction with preprogrammed 5 watts (W), handheld radios. The repeater consists of a 25 W radio powered by a bank of lead-acid batteries, recharged by a self-regulating solar panel and a wind generator. The repeater utilizes duplex frequencies licensed to Pogo for their exclusive use. The repeater is connected to a bi-directional antenna that is directed toward Delta Junction and Pogo camp.

#### **4.4 Potable Water Supply**

Water is collected from two 8-inch diameter wells, at depths of 61.5 and 53.3 feet below ground surface (ft bgs). They are located near the Goodpaster River and are in direct influence of surface waters. Two potable water plants (PWSID#) 372643 and 372685 treat and distribute the water respectively to the lower and upper camps. The water is ozonated, filtered, disinfected with chlorine, and a corrosion inhibitor, orthophosphate, added prior to distribution.

The potable system for upper camp was designed for an average daily demand of 25,000 gallons (at a maximum filtration rate of 28 gallons per minute (gpm)) and the lower camp was designed for an average daily demand of 16,875 gallon (at a maximum filtration rate of 20 gpm). Both potable water systems are operated within the limitations described in Pogo Mine Potable Water System Permits PWSID 372643 and PWSID 372685.

#### **4.5 Firewater**

The firewater system utilizes an 180,000 gallons surge tank that is sourced from the drinking water wells.

#### **4.6 Camp Facilities**

The upper employee camp is located in the mill and camp bench area. The camp is a pre-engineered modular structure capable of housing approximately 249 people. The camp, shown on **Figure 1.3c** in **Appendix B**, includes the following:

- Single status housing units;
- Washroom and shower facilities;

- Kitchen facilities;
- Dining area;
- Recreation area;
- Entertainment area; and
- Laundry facilities.

The lower camp is used for contractors and the exploration group. A new lower camp or “D wing” was commissioned in January 2010 (79 beds). It was added onto in 2012 (added 77 beds for a total of 156 beds). Refer to **Figure 1.3a** in **Appendix B**. The remaining single “E wing” from the construction camp is utilized for year round contractor accommodations until camp closure when it will be demobilized (47 beds). Total lower camp capacity is 203 beds. These facilities include the following:

- Double or single housing units;
- Washroom and shower facilities;
- Kitchen facilities;
- Dining area;
- Recreation area;
- Entertainment area; and
- Laundry facilities.

#### **4.7 Sewage Treatment**

An Alaska Department of Environmental Conservation (ADEC)-approved 72,000 gpd sewage treatment plant is located near the 1525 portal as shown on **Figure 1.3a** in **Appendix B**. This treatment plant services both the upper and lower camps.

The sewage treatment plant is connected to the lower camp and upper camp with heat traced gravity flow lines to lift stations. The sewage plant uses ultra violet (UV) effluent disinfection for final treatment. The treated effluent is discharged to the Goodpaster River at an average rate of 23 gpm (Outfall 002). The effluent limits are provided in Pogo Mine Alaska Pollutant Discharge Elimination System (APDES) Permit No. AK0053341.

## 4.8 Site Roads

Site roads are shown on **Figures 1.3 to 1.3d** in **Appendix B**.

## 4.9 Airstrip

A 3,000 ft long x 75 ft wide gravel airstrip was built to support construction operations when winter road access is not available. The airstrip is maintained for the life of the operations and is available until Phase IV Water treatment and post-closure reclamation (refer to **Figure 1.3b** in **Appendix B**).

## 4.10 Meteorological Stations

New Meteorological (Met) Stations will be located on Pogo Ridge (refer to **Figure 1.3** in **Appendix B**) and Pogo Airstrip (refer to **Figure 1.3b** in **Appendix B**). Their purpose is to collect data to support air quality and hydrologic modeling. Each station will have a ten meter guyed tower with a two foot by two foot concrete base pad. The Datalogger™ system will be placed in a weather proof enclosure at the base of each tower. Each station will measure the following parameters:

- (2) Wind Speed (m/s) (at 10-meters);
- (2) Wind Direction (degrees) (at 10-meters);
- (2) Sigma Theta (degrees);
- (2) Air Temperature and vertical temperature difference (degree C) (at 2 meters and 10 meters elevation);
- (2) Solar Radiation (W/m<sup>2</sup>); and
- (1) Heated Precipitation gauge with wind shield (inches).

Each of the monitoring stations will be powered by electrical service with a backup battery and solar power system. The airstrip site is readily accessible by vehicle; however, the ridge site is accessible by helicopter or ATV only.

## 4.11 Incinerator

Food waste generated from the Main Camp and Lower Camp maximized the capacity of Pogo's existing gasifier or incinerator in 2010. Pogo needed to upgrade this facility to allow proper cleaning, maintenance and a safe work environment. Pogo purchased an ACS Model CA-400 incinerator with an auto ash removal system. It was necessary to

construct a building to house the unit, controls and air pollution control device (wet scrubber). This unit uses propane as fuel. The old incinerator will remain onsite until it is decommissioned in later 2012. Refer to **Figure 1.3a** for location of new incinerator.

## 5.0 GEOLOGY & MINING

### 5.1 Geology & Ore Resources

The gold resource within the Pogo Upland Mining Lease includes sub-parallel quartz veins (the Liese Zone, East Deep, and Hill 4021) and sub-vertical quartz veins (North Zone). All of these veins are hosted in a sequence of amphibolite-grade, paragneiss and orthogneiss of probable Proterozoic to mid-Paleozoic age. Mid-Cretaceous, granitic, plutons and dykes intrude the gneisses, which in turn are generally cut by the veins. A post-vein, quartz-diorite pluton has been age dated at 94 million years before present (Ma) age, constraining the minimum age of the deposit. Re-Os dating of molybdenite from the Liese Zone further constrains gold mineralization at 104 Ma.

The gneissic rock sequence is interpreted as part of the Lake George sub terrane of the Yukon-Tanana terrane, which extends from Fairbanks into the Yukon Territory. Typical lithologies include intercalated biotite-quartz-feldspar gneiss, hornblende-rich gneiss, chlorite-sillimanite gneiss, calc-silicate gneiss, quartz-rich gneiss, and granitic orthogneiss. Well developed and regionally extensive foliation and folding within the gneiss largely pre-dates the ore vein structures.

The granitoid intrusive rocks are considered the source of the gold-bearing fluids that contributed to the gold endowment at Pogo. Granitoids have a causative relationship to a number of “plutonic-related” gold deposits in the region, including the Fort Knox deposit near Fairbanks (McCoy et al., 1997). Intrusive rocks within the mine area include granite, quartz monzonite, quartz diorite, diorite and basalt. Most intrusive rocks are likely of Late Cretaceous age as suggested by samples that yield a range of ages from 107 Ma to 92 Ma, using U-Pb and Ar40/Ar39 age-dating techniques. Some of the dikes appear to utilize the same structures as the ore veins.

Several fault sets, exhibiting a range of orientations, are documented within the mine area. Drill data and underground exposures reveal widespread faults with steep northeast to east orientations. The Liese Creek and Graphite faults are two northwest striking faults present in the mine area which have significant contributions to overall inflows of water from surface. Low angle faults, though not well expressed on the surface, are also well documented underground, particularly where they bound Liese-

type quartz veins. The Liese-type veins are low-angle sub-parallel veins currently comprising the majority of the Geologic Resource.

Mine Reserves, as of end-of-year 2012, lay entirely within three of these 'Liese' veins: L1, L2, and L3 and the newly discovered East Deep vein, E1. (see **Figure 5.1**). As of year-end 2012, Proven and Probable Reserves stood at 5.1 million metric tonnes of 13.58 grams per metric tonne (g/t) material for 2.2 million ounces. The Geologic Resource, outside the Reserve, stood at 6.8 million metric tonnes of 10.93 g/t material for 2.4 million ounces, including 4.1 million metric tonnes of Inferred Resource at a grade of 8.53 g/t.

Visual examination of drill core from East Deep is nearly identical to intercepts from the Liese zone. Both indicate that arsenopyrite (FeAsS), Pyrite (FeS<sub>2</sub>), and pyrrhotite (FeS) are present in most vein intercepts. Under microscopic examination, East Deep samples show the unique gold assemblage, referred to as "Pogo-Type" mineralization that is characteristic in the Liese Zone. To which, gold occurs as: 1) inclusions in arsenopyrite, 2) inclusions in quartz, 3) composite intergrowths with Bi-Te+/-S minerals in quartz, and 4) invisible Au (<1um) inclusions to solid-solution atomically bounded in loellingite (FeAs<sub>2</sub>) coupled with "low arsenic" arsenopyrite.

The strong association between bismuth and gold in interior Alaskan Intrusion Related Gold Deposits has shown a strong relationship between this ratio and the distance from the mineralizing source pluton. The Liese Zone, North Zone, and East Deep all support a similar Bi:Au of ~4.0 and correlation coefficients of 0.85 or better.

The near identical ore mineralogy, structural setting, vein orientations, metal correlations, and similar host rock suggest that East Deep is an extension of the Liese Zone and not a new stand alone deposit.

## **5.2 Mine Plan**

### **5.2.1 Mine Access**

Four portals are used to provide safe and efficient access to the Pogo ore body, as listed below. The number used to refer to each portal represents their elevation above sea level in feet.

- 1525 portal that was constructed during the advanced exploration phase;
- 1875 portal in the Liese Creek Valley;

- 1690 portal in the Liese Creek Valley; and
- 2150 portal in the Liese Creek Valley North.

The 1525 portal is used primarily for intake ventilation and is also used for access for mining contractors. The 1875 portal is the primary access for workers, supplies, equipment and provides intake ventilation. The 1690 portal is used primarily for conveyor access to the mine and for exhaust ventilation. The 2150 portal is used primarily for intake ventilation and will also be used for access for workers, supplies, and equipment. In addition, the 2150 ventilation raise will provide secondary egress from the East Deep ore zone.

### **5.2.2 Development**

Underground development consists primarily of lateral and ramp development, with some raise development for ventilation and emergency egress.

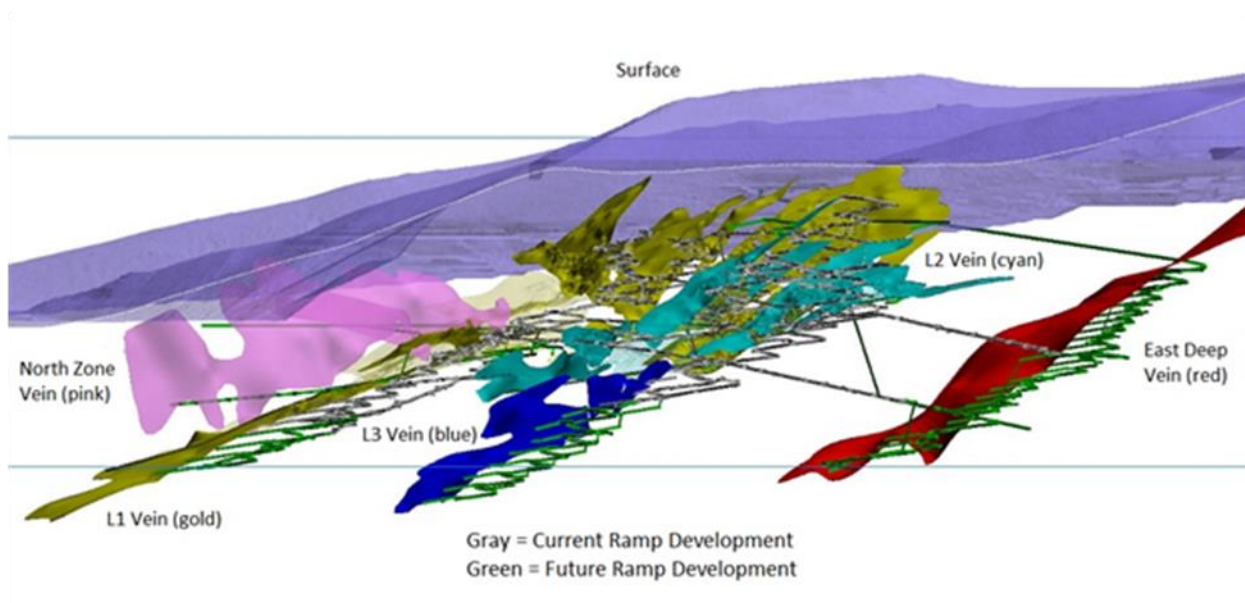
The ore body is accessed via a series of ramps and stope access drifts. Ramps have nominal dimensions of 19 ft wide x 16 ft high. They are driven at a 15% grade with flattened segments at stope access intersections, resulting in an average grade of 13.5%. The ramps are located a minimum of 50 ft from the footwall of the ore body.

Stope access drifts are developed from the haulage ramps at vertical intervals of 50 ft and driven perpendicular to both the ramp and the strike of the stope it accesses. Stopes are mined in both directions from the stope access drift intersection to the lateral extents of the ore zone. The access drifts are designed near the center of the stope's strike length to maintain two active faces for the majority of the stope's life.

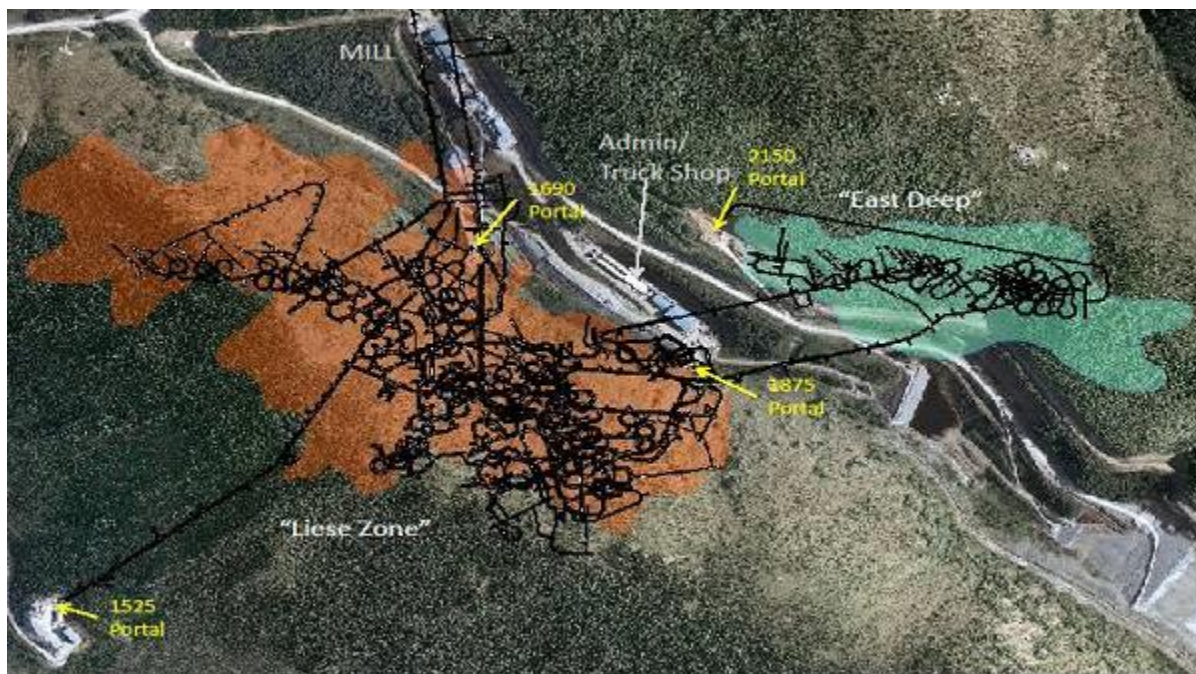
**Figure 5.1.1** and **Figure 5.1.2** show 3D rendering and plan view of life of mine development, respectively.



**Figure 5.1.1: 3D View of Orebodies and Underground Development**



**Figure 5.1.2: Plan View Life of Mine Underground Development**



### 5.2.3 Mining Method

Cut-and-fill mining is the primary mining method used at Pogo. This method is selective and yields a high overall ore recovery at a low dilution factor, as mining conforms to the shape of the deposit. All production drilling is conducted by rubber tired drill jumbos. After the stopes are mined, paste backfill is used to fill all mining voids. A simplified cross-section of cut-and-fill mining is shown in **Figure 5.2**. Mining equipment includes two-boom electric hydraulic jumbos, LHD units, rockbolters, service vehicles and explosive loading trucks. Mechanized rockbolters are used to support the ground in stopes greater than 15 ft x 15 ft, smaller stopes are supported with hand held jackleg drills.

To maximize ore recovery along the contacts and to minimize ore loss, breasting, slashing and benching is carried out in the stopes as a final cleanup of remaining ore prior to backfilling.

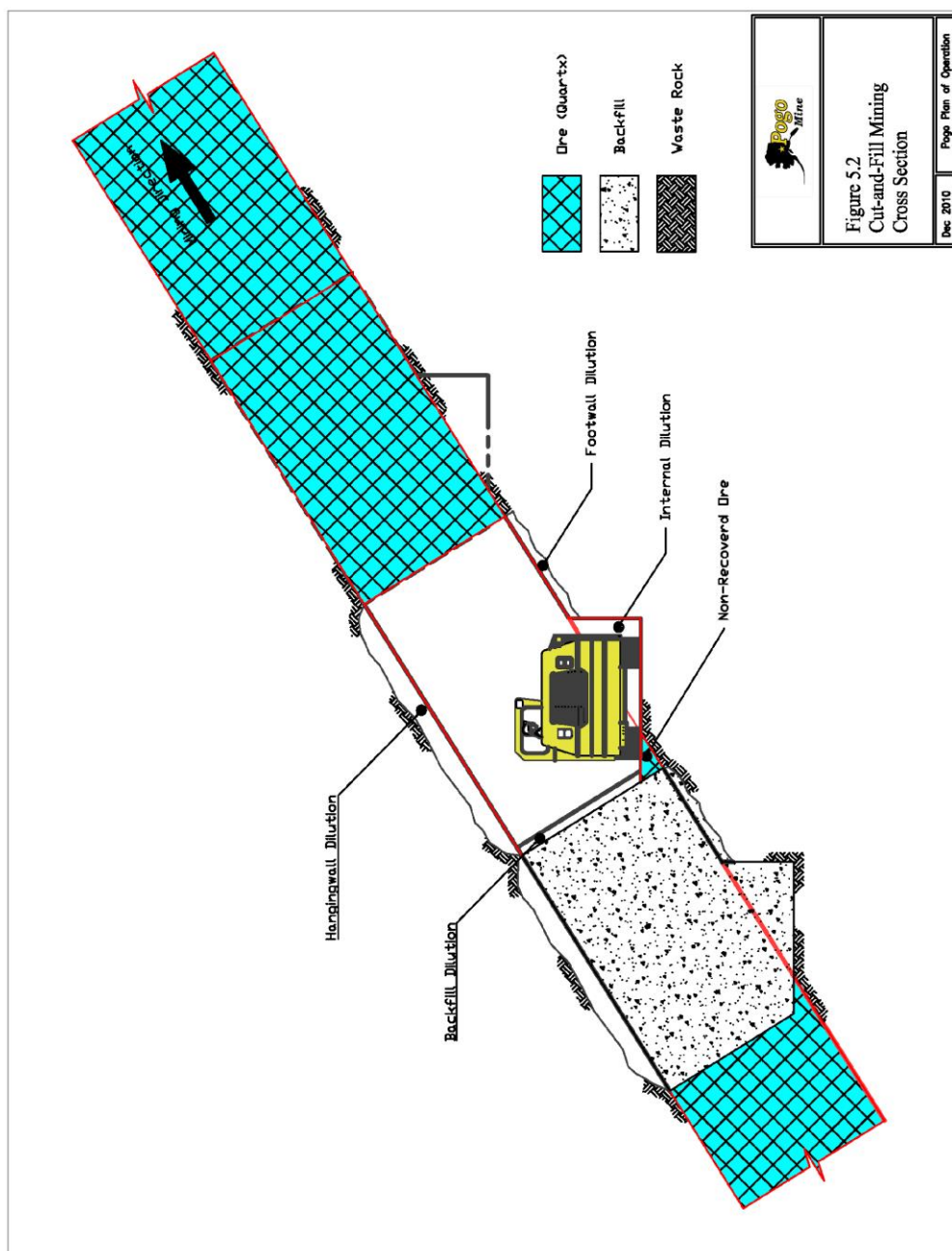
#### **5.2.4 Ore Haulage**

Ore is hauled from the stopes to the underground ore storage bin using 9 yd<sup>3</sup> LHD units and 50 ton haul trucks. The ore bin is fitted with a grizzly and a hydraulic rock breaker to reduce oversize material. Ore from the bin is fed onto a conveyor with a pan feeder and transported to the surface coarse ore bin for feed into the mill.

#### **5.2.5 Development Rock Haulage**

Development rock is trucked to the surface via the 1525, 1875, and 2150 portals and placed according to the rock segregation plan described in **Section 5.4**.

**Figure 5.2: Cut-and-Fill Mining Cross Section**



### 5.3 Temporary Ore Storage

As a normal part of mining, ore is produced at different rates in comparison to the steady operations of the mill. Mining operations store excess ore underground when possible. When this is not possible, the excess ore is stored at a temporary surface stockpile beneath the supply conveyor to the mill just above the 1690 portal. Ore from this temporary stockpile is hauled to the mill when the conveyor requires maintenance or back underground to provide steady mill feed. This temporary stockpile has a high turnover rate to reduce the oxidation potential.

### 5.4 Development Rock Segregation & Storage

Development rock is mined, brought to surface, segregated by individual blasted rounds, and held for assay (see **Table 2.1** for quantities). When the assays are complete, the material is classified as "mineralized" or "non-mineralized" based on the standard operating procedure for rock segregation that is summarized below.

To classify the rock, drill cuttings from blast holes that comprise each development blast are sampled and assayed on site. If the material is above either 0.5% sulfur or 600 milligrams per kilogram (mg/kg) arsenic, the blasted rock is classified as "mineralized." If the assay does not exceed these thresholds, the material is classified as "non-mineralized."

The mineralized development rock is stored at the temporary development rock placement area near the portals until it can be trucked to the dry stack facility and encapsulated in the tailings.

Optimization of the mine plan and layouts resulted in modifications to development rock quantities, with the current forecast shown in **Table 5.1**.



**Table 5.1: Development Rock Quantities (tons)**

	2013	2014	2015	2016	2017	2018	2019	Total
<b>Mineralized Rock to Underground</b>	5,000	5,000	5,000	5,000	5,000	5,000	0	30,000
<b>Mineralized Rock to Surface</b>	162,273	165,910	164,702	168,146	182,304	61,893	2,484	907,712
<b>Non-mineralized Rock to Surface</b>	355,455	363,184	360,617	367,936	398,020	142,148	5,278	1,992,638
<b>Total Development Rock</b>	522,728	534,094	530,319	541,082	585,324	209,041	7,762	2,930,350

Non-mineralized development rock is used as bulk fill on roads and pads, for construction of the toe berm of the drystack, and as riprap.

## 5.5 Backfill Distribution

The underground mining method requires that mined-out areas be backfilled with material to help provide ground support while the adjacent ore panel is mined. Mill tailings mixed with cement (paste backfill) provide part of the necessary support. **Figure 5.3** depicts the backfill cycle.

The paste is made in the paste backfill plant, located on the surface near the mill. At the backfill plant, on an average approximately six to eight percent cement is added to the mixture to give it strength after curing. A typical designed paste unconfined compressive strength is 30 pounds per square inch (psi) after 2 weeks.

For Liese zone, the paste is pumped from the paste plant via a steel pipeline installed in the surface conveyor structure called 'blue tube' and 1690 decline. For East Deep zone, a new 2,700 ft long surface paste pipeline will be constructed between paste plant and 2150 portal. This new paste pipeline will be installed with a containment system which consists of culvert and containment sumps. The proposed pipeline route is shown in **Figure 1.3f** and the details of pipeline system can be seen in the report titled "Surface Paste Distribution Containment Pipeline System" issued by Golder Associates on May 21, 2013.

To prepare the stopes for fill, all services are removed, including the air and water pipelines and electrical cable. High density polyethylene pipe (HDPE) and breather lines are installed in the highest areas of the stope and extended to the back end of the stope, where filling begins. The HDPE pipe is left in the stope as part of the fill process.

Shotcrete paste barricades are constructed near the access area to contain the cemented paste fill in the stope. During pouring, the paste builds up and pushes out towards the barricade, completely filling the mined void. As the stope fills, small explosive charges are blasted with detonating cord to break the pipe (at couplers) and retreat the active pipe outlet back to the barricade.

## **5.6 Mine Equipment**

### **5.6.1 Mobile Equipment**

All stopes with a vertical height greater than 10 ft are developed using two-boom electric hydraulic jumbo drills. Single-boom electric hydraulic jumbos are used in narrower stopes. Rockbolters are used for installing ground support. Two sizes of Loaders (LHD) units are currently used: 9 cubic yards (yd<sup>3</sup>) and 4 yd<sup>3</sup>. The 9 yd<sup>3</sup> LHDs are used to muck ore from stopes with a vertical height greater than 15 ft to the remuck, ore bin and to load trucks. The 4 yd<sup>3</sup> LHDs are used in narrower stopes with a vertical height of 10 ft.

Fifty-ton diesel haulage trucks are used to haul ore to the grizzly and development rock to surface.

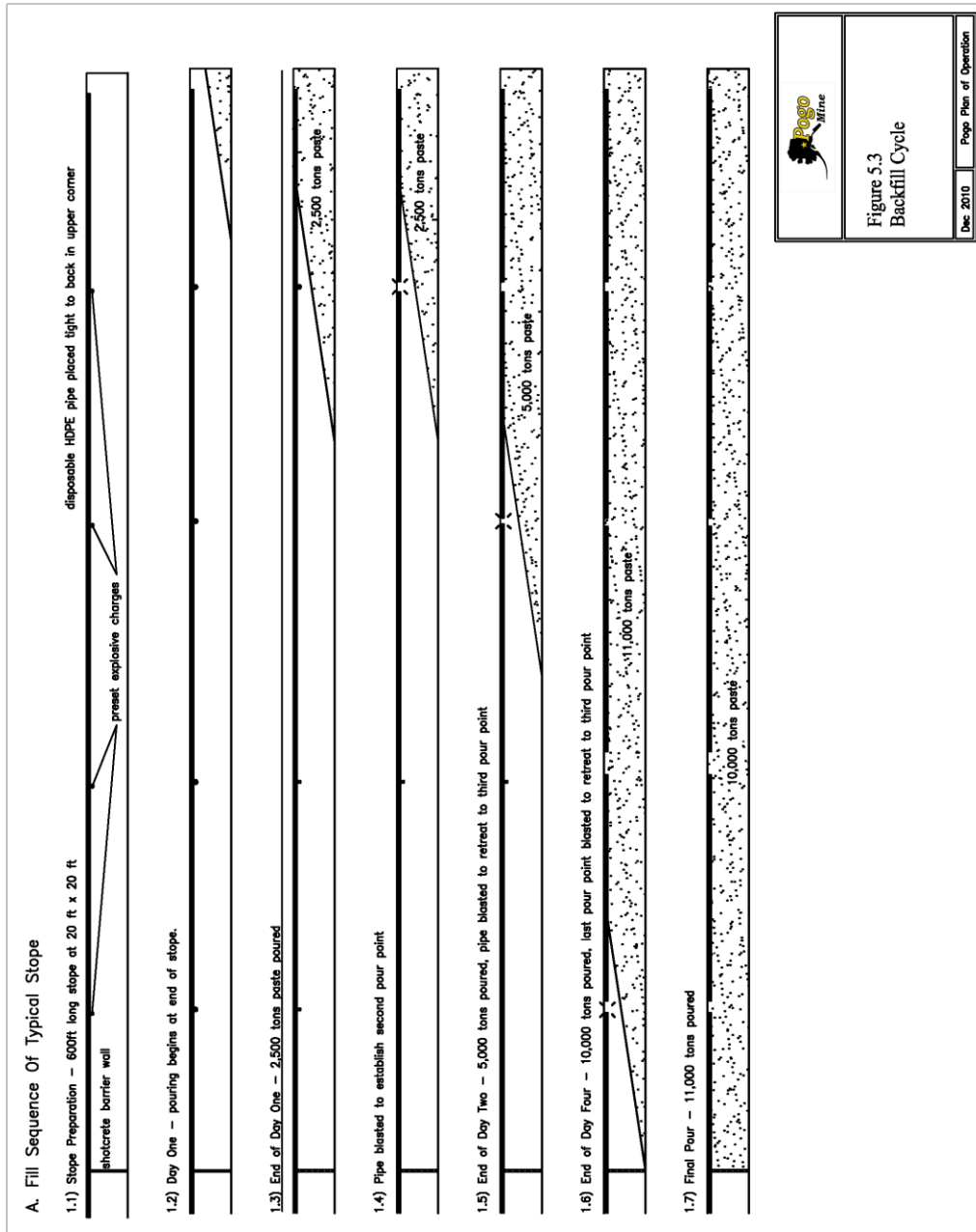
Bulk pumpable emulsion is the primary explosive used. Two service units with man baskets are used to load emulsion in drill holes. Packaged emulsion explosives are used in small stopes where the pump units cannot access or as a backup if a unit is down for repair.

Two scissor deck units and two flat bed units are used for installing mine services and to transport supplies.

Mine supervisors and mechanics operate pick-up trucks for underground transportation. Miners are transported into the mine with tractors.

A grader is provided for road maintenance and a bulldozer for stope clean up.

**Figure 5.3: Backfill Cycle**



### **5.6.2 Fixed Equipment**

Major pieces of underground fixed equipment used include the following:

- Main and auxiliary fans;
- Propane mine air heaters and storage tanks;
- Ventilation doors and regulators;
- Main and auxiliary pumps;
- Air compressors;
- Portable refuge stations;
- Grizzly;
- Hydraulic rock breaker;
- Conveyor belt feeder;
- Conveyor belt; and
- Equipment for furnishing the underground preventative maintenance facility, refuge stations, latrines, storage areas, and explosive and cap magazines.

## **5.7 Mine Facilities**

### **5.7.1 Ventilation**

Due to the ventilation requirements of the underground diesel equipment, equipment service bays, and other miscellaneous demands, the Pogo mine requires a total airflow of 500 kilo cubic feet per minute (kcfm).

Three fresh air intakes are used: the 1525 portal, 1875 portal, and 2150 portal. Each portal is equipped with two propane burner's to heat the cold air in winter to prevent temperatures from dropping below freezing inside the mine.

Exhaust air exits the mine from the 1690 portal and the 2150 ventilation raise. To ensure proper airflow, two 400 horse power (hp) fans are installed in bulkheads along the 1690 conveyor / exhaust drift. Air will also exhaust from the 2150 ventilation raise through two primary fans installed underground at the bottom of raise. Ventilation doors, auxiliary fans, ventilation tubing, and regulators are installed as the mine is developed to direct appropriate air quantities to the various work areas.



### **5.7.2 Conveyor**

A 42-inch wide x 2,500-ft long conveyor, approximately 1,200 ft of which is located underground in the 1690 conveyor ramp, conveys ore to the mill. The surface portion of the conveyor transports the ore to a 1000 ton (live capacity) storage bin located adjacent to the mill.

The conveyor's drive head pulley is in an enclosure at the top of the 1,000 ton storage bin, while the conveyor's vertical gravity take-up is located in the mine. The conveyor is suspended from chains for its entire underground length to facilitate cleanup.

The conveyor is anchored at intervals along one side of the drift wall. Vehicle access is provided along the length of the conveyor drift. Above ground, the conveyor is elevated and housed in a prefabricated tubular gallery that also carries mine services.

A self-cleaning magnet is located near the ore bin apron feeder and is designed to remove any ferrous metal that may harm the conveyor or downstream process equipment. A second conveyor transfers ore from the storage bin to the mill.

### **5.7.3 Underground Equipment Maintenance**

Mine equipment maintenance is performed both underground and at surface. A preventative underground service bays have been developed in the center of the mine for minor repairs. All major equipment repairs are performed in the surface shop.

### **5.7.4 Electrical Distribution System**

Electrical power is delivered to the mine from the surface substation at 13.8 kV. The 13.8 kV power cable is fed into the mine through the 1525, 1690, and 2150 portals. Distribution centers are located throughout the mine to convert the power to 480 volt (V) for mine equipment and auxiliary ventilation.

### **5.7.5 Underground Communications**

The mine is served by a leaky feeder system that enables communication via portable hand-held radios. Base radios have been installed in most of the mining equipment. Hand held radios are also available. Base radios are installed at each underground electrical transformer location.

A fixed telephone system is installed in the mine as a backup system, with telephones located at each refuge station and electrical transformer.

The mine is equipped with a stench gas emergency warning system, which can be initiated at the 1525 portal and the 1875 portal.

#### **5.7.6 Compressed Air**

Compressed air for drilling, pumps and the maintenance shops is supplied by an electric air compressor installed at the 1525 Portal with future plans to install additional compressors at the 1875 portal to support the growth of mine development. Compressed air is distributed to the primary development drives through 4-inch diameter pipes and to the stopes through 2-inch pipes. When the stoping lift is complete, compressed air lines installed in the stope access drifts and stoping areas are recovered and re-used for subsequent stope lifts.

#### **5.7.7 Service Water**

Mine service water is distributed throughout the mine in 4-inch pipelines suspended in the upper corner of the ramps. The pipelines are reduced to a 2-inch diameter in the stope accesses and stopes. When a stoping lift is completed, water lines installed in the stope accesses and stoping areas are recovered and reused in subsequent stope lifts.

A mine service water recycling system is located near 1230 mine sumps underground. It filters the sump water to reuse as mine service water.

#### **5.7.8 Refuge Stations**

Mine Safety and Health Administration (MSHA) requires that refuge chambers be provided in areas from which mine personnel may not be able to escape during an emergency. Currently four portable refuge chambers are located in mining blocks. This will eventually increase to five as mining progresses. Refuge chambers are equipped as per MSHA and 30 Code of Federal Regulations (CFR). First aid equipment and other necessities are provided.

### **5.7.9 Emergency Egress**

Personnel typically exit the mine through the 1875 portal. In an emergency, the 1525 portal, 1690 portal, and 2150 portal may also be used, and in some ventilation raises including 2150 ventilation raise, manway ladders are installed.

### **5.7.10 Fueling**

From surface storage at the mine shop, fuel is delivered to the mining equipment by a mobile fuel truck.

### **5.7.11 Diamond Drilling**

Diamond drilling is used to define the orebody and assist in access development placement, reserve estimation and short and long-range planning.

## 6.0 MILLING

### 6.1 Milling Facilities

The mill facilities are located in the Liese Creek Valley, parallel to a portion of the site access road. The general layout of the plant site facilities, including the mill and backfill plant, is shown in **Figure 6.2** in **Appendix B**. **Figure 1.2** shows a photo of the site facilities. The mill facilities consist of two main buildings: one houses the grinding, gravity, flotation, cyanide leach and carbon in pulp (CIP) processes and the other building contains the tailings dewatering and paste backfill processes.

Gold is recovered from the mined ore using a milling method consisting of: 1. Grinding the ore to a fine particle size to liberate the gold contained in the ore; 2. Recovering a portion of the gold using gravity methods; 3. Floating the remaining gold and sulfide minerals using froth flotation; and 4. Recovering the gold from the flotation concentrate using cyanide leach (see **Figure 6.1** in **Appendix B** for Process Flow Diagram). The cyanide process is isolated from any contact with the environment. The cyanide slurry is detoxified, and the residual cyanide contacted material contained underground in the paste backfill.

Operation of the Pogo mill proved that the ore is amenable to gravity recovery and approximately one third of the gold may be recovered in this manner. The use of gravity recovery and flotation allows for the downsizing of cyanide leach, cyanide detoxification, and carbon recovery. Reducing the size of the cyanide leach circuit in turn reduces the amount of cyanide required for ore processing.

The gravity process recovers less than 1% by weight of the mill feed with up to 40% of the recovered gold. The gravity circuit concentrate is leached in an intensive cyanide leach circuit to extract the gold from the concentrate. After leaching the residue is then combined with the flotation concentrate material at the starting point of the conventional cyanide leach circuit.

The flotation process recovers the gold not collected in the gravity circuit into a sulfide rich concentrate representing about 10% by weight of the mill feed. This concentrate is leached in a conventional cyanide leach circuit to extract the gold from the concentrate.

All of the cyanide leach circuits are designed to prevent contact between slurry and the external environment. Following leaching, the cyanide slurry is detoxified and placed underground as paste backfill to fill the void created during mining.

The Pogo mill produces two types of tailings:

*Tailings from the flotation circuit.* Approximately 90% of the total tailings mass consist of finely ground sand and traces of sulfide mineralization. Half the tailings are filtered and trucked to the surface drystack tailings placement facility. Filtered tailings are reduced to 15% moisture or less prior to placement. The filtrate water is recycled back into the mill process. The rest of the tailings are combined with the detoxified cyanide leach tailings and placed in the mine (see **Figure 5.3**).

*Tailings from the cyanide leach circuit.* Tailings from the cyanide leach circuit comprise the remaining 10% of the total tailings mass. All are used to make paste backfill after going through the cyanide detoxification circuit, ensuring that most of the sulfide minerals contained in the ore are returned to their original location.

In summary, the Pogo process flow sheet accomplishes the following critical objectives:

- Minimizes the amount of sulfide and arsenic mineralization in the surface drystack tailings facility;
- Ensures that cyanide contacts the minimum amount of ore possible and that all material that has come into contact with cyanide is isolated underground as cemented paste backfill; and
- Ensures that all cyanide-bearing solutions are treated to detoxify cyanide to the lowest practical level.

The milling unit operations are described in **Sections 6.1.1 to 6.1.6** below.

### **6.1.1 Grinding**

Ore is conveyed from the surface storage bin to a grinding circuit consisting of a Semi-Autogenous Grinding (SAG) mill and a ball mill. The ore is mixed with recycled water and ground by the tumbling action of steel balls to produce a target particle size of 80% less than 65 microns ( $\mu\text{m}$ ), at a slurry density of 35% solids by weight.

### **6.1.2 Gravity Circuit**

All of the ground slurry is directed to a trash screen and then to a centrifugal gravity concentrator that separates the particles according to differences in specific gravity and recovers any “free” gold. Approximately 15-40% of the gold is currently being recovered in this fashion.

Concentrates from the gravity circuit are leached in an Intensive Leach Reactor (ILR), and the residue is reground in a dedicated regrind mill to isolate the cyanide solutions. The reground residue is then pumped as slurry to the head of the conventional cyanide leach circuit. Gold bearing solution from the ILR is pumped to the gold electrowinning circuit located in the refinery.

### **6.1.3 Flotation & Concentrate Regrind**

After grinding and gravity concentration, the slurry reports to the flotation circuit. In this circuit, finely ground minerals are recovered according to mineral type and surface chemistry to a froth phase; this is created by frother and collector reagents in agitated and aerated tanks. The flotation concentrate amounts to approximately 10% by weight of the initial ore fed to the mill. This flotation concentrate is reground to a powder like consistency (target 80% passing 15 µm) to liberate fine gold from the sulfide minerals.

### **6.1.4 Cyanide Leach & Carbon-in-Pulp (CIP)**

Before entering the leach circuit, the reground concentrate is pre-aerated with oxygen. Cyanide is then introduced to dissolve the gold in the flotation concentrate material. The leached slurry is then directed to CIP tanks, where the dissolved gold is adsorbed onto activated carbon granules suspended in the pulp.

The leach and CIP circuits have two thickeners that permit cyanide solution from the CIP tailings to be recycled to the beginning of the leaching circuit. Pre-aeration and solution recycling minimizes the requirement for cyanide in the process.

### **6.1.5 Carbon Stripping, Electrowinning, Refining**

The gold-loaded carbon from the CIP circuit is periodically stripped of its gold in a carbon elution pressure vessel. Loaded solution passes through electrowinning cells and the gold is collected as sludge in the bottom of the cells as well as plated onto stainless steel wool cathodes. The gold is then removed from the cathodes by pressure

washing and melted to produce gold dore. The stripped carbon is reactivated by acid washing, followed by thermal regeneration in a horizontal kiln, and recycled back to the CIP circuit.

#### **6.1.6 Cyanide Detoxification**

Residual cyanide in the CIP tailings from the cyanide leach circuit undergoes detoxification by means of a Sulfur Dioxide / air cyanide detoxification process. The Sulfur Dioxide / air process uses a mixture of sodium metabisulfite solution and air sparged in agitated tanks to oxidize the cyanide. Lime is added to maintain a slurry pH of 8.0 to 9.5, and copper sulfate is added as a catalyst. Following this process, the CIP tailings are used to make paste backfill for the mine.

ADEC Waste Disposal Permit limits the Weak Acid Dissociable (WAD) Cyanide in the CIP tailings to be used for paste backfilling as follows: "At least 90% of the samples shall contain less 10 mg/kg of WAD cyanide and none of samples shall contain more than 20 mg/kg of WAD cyanide."

## 7.0 POGO MINE WASTE MANAGEMENT

The Pogo mine produces a variety of wastes the majority being tailings and mine rock with lesser amounts of general construction debris and other solid waste. About 40% of tailings will be placed underground as paste backfill. The remaining tailings are dewatered by pressure filtration and placed in a surface tailings facility or “drystack” in Liese Basin. So far, about 5.8 million tons of tailings and waste rock have been placed in the drystack tailings facility, which has an estimated maximum height of 350 feet and capacity of approximately 20 million tons.

### 7.1 Paste Backfill

As described in **Section 3.1**, the Pogo mine produces two tailings products: flotation tailings and cyanide leach tailings. CIP tailings represent approximately 10% of the total volume of milled waste material, contain most of the sulfides, and are the only waste material that had contact with cyanide.

After detoxification of the cyanide leach tailings, the cyanide leach tailings are mixed together with some of the flotation tailings and cement producing “paste backfill” and placed in the mined-out stope areas underground for ground support. Placement of all the cyanide leach tailings in the paste ensures safe and permanent disposal underground. In 2008, Pogo sampled the paste backfill mixtures and confirmed that the NP/AP (neutralization potential/acid potential) ratio of all samples was greater than the 1.4 target value proposed during project design (SRK 2008, Sobek Acid base Accounting).

In the event there are no stopes ready for backfill, cyanide leach tailings can be temporarily stored in a tank at the mill, allowing for milling operations to continue between paste pours. Once the temporary storage is full, the mill will shut down.

### 7.2 Surface Tailings Treatment Facility

The surface tailings treatment facility has two separate components, the drystack and the RTP. These components are described below.



### ***7.2.1 Drystack Tailings Facility***

The drystack has been in operation since February 2006. The drystack has two distinct zones: the “shell” area, which provides structural stability for the facility; and the “general placement area,” which is used for general tailings placement and mineralized rock placement and which is not required to contribute strength. The shell is comprised of non-mineralized development rock and compacted tailings. Through 2012 about 6,676,000 tons of material has been placed at Drystack Tailings Facility, which includes 4,104,000 tons of drystack tailings, 2,572,000 tons of waste rock. The capacity of the DSTF is 20 million tons (2012 POO Rev 2). The estimated rate of material placement for years 2012-2019 is provided in **Figures 7.1 a-h**. SRK Consulting (Canada) Inc. (SRK) conducted a preliminary DSTF study in 2011. The study includes an update of the DSTF material balance and an assessment of the structural stability of the expanded DSTF. Pogo submitted the report, titled “Pogo Mine Dry Stack Tailings Facility Expansion Preliminary Study” to ADNR on May 17, 2011. In order to place more than 7.5 million tons of material in the DSTF, a new diversion ditch and haul road must be constructed. The final DSTF diversion ditch and haul road design was prepared by SRK. Construction is planned in three phases: Phase I: Construct new North Diversion Ditch and Haul Road; Phase II: Construct new South Diversion Ditch; and Phase III: Close Existing Diversion Ditch. Pogo is prohibited from placing tailings over the existing diversion ditch until obtaining approval from ADNR. Refer to the Pogo DSTF Construction and Maintenance Plan provided in **Appendix F** for more details on DSTF. The new diversion ditch channels were designed to intercept non-contact runoff from undisturbed areas upgradient of the DSTF. They were sized to convey the 1 in 200-year, 24-hour precipitation event of 4.6 inches. This design storm event is consistent with the one used to design the segments of the existing diversion system prepared by AMEC in 2004.

#### **Shell Area**

The first shell (rock fill shell) was constructed using non-mineralized rock only to a width of 100 feet. Non-mineralized rock is placed in three ft lifts on the design 3:1 (horizontal: vertical) slope to construct a shell for the tailings general placement. The second shell (composite shell 1), which has been constructed since 2009, is constructed using non-mineralized rock and drystack tailings. Non-mineralized rock is placed at the face slope in three feet lifts on the 3:1 slope to a width of 20 feet, then the drystack tailings is placed in one foot lifts and compacted. The width of the second shell is about 150 feet.

The construction of the third shell (composite shell 2) commenced in 2011 using same method as the second shell.

Prior to the shell construction, the toe berm was extended downstream. Approximately one foot of organics and soil was cleared and grubbed from the drystack footprint area and stockpiled for future use as growth media. A 1.5 ft thick layer of non-mineralized rock was placed as an erosion control / drainage blanket over the entire drystack footprint after grubbing is completed. A haul road along the north side of the drystack is used to access the stack. Various access points to the benches are created from the main haul road as the facility rises.

DSTF shell construction temporarily ceased at the end of 2012, because the elevation of shells reached the elevation of current haul road.

### General Placement Area

Tailings and mineralized development rock is co-disposed year-round in the general placement area. The rock is encapsulated in the tailings to minimize the oxidation of any sulfide minerals present. Rock is not placed in the general placement area until there is a two foot minimum of compacted flotation tailings covering the area. The rock is placed in nine foot maximum lifts before another two feet of tailings cover is placed over the rock. The mineralized rock may not be placed within 50 feet from the perimeter of DSTF.

The same compaction procedures used in creating the structural shell are used in the general placement area, despite its lower requirement for structural strength. This effort aids trafficability and other operational considerations.

Snow and ice is taken into consideration during construction of the general placement area. Since the performance of the drystack does not depend on quality compaction in the general placement area, tailings and mineralized rock may be mixed with small amounts of snow and ice prior to placement; however, all reasonable attempts are made to minimize the amount that becomes buried in the stack.

Access to the general placement area is via a haul road between the plant site and drystack. As construction of the drystack continues, this haul road is progressively buried. No re-routing of this haul road is required.

### Compaction Requirements

The tailings are placed and compacted in accordance with the Pogo DSTF Construction and Maintenance Plan (**Appendix F**).

### Sedimentation Control

Drystack erosion translates into a sediment load in the RTP, thus specific sedimentation control measures are used to keep erosion to a minimum. These control measures have proven effective as very little tailings have reached the RTP. To achieve these results at Pogo, the following measures described below are taken.

Drystack Geometry The use of two percent slopes to limit erosion on the tailings. The slope face of the shells is covered with non-mineralized rock to minimize the erosion of drystack tailings at the slope face.

Drystack Compaction Both the shell area and general placement area are compacted, but the shell area is the most erosion resistant.

Equipment Operations The drystack shells are developed as a combination of terraces to prevent equipment from causing erosion.

Managing Runoff Silt fences are used for erosion control as necessary.

### Dust Control

Tailings have the potential to create dust, especially when they have been frozen or desiccated by the sun. The drystack area in the Liese Basin is not overly exposed to sun, and wind velocities are lower than on adjacent ridges. Observations from snowpack distributions in the basin show that drifting in the lower basin is not a concern.

Best management practices are used to control dust during drystack operations such as; compacting the tailings, controlling traffic on the drystack, and limiting the use of equipment to active placement area(s) only. Summer moisture from rainfall assists in keeping the surface moisture content within an acceptable range although prolonged periods of warm weather with low humidity may require building silt fences around non-active placement areas. In winter, silt fences are required if the shell is exposed. During this time, natural or artificial snow coverings provide cover for the shell area.

## Surface Water Management

### Flow-through Drains

All runoff in and around the tailings drystack facility is directed to the RTP by means of a network of ditches and drains. Flow-through drains are constructed in the existing stream valleys within the drystack area to augment the existing drainage courses and allow them to pass runoff under the stack.

At present, flows in these channels are above the water table (by approximately 10 ft in most cases) due to accumulated organic detritus in the bottom of the channel. The drainage courses have been prepared appropriately to remove this blinding layer. With this blinding layer removed and the diversion ditch in place, it is unlikely there would ever be any appreciable water near surface in the existing drainage courses. Nonetheless, for additional security following mine closure, the flow-through drains are designed to carry a significant capacity of water compared to previously measured flows in Liese Creek.

The rockfill used in the flow-through drains is between 12-inch and 36-inch in size, and covered with a filter material to prevent fines migrating in from the drystack tailings. The rockfill is placed at about 1H:1V, resulting in a drain base width of 21 ft, crest width of 9 ft and height of 6 ft. The corresponding flow capacity of such a drain is approximately equivalent to a 1:10,000-year/24-hour storm event with no allowance for freeboard and without the benefits of the diversion ditch.

### Perimeter of Drystack Tailings Facility

The non-mineralized waste rock is placed at the perimeter of drystack tailings facility to allow any runoff from precipitation that bypasses the major diversion ditch above the site is lead to the flow-through drains. All flows or seepage from the drystack passes to the RTP and treated as necessary.

### Monitoring

Bi-annual survey records of the drystack, truck loads, and tonnage data are recorded. Visual inspections are recorded. Annual as-built surveys are scheduled for September for the annual site as-built drawing.

Geotechnical monitoring is conducted at the shell area in order to confirm if the drystack is compacted as designed. This monitoring includes geotechnical testing such as

Standard Proctor Test, particle size distribution and Atterberg Limits, and in-situ density and moisture content using Troxler nuclear gauge.

### Contingency

Tailings handling and placement procedures are designed to accommodate equipment breakdowns and unforeseen weather events. Equipment is sized so that duty hours are low and/or backups are included. Underground mine equipment can also provide backup for loading and hauling.

### Drystack Tailings Facility Construction and Maintenance Plan

The Drystack Tailings Facility Construction and Maintenance incorporated into the Plan of Operation and is included as **Appendix F**.

#### **7.2.2 RTP Facility**

The RTP is designed to collect seepage from the drystack so that it can be treated before discharge. The RTP also collects all runoff from the drystack tailings facility and provides adequate retention time for settling of solids as well as providing surge storage capacity so that the drystack tailings runoff can be treated before discharge.

The RTP dam has a maximum storage capacity of approximately 43.6 million gallons (Mgal) and was permitted for a crest elevation of 2092 ft amsl. The dam is a membrane lined rockfill embankment with a hydraulic height of 67 feet. The dam crest is 35 feet wide and extends over a distance of 550 feet. The sharp crested weir located in the spillway inlet is at elevation 2084 ft amsl. The spillway has a maximum discharge capacity of 440 cubic feet per second (cfs). The spillway intake structure is constructed from reinforced concrete and discharges into a channel lined with a corrugated steel pipe. This channel is approximately 600 feet long and subsequently discharges into a rip rap outfall located in a channel that would return flows to Liese Creek in the event of spillway operation. A grout curtain located beneath the upstream toe of the dam was installed to limit seepage through the foundation bedrock while the use of a composite liner on the upstream face of the dam was installed to limit seepage through the dam embankment. During normal dam operations, water is pumped from the reservoir via two HDPE pipes emptying into a head tank. The RTP is operated in accordance with the Pogo RTP Operating and Maintenance Manual (**Appendix G**).

The required volume for the RTP Dam is 25 million gallons to accommodate a 10-year, 24-hour precipitation event (corresponding precipitation is 2.8 inches) with a maximum volume of water for mill operation during this event. However, Pogo sized the RTP at 40 million gallons to minimize the probability of spillway usage of the RTP Dam. Refer to Section 8.4 of the RTP Design Report prepared by AMEC in 2004. The current RTP can hold up to 43 million gallons. Construction of the 20 Mton DSTF would increase the RTP catchment area by 38.8 acres. The additional volume of runoff into the RTP would be 38.8 acres times 2.8 inches which equals 2.95 million gallons, assuming that all of the precipitation flows into the RTP (actually some of the precipitation would infiltrate into the ground). Therefore, the required storage volume for the RTP Dam that would accommodate the 20 Mton DSTF is 27.95 million gallons, which is considerably smaller than the current RTP capacity of 43 million gallons.

Seepage collection wells (SCW) are installed 150 ft downstream of the toe to capture seepage and return it to the RTP pond. Five wells are currently functional, and consist of four deep wells (60 – 70 feet in depth) and one shallow well (13 feet in depth). Seepage collected by SCWs is returned to RTP Head Tank via HDPE pipeline. SCW 1-4 (never functional) were properly plugged and abandoned in 2011.

Three water monitoring wells (MW) are installed about 330 feet downstream of the seepage collection wells below the RTP dam.

For more information on the RTP facility or water management in general, see **Section 8**.

### **7.3 Other Wastes**

Besides tailings and mine rock, other types of non-hazardous materials are generated at Pogo and require storage or disposal. As per Pogo's Waste Disposal Permit 0131-BA002, these non-hazardous materials may be placed in the drystack or underground.

- Settled solids from sumps, ditches, and degritting basins;
- Settle solids from the water treatment plant;
- Dewatered water treatment plant sludge, including the sludge generated during the advanced exploration phase; dewatered sewage sludge meeting the requirements of Section 1.2.2.6 of Pogo's Waste Disposal Permit 0131-BA002;
- Incinerator ash and residue;

- Ash from combustion of scrap wood material;
- Iron (drill steel, balls, empty case, etc);
- Used ventilation tubing and used filter press cloth;
- Empty plastic and glass containers; inert domestic waste;
- Construction debris;
- Tires;
- Spill cleanup debris approved by ADEC;
- Non-terne plated used oil filters that have been gravity hot-drained; and
- And such material as would otherwise be disposed of in a surface landfill without special handling.

An incinerator near the lower camp is used to incinerate all kitchen wastes, dewatered sewage sludge, and other cardboard, paper, and burnable wastes from the project.

A burn pit, near the gravel ponds in lower camp, is used to dispose of clean wood and cardboard composed mainly of large debris from shipping containers and packaging. A burn permit is obtained on a yearly basis from Alaska Department of Natural Resources (ADNR).

These materials may NOT be disposed into the surface landfill, the surface tailings drystack facility or the underground facility, unless otherwise provided or approved in writing by ADEC:

- Other than interstitial waters entrained in the tailings or past backfill tailings, treated or untreated process water in quantities or concentrations that would exceed water quality standards in 18 Alaska Administrative Code (AAC) 70;
- Chemical containers (unless triple rinsed) and discarded or unused chemicals;
- Un-combusted household waste;
- Laboratory wastes other than wash waters, neutralized acids and neutralized bases;
- Sewage solids that are untreated and/or have less than 10% solids by weight;
- Asbestos waste;



- Hazardous wastes, as defined by 40 CFR, Part 261, including radioactive material, explosives, strong acids and untreated pathogenic waste. This prohibition does not preclude disposal of residual wastes included as byproducts of the beneficiation process due to recycling of refinery slag, fire assay crucibles and cupels;
- Fuels, oil, transformers, paint, equipment and packing material;
- Glycol and solvents;
- Batteries; and
- CIP tailings except when subjected to cyanide destruction as required by section 1.2.3 of Pogo's Waste Disposal Permit 0131-BA002 and disposed underground as part of the paste backfill tailings.

These materials are taken off site for disposal.

- Screen material containing wood chips and carbon from the CIP and rougher concentrate screens (containing low levels of cyanide and gold) are shipped to a smelter;
- SAG mill liners may be recycled to the fabrication plant;
- Acid containers when feasible are shipped to the producer for re-use;
- Cyanide shipping containers comprised of wood are burned onsite with the burnable waste;
- All cyanide shipping containers comprised of bags are tripled rinsed and taken with the non-burnable trash off-site to a landfill;
- Used ball mill grease is delivered to an off-site incinerator;
- Wash bay sludge is delivered to an approved off site incinerator; and
- Used rags and absorbs containing petroleum are shipped off-site for incineration or they are incinerated on-site.

## **7.4 Waste Rock Storage**

There are two temporary storage piles for waste rock storage. One is outside of the 1875 portal and the other outside of the 1525 portal. The underground trucks bring the waste rock to the surface. The surface haul trucks move the mineralized rock to the



drystack general placement area. Non-mineralized rock is hauled to the various areas where it is used.

## 8.0 WATER MANAGEMENT

### 8.1 Overview

The purpose of the Pogo water management plan is to provide a framework for the collection and treatment of water to achieve the following objectives:

- Ensure the reliability of water supply for all process and potable needs;
- Protect the operations from flooding, erosion, interference from groundwater, precipitation and runoff; and
- Control and treat water that comes into contact with project facilities in an environmentally sound manner before discharge.

For additional background, see the Pogo “Water Management Plan” (February 2002 and June 2002).

In 2008, the Pogo Mine experienced 15 inches of summer precipitation, amounting to the seventh wettest year in the 50 year record for the Big Delta dataset. This amount of rain presented some challenges to operations due to increased groundwater inflows into the mine and significant surface runoff into the RTP. These challenges were met proactively by accepting the production curtailments necessary to store up to 12 million gallons of water in the mine until it could be treated and discharged. This short term approach reinforced the importance of the overall water management strategy to Pogo’s long-term success, and in late 2008 prompted an internal re-investigation of the assumptions and design criteria associated with the water management plan.

The major elements of this investigation included:

1. A review by AMEC of the precipitation events as compared to the model used during permitting, (see AMEC 2008, Pogo Precipitation Review);
2. A review by an external consultant to update the mine inflow forecast with or without the contingent options of grouting and diversion of the Liese Creek surface flows, (see Brown 2009, Pogo Mine Inflow Evaluation and Control Review);

3. A review of the mine water treatment and discharge system for potential flow capacity upgrades or optimizations (EM Associates 2009, Water Treatment Plant Upgrades – Phase II); and
4. An internal review of the mine services water supply.

In summary, although the precipitation was intense, it was within the envelope of the original 19 inches annual average model. The 2008 mine inflows of up to 180 gpm were within the forecast range, but future inflows are now expected to increase as the mine expands and deepens. These inflows continue to be mitigated as necessary by grouting as contemplated in the contingency plans during permitting. Upgrades to the underground recycle system included a new filter and pumping system installed underground. This system is recycling mine services (collected groundwater) water, which reduces the amount of RTP surface water introduced into the mine and thus the amount of water that must be treated and discharged.

The overall water management strategy and various water streams, inflows and outflows relevant to the Pogo Mine are summarized below.

## **8.2 Overall Water Collection, Treatment & Discharge Strategy**

The major components of the overall water collection, treatment, and discharge strategy for the project are shown in **Figure 8.1** in **Appendix B**. Water treatment plant #1 (WTP #1) is located underground inside the 1525 portal. Water treatment plant #2 (WTP #2) is located outside of the 1525 portal.

WTP #1 discharges to the final tank at WTP #2 where the water can then be returned to the mill or discharge to the off-river treatment works (ORTW). In case of an emergency, treated water can be pumped from the WTP#2 to the RTP for storage. Pogo is capable of continuously monitoring the treated effluent for pH, turbidity, and conductivity. Plant performance is monitored using these parameters, allowing for the automatic shutoff of any discharge during process problems.

## **8.3 Process Water**

The Pogo process plant is designed to maximize the recycling of water (see **Figure 8.2** in **Appendix B**). The only water released from the process is to the tailings as part of the cemented backfill or as residual moisture in the surface drystack. Additional water

necessary to make paste slurry is either RTP water or non-cyanide contacted raw water in the mill.

The total process water requirement is 147 gpm at 3,000 tpd. Make up water from external sources is used to replace the water entrained in the tailings material. In order of priority, mine drainage water, RTP water and fresh water is used to satisfy this requirement.

## 8.4 Mine Water

Mine water inflows are highly variable depending on the geology and hydrogeology of active stopes and ramps in the mine. Underground water management is an important component of the operation of the Pogo mine.

Since underground development commenced in 2004, the mine seepage gradually increased from about 60 gpm in mid-2006 to 150 gpm in mid-2011. It increased significantly from 150 gpm to 275 gpm in July - August 2011, then stayed relatively constant from September 2011 to March 2012 with an average flow rate of about 290 gpm (varied from 209 gpm to 343 gpm). The dramatic increase of mine seepage in mid- 2011 was interpreted to be due to intersecting a highly transmissive water bearing portion of the D3\_3 fault zone (includes Liese Creek and Graphite Faults) and contact with the southern margin of the diorite intrusive.

Pogo began a hydrogeological characterization in 2012 in order to rebuild the groundwater flow model. The original model was established in 2002. It was updated in 2009 (Brown 2009). The model is being updated to include the East Deep zone. The preliminary model was released by SRK in June, 2013 (SRK 2013). The expected inflows to the mine are summarized in **Table 8.1**. This flow model will be calibrated and updated once the 2013 field investigation is complete.

**Table 8.1: Expected Mine Inflows**

Water Management Strategy	Average Inflow	
	Current	EOY 2017 (Underground development completed)
Uncontrolled inflow	N/A	650 gpm
Grout at water bearing underground faults/structures	290 gpm	390 gpm

Using a combination of mine planning to schedule work near the water bearing faults and grouting mine inflows are maintained within the original design envelope.

Pogo began grouting in 2009, and it significantly contributes to controlling the underground seepage. Curtain grouting is applied to grout the water bearing faults such as Liese Creek ahead of advancing drifts. When water inflow is found in the drift, 60 feet long grout holes are drilled using a jumbo at the perimeter of drift, and then fine ground cement mixed with water is pumped into the holes at high pressure using a grout pump through mechanical packers set at the collar of grout holes. A couple of check holes are drilled after 24-hr curing time. Secondary grouting may be conducted if water inflow still exists. After completing the grouting procedure, the drift is advanced by 40 feet and is grouted again. If the water inflow can't be controlled by grouting, this stope may be paste backfilled.

A Tracer Test conducted in 2010 doesn't show any evidence of a connection between Liese Creek surface water and underground mine.

A Mine Water Recycling System was introduced in 2010 in conjunction with the construction of new 1230 Mine Sumps. This system filters sump water using sand filters and reduces the amount of RTP water sent to underground by as much as 150 gpm. It also reduces the pump up requirements of underground water from mine sumps to the mine water treatment plants.

## 8.5 Surface Water & Runoff

All surface water and runoff from the plant site and tailing drystack area is collected in the RTP immediately downstream of the tailing drystack facility. As shown on **Figures 8.4 and 8.5 in Appendix B**, a system of monitoring wells is installed downstream of the RTP to monitor the performance of the RTP seepage collection system.

To minimize the amount of precipitation and runoff that comes into contact with project facilities and then drains to the RTP, a diversion ditch was constructed along both sides of the Liese Creek basin uphill of the tailings drystack facility. This ditch is operated and maintained throughout the life of the mine and during decommissioning.

The storm water is controlled in accordance with the Storm Water Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs) Plan. The stormwater sump collects runoff from the haul roads, the plant site, and the campsite. The mill site and campsite pads are sloped toward the high-wall, with drainage directed to the stormwater sump. The mill site and campsite pads were constructed with impervious soil in order to reduce potential infiltration of stormwater and to help direct any spills to the sump. The stormwater pumping system has a large pump capable of handling a rate sufficient to accommodate a 5-year/6-hour storm. Both pumps are connected to emergency standby power. In addition, the site layout has been planned so that in the event of a storm surge that cannot be handled by the pumping system, excess water is directed over a weir and down the 1690 portal conveyor drift into the mine, where it can be stored as necessary.

Ice is removed from the ditches before spring breakup as necessary to ensure adequate ditch capacity is available for the freshet. Potentially contaminated ice or snow removed from the mill site pad or other areas is placed so that it drains to the RTP.

### 8.5.1 Drystack Runoff

The RTP is designed to capture runoff and seepage from the drystack. The design of the drystack, placement of materials, operation, and drainage control is described in **Section 7.2.1**.

Samples of the tailings taken since startup generally show that the arsenic and sulfur concentrations are within the range observed during the kinetic testing completed prior to construction. The pore water concentrations for both arsenic and sulfur are below those predicted in the Pogo 2002 Water Management Plan. On average, operational

drystack tailings contain roughly twice as much arsenic as the bench and pilot plant tailings. The sulfur concentrations are approximately a third higher for the drystack tailings (SRK, 2009, Review of Arsenic Concentrations in Dry Stack Tailings).

### **8.5.2 Recycle Tailings Pond (RTP)**

Water that accumulates in the RTP is used to fulfill all additional process makeup requirements that are not being met by mine water flow. In periods where precipitation inflows are inadequate, makeup fresh water is taken from the gravel ponds and pumped to WTP #2. RTP water is routed to the plant and the process water tank.

## **8.6 Excess Water Management, Treatment & Discharge**

Optimized storage at the RTP is 12 million gallons. This water is primarily used at the mill as make up water. When storage is greater than 12 million gallons the water from the RTP is treated at Water Treatment Plant #2 (WTP #2) and discharged to the ORTW. Excess water from the underground mine that can't be recycled is treated at Water Treatment Plant #1 (WTP #1) and discharged to WTP #2 for use at the mill or it is discharged to the ORTW.

WTP #2 removes suspended solids, arsenic, and other metals then the effluent is mixed and aerated in the off-river treatment works (ORTW) before final discharge to the Goodpaster River. The water treatment process is described in **Sections 8.6.1 and 8.6.2**.

### **8.6.1 Water Treatment Plant (WTP#2)**

The water treatment plant utilizes four processes to remove contaminants from the water before discharge. These processes are:

- High-density sludge (HDS) process to achieve enhanced co-precipitation of metals, including arsenic; and
- As necessary, lime softening and recarbonation to remove calcium and magnesium via precipitation and thereby reduce total dissolved solids (TDS).

A third process, sulfide precipitation is available as a contingent measure if additional treatment is necessary to achieve the expected metals concentrations. The proposed treatment system is not sensitive to variations in feed chemistry.

The final stage of the treatment system includes a multi-media pressure filter to polish the treated water for removal of residual suspended solids prior to release to the Off-River Treatment Works. Excess sludge generated by the process is dewatered using a filter press to produce a cake for disposal in the drystack or with tailings backfill.

### **8.6.2 Off-River Treatment Works (ORTW)**

The ORTW provides the final polishing step in the water treatment process. Details of the system are shown in **Figures 8.6** and **8.7** in **Appendix B**. It consists of two ponds constructed from gravel pits that were excavated for project development. The primary pond is connected to the river by an open channel. Water is pumped from the primary to the secondary pond via a shore-based pump station and a buried steel pipe. The ponds are not lined allowing water to flow between the river and the ponds.

The pump inlet screen is sized at 0.25-inch, with inlet velocities of less than 0.5 feet per second (ft/s) to protect fish from moving into the chamber.

Effluent from the water treatment plant is discharged to the mixing chamber of the ORTW pump station, at a maximum rate of 600 gpm. Flow data collected concurrently from the WTP#2 effluent and a flow meter at the ORTW pump station is used to control the pump output and maintain a maximum 25:1 mix ratio. The United States Geologic Survey (USGS) gauging station located near the Goodpaster bridge monitors the river flows. If winter icing conditions affect the gauging station, manual means of flow measurement are available to guide plant operations. Water is not pumped from the primary pond when the river flow is below 20 cfs.

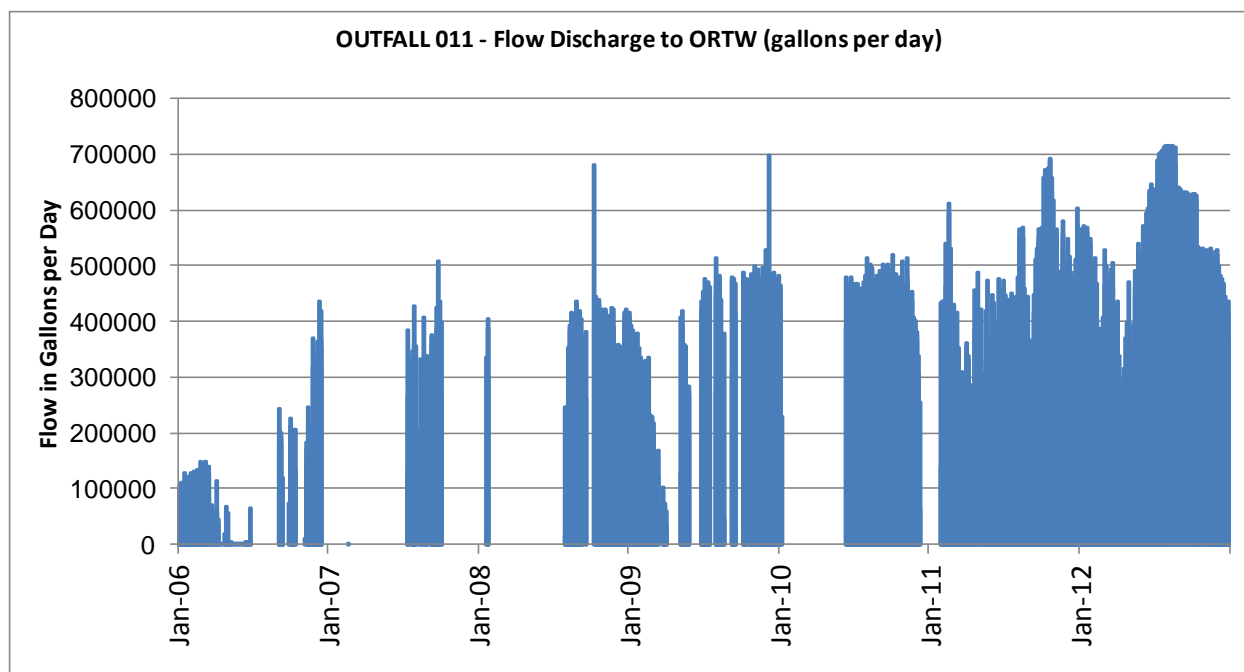
A mixing well and static inline mixers force the water to mix in the large steel pipe that conveys the water between the ponds. Additional mixing occurs in the secondary pond, assisted by the aeration treatment system. An overflow weir in the outlet works of the secondary pond maintains a stable pond elevation and prevents fish from entering the pond from the downstream direction. At a discharge rate of 400 gpm from the water treatment plant, the secondary pond has approximately 24 to 48 hours' residence time, which provides ample time to respond to potential upset conditions at WTP#2 by closing the shutoff valve in the outlet works of the secondary pond. The outlet of secondary pond near the weir provides a consistent and reliable monitoring location. The sampling facilities are located in a heated, weather-protected enclosure. The ORTW Effluent limitations are available in Pogo's APDES AK-005334-1 permit for Outfall 001.



### 8.6.3 Site Runoff & Discharge

During the years 2006 through 2012, site runoff and mine drainage was treated and discharged to the ORTW at an average rate of 44, 27, 91, 146, 151, 252, and 339 gpm respectively. The daily discharge is shown in **Chart 8.3** below:

**Chart 8.3: Discharge to ORTW 2006-2012**



Using the 19 inch annual average precipitation model used during project permitting, the forecast average discharge rate is 189 gpm as shown on **Figure 8.3**. It shows the site-wide water balance.

### 8.6.4 Water Treatment Plant #2 (WTP#2) Effluent Quality

WTP#2 effluent limitations are available in Pogo's NPDES Permit #AK-005334-1 for Outfall 011.

## 8.7 Fresh Water

Fresh water from the gravel pits near the 1525 portal is added to the RTP, MWTP #2, or the 1230 sump when other sources do not adequately meet process requirements.

## 8.8 Stormwater

Material site A below the mill was developed into a stormwater sedimentation pond for non-contact runoff. Overflow from the pond is filtered through the alluvial fill of the Road 6 embankment and diffused back into the groundwater in the Goodpaster Valley below the mouth of Liese Creek. An overflow weir controls the pond elevation to allow for storm surge modulation and sediment removal.

Well-defined practices known as “BMPs” (best management practices) are used for stormwater management to control runoff water quality. The primary parameter controlled is sediment. Oils and greases are controlled at their sources to ensure stormwater does not become contaminated with these materials.

In accordance with national standards, the stormwater BMPs adhere to the following design criteria:

- Design and construct drainage ditches as required;
- Provide spill planning, spill control materials and response teams to rapidly control oil, chemical or other spills that may affect Stormwater;
- Reclaim disturbed areas as soon as practicable after disturbance including regrading, topsoil establishment, revegetation with approved seed mixes and plantings, and maintenance of reclaimed areas to help establish the program;
- Maintain roads and travel areas to minimize erosion; and
- Grade roads and disturbed areas so that flows are directed to appropriate control facilities.

Refer to Pogo’s SWPPP for more details.

## 9.0 REAGENT MANAGEMENT

### 9.1 Underground Storage

#### 9.1.1 Supplies

Mining supplies are stored on the surface and in underground drifts. Supplies are regularly moved into the mine for mining activities. The major supplies are; roof bolts, welded wire, pipe, ventilation tubing, drill steel and bits.

#### 9.1.2 Explosives

Explosives are hauled to site by truck and stored underground. Bulk emulsion is stored in two steel tanks underground. Locked storage magazines are provided for caps, detonating cord, primers and boosters.

### 9.2 Surface Storage

#### 9.2.1 Mill Reagents

Reagents are purchased in normal commercial bulk containers or packaging, such as tote bins, barrels, palletized sacks, super sacks, etc. These packages are loaded into shipping containers at origin and shipped to site to provide security and protection against spills and loss throughout the transportation process. Upon delivery at site, reagents are stored in a covered building adjacent to the mill (see **Figure 6.2** in **Appendix B**) or stored in the shipping containers on site until they can be stored within the mill storage area. All covered storage areas have a concrete floor and are bermed or sloped to collect any spillage and aid in cleanup.

Reagents are mixed inside the mill building in appropriate tankage before being pumped to their addition points in the process. Any spills are contained within the concrete berms of the reagent area and collected in a sump for disposal or return to the process tanks.

**Lime** – Lime is used for controlling the slurry pH during leaching, water treatment, and cyanide detoxification. Lime is slaked in a ball mill slaker and added where required from a circulating pipe loop of hydrated lime slurry.

**Sodium Cyanide** – Sodium cyanide is used to dissolve gold. The cyanide is transported as dry briquettes in secure shipping containers and is stored in a reagent storage building that provides adequate secondary containment.

The contents of the cyanide mixing tank are mechanically agitated to enhance dissolution. After the cyanide has dissolved, the solution is transferred to the cyanide storage tank for distribution by centrifugal pumps to the leaching and stripping circuits.

**Activated Carbon** – Activated carbon is received in 1,000 pounds (lb) bulk bags and used to capture dissolved gold from the leached slurry. Carbon fines are collected and stored on site in tote bins. To recover residual gold values, these tote bins are periodically shipped to an off-site smelter for handling and disposal.

**Sodium Hydroxide** – This chemical is used to raise the pH in the carbon stripping circuit and neutralize after carbon acid washing. The sodium hydroxide is received as pellets packaged in steel drums containing 500 lb and is mixed with water in batches to form a 20% solution. The solution is prepared in a caustic solution tank between periods of usage thereby eliminating the need for a transfer pump and separate storage tank.

**Nitric Acid** – Nitric acid is used to acid wash the carbon (after stripping) to remove calcium scale buildup. The acid is delivered in returnable stainless steel drums containing approximately 100 lbs of concentrated acid solution per drum. Acid washing solution is prepared in a batch mixing tank at strength of 5% by volume. The solution is circulated through a carbon acid wash vessel using a recirculating pump system until the solution pH increases to 7.0. At this point, acid washing is complete and the spent acid solution is pumped to the mill process. The carbon is rinsed with process water prior to being advanced to the reactivation kiln feed tank. Acid solution is prepared in a single tank between periods of usage, thereby eliminating the need for a transfer pump and separate storage tank. Different storage methods of nitric acid, including bulk totes, are being considered to further improve the safety of handling the concentrated acid.

**Sulfuric Acid** – This is used for pH control in the cyanide detoxification circuit.

**Potassium Amyl Xanthate** – PAX is used as a flotation reagent to collect sulfide and gold-bearing minerals.

**AGEFLOC WT2902** – This reagent is used as a fines depressant for controlling the flotation of silt-like particles, resulting in improved thickening and flotation performance.

*Aero Maxigold 900 Promoter* – This reagent is used as a flotation reagent to promote the recovery of gold-bearing minerals.

*Aero 5688 Promoter* – This reagent is used as a flotation reagent to promote the recovery of gold-bearing minerals.

*Aero 6697 Promoter* – This reagent is used as a flotation reagent to promote the recovery of gold-bearing minerals.

*Aerfroth 549 or MIBC* – This reagent is used as a frothing agent in the flotation circuit.

*Flocculant* – This reagent assists with solids settling in the thickeners of the milling process. Dry flocculant is delivered to the site in 2,000 lb bags and stored in the mill reagent area, where it is mixed using a wet mixing system.

*Sodium Metabisulfite* – Sodium metabisulfite is delivered in 2,000 lb supersacks for use in the cyanide detoxification circuit. It is mixed and stored in tanks in the reagent mixing area.

*Copper Sulfate* – Copper sulfate is used as a catalyst in cyanide detoxification. It is received in 2,000 lb supersacks and dissolved in the copper sulfate tank as a 25% solution. The solution is metered from this tank to the SO<sub>2</sub>/air cyanide destruction tanks.

*Fluxes* – Fluxes are used in the gold refining process. Anhydrous borax, sodium nitrate, soda ash, manganese dioxide, and graded silica sand are received in 50 to 100 lb bags or drums. These fluxing agents are used directly from their containers to refine gold concentrates into bullion. The containers are stored in the gold refinery.

*Water Softening & Anti-scalant Agents* – Water softening and anti-scalant agents are used in the mill to treat process water and prevent scaling in pipes. These chemicals are received as prepared concentrated solutions in drums and used as required via liquid metering pumps.

### **9.2.2 Grinding Media**

Grinding balls are delivered in open containers and emptied into ball bunkers situated near the grinding mills. SAG mill grinding balls are loaded to a ball feeder situated over the mill feed conveyor.

### **9.2.3 Fuel & Propane**

Fuel is trucked to site from various suppliers on an as needed basis. Fuel piping is above ground as much as practical, and all piping is either in lined containment or underground inside secondary piping. Buried piping on-site is from Above Ground Storage Tank (AST)-1 containment to the permanent camp facility (1 inch carbon steel line inside 3 inch HDPE) and to the maintenance shop (2 inch carbon steel line inside 8 inch HDPE). The other buried piping on-site is from AST-2 containment to the mill facility (1 inch carbon steel line inside 3 inch HDPE).

The site has three stationary fueling areas; helicopter, main containment area (MCA) and 1875 portal area. They have all been constructed of earthen berms with impermeable liners providing tertiary containment at least 110% of the volume of the largest tank.

A fuel truck is used to deliver fuel from the main storage tanks to remote equipment and smaller storage tanks on the site. Fuel is pumped for delivery with appropriate automatic shutoff devices.

Smaller tanks with secondary containment are located at the mill building and the camp. These tanks are filled by the fuel truck and are used for fueling heaters, backup generators and the incinerator. The total above ground diesel fuel storage capacity is 265,340 gallons.

Up to 60,000 gallons of propane storage is provided near both the 1525 Portal and the 1875 Portal. In addition, two 30,000 gallon propane tanks are located at the 2150 portal. These tanks supply the mine air heaters and typically are full only in the winter months. The upper camp has three 1,000 gallon tanks for the kitchen facilities. The new lower camp has one 15,000 gallon tank which is used fuel the new incinerator. One 750 gallon tank is used to heat the mine dry. A total of 198,750 gallons of propane storage is provided on site.

## **10.0 MONITORING PLAN OUTLINE**

### **10.1 Quality Assurance Project Plan or QAPP**

The Quality Assurance Project Plan (QAPP) was developed using Environmental Protection Agency (EPA) guidance documents such as: EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5 (EPA, 2001) and Guidance for Quality Assurance Project Plans, EPA QA/G-5 (EPA, 2002b). The primary purpose for the Plan is to assure the quality and integrity of all collected samples, the representativeness of the results, the precision and accuracy of the analyses, and the completeness of the data. The Plan describes the sample methods, sample designs, compliance goals, measurement objectives, and quality assurance and quality control measures utilized by the staff. The Plan was submitted to the EPA and the ADEC in support of Pogo's permits.

### **10.2 Pogo Mine Monitoring Plan**

The principle objective of the Pogo Mine Monitoring Plan is to protect the water quality of the Goodpaster River. Through the use of a "Monitoring Plan," Pogo ensures this objective is achieved. The foundation of the plan is to monitor:

- Outfall of the off-river treatment system;
- Groundwater downstream of the RTP;
- Effluent of the domestic water treatment plant;
- Surface water in the Goodpaster River;
- Geotechnical stability of drystack tailings facility; and
- Geochemistry of the drystack tailings and mineralized waste rock.

The details of Pogo's Monitoring Plan were developed in consultation with State and Federal regulatory agencies. Monitoring results are reported to the appropriate agencies on a quarterly basis. The quarterly reports include data tables and graphs.

## **11.0 TEMPORARY SHUTDOWN**

Planning for potential shutdowns is an integral part of good mine management. At some point, the operation may shut down for a short period (less than three months) during the life of the mine. Short-term shutdowns occur due to events such as major equipment breakdowns or weather related interruptions. Long-term, but still temporary (between three months and three years) shutdowns usually only occur in response to economic changes, such as a prolonged decline in the price of gold. These types of events are much less likely to occur, but Pogo has also been designed to accommodate such eventualities. Permanent shutdown occurs at the end of the mine life.

### **11.1 Short-term Shutdown Plan**

During a short-term shutdown, the following activities are carried out:

- Continue to treat and discharge water;
- Continue all monitoring requirements;
- Continue maintenance of stormwater ditches;
- Shut down mill and filter plant and prepare to resume operations as soon as mining recommences; and
- Shape stockpiles to minimize erosion.

These and other maintenance activities keep the facility in good operating order for when the interruption is remedied and operations are ready to resume.

### **11.2 Long-term Shutdown Plan**

In the event of a long-term shutdown, a minimum staff continues to maintain and preserve the facility until it can be restarted. The long-term shutdown plan for the Pogo project involves the following activities:

- Draw down the RTP to a minimum volume;
- Treat and eliminate all process solutions;
- Shut down the mill and filter plant, draw down all process tanks and vessels, and mothball major equipment to preserve their mechanical condition;



- Flush and clean all process lines and instrumentation, protect all electronics and sensitive equipment;
- Secure the mill, filtration plant and mine and continue to treat water as necessary;
- Continue to maintain stormwater system including diversion ditch;
- Implement possible mitigation measures such as grouting and paste backfilling of mining stopes to minimize mine water inflows; and
- Install erosion protection on all stockpiles, dumps, site areas, etc.

Long-term shutdown practices would allow the mine and plant to be restarted after a commissioning period, wherein equipment is reassembled and restarted, reagents reintroduced, electrical and control systems re-energized, and production activities resumed.

All monitoring and reporting requirements required under the various project permits will be met unless otherwise agreed to by the appropriate agencies.

## 12.0 RECLAMATION

Detailed reclamation plans are provided in 2012 Pogo's *Reclamation & Closure Plan* (Rev 2). The financial bond amount is \$52,294,000 for the project area and \$4,810,000 for the access road and transmission line. Details are in the Reclamation Cost Model reviewed and approved by ADEC and ADNR.

Reclamation and closure are an integral part of the mining operations plan, providing guidance during the operational life of the mine to ensure that post-mining land use goals are achieved and that the waters of the state are protected. This plan describes a conceptual model for post-mining land use and provides the basis for reclamation and closure activities throughout the life of the project.

There are three critical reclamation and closure issues for the Pogo project:

- Successful stabilization and erosion control on steeply dipping slopes;
- Closure of the tailings drystack facility; and
- Closure of the underground workings.

Reclamation of the project site focuses on establishing post-mining land use in the area. This involves re-grading, surface amendment, re-establishing surface water drainage and re-vegetating. Closure of the project site focuses on stabilizing all development rock, tailings and underground workings in order to control or mitigate any seepage and prevent degradation of surface or groundwater.

An update of Pogo's DSTF Closure Plan was initiated in 2012 and an update of Pogo's Underground Mine Closure Plan was initiated in 2013. Special stipulations for them were included by ADNR in Pogo's Plan of Operations Approval (F20129500) issued on February 7, 2012.

## **12.1 Reclamation and Closure Phases**

The reclamation activities are separated into the following five phases:

- Phase I Reclamation of construction disturbance;
- Phase II Reclamation with concurrent mining;
- Phase III Final reclamation and closure of mine site;
- Phase IV Water treatment and post-closure reclamation; and
- Phase V Post-closure monitoring.

### ***12.1.1 Phase I Reclamation of construction disturbance***

The old airstrip on the sandbank of Goodpaster River was reclaimed.

### ***12.1.2 Phase II Reclamation with concurrent mining***

The old lower camp (former exploration camp) was demolished in 2010. The abandoned old surface exploration camp on the Pogo Ridge will be demolished and reclaimed. The mineralized rock stockpiled at the lower laydown area during the advanced exploration will be hauled to the Drystack Tailing Facility.

### ***12.1.3 Phase III Final reclamation of mine site***

Phase III will consist of the major closure activities required to decommission the mine, remove all facilities and structures not needed to support Phase IV activities from the property, and place the site in a stable condition. The facilities removed will include Mill facilities, Upper Camp, office, and shop. The mined-out stopes in underground will be

paste filled and concrete plugs will be installed in all mine portals. An engineered soil cover will be installed on the surface of Drystack Tailings Facilities.

#### ***12.1.4 Phase IV Water treatment and post-closure reclamation***

After completion of Phase III activities, the water of RTP will be treated and discharged until the water quality of RTP water will match the water quality standards. When appropriate, RTP will be breached and the remaining facilities such as water treatment plant and off-river treatment works, site access road, and 3,000 ft airstrip will be demolished and all of disturbed area will be reclaimed. The private portion of Pogo access road and the entire portion of transmission line will also be reclaimed. It is anticipated that the Phase IV water treatment will last 10 years.

#### ***12.1.5 Phase V Post-closure monitoring***

The water quality of surface water and ground water will be monitored at the designated locations in 1, 2, 5, 10, 15, 20, and 30 years after the completion of Phase IV post-closure reclamation.

### **12.2 Post-mining Land Use**

The Tanana Basin Area Plan states that traditional land use in the area is wildlife habitat and recreation (TBAP, 1991). The goal of reclamation is to re-establish wildlife habitat within five to fifteen years by stimulating the growth of early successional vegetation. This vegetation provides willow and shrub browse for moose and other game; young aspen stands for Ruffed Grouse habitat; and grass areas that provide forage, diversity and cover for voles and food for raptors.

### **12.3 Underground Mine Closure Study**

Underground mine closure study aims to:

- Finalize engineering design of portal plugs;
- Assess the need for backfilling of underground workings;
- Assess the need for accelerated re-flooding of underground workings.

The study plan was submitted to ADNR in February 2013 and approved. This study consists of followings tasks;

- Geochemical characterization of wall rocks and paste backfill materials in order to establish a pre-closure geochemical baseline for the chemical stability of the wall rock and paste backfill in the mine. It will also predict, evaluate, and measure any potential for ARD/ML underground following closure in order to determine the relative need to accelerate the flooding of the mine at closure;
- Hydrogeological study to evaluate the mine flooding rates, predict static water levels and static head at closure, and evaluate the potential for mine seepage to the surface at closure;
- Geotechnical study to gather data at each portal and use the geotechnical and hydrological data to develop engineered designs and costs for the portal plugs for the four mine portals.

## **12.4 Dry Stack Tailings Facility Closure Study**

Dry stack tailings facility (DSTF) closure study aims to evaluate the hydrologic, geochemical and geotechnical characteristics of the facility and proposed cover design, and model the impact to post-closure down-gradient water quality.

The study plan was submitted to ADNR and ADEC in October 2012 and approved. This study consists of the following tasks:

- Field investigation including the drilling of three sonic boreholes into the DSTF to obtain hydrological, geotechnical, and geochemical data representative of the DSTF spatially and with respect to material types;
- DSTF slope stability analysis update using the data obtained from field investigation;
- Hydrology and hydraulic analysis of DSTF in order to develop a a closure grading strategy for surface water management, prepare preliminary layouts and sections of hydraulic features, e.g., swales or channels, for surface water conveyance after closure, and establish preliminary erosion protection design for the post-closure DSTF;
- Engineered soil cover design;
- Long-term water quality estimate.

Three sonic boreholes were drilled in 2012 and two to three vibrating wire piezometers were installed in each borehole for pore water pressure and temperature measurement at depth intervals.

## 13.0 REFERENCES

- Teck-Pogo, February 2002, Water Management Plan;
- Teck-Pogo, 2003 Plan of Operations;
- Teck-Pogo, 2003 Solid Waste Monitoring Plan;
- Teck-Pogo, 2003 Reclamation and Closure Plan;
- SRK, Sobek Acid-Base Accounting Test Results, November 5, 2008;
- AMEC, Pogo Mine Dry Stack Geotechnical Considerations, August 20, 2008;
- AMEC, Pogo Precipitation Review, November 20, 2008;
- Adrian Brown, Pogo Mine Inflow Evaluation and Control Review, April 5, 2009;
- Engineering and Maintenance Associates, Water Treatment Plant Upgrades-Phase II, 2009;
- SRK, Review of Arsenic Concentrations in Dry Stack Tailings, January 10, 2009;
- Teck-Pogo, Pogo Stormwater Pollution Prevention Plan, June 2009;
- Teck-Pogo, Pogo Quality Assurance Project Plan, March 2009;
- Golder Associates, Surface Paste Distribution Containment Pipeline System, May 21, 2013;
- SRK, 2013 Preliminary Groundwater Model for Pogo Mine in Alaska, June 11, 2013.

## **Appendix A**

### **POGO MINE CLAIM LIST**

Seq	Quan	Bill No.	Claim Name		Date	Book/Page	ADL Serial No.
1	1	17488	Faith	#2	98/05/14	560/836	518091
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213	1	17505	POGO	266	96/08/15	976/736	565396
214	1	17505	POGO	267	96/08/01	976/737	565397
215	1	17505	POGO	360	96/08/21	976/738	565398
216	1	17505	POGO	361	96/08/21	976/739	565399
217	1	17505	POGO	362	96/08/19	976/740	565400
218	1	17505	POGO	363	96/08/19	976/741	565401

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219	1	17505	POGO	364	96/08/16	976/742	565402
220	1	17505	POGO	365	96/08/16	976/743	565403
221	1	17505	POGO	366	96/08/15	976/744	565404
222	1	17505	POGO	367	96/08/01	976/745	565405
223	1	17505	POGO	460	96/08/14	976/746	565406
224	1	17505	POGO	461	96/08/14	976/747	565407
225	1	17505	POGO	462	96/08/14	976/748	565408
226	1	17505	POGO	463	96/08/14	976/749	565409
227	1	17505	POGO	464	96/08/14	976/750	565410
228	1	17505	POGO	465	96/08/14	976/751	565411
229	1	17505	POGO	466	96/08/14	976/752	565412
230	1	17505	POGO	467	96/08/01	976/753	565413
231	1	17505	POGO	560	96/08/14	976/754	565414
232	1	17505	POGO	561	96/08/14	976/755	565415
233	1	17505	POGO	562	96/08/14	976/756	565416
234	1	17505	POGO	563	96/08/14	976/757	565417
235	1	17505	POGO	564	96/08/14	976/758	565418
236	1	17505	POGO	565	96/08/14	976/759	565419
237	1	17505	POGO	566	96/08/14	976/760	565420
238	1	17505	POGO	567	96/08/14	976/761	565421
239	1	17505	POGO	568	96/08/14	976/762	565422
240	1	17505	POGO	660	96/08/12	976/763	565423
241	1	17505	POGO	661	96/08/12	976/764	565424
242	1	17505	POGO	662	96/08/12	976/765	565425
243	1	17505	POGO	663	96/08/14	976/766	565426
244	1	17505	POGO	664	96/08/14	976/767	565427
245	1	17505	POGO	665	96/08/14	976/768	565428
246	1	17505	POGO	666	96/08/15	976/769	565429
247	1	17505	POGO	667	96/08/15	976/770	565430
248	1	17505	POGO	668	96/08/15	976/771	565431
249	1	17505	POGO	760	96/08/11	976/772	565432
250	1	17505	POGO	761	96/08/14	976/773	565433
251	1	17505	POGO	762	96/08/07	976/774	565434
252	1	17505	POGO	860	96/08/10	976/775	565435
253	1	17505	POGO	861	96/08/13	976/776	565436
254	1	17505	POGO	862	96/08/07	976/777	565437
255	1	17505	POGO	960	96/08/10	976/778	565438
256	1	17505	POGO	961	96/08/13	976/779	565439
257	1	17505	POGO	962	96/08/07	976/780	565440
258	1	17505	POGO	1060	96/08/10	976/781	565441
259	1	17505	POGO	1061	96/08/07	976/782	565442
260	1	17505	POGO	1062	96/08/07	976/783	565443
261	1	17505	POGO	1160	96/08/03	976/784	565444
262	1	17505	POGO	1161	96/08/07	976/785	565445
263	1	17505	POGO	1162	96/08/07	976/786	565446
264	1	17505	POGO	1646	96/08/21	978/967-968	565932
265	1	17505	POGO	1647	96/08/21	978/969	565933
266	1	17505	POGO	1648	96/08/21	978/970	565934
267	1	17505	POGO	1649	96/08/21	978/971	565935
268	1	17505	POGO	1650	96/08/21	978/972	565936
269	1	17505	POGO	1746	96/08/21	978/973	565937
270	1	17505	POGO	1747	96/08/21	978/974	565938
271	1	17505	POGO	1748	96/08/21	978/975	565939
272	1	17505	POGO	1749	96/08/21	978/976	565940
273	1	17505	POGO	1750	96/08/21	978/977	565941

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274	1	17505	POGO	3357	96/10/19	986/957-959	568819
275	1	17505	POGO	3358	96/10/19	986/960	568820
276	1	17505	POGO	3359	96/10/18	986/961	568821
277	1	17505	POGO	3360	96/10/17	986/962	568822
278	1	17505	POGO	3361	96/10/17	986/963	568823
279	1	17505	POGO	3362	96/10/18	986/964	568824
280	1	17505	POGO	3363	96/10/17	986/965	568825
281	1	17505	POGO	3457	96/10/19	986/966	568826
282	1	17505	POGO	3458	96/10/19	986/967	568827
283	1	17505	POGO	3459	96/10/18	986/968	568828
284	1	17505	POGO	3460	96/10/18	986/969	568829
285	1	17505	POGO	3461	96/10/17	986/970	568830
286	1	17505	POGO	3462	96/10/17	986/971	568831
287	1	17505	POGO	3463	96/10/17	986/972	568832
288	1	17505	POGO	3557	96/10/20	986/973	568833
289	1	17505	POGO	3558	96/10/19	986/974	568834
290	1	17505	POGO	3559	96/10/18	986/975	568835
291	1	17505	POGO	3560	96/10/16	986/976	568836
292	1	17505	POGO	3561	96/10/17	986/977	568837
293	1	17505	POGO	3562	96/10/17	986/978	568838
294	1	17505	POGO	3563	96/10/17	986/979	568839
295	1	17505	POGO	3653	96/10/22	986/980	568840
296	1	17505	POGO	3654	96/10/22	986/981	568841
297	1	17505	POGO	3655	96/10/21	986/982	568842
298	1	17505	POGO	3656	96/10/21	986/983	568843
299	1	17505	POGO	3657	96/10/20	986/984	568844
300	1	17505	POGO	3658	96/10/20	986/985	568845
301	1	17505	POGO	3659	96/10/18	986/986	568846
302	1	17505	POGO	3660	96/10/16	986/987	568847
303	1	17505	POGO	3661	96/10/16	986/988	568848
304	1	17505	POGO	3662	96/10/17	986/989	568849
305	1	17505	POGO	3663	96/10/17	986/990	568850
306	1	17505	POGO	3753	96/10/22	986/991	568851
307	1	17505	POGO	3754	96/10/22	986/992	568852
308	1	17505	POGO	3755	96/10/21	986/993	568853
309	1	17505	POGO	3756	96/10/21	986/994	568854
310	1	17505	POGO	3757	96/10/20	986/995	568855
311	1	17505	POGO	3758	96/10/20	986/996	568856
312	1	17505	POGO	3759	96/10/18	986/997	568857
313	1	17505	POGO	3760	96/10/16	986/998	568858
314	1	17505	POGO	3761	96/10/16	986/999	568859
315	1	17505	POGO	3762	96/10/17	987/001	568860
316	1	17505	POGO	3763	96/10/17	987/002	568861
317	1	17505	POGO	3853	96/10/22	987/003	568862
318	1	17505	POGO	3854	96/10/22	987/004	568863
319	1	17505	POGO	3855	96/10/21	987/005	568864
320	1	17505	POGO	3856	96/10/21	987/006	568865
321	1	17505	POGO	3857	96/10/21	987/007	568866
322	1	17505	POGO	3858	96/10/20	987/008	568867
323	1	17505	POGO	3859	96/10/18	987/009	568868
324	1	17505	POGO	3860	96/10/16	987/010	568869
325	1	17505	POGO	3861	96/10/16	987/011	568870
326	1	17505	POGO	3862	96/10/17	987/012	568871
327	1	17505	POGO	3863	96/10/15	987/013	568872
328	1	17505	POGO	3864	96/10/16	987/014	568873

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329	1	17505	POGO	3865	96/10/19	987/015	568874
330	1	17505	POGO	3866	96/10/19	987/016	568875
331	1	17505	POGO	3867	96/10/19	987/017	568876
332	1	17505	POGO	3868	96/10/19	987/018	568877
333	1	17505	POGO	3869	96/10/20	987/019	568878
334	1	17505	POGO	3870	96/10/20	987/020	568879
335	1	17505	POGO	3871	96/10/20	987/021	568880
336	1	17505	POGO	3872	96/10/23	987/022	568881
337	1	17505	POGO	3953	96/10/22	987/023	568882
338	1	17505	POGO	3954	96/10/22	987/024	568883
339	1	17505	POGO	3955	96/10/21	987/025	568884
340	1	17505	POGO	3956	96/10/21	987/026	568885
341	1	17505	POGO	3957	96/10/21	987/027	568886
342	1	17505	POGO	3958	96/10/21	987/028	568887
343	1	17505	POGO	3959	96/10/19	987/029	568888
344	1	17505	POGO	3960	96/10/16	987/030	568889
345	1	17505	POGO	3961	96/10/16	987/031	568890
346	1	17505	POGO	3962	96/10/16	987/032	568891
347	1	17505	POGO	3963	96/10/15	987/033	568892
348	1	17505	POGO	3964	96/10/16	987/034	568893
349	1	17505	POGO	3965	96/10/19	987/035	568894
350	1	17505	POGO	3966	96/10/19	987/036	568895
351	1	17505	POGO	3967	96/10/19	987/037	568896
352	1	17505	POGO	3968	96/10/20	987/038	568897
353	1	17505	POGO	3969	96/10/20	987/039	568898
354	1	17505	POGO	3970	96/10/20	987/040	568899
355	1	17505	POGO	3971	96/10/21	987/041	568900
356	1	17505	POGO	3972	96/10/21	987/042	568901
357	1	17505	POGO	4053	96/10/14	987/043	568902
358	1	17505	POGO	4054	96/10/22	987/044	568903
359	1	17505	POGO	4055	96/10/22	987/045	568904
360	1	17505	POGO	4056	96/10/20	987/046	568905
361	1	17505	POGO	4057	96/10/21	987/047	568906
362	1	17505	POGO	4058	96/10/22	987/048	568907
363	1	17505	POGO	4059	96/10/19	987/049	568908
364	1	17505	POGO	4060	96/10/16	987/050	568909
365	1	17505	POGO	4061	96/10/16	987/051	568910
366	1	17505	POGO	4062	96/10/16	987/052	568911
367	1	17505	POGO	4063	96/10/15	987/053	568912
368	1	17505	POGO	4064	96/10/16	987/054	568913
369	1	17505	POGO	4065	96/10/15	987/055	568914
370	1	17505	POGO	4153	96/10/20	987/056	568915
371	1	17505	POGO	4154	96/10/20	987/057	568916
372	1	17505	POGO	4155	96/10/22	987/058	568917
373	1	17505	POGO	4156	96/10/22	987/059	568918
374	1	17505	POGO	4157	96/10/22	987/060	568919
375	1	17505	POGO	4158	96/10/22	987/061	568920
376	1	17505	POGO	4159	96/10/19	987/062	568921
377	1	17505	POGO	4160	96/10/16	987/063	568922
378	1	17505	POGO	4161	96/10/16	987/064	568923
379	1	17505	POGO	4162	96/10/16	987/065	568924
380	1	17505	POGO	4163	96/10/15	987/066	568925
381	1	17505	POGO	4164	96/10/16	987/067	568926
382	1	17505	POGO	4165	96/10/13	987/068	568927
383	1	17505	POGO	4248	96/10/18	987/069	568928



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384	1	17505	POGO	4249	96/10/18	987/070	568929
385	1	17505	POGO	4250	96/10/18	987/071	568930
386	1	17505	POGO	4251	96/10/18	987/072	568931
387	1	17505	POGO	4252	96/10/18	987/073	568932
388	1	17505	POGO	4253	96/10/18	987/074	568933
389	1	17505	POGO	4254	96/10/18	987/075	568934
390	1	17505	POGO	4255	96/10/18	987/076	568935
391	1	17505	POGO	4256	96/10/12	987/077	568936
392	1	17505	POGO	4257	96/10/12	987/078	568937
393	1	17505	POGO	4258	96/10/12	987/079	568938
394	1	17505	POGO	4259	96/10/12	987/080	568939
395	1	17505	POGO	4260	96/10/14	987/081	568940
396	1	17505	POGO	4261	96/10/14	987/082	568941
397	1	17505	POGO	4262	96/10/15	987/083	568942
398	1	17505	POGO	4263	96/10/15	987/084	568943
399	1	17505	POGO	4264	96/10/15	987/085	568944
400	1	17505	POGO	4265	96/10/15	987/086	568945
401	1	17505	POGO	4348	96/10/17	987/087	568946
402	1	17505	POGO	4349	96/10/17	987/088	568947
403	1	17505	POGO	4350	96/10/17	987/089	568948
404	1	17505	POGO	4351	96/10/17	987/090	568949
405	1	17505	POGO	4352	96/10/14	987/091	568950
406	1	17505	POGO	4353	96/10/14	987/092	568951
407	1	17505	POGO	4354	96/10/14	987/093	568952
408	1	17505	POGO	4355	96/10/14	987/094	568953
409	1	17505	POGO	4356	96/10/12	987/095	568954
410	1	17505	POGO	4357	96/10/12	987/096	568955
411	1	17505	POGO	4358	96/10/12	987/097	568956
412	1	17505	POGO	4359	96/10/12	987/098	568957
413	1	17505	POGO	4360	96/10/12	987/099	568958
414	1	17505	POGO	4361	96/10/14	987/100	568959
415	1	17505	POGO	4362	96/10/14	987/101	568960
416	1	17505	POGO	4363	96/10/15	987/102	568961
417	1	17505	POGO	4364	96/10/15	987/103	568962
418	1	17505	POGO	4365	96/10/15	987/104	568963
419	1	17505	POGO	4457	96/10/12	987/105	568964
420	1	17505	POGO	4458	96/10/12	987/106	568965
421	1	17505	POGO	4459	96/10/12	987/107	568966
422	1	17505	POGO	4460	96/10/12	987/108	568967
423	1	17505	POGO	4461	96/10/14	987/109	568968
424	1	17505	POGO	4462	96/10/14	987/110	568969
425	1	17505	POGO	4463	96/10/14	987/111	568970
426	1	17505	POGO	4464	96/10/14	987/112	568971
427	1	17505	POGO	4465	96/10/14	987/113	568972
428	1	17505	POGO	4557	96/10/15	987/114	568973
429	1	17505	POGO	4558	96/10/15	987/115	568974
430	1	17505	POGO	4559	96/10/15	987/116	568975
431	1	17505	POGO	4560	96/10/15	987/117	568976
432	1	17505	POGO	4561	96/10/15	987/118	568977
433	1	17505	POGO	4562	96/10/15	987/119	568978
434	1	17505	POGO	4563	96/10/15	987/120	568979
435	1	17505	POGO	4564	96/10/15	987/121	568980
436	1	17505	POGO	4565	96/10/15	987/122	568981
437	1	17505	POGO	47	96/10/16	987/123-124	568982
438	1	17505	POGO	147	96/10/16	987/125	568983

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439	1	17505	POGO	247	96/10/16	987/126	568984
440	1	17505	POGO	48	96/04/06	958/368-369	571902
441	1	17505	POGO	49	96/04/06	958/370	571903
442	1	17505	POGO	50	96/04/06	958/371	571904
443	1	17505	POGO	51	96/04/06	958/372	571905
444	1	17505	POGO	52	96/04/06	958/373	571906
445	1	17505	POGO	53	96/04/06	958/374	571907
446	1	17505	POGO	54	96/04/06	958/375	571908
447	1	17505	POGO	55	96/04/06	958/376	571909
448	1	17505	POGO	56	96/04/05	958/377	571910
449	1	17505	POGO	57	96/04/05	958/378	571911
450	1	17505	POGO	58	96/04/05	958/379	571912
451	1	17505	POGO	59	96/04/05	958/380	571913
452	1	17505	POGO	148	96/04/09	958/381	571914
453	1	17505	POGO	149	96/04/06	958/382	571915
454	1	17505	POGO	150	96/04/06	958/383	571916
455	1	17505	POGO	151	96/04/06	958/384	571917
456	1	17505	POGO	152	96/04/06	958/385	571918
457	1	17505	POGO	153	96/04/05	958/386	571919
458	1	17505	POGO	154	96/04/05	958/387	571920
459	1	17505	POGO	155	96/04/05	958/388	571921
460	1	17505	POGO	156	96/04/05	958/389	571922
461	1	17505	POGO	157	96/04/05	958/390	571923
462	1	17505	POGO	158	96/04/05	958/391	571924
463	1	17505	POGO	159	96/04/05	958/392	571925
464	1	17505	POGO	250	96/04/05	958/393	571926
465	1	17505	POGO	252	96/04/06	958/394	571927
466	1	17505	POGO	350	96/04/05	958/395	571928
467	1	17505	POGO	450	96/04/05	958/396	571929
468	1	17505	POGO	451	96/04/05	958/397	571930
469	1	17505	POGO	452	96/04/05	958/398	571931
470	1	17505	POGO	551	96/04/05	958/399	571932
471	1	17505	POGO	68	96/04/11	958/400	571933
472	1	17505	POGO	69	96/04/16	958/403	571934
473	1	17505	POGO	70	96/04/14	958/404	571935
474	1	17505	POGO	71	96/04/14	958/405	571936
475	1	17505	POGO	72	96/04/14	958/406	571937
476	1	17505	POGO	73	96/04/16	958/407	571938
477	1	17505	POGO	74	96/04/18	958/408	571939
478	1	17505	POGO	168	96/04/11	958/409	571940
479	1	17505	POGO	169	96/04/14	958/410	571941
480	1	17505	POGO	170	96/04/14	958/411	571942
481	1	17505	POGO	171	96/04/14	958/412	571943
482	1	17505	POGO	172	96/04/14	958/413	571944
483	1	17505	POGO	173	96/04/16	958/414	571945
484	1	17505	POGO	174	96/04/18	958/415	571946
485	1	17505	POGO	268	96/04/11	958/416	571947
486	1	17505	POGO	269	96/04/14	958/417	571948
487	1	17505	POGO	270	96/04/14	958/418	571949
488	1	17505	POGO	271	96/04/14	958/419	571950
489	1	17505	POGO	272	96/04/14	958/420	571951
490	1	17505	POGO	273	96/04/16	958/421	571952
491	1	17505	POGO	274	96/04/18	958/422	571953
492	1	17505	POGO	368	96/04/11	958/423	571954
493	1	17505	POGO	369	96/04/14	958/424	571955



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494	1	17505	POGO	370	96/04/14	958/425	571956
495	1	17505	POGO	371	96/04/14	958/426	571957
496	1	17505	POGO	372	96/04/14	958/427	571958
497	1	17505	POGO	373	96/04/13	958/428	571959
498	1	17505	POGO	374	96/04/13	958/429	571960
499	1	17505	POGO	468	96/04/12	958/430	571961
500	1	17505	POGO	469	96/04/12	958/431	571962
501	1	17505	POGO	470	96/04/12	958/432	571963
502	1	17505	POGO	471	96/04/12	958/433	571964
503	1	17505	POGO	472	96/04/12	958/434	571965
504	1	17505	POGO	473	96/04/13	958/435	571966
505	1	17505	POGO	474	96/04/13	958/436	571967
506	1	17505	POGO	1256	96/04/20	958/437-438	571968
507	1	17505	POGO	1257	96/04/20	958/439	571969
508	1	17505	POGO	1356	96/04/20	958/440	571970
509	1	17505	POGO	1357	96/04/20	958/441	571971
510	1	17505	POGO	1456	96/04/20	958/442	571972
511	1	17505	POGO	1457	96/04/20	958/443	571973
512	1	17505	POGO	1556	96/04/20	958/444	571974
513	1	17505	POGO	1557	96/04/20	958/445	571975
514	1	17505	POGO	1655	96/04/20	958/446	571976
515	1	17505	POGO	1656	96/04/20	958/447	571977
516	1	17505	POGO	1657	96/04/20	958/448	571978
517	1	17505	POGO	1755	96/04/20	958/449	571979
518	1	17505	POGO	1756	96/04/20	958/450	571980
519	1	17505	POGO	1757	96/04/20	958/451	571981
520	1	17505	POGO	1855	96/04/20	958/452	571982
521	1	17505	POGO	1856	96/04/20	958/453	571983
522	1	17505	POGO	1857	96/04/20	958/454	571984
523	1	17505	POGO	4066	96/04/13	958/455-457	571985
524	1	17505	POGO	4067	96/04/13	958/458	571986
525	1	17505	POGO	4068	96/04/14	958/459	571987
526	1	17505	POGO	4069	96/04/17	958/460	571988
527	1	17505	POGO	4070	96/04/17	958/461	571989
528	1	17505	POGO	4071	96/04/17	958/462	571990
529	1	17505	POGO	4072	96/04/16	958/463	571991
530	1	17505	POGO	4073	96/04/18	958/464	571992
531	1	17505	POGO	4074	96/04/18	958/465	571993
532	1	17505	POGO	4166	96/04/13	958/466	571994
533	1	17505	POGO	4167	96/04/13	958/467	571995
534	1	17505	POGO	4168	96/04/14	958/468	571996
535	1	17505	POGO	4169	96/04/17	958/469	571997
536	1	17505	POGO	4170	96/04/17	958/470	571998
537	1	17505	POGO	4171	96/04/17	958/471	571999
538	1	17505	POGO	4172	96/04/17	958/472	572000
539	1	17505	POGO	4173	96/04/17	958/473	572001
540	1	17505	POGO	4174	96/04/18	958/474	572002
541	1	17505	POGO	4266	96/04/13	958/475	572003
542	1	17505	POGO	4267	96/04/13	958/476	572004
543	1	17505	POGO	4268	96/04/14	958/477	572005
544	1	17505	POGO	4269	96/04/17	958/478	572006
545	1	17505	POGO	4270	96/04/17	958/479	572007
546	1	17505	POGO	4271	96/04/16	958/480	572008
547	1	17505	POGO	4272	96/04/17	958/481	572009
548	1	17505	POGO	4273	96/04/18	958/482	572010

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549	1	17505	POGO	4274	96/04/18	958/483	572011
550	1	17505	POGO	4275	96/04/18	958/484	572012
551	1	17505	POGO	4276	96/04/18	958/485	572013
552	1	17505	POGO	4277	96/04/18	958/486	572014
553	1	17505	POGO	4278	96/04/19	958/487	572015
554	1	17505	POGO	4366	96/04/13	958/488	572016
555	1	17505	POGO	4367	96/04/13	958/489	572017
556	1	17505	POGO	4368	96/04/13	958/490	572018
557	1	17505	POGO	4369	96/04/16	958/491	572019
558	1	17505	POGO	4370	96/04/16	958/492	572020
559	1	17505	POGO	4371	96/04/16	958/493	572021
560	1	17505	POGO	4372	96/04/16	958/494	572022
561	1	17505	POGO	4373	96/04/17	958/495	572023
562	1	17505	POGO	4374	96/04/18	958/496	572024
563	1	17505	POGO	4375	96/04/19	958/497	572025
564	1	17505	POGO	4376	96/04/19	958/498	572026
565	1	17505	POGO	4377	96/04/19	958/499	572027
566	1	17505	POGO	4378	96/04/19	958/500	572028
567	1	17505	POGO	4466	96/04/13	958/501	572029
568	1	17505	POGO	4467	96/04/13	958/502	572030
569	1	17505	POGO	4468	96/04/13	958/503	572031
570	1	17505	POGO	4469	96/04/16	958/504	572032
571	1	17505	POGO	4470	96/04/16	958/505	572033
572	1	17505	POGO	4471	96/04/16	958/506	572034
573	1	17505	POGO	4472	96/04/16	958/507	572035
574	1	17505	POGO	4473	96/04/17	958/508	572036
575	1	17505	POGO	4474	96/04/18	958/509	572037
576	1	17505	POGO	4475	96/04/19	958/510	572038
577	1	17505	POGO	4476	96/04/19	958/511	572039
578	1	17505	POGO	4477	96/04/19	958/512	572040
579	1	17505	POGO	4478	96/04/19	958/513	572041
580	1	17505	POGO	4566	96/04/13	958/514	572042
581	1	17505	POGO	4567	96/04/12	958/515	572043
582	1	17505	POGO	4568	96/04/13	958/516	572044
583	1	17505	POGO	4569	96/04/16	958/517	572045
584	1	17505	POGO	4570	96/04/16	958/518	572046
585	1	17505	POGO	4571	96/04/16	958/519	572047
586	1	17505	POGO	4572	96/04/16	958/520	572048
587	1	17505	POGO	4573	96/04/17	958/521	572049
588	1	17505	POGO	4574	96/04/18	958/522	572050
589	1	17505	POGO	4575	96/04/19	958/523	572051
590	1	17505	POGO	4576	96/04/19	958/524	572052
591	1	17505	POGO	4577	96/04/19	958/525	572053
592	1	17505	POGO	4578	96/04/19	958/526	572054
593	1	17505	POGO	4657	96/04/10	958/527	572055
594	1	17505	POGO	4658	96/04/10	958/528	572056
595	1	17505	POGO	4659	96/04/10	958/529	572057
596	1	17505	POGO	4660	96/04/10	958/530	572058
597	1	17505	POGO	4661	96/04/11	958/531	572059
598	1	17505	POGO	4662	96/04/11	958/532	572060
599	1	17505	POGO	4663	96/04/11	958/533	572061
600	1	17505	POGO	4664	96/04/11	958/534	572062
601	1	17505	POGO	4665	96/04/12	958/535	572063
602	1	17505	POGO	4666	96/04/12	958/536	572064
603	1	17505	POGO	4667	96/04/12	958/537	572065

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605	1	17505	POGO	4669	96/04/16	958/539	572067
606	1	17505	POGO	4670	96/04/16	958/540	572068
607	1	17505	POGO	4671	96/04/16	958/541	572069
608	1	17505	POGO	4672	96/04/16	958/542	572070
609	1	17505	POGO	4673	96/04/17	958/543	572071
610	1	17505	POGO	4674	96/04/18	958/544	572072
611	1	17505	POGO	4675	96/04/19	958/545	572073
612	1	17505	POGO	4676	96/04/19	958/546	572074
613	1	17505	POGO	4677	96/04/19	958/547	572075
614	1	17505	POGO	4678	96/04/19	958/548	572076
615	1	17505	POGO	4757	96/04/10	958/549	572077
616	1	17505	POGO	4758	96/04/10	958/550	572078
617	1	17505	POGO	4759	96/04/10	958/551	572079
618	1	17505	POGO	4760	96/04/10	958/552	572080
619	1	17505	POGO	4761	96/04/11	958/553	572081
620	1	17505	POGO	4762	96/04/11	958/554	572082
621	1	17505	POGO	4763	96/04/11	958/555	572083
622	1	17505	POGO	4764	96/04/11	958/556	572084
623	1	17505	POGO	4765	96/04/12	958/557	572085
624	1	17505	POGO	4766	96/04/12	958/558	572086
625	1	17505	POGO	4767	96/04/12	958/559	572087
626	1	17505	POGO	4768	96/04/13	958/560	572088
627	1	17505	POGO	4769	96/04/16	958/561	572089
628	1	17505	POGO	4770	96/04/16	958/562	572090
629	1	17505	POGO	4771	96/04/16	958/563	572091
630	1	17505	POGO	4772	96/04/16	958/564	572092
631	1	17505	POGO	4773	96/04/16	958/565	572093
632	1	17505	POGO	4774	96/04/18	958/566	572094
633	1	17505	POGO	4775	96/04/19	958/567	572095
634	1	17505	POGO	4776	96/04/19	958/568	572096
635	1	17505	POGO	4777	96/04/19	958/569	572097
636	1	17505	POGO	4778	96/04/19	958/570	572098
637	1	17505	POGO	4857	96/04/10	958/571	572099
638	1	17505	POGO	4858	96/04/10	958/572	572100
639	1	17505	POGO	4859	96/04/10	958/573	572101
640	1	17505	POGO	4860	96/04/10	958/574	572102
641	1	17505	POGO	4861	96/04/11	958/575	572103
642	1	17505	POGO	4862	96/04/11	958/576	572104
643	1	17505	POGO	4863	96/04/11	958/577	572105
644	1	17505	POGO	4864	96/04/11	958/578	572106
645	1	17505	POGO	4865	96/04/12	958/579	572107
646	1	17505	POGO	4866	96/04/12	958/580	572108
647	1	17505	POGO	4867	96/04/12	958/581	572109
648	1	17505	POGO	4868	96/04/13	958/582	572110
649	1	17505	POGO	4869	96/04/16	958/583	572111
650	1	17505	POGO	4870	96/04/14	958/584	572112
651	1	17505	POGO	4871	96/04/14	958/585	572113
652	1	17505	POGO	4872	96/04/16	958/586	572114
653	1	17505	POGO	4873	96/04/16	958/587	572115
654	1	17505	POGO	4874	96/04/18	958/588	572116
655	1	17505	POGO	4875	96/04/19	958/589	572117
656	1	17505	POGO	4876	96/04/19	958/590	572118
657	1	17505	POGO	4877	96/04/19	958/591	572119
658	1	17505	POGO	4878	96/04/19	958/592	572120

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660	1	17505	POGO	4958	96/04/06	958/594	572122
661	1	17505	POGO	4959	96/04/10	958/595	572123
662	1	17505	POGO	4960	96/04/10	958/596	572124
663	1	17505	POGO	4961	96/04/11	958/597	572125
664	1	17505	POGO	4962	96/04/11	958/598	572126
665	1	17505	POGO	4963	96/04/11	958/599	572127
666	1	17505	POGO	4964	96/04/11	958/600	572128
667	1	17505	POGO	4965	96/04/12	958/601	572129
668	1	17505	POGO	4966	96/04/12	958/602	572130
669	1	17505	POGO	4967	96/04/12	958/603	572131
670	1	17505	POGO	4968	96/04/13	958/604	572132
671	1	17505	POGO	4969	96/04/16	958/605	572133
672	1	17505	POGO	4970	96/04/14	958/606	572134
673	1	17505	POGO	4971	96/04/14	958/607	572135
674	1	17505	POGO	4972	96/04/14	958/608	572136
675	1	17505	POGO	4973	96/04/16	958/609	572137
676	1	17505	POGO	4974	96/04/18	958/610	572138
677	1	17505	POGO	4975	96/04/19	958/611	572139
678	1	17505	POGO	4976	96/04/19	958/612	572140
679	1	17505	POGO	4977	96/04/19	958/613	572141
680	1	17505	POGO	4978	96/04/19	958/614	572142
681	1	17505	POGO	5057	96/04/05	958/615	572143
682	1	17505	POGO	5058	96/04/06	958/616	572144
683	1	17505	POGO	5059	96/04/05	958/617	572145
684	1	17505	POGO	5060	96/04/10	958/618	572146
685	1	17505	POGO	5061	96/04/10	958/619	572147
686	1	17505	POGO	5062	96/04/10	958/620	572148
687	1	17505	POGO	5063	96/04/10	958/621	572149
688	1	17505	POGO	5064	96/04/10	958/622	572150
689	1	17505	POGO	5065	96/04/10	958/623	572151
690	1	17505	POGO	5066	96/04/11	958/624	572152
691	1	17505	POGO	5067	96/04/11	958/625	572153
692	1	17505	POGO	5068	96/04/11	958/626	572154
693	1	17505	POGO	5069	96/04/16	958/627	572155
694	1	17505	POGO	5070	96/04/14	958/628	572156
695	1	17505	POGO	5071	96/04/14	958/629	572157
696	1	17505	POGO	5072	96/04/14	958/630	572158
697	1	17505	POGO	5073	96/04/16	958/631	572159
698	1	17505	POGO	5074	96/04/18	958/632	572160
699	1	17505	POGO	5075	96/04/18	958/633	572161
700	1	17505	POGO	5076	96/04/18	958/634	572162
701	1	17505	POGO	5077	96/04/18	958/635	572163
702	1	17505	POGO	5078	96/04/18	958/636	572164
703	1	17505	POGO	75	97/03/14	1006/932-933	574904
704	1	17505	POGO	76	97/03/14	1006/934	574905
705	1	17505	POGO	77	97/03/14	1006/935	574906
706	1	17505	POGO	78	97/03/14	1006/936	574907
707	1	17505	POGO	79	97/03/14	1006/937	574908
708	1	17505	POGO	80	97/03/14	1006/938	574909
709	1	17505	POGO	81	97/03/14	1006/939	574910
710	1	17505	POGO	82	97/03/14	1006/940	574911
711	1	17505	POGO	175	97/03/14	1006/941	574912
712	1	17505	POGO	176	97/03/14	1006/942	574913
713	1	17505	POGO	177	97/03/14	1006/943	574914

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714	1	17505	POGO	178	97/03/15	1006/944	574915
715	1	17505	POGO	179	97/03/16	1006/945	574916
716	1	17505	POGO	180	97/03/16	1006/946	574917
717	1	17505	POGO	181	97/03/16	1006/947	574918
718	1	17505	POGO	182	97/03/16	1006/948	574919
719	1	17505	POGO	275	97/03/14	1006/949	574920
720	1	17505	POGO	276	97/03/14	1006/950	574921
721	1	17505	POGO	277	97/03/14	1006/951	574922
722	1	17505	POGO	278	97/03/15	1006/952	574923
723	1	17505	POGO	279	97/03/16	1006/953	574924
724	1	17505	POGO	280	97/03/16	1006/954	574925
725	1	17505	POGO	281	97/03/16	1006/955	574926
726	1	17505	POGO	282	97/03/16	1006/956	574927
727	1	17505	POGO	375	97/03/14	1006/957	574928
728	1	17505	POGO	376	97/03/14	1006/958	574929
729	1	17505	POGO	377	97/03/14	1006/959	574930
730	1	17505	POGO	378	97/03/15	1006/960	574931
731	1	17505	POGO	379	97/03/16	1006/961	574932
732	1	17505	POGO	380	97/03/16	1006/962	574933
733	1	17505	POGO	381	97/03/16	1006/963	574934
734	1	17505	POGO	382	97/03/16	1006/964	574935
735	1	17505	POGO	475	97/03/14	1006/965	574936
736	1	17505	POGO	476	97/03/14	1006/966	574937
737	1	17505	POGO	477	97/03/14	1006/967	574938
738	1	17505	POGO	478	97/03/15	1006/968	574939
739	1	17505	POGO	479	97/03/16	1006/969	574940
740	1	17505	POGO	480	97/03/16	1006/970	574941
741	1	17505	POGO	481	97/03/16	1006/971	574942
742	1	17505	POGO	482	97/03/16	1006/972	574943
743	1	17505	POGO	4679	97/03/15	1006/973	574944
744	1	17505	POGO	4680	97/03/15	1006/974	574945
745	1	17505	POGO	4681	97/03/15	1006/975	574946
746	1	17505	POGO	4682	97/03/15	1006/976	574947
747	1	17505	POGO	4779	97/03/15	1006/977	574948
748	1	17505	POGO	4780	97/03/15	1006/978	574949
749	1	17505	POGO	4781	97/03/15	1006/979	574950
750	1	17505	POGO	4782	97/03/15	1006/980	574951
751	1	17505	POGO	4879	97/03/14	1006/981	574952
752	1	17505	POGO	4880	97/03/15	1006/982	574953
753	1	17505	POGO	4881	97/03/15	1006/983	574954
754	1	17505	POGO	4882	97/03/15	1006/984	574955
755	1	17505	POGO	4979	97/03/15	1006/985	574956
756	1	17505	POGO	4980	97/03/15	1006/986	574957
757	1	17505	POGO	4981	97/03/15	1006/987	574958
758	1	17505	POGO	4982	97/03/15	1006/988	574959
759	1	17505	POGO	5079	97/03/14	1006/989	574960
760	1	17505	POGO	5080	97/03/14	1006/990	574961
761	1	17505	POGO	5081	97/03/14	1006/991	574962
762	1	17505	POGO	5082	97/03/14	1006/992	574963
763	1	17505	POGO	741	97/03/17	1006/993	574964
764	1	17505	POGO	742	97/03/17	1006/995	574965
765	1	17505	POGO	743	97/03/17	1006/996	574966
766	1	17505	POGO	843	97/03/17	1006/997	574967
767	1	17505	POGO	4945	97/03/18	1006/998	574968
768	1	17505	POGO	4946	97/03/18	1007/001	574969

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769	1	17505	POGO	4947	97/03/18	1007/002	574970
770	1	17505	POGO	4948	97/03/17	1007/003	574971
771	1	17505	POGO	5045	97/03/17	1007/004	574972
772	1	17505	POGO	5046	97/03/17	1007/005	574973
773	1	17505	POGO	5047	97/03/17	1007/006	574974
774	1	17505	POGO	5048	97/03/17	1007/007	574975
775	1	17505	POGO	40	97/06/05	1020/824	575390
776	1	17505	POGO	41	97/06/05	1020/827	575391
777	1	17505	POGO	42	97/06/05	1020/828	575392
778	1	17505	POGO	43	97/06/05	1020/829	575393
779	1	17505	POGO	44	97/06/05	1020/830	575394
780	1	17505	POGO	140	97/06/06	1020/831	575395
781	1	17505	POGO	141	97/06/06	1020/832	575396
782	1	17505	POGO	142	97/06/06	1020/833	575397
783	1	17505	POGO	143	97/06/06	1020/834	575398
784	1	17505	POGO	144	97/06/06	1020/835	575399
785	1	17505	POGO	240	97/06/06	1020/836	575400
786	1	17505	POGO	241	97/06/06	1020/837	575401
787	1	17505	POGO	242	97/06/06	1020/838	575402
788	1	17505	POGO	243	97/06/06	1020/839	575403
789	1	17505	POGO	244	97/06/06	1020/840	575404
790	1	17505	POGO	340	97/06/06	1020/841	575405
791	1	17505	POGO	341	97/06/06	1020/842	575406
792	1	17505	POGO	342	97/06/06	1020/843	575407
793	1	17505	POGO	343	97/06/06	1020/844	575408
794	1	17505	POGO	344	97/06/06	1020/845	575409
795	1	17505	POGO	440	97/06/06	1020/846	575410
796	1	17505	POGO	441	97/06/15	1020/847	575411
797	1	17505	POGO	442	97/06/15	1020/848	575412
798	1	17505	POGO	443	97/06/06	1020/849	575413
799	1	17505	POGO	444	97/06/06	1020/850	575414
800	1	17505	POGO	540	97/06/06	1020/851	575415
801	1	17505	POGO	541	97/06/14	1020/852	575416
802	1	17505	POGO	542	97/06/15	1020/853	575417
803	1	17505	POGO	543	97/06/15	1020/854	575418
804	1	17505	POGO	544	97/06/15	1020/855	575419
805	1	17505	POGO	640	97/06/06	1020/856	575420
806	1	17505	POGO	641	97/06/14	1020/857	575421
807	1	17505	POGO	642	97/06/14	1020/858	575422
808	1	17505	POGO	643	97/06/14	1020/859	575423
809	1	17505	POGO	644	97/06/14	1020/860	575424
810	1	17505	POGO	740	97/06/15	1020/861	575425
811	1	17505	POGO	840	97/06/06	1020/862	575426
812	1	17505	POGO	841	97/06/06	1020/863	575427
813	1	17505	POGO	842	97/06/06	1020/864	575428
814	1	17505	POGO	940	97/06/15	1020/865	575429
815	1	17505	POGO	941	97/06/15	1020/866	575430
816	1	17505	POGO	942	97/06/14	1020/867	575431
817	1	17505	POGO	943	97/06/14	1020/868	575432
818	1	17505	POGO	1040	97/06/15	1020/869	575433
819	1	17505	POGO	1041	97/06/15	1020/870	575434
820	1	17505	POGO	1042	97/06/14	1020/871	575435
821	1	17505	POGO	1043	97/06/14	1020/872	575436
822	1	17505	POGO	1140	97/06/15	1020/873	575437
823	1	17505	POGO	1141	97/06/15	1020/874	575438



Seq	Quan	Bill No.	Claim Name		Date	Book/Page	ADL Serial No.
824	1	17505	POGO	1142	97/06/14	1020/875	575439
825	1	17505	POGO	1143	97/06/14	1020/876	575440
826	1	17505	POGO	1240	97/06/15	1020/877	575441
827	1	17505	POGO	1241	97/06/15	1020/878	575442
828	1	17505	POGO	1242	97/06/14	1020/879	575443
829	1	17505	POGO	1243	97/06/14	1020/880	575444
830	1	17505	POGO	1340	97/06/15	1020/881	575445
831	1	17505	POGO	1341	97/06/15	1020/882	575446
832	1	17505	POGO	1342	97/06/14	1020/883	575447
833	1	17505	POGO	1440	97/06/15	1020/884	575448
834	1	17505	POGO	1441	97/06/15	1020/885	575449
835	1	17505	POGO	1442	97/06/14	1020/886	575450
836	1	17505	POGO	1540	97/06/15	1020/887	575451
837	1	17505	POGO	1541	97/06/15	1020/888	575452
838	1	17505	POGO	1542	97/06/14	1020/889	575453
839	1	17505	POGO	1640	97/06/15	1020/890	575454
840	1	17505	POGO	1641	97/06/15	1020/891	575455
841	1	17505	POGO	1642	97/06/01	1020/892	575456
842	1	17505	POGO	1643	97/06/01	1020/893	575457
843	1	17505	POGO	1644	97/06/01	1020/894	575458
844	1	17505	POGO	1645	97/06/01	1020/895	575459
845	1	17505	POGO	1740	97/06/01	1020/896	575460
846	1	17505	POGO	1741	97/06/01	1020/897	575461
847	1	17505	POGO	1742	97/06/01	1020/898	575462
848	1	17505	POGO	1743	97/06/01	1020/899	575463
849	1	17505	POGO	1744	97/06/01	1020/900	575464
850	1	17505	POGO	1745	97/06/01	1020/901	575465
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852	1	17505	POGO	1747A	97/05/29	1020/903	575467
853	1	17505	POGO	1748A	97/05/29	1020/904	575468
854	1	17505	POGO	1749A	97/05/29	1020/905	575469
855	1	17505	POGO	1750A	97/06/14	1020/906	575470
856	1	17505	POGO	1846	97/05/29	1020/907	575471
857	1	17505	POGO	1847	97/05/29	1020/908	575472
858	1	17505	POGO	1848	97/05/29	1020/909	575473
859	1	17505	POGO	1849	97/05/29	1020/910	575474
860	1	17505	POGO	1850	97/05/29	1020/911	575475
861	1	17505	POGO	1851	97/05/29	1020/912	575476
862	1	17505	POGO	1852	97/05/29	1020/913	575477
863	1	17505	POGO	4940	97/06/05	1020/914	575478
864	1	17505	POGO	4941	97/06/05	1020/915	575479
865	1	17505	POGO	4942	97/06/05	1020/916	575480
866	1	17505	POGO	4943	97/06/05	1020/917	575481
867	1	17505	POGO	4944	97/06/05	1020/918	575482
868	1	17505	POGO	5040	97/06/06	1020/919	575483
869	1	17505	POGO	5041	97/06/06	1020/920	575484
870	1	17505	POGO	5042	97/06/06	1020/921	575485
871	1	17505	POGO	5043	97/06/06	1020/922	575486
872	1	17505	POGO	5044	97/06/06	1020/923	575487
873	1	17505	POGO	3873	97/10/10	1042/097-099	592661
874	1	17505	POGO	3874	97/10/11	1042/100	592662
875	1	17505	POGO	3875	97/10/11	1042/101	592663
876	1	17505	POGO	3876	97/10/07	1042/102	592664
877	1	17505	POGO	3877	97/10/07	1042/103	592665
878	1	17505	POGO	3878	97/10/07	1042/104	592666

Seq	Quan	Bill No.	Claim Name		Date	Book/Page	ADL Serial No.
879	1	17505	POGO	3879	97/10/07	1042/105	592667
880	1	17505	POGO	3880	97/10/07	1042/106	592668
881	1	17505	POGO	3881	97/10/08	1042/107	592669
882	1	17505	POGO	3973	97/10/08	1042/108	592670
883	1	17505	POGO	3974	97/10/08	1042/109	592671
884	1	17505	POGO	3975	97/10/08	1042/110	592672
885	1	17505	POGO	3976	97/10/08	1042/111	592673
886	1	17505	POGO	3977	97/10/08	1042/112	592674
887	1	17505	POGO	3978	97/10/10	1042/113	592675
888	1	17505	POGO	3979	97/10/08	1042/114	592676
889	1	17505	POGO	3980	97/10/07	1042/115	592677
890	1	17505	POGO	3981	97/10/08	1042/116	592678
891	1	17505	POGO	4075	97/10/10	1042/117	592679
892	1	17505	POGO	4076	97/10/10	1042/118	592680
893	1	17505	POGO	4077	97/10/10	1042/119	592681
894	1	17505	POGO	4078	97/10/10	1042/120	592682
895	1	17505	POGO	4079	97/10/07	1042/121	592683
896	1	17505	POGO	4080	97/10/07	1042/122	592684
897	1	17505	POGO	4081	97/10/08	1042/123	592685
898	1	17505	POGO	4082	97/10/07	1042/124	592686
899	1	17505	POGO	4083	97/10/07	1042/125	592687
900	1	17505	POGO	4175	97/10/10	1042/126	592688
901	1	17505	POGO	4176	97/10/10	1042/127	592689
902	1	17505	POGO	4177	97/10/10	1042/128	592690
903	1	17505	POGO	4178	97/10/10	1042/129	592691
904	1	17505	POGO	4179	97/10/07	1042/130	592692
905	1	17505	POGO	4180	97/10/07	1042/131	592693
906	1	17505	POGO	4181	97/10/08	1042/132	592694
907	1	17505	POGO	4182	97/10/07	1042/133	592695
908	1	17505	POGO	4183	97/10/07	1042/134	592696
909	1	17505	POGO	4279	97/10/07	1042/135	592697
910	1	17505	POGO	4280	97/10/07	1042/136	592698
911	1	17505	POGO	4281	97/10/10	1042/137	592699
912	1	17505	POGO	4282	97/10/07	1042/138	592700
913	1	17505	POGO	4283	97/10/07	1042/139	592701
914	1	17505	POGO	4379	97/10/07	1042/140	592702
915	1	17505	POGO	4380	97/10/07	1042/141	592703
916	1	17505	POGO	4381	97/10/10	1042/142	592704
917	1	17505	POGO	4382	97/10/07	1042/143	592705
918	1	17505	POGO	4383	97/10/07	1042/144	592706
919	1	17505	POGO	4479	97/10/07	1042/145	592707
920	1	17505	POGO	4480	97/10/04	1042/146	592708
921	1	17505	POGO	4481	97/10/10	1042/147	592709
922	1	17505	POGO	4482	97/10/07	1042/148	592710
923	1	17505	POGO	4483	97/10/07	1042/149	592711
924	1	17505	POGO	4579	97/10/07	1042/150	592712
925	1	17505	POGO	4580	97/10/04	1042/151	592713
926	1	17505	POGO	4581	97/10/10	1042/152	592714
927	1	17505	POGO	4582	97/10/06	1042/153	592715
928	1	17505	POGO	4583	97/10/06	1042/154	592716
929	1	17505	POGO	4683	97/10/06	1042/155	592717
930	1	17505	POGO	4783	97/10/06	1042/156	592718
931	1	17505	POGO	4883	97/10/06	1042/157	592719
932	1	17505	POGO	4983	97/10/06	1042/158	592720
933	1	17505	POGO	5083	97/10/03	1042/159	592721



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934	1	17505	POGO	83	97/10/03	1042/160	592722
935	1	17505	POGO	183	97/10/03	1042/161	592723
936	1	17505	POGO	283	97/10/03	1042/162	592724
937	1	17505	POGO	383	97/10/03	1042/163	592725
938	1	17505	POGO	483	97/10/03	1042/164	592726
939	1	17505	POGO	582	97/10/03	1042/165	592727
940	1	17505	POGO	583	97/10/03	1042/166	592728
941	1	17505	POGO	682	97/10/03	1042/167	592729
942	1	17505	POGO	683	97/10/03	1042/168	592730
943	1	17505	POGO	3364	96/10/13	1042/169-170	592731
944	1	17505	POGO	3365	96/10/13	1042/171	592732
945	1	17505	POGO	3366	96/10/13	1042/172	592733
946	1	17505	POGO	3367	96/10/13	1042/173	592734
947	1	17505	POGO	3368	96/10/13	1042/174	592735
948	1	17505	POGO	3369	96/10/13	1042/175	592736
949	1	17505	POGO	3370	96/10/13	1042/176	592737
950	1	17505	POGO	3371	96/10/13	1042/177	592738
951	1	17505	POGO	3372	96/10/13	1042/178	592739
952	1	17505	POGO	3464	96/10/13	1042/179	592740
953	1	17505	POGO	3465	96/10/13	1042/180	592741
954	1	17505	POGO	3466	96/10/13	1042/181	592742
955	1	17505	POGO	3467	97/10/11	1042/182	592743
956	1	17505	POGO	3468	97/10/11	1042/183	592744
957	1	17505	POGO	3469	97/10/11	1042/184	592745
958	1	17505	POGO	3470	97/10/11	1042/185	592746
959	1	17505	POGO	3471	97/10/11	1042/186	592747
960	1	17505	POGO	3472	97/10/11	1042/187	592748
961	1	17505	POGO	3564	96/10/13	1042/188	592749
962	1	17505	POGO	3565	97/10/11	1042/189	592750
963	1	17505	POGO	3566	97/10/11	1042/190	592751
964	1	17505	POGO	3567	97/10/11	1042/191	592752
965	1	17505	POGO	3568	97/10/11	1042/192	592753
966	1	17505	POGO	3569	97/10/11	1042/193	592754
967	1	17505	POGO	3570	97/10/11	1042/194	592755
968	1	17505	POGO	3571	97/10/11	1042/195	592756
969	1	17505	POGO	3572	97/10/11	1042/196	592757
970	1	17505	POGO	3664	97/10/11	1042/197	592758
971	1	17505	POGO	3665	97/10/11	1042/198	592759
972	1	17505	POGO	3666	97/10/10	1042/199	592760
973	1	17505	POGO	3667	96/10/13	1042/200	592761
974	1	17505	POGO	3668	97/10/10	1042/201	592762
975	1	17505	POGO	3669	97/10/10	1042/202	592763
976	1	17505	POGO	3670	97/10/10	1042/203	592764
977	1	17505	POGO	3671	97/10/10	1042/204	592765
978	1	17505	POGO	3672	97/10/10	1042/205	592766
979	1	17505	POGO	3764	97/10/11	1042/206	592767
980	1	17505	POGO	3765	97/10/11	1042/207	592768
981	1	17505	POGO	3766	97/10/11	1042/208	592769
982	1	17505	POGO	3767	97/10/11	1042/209	592770
983	1	17505	POGO	3768	97/10/11	1042/210	592771
984	1	17505	POGO	3769	97/10/11	1042/211	592772
985	1	17505	POGO	3770	97/10/11	1042/212	592773
986	1	17505	POGO	3771	97/10/11	1042/213	592774
987	1	17505	POGO	3772	97/10/10	1042/214	592775
988	1	17505	POGO	763	97/10/03	1042/215-217	592776

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989	1	17505	POGO	764	97/10/03	1042/218	592777
990	1	17505	POGO	765	97/10/03	1042/219	592778
991	1	17505	POGO	766	97/10/06	1042/220	592779
992	1	17505	POGO	767	97/10/06	1042/221	592780
993	1	17505	POGO	768	97/10/03	1042/222	592781
994	1	17505	POGO	863	97/10/03	1042/223	592782
995	1	17505	POGO	864	97/10/03	1042/224	592783
996	1	17505	POGO	865	97/10/03	1042/225	592784
997	1	17505	POGO	866	97/10/03	1042/226	592785
998	1	17505	POGO	867	97/10/03	1042/227	592786
999	1	17505	POGO	868	97/10/03	1042/228	592787
1000	1	17505	POGO	963	97/10/03	1042/229	592788
1001	1	17505	POGO	964	97/10/03	1042/230	592789
1002	1	17505	POGO	965	97/10/03	1042/231	592790
1003	1	17505	POGO	1063	97/10/03	1042/232	592791
1004	1	17505	POGO	1064	97/10/03	1042/233	592792
1005	1	17505	POGO	1065	97/10/03	1042/234	592793
1006	1	17505	POGO	1163	97/10/02	1042/235	592794
1007	1	17505	POGO	1164	97/10/02	1042/236	592795
1008	1	17505	POGO	1165	97/10/02	1042/237	592796
1009	1	17505	POGO	1258	97/10/02	1042/238	592797
1010	1	17505	POGO	1259	97/10/02	1042/239	592798
1011	1	17505	POGO	1260	97/10/02	1042/240	592799
1012	1	17505	POGO	1261	97/10/02	1042/241	592800
1013	1	17505	POGO	1262	97/10/02	1042/242	592801
1014	1	17505	POGO	1263	97/10/02	1042/243	592802
1015	1	17505	POGO	1264	97/10/02	1042/244	592803
1016	1	17505	POGO	1265	97/10/02	1042/245	592804
1017	1	17505	POGO	1358	97/10/02	1042/246	592805
1018	1	17505	POGO	1359	97/10/02	1042/247	592806
1019	1	17505	POGO	1360	97/10/02	1042/248	592807
1020	1	17505	POGO	1361	97/10/02	1042/249	592808
1021	1	17505	POGO	1362	97/10/02	1042/250	592809
1022	1	17505	POGO	1363	97/10/02	1042/251	592810
1023	1	17505	POGO	1364	97/10/02	1042/252	592811
1024	1	17505	POGO	1365	97/10/02	1042/253	592812
1025	1	17505	POGO	1458	97/10/02	1042/254	592813
1026	1	17505	POGO	1459	97/10/02	1042/255	592814
1027	1	17505	POGO	1460	97/10/02	1042/256	592815
1028	1	17505	POGO	1461	97/10/02	1042/257	592816
1029	1	17505	POGO	1462	97/10/02	1042/258	592817
1030	1	17505	POGO	1463	97/10/02	1042/259	592818
1031	1	17505	POGO	1464	97/10/02	1042/260	592819
1032	1	17505	POGO	1465	97/10/02	1042/261	592820
1033	1	17505	POGO	1740A	97/10/01	1042/262-263	592821
1034	1	17505	POGO	1741A	97/10/01	1042/264	592822
1035	1	17505	POGO	1742A	97/10/01	1042/265	592823
1036	1	17505	POGO	1743A	97/10/01	1042/266	592824
1037	1	17505	POGO	1744A	97/10/01	1042/267	592825
1038	1	17505	POGO	1745A	97/10/01	1042/268	592826
1039	1	17505	POGO	1840	97/10/01	1042/269	592827
1040	1	17505	POGO	1841	97/10/01	1042/270	592828
1041	1	17505	POGO	1842	97/10/01	1042/271	592829
1042	1	17505	POGO	1843	97/10/01	1042/272	592830
1043	1	17505	POGO	1844	97/10/01	1042/273	592831

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1044	1	17505	POGO	1845	97/10/01	1042/274	592832
1045	1	17505	POGO	4748	98/05/14	1066/567-568	593465
1046	1	17505	POGO	4749	98/05/14	1066/569	593466
1047	1	17505	POGO	4750	98/05/14	1066/570	593467
1048	1	17505	POGO	4751	98/05/14	1066/571	593468
1049	1	17505	POGO	4752	98/05/14	1066/572	593469
1050	1	17505	POGO	4753	98/05/14	1066/573	593470
1051	1	17505	POGO	4754	98/05/14	1066/574	593471
1052	1	17505	POGO	4755	98/05/14	1066/575	593472
1053	1	17505	POGO	4756	98/05/14	1066/576	593473
1054	1	17505	POGO	4848	98/05/14	1066/577	593474
1055	1	17505	POGO	4849	98/05/14	1066/578	593475
1056	1	17505	POGO	4850	98/05/14	1066/579	593476
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# **Appendix B - FIGURES**

- Figure 1.3: Pogo Mine As-built (incl. all update)
- Figure 1.3a: 1525 Portal Area As-built (incl. additional sand filter)
- Figure 1.3b: Airstrip Area As-built
- Figure 1.3c: Mill and Camp Bench Area As-built (incl. ER1, paste pipeline)
- Figure 1.3d: RTP and Drystack Area As-built (DSTF as of Oct. 2012)
- Figure 1.3e: 2150 Portal Area Plan
- Figure 1.3f: Proposed Paste Pipeline from Paste Plant and 2150 portal
- Figure 4.1: Pogo Access Road and Transmission Line
- Figure 6.1: Process Flow Diagram
- Figure 6.2: As-built Mill Plant
- Figure 7.1: DSTF 20 Million Tons
- Figure 7.1a: Drystack Storage Facilities Year 2012 As-built
- Figure 7.1b: Drystack Storage Facilities Year 2013
- Figure 7.1c: Drystack Storage Facilities Year 2014
- Figure 7.1d: Drystack Storage Facilities Year 2015
- Figure 7.1e: Drystack Storage Facilities Year 2016
- Figure 7.1f: Drystack Storage Facilities Year 2017
- Figure 7.1g: Drystack Storage Facilities Year 2018
- Figure 8.1: Conceptual Water Management Flows
- Figure 8.2: Process Flow Diagram with Water Use
- Figure 8.3: Water Balance 2,500 tpd Average Case
- Figure 8.4: RTP Dam As-built
- Figure 8.5: RTP Seepage Collection System
- Figure 8.6: Off-River Treatment Works
- Figure 8.7: Off-River Treatment Works Pump Lift Station & Outlet Structure

Note: The year-by-year drawings were created assuming the shells would not be constructed between 2013 and 2019, since the elevation of the shells reached to the elevation of existing haul road.

## **Appendix C**

### **POGO QUALITY ASSURANCE PLAN**



## **Appendix D**

### **POGO MINE MONITORING PLAN**

## **Appendix E**

### **POGO RECLAMATION AND CLOSURE PLAN**

## **Appendix F**

### **POGO DSTF CONSTRUCTION AND MAINTENANCE PLAN**

## **Appendix G**

### **POGO RTP OPERATING AND MAINTENANCE MANUAL**