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TECK-POGO MINE 5-YEAR ENVIRONMENTAL AUDIT

Submitted to:

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2 Copies – Teck-Pogo, Inc.
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1.0 PURPOSE AND OBJECTIVES OF THE AUDIT

The Alaska Department of Natural Resources (DNR) and the Alaska Department of Conservation (DEC) require Teck-Pogo Inc. (Pogo) to have third-party audits conducted every five years in accordance with the issued Millsite Lease (ADL No. 416949) and the Solid Waste Disposal Permit (No. 0131-BA002). In compliance with the regulatory requirements Golder Associates Inc. (Golder) performed an environmental audit (Audit) of the Pogo Mine, and the access road near Delta Junction, Alaska. Pogo permits were issued in December 2003, construction began in 2004 and Operations at Pogo started in 2006. This is the first five-year audit that Pogo has undergone. This report presents the results from that Audit, in the following sections:

- Executive Summary;
- Project Description;
- Audit Procedure and Field Activities;
- Recommendations; and
- Appendixes.

The Audit was objective, systematic, and documented review of the conditions, operations, and practices related to environmental requirements and environmental management of the Pogo operations. The Audit results will be used by Pogo and the state of Alaska to assist in updating, renewing, or issuing authorization and permits, in updating policies, plans and procedures, and in determining compliance with permits and authorizations. The Audit covers the following tasks and scope of work related to completing those tasks:

- Task 1 - Compliance with Federal, State, Local Permits and Authorization;
- Task 2 - Compliance with Specialized Environmental Plans;
- Task 3 - Reliability and Integrity of Information Relating to Environmental Reporting and Compliance;
- Task 4 - Adequacy of State Oversight to Protect State Resources;
- Task 5 - Condition of Chemical Containment Structures;
- Task 6 - Laboratories and Sample Analysis Procedures;

- Task 7 - Adherence with Pollution Prevention Strategy;
- Task 8 - Adequacy of Closure and Post-Closure Financial Responsibility; and
- Task 9 - Monitoring Programs.

The scope of work includes the following activities for each of the Tasks 1 through 9.

- Preparation of Audit Protocols and Agency Kickoff Conference Call;
- Desk Review;
- Site Kickoff Meeting, Facility Audit and Site Interviews;
- Agency Interviews and Closeout Meeting; and
- Production of Audit Report.

The Audit was conducted with an independent and objective approach following systematic procedures. Regular interaction with the Pogo senior personnel was a requirement to assure accessibility and reliability of information collected.

The recommendations provided in this Audit are Golder's best professional judgment based on the site visit and information review. Detailed scientific and engineering analyses were not part of the scope of work for this audit. The recommendations are provided to the Large Mine Permitting Team as suggested solutions (or alternatives) to the potential audit issues or concerns. It is anticipated that Pogo may develop alternative, but acceptable responses to the audit issues or concerns based on more detailed analyses.

1.1 Audit Protocols and Agency Kickoff Conference Call

Golder prepared audit protocols for review and approval by the Large Mines Permitting Team (LMPT). These protocols were discussed in detail on May 30, 2008 with the LMP Team and Pogo. These protocols formed the basis of our interview during the site visit.

1.2 Desk Review

A thorough review of the existing project environmental management plans, relevant procedures, policies, and guidelines, project commitments to the agencies and federal, state and local regulations

was conducted. Pogo and the DNR provided copies of relevant background information and project specific documents prior to the field audit.

Compliance information with respect to facilities is summarized in Tables 1 and 2 to support the comprehensive and systematic auditing of the facilities and programs. Tasks 1 and 2 (Sections 3.1 and 3.2) describe this information in detail.

1.3 Facility Audit and Site Interviews

Golder conducted a site kickoff meeting with the Pogo department managers. An Audit of the facilities was conducted to characterize the compliance with the site environmental management systems. The audit team consisted of specialists in mining environmental permitting, geochemistry, geotechnical engineering, hydrogeology, and closure/reclamation. The audit team used protocols which Golder developed to meet the specific needs of this project. The protocols include checklists, questions for site personnel, and compliance references. Golder provided the protocols to Pogo and the state prior to the site audit for their review and approval. Golder conducted daily meeting with Teck Cominco Alaska's Director of Corporate Affairs and Pogo's Senior Environmental Coordinator.

As with all successful audits, there was considerable interaction between the Pogo staff, the regulatory agencies, and the audit team. We conducted interviews with key individuals in addition to the site visits and data collection. Golder's preliminary review and interpretations were discussed with the staff in an interactive fashion during the audit. Direct observation, field reviews, interviews with key personnel, technical evaluations and other activities were conducted for all tasks. Section 3.0 describes which mine components were audited and the Pogo staff and their titles who were interviewed. Based on the Audit results and findings Golder has provided recommendations for corrective action as Section 4.0.

1.4 Agency Interviews

Regulatory agency interviews were conducted both in Anchorage and in Fairbanks to discuss perceptions and expectations of the mine, and to determine the agencies' adequacy to protect Alaskan resources. Task 4 (Section 3.4) identifies which agencies and personnel were interviewed and a summary of those meetings (Appendix A).

1.5 Production of Audit Report

The production of this report was the culmination of the following professionals' analyses, internal communications, and specific task responsibilities:

- Ms. Pamela Stella, M.Sc., P.G., C.E.A., Lead Auditor: Tasks 1, 3, 4, 5, 7, 9, site visit, and agency interviews at DNR (Fairbanks);
- Dr. Rens Verburg, Ph.D., Geochemist: Tasks 1, 6, 9 and site visit;
- Mr. Brent Bailey, P.E., C.E.A., Civil Engineer: Tasks 1, 3, 8, site visit and agency interviews at DNR (Fairbanks);
- Ivon Aguinaga, M.Sc., Engineer: Tasks 1, 2, 3, 9, site visit, and agency interviews;
- Mr. Steve Anderson, P.E., Geotechnical Engineer: Tasks 1, 3, 9, site visit and interview with DNR (Dam Safety) Anchorage; and
- Mr. Jan Deick, M.Sc., Hydrogeologist: Tasks 6, 9, site visit and telephone interview with Corp of Engineers.

2.0 PROJECT DESCRIPTION

This section is a concise description of the project that focuses on project components with potential environmental concerns.

The Pogo mine is located on state land in the upper Goodpaster River valley, about 38 miles northeast of Delta Junction and 85 miles east-southeast of Fairbanks, Alaska. Access to the mine is via the 50-mile Shaw Creek Road from the Richardson Highway (Figure 1).

Pogo is an underground mine with a current annual gold production of 340,000 ounces of gold per year. The mine is expected to produce 400,000 ounces of gold per year over a 10-year mine life. Pogo is a joint venture with Sumitomo Metal Mining Co. Ltd. (51%) and Sumitomo Corporation of Japan (9%). Teck Cominco has a 40% interest in the mine and is the operator.

The ore is extracted using conventional underground mining techniques. The mine is accessed by three declines—two are used for worker/material access and ventilation (1525 and 1875 Portals), the third for conveying the ore to surface and ventilation exhaust (1690 Portal). The ore is mined by a drift and fill method. The ore is then hauled to a central underground bin, from where it is conveyed to the surface mill. The mill has a capacity of 2,500 tons per day and utilizes conventional milling and both gravity separation and development of a flotation concentrate for carbon-in-pulp (CIP) cyanide leaching. The gold from both the gravity and CIP circuits is smelted into bars. The gold dore is then shipped to an off-site for further refining.

Major mine components, presented in Figure 2, include:

- Mill facility and reagent storage;
- Paste backfill plant;
- Non-mineralized rock stockpile;
- Mineralized rock storage area;
- Temporary rock storage areas;
- Mine camp;
- Mine/office/truck shop complex;

- Drystack tailings facility;
- Recycle tailings pond (RTP) and dam;
- Airstrip;
- Fuel and materials storage facilities;
- Water supply wells;
- Injection wells (still on site but not in use);
- Sewage treatment plant (STP);
- Water treatment plant (WTP);
- Off-river treatment works (ORTW);
- Two potable water treatment plants;
- Seepage collection wells;
- Underground workings;
- Shaw Creek Hillside all-season road; and
- Project powerline.

The flotation tailings that have not come into contact with cyanide are pressure-filtered and placed into a drystack tailings facility or used as part of the paste backfill. Tailings from the CIP circuit are detoxified using a multi-step process, which involves decanting and recycling the majority of the cyanide solution, and chemically breaking down the cyanide in the remainder. The detoxified tailings are mixed with cement and flotation tailings and placed underground as cemented pastefill.

Development rock from the underground excavations is segregated into mineralized and non-mineralized development rock. Mineralized development rock (>0.5% sulfur or 600 mg/L arsenic) is disposed of in the drystack tailings facility. Non-mineralized development rock (<0.5% sulfur and 600 mg/L arsenic) is placed in the shell of the drystack tailings facility or used for construction, if needed.

All surface water and runoff from the drystack tailings facility and the mill site and associated roads are collected in the RTP located immediately downstream of the drystack facility. Water that accumulates in the RTP is used to fulfill all additional process makeup requirements that are not being met by mine water inflow. A system of seepage collection wells was installed at the downstream toe of the RTP dam to collect seepage and runoff from the downstream face of the dam and return it to the RTP pond. Pogo has installed a system of wells downstream of the seepage collection wells to monitor groundwater quality downstream of the RTP. Mine drainage water, RTP water, and fresh water are used to satisfy any water makeup requirement.

Water from the RTP and mine drainage, not used as makeup water, is treated by two methods before it is released to the Goodpaster River. First, a water treatment plant removes suspended solids, arsenic, and other metals. Effluent from the WTP, that is not reclaimed and sent back to the mill or the RTP, is then mixed in the ORTW before final discharge to the Goodpaster River.

Fresh water is obtained from water supply wells located in the Goodpaster valley. The mine has two potable water treatment systems, one located at the Permanent Camp and the other at the Construction Camp, to treat fresh water for drinking purposes. Domestic wastewater from the mine site is treated at a sewage treatment plant located near the 1525 Portal for secondary treatment and, final disinfection and then discharged directly into the Goodpaster River.

The Department of Natural Resources, Division of Mining, Land and Water issued the Final Decisions of the Millsite Lease and the Pogo Mine Project Plan of Operations for Teck-Pogo Inc. on December 13, 2003. The underground mine and surface mill began production in the first quarter of 2006. At year-end 2007, 243 people were employed at Pogo, with an additional 88 persons employed by contractors in housekeeping and underground development.

3.0 AUDIT PROCEDURE AND FIELD ACTIVITIES

In accordance with the requirements in the Millsite Permit and the Solid Waste Disposal Permit, an audit of the Pogo mining facility and Shaw Creek all-season access road is required every five years. An audit of the facilities was conducted from June 9th through June 12th, 2008 to characterise the compliance with the approved environmental permits. Interviews with various state agencies and a closeout meeting were held at the DNR offices in Fairbanks on June 13, 2008. The audit team consisted of specialists in mining environmental and compliance issues, geochemistry, geotechnical engineering, hydrogeology and closure and reclamation. The audit team used protocols Golder developed for auditing projects and tailored to meet the specific needs of this project. These protocols included checklists, questions for site personnel, and compliance references.

Golder believes that the audit process is most successful when preliminary review and interpretations are discussed with the staff in an interactive fashion during the audit. A kickoff meeting with Pogo's key personnel and Golder was conducted on June 9th to discuss the purpose of the audit, request the assistance of Pogo in obtaining additional data in their files, conducting interviews, and conducting tours of key facilities at the mine. The audit process was conducted in a completely transparent manner to all involved.

In order to have a successful audit, there was considerable interaction between the Pogo staff, the regulatory agencies and the Golder audit team. Golder conducted interviews with key individuals in addition to the site audit and data collection. The Corporate and Pogo personnel who were interviewed included:

- Director Corporate Affairs, Karl Hanneman;
- Senior Environmental Coordinator, Donna Stevison;
- Assistant Mine Manager, Makoto Umedera;
- Mill Superintendent, Bryan Rairdan;
- Environmental Coordinator, Stacy Staley;
- Environmental Technician, Lucas Walker;
- Environmental Engineer, Casey Mueller;
- Mine Superintendent, Keith Malone;

- Maintenance Superintendent, Chris Kennedy;
- Safety Coordinator, Mike Herndon; and
- Controller, Dino Martin.

Direct observation, field reviews, interviews with key personnel, technical evaluations and other activities were conducted for all tasks.

The Audit covered the following facilities:

- Pogo Mine Facilities and Operations;
- Shaw Creek All-Season Access Road.

The following sections summarize the nine tasks required for this audit, the information reviewed for each task and a description of the results from each task. Section 4 Recommendations, describes any areas of concern identified during the auditing for each task and our recommendation for additional work (i.e., data collection, sampling alternatives) to mitigate that related issue.

3.1 Task 1 – Compliance with Federal and State Permits and Authorizations

Pogo is in general compliance with federal and state permits and authorizations. Golder conducted a thorough review of the existing project environmental management plans, key federal and state permits, relevant procedures and guidelines, and federal and state regulations. The review included compliance, expiration, and renewal requirements. Compliance information according to facility is summarized in Table 1 to support the comprehensive and systematic auditing of the facilities and programs. Table 1 includes permits and environmental authorizations reviewed prior to and during the environmental audit.

TABLE 1

POGO MINE PERMITS AND AUTHORIZATIONS

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	TERM/ EXPIRATION
FEDERAL				
EPA – Region 10	AK-005334-1	Authorization to Discharge Under the National Pollutant Discharge Elimination System	04/16/2004	3/31/2009
EPA – Region 10	Records of Decision (ROD) for the Pogo Gold Mine Project	Letter enclosing the information on the EPA's Record of Decision (ROD) for the Pogo Gold Mine Project	03/15/2004	N/A
Department of the Army Permit – US Army Engineer District	Q-1996-0211	Section 404 (Wetlands Permit) - 404 Permit For Discharge of Dredge or Fill Materials Into Waters of the US (Fish Creek) Permit Modification – Changes in acres from 197.1 to 200.2 (March 19)	01/12/2004	12/31/2015
Federal Communications Commission - Wireless Telecommunications Bureau	0001758097 (File Number) FCC Registration Number (FRN): 0009367285	Radio Authorization	06/03/2004	06/31/2014
US Department of Interior – Fairbanks Fish and Wildlife Office	Q-1996-0211 Goodpaster River 1	Endangered Species Act Section 7 Consultation	10/14/2003	N/A
US Department of Homeland Security – US Coast Guard	16590	Bridge Construction over Goodpaster River for Pogo Mine Access.	2/6/2004	When bridge is completed
Mine Safety and Health Administration	Mine I.D. 5001642	Mine Identification Number	6/1/1998	N/A
U.S. Environmental Protection Agency - U.S. Army Corps of Engineers - Alaska Department of Natural Resources		Final Environmental Impact Statement Pogo Gold Mine Project	September 2003	Life of the Project
Bureau Of Alcohol, Tobacco, And Firearms (ATF)	9-AK-090-33-8D-00173	33-User of High Explosives	03/29/2005	April 1, 2008 Pogo is authorized to continue operations under this permit until **October 1 2008** or until the ATF completes action on the renewal of this permit.

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	TERM/ EXPIRATION
Federal Air Aviation	03AAL-159NRA	Notice of Landing Area Proposal – Pogo Mine Airport, Alaska. 03AAL-159NRA	11/07/2003	N/A
Federal Air Aviation	03AAL-160NRA	Notice of Landing Area Proposal – Goodpaster West Airport, Alaska. 03AAL-160NRA	11/07/2003	N/A
Federal Air Aviation	03AAL-161NRA	Notice of Landing Area Proposal – Gilles Creek West Airport, Alaska. 03AAL-161NRA	11/07/2003	N/A
Federal Air Aviation	03AAL-161NRA	Notice of Landing Area Proposal – Gilles Creek West Airport, Alaska. 03AAL -160NRA	11/07/2003	N/A
Federal Air Aviation	76AK	Pogo Airstrip approval	12/29/2004	N/A
STATE				
DEC – Division of Water, Wastewater Discharge Program	AK-005334-1	ADEC 401 Certification of NPDES Permit AK-005334-1	03/12/2004	03/11/2009
DNR	ADL 416949	Pogo Mine Project Millsite Lease Final Decision to Issue Millsite Lease	12/18/2003	Until completion of all requirements under and pursuant to the Plan of Operations approved by the Division for lands within the Millsite Area
DNR – Division of Mining, Land and Water	F20039500	Pogo Gold Mine Project - Plan of Operations Approval	01/18/2004	01/18/2009
DNR – Division of Land	LAS 24541	Land Use Permit	01/02/2004	01/01/2009
DNR – Division of Land	92-0173618	FCC Radio License	11/01/2003	10/2013
DNR – Division of Mining, land, water, Dam Safety and Construction Unit	NID ak00304	Certificate of Approval to Construct a Dam (Pogo RTP Dam)	10/07/2004	When dam is completed
DNR – Division of Land	ADLs 416809 (Private exclusive right-of-way) and 417066 (public right-of-way)	Land Use Permit - For Construction and Use of the Pogo Mine Access Road	12/18/2003	For 15 years
Alaska Pipeline Service Company		Letter of Non-Objection (Access to/across these Trans Alaska Pipeline System facilities: Access Road 49 APL-2 and Pipeline Workpad, Mileposts 517.2 to 520.7. Pipeline and Workpad at Pipeline Milepost 517.24/ In the Vicinity of Station 27310÷48)	01/23/2004	N/A

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	TERM/ EXPIRATION
Alaska Pipeline Service Company		Letter of Non-Objection (Access to/across these Trans Alaska Pipeline System facilities: Pipeline and Workpad at Pipeline Milepost 517.24/ In the Vicinity of Station 27310÷48)	11/27/2002	N/A
DNR – Division of Mining, land, and water.	LAS 24611, LAS 2461; LAS 24615. 24616 and 24617	Permit to Appropriate Water	04/23/2004	04/22/2024
DNR – Division of Mining, land, and water.	92-0173618	Material Sale Contract	02/18/2004	02/17/2014
DNR – Division of Mining, land, and water.	ADL 416953	Lease agreement	02/18/2004	02/17/2019
DEC - Wastewater Discharge Program	Permit 0131-BA002	Waste Disposal Permit 0131-BA002 (Attachment: Solid Waste Monitoring Plan)	12/18/2003	12/18/2008
DEC - Division of Water Wastewater Discharge Program	Permit 0131-BA002	Extension of QAPP submittal deadline in waste Disposal Permit 0131-BA002	03/15/2004	90 days more of the 60 days required after the NPDES permit approval
DEC – Division of Air and water quality – Non-point source water pollution control	Q-1996-0211	Certificate of Reasonable Assurance (Placement of fill into 306 acres of wetlands in the development of the Pogo Mine facilities.	12/04/2003	N/A
DEC - Division of Water Wastewater Discharge Program	File Number 121.45.005 and 121.07.001	Teck-Pogo Main Mine Site Wastewater Treatment Facility – Final Approval to Operate	12/16/2004	Upon Closure and Abandonment of the Water Treatment Plant
DEC	Permit AQ0406MSS03	Air Quality Control Minor Permit	12/13/2006	N/A
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0340	Domestic Wastewater Discharge Structure, operation, Maintenance, and Removal; Section 34, T5S, R14E, FM; Goodpaster River (Stream N 334-40-11000-2490-3407)	12/18/2003	Upon Closure and Abandonment of the Domestic Wastewater Discharge structure
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0331	Bridge Installation, Maintenance, and Removal; Section 27, T5S, R14E, FM; Goodpaster River, (Stream No 334-40-11000-2490-3407)	12/18/2003	Upon Closure and Abandonment of the Pogo Mine Project
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0334	Keystone Creek Bridge Installation, Maintenance, and Removal; Pogo Project; Section 12, T5S, R8E, FM	12/18/2003	Upon Closure and Abandonment of the Pogo Project
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0335	Shaw Creek Bridge Installation, Maintenance, and Removal; Pogo Project; Section 3, T6S, R12E, FM	12/18/2003	Upon Closure and Abandonment of the Pogo Project

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	TERM/ EXPIRATION
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0333	Caribou Creek Bridge Installation, Maintenance, and Removal; Pogo Project; Section 11, T7S, R9E, FM	12/18/2003	Upon Closure and Abandonment of the Pogo Project
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0336	Wolverine Creek Diversion, Pogo project, Section 34, T5S, R14E, FM., Stream N 334-40-11000-2490-3407-4169	12/18/2003	Upon Closure and Abandonment of the Pogo Project
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0337	Stream Channel Filling, Pogo Ridge; Section 27, T5S, R14E, FM., Goodpaster River, (Stream No 334-400-11000-2490-3407)	12/18/2003	Upon Closure and Abandonment of the Pogo Project
DNR - Office of Habitat Management	Fish Habitat Permit FH03-III-0339	Off-River Treatment Works Installation, Operation, Maintenance, and Removal; Sections 14 & 23, T5S, R14E, FM, (Stream No 334-400-11000-2490-3407)	12/18/2003	Upon Closure and Abandonment of the Off-River Treatment Works
DNR	Burning Permit #A 1507	Burning Permit	04/01/2008	08/31/2008
DNR - Division of Mining, Land and Water	ADL 416809 & ADL 417066	Right-of-Way for the Pogo Project Road Final Decision.	12/18/2003	15 years from time the final right-of-way permit is issued
DNR - Division of Mining, Land and Water	ADL 416817	Pogo Mine Project Powerline Right-of-way ADL 416817 Final Decision	12/18/2003	15 years from time the final right-of-way permit is issued
DEC – Drinking Water Program		Pogo Mine Potable Water System Approval To Operate for PWSID 372643 (Temporary camp water treatment system) & PWSID 372685 (Permanent camp water treatment system).	4/23/04	1/31/2007

Note: N/A = Not Applicable

The main regulatory drivers for the project are:

- Plan of Operations Approval for the Pogo Mine Project (Issued 12/18/2003)(F20039500);
- Pogo Mine Project Final Decision to Issue Millsite Lease (Issued 12/18/2003)(ADL 416949);
- Pogo Project Road, Rights-of-way (Issued 12/18/ 2003)(ADL 416809, ADL 417066);
- Certificate of Approval to Operate a Dam for Pogo RTP Dam (NID ID# AK00304);
- Quality Assurance Project Plan (QAPP);

- Alaska Department of Environmental Conservation Waste Disposal Permit (0131-BA002 dated December 18, 2003)(includes the Solid Waste Monitoring Plan);
- National Pollutant Discharge Elimination System (NPDES) Water Discharge Permit (AK-005334-1);
- Spill, Prevention, Control, and Countermeasure (SPCC) Plan;
- Stormwater Pollution Prevention Plan (SWPPP);
- 404 Permit; and
- DEC Air Quality Control Minor Permit (AQ0406MSS03 dated December 13, 2006).

Pogo maintains a filing system for all environmental studies and reports, permits and compliance information, and agency correspondences related to the project. The system has a systematic index to the files, which was provided to Golder prior to the audit to facilitate record auditing on site. In addition, Pogo provided key permits and environmental plans prior to the field audit.

The implementation of each document terms was checked during the field audit and found to be in compliance in general.

3.1.1 Potable Water Supply

Pogo is not in compliance with one of its permits, the certificate to operate the two existing potable water treatment systems (PWS 372685 and PWS 372643). This certificate has expired in January 2008 and needs to be renewed.

Wells PWS 372685 and PWS 372643 are located at the Permanent Camp and Construction Camp, respectively. Pogo has installed a new bag filtration system and chemical feed equipment for corrosion control in both water treatment systems. Pogo has received interim approval by the DEC Drinking Water Program to operate these two treatment systems. However, to get final approval to operate the potable water treatment systems, Pogo needs to submit to DEC additional data to show that the corrosion control systems and the new filters are working properly. Verification of the status of the permit renewal process was through interview with Johnny Mendez, the person responsible for permit renewal at the DEC Division of Environmental Health.

Pogo has developed its own system called Master Task Master (MTM) to maintain Pogo's records and schedules for permits and is in the process of implementing an Environmental Management System. The MTM system was developed in Excel and tracks the different tasks (such as inspections,

and monitoring and reporting-related tasks) that need to be performed daily, weekly, monthly or annually to meet all the federal and state permit requirements. Pogo's Senior Environmental Coordinator produces monthly calendars that include the date and the person responsible for completing the tasks. Those calendars are sent to the Environmental Personnel, who send the calendars back to the Senior Environmental Coordinator weekly to report when the tasks are completed. The Senior Environmental Coordinator keeps track of the accomplishment of the tasks. The Senior Environmental Coordinator also conducts random inspections to the mine facilities to verify if the tasks were completed according to the schedule.

The Senior Environmental Coordinator reviews and updates the MTM system as necessary to reflect current activities and operations at the mine and incorporate any modifications to the permit and authorization requirements.

3.1.2 Dry Stack Tailings Facility

The dry stack tailings facility was evaluated from a geotechnical engineering and geochemical perspective.

Geotechnical

According to Section 1.5.9.4 of the Solid Waste Permit (SWP), Pogo will "…conduct inspections of the tailings dry stack disposal facility and the RTP in conformance with the Operation and Maintenance Manual approved by DNR, Division of Mining, Land and Water, Dam Safety and Construction Unit." Pogo has developed an Operations, Maintenance and Surveillance (OMS) Manual, dated January 2006, for the dry stack tailings facility. The dry stack tailings facility is not regulated as a dam under AS 46.17. However, the Alaska Sam Safety and Construction Unit provided technical support to the Department of Natural Resources Division of Mining, Land & Water Appraisal Unit and technical review for the design of the Pogo dry stack tailings.

The information cited in the Solid Waste Monitoring Plan provided by Pogo that is attached to the SWP is very similar to what is described in the OMS Manual. Pogo appears to be complying with both of these documents regarding the tailings dry stack disposal facility except for the following discrepancies:

- The annual reviews of the OMS Manual do not appear to have been performed as updates to site personnel, figures, tables, operations, and surveillance have not been addressed.

- Instead of using compacted dry tailings to construct the shell, the shell is being constructed with non-mineralized (green) development rock that is being placed in 3-ft loose lifts and compacted with at least four to six passes with a 10-ton vibrating roller compactor (Photo 1). The width of this shell appears to be about the same as the rockfill toe berm in the design drawings. We understand the reasoning for this change is due to inconsistency in the milled tailings. Future plans are to use compacted tailings for the shell when the green development rock volume diminishes. There has been no formal approval from the DNR for this change.

- Instead of minimum two feet, in recent months only one foot of dry stack tailings are generally being placed and compacted over the mineralized (red) development rock that is being encapsulated (Photo 2).

- Monitoring of physical parameters of tailings material during start-up and normal operations, such as grain size distribution, Atterberg limits, standard proctor, triaxial testing, and moisture-retention testing are not being performed. We understand the reasoning for this is due to the inconsistency of the milled tailings and that compacted tailings are not being used for the shell.

- The annual Facility Safety Inspections (FSI) has not been performed.

Geochemical

The drystack was visited and an inspection of visible signs for sulfide oxidation and/or acid generation was conducted. Such signs include discoloration (e.g., reddish staining) and the presence of efflorescence and other surficial precipitates. No visible signs of sulfide oxidation and/or acid generation were observed.

Drystack construction is being conducted in a manner that is different from the one specified in the OMS Manual. Instead of placing 2-foot lifts of compacted tailings over relatively thin layers of development rock, 1-foot layers of tailings are placed over thicker rock layers (Photo 2).

An acid-base balance was developed for a number of layering scenarios using available acid base accounting (ABA) data for the composite samples of tailings and development rock that have been collected quarterly since the 3rd quarter of 2006. An average acid-base composition was calculated for both tailings and development rock, and these average values were used to determine how the overall acid-base balance changes as a function of the relative thickness of the tailings layer vs. the underlying rock layer. These balances were calculated in 10% increments, i.e., from a 90%-10% tailings/development rock mixture to a 10%-90% tailings/rock mixture. In accordance with the threshold established between mineralized and non-mineralized development rock, a sulfur content of 0.5% was used to distinguish between potentially acid generating and non acid generating mixtures of tailings and development rock.

The results of this evaluation demonstrate that no tailings/rock mixture exceeds the 0.5% sulfur. This is because, on average, mineralized development rock has contained 0.33% sulfur over the period of monitoring based on analysis of the quarterly composite samples. The average sulfur content of the tailings over this period has been 0.19%. Only one of the composite rock samples (1st quarter 2007) has slightly exceeded the sulfur threshold at 0.54% sulfur. This implies that, for all practical purposes, based on the sulfur content of the composite samples, the development rock placed on the drystack has consisted of non-mineralized material which, in turn, suggests that the thickness of an overlying tailings layer is not important from an acid generation perspective. With regard to the other criterion for identifying mineralized development rock (i.e. Arsenic > 600 mg/L), several composite development rock samples have exceeded that value. However, the tailings themselves over the period of record have contained an average arsenic concentration of approximately 1,490 mg/L. Therefore, although the tailings may limit arsenic mobility from mineralized development rock by acting as an infiltration barrier, the tailings themselves constitute a potential arsenic source as well.

In conclusion, deviations from the layering design specified in the OMS Manual are acceptable from an acid generation perspective. The design function of the tailings layers to prevent sulfide oxidation and acid generation appears to be of limited importance given the overall non-mineralized nature of the development rock placed on the drystack. No information was identified on the effectiveness of the tailings layers as a barrier to infiltration and prevention of transport of any leachable components from the development rock. Such an evaluation does not appear to have been conducted.

3.1.3 Shaw Creek All-Season Access Road

The construction and maintenance of the Shaw Creek All-Season Access Road (access road) is permitted under permits (ADL 416809 and ADL 417066). The rights-of-way are located on state lands primarily within the Tanana Basin Area Plan's Subregion 7. The road is 49.5 miles long and a maximum of 24-feet wide, narrowing to 16 feet wide in places. There are 5 single lane bridges. All major river crossing were examined during the audit. The first half of the road (from Shaw Creek Road to Gilles Creek) is a restricted access to mine-related traffic, government use, and commercial timber harvesting use, during mine life. This portion of the road will not be reclaimed after mine life but will be open to general public use. The second portion of the road (from the west side of Gilles Creek to the Goodpaster River) is a private exclusive right-of-way to Pogo and will be reclaimed after the mine's life.

Pogo uses best management practices (BMPs) to minimize sediment from entering the waterbodies. The DNR conducted an inspection in May 2008 and identified that several of the bridges' mud sills required cleaning or repairs. Road maintenance is conducted by Pogo's maintenance department.

They conduct routine repairs to maintain the integrity of the road. They are currently developing a road maintenance program that will address culverts, brush berms, and other road repairs for the Shaw Creek access road.

The permit states that Pogo must have operational plans for shipping and spill containment that must be approved by the state. Golder reviewed Pogo's Emergency Response Plan. The plan did not detail response and remediation measures for spills of hazardous materials such as ammonium nitrate, process reagents (i.e. sodium cyanide, copper sulfate, nitric acid) or other hydrocarbons. Contact notification in the plan needs to be updated. Based on an interview with the environmental coordinator we understand that the individual transporter of the material must have a contingency plan and emergency response. The contingency plan for the fuel transporter (Alaska West Express, Inc.) was reviewed. It contains emergency contact information for Pogo. The plan does not detail a response along the access road but is for a fuel storage facility in Fairbanks. Site-specific response plans directly related to the access road should be developed for all transporters. The plans should also include a map of the road and the major markers and river crossings.

Pogo has developed a traffic communication procedure for vehicles using the road. Every vehicle must check in at the guard shack located close to the road egress with the Richardson Highway. Radio communication with the guard shack of vehicle locations coordinates traffic to minimize congestion at the single lane bridge crossing.

The burn permit requires Pogo to check fire danger levels and request approval to burn from the Delta Area Forestry office prior to conducting a burn. Records are maintained on site to document the contact with the forester and approval to burn.

3.1.4 Spill Prevention Control and Countermeasure (SPCC) Plan

Based on our review of the current spill prevention control and countermeasure (SPCC) plan, the monthly inspection documents, and an inspection of the aboveground tanks (ASTs), we find the following issues:

- Some 55-gallon drums that contained oil or oily water did not have secondary containment. These drums were located at the warehouse lube oil area, in the shop, near the 1875 fuel island, and near AST-1 (Photo 3).

- Some double-walled or double-bottom tanks did not have the necessary overfill prevention measures, including both an overfill alarm and an automatic flow restrictor or flow shut-off, required for equivalent secondary containment as identified in the Environmental Protection Agency (EPA) Memorandum

OSWER 9360.8-38. These tanks included AST-14, AST-33, AST-34, AST-49, and AST-50 that were not equipped with an overfill alarm nor an automatic shut-off valve or flow restrictor; and, AST-31 that did not appear to have an overfill alarm. Pogo is in the process of installing overfill protection on these tanks. They estimate the work to be completed by August 31, 2009.

- The lined tertiary containment of AST-2 appeared damaged with rips and tears on the east side; therefore, this tertiary containment capacity appears to be compromised.

- The interstices (secondary containment) of double-walled and double-bottom aboveground tanks are to be monitored for water and fuel as part of the monthly inspections. Although the person at the facility who does the monthly inspection for Teck-Pogo was not there to interview, based on a review of the aboveground tanks and the inspection records it appears that this is not occurring. Some of the double-walled or double-bottom tanks either did not appear to have a port to monitor the interstice or the port did not look like it has ever been opened (Photo 4).

- Several tanks have liquid level sensing gauges, but it does not appear that they are being regularly tested for proper operation, as required by Section 112.8(c)(8)(v) of 40 CFR 112. This type of testing generally involves sticking the tank to determine the capacity and checking that value with the values shown on the visual gauge.

- Section 8 of the SPCC Plan describes that when oil sheen is observed in a containment area the sheen will be removed by placing oil absorbent pads in the water until the sheen is no longer present, then the water is manually pumped out of the containment. Based on discussions with personnel and observations, water with oil sheen is being pumped into 55-gallon drums and is then cleaned through an oil/water separator or scrubber.

3.1.5 Toxic Release Inventory (TRI) Program

The Pogo Mine has developed a tracking system for TRI chemicals that it uses, develops, or exposes through the mining and milling process. These chemicals are tracked and monitored to determine if the quantities released to the environment (placed in the drystack tailing pile, discharged in water effluent [in compliance with permit conditions], or emitted in incinerator emissions, etc.) meet the reporting threshold. Samples are taken at strategic points and analyzed for concentrations. The measured concentrations along with the measured weights of process materials or waste materials are entered into Excel® spreadsheets and the weights of the TRI chemicals are calculated. The accumulated volumes of TRI chemicals are calculated and compared to the reporting threshold. Chemicals exceeding the reporting threshold are reported in the Annual Reports.

Historical Reporting

It was determined during the audit that the Pogo operation uses the EPA software called TRI Made Easy (TRI-ME) to prepare the Annual Reports and submit them electronically over the Internet to the EPA. It was reported that the 2006 Annual Report was submitted on time.

2007 Report

The review of the TRI program focused around the work that was in progress for the development of the 2007 Annual Report. The company provided the spreadsheet accounting program to the auditors and described the process for generating the data and information for the Annual Report.

TRI Summary

The review of the Pogo TRI Reporting program indicated that it was well developed and that it was in compliance with the regulations.

3.1.6 Best Management Practices

Pogo has developed a BMP Plan according to the EPA Guidance Manual for Developing Best Management Practices (EPA 833-B-93004, October 1993). This plan has been approved by the EPA and DEC. The BMP Plan includes a statement of BMP policy, structure and procedures of the BMP committee, description of potential pollutants, a risk assessment, standard operating procedures (SOPs) to achieve described BMPs and procedures for reporting BMP's incidents.

Golder verified, as part of the SWPPP compliance, the on-site implementation and appropriate use of the BMPs described in the BMP plan. A discussion describing the audit findings related to the BMPs is included in the SWPPP compliance section.

The plan is annually reviewed by Pogo's BMP committee. Compliance with this item was through review of the January 14, 2008 BMP Plan Certification prepared by Pogo and submitted to the EPA and DEC, stating that the 2007 plan was reviewed according to the NPDES requirements.

3.1.7 Air Quality Control Minor Permit

Permit Requirements

Pogo is permitted under the Air Quality Control Rules within the purview of DEC's Air Permits Program. The Program's Compliance Assurance Group has oversight for all reports.

Pogo operates under an Air Quality Control Minor Permit (No. AQ0406MSS03) issued by the Alaska Department of Environmental Conservation dated December 13, 2006. This permit is a replacement to the original operating Air Quality Control Minor Permit AQ0406MSS02 and was requested by Pogo because of emission unit changes. Pogo is not classified as a Prevention of Significant Deterioration (PSD) project because the applicable emissions for each pollutant (NO_x, CO, PM-10, VOC and SO_2) are less than 250 tpy (18 AAC 50.300 (c)(1)). Pogo is subject to fuel limits to protect both the ambient air quality standards and increments during operation. As restricted by Pogo's requested fuel limits, the emission limit for the project during operations is 140 tpy of NO_x, 86 tpy of CO, 50 tpy of PM-10, 43 tpy of VOCs, and 10 tpy of SO_2. The project is not located in an Alaska coastal zone, so the project is not subject to consistency review with the Alaska Coastal Management Program. Pogo has no New Source Performance Standards (NSPS) requirements for a continuous monitoring system.

Emission Units

The project includes diesel-fired generators, diesel-, propane-, and used oil-fired heaters, ore-concentrate handling equipment such as crushers, screen, and conveyors, and other miscellaneous equipment. The emission unit inventory also includes fugitive emission sources, non-road engines, and mobile sources.

The above ground portions of the mine are subject to NSPS requirements of Subpart LL for metallic mineral processing plants. The underground portions of the project are exempt from the provision of Subpart LL, under 40 C.F.R. 60.380(a). The following facilities are affected facilities under Subpart LL:

- Material Transfer – Conveyor to surface coarse ore bin;
- Surface coarse ore bin;
- Material transfer – Conveyor to Semi-autogenous grinding (SAG) mill;

- Gravity feed screens (two);
- Trash screens;
- Safety screens;
- Baghouse - associated with the cement screw conveyor;
- Scrubber – exhaust to the gold smelting furnace;
- Scrubber – exhaust from the carbon regeneration kiln;
- Scrubbers (two) – assay laboratory fume hoods; and
- Above ground storage tanks.

Only these affected facilities are subject to an emission standard.

Materials Reviewed

Golder reviewed the permit requirements and compared them to operating practices. We reviewed the following:

- Emission unit inventory table;
- Operating Reports from Pogo to the DEC;
- Pertinent electronic and hard files;
- Fuel receipts, monthly fuel usage, vendor receipts (to verify sulfur content, fuel grade and amount), used oil sulfur content analyzes;
- Inspection reports by the DEC;
- Correspondence between Pogo and the DEC; and
- Visible emission tests results.

Golder interviewed Pogo's environmental coordinator in charge of organizing the reporting files, inventory tracking and reporting requirements. Pogo is subject to fuel limits to protect both the ambient air quality standards and increments during operation. The fuel burning equipment has

restrictions on fuel consumption, fuel sulfur content (not to exceed 0.5 % by weight), hours of operation; and has specific record keeping, testing and reporting requirements.

Pogo uses several types of fuel: distillate, propane, liquid petroleum gas (LPG), and solid waste. The emission unit inventory table consist of an emission unit identification number, unit type, make and model number, location/other description, fuel, maximum capacity, and installation date. Pogo has developed a monitoring system that allows monthly tracking of fuel and 12 month rolling totals for each required emission unit. By the 15th of each month, the environmental department calculates and records the monthly fuel consumption in gallons from the previous month and adds to the total for the previous 11 months to obtain the 12 month rolling total. Pogo is to report an excess emission if the fuel consumption calculated exceeds the limit in the permit.

Golder verified the emission units listed in the permit (Section 6) that have restricted fuel use with a sulfur content less than 0.5 percent by weight are in compliance. Pogo shows compliance with the state sulfur standard for distillate fuel burning equipment by keeping records of the fuel grade and the amounts. Pogo maintains amounts of each fuel combusted during each day for the mine air heaters that use LPG fuel.

Pogo completed the permit general requirements (Section 2 of the permit), an operational emission unit inventory and visible emission testing.

Reporting Requirements

During the life of the permit, Pogo is required to send the DEC an operating report by August 1 for the period January 1 to June 30 of the current year and by February 1 for the period July 1 to December 31 of the previous year. As required by the permit, the reports are certified by a Pogo responsible official, Teck Cominco Alaska's Director of Corporate. The semi-annual facility operating reports for the second half of 2006, first half of 2007, and the second half of 2008 were reviewed to confirm that Pogo complies with this permit requirement.

The reports include monthly fuel consumptions, non-road engine, LPG certification, used oil sulphur content, fuel grades, any reporting issues, excess emission/permit deviations, NSPS notices submitted to EPA and other notices submitted during reporting period. Pogo completed Visible Emissions Field Data Sheets for a heater and two generators. The sheets were included in a semiannual report to the DEC. This was only required once by the DEC.

Notification of Permit Deviation

In October 2006 Pogo had a fire that destroyed the main electrical control room and switchgear. Electrical service from the GVEA grid was interrupted and operations at the mine were halted. Generators which were expected to be used as standby power during rare and relatively short durations GVEA outages were needed to provide continuous emergency power to the mine site for underground ventilation, heat, lights and potable water and waste water treatment. Systems were repaired and the mine was switched back to grid power in December 2006. As a result of the extended outage, the 12-month rolling total fuel limit of the permit was exceeded. Pogo notified that DEC at the time of the problem and in each semiannual report and reason for the exceedances.

Pogo notified the DEC on January 31, 2008 of an excess emission related to a generator maintenance check.

DEC Inspection Summary

The DEC conducted an evaluation of Pogo from the period January 1, 2005 through March 1, 2007 The evaluation included an inspection of the mine, interviews with the Pogo representatives, and a review of the files and records. The DEC sent Pogo a report dated March 28, 2007 and identified eight compliance issues. Pogo completed corrective action to respond to each of these issues and sent a letter to the DEC dated July 30, 2007 explaining their corrective actions. Golder verified that Pogo implemented these changes.

Pogo uses the emission strategy to track the NOx emissions for fuel burning equipment by monitoring fuel and using emission unit specific emission factor to track NOx emissions. Pogo is required to track NOx emissions for the fuel-burning equipment by tracking fuel consumption and using a source-specific emission factor to track NOx emissions.

The DEC expanded the standard condition for Reasonable Precautions to Prevent Fugitive Dust and added specific fugitive dust requirements to include a baghouse requirement. Pogo is required to monitor the pressure drop once a day to determine if the baghouses are operating properly. Daily inspection forms were reviewed. The reports include the emission unit number, location, free of dust emissions, differential pressure (in/H_2O), damaged bags/filters, comments number of running hours, alarm and running hours and monthly totals of running. The emission units that are inspected include baghouses at the surface apron feeder, the surface coarse ore bin apron feeder the backfill cement silo (Paste Plant), the course ore bin (Conveyor to surface coarse ore bin /Above Ground Bag House), the cement screw conveyor, the lab assay lab sample prep and the fire assay lab. If the differential

pressure is out of the range recommended by the manufacturer then Pogo repairs the problem and records the work on the form.

Assessable Emission Fees

Pogo submits payment to the DEC for their annual emissions based on the facility's assessable emissions of 444 tpy as stated in Section 5 of the permit.

3.1.8 National Pollutant Discharge Elimination System (NPDES) Water Discharge Permit (AK-005334-1)

Surface water and effluent monitoring programs were evaluated according to the requirements described in the NPDES Permit (AK-005334-1). The audit team reviewed the environmental management and monitoring plans, the monitoring data, the QAPP, and the MTM system; and interviewed the Pogo Environmental Coordinator, Stacy Staley, and the DEC Permit Writer, Tim Pilon, during the site audit. Surface water and effluent monitoring programs are in compliance with the NPDES and waste disposal permit requirements. The Off-River-Treatment Works is functioning as permitted. Section 3.9.5 describes the surface water monitoring program in detail.

3.1.9 Storm Water Management

The Pogo Mine controls and manages storm water under an EPA Multi-Sector General Permit for Industrial Activities (for Alaska-Permit #ADR05). In accordance with the permit requirements, the Pogo Mine prepared a SWPPP and filed a Notification of Intent (NOI) on October 25, 2005. The review of the Pogo Storm Water Management program indicated that it was well developed and that it was in compliance with the regulations.

Included with the main features of the Pogo Mine are the storm water control features. This includes the by-pass diversion ditches around the dry stack tailings, the Recycle Tailing Pond, the Main Storm Water Pond between Road No. 1 and Road No. 5 near the 1690 Portal, berms on the outside of all haul roads, collection ditches on haul roads that drain to sedimentation basins, grading of laydown areas and pads away from surface drainage courses, and the employment of BMPs.

One of the main features of the storm water program is that non-contact storm water is diverted around the drystack tailings disposal area by the two diversion ditches constructed along mountain side above the dry stack area. Storm water that contacts and runs off the drystack tailings accumulates in the RTP. Storm water from the mill/camp/truck-shop and the upper haul roads is

diverted to the Main Storm Water Pond. Flows that accumulate in the Main Storm Water Pond are pumped back to the RTP were it is used by the mill as make-up water.

The SWPPP calls for quarterly visual examination of the storm water discharge associated with the mining activity. Inspections reports are attached to the SWPPP and have been conducted on a quarterly basis as weather has allowed. That is, storm water discharges are not expected or realized during periods of extended cold weather. Consequently, the inspection records show that the inspections have been conducted four times per year but have been done in the April to October time frame. This is considered appropriate for the site conditions.

Visual inspection during the site investigation of the storm water controls and systems was conducted. It was determined that all of the storm water systems were working properly and in accordance with the plan. It was observed that there was some accumulation of sediment in some of the drainage ditches and in the sedimentation basin located in Material Site A (Photos 5 and 6). Although these accumulations do not represent a problem, near term maintenance should include removal of this material to keep these facilities functional.

The storm water discharge point, SW21B, was inspected and there was no discharge at the time of the audit. The up-gradient settling ponds had some standing water but there was no evidence of sediment accumulation. The banks of the settling ponds were covered with natural vegetation and some vegetation was growing in the channels, which serve to slow run-off and minimize the movement of sediment (Photo 7).

There are additional smaller sediment ponds upgradient from the sediment pond discharging to SW21B and these ponds did have accumulations of sediment. There was evidence that sediment had been removed from one of these smaller ponds. However, the material had been stacked adjacent to the pond where it could easily be washed back into the pond and storm water collection system (Photo 8).

Liese Creek was inspected at the bridge on Road No.7. There was no evidence of sediment in the stream channel suggesting that the upstream storm water controls are effectively controlling storm water runoff.

3.1.10 Waste Disposal Permit (0131-BA002)

The Waste Disposal Permit was reviewed and the following deficiencies were noted:

Secondary Containment

Section 1.3, sub-section 1.3.2, of the Waste Disposal Permit states that the *permittee must provide and maintain secondary containment for all process piping and chemical mix tanks containing hazardous or toxic materials. Secondary containment is considered to be 110% of the largest tank within one containment, or the total volume of manifolded tanks.* The CIP storage tank located outside of the paste plant and the overhead process delivery lines from the mill to the paste plant do not provide adequate secondary containment (Photos 9 and 10). The CIP storage tank contains tailings that has been through the cyanide destruct circuit and contains up to 20 mg/L WAD cyanide. These tailings are then conveyed to the paste plant for blending with filter press flotation tailings and/or cement. Based on our review and of accepted industry practices this material would be considered a process material and subject to the secondary containment requirements until the blending step is complete. The blending step within the paste development process reduces the cyanide content of the tailings. Pogo maintains that this material is exempt from the secondary containment requirements because it is a non-hazardous waste material. Our review indicates that until the tailings has undergone the blending with filter press flotation tailings and/or cement that it is still a process material..

Reporting

Section 1.6 of the Waste Disposal Permit states that *An annual meeting with the Department will be held in conjunction with ADNR in which the annual report will be presented to the agencies and the public.* Pogo reports that they have these meetings. Copies of the sign-in sheets for 2006 and 2007 meetings were provided.

3.2 Task 2 – Compliance with Internal Environmental Policies, Plans, and Procedures

Golder reviewed Pogo's internal environmental plans (listed in Table 2) and determined that Pogo is in compliance with those plans. Golder interviewed Pogo operations personnel on the mining and process operations, permit and regulatory requirements, chemical containment structures and storage procedures, monitoring and environmental controls and procedures, data collection, reclamation and closure procedures, and environmental reporting. The audit team systematically addressed the adequacy of the environmental plans, whether the plans are being followed, and documented the performance of the environmental programs during the field audit. A tour of the mine facilities revealed that the site-specific environmental systems are in place and being followed.

TABLE 2

POGO MINE - LIST OF SPECIALIZED ENVIRONMENTAL PLANS

Plan	Description	Plan Location	Expiration/Renewal
Emergence Response Plan	Covers Pogo Mine operations and access road.	Pogo Mine Offices	Life of mine.
Spill Prevention, Control and Countermeasure Plan (SPCC)	Includes storage of oil and oil products, spill response procedures and reporting procedures – November 2007.	Pogo Mine Offices	Review at least once every five years. Expiration November 2012.
Storm Water Pollution Prevention Plan (SWPPP)	Requirements to meet conditions of the EPA Multi-Sector General Permit for Alaska - October 25, 2005.	Pogo Mine Offices	Review annually by June 15 of each year.
Best Management Practices (BMP) Plan	Identifies and characterizes potential water pollution sources and describes pollution minimization opportunities and BMPs for water pollution prevention - December 28, 2006.	Pogo Mine Offices	Review annually.
Quality Assurance Project Plan	Describes management of monitoring programs, including effluent, surface and groundwater, and biological monitoring; toxicity testing; backfill tailings monitoring; rock segregation; facility inspection; flotation tailings interstitial water, drystack geochemistry, geotechnical program; wildlife; Quality Assurance/Quality Control (QA/QC) procedures; monitoring schedules and reporting - April 14, 2006.	Pogo Mine Offices	Periodic review and amendment as required.
Solid Waste Management Plan	Monitoring plan that meets the requirements of the solid waste regulations 18 AAC 60.800-860 and the Waste Disposal Permit 0131-BA002 - December 18, 2003.	Pogo Mine Offices	Periodic review and amendment as required.
Reclamation and Closure Plan Update	Plans for potential temporary closure and concurrent and final reclamation - October 2003.	Pogo Mine Offices	Every 5 years according to the Waste Disposal Permit 0131-BA002 Financial assurance needs to be updated annually.

3.3 Task 3 – Reliability and Integrity of Information Relating to Environmental Reporting and Compliance

Direct field observations were completed to determine the reliability of reported information and to verify additional information provided through interviews with key mine personnel. Site observations focused on the environmental controls, reclamation activities, and monitoring systems.

Mine operations and facilities that were inspected included the following:

- Milling and beneficiation facilities;

- Processing and surface maintenance operations;
- Paste backfill plant;
- Non-mineralized rock stockpile;
- Mineralized rock storage area;
- Temporary rock storage areas;
- Drystack tailings facility;
- Recycle tailings pond (RTP) and dam;
- Fuel and materials storage facilities;
- Water supply wells;
- Sewage treatment plant (STP);
- Water treatment plant (WTP);
- Off-river treatment works (ORTW);
- Two potable water treatment plants;
- Seepage collection wells;
- Underground workings;
- Shaw Creek Hillside all-season road;
- Monitoring facilities; and
- File system.

The reliability and integrity of information for reporting and compliance is adequate. Pogo has an environmental management plan that includes protocols for reporting, data QA/QC, instrument calibration, spreadsheets for monitoring and waste management tracking and monitoring requirements in place. The staff is well organized, knowledgeable, and well-trained on environmental management for mines. The Senior Environmental Coordinator has regular discussions and planning meetings with the plant and maintenance supervisors.

3.4 Task 4 - Adequacy of State Oversight to Protect State Resources

In order to determine the adequacy of state oversight to protect state resources Golder interviewed staff from the following agencies:

- DNR, Anchorage;
- DNR, Fairbanks;
- DEC, Fairbanks;
- COE;
- U.S. Fish and Wildlife Service; and
- Alaska Department of Fish and Game.

A complete list of individuals and the agencies they represent is presented below. All personnel, except Mr. Victor Ross, were personally interviewed. They were interviewed via the telephone.

- Steve McGroarty, Fairbanks, DNR, Division of Mining, Land and Water Management;
- Jack Winters, Fairbanks, DNR, Office of Habitat Management and Permitting;
- Johnny Mendez, Fairbanks, DEC, Division of Environmental Health;
- Tim Pilon, Fairbanks, DEC, Division of Water;
- Charles Cobb, Anchorage, DNR, Dam Safety;
- Victor Ross, Anchorage, COE; and
- Don Rice, Anchorage, COE.

Summaries of the agency interviews are provided as Appendix A.

Golder reviewed inspections reports from the DNR. The reports include one for years 2002, 2003 and 2004 and two for years 2005, 2006, and 2007. The most recent inspection and report was for May 2008. The reports summarize their inspection tour, any finding/observations and photographs. The inspections have included staff from the DNR and other agencies. Inspections included

construction activities, the general mine site and access road. The complete titles of each report are included in Section 5.0 References.

The regulatory agencies for this project appear knowledgeable and have sufficient understanding of mining practices, environmental mitigation measures and the state and federal regulations.

3.5 Task 5 – Condition of Chemical Containment Structures

Section 1.3, sub-section 1.3.2, of the Waste Disposal Permit states that *the permittee must provide and maintain secondary containment for all process piping and chemical mix tanks containing hazardous or toxic materials. Secondary containment is considered to be 110% of the largest tank within one containment, or the total volume of manifolded tanks.* The CIP storage tank located outside of the paste plant and the overhead process delivery lines from the mill to the paste plant do not have adequate secondary containment (Photos 9 and 10).

Detoxified cyanide solution and material from the cyanide destruct circuit is delivered from the mill to the storage tank via the overhead pipeline. The detoxified solution still can contain up to 20 mg/L WAD cyanide. Pogo's rationale for not having secondary containment for the delivery pipeline and the storage tank is that they are Bevill Amendment exempt. Golder does not agree with this and considers the detoxified solution and materials to still be a process solution that is "stored" in a tank and is not "disposed of" as a solid waste material at that point in the circuit. Golder recommends secondary containment of the delivery pipeline and the storage tank.

Golder reviewed an as-built drawing that confirmed adequate secondary containment for the cyanide leach tanks in the CIP circuit.

3.6 Task 6 – Laboratories and Sample Analysis Procedures

3.6.1 On-Site Laboratory

Adequacy of Equipment for Intended Tasks

The analytical program associated with the development rock management involves determination of arsenic (As), sulfur (S) and iron (Fe) content of sludge (cuttings) samples generated by blasthole drilling, or muck samples if sludge is not available. The analysis is conducted by wavelength dispersive x-ray fluorescence (XRF), which is an appropriate tool for this purpose. The XRF equipment is a Rigaku ZSX Mini II. The turnaround time is 6 hours. It should be noted that

Appendix VIII of the QAPP specifies analysis of lead instead of iron. Discussions with Pogo indicated that the reference to lead is considered in error and that iron should be the parameter reported.

Sample Custody and Management

The samples are delivered on an ongoing basis to the laboratory and are logged according to date and time of arrival as well as a unique sample number. This log book is available to all personnel, which at the time of the visit included 6 full-time and 2 temporary staff.

Laboratory Practices

The XRF analysis takes place in a laboratory facility used for routine assaying of ore, tailings and development rock. The cleanliness of the laboratory is adequate for this purpose, but would likely not meet the requirements for more stringent analyses such as, for instance, of water quality compliance samples. Sufficient reagent and other material supplies are present to ensure that analysis can continue uninterrupted. The laboratory generates its own deionized water in 20-liter batches, and its quality is ensured through ongoing resistance measurements. Decontamination of the XRF machine consists of periodic dust removal through air blowing.

XRF Operation

The XRF is operated by personnel who have been trained on the job. No training manual or formal program is available, but hands-on training is provided under the supervision of an experienced personnel. Standard operating procedures (SOP) for XRF startup and detailed maintenance checks are used (PAL-028 and PAL-040, respectively). Maintenance checks occur daily, weekly, monthly or annually depending on the nature of the check. Pellets resulting from the XRF analysis are collected in a 5-gallon bucket until full and disposed of according to SOP PAL-041 in the dry stack. The amount of pellet material is recorded, and PAL-041 requires that personnel from the Environmental Department be present during disposal. No archival samples are retained. Laboratory personnel perform minor repairs on the XRF, but qualified technicians are consulted and invited to site in the case of more serious breakdowns.

XRF Analysis

Development rock segregation is based on criteria related to the arsenic and sulfur content, with the threshold between mineralized and non-mineralized development rock being 600 ppm arsenic and

0.5% sulfur. The method reporting limits for As, S and Fe are 1 ppm, 0.05% and 0.1%, respectively, which are well below the decision criteria of interest.

The performance of the XRF can be gauged using the results from the quarterly composite samples of mineralized development rock on the drystack. Table 3 shows the quarterly results for sulfur and arsenic in the composite samples, as well as the average XRF results for mineralized development rock for those same periods.

TABLE 3

QUARTERLY RESULTS FOR SULFUR AND ARSENIC IN COMPOSITE SAMPLES AND AVERAGE XRF RESULTS FOR MINERALIZED DEVELOPMENT ROCK

	Quarter	3rd 2006	4th 2006	1st 2007	2nd 2007	3rd 2007	4th 2007	Average
XRF	S (%)	0.63	0.50	0.62	0.26	0.30	0.77	0.51
	As (mg/L)	1499	1605	615	1974	1621	1310	1437
Composites	S (%)	0.32	0.14	0.54	0.24	0.46	0.26	0.33
	As (mg/L)	559	25.1	5790	39.5	1250	617	1380
	RPD S (%)	65	111	13	8	-43	100	44
	RPD As (%)	91	194	-162	192	26	72	4

The difference between the quarterly results and XRF results was evaluated by calculating the relative percent difference (RPD) in according with EPA guidance[1] for assessment of duplicate analytical results. Although in this case the RPD is not used in the formal sense as intended by the EPA guidance, it provides a useful tool for qualitative evaluation of XRF performance. In this case, the RPD is calculated as:

RPD (%) = (difference between quarterly average XRF value and composite/average of quarterly average XRF value and composite) x 100.

According to the EPA guidance, an RPD of |35%| (i.e. the absolute value of 35%) is considered acceptable precision for solid samples. As illustrated by the table, RPD values routinely exceed 35% on a quarterly basis for both As and S, with the XRF results generally biased high relative to the quarterly samples. When the average values over the 6 quarters are considered, the RPD value for sulfur exceeds 35%, while the XRF and quarterly monitoring results for arsenic are in good agreement with an RPD of 4%.

[1] *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA-540-R-04-004, October 2004)

Since the XRF results are higher than those for the quarterly composite samples, development rock management to date has been conservative: the amount of mineralized development rock likely has been overestimated. Although on a quarterly basis results from XRF and quarterly samples may differ, due to the conservative bias of the XRF, the XRF analytical results can be used for decision making regarding development rock segregation.

Quality Assurance/Quality Control (QA/QC)

The XRF was originally calibrated in 2002 using 30 samples in a formal calibration study conducted in collaboration with the University of Alaska Fairbanks. As part of ongoing QA/QC, a standard with a known As, Fe and S content is included in every analytical batch and any observed drift is corrected for automatically twice a day at noon and midnight. Analysis of replicate samples was performed until approximately 6 months ago, when it was discontinued due to the consistent "good agreement" between original and duplicate samples.

Tables 14 and VIII-2 in the QAPP dictate the QA/QC requirements for the XRF analysis, but they contain inconsistent information. According to Table 14, one duplicate sample, one blank, and one laboratory control sample are required per batch of 20 or fewer samples (i.e. > 5% of total samples). According to Table VIII-2, one duplicate sample is required per 25 samples (i.e. 4% of total samples), with one equipment blank analyzed on an annual basis.

Physical and electronic records of the analytical results are kept in the laboratory, while electronic results are also forwarded to the Geology Department for use in development rock management decision-making.

Contracted Water Quality Laboratories

Water quality sample analysis procedures (i.e. analytical method) are performed at laboratories certified to conduct the methods presented in the QAPP. The analytical methods used to analyze the water quality samples were consistent with those presented in the QAPP based on a spot check using one of the laboratory's report for 2006 and 2007 during the site visit and a review of the methods reported in an electronic water quality data base.

3.7 Task 7 – Adherence with Pollution Prevention Strategy

In order to prevent and minimize present and future pollution, when making management decisions that affect waste generation, the permittee shall consider the following order of priority options as outlined in AS 46.06.021:

a. Waste source reduction;

b. Recycling of waste;

c. Waste treatment; and

d. Waste disposal.

Pogo has adhered to this pollution strategy in both strategic project design at the project inception and on-going programs that the environmental group has initiated. Pogo opted to develop two ore recovery processes instead of using whole ore cyanidation in order to reduce potential impacts to the environment. Although this dual process has reduced the gold recoveries by 1% to 2%, it was selected in order to minimize the amount of cyanide used in the recovery of the gold. After milling, gold is recovered by gravity methods; floating the remaining gold and sulfide minerals using froth flotation; and recovering the gold from the flotation concentrate using cyanide leaching. Cyanide is recovered after leaching using counter-current decantation (CCD) for reuse in the process circuit. Subsequently the remaining cyanide residual is destroyed using the INCO SO2 process. These methods have been selected to isolate the cyanide process from any contact with the environment, to allow the cyanide to be destroyed, and to isolate any residual material underground in the cemented backfill.

The high proportion of gravity recovery allows for the downsizing of unit operations including cyanidation, cyanide destruction, and carbon recovery. Reducing the size of the cyanidation circuit in turn reduces the amount of cyanide required for ore processing.

The flotation process recovers the gold not collected in the gravity circuit into a gold sulfide concentrate representing 10% wt of the mill feed. This concentrate is leached in a conventional cyanidation circuit to extract the gold from the concentrate. The cyanide leaching circuit is designed to prevent any contact between slurry that contains cyanide and the external environment. Following cyanidation, the cyanide is destroyed, and the slurry is mixed with cement to create a paste material which is placed underground as cemented paste backfill to fill void spaces created during mining.

The tailings from the flotation circuit which comprise approximately 90% of the total tailings produced are filtered and trucked to a surface drystack tailings placement facility. Half of the flotation tailings are combined with the cyanidation tailings and used as paste backfill in the mine.

Pogo recycles most of the process water from the process circuit. For example, water that accumulates in the RTP is used in the process makeup water requirements. This recycle ensures that water for process is drawn from the RTP and that the entrainment of the RTP contaminants in the backfill and tailings is maximized.

Pogo's environmental department has developed and implemented many recycling programs. They work jointly with the maintenance department is using "environmentally friendly" products. A few of the programs include the following:

- Recycle computer parts annually through Alaskan Green Star;
- Solid waste reduction;
- Distributing left over adhesives and construction materials to Habitat for Humanity;
- Spill response mill materials go back into the mill;
- Recycle cooking greases for pet food additives. ESS group;
- Oil, antifreeze "contaminated" soils get processed/tested/approved and used for road base. Certificates of destruction were reviewed;
- Used toner cartridges are given to program called the Hire Program for recycling and applications of funds;
- Steel, aluminum cans, copper and other metals (i.e. metal roof bolts) are recycled;
- Recycle vehicles (water truck, 350's, pickups);
- Recycle antifreeze on site;
- Recycle batteries; lead; alkaline; lithium; nickel cadmium;
- Carpool on buses of employees from Tok, Delta Junction, Moose Creek, North Pole and Fairbanks; and

- Prevent hazardous material purchases. Buy environmentally sound solvents for the maintenance shop. All hazardous material purchases are reviewed by the environmental and safety departments.

3.8 Task 8 – Closure and Post-Closure Financial Responsibility

This section of the audit report evaluates the adequacy of the closure and post-closure financial responsibility, including the collection and treatment of contact water. This was achieved by reviewing the Pogo Reclamation and Closure Plan, investigation of the on-site conditions, and evaluation of the Reclamation and Closure Cost Estimates used by the company.

The Pogo Mine reclamation and closure requirements are outlined in the Pogo Project, Documentation Series for Permitting Approval, October 2003, Volume 7, and "Reclamation & Closure Plan Update." The intent of the Plan is to guide the Pogo Mine operations in conformance with the appropriate regulations from the DNR, DEC, EPA, and COE. As stated in the plan:

> *The reclamation objective is to stabilize disturbed land surfaces against erosion and return the land to a post-mining land use of public recreation and wildlife habitat. The closure objective is to ensure that water quality is not unduly influenced after mining operations cease.*
>
> *The issues Teck-Pogo Inc. believes to be most important to successfully achieving these reclamation and closure objectives are:*
>
> - *successful stabilization and erosion control on steeply dipping slopes*
> - *closure of the tailings drystack facility*
> - *closure of the underground workings.*

Reclamation and closure of the Pogo mine is organized into five phases. Table 4 describes the general activities that will be conducted during each phase.

TABLE 4

POGO PROJECT RECLAMATION PHASES

Phase	Description	Activities
I	Reclamation of Construction Disturbance	This phase includes regrading and revegetating areas disturbed during construction and advanced exploration.
II	Reclamation Concurrent with Mining	All of the stockpiled mineralized development rock and a portion of the non-mineralized development rock will be reclaimed during this phase.
III	Final Reclamation & Closure of the Mine Site	This phase will consist of the major closure activities required to decommission the mine and place the site in a stable condition. This will involve removal of all facilities and structures not needed to support future post-closure reclamation activities, placement of a vegetative cover on the drystack tailings facility, reclamation of the balance of the non-mineralized development rock stockpiles, sealing the mine portals and vent raises, and reclamation of the airstrip and surrounding area. A temporary closure camp will be set up at the 1525 portal area to support Phase III, IV, and V activities.
IV	Post-Closure Reclamation	This phase will begin when site monitoring indicates that reclamation and revegetation has stabilized the drystack tailings facility sufficiently so that major additional earthworks will not be required. At this point, it is anticipated that the vegetative cover on the drystack will be taking hold, (Phase III) Water quality will be monitored in the surface water and groundwater in Liese Creek downstream of the drystack facility to determine whether operation of the RTP and water treatment plant should continue. The RTP and water treatment plant will remain in place during Phase IV to treat the dry-stack runoff and seepage. When agency review of the site information indicates it is appropriate to do so, the RTP water will be treated and discharged, and the RTP will be breached and reclaimed. Tailings transported to the RTP over the life of the project will be capped in place, in the bottom of the RTP reservoir, and protected from erosion. It is anticipated Phase IV will last10 years.
V	Post-Closure Monitoring	Phase V will involve post-closure monitoring of groundwater, storm water, and surface water. This is estimated to continue for a 20-year period.

Beginning in October 2003, reclamation and closure cost estimates were prepared for the Pogo Mine and related features, i.e., cost estimates for the mine site, the Shaw Creek Hillside Road, and the power Transmission Line. Records show that the mine site reclamation and closure cost was updated in December 2004; and it appears the updated costs were provided to the agencies for financial assurance in 2005. The Annual Reports for 2006 and 2007 show values from the December 2004 Cost Estimate for reclamation of the mine site along with updated costs for the Road and the Transmission Line. The amounts and dates of the various cost estimates are presented in Table 5.

TABLE 5

POGO MINE, SUMMARY OF RECLAMATION AND CLOSURE COSTS

	Direct Costs	Indirect Costs	Total Cost
2003			
Mine Site	$16,897,380		
Road			$2,262,583
T-Line			$2,256,336
Total	$16,897,380		-
2004 through 2007			
Mine Site	$17,618,122	$5,461,618	$23,079,740
Road	$1,726,515	$535,220	$2,261,735
T-Line	$1,723,000	$534,130	$2,257,130
Total	$21,067,637	$6,530,968	$27,598,605

During the Pogo Mine audit it was determined that the Pogo operation is in the advanced stages of developing a cost model to calculate updated reclamation and closure costs. It is being prepared with the intention of submitting revised reclamation and closure costs with the company's application for renewal of the plan of operation and the waste discharge permit.

The following discussion addresses aspects of the historical reclamation and closure cost estimates and limited descriptions of various components of the new, developing Pogo Reclamation and Closure Cost Model.

3.8.1 Reclamation of Facility Components – Construction Costs

The organization of the reclamation and closure cost estimates follows the five phases of the Reclamation and Closure Plan. As indicated in Table 4, the plan addresses all the components of the Pogo Mine; and a review of both the 2003 and the December 2004 cost estimates along with the information provided in the 2006 and 2007 Annual Reports shows that reclamation and closure costs for all of the components of the mine are addressed.

As examples: The Reclamation and Closure Plan calls for an engineered soil cover for the drystack tailings. This will consist of a 1-foot layer of non-mineralized development rock over the crowned surface of the drystack facility. This will be followed by a 6-inch layer of sand and gravel to provide support for an additional 6 inches of growth media. Both the 2003 and 2004 Cost Estimates provide

for 62,000 cubic yards (CY) of non-mineralized waste rock, 31,000 CY of sand and gravel, and 31,000 CY of growth media. The Plan reports that the estimated area of the drystack tailings will be 32.1 acres at closure. One foot of material over this area is equal to 51,800 CY (compacted). Hence, the allowance of 62,000 CY for the first cover layer would be more than sufficient to cover the drystack. The estimates include additional quantities for recontouring the drainage ditches and providing for "Erosion Protection Ditches." This work will be conducted with Cat 980G loaders, 17 CY dump trucks, D6R dozers, and Cat 330 excavators and are considered appropriate for this these activities.

Reclamation of the waste rock storage facilities will be minimal with the placement of mineralized and non-mineralized development rock in the drystack tailings disposal facilities during the life of the mine. Reclamation of temporary storage areas for development rock is addressed in Phases III and IV and involves recontouring the areas, covering them with growth media, and revegetation. Similar equipment listed for the drystack tailings will be used for reclamation of the temporary development rock storage sites.

The RTP will be reclaimed in Phase IV. It will remain in place as long as a pool is required to collect runoff and seepage from the drystack tailings. In coordination with the agencies, a decision will be made to discontinue treatment and discharge any accumulated RTP water, allowing the RTP to be breached and reclaimed. Any tailings that have accumulated in the RTP over the life of the project will be capped in place in the bottom of the RTP reservoir and protected from erosion. The Reclamation and Closure Plan includes drawings that illustrate that approximately half of the dam will be removed to achieve the breach. The estimate includes excavation and movement of 147,800 CY from the dam with Cat 330 Excavators and Cat D10R dozers.

The water treatment plant will remain in place during phase IV, as long as it is needed to treat runoff and seepage from the drystack-water that may accumulate in the RTP. The reclamation and closure cost estimate includes costs for operation and maintenance of the water treatment plant for 10 years.

The 2003 and 2004 Reclamation and Closure Cost Estimates are detailed and include approximately 140 line items. All of the major facilities and many of the incidental items are listed and provided with reclamation costs. The general approach and assumptions used in the calculation of the reclamation and closure costs appear reasonable and extensive. However, a problem with the cost estimates is that it difficult to track calculations to verify how and which unit costs are applied to various reclamation areas and determined quantities. Other aspects and issues related to Cost Estimates are described in the following subsections.

The organization of the updated Pogo Excel® model currently being developed also follows the organization of the Reclamation and Closure Plan allowing easy reference to the features of the plan.

Building Demolition and Material Disposal Costs

The 2004 Pogo cost estimate provides a considerable number of line items describing demolition or removal of structures. However, supporting detail describing the various facilities (dimensions and building features) is not included with the estimate. Consequently, it was necessary to search through the line items to find facility descriptions with enough information that would allow a sample check of the calculations. As a sample item, the Dry and Office Building are described as modular construction, two stories, 10,750 square feet, with an estimated reclamation cost of $170,160. Allowing for 20 feet of structure height, the unit cost of demolition is $0.79 per cubic foot. In another case, the Shop Building, a pre-engineered metal building, 25,500 square feet, is included with an estimated reclamation cost of $110,604. Again, allowing for a structure height of 20 feet, the unit cost of demolition is $0.22 per cubic foot.

R.S. Means provided costs for demolition of fixed structures, no foundation removal and no salvage, of $0.20 per cubic foot of structure in 2004. The unit costs calculated for the Pogo reclamation cost estimate compare favorably with the demolition costs derived from RS Means. It should also be pointed out that many of the buildings at Pogo are modular and skid mounted and will facilitate easy removal.

The 2004 Cost Estimate included the disposal of building debris in the on-site landfill. At the time of audit the on-site landfill had not been constructed and there was some question as to whether it would. Given this, the 2004 Cost Estimate does not adequately address the disposal costs of materials off-site.

A review of the new, proposed Pogo Reclamation and Closure Cost model shows considerable information describing the demolition of structures and applied unit costs. It also includes disposal of building debris by hauling to Fairbanks.

Adit and Raise Plugs

The Pogo Mine was planned with 17 feet wide by 15 feet high (nominal dimensions) ramps. The December 2004 Cost Estimate shows costs for plugging the adits and raise as follows:

1690 Portal Seal Opening with Concrete Plug	$150,960
1875 Portal - Seal Opening with Concrete Plug	$150,960
1525 Portal - Seal Opening with Concrete Plug	$148,934
Seal Vent Shaft	$85,048

In a cost estimate prepared by Golder in 2006 for the closure of an underground mine in Nevada, the estimated cost of placing internal concrete dams, and sealing with grout, in twin adits (16 feet high by 18 feet wide) was $385,835, for an average cost of $192,917 per plug. This Nevada project included the placement of approximately 5,500 CY of development rock against the plugs that added nearly approximately $50,000 per plug to the cost. Deducting this amount from the total cost per plug produces an approximate cost of $143,000. This compares favorably with the estimated costs for plugging the adits of the Pogo Mine.

Labor Rates

The 2004 Reclamation and Closure Cost estimate was not provided with labor rates, so it was necessary to use labor rates from the 2003 Cost Estimate. Table F-1 of the 2003 Cost Estimate presents "Demolition Hourly Labor Wage Rates." Select labor categories from Table F-1 are presented in Table 6.

Select positions found in Alaska Pamphlet No. 600, September 1, 2007, along with base rates and burdens are listed in Table 6. Direct and indirect labor rates are as presented in the Pamphlet except additional costs were included for Social Security, Medicaid, Unemployment, Liability, and Worker Comp Insurance, and overtime. These latter items were calculated using the same factors used in the December 2003 Cost Estimate. Camp costs and travel time were based on the State of Alaska's policy of requiring $75 per day for per diem (10 hour day).

TABLE 6

SELECT LABOR RATES FROM THE POGO RECLAMATION AND CLOSURE COST ESTIMATE, OCTOBER 2003

Description	Laborer	Heavy Equipment Operator	Foreman
Direct Hourly Labor Rates:			
Base Hourly Rate (straight time)	$23.43	$27.77	$30.55
Over time for 50 hour week @ 10%	$2.34	$2.78	$3.06
Adjusted Hourly Base Rate	$25.77	$30.55	$33.61
Social Security, Medicaid, Unemployment, Liability, and Worker Comp Insurance @ 21%	$5.59	$6.63	$7.29
Total Direct Hourly Labor Rates	$31.37	$37.18	$40.90
Indirect Hourly Rates:			
Benefits - percentage of adjusted hourly rate @ 14.5%	$4.55	$4.43	$4.87
Field Overhead - percentage of direct hourly rate & benefits @ 18.0%	$6.32	$7.49	$8.24
Small Tools Allowance - rate per work-hour	$3.00	$3.00	$3.00
Camp and/or Travel Allowance - rate per work-hour	$8.00	$8.00	$8.00
Total Indirect Hourly Costs	$21.06	$22.92	$24.11
Total Hourly Costs	$52.42	$60.10	$65.01

From 2003 through 2007 the Engineering News Record (ENR) Skilled Labor Index (SLI) changed from 6,616 to 7,796 for a 17.8 percent change. Using this number, the estimated labor rates for 2003 can be calculated from the 2007 values presented in Table 7. Back calculated 2003 labor rates are:

Laborer	$50.08
Heavy Equipment Operator	$54.88
Foreman	$58.23

It can be reasoned that the labor costs presented in the October 2003 estimate were approximately 8.8 percent higher than what could have been expected. This over estimation of labor cost in 2003 would have provided some cushion for escalating costs.

TABLE 7

SELECT LABOR RATES, ALASKA PAMPHLET No. 600 SEPTEMBER 2007

Description	Laborer, Group II	Heavy Equipment Operator, Group III	Foreman (based Group IA Equipment Operator)
Direct Hourly Labor Rates:			
Base Hourly Rate (straight time)	$28.27	$32.99	$36.00
Health and Welfare	$4.80	$6.98	$6.98
Pension	$8.15	$6.00	$6.00
Training	$1.15	$0.85	$0.85
Labor and Management Fund	$0.20	$0.10	$0.10
Legal Fund	$0.15		
Social Security, Medicaid, Unemployment, Liability, and Worker Comp Insurance @ 21% of BHR.	$5.94	$6.93	$7.56
Over time for 50-hour week @ 10% of BHR	$2.83	$3.30	$3.60
Camp and/or Travel Allowance - rate per work-hour	$7.50	$7.50	$7.50
Adjusted Hourly Rate	$58.99	$64.65	$68.59

Worker Camp Costs

The September 1, 2007, Pamphlet No. 600 discusses Alaska's labor rules requiring meals and lodging or per diem for work performed in remote locations. Since the Pogo Mine has camp facilities, it is a case of establishing a reasonable allowance for camp costs. The September 1, 2007, Pamphlet No. 600 indicates that a $75 per diem allowance should be provided when commercial facilities and lodging are not available. Without actual camp costs, it can be assumed that an equivalent amount would be appropriate for a cost estimate. Table 6 shows that the October 2003 Cost Estimate provided $8.00 per hour for camp or travel costs, or $80 per day.

In the new Cost Model being developed by Pogo, camp costs are included at $50 per day, which, reportedly, is based on actual costs of operating the Pogo Mine camp.

Equipment and Operating Costs

Similar to the labor rates, the 2004 Reclamation and Closure Cost estimate was not provided with equipment and equipment operating costs. Hence, the equipment and operating costs presented in the 2003 Cost Estimate were evaluated. Table F-2 of the 2003 Cost Estimate presents "Hourly

Equipment Rates." Select equipment and corresponding rental and operating costs from Table F-2 are presented in Table 8. Also included in Table 8 are 2007 equipment costs derived from the "Rental Rate Blue Book, Volume 1", as produced by Equipment-Watch, 2008.

TABLE 8

COMPARISON OF COSTS FOR SELECT PIECES OF EQUIPMENT FROM THE 2003 POGO COST ESTIMATE TO 2007 COSTS FROM THE "RENTAL RATE BLUE BOOK"

	2003 Cost Estimate			2007 Costs		
Description	**Hourly Rental Cost**	**Hourly Operating Cost**	**Total Cost per Hour**	**Hourly Rental Cost**	**Hourly Operating Cost**	**Total Cost per Hour**
Dozer, Cat D6R	$30.00	$36.00	$66.00	$50.98	$50.05	$101.03
Dozer, Cat D8R	$42.00	$51.00	$93.00	$129.99	$93.55	$223.54
Dozer, Cat D10R	$73.00	$78.00	$151.00	$181.44	$156.85	$338.29
Grader - Cat 16G (H)	$34.00	$57.00	$91.00	$60.30	$45.20	$105.50
Loader, Cat 992G	$62.00	$138.00	$200.00	$282.36	$190.95	$473.31
Truck, 17-22 CY Dump Truck	$31.00	$40.00	$71.00	$79.01	$53.55	$132.56

Note 1: Central Alaska, base rental costs increased by a factor of 1.247.

The 2003 Cost Estimate includes costs for "Support & Transport" but these were not added to the values in the table since it is believed that these costs are covered in mobilization and demobilization costs and the hourly operating costs.

The percent changes, in the cost of the selected equipment, from the 2003 Cost Estimate to the values derived from the Rental Rate Blue Book (2007) are illustrated in Table 9. The 2007 equipment costs are an average of 92.8 percent higher than the 2003 equipment costs, for the listed equipment. In December 2003 the Engineering New Record (ENR) Construction Cost Index (CCI) was 6,782 and in December 2007 it was 8,089, for an increase of 19.3 percent during the 4-year period. If the equipment costs derived from the Rental Rate Bluebook were reduced by the change in the ENR CCI, then it is possible to compare expected equipment costs to the equipment costs used for the 2003 Cost Estimate. This comparison shows that the equipment costs used in 2003 were approximately 73.5 percent low.

TABLE 9

PERCENT CHANGE IN EQUIPMENT COST FROM 2003 TO 2007 FOR SELECTED EQUIPMENT (REFERENCE TABLE 8)

Description	Percent Change in Cost
Dozer, Cat D6R	53.1
Dozer, Cat D8R	140.4
Dozer, Cat D10R	124.0
Grader - Cat 16G (H)	15.9
Loader, Cat 992G	136.7
Truck, 17-22 CY Dump Truck	86.7
Average	92.8

Neither the 2003 Cost Estimate nor the 2004 Cost Estimates discuss the cost of fuel as a major factor in establishing operating costs for equipment nor isolates fuel costs that would facilitate periodic updates for radical changes in fuel costs.

Pogo's new Cost Model provides a detailed evaluation of equipment costs including equipment operating costs. Equipment operating costs are linked to fuel consumption values for each piece of equipment, which allows the unit cost for fuel to be entered into a spread sheet cell that in-turn adjusts the equipment operating costs and the total Reclamation and Closure Costs.

Equipment Production Rates

As has been stated previously, the 2003 and 2004 Cost Estimates are difficult to evaluate because there is little supporting information demonstrating how the units shown in the calculation sheets were derived. However, simple evaluations of equipment productivity can be made by using the volumes and estimated hours presented in the cost sheets to calculate nominal productivities. For example, in the 2004 Cost Estimate for Item K-02, fill embankments around the mill, a D8R dozer is used to move 48,600 CY. The corresponding estimated time is 189 hours and this equates to 257 CY per hour; and this is within the range and capability of a D8 dozer. A portion of the work for Item K-02 involves a 330 Excavator moving the same volume of material, 48,600 CY, in 129 hours. This is equal to 377 CY per hour, which is considered high for this piece of equipment. A complete description of the use and application of an excavator for this task would probably clarify why the calculated productivity value is high.

A line-by-line evaluation of the tasks to evaluate equipment performance would be an arduous task and would probably produce inconsistent numbers similar to those presented above. In order to make an evaluation that would be meaningful, it would be necessary to have more supporting information on the cost estimates.

An important note regarding this issue is that the new proposed Pogo Cost Model provides considerable detail, showing tasks, equipment, productivities, and costs.

Post-Closure Water Treatment, Monitoring, and Site Maintenance Costs

The 2003 and 2004 Reclamation and Closure Cost Estimates assume that the water treatment plant will remain in place for 10 years during Phase IV (as long as it is needed to treat runoff and seepage from the drystack-water that may accumulate in the RTP) and includes costs for operation and maintenance of the water treatment plant during this per period. The December 2004 Cost Estimate estimated water treatment costs at $3,605,490 for a 10-year period. At 180 GPM for 10-years the average cost per 1,000 gallons treated was approximately $5.80. Pogo reported water treatment plant costs are approximately $4.14 per 1,000 gallons treated[2], which compares favorably with the allowance in the 2004 Cost Estimate.

The 2004 Cost Estimate provides $104,490 for monitoring during Phase IV, and approximately $695,000 for Phase V for a total of $799,490. Combining the estimated 10-year period for Phase IV and the 20-year post-closure monitoring under Phase V, there is an estimated 30-year monitoring period after closure of the mine. Given these numbers, the estimated cost for monitoring was $26,650 per year. Subjectively, this number seems low considering the amount of monitoring that will be required for the reclaimed mine. The 2004 Cost Estimate only provides lump sum entries for the monitoring line items and does not provide any detail on the methods and assumptions used to determine the monitoring costs.

The 2004 Cost Estimate did not show transportation costs, except for the housing and transportation allowance provided with the labor costs. It is suggested that future cost estimates itemize transportation costs to facilitate evaluation and review.

[2] The cost of water treatment was derived from the new, proposed Cost Model. This value was confirmed in communications with the site on July 2008.

3.8.2 Contractor Indirect Costs

Contractor Indirect Costs are considered Mobilization and Demobilization, Overhead and Profit, Performance and Payment Bonds, and Liability Insurance. The following subsections provide discussions on usual and expected percent rates that can be used to estimate these costs.

Mobilization / Demobilization

Important factors influencing mobilization and demobilization costs are the remoteness of the site, availability of equipment, road use restrictions and permits. Allowances for these costs usually range from 2 to 10 percent of the direct costs plus Contractor Overhead and Profit. The Forest Service in its "Cost Estimating Guide for Road Construction" recommends 7.0 percent for projects between $100,000 and $500,000; 6.0 percent for projects over $500,000 with additional allowances for specialized equipment if applicable. The Indiana Department of Transportation (IDOT) uses 5 percent of the total contract amount. IDOT also states that additional amounts for mobilizing and demobilizing specialized equipment should be made up to the point that it equals 10 percent of the total cost estimate. The calculation of a cost estimate for a project consisting of the construction of structures, canals and embankments used 10 percent of the direct total cost plus overhead (South Florida Water Management District, November 2006). The Pogo Mine is in a remote location but the equipment that would be used in the reclamation and closure is conventional and could be easily transported over the road system. It is recommended to use a percentage ranging from 5 to 8 of the contractor's direct costs.

Contractor Overhead and Profit

Overhead and Profit is usually based on a percentage of the total direct costs. In 2004, the Forest Service reported Overhead and Profit ranging from 15 to 30 percent and related the 15 percent to projects with direct costs of $100,000 and lower and 30 percent for projects with direct costs of $10,000,000 and greater. A recent cost estimate prepared for a reclamation project in Arizona (reviewed by Golder) had "Office Overhead (salaries, corporate expense, etc.) and Profit" at 20 percent on a total estimated direct costs of $77.34 million. In another reclamation and closure cost estimate reviewed by Golder for a project in Nevada the contractor "profit" was calculated as 10 percent of the direct costs. As a recommendation, the Contractor Overhead and Profit for the Pogo Project should be near 15 percent of direct costs plus mobilization and demobilization.

Performance and Payment Bonds

State of Alaska statutes (AS 36.25.010) require both a performance bond and a payment bond for construction of projects administered by the state. The cost of each of these bonds is usually estimated at 1.5 percent of the total direct costs (including mobilization and demobilization, and profit and overhead).

Liability Insurance

An allowance for contractor's liability insurance should be included at 1.5 percent of the total direct costs (including mobilization and demobilization, and profit and overhead).

3.8.3 Administrative Costs - Project Indirect Costs as a Percentage of Contractor Costs

Administrative Costs are costs for agency project management including costs for contract administration (time for agency personnel and agency overhead), project design and planning, and project cost contingencies. Administrative Costs are usually added to the Contractor Costs to produce the Total Reclamation and Closure Cost. As discussed in previous sections, the Contractor Costs, or the construction costs, are the total of Contractor Direct and Contractor Indirect Costs.

Following is a discussion of Administrative Costs and factors used by various entities and in other cost estimates. This discussion includes recommended factors for application to the Pogo Reclamation and Closure Cost Estimate.

Contract Administration

The BLM in "Guidelines for Reviewing Reclamation Cost Estimates" estimates that BLM Contract Administration Costs are 6 to 10 percent of the O&M costs (O&M is defined as the total contractor's cost, which includes the contractor's direct costs, overhead and profit, and mobilization and demobilization). Additionally, Administrative Costs include BLM Indirect Costs of 21 percent of the Contract Administration Cost or an additional 1.3 to 2.1 percent (21 percent of the 6–10 % contract administration costs). This totals to a range of 7.3 to 12.1 percent. The US Forest Service in "Training Guide for Reclamation Bond Estimation and Administration" discusses Agency Administration costs ranging from 2 to 7 percent of "Contract Costs" (This is assumed to be equal to 2 to 7 percent of the Contractor Costs). The percentages for both agencies are inversely proportional to the total project cost with the lower percentages associated with higher project costs. Reclamation costs for the Pogo Project are considered on the higher end of the scale and therefore the lower percentages are applicable for estimating agency costs. The average of the lower end of the range of

percentages for the two land agencies is 4.65 percent. It is recommended that the Agency Administrative Costs for the Pogo Project should range from 4 to 5 percent of the total contractor's costs.

Engineering Design and Construction Plan

An Engineering Design and Construction Plan is usually needed to provide details for contracting and executing the reclamation construction work. The BLM in "Guidelines for Reviewing Reclamation Cost Estimates" recommends 4 to 8 percent of the estimated contractor's costs. The US Forest Service in "Training Guide for Reclamation Bond Estimation and Administration" states that Engineering Redesign costs typically range from 2 to 10 percent of the total direct costs. The Pogo Reclamation Plan is considered comprehensive and will provide considerable guidance in the event that the agencies are required to administer the reclamation and closure. Hence it is believe that 4 to 6 percent of the total contractor costs would be a reasonable estimate of these costs for the Pogo Mine.

Contingency

Contingency is often considered the most misunderstood element contained in a cost estimate. This is due in large part to how different users of the calculation use contingency. Contingency is considered "…as the funds added to the originally derived point estimate to achieve a given probability of not overrunning the estimate (given relative stability of the project scope and the assumptions upon which the estimate is based)" (Amos, 2007). A significant part of this statement rests in the reference to "an originally derived point estimate", interpreted to mean that a contingency is added only once to an estimate. This would seem appropriate to avoid placing contingencies upon contingencies in a cost estimate.

The US Forest Service states in "Training Guide for Reclamation Bond Estimation and Administration" that "Once mine construction and operations commence, the details of the project and reclamation plan may approach a 'Definitive Category'…" providing a level of accuracy in the cost estimate that would allow a contingency ranging from 6 to 10 percent. The BLM recommends a contingency of 4 to 10 percent of the estimated construction cost. Given the level of detail provided in the Pogo Reclamation and Closure Plan, it is believed that an 8 percent contingency value can be supported.

An important aspect of the discussion of contingencies in the Forest Service "Training Guide…" is the discussion of Scope Contingency and Bid Contingencies, which seems to come from the approach

that the Environmental Protection Agency uses in preparing cost estimates for Feasibility Studies for sites being remediated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The difficulty in estimating the remediation costs for a CERLA project are well known since estimates are often required when site conditions and remediation programs are difficult to define and understand. Consequently, Bid Contingencies are often included to cover the remediation costs for what has yet to be found or determined. Generally, reclamation planning for a mining project is more definite than remediation planning.

The recommended contingency for the Pogo Reclamation and Closure Cost Estimate is based on providing a single contingency that will provide cushions to variances in the construction program as well as variances in the administrative costs. It is believed that a Bid Contingency for the Pogo Reclamation and Closure Cost Estimate is not warranted because of the level of detail that has been presented in the Reclamation Plan.

One-year "Holding Period"

The 2003 and 2004 Reclamation and Closure Cost estimates do not include costs for a one year holding period. Further, neither of the Reclamation and Closure Costs described in the Annual Reports for 2006 and 2007 includes costs for a one-year holding period.

The new Pogo cost model includes a line item for a One year Holding Period. The entry is supported with a work sheet showing detailed calculations of the expected costs for the one-year period.

The question of the one-year holding period appears to be related to concerns the State has regarding costs associated with an interim period prior to active site reclamation if the company defaulted on their obligations and the State had to assume reclamation responsibilities for the reclamation. This is similar to Bureau of Land Management (BLM) guidelines provided in their "Guidelines for Reviewing Reclamation Cost Estimates" that includes requirements for "Interim Operation and Maintenance", to cover care and maintenance of a site prior to the start of the reclamation in the event "…an operator abruptly ceases operations." The BLM suggests providing costs for a six month period of interim O&M by a contractor. The state of Nevada also addresses this through a statue calling for a financial assurance to cover "Interim Fluid Management" for a six month period. However, the Waste Disposal Permit 01301-BA002 and the Alaska Administrative Code, 18 ACC 15, 18 ACC 60, and 18 ACC 70 do not mention this requirement. Whether there is an agency guidance document or correspondence between the agencies and the company discussing this requirement is not known.

Inflation Factor

The 2004 Reclamation and Closure Cost Estimate was used as the basis for calculating the "Total Project" costs in the 2006 and 2007 Annual Reports and the estimated Total Project cost was the same in both years. Also, the direct construction costs remained the same from 2004 through 2007. During this period the Engineering News Record (ENR) Construction Cost Index (CCI) changed from 7,308 to 8,089 for a 10.7 percent change. This suggests an annual average inflation of 3.6 percent and it seems that the Pogo Reclamation and Closure Cost Estimate should have been adjusted accordingly.

Section 1.10.2 of the Waste Discharge Permit states that:

> *"The Department, in consultation with ADNR, will review, and modify, if appropriate, the financial responsibility requirements including adjustments for inflation, concurrent reclamation and expansion or other changes to the operation of the facility annually, or during the renewal, modification or amendment of this permit. The permittee shall address the adequacy of the financial responsibility in the annual report."*

The Pogo Mine submitted a Reclamation and Closure Cost Estimate in its annual reports with no apparent revisions for inflation; and there does not appear to be any notification or correspondence from the agencies asking the company to revise its estimated costs. It seems that the language of the permit is unclear as to what conditions and situations are appropriate to constitute review and revision of the Reclamation and Closure Cost Estimate and the financial responsibility requirements.

3.8.4 Determination of Total Reclamation and Closure Costs

The 2003 and 2004 Reclamation and Cost Estimates primarily present direct costs with the exception that a lump sum was provided for Winter Road Demobilization. However, the Annual Reports for 2006 and 2007 include both direct and indirect costs. Shown below are the percentages for indirect costs used in the calculations. All of the percentages were applied directly to the direct costs and the values summed to provide a Total Reclamation and Closure Cost.

Contractor Profit and Overhead	10%
Contingency	10%
Agency Administrative Costs	3%
Contractor Mob/Demob	5%
Engineering Redesign	3%

A side-by-side comparison of the percentages used in the Pogo 2006 and 2007 Annual Reports to the recommended percentages developed in the previous sections of this report along with a generalized outline of their application is illustrated in Table 10.

TABLE 10

COMPARISON OF INDIRECT COST FACTORS AND APPLICATION TO CALCULATION OF RECLAMATION AND CLOSURE COSTS

Line No.	Item	Used Value	Recommended Value
1	Direct Construction Costs	Calculated	Calculated
2	Mobilization and Demobilization (% of Line 1)	5%	5 to 8%
3	Subtotal (Line 1 + Line 2)	Calculated	Calculated
4	Contractor Overhead and Profit	10%	15%
5	Subtotal (Line 3 + Line 4)	Calculated	Calculated
6	Performance and Payment Bond (% of Line 5)	No Value	3%
7	Insurance (On-site Liability) (% of Line 6)	No Value	1.5%
8	Total Construction Cost (Sum of Lines 5,6,and 7)	Calculated	Calculated
9	Administrative Costs:		
10	Contract Administration (% of Line 8)	3%	4 to 5%
11	Engineering Design and Construction Plan (% of Line 8)	3%	4 to 6%
12	Contingency (% of Line 8)	10%	8%
13	Total Estimated Reclamation and Closure Cost (Sum of Lines 8,10, 11, and 12)	Calculated	Calculated
14	*1-year Holding Period*	*Calculated*	*Calculated*
15	*Total for Financial Assurance*	*Calculated*	*Calculated*

The application of the approach outlined in Table 10, using the direct costs produced in the December 2004 Cost Estimate and the percentages utilized by Pogo in the 2006 and 2007 Annual Report, is

illustrated in Table 11. This produces a Total Reclamation and Closure Cost of approximately $28,226,420, or approximately 2.3 percent higher than the number produced in the Annual Reports. If the percentages for the indirect costs, developed in this report, are utilized the range of Total Reclamation and Closure Costs is $30,837,364 to $32,538,736, or from 11.7 to 17.9 percent higher than the Reclamation and Closure Cost presented in the 2006 and 2007 Annual Reports.

Without a set policy, the method of application of the recommended percentages for indirect costs is considered a matter of negotiation between the Pogo Mine and the agencies.

TABLE 11

POGO RECLAMATION AND CLOSURE COST ESTIMATE (2007) – REVISED APPROACH

Item	Percentages Used by Pogo		Recommended Percentages		
	Used Value		Recommended Values	Low Value	High Value
Direct Construction Costs	Calculated	$21,067,637	Calculated	$21,067,637	$21,067,637
Mobilization and Demobilization	5%	$1,053,382	5 to 8%	$1,053,382	$1,685,411
Subtotal	Calculated	$22,121,019	Calculated	$22,121,019	$ 22,753,048
Contractor Overhead and Profit	10%	$2,212,102	15%	$3,318,153	$3,412,957
Subtotal	Calculated	$24,333,121	Calculated	$25,439,172	$26,166,005
Performance and Payment Bond	No Value		3%	$763,175	$784,980
Insurance (On-site Liability)	No Value		1.50%	$381,588	$392,490
Total Construction Cost	Calculated	$24,333,121	Calculated	$26,583,934	$27,343,475
Administrative Costs:					
Contract Administration	3%	$729,994	4 to 5%	$1,063,357	$1,367,174
Engineering Design and Construction Plan	3%	$729,994	4 to 6%	$1,063,357	$1,640,609
Contingency	10%	$2,433,312	8%	$2,126,715	$2,187,478
Total Estimated Reclamation and Closure Cost	Calculated	$28,226,420	Calculated	$30,837,364	$32,538,736
1-year Holding Period	*Calculated*		*Calculated*		
Total for Financial Assurance	*Calculated*		*Calculated*		

Note: Direct Construction Costs are based on the December 2004 Pogo Reclamation Costs.

3.8.5 Revised Reclamation and Closure Cost

This section presents a revised Reclamation and Closure Cost Estimate based on adjusting the direct construction costs in the December 2004 Cost Estimate and then utilizing the suggested methodology, presented in the previous section, for application of the indirect costs. The basis for the construction costs adjustment was based on the variances in the Labor, Materials, and Equipment discussed in the previous sections.

The "Pogo: Reclamation Cost Estimate (December 2004)" presents the total direct costs in terms of Labor, Materials, Equipment and Subcontractor costs. Where there was no distribution of Labor, Materials, and Equipment for the Road and the T-Line, a distribution was made based on the cost distribution for the mine reclamation. This is presented in Table 12. Subcontractor costs are primarily associated with water treatment during Phase IV and water quality monitoring in Phase V and are not considered to be comparable to reclamation costs for the Road and T-Line; hence subcontractor costs in the 2004 Cost Estimate were not included in determining the distribution of Labor, Materials, and Equipment for the Road and T-Line.

TABLE 12

POGO RECLAMATION COSTS – LABOR, EQUIPMENT, AND EQUIPMENT DISTRIBUTION W/O SUBCONTRACTOR INCLUDED IN THE TOTAL

Description	Labor	Materials	Equipment	Sub-Total	Sub - contractor	Total
Total Estimated Cost - Dec. 2004	$6,938,438	$1,138,136	$4,711,849	$12,788,423	$4,829,700	$17,618,123
Percentage of Subtotal	54.26	8.90	36.84	100.00		
Assume Road and T-Line Costs are distributed in these proportions:						
Road	$936,731	$153,655	$636,128	$1,726,515	$0	$1,726,515
T-Line	$936,731	$153,342	$634,833	$1,724,907	$0	$1,723,000
Total – Mine, Road & T-Line	$8,811,901	$1,445,134	$5,982,811	$16,239,845	$4,829,700	$21,067,638

The approximate values for Labor, Materials, and Equipment provide a means of increasing the costs using the values developed in the previous discussions. As mentioned above the Subcontractor costs are primarily associated with water treatment; and whereas the 2004 Cost Estimate provided $5.80 per 1,000 gallons treated and Pogo is reporting current treatment costs at $4.14 per 1,000 gallons treated, a Revised Reclamation and Closure Cost does not include revisions to Subcontractor Costs.

Under the *"Labor"* section it was shown that the increase in ENR Skilled Labor Index changed approximately 18 percent from 2003 to 2007. Further, it was deduced that the Labor Rates used in the October 2003 Reclamation and Closure Cost Estimate were approximately 9 percent higher than what would have been expected when compared to the Alaska September 2007 Labor Rates and the change in the Skilled Labor Index. Hence, the Labor Rates in the 2003 Estimate only need to be adjusted by 9 percent to utilize them in a 2007 Cost Estimate. Nine percent over the four years amounts to approximately 2.25 percent year. This amounts to a labor adjustment (increase) of 6.75 percent from 2004 to 2007.

As presented in the 2004 Cost Estimate, total Material Costs represent about 9 percent of the total direct costs. Where it was difficult to identify specific material costs in the 2004 Cost Estimate, an evaluation of these costs was not readily possible. Hence an adjustment of the Material Costs was based on the reported change in the ENR CCI from 2004 to 2007. The CCI changed approximately 19.3 percent from 2003 to 2007, or approximately 4.83 percent per year. Using the average annual change in the CCI during this period, the percent change from 2004 to 2007 was approximately 14.5 percent.

In the "*Equipment and Operating Costs*" Section it was shown that the average equipment cost for the 2003 Cost Estimate was approximately 73.5 percent low. Using the average change from 2004 to 2007 of 14.5 percent the adjustment to the 2004 equipment costs would require a total change of approximately 88 percent (73.5 plus 14.5 percent).

Table 13 shows the adjusted direct construction costs for 2007 using the developed factors. The total indirect costs are approximately 28.8 percent higher than the indirect costs presented in the 2006 and 2007 annual report.

Determining the total Reclamation and Closure Cost is shown Table 14 where Indirect Costs are applied to the Direct Costs. Using the factors and approach presented in Table 10, the Revised Reclamation and Closure Cost for 2007 is estimated to range from $39.7 to $41.9 million. This does not include $1.1 million for a Holding Period. These revised costs are 43.9 to 51.9 percent higher than the cost presented in the 2006 and 2007 Annual Reports.

TABLE 13

CLOSURE AND RECLAMATION COSTS - REVISED FOR DECEMBER 2007

Description - Direct Costs	Labor	Materials	Equipment	Subcontractor	Total
Estimated Mine Reclamation Costs - Dec. 2004	$6,938,438	$1,138,136	$4,711,849	$4,829,700	$17,618,123
Estimated Road Reclamation Costs	$936,731	$153,655	$636,128	$0	$1,726,515
Estimated T-Line Reclamation Costs	$936,731	$153,342	$634,833	$0	$1,724,907
Total Distributed Reclamation Costs - Dec. 2004	$8,811,901	$1,445,134	$5,982,811	$4,829,700	$21,069,545
Percent Increase from 2004 to 2007	6.75	14.5	88.0	0	
Change in Costs from 2004 to 2007	$594,803	$209,544	$5,264,873	0	$6,069,221
Total Revised Direct Costs - 2007	9,406,704	$1,654,678	$11,247,684	$4,829,700	$27,138,766

TABLE 14

POGO RECLAMATION AND CLOSURE COST ESTIMATE (2007) - REVISED

Item	Recommended Percentage	Range of Values	
		Low Value	High Value
Direct Construction Costs (Note 1)	Calculated	$27,138,766	$27,138,766
Mobilization and Demobilization	5 to 8%	$1,356,938	$2,171,101
Subtotal	Calculated	$28,495,704	$29,309,867
Contractor Overhead and Profit	15%	$4,274,356	$4,396,480
Subtotal	Calculated	$32,770,060	$33,706,347
Performance and Payment Bond	3%	$983,102	$1,011,190
Insurance (On-site Liability)	1.50%	$491,551	$505,595
Total Construction Cost	Calculated	$34,244,713	$35,223,133
Administrative Costs:			
Contract Administration	4 to 5%	$1,369,789	$1,761,157
Engineering Design and Construction Plan	4 to 6%	$1,369,789	$2,113,388
Contingency	8%	$2,739,577	$2,817,851
Total Estimated Reclamation and Closure Cost	**Calculated**	**$39,723,867**	**$41,915,528**
1-year Holding Period (Note 2)	*Calculated*	$1,170,399	$1,170,399
Total for Financial Assurance	*Calculated*	$40,894,266	$43,085,927

Note 1: Direct Construction Costs are adjusted December 2004 Pogo Reclamation Costs.
Note 2: This cost was derived from the new Pogo Reclamation Calculation Model and is considered tentative for this cost analysis.

3.8.6 Summary – Reclamation and Closure Cost Estimate.

The evaluation of the Pogo Reclamation and Closure Cost Estimate is based on the evaluation of the Pogo Reclamation & Closure Plan Update, October 2003. A review of the Plan and the site conditions revealed that the Plan was comprehensive and described in considerable detail the steps

that would be taken to close and reclaim the site. Given the content of the Plan, it was possible to review the Reclamation and Closure Costs for the project. Salient features of this review are present below.

- Two Reclamation and Closure Cost Estimates were produced for the Pogo Mine, one in October 2003 and a second in December 2004. Reclamation and Closure Costs presented to the State for 2006 and 2007 were based on the Direct Construction Costs in the December 2004 Cost Estimate, without escalation for inflation.

- The 2003 and 2004 Reclamation and Closure Cost Estimates are detailed and include approximately 140 line items. All of the major facilities and many of the incidental items are listed and provided with reclamation costs. The general approach and assumptions used in the calculation of the reclamation and closure costs appear reasonable and extensive.

- A sampling of Building Demolition showed reasonable agreement with published values for building demolition. However, these costs were extremely difficult to evaluate due to the nature of the information presented in the cost estimates.

- The cost of Adit and Raise Plugs compared favorably with cost estimates prepared for other mines.

- Alaska Pamphlet No. 600, September 1, 2007, was utilized to back-calculate selected labor categories to December 2003; and these values were determined to be approximately 8.8 percent higher than the values used in the December 2003 cost estimate.

- Equipment and Operating Costs were evaluated by comparing costs used in the December 2003 Cost Estimate with values from the 2008 Equipment Watch, Bluebook Rental Rates for selected pieces of equipment. Costs were adjusted for Alaska; and it was deduced that equipment costs used in the December 2003 Cost Estimate were approximately 73.5 percent low.

- An evaluation of equipment production rates produced mixed results with production values for some pieces of equipment being considered appropriate and others being relatively high. As with the demolition costs, the discrepancy may be easily explained if additional information on the cost estimate was available.

- The evaluation of the Post-Closure Water Treatment, Monitoring, and Site Maintenance compared the 2004 estimated water treatment costs with the costs that are currently being experienced by Pogo. Water treatment costs in the 2004 Cost Estimate were considered to be adequate. However, subjectively, the allowance for site monitoring seems low.

- The determination of appropriate Contractor Indirect Cost Factors consisted of the evaluation of published values and conventions. Suggested values for the following indirect cost factors are:

    - Mobilization and Demobilization: 5 to 8 percent of the direct costs.

    - Contractor Overhead and Profit: 15 percent of direct costs plus mobilization and demobilization.

    - Performance and Payment Bonds: 1.5 percent each applied to the sum of the Direct Costs, Mobilization and Demobilization, and Contractor Overhead and Profit.

    - Liability Insurance: 3 percent of the sum of the Direct Costs, Mobilization and Demobilization, and Contractor Overhead and Profit.

- Contract Administration: 4 to 5 percent of the total of Direct Costs and the Contractor Indirect Costs.

- Engineering Design and Construction: 4 to 6 percent of the total of Direct Costs and the Contractor Indirect Costs.

- Contingency: 8 percent of the total of the Direct Costs and the Contractor Indirect Costs.

- The 2003 and 2004 Cost Estimates do not include holding costs; nor do the Reclamation and Closure Costs presented in the 2006 and 2007 Annual Report. It was not established that this is a regulatory requirement.

- Revised Direct Costs for Reclamation and Closure were produced by adjusting the Labor, Material, and Equipment Costs in the December 2004 Cost Estimates. Increases in these cost categories were made by combining the ENR CCI with the differences that were determined from the analysis of the cost estimates. Using this methodology, the Direct Costs of a 2007 Revised Reclamation and Closure Cost were determined to be $27,138,766, which is approximately 28.8 percent higher than the Direct Costs for Reclamation and Closure presented in the 2006 and 2007 Annual Reports.

- Application of the factors for the Indirect Costs produced a Revised Reclamation and Closure Cost ranging from $39,723,867 to $41,915,528, which is 43.9 to 51.9 percent higher than the costs presented in the 2006 and 2007 Annual Reports.

3.9 Task 9 – Monitoring Program

Golder reviewed monitoring data related to various environmental and engineering programs over the term of these permits and determining if there are any gaps or significant trends in the data.

3.9.1 Geotechnical

Based on a review of the design documents, as-built report, OMS Manual (which includes the emergency action plan), 2007 periodic safety inspection (PSI), and a visual inspection of the facility, the RTP Dam and the dry stack tailings area appear to be in general compliance with the related permits.

3.9.2 Geochemical

Dry Stack Tailings

The drystack geochemistry program is described in detail in Appendix XIII of the QAPP. As stated in the QAPP, the objective of this program is "…to compare the nature of the tailings material to the test work and assumptions used for drystack design." This program includes analysis of tailings solids as well as development rock.

The program is conducted in accordance with the sampling and analytical specifications presented in the QAPP. The required QA/QC samples consist of one annual field duplicate and one annual field blank each for the tailings and development rock. Records indicate that the annual tailings duplicates have been collected, but not necessarily the annual duplicates for the development rock and the annual blanks for tailings and development rock. Data validation is conducted in EQWin.

The results for carbon species are presented by the laboratory (ALS Chemex) expressed as "%C" and "%CO2." In the Monitoring Reports, "%C" and "%CO2" are used to describe "carbon" and "total inorganic carbon", respectively. In reality, both sets of results appear to represent the total inorganic carbon content, with the only difference being the unit used for reporting.

Flotation Tailings Interstitial Water Program

The flotation tailings interstitial water program is described in detail in Appendix XII of the QAPP. As stated in the QAPP, the objective of this program is "…to compare the chemical nature of the tails material to the test work and assumptions used for drystack design."

The program is conducted in accordance with the sampling, analytical and QA/QC specifications presented in the QAPP. The required QA/QC samples, consisting of one annual duplicate and one annual blank, are collected. Data validation is conducted in EQWin, an environmental data management software program.

3.9.3 Groundwater

The groundwater monitoring program was evaluated according to the requirements described in Section 1.5.1.2 the Waste Disposal Permit (0131-BA002) and the Quality Assurance Protection Plan (QAPP) (Tech-Pogo April 14, 2006). Golder reviewed the environmental management and monitoring plans, the monitoring data and associated quarterly and annual monitoring reports, the QAPP; and interviewed the Pogo Environmental Coordinator, Stacy Staley. Groundwater monitoring wells were observed at all locations, except the location of MW99-216, which was a relatively remote sampling location.

The groundwater monitoring well locations and rationale is summarized in Table 15 below:

TABLE 15

GROUNDWATER MONITORING WELL LOCATION AND RATIONALE

Station ID	Monitoring Program Type and Location	Frequency and Monitoring Rationale/Purpose
MW99-213 (replaced with MW04-213) MW99-216	Trend monitoring downgradient of ore body	Semi-annually to monitor bedrock/country rock groundwater quality and elevation trends downgradient of the ore zones as mining proceeds
MW03-500 MW03-501 MW03-502	Detection compliance points down gradient of RTP	Quarterly to monitor to detect seepage from RTP
MW03-503 MW03-504	Detection compliance points down gradient of surface solid waste facility	Semi-annually to detect seepage surface solid waste facility
LT-009 (piezometer)	Trend monitoring of groundwater levels below drystack along Liese Creek	Quarterly to measure groundwater elevation trends as the solid waste facility expands
LL04-031 LL04-032	Trend monitoring between the Off-River Treatment Works Pond #2 and the Goodpaster River	Quarterly to monitor groundwater quality trends in alluvium downgradient between of pond and river

Table Information Reference: QAPP, Appendix V DQO Process: Groundwater Monitoring Program and Appendix XI DQO Process: ORTW Groundwater Monitoring Program, Tech-Pogo April 14, 2006

The analytical parameters per each groundwater monitoring location are specified in the QAPP in Appendix V DQO Process: Groundwater Monitoring Program and Appendix XI DQO Process: ORTW Groundwater Monitoring Program. Per the QAPP the objectives of the "detection" and "trend" monitoring programs are as follows:

> *"The objectives of the detection groundwater monitoring program are (1) to detect an exceedance of a water quality standard, for those parameters that have a natural condition exceeding the water quality standards, detect a statistically significant increase in concentration above the natural condition; and (2) to detect a statistically significant increase above background in water quality.*
>
> *The objective of the trend groundwater monitoring program is to monitor trends in groundwater quality and elevation."*

The detection and trend groundwater monitoring program has been conducted in general accordance to the Monitoring Plan and QAPP at the locations specified since the first quarter of 2005, based on a review of the monitoring reports. The monitoring results are presented in quarterly and annual reports for the years 2006 and 2007. In addition, the 2008 First Quarter Monitoring Report (Tech-Pogo May 28, 2008) was made available for review during the site visit. Appendix A & C tables in the 2008 report summarized the groundwater quality data for the quarter and Appendix B summarized the data graphically in time versus concentration charts. The electronic data set was provided for all the Appendices.

The Appendix B charts in the 2008 First Quarter Monitoring Report shows a comparison of the actual result of time to the water quality standards (WQS) since the first quarter 2005. This graphic comparison assists the reviewer in evaluating the results against the objectives of the detection monitoring results. The graphs indicate that the water quality standard or action limit as defined in the QAPP have not been exceeded with some minor and short term exceptions. Dissolved copper exceed the WQS during three quarters at the detection monitoring location of MW03-501 until a heat tape, that was apparently affecting water quality in the well, was replaced. The copper concentration dropped to near previous levels after the replacement.

Other exceedances of the WQSs were at trend monitoring locations (MW04-213 and MW99-216). The exceedances were typically for only one quarter and may have been a result of sampling technique. The Total Dissolved Solids (TDS) result has consistently exceeded the WQS at MW99-216. A general comment is that the data as presented in the monitoring reports do not readily allow the reader to evaluate if there is a trend developing in the data set. The information has been collected but there has not been a clear trend analysis completed except what the reader can generally determine from the graphical presentation of the data.

The well purge and sampling techniques described for each well appeared consistent and should provide representative water quality data with one exception noted for MW99-216. The purge and sample method used for this well has the potential to affect the water quality result for some parameters and potentially could affect the aquifer by introducing air into the sample and the

formation. This sampling method may be the reason for the inconsistent concentrations of some parameters detected in samples from this well. All the other groundwater wells are purged and the water sample obtained from the well using dedicated PVC tubing with a check valve located at the bottom of the tubing. The tubing is dedicated to avoid potential cross contamination and the water is withdrawn by moving the tube up and down. This purge and sample technique was identified as a consistent method with all the wells except, MW99-216 where an air-lift method is used to purge and sample groundwater.

The air lift method of extracting water from the well can result in samples that are not representative because of the water and air interaction. The measured field water quality parameters will be affected using the air-lifting technique, including pH, dissolved oxygen and specific conductance. Parameters tested at the laboratory can also be affected and the compressor used to introduce air into the well has the potential of injecting lubricating oil in to the sample and well. An additional risk is that the aquifer has a potential of being affected by air that escapes in the geologic formation altering oxidation–reduction conditions and potentially affecting water quality.

An additional concern for two trend monitoring points (MW04-213 and MW99-216) is that the well head protection is inadequate to eliminate the risk of surface water (i.e. snow melt) and potential debris from entering the well. The site visit at MW04-213 found the well casing extending about 1 ft or less above ground surface with an open top that was protected from precipitation by an over turned bucket. Pogo stated that the well head protection at MW99-216, which auditors did not visit, could be similar to MW04-213. All the other groundwater monitoring wells visited had adequate well head protection from foreign material entering the well.

3.9.4 Water Balance

The fluid management plan was evaluated according to the requirements described in Section 1.5.1.4 the Waste Disposal Permit (0131-BA002) and the QAPP, Appendix VI DQO Process: Fluid Management Plan. Golder reviewed the QAPP Fluid Management Plan, Water Balance data sheet provided by Pogo, and associated quarterly and annual monitoring reports. The fluid meter station at the RTP was observed.

Fluid management appears to be consistent with the Fluid Management Plan. Fluid transfers through the project are tracked using flow meters at appropriate points and the results are documented in the quarterly and annual monitoring reports. The water balance calculations demonstrate that the RTP has significant excess capacity allowing the operator flexibility in managing the project fluids and

minimizing discharges to the Off-River Treatment Works (ORTW). Discharges to the ORTW appear to be infrequent and of relatively low annual volume.

The only parameter or volume within the water balance equation that is not documented or calculated based on metered volumes is the "Run-off "parameter. This parameter apparently is an assumed value that is used to balance the water budget, and is not based on any specific measurement on a monthly basis. The "Run-off" parameter includes various components that cannot be metered such as groundwater flux in and out of the RTP, direct precipitation into the pond, evaporation, and storm water run-off, and the cumulative effect of the fluid meter range of accuracy that may be under or over report volumes or rates of flow.

The water balance calculation sheet was provided in electronic format by the operator. The focus of the review was the volume stored in the RTP versus its capacity. The review indicated that the RTP capacity was always more than adequate throughout the year.

The QAPP (Table VI-1 Water Balance) indicates that all of the fluid meters require accuracy checks on an annual basis. It is our understanding that the various meters used to track fluid transfers throughout the project are scheduled for calibration in 2008, but some have not been calibrated since startup. The components of the run-off parameter would be difficult to determine with certainty without significant monitoring of groundwater levels, and other hydrology studies, and a detailed weather tracking and measurement system. These additional hydrology studies may not be applicable considering the RTP appears to be operating with excess capacity without consistent discharges to the ORTW.

3.9.5 Surface Water and Effluent

Surface water and effluent monitoring programs were evaluated according to the requirements described in the NPDES Permit (AK-005334-1) and the Waste Disposal Permit (0131-BA002). Golder reviewed the environmental management and monitoring plans, the monitoring data, the QAPP, and the MTM system; and interviewed the Pogo Environmental Coordinator, Stacy Staley, and the DEC Permit Writer, Tim Pilon, during the site audit. Surface water and effluent monitoring programs are in compliance with the NPDES and waste disposal permit requirements. The Off-River-Treatment Works is functioning as permitted. There were some minor permit deviations due to changing natural conditions (pH, turbidity, flow) and were not related to discharge from Water Treatment Plant.

Pogo conducts discharges from Outfall 001 and Outfall 002 into the waters of the Goodpaster River as allowed under the NPDES permit. Outfall 001 and Outfall 002 are located at the treated effluent stream of the ORTW and the STP, respectively, after the last treatment unit prior to discharge into the river. Pogo weekly monitors discharges at Outfall 001 and Outfall 002 as required in the NPDES permit. Golder reviewed ORTW and STP effluent quality data to verify compliance with NPDES requirements and evaluate STP and ORTW operation performance. STP and ORTW operate according to permit requirements.

Internal monitoring to Outfall 001 is conducted quarterly at Outfall 011, located after the WTP located near the 1525 Portal and prior to the flow entering the ORTW. Natural conditions of the Goodpaster River are also monitored at Outfall 001b within an hour of the effluent sample at Outfall 001. Outfall 001b is located above any disturbance caused by the mine facility, upstream of the convergence with Liese Creek. Pogo is not discharging any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the Goodpaster River.

Pogo collects STP influent samples at STP002 to weekly measure $BOD_{5,}$ Fecal Coliform, Nitrates, Chlorine and Total Suspended Solids (TSS) to monitor the STP performance. Percentage removal for those parameters are evaluated as required under the NPDES Permit and submitted to the EPA and DEC in the monthly Discharge Monitoring Reports (DMR) in March, June, September, and December. Copies of the DMRs submitted to the agencies were reviewed to verify compliance with the NPDES Permit.

Chronic toxicity tests (Whole Effluent Toxicity (WET) testing) of Outfall 001 effluent are conducted annually, every June. Toxicity tests are conducted to characterize and measure the absolute chronic toxicity of Outfall 001 and measure compliance with WET triggers. Toxicity analyses are performed by CH2MHill's Aquatic Toxicology Laboratory in Corvallis, Oregon. A split of the annual sample is also sent to ENSR Laboratory in Fort Collins, Colorado, to verify the accuracy of the laboratory analyses. No chronic toxicity for Ceriodaphnia Dubia and Fathead Minnow, the two test organisms, was detected in the 2006 and 2007 toxicity tests. All the results indicated toxicity values equal to 1.0 TU_C, well under the toxicity trigger of 2 TU_C specified in the NPDES Permit.

In addition, Pogo conducts surface water quality sampling at four Goodpaster River monitoring stations (SW01, SW15, SW41 and SW42) to monitor changes that may occur as a result of activities associated with the discharges from Outfall 001 and Outfall 002 and assure that the state water quality standards are met. SW01 and SW15 are located above and below all project facilities, respectively. SW41 is located below the confluence with Liese Creek and SW42 is below Outfall002 on the Goodpaster River. Samples are taken six times a year: two times in winter (in late February to mid-

March and in December) and summer (in June and August), and one time in late spring (in May) and late fall (in September). Surface water quality sampling activities began in mid-May 2004 and will continue through post-closure. Surface water quality monitoring and analyses are conducted following the procedures described in the QAPP.

In order to assess long term trends in the Goodpaster River, fish tissue monitoring is conducted to monitor metals concentration in fish tissues at two stations, one upstream (SW01) and the other downstream (SW12) from the project facilities. Pogo conducts the annual monitoring by collecting and analyzing whole bodies of 10 juvenile Chinook salmon in late September.

Pogo has developed a QAPP according to the EPA Requirements for Quality Assurance Project Plans (EPA/QA/R-5) and the EPA Guidance for Quality Assurance Project Plans (EPA/QA/G-5). The QAPP was approved by both the EPA and DEC. The plan was reviewed to verify compliance with monitoring requirements, action limits and data verification and validation.

Surface water and effluent sampling is conducted according to the schedule and at the station locations described in the NPDES Permit, the Solid Waste Monitoring Plan and the QAPP. Effluent and surface water samples are analyzed for the parameters and in conformance with the EPA methods described in the Solid Waste Monitoring Plan and the QAPP. STP influent and effluent samples are submitted to Analytica Laboratories. Surface water quality samples are submitted to TestAmerica Laboratories Inc. in Oregon.

Surface water and effluent monitoring results are appropriately validated using the QA/QC procedures described in the QAPP (e.g., blanks, duplicates, relative percent difference (RPD) values) and using the EQWin Data Manager program. EQWin Data Manager is a Teck Cominco's software designed to meet requirements for the collection, storage, analysis and reporting of environmental data.

EQWin monitoring records reviewed by the auditors included the date, exact place and time of sampling; the name of the individual who performed the sampling; the date the analyses were performed; the name of the person responsible for performing the laboratory analysis; the analytical techniques used in the laboratory; and the analysis results.

The EQWin database stores monitoring records from 2004 to the present. In addition to those records, Pogo retains all the monitoring records including calibration and maintenance records, laboratory reports, and copies of the monitoring reports and DMRs for a period of at least five years

from the date of the sample, measurement or report. Pogo maintains all the monitoring information used for the application of the NPDES Permit.

Pogo submits quarter and annual reports to the DNR Division of Mining, Land and Water, DEC and the EPA summarizing the inspection and environmental monitoring results to fulfill the requirements of the DEC Waste Disposal Permit (0131-BA002) and the EPA NPDES Permit (AK005334-1). In addition Pogo submit monthly DMRs, signed and certified by the Pogo authorized agent (Karl Hanneman), to the DEC and EPA. Copies of the 2006 and 2007 DMRs and quarter and annual reports submitted to the agencies were reviewed to verify compliance with this item.

Pogo has reported any occurrences of non-compliance with the NPDES Permit to the EPA and DEC by phone within 24 hours from the time Pogo became aware of the non-compliance and in writing within 5 days after a non-compliance issue was verified. Incident reports including the cause, source of the permit exceedance and correctives actions were submitted to the DEC and EPA, and were reviewed by Golder during the Environmental Audit.

Table 16 summarizes the NPDES permit non-compliances reported to EPA and DEC by Pogo in 2006 and 2007, including the date and cause of the non-compliances and their corrective actions. Golder reviewed the 2006 and 2007 environmental monitoring data to verify that the issues described in Table 16 were the only permit exceedances occurred in 2006 and 2007.

TABLE 16

NPDES PERMIT NON-COMPLIANCE ISSUES

Location/ Monitoring Station	Date	Non-Compliance	Corrective Actions
ORTW	June 28, 2006	ORTW effluent turbidity was 0.5 NTU higher than the 5 NTU allowable effluent increase over the Goodpaster River natural condition.	No discharge from the WTP into the ORTW until ORTW performance returned to normal conditions.
ORTW	10 days in September and 1 day in October, 2006	Dilution ration at the ORTW exceeded the permit limit of 25.	Operator and programming error. Problems were fixed.
ORTW	May 30, 2007	One weekly sample exceeded by 0.1 NTU the 5 NTU allowable increase over the Goodpaster River natural condition.	A major storm of 1.7 inches of rainfall occurred over the previous 3 days of the non-compliance issue. No WTP water was discharged to the ORTW until ORTW performance returned to normal conditions.

Location/ Monitoring Station	Date	Non-Compliance	Corrective Actions
ORTW	June 7, 2008	Flow rate exceedance of 4,900 gpm.	Exceedance occurred as a result of a rain event that caused the river to rise 2.5 feet. No WTP water was discharged to the ORTW until ORTW performance returned to normal conditions.
ORTW	October 31, 2008	A weekly sample showed a pH of 6.32 units as compared to the lower permit limit of 6.5 pH units.	No WTP water was discharged to the ORTW until ORTW performance returned to normal conditions.
STP	May 19, 2006	Discharge of partially treated sewage for approximately 1 hour.	Plant was prematurely reenergized after a schedules power outage. STP discharge was immediately halted until plant performance returned to normal conditions.
STP	December 6 and 13, 2006	Two STP effluent samples were above the 400#/100 mL permit limit for fecal coliforms (800 and 2110 #/100 mL, respectively).	STP discharge was immediately halted until plant performance returned to normal conditions.
STP	February 07, 2007	One STP effluent sample was above the 400#/100 mL permit limit for fecal coliforms (17,500 #/100 mL) and above the BOD permit limit of 45 (56.1).	STP discharge was immediately halted until plant performance returned to normal conditions.
Goodpaster River	September 26, 2006	One water sample results from SW42 in WAD CN value of 5.5 ppb as compared to the 5.2 ppb criteria.	No discharge from the STP and ORTW into the river during the prior two weeks.
Goodpaster River	September 2, 2006	pH at SW42 was below the 6.5 criteria.	

3.9.6 Biological Visual Survey

Pogo performs biological visual survey to monitor wildlife interaction with the surface waste disposal facilities in order to evaluate impacts that operations may have on wildlife. Solid waste truck drivers record wildlife sightings in and near the solid waste facility, using a biological observation forms prepared by the Environmental Department. The observation criteria include observer, location (e.g., dry-stack tailings facility and RTP), habitat, weather, date and time of observation, and individual numbers, species sex, species activity and species age. The Environmental Departments keeps the biological visual survey records. Any wildlife mortalities that are observed will be notified to the Alaska Department of Fish &Game (ADF&G). No mortalities have been observed on the Pogo mine site.

3.9.7 Cyanide Concentrations CIP-Paste

The DEC permit 0131-BA002 requires that the carbon-in-pulp (CIP) tailings undergo cyanide destruction after the gold is recovered from the ore in the CIP tanks and before they are sent to the paste plant for use as backfill material. After cyanide is destroyed, the CIP tailings are stored in the CIP stock tank prior to being sent for mixing with cement and used for backfill in the mine. Samples are taken prior to mixing to confirm cyanide destruction. The permit requires that at least 90% of the samples contain less than 10 mg/L of WAD cyanide and none of the samples contain more than 20 mg/L of WAD cyanide. Pogo has a standard of operating procedure (SOP) that includes sampling procedures for measuring WAD cyanide concentration prior to paste mixing. This SOP was reviewed.

During 2006, 97% of the CIP stock tank samples were less than 10 ppm of WAD cyanide. During the year, three samples were over 20 ppm of WAD cyanide. Two of these samples were attributed to sampling error. On September 16, 2006 a sample was reported as 30.2 ppm WAD cyanide and associated three samples were above 10 ppm WAD cyanide. A mechanical problem and plugged feed line in the sodium metabisulfite reagent addition system was determined to be the cause. Pogo designed and installed a new reagent metering and control system to minimize recurrence of this type of problem. Review of monitoring data since the installation indicates that the new system is effective.

During 2007, 96% of the CIP stock tank samples were less than 10 ppm of WAD cyanide and none were greater than 20 ppm WAD cyanide. Sampling records for the first quarter of 2008 reported that 100% of the CIP stock tank samples returned values of less than 10 ppm. Daily records from the mill to the environmental department were checked against values reported in the quarterly and yearly report. The values were reported correctly. The mill operator completes a "Paste Pour Sheet Summary" form prior to paste mixing that includes recording the WAD cyanide concentration for that pour number.

Pogo is in compliance with the DEC permit 0131-BA002 by monitoring and controlling the WAD cyanide concentrations of the CIP tailings prior to paste backfill use.

3.9.8 Development Rock Segregation and Tracking

Golder evaluated the effectiveness and compliance of Teck-Pogo's waste rock operational characterization and handling with the Pogo Development Rock Segregation and Tracking Procedure. The development rock segregation program is described in detail in Appendix VIII of the QAPP. As stated in the QAPP, the objective of this program is "…to segregate the rock at the approved

concentrations." The program generally is conducted in accordance with the sampling, analytical and QA/QC specifications presented in the QAPP. Development rock segregation is conducted based on arsenic and sulfur content to ensure that mineralized development rock is disposed of in a manner that prevents potential environmental impacts. The following was noted during the site visit:

1. Contrary to the description of the development rock segregation and tracking procedures, no signage or picketing was observed in the muck bays during the underground visit, which included the L1E and L2E upramps and downramps. Three partially filled muck bays and one full muck bay were inspected (Photo 11). It should be noted that partially filled muck bays might have been in development. The ventilation system was inactive and mine operations had largely stopped during most of the underground visit.

2. During surface area placement, overlap between piles may occur, potentially resulting in overlap between green (non-mineralized) and red (mineralized) material (Photo 12). Also, not all surface piles contained flags. In a conversation with a dozer operator, the following quote was presented: "when in doubt, red it out". This implied the following:

    a. Unflagged material is considered red; and

    b. In the case of overlapping red and green piles, only the core of the green pile is handled as green, with the remainder being considered red.

3. There is no control on the final disposition of development rock on the drystack. The general placement area is supposed to receive the red material, with the green material reporting to the shell or used for drain construction. Although the potential for misplacement is very minor due to the obvious differences in destination, incorrect placement cannot be ruled out.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Dry Stack Tailings Facility

Based on our findings regarding the dry stacktailings facility, we have the following comments and recommendations related to geotechnical engineering and geochemistry:

- The OMS Manual should be updated to include changes in site personnel, tables, figures, operations, and surveillance. The revised manual should be issued to the Alaska Department of Natural Resources Division of Mining, Land and Water Appraisal Unit..

- Use of compacted non-mineralized development rock instead of compacted tailings for the shell is likely to improve the slope stability of the facility. We recommend that continued placement of compacted non-mineralized development rock be performed according to the rockfill toe berm specifications listed in Figure B00421-200-004 of the OMS Manual.

- Although the structural aspects of the dry stack tailings facility are not a concern under the present operations, physical parameter tests such as grain size distribution, Atterberg limits, standard proctor, and moisture-retention are important for the tailings placed in the general placement area. These tests are relatively inexpensive and will be useful to confirm design values, for future FSRs, and will help understand and prevent possible trafficability issues related to compaction and moisture content. The triaxial testing schedule should resume after mill produces more consistent results.

- Although use of one foot of compacted dry stack tailings instead of the minimum two feet over the mineralized development rock may not likely affect the water quality after closure (provided the facility is capped as designed), we have not been able to verify this statement. We were not provided physical characteristic test results of the tailings to verify this.

- Pogo and the DNR should reconcile the difference in the design and operational changes and document the decision in their files.

- Annual and three-year geotechnical inspections should be performed.

- QA/QC samples of the dry stack geochemistry should be collected at the frequency identified in the QAPP. It is further recommended that analysis of field blanks not be included in the QA/QC program, but analysis of field duplicate samples only.

- In future Monitoring Reports, it is recommended to change the reporting for both results to “total inorganic carbon”, with units of “%C” and “%CO2”, respectively. Alternatively, one of the two analyses can be eliminated.

4.2. Recycle Tailings Pond (RTP) Dam

Based on a review of the design documents, as-built report, OMS Manual (which includes the emergency action plan), 2007 periodic safety inspection (PSI), and a visual inspection of the facility, the RTP Dam appears to be in general compliance with the related permits. Based on our findings we have the following comments and recommendations:

- Erosion was noted along the spillway flume where the diversion ditch outlet discharges into the flume (Photo 13). This problem has been mitigated by installing an elbow at the discharge point to direct the drainage ditch flows into the flume. We recommend repairing the washout area during routine maintenance operations.

- Some HDPE pipe that was used during construction is partially blocking the spillway and flume, which could potentially reduce the flow capacity. We recommend removing this HDPE pipe during routine maintenance operations.

- We recommend performing the additional work identified in the 2007 PSI including repairing or replacing the pressure transducer located on the upstream pumps and installation of a fixed gauge to manually monitor the water elevation. Currently the water elevation is determined by survey stakes located on the upstream side of the RTP (Photo 14).

4.3 Development Rock Segregation

- Underground use of signage and picketing needs to be conducted in accordance with the development rock segregation protocols. Although the origin of unmarked material in muck bays can be traced based on drilling and other records, use of proper signage will reduce the potential for incorrect classification and disposal/use.

- Overlap between piles of non-mineralized (green) and mineralized (red) development rock should be avoided in surface placement.

- A “reminder” should be provided on the drystack with regard to the proper placement of mineralized (red) and non-mineralized (green) development rock. This could be as simple as having green and red stakes in the respective dumping locations.

- The reference to lead analysis for the development rock is in error in the QAPP and should be corrected in future versions.

- XRF and monitoring results for development rock from the drystack should be compared on a quarterly basis for quality control by including XRF analysis of the quarterly composites of development rock.

4.4 Laboratories and Sample Analysis Procedures

The current XRF analysis does not meet the QA/QC requirements as set forth in the QAPP. It is recommended that analysis of the standard be continued, while analysis of a duplicate sample should be re-introduced. It is further recommended that duplicate results be evaluated using the RPD approach.

4.5 Surface Water and Effluent Monitoring

Golder recommends that Pogo develops and includes procedures for trend analysis and interpretation in its QAPP to evaluate changes in water quality parameters over time. Procedures may include purpose of the statistical analysis, procedures to evaluate the overall pattern of change in a parameter over time, and statistical methods to be used. DEC stated during the audit interview, that the graphs that Pogo submits in the Annual Activity and Monitoring Reports are excellent at displaying trends. However, on a case-by-case basis, DEC may request further statistical analysis of any parameter when a graph suggests a troubling trend.

4.6 SPCC Plan

Based on our findings regarding the Spill Prevention Control and Countermeasure (SPCC) Plan, we have the following comments and recommendations:

- We recommend providing secondary containment for all 55-gallon drums that contain oil or oily water.

- We recommend providing the necessary overfill prevention measures for all double-walled or double-bottom tanks without tertiary containment to comply with EPA Memorandum OSWER 9360.8-38. Pogo is in the process of installing overfill protection on these tanks. They estimate the work to be completed by August 31, 2009.

- We recommend repairing the damaged tertiary containment liner for AST-2 or provide the necessary overfill prevention measures to comply with EPA Memorandum OSWER 9360.8-38.

- We recommend monitoring the interstices of double-wall and double-bottom tanks to verify that no water or oil is present, and the primary tanks have not been compromised. This may be done using water-finder or oil-finder paste. Some tanks, such as AST-50, may require installing a plug on the top of the tank to monitor the interstice.

- We recommend implementing specific methods to verify the operation of the liquid level sensing gauges and include this check as part of the periodic inspections.

- We recommend updating the SPCC Plan to include the changes/upgrades noted above as well as all methods for handling and controlling water in open secondary containment that may have oil sheen.

4.7 Groundwater

Groundwater monitoring appears to be conducted per the requirements of the Waste Disposal Permit and the QAPP. Actual exceedences of water quality standards at the detection monitoring compliance points have been infrequent, of limited duration and likely a result of a variation in sampling technique. At one location the exceedence was apparently the result of copper leaching from a heat tape.

One concern is that the water quality results from the trend monitoring locations (i.e. MW04-213 and MW99-216) may not be representative of natural conditions. The purge and sampling technique (i.e. air-lifting) at MW99-216 (the air lifting technique is not used at MW04-213) allows air to contact the water sample. In addition, there is a potential for the groundwater to be affected by air escaping into the formation, and potential for small amounts of oil from the compressor to affect the sample.

The water quality data presented in the monitoring reports for detection monitoring does not appear to be any statistical evaluation or trend analysis except what is presented in the concentration plots in the 2008 First Quarter Monitoring Report.

A chemist should be consulted to determine what previously collected water quality data was potentially affected by the air-lift purge and sample method and appropriate data qualifier flags added to the database as need. Alternative purging and sampling methods should be considered to eliminate the air to water contact. Future monitoring reports should include a statistical evaluation for significant water quality parameters changes or trends as discussed in the Surface Water Monitoring Sections of this report.

4.8 Fluid Management

Fluid management appears to be consistent with the Fluid Management Plan. The water balance calculations demonstrate that the RTP has significant excess capacity allowing the operator flexibility in managing the project fluids and minimizing discharges to the Off-River Treatment Works. Discharges to the ORTW appear to be infrequent and of relatively low annual volume.

The "Run-off" parameter in the water balance equation includes various components that cannot be metered such as groundwater flux in and out of the RTP, direct precipitation into the pond, evaporation, and storm water run-off, and the cumulative effect of the fluid meter range of accuracy that may be under or over report volumes or rates of flow. The components of the run-off parameter would be difficult to determine with certainty without significant monitoring of groundwater levels, and other hydrology studies, and a detailed weather tracking and measurement system. These additional hydrology studies may not be applicable considering the RTP appears to be operating with excess capacity without consistent discharges to the ORTW.

Fluid meters should be calibrated on annual bases as specified in the fluid management plan. The factors that contribute to the "run-off" component used to balance the water budget should be more clearly identified in the monitoring reports, and the magnitude of each should be approximated, if possible, so any error range in the water balance can be estimated.

4.9 Secondary Containments

Secondary containment for all process tanks and pipelines is required for the Solid Waste Disposal Permit. Pogo has appropriate secondary containments for all process facilities except the CIP tailings storage tank and associated pipelines to the paste plant. It is recommended that engineered secondary containments are constructed and maintained for this part of the process circuit. This may include expansion of the stem-walled concrete for the tank and pipe-in-pipe containment for the pipelines.

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"Pogo Inspection Report, General Inspection of Road and Mine Site," prepared for Teck-Pogo, Inc. by the Alaska Department of Natural Resources, Division of Mining, Land and Water, dated May 21, 2008.

"Pogo Inspection Report, General Inspection of Mine Site," prepared for Teck-Pogo, Inc. by the Alaska Department of Natural Resources, Division of Mining, Land and Water, dated June 12, 2007.

"Pogo Inspection Report, Material Site Inspection and General Inspection of Mine Site," prepared for Teck-Pogo, Inc. by the Alaska Department of Natural Resources, Division of Mining, Land and Water, dated July 13, 2006.

"Pogo Inspection Report, General Inspection of Mine Site and Access Road Construction Activity," prepared for Teck-Pogo, Inc. by the Alaska Department of Natural Resources, Division of Mining, Land and Water, dated July 26, 2005.

"Pogo Inspection Report, General Inspection," prepared for Teck-Pogo, Inc. by the Alaska Department of Natural Resources, Division of Mining, Land and Water, dated September 29, 2005.

"Pogo Inspection Report, General Inspection of Mine Site," prepared for Teck-Pogo, Inc. by the Alaska Department of Natural Resources, Division of Mining, Land and Water, dated October 16, 2007.

"Pogo Inspection Report, Inspect condition of Winter Trail from Quartz Lake to Goodpaster River (GP 9)," prepared for Teck-Pogo, Inc. by the Alaska Department of Natural Resources, Division of Mining, Land and Water, dated December 31, 2003.

"Inspection Report Pogo Mine Advanced Exploration Project," prepared for Teck-Pogo, Inc. by the Alaska Department of Environmental Conservation, Division of Air and Water Quality, dated September 23, 2002.

"Site Visit Report Pogo Mine Site," prepared for Teck-Pogo, Inc. by the Alaska Department of Environmental Conservation, Division of Water, dated August 10, 2004.

"Site Visit Report Pogo Mine," prepared for Teck-Pogo, Inc. by the Alaska Department of Environmental Conservation, Division of Water, dated June 12, 2007.

"Site Visit Report Pogo Mine," prepared for Teck-Pogo, Inc. by the Alaska Department of Environmental Conservation, Division of Water, dated October 16, 2007.

FIGURES

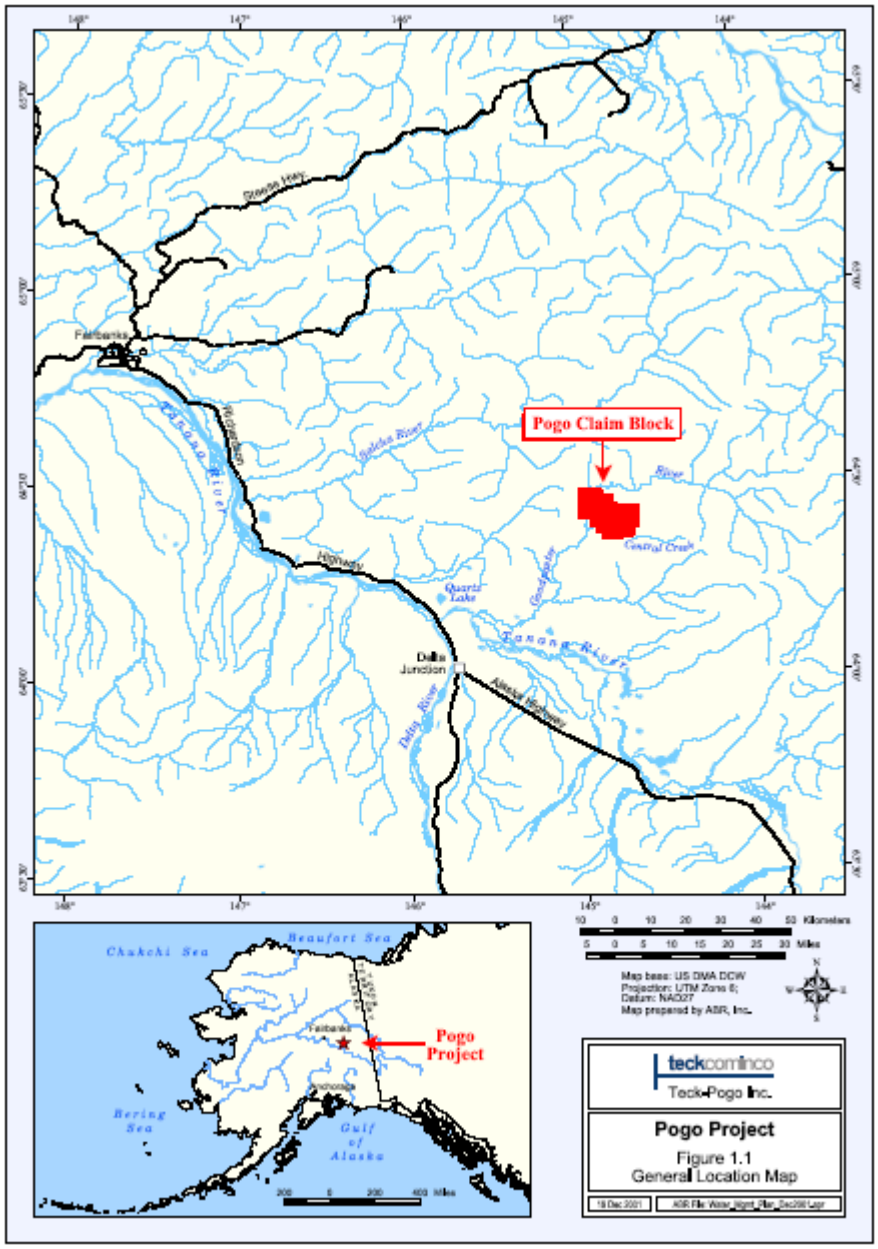

Figure 1. General Location Map.

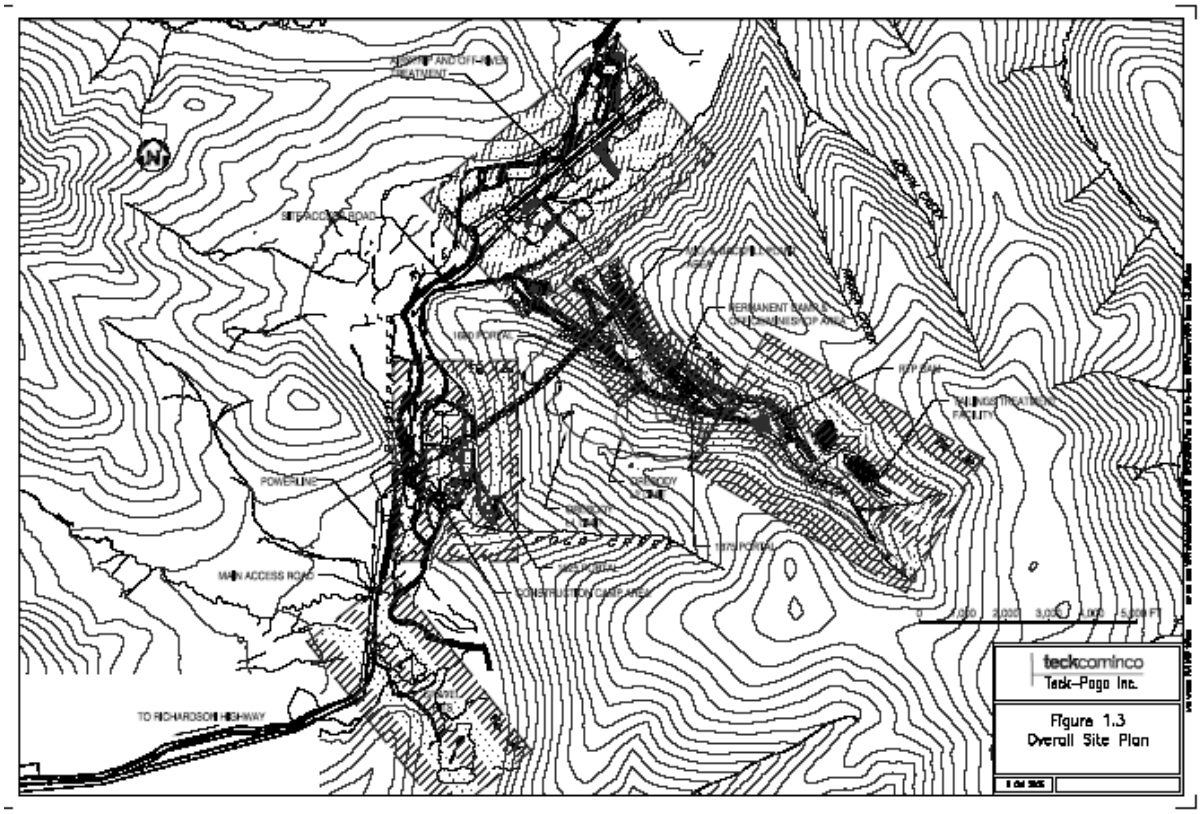

Figure 2. Overall Site Plan

APPENDIX A

AGENCY INTERVIEWS

APPENDIX A

AGENCY INTERVIEW SUMMARY

Interview: Brent Bailey, P.E., CEA, with Steve McGroarty, P.E., Mining Engineer, DNR, Large Mine Section Manager:

Date: June 13, 2008

- Steve and I initially discussed the general features of Pogo reclamation and closure cost estimates. I told Steve that Pogo is in the process of developing a new cost model. Steve felt that the audit should focus on the historical data that had been submitted to the agencies. The agencies have not seen anything on the new model and any discussion of that would be difficult to evaluate. Any discussion of the new model should clearly distinguish it from the historical calculations.

- Steve stated inflation needs to be factored into the model. He mentioned that an Irrevocable Letter of Credit does not generate interest; therefore the amount of the financial assurance remains fixed until adjusted by the company.

- Steve suggested that Mobilization/Demobilization costs should be calculated rather than based on a percentage. Percentage does not work very well in Alaska.

- Steve stated that assumptions and unit costs need to be supported with sources of information. He suggested an appendix in the Reclamation and Cost Estimates that describes the sources of information.

- Steve stated that if Pogo wants the new cost model discussed in the audit report then they should provide a working version for review – either on a transportable drive or a CD. It will be import to substantiate or demonstrate how it works.

- Steve emphasized that the questions in the RFP were related to historical submittals of the Reclamation and Closure Cost Estimate to the State. Pogo needs to provide back-up for the costs in the cost estimate.

- The method of calculating the indirect costs as percentages of the direct costs needs to be reviewed. RS Means can be used for determining Overhead and profit. The Fort Knox Reclamation and closure cost used 15 percent.

- There was some mention of the use of the Forest Service Bonding Guidelines.

Interview: Pamela Stella, P.G., C.E.A., and Ivon Aguinaga, Engineer, with Mr. Tim Pilon, the DEC Permit Writer.

Date: June 13, 2008.

- He is responsible for evaluating the surface water and effluent monitoring data submitted by Pogo to DEC in the monthly DMRs, and quarter and annual activity and monitoring reports. He also verifies compliance with the requirements of the NPDES Permit and Waste Disposal Permit.

- He has visited the mine site three times.

- Pogo sends the monitoring reports to DEC on time and has reported any non-compliance issues with the NPDES permit by phone within 24 hours and in writing within 5 days after a non-compliance issue was verified. He is in charge of reviewing the notice of violations (NOVs) and following up the implementation of corrective actions.

- He has not noticed any significant surface water or effluent quality issues at the mine site.

- Pogo is in compliance with the NPDES and Waste Disposal permits.

- He said he has not gotten a chance to review the QAPP.

- He has good open communication with Pogo and will call Karl, Donna or Stacey with any questions or comments he has.

- Mr. Pilon had an intern with him who discussed the report filing system.

- He stated that some mines may under report spills but that Pogo does report all spills.

- He reviews the water quality reports from the site. The reports are easy to interpret and are complete. He requested that Pogo provide the water quality monitoring data in a statistical analysis format. Pogo complied.

Interview: Pamela Stella, P.G., C.E.A., and Jack Winters, the DNR Habitat.

Date: June 13, 2008.

- He has been involved in the project since 1996. His involvement resulted from the project's need for water supply from the Goodpaster River. He conducted site inspections every 2 weeks during construction to verify the implementation

of the best management practices related to water abstraction and sedimentation control.

- Since the completion of construction, he conducts yearly inspections. His last site inspection was in May 2008. He identified the need for improvements on the mud sills on some of the bridges. Reports that he writes get issued to the agencies and to site.

- He stated that communication with the site is open and is issue driven. He also stated that if there are any water related issues, the DNR would communicate with him.

Interview: Ivon Aguinaga, Engineer, with Johnny Mendez of the DEC Division of Environmental Health.

Date: June 13, 2008. Mr. Mendez made the following points:

- He is aware that the Pogo's certificate to operate the two potable water treatment plants has expired. He has been in contact with Pogo to discuss the status of the certificate renewal application and answer any questions related to the renewal process.

- He said that Pogo has received internal approval to operate the treatment systems, but that Pogo still needs to submit to the DEC additional information to demonstrate that the corrosion control systems recently installed in the plants are working properly and that the filter upgrading has been performed. After DEC receives and reviews this information and the application for the renewal of the certificate to operate the treatment plants, the program can provide final approval.

Interview: Steve Anderson, P.E., Geotechncial Engineer, with Mr. Charlie Cobb, Chief Engineer DNR.

Date: June 17, 2008.

- He conducts site visits occasionally when his schedule permits or as the need arises. His last site visit was after construction of the recycle tailings pond dam (RTP) in 2006.

    - Teck-Pogo does a good job of cooperating with Dam Safety.

    - RTP Dam is currently in compliance with State of Alaska regulation with a recently issued "Certificate of Approval to Operate a Dam."

- He was involved with reviewing the dry stack tailings facility during preliminary permitting reviews as part of the Mining Group.

    - He has limited record of the dry stack tailings facility design in his files, but no record of construction.

    - The dry stack tailings facility is not under his jurisdiction as it is not a dam.

    - According to the Pogo Mine Solid Waste Permit, he is supposed to review and approve the Operations and Maintenance Manual for the dry stack tailings facility. According to his file system, he has not received the dry stack tailings facility Operations and Maintenance Manual for review. However, he does not need to review because it is not under his jurisdiction.

Golder telephone interviewed Victor Ross of the Corps of Engineers. Mr. Ross was involved in the wetlands permitting and some additional compliance review until he changed positions. Mr. Ross had the following points:

- Mr. Ross thought there have been no Corps issues with the Pogo project since operations were permitted.

- Mr. Ross suggested contacting Don Rice , Corps North Section Team Leader and now the compliance Corp person for the Popo Project.

Golder telephone interviewed Don Rice of the Corps of Engineers. Mr. Rice is the current compliance person for the Pogo Project. Mr. Rice comments are as follows:

- The project has been visited several times over the last couple of years with no violations found or other significant issues.

- Mr. Rice commented that the project is better than most and there has been no "red flags" raised about the project.

APPENDIX B

PHOTOGRAPHIC LOG

Photo 1: Upstream Shell of Dry Stack Tailings Constructed from Non-mineralized Development Rock.

Photo 2: Rock Placement and Tailings Compaction at the Drystack Tailings Area. Mineralized Rock Entombed inside the Dry Tailings at the Drystack Tailings.

Photo 3: Secondary Containment System for Ast-1 and Portable Tanks and Drums. Note: Drums on Pallet near Front of Ast-1 are outside of Secondary Containment.

Photo 4: AST-50 showing no Access Plug to Monitor Secondary Tank Interstitial Space.

Photo 5: Sediment Accumulation in Sediment Pond in Material Site A.

Photo 6: Sediment Buildup in Interior Road Ditch near Mill.

Photo 7:Sediment Pond Located above Discharge Point SW21B

Photo 8: Sediment Accumulation Pond at the Construction Camp. Removed Sediment is Piled adjacent to Pond.

Photo 9 : CIP Tailings Storage Tank Located outside of the Paste Plant. Lack of Adequate Secondary Containment.

Photo 10: Overhead Pipelines Delivering Tailings from the Cyanide Destruction System in the Mill to the CIP Tailings Storage Tank. Lack of Secondary Containment.

Photo 11: Muck in the Underground

Photo 12: Mineralized Rock (Right) and Non-mineralized Rock (Left) Segregation with Flagging.

Photo 13: Erosion along RTP Dam Flume Spillway from Diversion Ditches Discharge Outlet.

Photo 14: Upstream Side of RTP Dam with Survey Stakes to Determine Impounded Water Elevation.