

Environmental Compliance and Management Systems Audit

Fort Knox and True North Mines

Report Submitted to

State of Alaska Department of Environmental Conservation

State of Alaska Department of Natural Resources

State of Alaska Department of Fish and Game

Fairbanks Gold Mining, Inc.



Report Prepared by



SRK Consulting (U.S.), Inc.

73400.070

May 2012

Environmental Compliance and Management Systems Audit

Fort Knox and True North Mines

Fairbanks Gold Mining, Inc.

#1 Fort Knox Road
Fairbanks, AK 99712

SRK Consulting (U.S.), Inc.

4710 Business Park Blvd, Suite F-40
Anchorage, AK 99503

Tel: 907.677.3520 Fax: 907.677.3620

SRK Project Number 73400.070

May 2012

Executive Summary

SRK Consulting (U.S.), Inc. (SRK) was retained by Fairbanks Gold Mining, Inc. (FGMI) to perform an environmental audit of the Fort Knox and True North mines located in the Fairbanks North Star Borough, approximately 26 road miles northeast of Fairbanks, Alaska as shown on Figure 1. The Request for Proposal (RFP) for this audit was issued by FGMI on April 21, 2011, in coordination with the State of Alaska Department of Environmental Conservation (ADEC), State of Alaska Department of Natural Resources, Division of Mining, Land, and Water (ADNR), and the United States Army Corps of Engineers (USACE), referred to subsequently as “the agencies”.

The work associated with this environmental compliance and management systems audit was directed by Alaska Department of Natural Resources (ADNR), in conjunction with Alaska Department of Environmental Conservation (ADEC) and U.S. Army Corp of Engineers (USACE). FGMI was responsible for all financial obligations associated with the audit, in addition to soliciting proposals, hosting site visits, providing reports, answering technical questions, and participating with the agencies in the audit. The agencies and FGMI selected SRK to conduct the audit and prepare a report of the findings. The site visit for the audit was conducted at the Fort Knox and True North mine sites and in the offices of ADNR from August 8 to August 11, 2011.

The purpose of the audit is to determine if Fort Knox Mine’s environmental management systems and the regulatory controls in place provide reasonable assurances that the environmental objectives in the Plan of Operations and relevant permits and approvals are being met and that the systems and controls are functioning as intended. The audit results will be used by FGMI and the agencies to assist in updating, renewing, or issuing approvals and permits, in updating policies, environmental management plans and procedures, in determining compliance with permits and approvals, and in evaluating the adequacy of the financial assurance.

SRK’s role was not to solve issues but to bring them to light. The following sections present SRK’s conclusions assessing if these objectives were met. Recommendations are also presented to aid the agencies and FGMI in further attaining their environmental compliance objectives.

Conclusions

Fort Knox Mine

- FGMI is in substantial compliance with those environmental permits and authorizations reviewed as part of this audit and appears to be very diligent in their operations.
- Heap rinsing studies need to be completed to better assess the Closure Plan and reclamation cost estimate FGMI is currently developing a plan to address heap rinsing;
- FGMI need to complete tailings consolidation study to assess trafficability of heavy equipment on the TSF.
- State agencies and USACE need to come to an agreement for the closure requirements for the Fort Knox TSF.
- The Fort Knox tailings are exhibiting elevated levels of arsenic and antimony in MWMP testing.
- TSF seepage collection and monitoring systems appear to be functioning according to design based on the currently available data and in compliance with permit conditions.
- The current pit lake model is generally appropriate and provides a reasonable indication that concentrations in spill water will not exceed current water quality standards.
- A few administrative compliance deadlines were missed, but overall operational compliance is above industry standards.
- Environmental health and safety procedures in place with the environmental management system and cyanide code certification demonstrate pro-active management of the Fort Knox Mine.
- The reclamation schedule is very focused with limited flexibility to address uncertainties, i.e., changing water quality, unpredictable changes in climate, variability in exposed pit wall, tailings, and waste rock dump mineralogy.
- The reclamation cost estimates appear to be adequate to cover surface reclamation as proposed; however, the uncertainties surrounding long-term water quality and management,

i.e., treatment, pumping, etc. are not clearly defined and may be substantially underestimated.

True North Mine

- Surface reclamation in particular recontouring and revegetation has been successful, with some minor exceptions:
 - Differential settlement due to permafrost melting within the waste rock dumps resulted in surface tension cracking. FGMI continues to monitor and repair as needed;
 - Reclamation of the Hindenburg waste rock facility blocked a segment of upper Spruce Creek resulting in minor upstream ponding and possible seepage through the waste rock.
 - A small amount of debris remains at the site from building demolition.
- Limited baseline water quality data for Spruce Creek and more recent monitoring data indicate the need for continued monitoring.

Agencies

- Overall permitting and regulatory oversight of the mine and associated activities is reasonable and appropriate.
- LMPT has taken too long to review, comment, and issue authorizations in a timely manner.

Recommendations

The scope of the audit required a review of the company's compliance with permits and authorizations such as a general overview of the operations. Further, SRK's role was not to solve issues. The following are general recommendations to address some of the issues identified during the audit:

Fort Knox

- Collect samples of TSF pond water at depth to assess redox conditions and how mobilization of arsenic, antimony, copper, and selenium may be affected;
- Continue monitoring the tailings seepage in accordance with Waste Management Permit #2006-DB0043 for the Fort Knox Mine to assess the "zero discharge" status for seepage flowing from the TSF to Fish Creek of Victoria Creek;
- Complete the column rinsing tests to determine final rinsing requirements for the Walter Creek Valley heap to assess long-term water quality and management. A heap rinsing study is currently being developed.
- More detailed growth media balances should be developed as the site moves toward final reclamation and closure to prioritize placement as necessary.
- Complete the consolidation study to determine trafficability and how this affects the reclamation schedule, water management, cover placement, the rockfill channel design, and possible reactivity of the tailings.
- Re-examine the requirement for 12 inches of growth media placement during reclamation;
- Work with ADF&G to further enhance the fishery in the WSR and wetlands is ongoing or being considered and includes:
 - Development of a second wetland complex along the north side of the Fish Creek valley;
 - Conversion of the existing Gil causeway into revegetated islands;
 - Additional civil work in Last Chance Creek to mitigate aufeis;
 - Continued maintenance of the road down the valley between the tailings dam and the Water Supply Reservoir;
 - Construction of a passive water treatment wetlands below the tailing dam; and

- Removal of beaver dams to maintain fish passage for Arctic grayling spawning in the developed wetlands.
- FGMI and the agencies, particularly ADEC, should consider the establishment of a trust fund as a financial security mechanism for post-closure water management issues.

True North Mine

- Repair surface cracking on the True North waste rock facilities once movement has stabilized;
- Consider Golder's recommendations or alternatives concerning monitoring the temperatures within the True North waste rock slump areas and other mitigation;
- Evaluate the re-establishment of the Spruce Creek drainage by pulling back the toe of the Zeppelin/Hindenburg waste rock facility to allow surface water to free drain and bypass the waste rock;
- Investigate the nature and extent of this discoloration in the Central Pit area to determine if it is indeed sulfide oxidation, and propose possible mitigation efforts, as necessary.
- Install warning signs at the base of pit highwalls warning the public of the danger of falling rocks;
- Continue monitoring revegetation success;
- FGMI and agencies consider the establishment of a trust fund as a financial security mechanism for post-closure water management issues.

Agencies

- Consider a computerized document tracking system for control;
- Plan and implement adequate training and resources for ADNR staff to convert Permits to Appropriate to Certificates of Appropriation. The legislature approved funding for more positions to deal with the state-wide backlog of permits. An additional staff member was hired in September 2011. Initial training was completed on November 4, 2011, and Fairbanks staff has received approval to begin processing Water Rights Permits and Certificates of Appropriations.

Table of Contents

Executive Summary	i
Acronyms.....	vii
1 Introduction	1
1.1 Background	1
1.2 Limitations	1
1.3 Regulatory Purpose of the Audit	1
1.4 Scope of the Audit.....	2
1.5 Structure of this Report	3
1.6 Acknowledgements	3
2 Audit Methods	4
2.1 Overview	4
2.2 Audit Methodology	4
2.3 Audit Team.....	4
2.4 Site Visit Preparation.....	5
2.5 Site Activities.....	5
2.6 Close-Out Meeting	5
2.7 Reporting.....	6
3 Site Description.....	7
3.1 Site Location	7
3.2 Fort Knox Mine.....	7
3.3 True North Mine	9
3.4 Climate	9
3.5 Geology	9
3.6 Geochemistry	11
3.7 Regulatory Setting.....	11
4 Audit Findings.....	14
4.1 Areas Addressed by the Audit	14
4.1.1 Summary of Federal, State, Local Permits, and Other Obligations	15
4.1.2 Geochemistry	20
4.1.3 Reclamation and Closure	24
4.1.4 Reclamation Cost Estimates	35
4.1.5 Physical Stability	40
4.1.6 Biological Resources.....	41
4.1.7 Environmental Management Systems	43
4.2 Audit of the Agencies	45

4.2.1	Introduction.....	45
4.2.2	ADNR	45
4.2.3	ADEC.....	47
4.2.4	ADF&G, Division of Habitat.....	49
4.2.5	USACE	49
4.3	Follow-Up From the 2004 Audit	49
4.3.1	FGMI's Compliance with Federal, State, Local Permits, and Authorization	49
4.3.2	FGMI's Compliance with Specialized Environmental Plans.....	49
4.3.3	Reliability and Integrity of Information Relating to Environmental Reporting and Compliance	50
4.3.4	The Adequacy of State Oversight to Protect State Resources	50
4.3.5	Changes in Tailings Impoundment Geochemistry Due to Processing True North Ore	51
4.3.6	Changes in Tailings Impoundment Geochemistry Due to the Lead Nitrate Addition to the Milling Circuit.....	51
4.3.7	Changes in Tailings Impoundment Geochemistry Due to Operation of the New Tailings Thickener.....	51
4.3.8	Operation of the Interceptor Well System to Maintain a Zero Discharge from the Tailings Impoundment	52
4.3.9	Reclamation Plan Alternatives Proposed for the Tailing Impoundment and Critical Areas at Both Fort Knox and True North.....	52
4.3.10	Adequacy of the Reclamation Financial Sureties for Both Sites.....	52
4.3.11	Evaluate: the Extent and Functional Value of Developed Wetlands Created by FGMI as Mitigation for Lost Acres Beneath the Tailings Impoundment.....	52
4.3.12	Compliance with Recommendations made in the Last Audit.....	53
5	Conclusions	57
5.1	Major Findings.....	57
5.1.1	Fort Knox Mine	57
5.1.2	True North Mine	57
5.1.3	Agencies.....	58
5.2	Recommendations	58
5.2.1	Fort Knox.....	58
5.2.2	True North Mine	59
5.2.3	Agencies.....	59
6	References.....	60
	Disclaimer	62

Tables

Table 2-1: Summary of Individuals Involved in the Audit	4
Table 4-1: Summary of Specific Areas to Be Addressed By Audit.....	14
Table 4-2: Summary of Major Fort Knox Permits and Authorizations	15
Table 4-3: Summary of True North Mine Permits and Authorizations.....	16
Table 4-4: Comparison of Fort Knox Reclamation and Closure Plans with Alaskan Administrative Regulation (2004) Chapter 097 Mining Reclamation ¹	24
Table 4-5: Fort Knox Mine Reclamation Cost Estimate Assessment.....	36
Table 4-6: True North Mine Reclamation Cost Estimate Assessment	37
Table 4-7: List of True North Environmental Management Plans	44
Table 4-8: Summary of Agency Personnel Participating in Audit.....	45
Table 4-9: Concerns and Recommendations Identified in the 2004 Audit	54

Figures

- Figure 1: Project Location
- Figure 2: Fort Knox Site
- Figure 3: True North Site
- Figure 4: TSF Reclamation Configuration
- Figure 5: Tailings Reclamation

Appendices

- Appendix A: List of Permits
 - A.1: Fort Knox Mine Permits
 - A.2: True North Mine Permits
- Appendix B: Variance Between the 2006 and 2011 Reclamation and Closure Plans
 - B.1: Variances Between the 2006 and 2001 Fort Knox Reclamation and Closure Plans
 - B.2: Variances Between the 2006 and 2001 True Reclamation and Closure Plans
- Appendix C: Summary of CERCLA 108(b)
- Appendix D: List of Specialized Environmental Management Plans
- Appendix E: Graphs of Select Parameter Concentrations for Tailings Decant and Seepage Solutions

Acronyms

ABA	Acid-Base Accounting
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish & Game
ADNR	Alaska Department of Natural Resources
AGP	Acid Generation Potential
amsl	above mean sea level
ANP	Acid Neutralization Potential
APDES	Alaska Pollutant Discharge Elimination System
ARD	Acid Rock Drainage
ARDF	Alaska Resource Data Files
AWQS	Alaska Water Quality Standards
BLM	U.S. Bureau of Land Management
BMP	Best Management Practices
CaCO ₃	Calcium Carbonate
CIP	Carbon-In-Pulp
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DOT	Department of Transportation
EA	Environmental Assessment
EHSS	Environmental Health and Safety System
EIS	Environmental Impact Statement
EMS	Environmental Management Systems
EPA	Environmental Protection Agency
FEIS	Final Environmental Impact Statement
FGMI	Fairbanks Gold Mining Inc.
gpm	gallons per minute
HDPE	High-Density Polyethylene
FGMI	Fairbanks Gold Mining, Inc.
ISO	International Organization for Standardization
LCRS	Leachate Collection and Recovery System
LMPT	Large Mine Permitting Team
LOM	Life of Mine
MHTLO	Alaska Mental Health Trust Land Office
ML/ARD	Metal Leaching/Acid Rock Drainage
MLUP	Miscellaneous Land Use Permits

MOU	Memorandum of Understanding
MSGP	Multi-Sector General Permit Activity
MWMP	Meteoric Water Mobility Procedure
NEPA	National Environmental Policy Act
NNP	Net Neutralization Potential
NOAA	National Oceanic and Atmospheric Administration
NP	Neutralization Potential
NPDES	National Pollutant Discharge Elimination System
NPV	Net Present Value
NRC	National Response Center
OH&S	Occupational Health & Safety
OOCC	Other Organic Contaminants
PAG	Potentially Acid Generating
PCMS	Process Component Monitoring System
PoO	Plan of Operations
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFP	Request for Proposal
ROD	Record of Decision
SOP	Standard Operating Procedure
SPAR	Spill Prevention and Response
SPCC	Spill Prevention Control and Countermeasure
SRK	SRK Consulting (U.S.), Inc.
TSF	Tailings Storage Facility
TPH	Total Petroleum Hydrocarbons
TWUP	Temporary Water Use Permit
WMP	Waste Management Plan
WRMP	Waste Rock Management Plan
WSR	Water Supply Reservoir
WTP	Water Treatment Plant

1 Introduction

1.1 Background

SRK Consulting (U.S.), Inc. (SRK) was retained by Fairbanks Gold Mining, Inc. (FGMI) to perform an environmental audit of the Fort Knox and True North mines located in the Fairbanks North Star Borough, approximately 26 road miles northeast of Fairbanks, Alaska as shown on Figure 1. The Request for Proposal (RFP) for this audit was issued by FGMI on April 21, 2011, in coordination with the State of Alaska Department of Environmental Conservation (ADEC) in Fairbanks, State of Alaska Department of Natural Resources, Division of Mining, Land, and Water (ADNR) in Fairbanks and Anchorage, and the United States Army Corps of Engineers (USACE), referred to subsequently as “the agencies”.

The work associated with this audit was directed by ADNR, in conjunction with ADEC and USACE. FGMI was responsible for all financial obligations associated with the audit, in addition to soliciting proposals, hosting site visits, providing reports and documentation, responding to technical questions and data requests, and participating with the agencies in the audit of the facilities.

The on-site audit phase of the project was conducted at the Fort Knox and True North mine sites and in the offices of ADNR, USACE, and Alaska Department of Fish and Game (ADF&G) from August 8 to August 11, 2011. This document presents the findings of the on-site audit observations as well as subsequent data and document reviews.

1.2 Limitations

The scope of work requested by the agencies participating in this audit was comprehensive and included areas outside the scope of general regulatory compliance. To evaluate compliance with permits, plans, approvals, and regulations, a sample of documents and procedures was examined, as is the normal practice for an audit in which the timing of the audit is pre-defined (ISO, 2002). The documents reviewed are referenced in the corresponding sections of this audit report. As a result, SRK does not guarantee the compliance status of all requirements of a given permit, plan or approval.

The findings and recommendations in this report are based on the best professional judgment, expertise, and expertise of the auditors. FGMI and/or the participating agencies may develop alternative responses to the audit findings that are equally acceptable.

1.3 Regulatory Purpose of the Audit

The purpose of the audit is to determine if FGMI’s environmental management systems and the regulatory controls in place at the Fort Knox and True North mines provide reasonable assurances that the environmental objectives in the Plans of Operation and relevant permits and approvals are being met, and that the systems and controls are functioning as intended. The audit results will be used by FGMI and the agencies to assist in updating, renewing, or issuing approvals and permits, in updating policies, environmental management plans and procedures, in determining compliance with permits and approvals, and in evaluating the adequacy of the financial assurances.

Facility audits are required in accordance with FGMI’s, Millsite Leases (ADL Nos. 414960 and 414961) originally issued by the ADNR on February 15, 1994, and Waste Management Permit (No. 2006-DB0043) for the Fort Knox Mine, and Millsite Lease (ADL No. 416509) for the True North Mine and Twin Creeks Road.

The audit provision from the original Millsite Lease (Permit¹) has been carried forward in permit renewals, modifications to permits, memoranda of understanding, and within the ADEC's Waste Management Permit. Although ADNR permits refer to "Environmental Audit" and ADEC lists the requirement as a "Facility Audit," SRK understands these terms have the same regulatory meaning as applied to the Fort Knox and True North mines.

Section 1.13.1 of the Waste Management Permit further states: *The permittee shall conduct periodic audits for the purpose of reviewing performance under this permit and approvals, and the agencies' regulatory oversight of such performance, and to aid in updating the Reclamation and Closure Plan and associated closure and post closure monitoring cost estimate. The first audit shall occur in 2011 or prior to final closure if final closure occurs prior to 2011. Subsequent environmental audits shall occur every five years.*

This audit follows the two previous audits prepared by TRC (1999) and Golder Associates (2004).

1.4 Scope of the Audit

In accordance with Item 12 of the Millsite Lease, SRK's audit intended to be an objective, systematic, and documented review of the conditions, operations, and practices related to environmental requirements and environmental management of the two facilities. The audit also considers some specific areas of concern that were identified in the RFP. These include:

- Evaluate the "Zero Discharge" status for seepage flowing from the tailings storage facility (TSF) to Fish Creek or Victoria Creek;
- Evaluate the pit lake model to as relates to current closure plans;
- Evaluate the rinsing of the spent heap leach ore with regard to achievement of the closure requirements in the Waste Management Permit – can it be accomplished, how long will it take, and if a more appropriate approach should be considered;
- Evaluate the tailings storage facility seepage with regard to closure, the efficacy of the proposed closure method, and the project duration of draindown and closure;
- Evaluate the Reclamation & Closure Plan (February 2011) for technical feasibility and whether it satisfies the requirements of the current regulations for reclamation and closure of the site;
- Evaluate the financial assurance calculations in the Reclamation & Closure Plan (February 2011) to determine if the projected costs are reasonable and appropriate;
- Evaluate Buell and Moody's (2005) recommendations for additional work to enhance fish and wildlife habitats between the tailings dam and WSR for efficacy, timing, and positive effects; and
- Evaluate actions taken to address recommendations made in the last audit (Final Five-Year Environmental Audit Fort Knox Mine, True North Mine and Twin Creek Road (Golder, 2004).

Likewise, the True North Mine audit was required to be an objective, systematic, and documented review of the conditions and practices related to environmental requirements and environmental management of the True North Mine. Specific areas of concern included:

- Evaluate the Reclamation & Closure Plan (January 2011) for technical feasibility and does it satisfy the requirements of the current regulations for reclamation and closure of the site;
- Assess the reclamation work implemented to date;

¹ The terms Millsite "Lease" and Millsite "Permit" are used for the same document. ADNR should make a final determination as to whether it is a lease or a permit.

- Evaluate the financial assurance calculations in the Reclamation & Closure Plan (January 2011) to determine if reasonable and appropriate; and
- Evaluate actions taken to address recommendations made in the last audit (Final Five-Year Environmental Audit Fort Knox Mine, True North Mine, and Twin Creek Road (Golder 2004)).

The audit also requested to carefully consider some specific areas of concern that have been identified. These include:

- Assess stability of waste rock dumps; and
- Assess stability and safety of pit highwalls.

1.5 Structure of this Report

The report is structured in the following major sections:

- Section 1 provides background on the motivation, requirements and scope of the audit;
- Section 2 describes the audit methods;
- Section 3 summarizes the audit team's understanding of the main site features obtained from a review of documents and visits to the sites;
- Section 4 provides detailed findings of the audit and recommendations; and
- Section 5 summarizes major findings and recommendations arising from the audit.

1.6 Acknowledgements

SRK acknowledges FGMI and the agencies for their accommodations, time, assistance, and cooperation in conducting this audit. The success of an audit hinges on the cooperation of all participants, which was granted to the SRK team at all times during the audit and in follow-up inquiries.

2 Audit Methods

2.1 Overview

SRK’s approach to environmental audits recognizes the multi-disciplinary character of these types of projects. To that end, the audit team was selected to include a variety of specialties including permitting, impact analyses, geochemistry, engineering, and closure specialists who have the experience to see the “big picture” and specialist consultants who provide highly specific input to the process. SRK recognizes that the overall objective of the audit is to prepare a systematic and documented review of the conditions, operations, and practices related to environmental requirements and environmental management of the operations conducted at both the Fort Knox and True North mines.

2.2 Audit Methodology

The audit broadly followed standard methodology.. In general, the major activities of an audit are:

- Initiating the audit;
- Conducting initial document review;
- Preparing for on-site auditing activities;
- Conducting on-site audit activities;
- Preparing, approving, and distributing the audit report;
- Completing the audit; and
- Conducting audit follow-up.

2.3 Audit Team

The Large Mine Permitting Team (LMPT) was originally formed specifically for the Fort Knox Mine Project and includes the agencies presented in Table 2-1 as well as Region 10 EPA and U.S. Fish and Wildlife Service (USFWS). ADNR is the lead agency for the LMPT. Individuals involved in the audits included representatives from ADNR, ADEC, AF&G, USACE, FGMI, and SRK. All of the agency individuals and FGMI staff are very familiar with both mines and provided invaluable expertise.

Table 2-1: Summary of Individuals Involved in the Audit

FGMI		Agencies		SRK	
Name	Responsibility	Name	Responsibility		Responsibility
Bob Musgrove	Operations Manager	Jack DiMarchi, ADNR	Team Leader	Val Sawyer, Team Leader	Air, Water Rights, Environmental
Dan Snodgrass	General Manager/Vice President	Tim Pilon, ADEC	Water	Steve Teller, Ass't Team Leader	Geochemistry
Delbert Parr	Environmental Manager	Pete McGee, ADEC	Water	Mark Willow	Environmental, Biological, Reclamation and Closure, Hazardous Materials and Waste
Jennifer Pyecha	Reclamation, Dam Permits	Steve McGroarty, ADNR	Mill Site Lease and Reclamation Plan	Bill Jeffress	Environmental Management Systems, Biological
Erin Strang	Air, Water, Waste Management	Brent Martellaro,	Mill Site Lease and Reclamation Plan	Dan Neuffer	Geotechnical

FGMI		Agencies		SRK	
		ADNR			
Dave Stewart	Monitoring, Data Management, Waste Management, Potable Water, Spill Reporting	Stephanie Lovell, ADNR	Mill Site Lease and Reclamation Plan		
		Jim Vohden, ADNR	Hydrology, Water Rights		
		Al Ott/Bill Morris, AF&G	Wildlife and Fisheries		
		Mary Romero, USACE	Wetlands, WOUS		

2.4 Site Visit Preparation

Preparations for the site visit included initial document review. Mr. Delbert Parr, Environmental Director, and ADNR provided files of relevant reports, plans, and permits. Additional information was taken from FGMI’s internal website where Mr. Mark Willow and Ms. Val Sawyer were able to obtain additional documents for review; these documents were passed on to the other team members and are part of SRK’s project file.

2.5 Site Activities

Site activities began on August 8, 2011 with a kickoff meeting between representatives of the various agencies, FGMI, and SRK. During this meeting, FGMI hosted a safety talk, and then provided a brief introduction of the site history. Ms. Sawyer then discussed the goals of the audit, stressing that this audit was a review of the company’s compliance with permits and authorizations to look at what was, and was not, working. Further, it was agreed that SRK’s role was not to solve issues that were identified, but simply identify them and, where appropriate, make recommendations based on our experience and expertise. The meeting adjourned for the site visit with no representatives from ADNR attending.

The group visited the Fort Knox Mine first, followed by the True North Mine. FGMI representatives described the mining and reclamation activities at both sites. Employees of FGMI and the agencies were kept informed of preliminary results of the audit and assessments by the auditors during the site visit as the information became available.

The auditors met with agency representatives on August 10 and 11, 2011 at the ADNR office, ADEC office, USACE office, and at the ADF&G office. Mr. Charles Cobb, ADNR Dam Safety, was interviewed in Anchorage on August 15, 2011, and Ms. Elizabeth Kerin, ADEC Air Quality, was interviewed via the phone on September 23, 2011 due to scheduling conflicts. The goal of the interviews with the agency personnel was to determine overall FGMI compliance with permits conditions and stipulations and the adequacy of regulatory oversight of the project.

2.6 Close-Out Meeting

The close-out meeting was held in Fairbanks on August 11, 2011, at the ADNR office to brief the agencies and FGMI on the preliminary findings of the audit. SRK presented the initial impressions of the sites, and preliminary findings in the major areas, with the caveat that additional review could change these preliminary findings.

2.7 Reporting

The deliverable for this audit is a draft report, issued electronically to ADNR, ADEC, ADF&G, USACE, and FGMI on November 1, 2011, and a final report will be submitted to ADNR, ADEC, ADF&G, and FGMI after review.

The reports shall include a comprehensive written record of the audit findings, along with conclusions and recommendations of the auditors. Each team member was assigned sections based on their areas of responsibility, with the report compiled by the Project Manager.

3 Site Description

3.1 Site Location

FGMI, a wholly owned subsidiary of Kinross Gold Corporation (Kinross), operates an open pit gold mine, a heap leach facility, and a mill and associated tailings storage facility at its Fairbanks, Alaska property. The Fort Knox Mine complex is located in the Fairbanks North Star Borough, approximately 26 road miles northeast of Fairbanks, Alaska. Access is via the Steese Highway for approximately ten miles to the town of Fox, then northeast on Alaska Highway 2 for approximately ten miles to Cleary Summit and travel southeast on the Twin Creek Road and Fish Creek Road for approximately six miles to the site. Access to the True North Mine is via the same route exiting the Steese Highway in the same location and traveling to west on the Twin Creek Road for approximately six miles.

The Fort Knox site is located in the Chena River basin within the Yukon-Tanana Uplands physiographic province. The site is situated within the Fish Creek sub-basin, which is tributary to the Chena River. Ridges with gentle slopes characterize the higher elevations ranging between 1,200 and 1,300 feet above mean sea level (amsl). The ore body is centered on the north flank of Gilmore Dome on a ridge between Melba Creek and Monte Cristo Creek. The heap leach facility is located in the Walter Creek Drainage. The remaining site facilities, including the waste rock dumps, TSF, water reservoir, mill and plant, are located within the Barnes Creek and Fish Creek drainages. The Barnes, Melba, and Monte Cristo Creeks, as well as the smaller tributaries of Walter, Pearl, Yellow Pup, Solo, and Last Chance all flow to Fish Creek (Schlumberger, 2011).

3.2 Fort Knox Mine

The Fort Knox Mine provides ore for the Fort Knox mill, a large and modern carbon-in-pulp gold extraction plant that has a capacity to process between 36,000 to 50,000 short tons of ore per day. In addition, heap-grade ore is placed on the Walter Creek heap leach pad which was authorized in 2007. FGMI is in the process of closing the True North Mine, which was an open pit mine that supplied ore to the Fort Knox mill for a short period of time. The Fort Knox open pit and mill are anticipated to operate until 2017, and the heap leach is anticipated to operate until 2026, which includes a period of residual leaching.

Major Fort Knox Mine components include:

- Fort Knox open pit
- Milling and beneficiation facilities
- INCO SO₂/Air cyanide destruction process (standby)
- Tailings Storage Facility (TSF)
- Seepage and groundwater collection (interceptor) system
- Twin Creek Access Road
- Administration and security buildings
- Maintenance facility
- Fresh water supply reservoir (WSR)
- Overburden/waste rock dumps
- Coarse ore stockpile
- Low-grade ore
- Stockpiled growth media, and
- Constructed wetlands.

The Fort Knox Mine was permitted in early 1994, and construction began in March 1995; gold has been produced on a continuous basis since 1996. The Fort Knox Pit is currently mined as a conventional truck-and-shovel mine and operates year-round. Ore is processed at FGMI's mill complex adjacent to the Fort Knox Pit. Processing the ore begins with a one-stage crushing, conveyance to the mill on belt conveyors, grinding by a semi autogenous and two ball mills, ending in a slurry. The slurry passes through a gravity separation circuit, thickened to 55 percent solids and

processed through a cyanide leaching circuit. Gold is recovered from a carbon in pulp (CIP) circuit followed by carbon stripping, electrowinning, and refining.

The CIP discharge gravity flows to a tailings thickener, and the warm decant solution is re-introduced into the milling circuit thus recovering residual heat, cyanide, and other mill reagents. The tailings thickener underflow is mixed with decant solution (supernatant) pumped from the TSF. Cyanide is recovered and cycled back into the process, substantially reducing the WAD concentrations in tailings as well as reducing the amount of cyanide and other reagents required. The patented INCO SO₂/Air process detoxification circuit is held in reserve and activated as necessary to address process fluctuations. FGMI's goal is to maintain a WAD cyanide level less than 10 mg/L in the tailings solution.

The slurry is either pumped or gravity-fed depending on the discharge point to the tailings disposal system with controlled deposition in order to control the size and location of the supernatant pond. Slurried tailings are discharged sub-aerially from pipes located at the upstream margin of the TSF facility. Approximately 39,500 tons per day are processed and deposited in the TSF. A primary decant pond serves as the source of makeup water to the mill. An additional decant pond exists in the Pearl Creek area of the TSF (Schlumberger, 2011).

The Fort Knox tailings management is a zero discharge system consisting of a 1,147-acre tailings storage facility located 1.5 miles from the Fort Knox Pit. As of October 2010, approximately 200 million tons of tailings have been placed in the facility. The tailings dam is an earthen-filled structure designed to contain all process water from the mill, as well as surface water runoff. The dam is designed and maintained to contain the 100-year, 24-hour storm event in addition to the average 30-day spring breakup. Impoundment water is not discharged to the environment but is recycled to the mill for reuse in the beneficiation process. To ensure zero discharge, a seepage collection system at the toe of the dam collects and returns seepage to the tailings impoundment. A series of groundwater pump-back (interceptor) wells, just down-gradient of the seepage control system, is designed to intercept groundwater and seepage and pump the water back into the tailings impoundment. Observation wells were installed to monitor groundwater quality downstream of the interceptor wells.

The Walter Creek Valley heap leach facility was authorized in 2007; construction began in 2008, and ore placement and leaching began in 2009. Up to 165 million tons of low grade or run-of-mine heap grade ore, mined from the Fort Knox Pit will be placed in the heap leach facility.

Ore is loaded on the pad in incremental lifts at an average rate of 50,000 to 100,000 tons per day. Barren cyanide solution is applied near surface at a rate of 16,000 gallons per minute (gpm) through a network of solution drip emitters. These are placed on the ore or buried during cold weather months. The barren solution percolates through the heap and is intercepted by the composite liner and the solution collection piping in the overliner covering the base of the heap.

The pregnant solution (containing gold) is collected in the in-heap storage pond and then pumped to dedicated heap leach carbon columns in the mill facility for gold recovery. A seepage collection system is monitored to detect potential leaks in the liner system. As a backup, the TSF is capable of completely storing the 6,600 acre-feet operations pond volume, plus the probable maximum precipitation (PMP) (3,311 acre-feet), and all of the water contained within the heap leach facility. Under this worst-case situation, storage of the PMP would encroach into the 3.0 feet of freeboard. The TSF includes capacity to contain the three-month draindown volume of the in-heap storage for the extremely unlikely event of a catastrophic failure of the heap leach pad embankment dam.

Beneath the in-heap storage pond, a Leachate Collection and Recovery System (LCRS) was constructed between an overlying primary geomembrane liner and an underlying secondary geomembrane liner, which, in turn, is underlain by a 12-inch-thick layered prepared sub-base. The LCRS consists of a drainage layer that reports to a pump-back system to return any solution passing through the primary liner back to the in-heap storage pond. The LCRS constructed in conjunction with the double liner in the area of the in-heap storage reservoir provides leak monitoring and collection. A Process Component Monitoring System (PCMS) was constructed under the main header lines for the solution collection system outside of the LCRS, providing additional leak detection. An underdrain system consisting of a network of drainage channels containing drain rock

routes water from baseflow in Walter Creek, and other seeps and springs, under the sub-base to the TSF providing a third level of leak detection (Schlumberger, 2011).

3.3 True North Mine

The True North project area lies within the Chatanika River watershed, located on the northwest flank of Pedro Dome. The ridgelines drain into Murray Creek, a tributary of Dome Creek to the south, and Louis Creek, Whiskey Gulch, and Spruce Creek, tributaries to Little Eldorado Creek to the north. Production from the True North deposit commenced in 2001 and ended in 2004. In 2009, FGMI made the decision to forego further mining and exploration at the site, and began final reclamation. In 2010, 149 acres of the site were graded, growth media was placed on 52 acres, and 270 acres were scarified, seeded, and fertilized. By 2011, the major earthwork was completed leaving a small area of materials to be salvaged.

3.4 Climate

The climate at the site is continental sub-arctic, with the majority of precipitation occurring between the months of May and September. Precipitation has been measured continuously at the mine site and has averaged approximately 18 inches per year, with a low of 10.86 inches in 2006 and a high of 23.1 inches in 2002. The precipitation station at the mine is located in the main parking lot, on the east side of the administration building, at an approximate elevation of 1,640 feet amsl. The temperatures on site range from highs above 90° Fahrenheit (F) to lows of minus 50°F (Schlumberger, 2011).

3.5 Geology

Both the Fort Knox and True North sites are located within the Fairbanks mining district, a southwest–northeast trending belt of lode and placer gold deposits that comprise one of the largest gold producing areas in the state of Alaska. The Fairbanks district is situated in the northwestern part of the Yukon–Tanana Uplands. The Yukon–Tanana terrane consists of a thick sequence of polymetamorphic rocks that range from Precambrian to upper Paleozoic in age. The protoliths were comprised primarily of sedimentary and volcanic units, with only minor rocks of plutonic origin. The region has undergone at least two periods of dynamic and thermal metamorphism, an early prograde amphibolite event, and a later, retrograde, greenschist facies event (FGMI 2003).

The dominant rock unit in the district is the Fairbanks Schist which is comprised of gray to brown fine-grained micaceous schist and micaceous quartzite. Interlayered with the Fairbanks Schist is the Cleary Sequence, a varied assemblage of metamorphic lithologies. In the northern part of the district highly metamorphosed rocks of the Chatanika terrane have been identified. These rocks, which are in fault contact with the Fairbanks Schist and Cleary Sequence, are thought to be Devonian to Mississippian in age, and have been metamorphosed to eclogite facies (FGMI 2003).

The dominant structural trend of the district is expressed by numerous northeast trending faults and shear zones. These structures, which were important to the localization of gold mineralization, show a dominant strike-slip movement (FGMI 2003).

Several intrusive bodies, ranging in age from late Cretaceous to early Tertiary, penetrate the Yukon–Tanana terrane. They generally range from ultramafic to felsic in composition, and can be distinguished from older intrusive rocks by their lack of metamorphic textures (FGMI 2003).

Fort Knox Mine

The Fort Knox Mine is located in the Fairbanks Mining District in the northeast part of the Yukon–Tanana Upland. The mining district is divided into four metamorphosed stratigraphic groups; the Chatanika sequence, the Fairbanks Schist, the Chena River sequence, and the Birch Hill sequence (Schlumberger, 2011).

The area of the mine is underlain by the Fairbanks Schist unit and the Cleary Sequence of the Fairbanks Schist unit. The Fairbanks Schist consists largely of muscovite-quartz schist and

micaceous quartzite. The Cleary Sequence consists of calcareous actinolitic greenschist, impure marble, muscovite quartz schist, and potassium feldspar white schist. The schist is host to younger granitic intrusions, such as the one outcropping at the mine site. The Fairbanks Schist and other metamorphic rocks range in age from late Precambrian to lower Paleozoic. The intrusive granodiorites and quartz monzonite are most likely Cretaceous to Tertiary in age (Schlumberger, 2011).

The Gilmore Dome pluton, which consists of granodiorite and quartz monzonite, is present in the pit area of the mine site. Prior to opening the pit, granodiorite outcropped in the Melba and Monte Cristo Creeks and is the main host rock for the gold mineralization of the Fort Knox deposit. This pluton has intruded into the Fairbanks Schist, which makes up the upper portion of the pit wall (Schlumberger, 2011).

Gold occurs in and along the margins of pegmatites, quartz veins and veinlets, quartz-filled shears, and fractures within the granite. Pre-mineralization fractures, which resulted from magmatic doming, provided conduits for mineralizing fluids within the stockwork and shear zones. The stockwork veins strike predominantly east-west and dip randomly. Vein density decreases with depth. Shear zones generally strike northwest to southeast and dip moderately to the southwest (Schlumberger, 2011).

The upper 100 to 300 feet of the bedrock is highly weathered. The degree of weathering depends on the original mineral content of the bedrock and exposure. Weathering characteristics consist of intense fracturing and alteration of primary minerals to clay and oxide. Based on drilling completed in the area of the TSF, the greatest fracturing and depth of weathering occurs in the valley floor where the maximum depth of effective fracturing has been estimated to be between 300 and 500 feet (Schlumberger, 2011).

The alluvium consists primarily of a thin layer of organic soil and unconsolidated silt, sand, and gravel. In the larger valleys there is basal gravel, which has grain sizes between sand and gravel size and may contain boulders as large as 1 to 2 feet in diameter. This basal unit between the surficial materials and the bedrock has been extensively placer mined in the area. Based on drilling completed to support the design of the seepage collection system and fresh water reservoir, the average thickness of alluvium down-gradient of the TSF is approximately 30 to 35 feet (Schlumberger, 2011).

True North Mine

The True North gold deposits lies within the poly-metamorphic Chatanika Terrane, a klippe of eclogitic marbles, calc-magnesian schists, quartz-muscovite schists, carbonaceous phyllites, and quartzites. In the mine area, rocks have been subdivided into four main lithologic units:

- Graphitic phyllite - Grades into a carbonaceous and extremely fine-grained schist and fine-grained carbonaceous quartzite;
- Mafic schist unit - Amphibolite and biotite-chlorite-amphibolite schist;
- Eclogite unit - Magnetic and non-magnetic calcareous eclogite and marble; and
- Felsic unit - Muscovite schist, quartz-muscovite +/- biotite schist and quartzite (FGMI 2003).

The mineral deposits are partially situated in a structurally complex zone that has a northeast elongated orientation that parallels the Eldorado fault. It is characterized by a series of gentle to complex folds, especially between the Eldorado fault and the sub-parallel "Neil's discontinuity", shear zones, breccias, and occasional low angle faults. Northwest of Neil's discontinuity the mineralized zones dip gently to the northwest, while south of the zone mineralization dips to the southeast. The area between Neil's discontinuity and the Eldorado fault is structurally complex, and the orientation of individual mineralized zones in this area can be highly variable (FGMI 2003).

The gold mineralization in the True North deposits is hosted in felsic schists and is frequently accompanied by carbon and carbonate alteration in sheared or otherwise structurally prepared zones. The gold is very fine grained and is closely associated with pyrite, arsenopyrite, and stibnite in the unoxidized zones. It occurs in drusy quartz veins, and in altered and brecciated rocks adjacent to breccia bodies. There appears to be a direct relationship between veining and gold content, as weakly veined rocks generally carry lower gold values (FGMI 2003).

3.6 Geochemistry

Fort Knox Mine

FGMI has collected quarterly Meteoric Water Mobility Procedure (MWMP) data from the tailings solids since operation began. These data are reported in the quarterly reports for Solid Waste Management Permit #2006-DB0043. The information is presented relative to pre-True North ore processing. Milling of the True North ore ended in early 2005. Therefore, the final tailings surface will be comprised of tailings from the Fort Knox deposit only (Schlumberger 2011).

Tailings samples have been analyzed on a quarterly basis for acid base characteristics since 1996. The values for acid neutralizing potential (ANP) range from 23 to 78 tons CaCO₃/kT. The values for acid generation potential (AGP) range from below detectable levels to 2.2 tons CaCO₃/kT. The ANP:AGP ratios range from 30 to over 300 indicating that the neutralization potential of the tailings are significantly higher than the sulfide content. In general, ANP:AGP ratio values of three or greater are indicative of materials with low net acid generation potential. Based on the results of testing completed to date, the Fort Knox tailings have an insignificant potential for acid generation.

True North Mine

The main conclusions to be drawn from the bulk geochemical database for waste rock indicates:

- Most of the waste rock is highly oxidized, which resulted in depletion of sulfur and resulted in precipitation of ferric oxy-hydroxides.
- Trace elements are primarily associated with oxide forms such as scorodite and goethite.
- Geochemical analysis indicates that rock type and lateral variations are much less significant than vertical variations.
- Significant vertical variations include the increase of sulfur and acid generation potential with depth, and the apparent presence of zones of elevated arsenic concentrations.
- Overall potential for acid generation is low.
- The database provides a good characterization of waste rock geochemistry within the pits (SRK 2000).

3.7 Regulatory Setting

The Fort Knox and True North mines are located on a combination of State of Alaska and private land. Currently, there are 68 separate permits, authorizations, and licenses, covering activities in and around the two sites, issued by various federal, state, and Fairbanks North Star Borough agencies. Development, operation, and reclamation activities are authorized in part under a series of leases and other land use authorizations from the ADNR, the Alaska Mental Health Trust Land Office (MHTLO), and Fairbanks North Star Borough. Only a brief discussion of the primary agencies and permits is practical in describing the fundamental regulatory setting for the Fort Knox and True North sites. The primary permits and authorizations for Fort Knox and True North are:

- Millsite Leases (ADL Nos. 414960 and 414961 for Fort Knox and ADL No. 416509 for True North) issued by the Alaska DNR;
- Alaska DNR Plan of Operations Approval;
- True North Mine Right-Of-Way Approval;
- Waste Management Permit #2006-DB0043 (which superseded Solid Waste Permit #0031-BA008 and #9931-BA001);
- 404 Permit Issued by the U.S. Army Corps of Engineers (Corps); and
- Fort Knox Gold Project Technical Assistance Report prepared by the U.S. Environmental Protection Agency Region 10 for the Corps.

A list of the permits, authorizations, and certificates are presented in Appendix A.1 and A.2 for the Fort Knox and True North mines, respectively.

Jurisdictional Agencies

The USACE is the primary federal agency administering Section 404 (Dredge and Fill) provisions of the Clean Water Act (CWA) for activities affecting wetlands (waters of the U.S.). The USACE issued the original permit (POA-192-574 – Fish Creek 23) for the Fort Knox project in May 1994 and has since reviewed, extended, or modified the permit 19 times.

The USACE issued Permits: POA-M-940742, N-940742, O-940742, P-940742, Q-940742, and R-940742, Murray Creek 2, Waterway Murray Creek 2 for the True North project that ceased operation in 2004 and is in reclamation and closure.

ADEC regulates air quality, solid waste, storm water, potable water and other aspects of the operations primarily through Title 18 of the Administrative Code (AAC) Chapters 50, 60, 70, 72, and 80. Several certificates, authorizations, and permits are issued by ADEC, including, but not limited to the Air Quality Permit Nos. AQ 0053MSS01 and AQ0053MSS02, Waste Management Permit for Fort Knox 2006-DB0043, and Certificates of Reasonable Assurance (CWA 401). ADEC authorizes air sources, tailings and other solid waste disposal, prescribes monitoring, reporting, closure, post-closure and financial responsibility requirements.

ADNR issues certain land and water use authorizations, dam safety certificates, and is the primary agency implementing reclamation/ closure planning and bonding primarily through Title 11 of AAC Chapters 86, 93, 96, and 97.

Fort Knox Land Use Authorizations

The project area encompasses approximately 7,725 acres. The project area includes the Amended and Restated Millsite Lease, the Upland Mining Lease, and private land. The Amended and Restated Millsite Lease (amending and restating the Millsite Lease effective as of February 15, 1994, ADL # 414960 and 414961) contains approximately 5,832 acres of state land and 121 acres of private land as shown on Figure 2. Further, 63 acres of land were purchased/deeded (in 2008) as part of the Phase 7 expansion. An additional 1,790 acres were purchased in 2008 from MHTLO.

FGMI submitted an application for an Upland Mining Lease (ADL #535408) covering tentatively approved lands on December 4, 1992. These lands include 48 state mining claims owned by Melba Creek Mining, Inc., an Alaska corporation, and FGMI, a Delaware corporation. FGMI, on December 4, 1992, applied for two surface leases; the Surface Lease A (ADL #414960) and Surface Lease B (ADL #414961) were tentatively approved in the vicinity of the Fort Knox lode gold deposit. ADNR issued a Millsite Lease (ADL Nos. 414960 and 414961) and Upland Mining Lease (ADL 535408) on February 15, 1994.

On July 8, 2002 the Amended and Restated Millsite Lease (amending and restating the Millsite Lease effective as of February 15, 1994, ADL # 414960 and 414961) became effective and authorized gold-bearing ores derived from outside the Millsite Lease area to be processed through the Fort Knox mill and tailings facilities.

Private land included within the Fort Knox project area consists of 121.2 acres of patented claims purchased by FGMI. The narrow block of patented claims adjacent to, but not included in, the Upland Mining Lease or the Millsite Lease, were conveyed to FGMI and Melba Creek Mining, Inc. via warranty deed in August 1993.

An agreement was reached with the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Land Management (BLM) to release 63 acres from the NOAA withdrawal for expansion of the Fort Knox Pit. The land was conveyed to the State of Alaska who in turn conveyed it to MHTLO. As part of this agreement, a 19-acre easement was established at the ridgeline to prevent any activity that could impact the activities of NOAA. In 2008, FGMI reached an agreement with MHTLO to purchase their surface interest within the Millsite Lease area. The purchase was finalized in May 2008.

No federally administered land is located within the project boundaries. The closest residence to the project area is approximately 2.5 miles from the project boundary, on Cleary Summit.

The ore body and the majority of the project area are located on land belonging to the State of Alaska. Private land and mineral rights in the project area along Fish Creek, originally patented to placer miners under the General Mining Act of 1872, have been purchased by FGMI. The patented private lands along Fish Creek were conveyed to the State of Alaska, at the time the Millsite Lease was issued.

Fort Knox operates under Plan of Operations F20079852, last amended in July 2007, and effective until July 2012. This authorization is granted by the ADNR in accordance with and subject to Alaska Statutes 27.19 (Reclamation) and 38.05 (Alaska Land Act) and the Alaska Administrative Code, Title 11 and chapters 86.800 (Plan of Operations), 96 (Miscellaneous Land Use), and 97 (Mining Reclamation). The Plan of Operations authorizes activities upon state lands encompassed by the previously mentioned *Amended and Restated Millsite Lease*, *Uplands Mining Lease*, and certain private lands. The Plan of Operations contains general, project-specific, and standard stipulations for environmental protection, monitoring, reporting, and reclamation and closure.

True North Land Use Authorizations

The True North Mine is within the Chatanika River watershed located on the northwest flank of Pedro Dome approximately 25 miles northeast of Fairbanks. Millsite Lease ADL 416509 boundary shown on Figure 3 is located in portions of Sections 21, 27, 28, 29, 32, & 33, Township 3N, Range 1E, Fairbanks meridian entirely on State and University of Alaska land. The True North ore body and ancillary facilities have been placed within the Millsite Lease. The Millsite Lease ADL 416509 includes agreement among FGMI, ADNR, and MHTLO for the construction, upgrade, use and maintenance of the Twin Creeks Road.

4 Audit Findings

The following sections document the findings of the auditors and, in some cases, include recommendations to address the findings. The sections are organized in a similar fashion to the Detailed Scope of Work provided in the RFP. Sections have also been added for findings not included in the original Detailed Scope of Work.

4.1 Areas Addressed by the Audit

The audit team identified and focused on the following areas to evaluate if the Fort Knox Mine's environmental management systems and the regulatory controls in place provide reasonable assurances that the environmental objectives in the Plan of Operations and relevant permits and approvals are being met and that the systems and controls are functioning as intended:

- Federal, state, and local permits, authorizations, certificates, and obligations;
- Geochemistry;
- Reclamation and closure;
- Reclamation cost estimates;
- Physical stability;
- Biological resources;
- Environmental management plans; and
- Waste management.

In addition, the RFP requested that the following areas summarized in Table 4-1 be addressed.

Table 4-1: Summary of Specific Areas to Be Addressed By Audit

Area	Section where addressed
Evaluate the "Zero Discharge" status for seepage flowing from the TSF to Fish Creek or Victoria Creek	4.1.2, Geochemistry
Evaluate the pit lake model as relates to current closure plans	4.1.2, Geochemistry
Evaluate the rinsing of the spent heap leach ore with regard to achievement of the closure requirements in the Waste Management Permit	4.1.3, Reclamation and Closure
Evaluate the TSF seepage with regard to closure, the efficacy of the proposed closure method, and the project duration of drain-down and closure	4.1.4, Reclamation Cost Estimate
Evaluate the <i>Reclamation and Closure Plan</i> (2011) for technical feasibility and whether it satisfies the requirements of the current regulations for reclamation and closure of the site	4.1.3, Reclamation and Closure
Evaluate the financial assurance calculations in the <i>Reclamation and Closure Plan</i> (2011) to determine if the projected costs are reasonable and appropriate	4.1.4, Reclamation Cost Estimate
Evaluate Buell and Moody's (2005) recommendations for additional work to enhance fish and wildlife habitats between the tailings dam and WSR for efficacy, timing, and positive effects	4.1.6, Biological Resources
Evaluate actions taken to address recommendations made in the 2004 audit.	4.3, Follow-Up from the 2004 Audit

4.1.1 Summary of Federal, State, Local Permits, and Other Obligations

The Fort Knox Mine maintains 68 individual permits and authorizations issued by federal, state and local agencies. Table 4-2 presents a summary of the permits and authorizations, and Appendix A.1 presents a list of the current permits. The specific documents and permits reviewed are referenced in the corresponding sections of this audit report. The audit included all aspects of the mine including access roads, material sites, waste rock dumps, the open pit, the mill, the heap leach facility, the TSF, the constructed wetlands, and the water storage reservoir.

Table 4-2: Summary of Major Fort Knox Permits and Authorizations

Agency	Permit/Authorization
Federal	
USACE	<ul style="list-style-type: none"> • 404 Permits • Jurisdictional Determinations
Federal Communication Commission	<ul style="list-style-type: none"> • Radio Station Authorizations
Bureau of Alcohol, Tobacco, Firearms, and Explosives	<ul style="list-style-type: none"> • License for Use of Explosives
Nuclear Regulatory Commission	<ul style="list-style-type: none"> • Radioactive Materials License
U.S. Department of Transportation	<ul style="list-style-type: none"> • Hazardous Materials Certificate of Registration
State	
ADEC	<ul style="list-style-type: none"> • Alaska Pollutant Discharge Elimination System (APDES) • Air Quality Permits • Waste Management Permits • Certificate of Reasonable Assurance (401 certification) • Non-transient Non-Community Class A Drinking Water Permit
ADF&G	<ul style="list-style-type: none"> • Fish Habitat Permits
ADNR	<ul style="list-style-type: none"> • Millsite leases • Hardrock Exploration Permit • Lease of Water Rights • Permits to Appropriate • Certificate of Approval to Operate a Dam • Certificate of Approval to Modify a Dam • Upland Mining Lease • Millsite Permit • Amended and Restated Millsite Permit • Final Plan of Operations Approval and Amendments • Land Use Permits
Alaska Department of Transportation	<ul style="list-style-type: none"> • Approval to Transport Hazardous Materials
Local	
Fairbanks North Star Borough	<ul style="list-style-type: none"> • Floodplain Permit • Conditional Use Permit for tailings disposal and solid waste landfill) • Zoning Permit

The Fort Knox Mine is in substantial compliance with those permits and authorizations reviewed during the audit, as specifically identified in RFP 2011-305. Non-compliances identified by agencies, or discrepancies noted during the 2011 audit and since the 2004 audit, are called out in the respective sections.

Table 4-3 presents a summary of the True North Mine permits and authorizations. The approval for Plan of Operations for the True North Mine (including the 2001 reclamation plan) expired in June 2007. This appears to have been an oversight on both FGMI and ADNR, as neither organization seemed to realize that the regulatory expiration was imminent (according to the document records provided as part of this audit). FGMI was going to submit a renewal application, but withdrew the Plan, as mining was to be discontinued and the company had decided to complete final reclamation and closure of the property.

The final reclamation work planned for 2009 and 2010 was authorized under Miscellaneous Land Use Permits (MLUP) to allow the reclamation activity planned for the site to proceed. MLUP# F097522 was issued on June 26, 2009, at which time FGMI initiated reclamation of the mine site. Subsequently, MLUP# F097522 was amended in August 2009, and again in November 2009, to allow the reclamation work to progress. On January 12, 2010, a second Miscellaneous Land Use Permit, MLUP# F107522, was issued to allow FGMI to continue with reclamation activities at the site during that year. However, FGMI took issue with several of the items in the new authorization document, and thus retracted the application (June 13, 2011), and instead, requested that the plan approval process resume. FGMI submitted a new draft Reclamation Plan in January 2011 (which was revised in July 2011 to address RS-2477 trail issues).

Table 4-3: Summary of True North Mine Permits and Authorizations

Agency	Permit/Authorization
State	
EPA/ADEC	<ul style="list-style-type: none"> • NPDES/APDES (Storm Water)
ADNR	<ul style="list-style-type: none"> • Millsite leases • Temporary Water Use Permit • Miscellaneous Land Use Permits (FO97522 & F107522) and Amendments (June 26, 2009, August 14, 2009, August 23, 2009, November 18, 2009 and March 24, 2010)

Review of the *True North Reclamation and Closure Plan* (December, 2001), for evaluation of compliance purposes only, was included in the original audit scope of work. However, as noted above, that plan approval expired in June 2007, and the 2006 plan, intended to be a renewal application for the operation, was retracted upon decision to cease mining and initiate closure of the True North site. Because the 2001 closure plan was legally no longer valid, the ADNR was obligated to authorize the site reclamation activities under the MLUPs and amendments. For this reason, SRK focused the compliance audit on the submitted, but not yet approved, draft True North Reclamation and Closure Plan (January/July, 2011), which forms the basis for final reclamation of the site.

NPDES and APDES Permit/Stormwater

During the summer construction period (July 2006 – September 2006) the Fort Knox Mine was covered under EPA’s NPDES Stormwater Construction Permit AKR10BR49. On April 27, 2009 EPA acknowledged receipt of a complete Notice of Intent (NOI) form, and the coverage under the NPDES General Permit for Stormwater Discharge for Multi-Sector General Permit Activity (MSGP) became effective on May 27, 2009. FGMI prepared a Stormwater Pollution Prevention Plan (SWPPP) and updates the document as required.

Site inspection of Best Management Practices (BMPs) implemented along the access and service roads demonstrated effective control structures, innovative techniques (i.e., brush berms, rock check dams, velocity reducing structures, stilling basins, etc.), and obvious maintenance of the structure shown on the photographs below.



With the expiration of the original 2000 EPA NPDES Stormwater MSGP (Tracking Number AKR05A473) that encompassed the True North Mine and Twin Creek haul road, FGMI submitted a NOI to ADEC²/EPA on May 27, 2009 for the new MSGP that became effective on September 29, 2008). ADEC issued tracking number AKR05CB49 for the True North Mine. The associated SWPPP was revised and updated in April 2011.

Observation of the BMPs along the Twin Creek Road and at the True North site indicated effective management of stormwater runoff. The revegetated brush berms located on the downhill side of the access road and at the toe of the recontoured waste rock facilities (WRF) are well established and require minimum to no maintenance. Revegetation of the recontoured WRF and other disturbed areas at the site is effectively mitigating erosion from storm water runoff shown on the photograph below.



Air Quality Operation Permits

The Fort Knox Mine is authorized to operate under a number of air quality permits (AQ0053MSS01 and AQ0053MSS02) for stationary sources issued by the ADEC – Division of Air Quality, Air Permits Program. These permits regulate gaseous (sulfur compounds nitrogen compounds, visible, and fugitive emissions).

The significant emission units at the facility permitted under Permit No. AQ0053MSS01 include four diesel electric generators, eight fuel oil-burning boilers, two waste oil-burning boilers, twelve heaters, three diesel fuel storage tanks, and a solid waste incinerator (decommissioned). These emission

² ADEC assumed primacy of the NPDES Stormwater Discharge Program from EPA in the fall of 2009 and issued the APDES Multi-Sector General Permit for Storm Water Discharges Associated with Industrial Activity Permit Number AKR050000 on November 2, 2009.

units provide power, heat, process steam, and waste reduction services to the facility. The significant emission units employed in the open pit mining, crushing, grinding, and material handling include two rock crushers, a reclaim tunnel, a lime silo, an induction furnace, and a carbon regeneration kiln. Five heaters were added at a later date and were incorporated into Permit No. AQ0053MSS02.

The air permits require a variety of parameters be collected such as differential pressure drops across baghouses, opacity from emission units and fugitive dust, fuel deliveries and usage, sulfur content, and hours of operation. In addition, source testing is required for stationary sources (such as bag houses and the carbon regeneration kiln, to verify the source is operating correctly. In addition, FGMI submits an estimate of particulate matter ten microns or less, oxides of nitrogen, oxides of sulfur, and carbon monoxide. FGMI submits compliance reports with the required information every six months to the Division of Air Quality. Fort Knox's air quality permit does not require source testing unless an opacity test fails. Since FGMI have never failed an opacity test, source testing performed to date has been voluntary, proactive testing performed by FGMI, and goes above and beyond the permit requirements.

The ADEC conducted an *Air Quality Full Compliance Evaluation* covering the period from January 1, 2006 through March 21, 2011. The purpose of the evaluation was to determine if the stationary sources were in compliance with the terms and conditions of Air Quality Operating Permit AQ0053MSS01 and AQ0053MSS02 and Alaska air quality control regulations.

The evaluation discovered non-compliance with conditions 6.2, 7.2, and 8.2 of Permit No. AQ0053MSS01. Conditions 6.2, 7.2, and 8.2 are reporting requirements for operating hours, fuel use, and used oil use in specific emissions units covered by this permit. FGMI did not correctly report monthly or 12-month rolling totals required in the facility operating reports for the time period of the evaluation. However, sufficient data was provided in the form of six-month totals or monthly values for the ADEC to verify that permit limits or operating hours, fuel use, and used oil were not exceeded. FGMI supplied the missing data to the ADEC in a subsequent letter and have now incorporated new management controls to prevent a repeat occurrence.

According to ADEC's automated complaint tracking system, only one complaint was received during the period from January 1, 2006 through March 21, 2011. On January 6, 2006, a complainant reported a problem that he felt was the Fort Knox Mine was contributing to the Fairbanks North Star Borough's particulate matter air quality problems. The ADEC was unable to verify the allegations or that they were attributable to the Fort Knox Mine, so the case was closed with no violation.

Amended Plan of Operations

Fort Knox operates under Plan of Operations F20079852, last amended in July 2007, and effective until July 2012. This document contains general, project-specific, and standard stipulations that cover environmental protection, monitoring, reporting, and reclamation and closure. The following documents are also part of the Plan of Operations:

- *Fort Knox Project Water Resources Management Plan* (March 1994)
- *Project Description for the Fort Knox Mine* (October 1995)
- *Fort Knox Mine Plan of Operations Amendment for Placement of Waste Rock and Low-grade Stockpile in Barnes Creek* (June 1998)
- *Fort Knox Mine Plan of Operations Amendment to Construct Power Line Within Millsite Lease Area* (January 2006)
- *Fort Knox Mine Plan of Operations Amendment for Realignment of Tailings Deposition Line Within the Tailings Storage Facility* (April 2006)
- *Fort Knox Reclamation and Closure Plan* (June 2006),
- *Fort Knox Mine Tailings Facility Closure Management Plan* (June 2006)
- *Revised Fort Knox Pit Lake Evaluation* (January 2007), and
- *Fort Knox Mine Monitoring Plan* (June 2008).

The terms and conditions contained within the documents above are considered stipulations of the Plan of Operations authorization. Changes to these documents must be approved by ADNR if they affect the Plan of Operations; if approved by ADNR, the stipulations become part of the Plan of Operations approval. Appendix A.3 provides a summary of the stipulations in the 2007 *Fort Knox Mine Plan of Operations Amendment*.

Hazardous Waste Management

FGMI is a Small Quantity Generator under the Resource Conservation and Recovery Act (RCRA), and ships limited quantities of hazardous wastes off site to a permitted treatment, storage and disposal facility (TSDF). As such, FGMI maintains a Hazardous Materials Registration (Reg. No: 063009 552 048RT) with the U.S. Department of Transportation as required by 49 CFR Part 107, Subpart G.

As a Small Quantity Generator, FGMI generates between 100 and 1,000 kg of hazardous waste per month and is required to comply with the RCRA regulations in 40 CFR, including:

- 262.11 – Requirement to make a hazardous waste determination on all wastes;
- 262.12 – Requirements for obtaining an EPA identification number;
- 262 Subpart B – Requirement for manifests for shipments of hazardous waste;
- 262 Subpart C – Pre-transport requirements, including packaging, labeling, marking, placarding and accumulation time;
- 262 Subpart D – Requirements for record keeping and reporting;
- Part 266 – Standards for the management of specific hazardous wastes
- Part 268 – Land Disposal Restrictions
- Part 273 – Universal Waste standards
- Part 279 – Used Oil standards

A RCRA Compliance Evaluation Inspection of the Fort Knox and True North mines was conducted by the Region 10 EPA on June 15, 2005. The purpose of the inspection was to determine the facility's compliance with the hazardous waste and used oil regulations found at 40 CFR parts 260 through 270 and 279. The inspection was conducted out of the EPA Seattle office, which submitted its findings to FGMI on February 16, 2006. At the Fort Knox Mine, the EPA observed only "minor violations" which were immediately corrected and documented in return correspondence dated July 28, 2005. At the True North Mine, no violations were identified by EPA.

Hazardous waste management practices were reviewed broadly during the 2011 environmental audit. SRK found no obvious issues with hazardous waste management at the Fort Knox site. However, since the 2005 EPA inspection, FGMI has relocated the primary hazardous waste storage area onto a lined facility near the mill complex.

Hazardous waste is no longer generated, managed, or stored at True North.

Solid Waste Management

Solid wastes at the site are managed under Waste Management Permit 2006-DB0043, which covers disposal of mine waste to the TSF, inert solid waste landfill facilities, the Walter Creek Valley Heap Leach Facility, the mine pit, and groundwater and surface water monitoring systems at the Fort Knox Mine. The permit is issued under the provisions of Alaska Statute 46.03, and the Alaska Administrative Code, 18 AAC 15, 18 AAC 60, 18 AAC 70, and 18 AAC 72 and other applicable state laws and regulations.

The operation of the TSF as a zero discharge facility is stipulated under this permit. The evaluation of that compliance item is discussed elsewhere in this audit report.

A large number of solid waste materials are sent offsite for recycling, significantly reducing the quantities of waste to be managed onsite. FGMI should be commended for their efforts to reuse and recycle materials. The majority of non-hazardous incidental waste that cannot be recycled is

incinerated or shipped offsite for disposal. In addition, some quantities of non-hazardous wastes are placed in permitted facilities within the waste rock dumps.

Solid waste management practices were reviewed broadly during the 2011 environmental audit. SRK found no obvious issues with solid waste management at the Fort Knox site. All solid waste generated at the True North Mine is transported to Fort Knox for proper handling and disposal.

Obligations

The Fort Knox Mine is signatory to *the International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold (Cyanide Code)* since 2007. The Cyanide Code is a voluntary industry program for the gold mining industry to promote:

- Responsible management of cyanide used in gold mining;
- Enhance the protection of human health; and
- Reduce the potential for environmental impacts.

The Cyanide Code is intended to complement an operation's existing regulatory requirements. Compliance with the rules, regulations and laws of the applicable political jurisdiction is necessary; this Code is not intended to contravene such laws. The Code focuses exclusively on the safe management of cyanide that is produced, transported and used for the recovery of gold, and on cyanidation mill tailings and leach solutions. The Code originally was developed for gold mining operations, and addresses production, transport, storage, and use of cyanide and the decommissioning of cyanide facilities. It also includes requirements related to financial assurance, accident prevention, emergency response, training, public reporting, stakeholder involvement and verification procedures. The Code does not address all safety or environmental activities that may be present at gold mining operations such as the design and construction of tailings impoundments or long-term closure and rehabilitation of mining operations.

Companies that become signatories to the code must have their operations audited by an independent third party to demonstrate compliance with the code. Audit results are made public on <http://www.cyanidecode.org> to inform stake holders of the status of cyanide management practices at the certified operations.

Auditors in both the 2007 and 2011 Fort Knox Mine audits found the facility to be in full compliance with the standards and practices of the Cyanide Code.

SRK Recommendation: None. FGMI is in substantial compliance with those permits and authorizations reviewed for this audit.

4.1.2 Geochemistry

Compliance with Geochemical Monitoring Requirements

The Waste Management Permit 2006-DB0043, Fort Knox Mine, Section 1.6.1.5 stipulates that FGMI conduct geochemical monitoring of overburden, development rock, run-of-mine ore placed on the Walter Creek Valley Heap Leach Facility and tailings samples from the Fort Knox mill to ensure that there is a low potential for the production of leachate that is acidic or contains levels of metals that would contaminate surface or groundwater.

Section 1.2.2 of the Waste Management Permit states '*Ore from satellite pits may be processed at Fort Knox provided that the following procedures are followed and the department determines that there will be insignificant impact on mine closure, reclamation, and water quality*'. No ore from satellite pits was sent to the Fort Knox Mine since the True North Mine ceased shipping ore in 2004.

SRK reviewed the annual monitoring reports from 2007, 2008, 2009, and 2010 that presented the monitoring results. FGMI analyzed tailings solids, low grade (heap leach) ore, and topsoil (overburden) as this material was encountered during mining and processing. Samples were collected on a quarterly basis. Samples underwent meteoric water mobility procedure (MWMP) testing and acid base accounting (ABA).

The MWMP testing evaluates the potential for dissolution and mobility of certain constituents from a mine rock sample by meteoric (precipitation) water. The solution from the test is analyzed for certain constituents and compared to water quality reference values. The ABA test looks at the amount of neutralizing material in a mine rock sample in comparison to its potential to produce acid. Samples with acid neutralizing potential (ANP) to acid generating potential (AGP) ratios greater than 3 to 1 are considered to have a low risk of generating acid.

Results of the MWMP tests showed that the majority of the tailings samples resulted in arsenic and antimony, and iron above the reference values of 0.01 mg/L and 0.006 mg/L respectively. These results indicate that the Fort Knox tailings have the potential to mobilize these constituents. Some of the growth media sample analytical results indicated that manganese could be mobilized with solution concentrations exceeding 0.05 mg/L.

Golder (2004) identified antimony and arsenic as potential constituents of concern with respect to the True North ore. These constituents are mobilized from tailings samples that were collected after the mill ceased processing the True North ore. The 2004 audit also recommended that copper and selenium be monitored as well. Golder stated that *'the four trace metals of interest in tailings water (arsenic, copper, selenium, and antimony) are all redox sensitive species to varying degrees. As such, redox conditions will influence the mobility of these metals. To characterize tailings water at depth, a pond water sample should be collected from the base of the tailings pond. This sample is expected to be more representative of pore water conditions within the tailings and therefore more representative of tailings seepage water quality'*.

SRK Recommendation: SRK reiterates this recommendation from the 2004 audit. Further, SRK recommends samples be collected at depth in the deposited tailings.

The ANP/AGP results were all greater than 3 to 1 and ranged from 4 to about 69 for the tailings. The low-grade and growth media had occasional ratios less than 3 to 1 prior to 2007.

The review of the monitoring results indicates that FGMI is complying with the geochemical monitoring requirements stated in Section 1.6.1.5 of Waste Management Permit 2006-DB0043, Fort Knox Mine.

Evaluate the “Zero Discharge” status for seepage flowing from the TSF to Fish Creek or Victoria Creek

In accordance with Waste Management Permit #2006-DB0043 for the Fort Knox Mine, FGMI “shall construct and maintain a seepage collection system below the TSF in accordance with plans approved by the department (ADEC). This seepage collection system below the TSF shall be constructed and maintained such that all seepage and runoff water from the TSF will be captured and pumped back to the TSF impoundment. The seepage and runoff collection system shall be operated to ensure that the TSF operates as a “zero discharge facility.”

In order to comply with this permit condition, FGMI constructed and operates a seepage collection system at the toe of the tailings dam embankment that collects seepage and returns it to the tailings impoundment. A series of groundwater pump-back (interceptor or IW) wells (IW-1, IW-2, IW-3, IW-4, IW-5, IW-6, IW-7, IW-8, IW-11, MW-1, MW-3, & Site 401), immediately down-gradient of the tailings dam and seepage control system, were designed and installed to intercept groundwater and seepage and pump the water back into the impoundment, thus creating drawdown in localized groundwater, and a gradient of groundwater flow toward the impoundment instead of down the Fish Creek drainage, as it would normally flow. In addition, four observation wells (MW-5, MW-6, and MW-7) are operated down-gradient of the interceptor wells to ensure that the system is functioning as designed and that groundwater quality downstream of the interceptor wells is not indicative of tailings process water chemistry, which would suggest that seepage from the impoundment was not being fully captured.

The ongoing status of the TSF zero-discharge system and water quality monitoring are tracked through quarterly reports submitted to ADEC. As part of the 2011 environmental audit, SRK was requested to evaluate the current status of the system. A review of the annual reports for 2007 through 2010 indicated that, with few exceptions, the seepage collection below the TSF has functioned properly, and that seepage has not entered the Fish Creek drainage. FGMI collects

monthly samples of seepage from the tailing impoundment. While the laboratory samples are analyzed for a full suite of chemical constituents, FGMI focuses the data interpretation and trend analyses on arsenic (As), antimony (Sb), selenium (Se) and lead (Pb) to evaluate the presence of any trends in the concentration of these constituents.

SRK chose to examine for more conservative elements as part of the 2011 audit; chloride (Cl), sulfate (SO₄), cyanide (CN), and nitrate (NO₃). All of the constituents, if present or elevated in the down-gradient monitoring wells, could be indicative of seepage breakthrough. Based on the quarterly data for 2010, the interceptor wells contained, on average, 17 mg/L Cl (ranging from 5 to 29 mg/L), 118 mg/L SO₄ (ranging from 36 to 220 mg/L), 0.61 mg/L CN (ranging from <0.003 to 0.4 mg/L), and 2.7 mg/L NO₃ (ranging from <0.02 to 13 mg/L).

The monitor wells, on the other hand, showed no evidence of these constituents; 2 mg/L Cl (ranging from <1 to 3 mg/L), 8.7 mg/L SO₄ (ranging from <1 to 18 mg/L), and 0.025 mg/L NO₃ (ranging from <0.02 to 0.05 mg/L). Cyanide was not detected in any of the monitor well samples. These findings substantiate the conclusions provided by FGMI in the respective annual report, indicating that the zero discharge system is functioning properly.

Two incidences related to tailings seepage have occurred over the last five years which merit disclosure:

Seepage Below Tailings Impoundment Dam (2006)

In December 2006, FGMI observed a surface seep (i.e., a spring) immediately below the downstream toe of the TSF embankment, south abutment. The initial estimate of flow from this seep was approximately 10 gallons per minute. In response, FGMI notified the relevant state agencies and immediately initiated an action plan that included:

- capturing flow from the seep and returning the flow to the TSF impoundment;
- returning solution from existing surface water features immediately down-gradient of the seep to the TSF (in case they had been impacted by the seepage);
- increasing the frequency of water quality monitoring (daily through May 2007, weekly from May to August 2007, and monthly from August 2007);
- conducting an additional dam inspection by the Engineer of Record (Knight-Piésold);
- placement of additional groundwater interception wells;
- constructing a toe drain to capture shallow groundwater flow; and
- placement of six piezometers across the dam.

On January 11 and 12, 2007, Mr. Tom F. Kerr, P.E. (Alaska) of Knight Piésold, the Engineer of Record for the TSF dam, visited the site to inspect the seepage and provide an assessment. He determined that the most likely cause for the seepage was that the TSF decant pond had reached an elevation above a zone of extensive discontinuities in the south abutment, thus allowing a small amount of seepage to migrate under the dam, eventually reporting to the surface. In conclusion, Mr. Kerr stated:

“Since the dam design accounts for seepage through the foundation, the presence of a small new seep is not considered a deviation from the design. Since the seep is occurring through discrete fractures in hard rock under the dam and the water is clear, it also does not represent a dam safety issue. However, if the source of the seep is confirmed to be from the tailings facility, it then, in accordance with the design basis, should be intercepted and returned to the tailings facility.”

Based on results from the ongoing monitoring of groundwater and surface water, this seepage has been contained within FGMI's seepage containment system. Down-gradient groundwater and surface water sampling points outside of containment continue to be free from cyanide.

Ponding Water Below Tailings Impoundment Dam (2008)

A surface pond that formed at Site 801 was sampled in September 2008 for Weak Acid Dissociable (WAD) cyanide and total cyanide. WAD cyanide was detected, and FGMI began a weekly sampling program on October 6, 2008, for WAD cyanide at Site 801 and at five surface water sites located down-gradient. In addition, monitoring wells 5, 6, 7, and 8, and the Upper Wetlands were sampled

weekly. During this period of enhanced monitoring, there were seven exceedances at Site 801, and one exceedance at Test Site 1 during the weekly sampling for WAD cyanide.

The water that ponded at Site 801 dried up by the first week of December 2008, and pumping had to be discontinued. Down-gradient groundwater and surface water sampling points continue to be free from cyanide.

Victoria Creek Drainage Investigation

With the approved expansion of the Fort Knox TSF, some concerns were raised that seepage from the impoundment could migrate through geologic strata along the southern perimeter of the facility and potentially impact groundwater and surface water resources in the Victoria Creek Drainage. FGMI proactively set up a surface water monitoring program at stations in upper and lower Victoria Creek in 2009, and initiated a groundwater monitoring program in 2010. FGMI installed two monitoring wells in the drainage – one drilled specifically for monitoring, and the other (drill as an exploration hole) converted to a monitoring well. At the beginning of October 2011, two new monitoring wells were drilled – one well is complete the other was nearing completion at the time of this report. Three additional wells were drilled, but dried up following development.

The baseline data generated during this monitoring program are reported to ADEC. Thus far, there do not appear to be any constituents in these samples that would indicate the influence of TSF seepage.

SRK Recommendation: Continue monitoring seepage in accordance with Waste Management Permit #2006-DB0043 for the Fort Knox Mine.

Post-Mining Pit Lake

The technical memorandum “Fort Knox pit lake evaluation 2010 update” from Schlumberger Water Services to FGMI dated February 16, 2011 was used as the basis for the review. The original methods for the pit lake model were described in the technical memorandum “Fort Knox pit lake evaluation” from Water Management Consultants to FGMI dated December 28, 2006. The audit team did not review the model in detail but performed a first principles check on the physical and chemical inputs to the model.

The Fort Knox Pit will be used as a water management facility at closure. Following completion of mining in the pit, TSF water and TSF seepage will be pumped to the pit for a period estimated to be 15 years. Heap leach drain down and rinse water will also be pumped to the pit later in this period. The modeling has indicated water chemistry will meet applicable water quality standards when the pit spills 51 years after mining concludes.

The pit lake model is a coupled fully-mixed physical and chemical model. The water balance indicates the dominant flow entering the pit will be groundwater followed eventually by direct precipitation and pit wall runoff. While TSF water represents a relatively important inflow from years 0 to 15 of post-mining, the current prediction indicates that pumpback will end long before the pit discharges limiting its significance to the overall pit lake water balance.

Groundwater entering the pit has been monitored in a series of monitoring wells. Concentrations in the water do not exceed water quality standards though arsenic concentrations at 0.0072 mg/L approach the standard of 0.01 mg/L. Pit wall runoff chemistry is a predicted rather than measured source term based on interpretation of meteoric water mobility procedure (MWMP) results. Geologically, the pit walls are expected to be mainly low in sulfide content and have negligible acid rock drainage (ARD) potential leading to the conclusion that pit wall runoff will be relatively dilute and non-acidic. The audit team does not consider the use of MWMP results and the interpretation of the results presented in the technical memoranda appropriate for the prediction of pit wall runoff chemistry. Concentrations may be under-estimated. Nonetheless, the low reactivity of the walls and relatively low volume contributed by pit wall runoff implies that uncertainty in runoff chemistry is relatively unimportant. A factor not considered in the model was the potential for progressive wall

instability or large scale failures to result in increase in the reactive surface area of the walls. This could result in higher chemical load contributions from pit walls than currently assumed.

The model did not consider limnological processes that may lead to thermal, physical or chemical stratification of pit water. Northern pit lakes commonly develop density and temperature profiles that may or not be disrupted by seasonal turnover. Due to the nature of the chemical inputs to the pit lake, it appears unlikely that chemical stratification would develop and be a significant contributor to variability in spill water chemistry.

In conclusion, the current pit lake model is generally appropriate and provides a reasonable indication that concentrations in spill water will not exceed current water quality standards. Due to the lengthy time required to flood the pit, monitoring provides an opportunity to evaluate the model predictions and determine whether water quality will be acceptable for discharge.

True North/Spruce Creek

See Section 4.1.3 for a discussion of the True North waste rock dump toe seep in relation to Spruce Creek.

4.1.3 Reclamation and Closure

Fort Knox Mine Reclamation and Closure Planning

As part of the 2011 environmental audit, SRK was requested to review (for evaluation of compliance purposes only) the following approved reclamation and closure plans:

- The *Fort Knox Reclamation and Closure Plan* (June 2006);
- *Fort Knox Mine Closure Management Plan for the Tailings Storage Facility* (June 2006); and
- *Fort Knox Mine Closure Management Plan for the Proposed Heap Leach Facility* (2006).

These plans formed the basis from which the more recent (2011) draft plan submittals were evaluated, prepared, and reviewed. The audit RFP also requested an evaluation of the adequacy and comment on the technical feasibility of the draft reclamation and closure plans associated with Fort Knox Mine facilities that are currently under review of the ADNR. These include:

- *The Fort Knox Reclamation and Closure Plan* (February 2011); and
- *Fort Knox Mine Closure Management Plan for the Tailings Storage Facility* (April 2011); and

The major variances between the 2006 and 2011 reclamation plans are detailed in Appendix B. An assessment of compliance with the requirements of the current regulations for reclamation and closure of the site was performed, the results of which are presented in Table 4-4.

Table 4-4: Comparison of Fort Knox Reclamation and Closure Plans with Alaskan Administrative Regulation (2004) Chapter 097 Mining Reclamation¹

Note: The requirements listed under each regulation sub-part are not copied in entirety but summarized to highlight the main requirements of each part. The regulations should be referenced directly for specific detail.

Regulation	Fort Knox Reclamation and Closure Plan (2011)	Fort Knox Mine Closure Management Plan for the Tailings Storage Facilities (TSF) (2011)	Fort Knox Mine Closure Management Plan for HL Facility (2006)
ARTICLE 02: RECLAMATION PERFORMANCE STANDARDS			
11 AAC 97.200 LAND RECLAMATION PERFORMANCE STANDARDS (a) Any surface that will not have a stream flowing over it is left in a stable condition. (1) Stable condition means return waterborne soil erosion to pre-mining levels within one year after reclamation is completed and achieves revegetation, where feasible, within five years after reclamation. (2) If topsoil from an area disturbed by mining is not promptly redistributed, a miner shall segregate it,	For the most part, assessment of the site against the performance standards is not yet possible as reclamation has not occurred For Item (a) (2),	Assessment of the site against the performance standards is not yet possible as reclamation has not occurred. The closure schedule indicates that	Assessment of the site against the performance standards is not yet possible as reclamation has not occurred. The closure plan does not clearly show how stormwater will be

Regulation	Fort Knox Reclamation and Closure Plan (2011)	Fort Knox Mine Closure Management Plan for the Tailings Storage Facilities (TSF) (2011)	Fort Knox Mine Closure Management Plan for HL Facility (2006)
<p>protect it from erosion and from contamination by acidic or toxic materials and preserve it in a condition suitable for later use.</p> <p>(3) If the natural composition, texture or porosity of the surface materials is not conducive to natural revegetation, a miner shall take measures to promote natural revegetation, including redistribution of topsoil, where available.</p> <p>(b) Surface contours after reclamation should be conducive to natural revegetation or are consistent with an alternate approved post-mining land use. A miner need not restore the sites approximate original contours but shall stabilize the reclaimed site to a condition that will retain sufficient moisture for natural revegetation or approved alternate post-mining land use.</p> <p>(c) A pit wall, subsidence feature, or quarry wall is exempt from the requirements of (a) and (b) if the steepness of the wall makes them impractical or impossible to accomplish.</p> <p>(d) If a mining operation diverts a stream channel or modifies a flood plain to the extent that the stream channel is no longer stable, a miner shall re-establish the stream in a stable location. Settling basins may not be placed in the way of the re-established channel location unless fines are properly removed or protected from erosion.</p>	<p>FGMI has been effectively stockpiling growth media near the heap leach and below the tailings impoundment.</p>	<p>reclamation of the TSF is not likely to be completed for at least ten years as it is dependent on water management requirements at the site. This will need to be taken into account when developing a timeline for assessing the site against the required performance standards.</p>	<p>controlled over or around the facility.</p>
<p>11 AAC 97.210 DISPOSAL OF BUILDINGS, STRUCTURES, AND DEBRIS ON STATE LAND A miner shall remove, dismantle, or otherwise properly dispose of buildings and structures constructed, used, or improved on state land unless the surface owner or manager authorizes otherwise. Scrap iron, equipment, tools, piping, hardware, chemicals, fuels, waste, and general construction debris on state land should also be removed or properly disposed of.</p>	<p>2011 plan does not mention disposal procedures for hazardous or non-hazardous waste.</p>	<p>In compliance although some residual piping will be enclosed within the facility.</p>	<p>No buildings or structures are associated with the heap leach pad. All residual piping will be enclosed within the heap.</p>
<p>11 AAC 97.220 UNDERGROUND MINES Openings of shafts, adits, tunnels and air vents to underground mine workings should be stabilized and properly sealed after mine closure.</p>	<p>Not applicable</p>	<p>Not applicable</p>	<p>Not applicable</p>
<p>11 AAC 97.230 HEAP LEACH OPERATIONS After neutralization of heaps, pads, ponds, and other facilities has been approved by the appropriate regulatory authority, a miner shall reclaim the site of a heap leach operation to the standards of AS 27.19 and these regulations.</p>	<p>Plan in compliance though stable conditions will need to be evaluated at one year and five years following closure.</p>	<p>Not applicable</p>	<p>Plan in compliance though stable conditions will need to be evaluated at one year and five years following closure.</p>
<p>11 AAC 97.240 ACID ROCK DRAINAGE A miner shall reclaim a mined area that has the potential to generate acid rock drainage (acid mine drainage) in a manner that prevents the generation of acid rock drainage or prevents the offsite discharge of acid rock drainage.</p>	<p>Not applicable – acid rock drainage is not anticipated at the site.</p>	<p>Not applicable - based on the results of testing completed to date, the Fort Knox tailings have an insignificant potential for acid generation.</p>	<p>Not applicable – spent ore is expected to have an insignificant potential for acid generation.</p>
<p>11 AAC 97.250 MATERIAL SITES (a) For continuous use or intermittent use of a material site, a miner shall reclaim a material site in accordance with AS27.19.020, 11 AAC 97.200, 11 AAC 97.210, and this section as contemporaneously as practicable with the mining. (1) If conditions permit a miner shall proceed cell by cell so that reclamation can and will occur immediately after each cell is mined. (2) If site conditions require the entire material site to be mined continuously, a miner shall reclaim the site as soon as the mining is completed.</p>	<p>Closure actions for borrow areas are not specified but general reclamation procedures cover some of the required detail. Actions such as backfill or requirements for regrading of</p>	<p>Reclamation of borrow sources or stockpiles is not explicitly covered by this plan. Refer to 2011 Reclamation and Closure Plan.</p>	<p>Reclamation of borrow sources or stockpiles is not explicitly covered by this plan. Refer to 2011 Reclamation and Closure Plan.</p>

Regulation	Fort Knox Reclamation and Closure Plan (2011)	Fort Knox Mine Closure Management Plan for the Tailings Storage Facilities (TSF) (2011)	Fort Knox Mine Closure Management Plan for HL Facility (2006)
<p>(b) Extraction of materials from river beds (gravel bailing operations). If a miner extracts materials from the bed of a water course, the miner shall re-establish a stable bed and bank profile as contemporaneously as practicable with the extraction.</p> <p>(c) Peat and topsoil mines. At least two inches of a suitable growing medium will be left or replaced on the mined land.</p> <p>(d) Materials used for other mines. If the primary use of the extracted materials is to assist another mining operation regulated under this chapter, the miner must include the reclamation plan or letter of intent for the material site operation as part of the reclamation plan or letter of intent for the primary mine.</p> <p>(e) Exempt excavations. If materials are extracted primarily for a non-mining purpose.</p> <p>(f) Stockpiles. Requirements do not apply to materials stockpiled at a distribution point other than the mined area, nor to minerals stockpiled at a mined area where no mining has taken place after October 14, 1991. A stockpile is a storage pile of materials segregated as a commercial product for sale or distribution elsewhere and does not include non-commercial waste rock, overburden or tailings. A stockpile associated with a mining operation other than for materials is not exempt from this chapter.</p> <p>(g) Material used for logging (detail not included herein).</p>	<p>borrow areas in particular are not mentioned.</p> <p>Closure activities for ore stockpiles, if the site were to closure unexpectedly, are not explicitly included.</p> <p>Closure of borrow areas and ore stockpiles is included in the cost estimate, however.</p>		
ARTICLE 03: RECLAMATION PLAN			
11 AAC 97.310 RECLAMATION PLAN			
<p>(a) The miner must submit a proposed reclamation plan before starting a mining operation.</p> <p>(b) A reclamation not submitted on a form provided by the commissioner must include the following:</p> <ol style="list-style-type: none"> (1) Name, address and telephone number of the miner who will serve as agent to receive any notice that is required under this chapter, and the names, addresses and telephone numbers of all other owners, operators, or leaseholders of the mining operations. (2) List of all properties, mining locations, or leases on which the mining operation is to be conducted. (3) A map at a scale no smaller than 1:63,360 (inch to the mile) showing the general vicinity of the mining operation and the specific property to be worked (4) A general description and diagram of the mining operation and the mined area that shows and states the number of acres to be mined <u>during each year</u> covered by the plan and that shows the location corners or property boundaries and their relationship to the reclamation work, the tailings or spoil disposal areas, and the areas otherwise affected by the operation. (5) The estimated number of yards or tons of overburden or waste and ore or materials to be mined during each year covered by the plan. (6) A description of the reclamation measures that will be taken to comply with AS 27.19.020 and 11 AAC 97.200 – 11 AAC 97.250, including the equipment to be used; a time schedule; and, if the miner proposes to reclaim the land to an alternate post-mining land use, a statement of that proposed or intended use; the description must include: <ol style="list-style-type: none"> (A) Measures for topsoil removal, storage, protection and replacement; (B) Measures for reclamation of tailings impoundments, settling ponds, reservoirs, heaps, open pits and cuts, shafts, adits, tunnels, portals, overburden, waste rock storage areas, and all other 	<p>In compliance with the exception of the following:</p> <p>Section (b)(4) and (b)(5) - Yearly breakdowns of mined acreages and tonnages of ore and waste rock not provided. However, plan does include LOM disturbance acreages and LOM ore and waste rock tonnages, but not the year on year breakdown</p> <p>Section (b)(6)(A) the plan states that growth media will be stockpiled,</p>	<p>Satisfies section (b)(6)(B) measures for reclamation of tailings</p>	<p>Satisfies section (b)(6)(B) measures for reclamation of heaps.</p>

Regulation	Fort Knox Reclamation and Closure Plan (2011)	Fort Knox Mine Closure Management Plan for the Tailings Storage Facilities (TSF) (2011)	Fort Knox Mine Closure Management Plan for HL Facility (2006)
affected areas; (C) Measures for stream placement and reclamation at the end of mining; and (D) A proposal for reclamation or post-mining conversion of access roads leading to the mining operation, airstrips, and other associated facilities.	but specific measures for removal, storage, and protection are not provided.	impoundments.	

¹ The annual mined acreage and tonnage in the Reclamation Plan was superseded by those parameters being report in the Annual Activity Report and the requirement to update the plan every 5 years.

As noted by Golder (2004), the reclamation planning for the Fort Knox Mine continues to be preliminary and conceptual in nature, and is appropriate for this stage of mine development. In general, the approaches to reclamation of the Fort Knox facilities are in keeping with industry practice, with, perhaps the exception of the innovative approach currently being proposed for the tailings storage facility. The following sections provide additional detail and items of note from the 2011 audit review of the reclamation and closure plans.

Revegetation

The initial *Fort Knox Project Reclamation Plan* (July 15, 1993) was approved by the state and federal review agencies and incorporated into the applicable permit approvals (i.e. USACE 404 Permit and ADNR Plan of Operations Approval). The caveat carried in the permits and approvals required FGMI to continue monitoring reclaimed areas and solicit additional input and guidance from ADNR’s Plant Material Center. The USACE permit POA 4-920574, Fish Creek 23, Special Conditions 9. b. required consultation with the ADNR, Plant Materials Center as to the recommended “types of vegetation, seed/cutting/seedling/bundle, application rates, woody species densities, time(s) of planting, and methods...” as the State of Alaska’s authority on reclamation procedures.

Earlier submissions of the *Fort Knox Mine Plan of Operations* assumed the placement of 6 inches of growth media on disturbed areas and was bonded using this amount. However, the *Fort Knox Mine Project Final Plan of Operations Amendment Approval* (July 3, 2007_ – Project Specific Stipulations, *Fort Knox Reclamation and Closure Plan* (June 19, 2006), Sections 5.0, 5.1, 5.2, 5.3, 6.9, and 6.10 and in the *Walter Creek Valley Fill Heap Leach Facility Project Description* (June 2006) Section 3.2 all have been modified (in similar wording) to require “12-inches of growth media unless otherwise approved by ADNR.” The ADNR required this modification of language as a condition of approval of the Plan of Operations. However, there are no provisions in Alaska Statutes Chapter 27.19 Reclamation that has “12-inches growth media” cover requirement or within the Alaska Administrative Code (AAC) Chapter 097, Article 2, Reclamation Performance Standards 11 AAC 97.200.

There is a single provision in 11 AAC 97.250 Material Sites (c) **Peat and topsoil mines** which states that a reclamation plan for a mine that produces peat, topsoil, or similar materials must provide that at least two inches of a suitable growing medium will be left or replaced on the mined land. This subsection does not apply to placer or hardrock mine reclamation.

Mr. Stoney Wright, Director of the ADNR Plant Material Center in Palmer Alaska, has been involved with reclamation activities at the Fort Knox site since 1993 by conducting germination test, phytotoxicity testing on mill tailings from mill pilot plant tests, recommending reclamation seed species and mixture, and adjusting the broadcast seeding rate in 1997 from 44 pounds/acre to 10 to 15 pounds/acre. Mr. Wright and his staff have been on several site visits to inspect reclaimed areas and according to his statement during a telephone interview on October 10, 2011 he has “never made a recommendation for 12-inches of growth media be the standard for any project in Alaska.”

ADNR’s requirement for 12 inches of growth media is not supported by scientific data, case histories applicable to Alaska, or ADNR’s own revegetation specialists. Although FGMI has incorporated the ADNR’s language into revised reclamation plans as ADNR made it a condition of approval, this standard is arbitrary and sets a precedence not supported by law or agricultural (scientific) practices.

SRK Recommendation: Provision set forth in subsection 5.2.9 Revegetation Cover Criteria of the *Fort Knox Mine Reclamation and Closure Plan* dated February 2011 are consistent with the 11 AAC 97.200 and as demonstrated by the reclamation completed to date by FGMI:

“A vegetative cover criterion of 70 percent will be achieved prior to requesting final release of financial assurance for each reclaimed area. The 70 percent vegetative cover criteria shall be determined a minimum of three years after the last application of topsoil, seed, fertilizer, or any water in addition to natural precipitation. The 70 percent cover criteria may be waived upon the concurrence of ADNR or the land owner for specific areas that are deemed stable, have minimal potential to adversely impact surface water quality, and are consistent with the post mining land use.

Percent live foliar cover will be determined using a method such as the Point-Intercept Method described in National Park Service’s fire monitoring handbook (NPS, 2003). Other more suitable methods to determine percent cover may become available and will be used upon approval from ADNR.

For a seeding determined to be unsuccessful, FGMI will implement appropriate action, which could include reseeding the area, fertilization, and/or placement of growth media on the site.” To date, successful concurrent reclamation activities at the Fort Knox Mine have not required the use of mulch. However, in some situations, mulches may enhance revegetation and stabilization of areas. Straw or grass hay at a rate of 1 to 2 tons per acre has proven to be the most cost effective. On steeper slopes, hydromulch may be desirable. A vegetative cover criterion of at least 70 percent will be achieved prior to requesting bond release and/or final abandonment of the project site for those areas not specifically exempted from the criterion (e.g., pit walls and special wildlife habitat areas).

Heap Leach Pad and Waste Rock Dumps

The reclamation of the spent heap and waste rock dumps is very much in keeping with standard industry practice: regrading, cover placement (as necessary) and revegetation. The key factor for consideration will be the quality of runoff and seepage from these facilities, which will contribute to the overall water quality of the TSF post closure. To that end, the 2011 reclamation plan does provide some leachate quality for waste rock but does not provide the data demonstrating the future condition of the heap drainage, nor the requirements for recirculation of process water or application of fresh water to rinse the heap.

According to the *2006 Fort Knox Mine Reclamation and Closure Plan*, “Column testing currently underway will provide more detailed information on the quality of rinse water at the completion of rinsing and the time required for rinsing. The column testing will be completed in the summer 2006, and a supplementary report will be prepared to address water quality associated with rinsing. This program was in response to recommendations made by Golder (2004) during the previous environmental audit. However, these data do not appear to have ever been generated, nor was a report addressing long-term water quality from the heap prepared.

According to FGMI, ten metallurgical column tests of heap leach ore are currently running which are intended to determine the final rinsing requirements of the facility as part of permanent closure. According to Mr. Hunter Propsom, FGMI metallurgist, the data from these studies should be available at the end of 2011, at which time the precise requirements for recirculation of process solutions and freshwater rinsing will be determined. As the Fort Knox closure plan is still conceptual, it is not unreasonable to expect that these data will be generated as the mine moves toward final closure beginning in 2026 for this facility. Given the uncertainty surrounding the overall, long-term water quality management issues for the site, and the complexity of the currently proposed closure plan, more definitive data on the future seepage quality from the heap leach pad is invaluable, and could have implications on the duration of water management (directly affecting reclamation bond costs).

SRK Recommendation: Complete the column rinsing tests to determine final rinsing requirements.

Growth Media Stockpiles

ADNR expressed some concern over the abundance and availability of growth media to effectively cover all of the mine waste facilities (i.e., waste rock dumps, spent heap, tailings impoundment, etc.) at the Fort Knox Mine. A consolidated growth media balance is presented in the reclamation plan.

Table 5.1 (p. 27) indicates that 5,816,595 cubic yards of growth media will be available from the seven primary stockpiles and borrow areas located around the site. Utilizing the LOM footprints and prescribed 12-inch growth media cover requirement, this quantity should be sufficient for reclamation.

SRK Recommendation: More detailed growth media balances should be developed as the site moves toward final reclamation and closure.

Building Demolition

At the time of the Golder environmental audit (2004), the buildings in the mill area of the Fort Knox Mine were situated on land controlled by the Alaska MHTLO, and required demolition as part of 11 AAC 97.210 Disposal of Buildings, Structures, and Debris on State Land. At the end of 2007, FGMI negotiated a deal to purchase this land, in effect converting the area from state land to private land. As such, the obligation for complete demolition and removal no longer exists. FGMI is currently investigating several alternative post-mining land uses that could incorporate all or portions of the buildings at the mill site, including, but not limited to, a geologic field and interpretation center for use by faculty and students if the University of Alaska and other similar institutions.

SRK Recommendation: None

Tailings Storage Facility

The ADNR requested an evaluation of the TSF closure and reclamation plan submitted in April 2011. However, in a June 16th email from Mr. Delbert Parr to Mr. Jack DiMarchi, the company cautioned "anyone who wishes to look at this document that it is for reference only. The Fort Knox Mine Reclamation and Closure Plan is the document submitted for your review. The TSF Closure Plan document has not been through a thorough review by FGMI, and therefore, there is no commitment to anything in this document unless it has been incorporated into the Reclamation and Closure Plan". As such, details about the TSF plan are not consistent with the final approach proposed in the reclamation plan. SRK, therefore, based its general assessment of the technical feasibility of the TSF closure on the February 2011 *Fort Knox Reclamation and Closure Plan* instead of the facility-specific plan, which was used for some supporting documentation.

As noted by MWH (2004), of the Fort Knox Mine facilities, the TSF will be the most critical component to be addressed during closure. The TSF will require some level of long-term water management and water treatment to allow for a discharge from the facility. Previous approaches to TSF closure at Fort Knox focused principally on a standard water cover, with upland and wetland covers along the impoundment perimeter. Wet reclamation covers of tailings impoundments are somewhat typical for mine reclamation, as are dry covers, which eliminate the storage of water on the surface of the impoundment. The question of wet versus dry closure of the Fort Knox TSF has been ongoing for years. The USACE in a letter dated November 3, 2011 approved the February 2011 reclamation plan and with that approval all mitigation of wetlands disturbed to date was satisfied.

The currently proposed approach by FGMI is both unique and innovative, as it utilizes characteristics of both standard approaches, and includes areas of open water, wetland boundaries and dry upland covered areas as shown on Figure 4. Excess water from the south pond will be conveyed to the north ponds in order to stabilize the overall water balance of the facility. Ultimately, as allowed by the final water quality in the impoundment, excess water will be discharged via an engineered spillway into the rehabilitated Fish Creek.

While the TSF closure plan is still preliminary, and conceptual in nature, and final designs and schedules are not available, SRK's review of the plan identified the following points of interest/concern:

- The plan does not address the issue of trafficability of large mining vehicles on the TSF surface in order to place the two feet of waste rock material for the upland closure cover. The reclamation cost estimate assumes that Cat 988 loader, Cat 740 haul truck (weight = 80 tons), and a Cat D10R dozer (weight = 90 tons) will be used to place the cover on the TSF. The stability of this equipment on two feet of waste rock material over moist or partially

saturated tailings remains in question, and should be evaluated. Golder also brought this concern forward in the 2004 audit.

- The sequencing of water management and cover placement is predicated on a very precise water balance and timeline. As is constantly being pressed in the mainstream media, global climate change is affecting weather patterns all around the world, and long-term water balance may see increases in precipitation or drought conditions before reaching the 'stable' conditions described in the plan. In particular, drought conditions could evapoconcentrate the various water sources and lead to longer periods of active water management. However, FGMI can only base its plans and projected costs on climatic conditions that are "normal" for the area. At this time costing for hypothetical climatic projections is not reasonable.
- More information is required on the coarse, rockfill channel that will be used to transfer water from the south pond area to the north pond area, including design, construction and maintenance details. At this time in the mine life, detailed design of the rockfill channel is premature.
- The pit lake is expected to eventually reach an elevation where it will "discharge" into the tailings impoundment. This "discharge" is not discussed in the reclamation plan, nor indicated on the post-closure figures. The plan should discuss the implications of surface discharge onto the upland cover area. If, as is purported by FGMI, the "discharge" is subsurface (through the highly permeable alluvium), the plan should discuss the implications to the durability of the upland cover in the tailings impoundment as well as the rockfill channel, and any possible reactivity issues that could arise from the injection of oxygenated water from the surface waters of the pit lake to the subsurface tailings.
- Dr. Alvin Ott, Operations Manager for the Division of Habitat of ADF&G, expressed some concern that the upland portions of the proposed TSF closure plan would be too permeable, and percolate water to quickly, thus leaving the surface dry and barren.

SRK Recommendation: Complete the consolidation study to determine trafficability and how this affects the reclamation schedule, water management, cover placement, the rockfill channel, and possible reactivity of the tailings.

True North Mine Reclamation and Closure

To better understand the current status and context of reclamation of the True North Mine, SRK has provided the following summary outlining the progress of reclamation at the site. As a basis of the life of the mine, ore was mined and shipped to the Fort Knox mill from 2001 through 2004, when operations were halted and the facility entered temporary closure status until such time that FGMI determined what to do with the property.

- The approval for Plan of Operations for the True North Mine (including the 2001 reclamation plan) expired in June 2007. This appears to have been an oversight on both FGMI and ADNR, as neither organization seemed to realize that the regulatory expiration was imminent (according to the document records provided as part of this audit).
- In February 2008, ADNR requested that a renewal application for the Plan of Operations be submitted within two months. In the meantime, FGMI was permitted to continue monitoring and maintenance of the site.
- By May 2008, FGMI had submitted an updated *Reclamation and Closure Plan*, *Project Description*, and *Monitoring Plan* as part of the renewal application. This included the possibility of additional exploration and resource evaluations. However, by 2009, FGMI made the decision to not pursue further mining at True North and to complete final reclamation and closure of the property as "expediently as practical."
- ADNR did not advance the approval process of the 2009 PoO renewal application which in effect reverted back to the approved 2001 plan. Instead, the final reclamation work planned for 2009 and 2010 was to be authorized under Miscellaneous Land Use Permits (MLUP) to authorize the reclamation activity planned for the site.
- The True North Millsite Lease (ADL 416509) required an environmental audit "prior to and in preparation for termination of this Lease and/or every third year of operation but not later than August 31, 2003". The previous environmental audit occurred during 2003. By strict terms of the Millsite Lease, the second audit should have occurred in 2006; however, ADNR elected to allow the time table for the environmental audit at True North to coincide with the

environmental audit at the Fort Knox Mine. This would have set the next environmental audit to occur in 2008; however, when the Walter Creek Heap Leach was permitted at the Fort Knox Mine, this “reset” the environmental audit clock to 2011.

At the True North Mine, ADNR observed waste rock dump instability, apparent oxidation products in the Central Pit, and possible increases in water quality parameters in Spruce Creek and desired the results of the next environmental audit before approving a final reclamation plan at the True North Mine. ADNR authorized continued reclamation activities at True North through the use of MLUPs during 2009 and 2010.

- MLUP# F097522 was issued on June 26, 2009, at which time FGMI initiated reclamation of the mine site. Subsequently, MLUP# F097522 was amended in August 2009 and again in November 2009 to allow the reclamation work to continue to progress.
- On January 12, 2010, a second Miscellaneous Land Use Permit, MLUP# F107522, was issued to allow FGMI to continue with reclamation activities at the site. However, FGMI took issue with several of the items in the new permit, and thus retracted the application (June 13, 2011), and instead, requested that the plan approval process resume.
- To this, FGMI submitted a new draft Reclamation Plan (January 2011), which was subsequently revised in July 2011 to address RS-2477 trail issues.

The reclamation of the True North Mine surface facilities is ongoing, with most of the major facilities successfully reclaimed to within industry norms. However, there remain several unresolved reclamation issues at the site which have created noticeable friction between FGMI and the ADNR which are counter-productive to effective closure of the site.

Waste Rock Dump Stability

Following reclamation activities by FGMI, areas of mass slumping and surface tension cracking occurred at the site; three of the more significant areas being the North Shepard Slump, the Hindenburg Road Sloughs, and the Explosives Road Cracking.



Hindenburg Road Sloughs (2011)



North Shepard Slump (2007 & 2011) (Golder, 2011)

The surfaces were repaired and revegetated, but smaller cracks reappeared in several locations. FGMI initiated a monitoring program to track the movement of the dumps. Surveyed control points were established and are surveyed quarterly to determine movement. These data are included in quarterly reports to the ADNR. FGMI proposes to continue monitoring these points until movement ceases before completing final reclamation of the facilities. At the North Shepard Slump site the reported ground movements were up to about one foot over a period of about 9 months in 2010, requiring some supplemental surface regrading. For the Hindenburg Road Sloughs, total movements over four feet were reported during a period of two years (2010 and 2011) of measurements (Golder, 2011). According to Golder (2011), the Shepard site appears to be moving slowly and may be representative of a site placed partially in winter and partially in summer with a limited amount of water and ice in it. Waste rock was dumped with no compaction, so this material is likely loose and will slowly consolidate over time. Some waste rock was placed in winter, so more settlement may occur as the depth of surface thawing increases.

As for the Hindenburg Road Sloughs, Golder (2011) concludes that the rate and magnitude of movement can be representative of continuous thawing and thaw settlement in the area. Continued monitoring could help predict how long the settlement will continue and what magnitude of settlement can be expected, as there may be more ice in this location. The entrained ice is expected to eventually thaw to some depth, then become relatively thaw stable. The surface reflections (i.e., cracking) would become less and be less detectable.

According to ADNR, the construction of the dumps at True North is not consistent with the original Golder (2000) stability analysis. While the audit cannot comment on the original construction of the dumps that have now been reclaimed, SRK notes that Golder (2000) also commented that "Downslope movements of waste dumps are common, and are particularly likely at this site because of the presence of creep-sensitive frozen materials in the subgrade." Continuous monitoring was recommended.

The current extent of cracking does not appear to represent a significant threat to the local environment, but may result in increased infiltration of surface water runoff during the spring freshet. In addition, the cracks could represent a potential liability to FGMI from a public safety perspective, should any unauthorized persons gain access to the site and injure themselves falling into one of these features.

SRK Recommendation: At a minimum, the surface cracking on the waste rock dumps needs to be repaired, and the monitoring of movement in the dumps continued for as long as FGMI controls the property and site access. Subsequent to the audit site visit, Mr. Rupert "Bucky" Tart, of Golder Associates Inc., conducted a follow-up review of the existing data to examine the dumps from an engineering perspective; the results of which were reported in *Geotechnical Review of True North Waste Dump Slumping and Cracking* (Golder, November 21, 2011). Discussions between SRK and Mr. Tart on October 18, 2011 revealed that the preliminary assessment of the issue is that discontinuous permafrost and/or snow is melting within the dumps leading to the differential settling of the waste rock (as Golder had predicted). This conclusion was reiterated in the November 21, 2011 memorandum.

That assessment leads to the question, however, of whether or not sulfide oxidation within the dumps (which is an exothermic, heat releasing reaction) is warming the interior of the dumps and contributing to the melting of the inter-bedded layers of permafrost. While the overall sulfide content of the True North ore and waste rock is generally considered to be low, a further review of the site ABA data indicates that the sulfur content of the rock increased over the last year of operation (some samples reaching as much as 1% sulfur). While this may not be sufficient sulfur to react and form Acid Rock Drainage (ARD), oxidation could lead to internal warming and thawing of entrained snow and ice. SRK therefore recommends that a program be initiated to monitor the temperatures within the dumps in the slump areas to assess this possibility, and that mitigation measures be implemented, as needed. Mr. Tart (Golder, 2011), on the other hand, only recommends temperature monitoring "If more information or definition of the performance of the waste dumps is needed," Temperature monitoring could be conducted using infra-red heat surveys (or equivalent), which would not involve drilling into the waste dumps. An alternative to thermistor installation is to establish a visual inspection program during the winter months and spring to note differential melting of the snow cover or other visible indicators i.e., steaming, open vents, winter seeps, etc. If differential melting is noted, then further investigations could be carried out.

Waste Rock Dump Toe Seepage

The possible infiltration and seepage of water through the True North waste rock dumps" as an issue about which there is disagreement between the agencies and FGMI. According to SRK (2000), the focus of mitigation should be to "*minimize infiltration into the waste rock and reduce the quantity of rock drainage entering ground water. This could be achieved by enhancing runoff and evapo-transpiration, and minimizing the overall footprint.*" While not specifically advising not to rip the surfaces of the waste rock dumps, it does suggest that the overall reduction of infiltration is the target objective. As such, ADNR commented that it advised FGMI that, when ripping for soil scarification, care must be taken to balance the needs of revegetation with keeping an intact surface to reduce infiltration. Should it be determined that infiltration was adversely impacting *water quality*, ADNR may require FGMI to add additional growth media or take additional measures to reduce infiltration (2002 Plan of Operations approval) The precise stipulation in the approval is as follows: "Growth medium replacement depths on waste rock dumps, pits and roads will be determined based upon water quality monitoring data and final facility closure plans developed to achieve closure water quality objectives." Unfortunately, the closure water quality objectives were not clearly defined.



In order to facilitate revegetation of the waste rock dumps, FGMI utilized ripping and scarification, a common industry practice. However, rather than rip on contour, which restricts the surface flow of water and generally promotes infiltration, FGMI's contractor ripped many of the dump areas across the contour (or down slopes). While still allowing for the collection of soil fines and seed germination, the approach allows for somewhat more surface runoff than the on-contour approach. Whether this difference in infiltration rates is significant or even quantifiable remains open for debate.

In addition, it appears that pit runoff as well as non-contact stormwater is collecting behind a portion of the reclaimed Zeppelin/Hindenburg dump in the upper Spruce Creek drainage as shown on Figure 3. As a result of reclamation grading activities in that area, the upper reach of Spruce Creek has been blocked by waste material. Water, containing elevated total dissolved solids and sulfate concentrations, is ponding on the up-gradient side of the waste dump. The exact nature of this water is currently unknown, but could be water infiltrating/flowing from the pits. According to site records, a pit lake existed in the Central Pit in 2005 and 2006, but suddenly disappeared in 2007. Coincidentally, a new spring appeared in the upper reaches of Spruce Creek; a spring which the

ADNR believes did not exist prior to mining. It is this spring that is currently feeding the aforementioned pond.

The probability is high that this water is permeating through the waste rock dump, exiting at the toe, and may be contributing to ambient water quality impacts in Spruce Creek. However, upon review of the water quality in Spruce Creek by ADEC, the agency concluded (in their findings letter dated February 5, 2010) that a correlation between the water quality in Spruce Creek and water quality effects from FGMI's mining and reclamation activities could not be established at this time.

Unfortunately, limited pre-mining baseline data of the water quality in Spruce Creek are available, but early testing by Newmont indicated elevated TDS and alkalinity as naturally occurring. Given that these drainages originate (d) in areas of known sulfide mineralization, one can assume that some evidence (or fingerprint) of that material existed in the pre-mine surface waters. It is unclear if mining has exacerbated these conditions.

SRK Recommendation: The blocking of the upper reach of Spruce Creek during reclamation of the Zeppelin and Hindenburg dumps failed to consider the possibility for buildup of water on the up-gradient portion of the dump within the Spruce Creek drainage. As stipulated in 11 AAC 97.200(d) of the Land Reclamation Performance Standards, "If a mining operation diverts a stream channel or modifies a flood plain to the extent that the stream channel is no longer stable, a miner shall re-establish the stream in a stable location."

While the precise nature of this water is not known, the accumulation of this water behind a mine waste pile is not in keeping with industry best practices, and is likely contributing to the seepage at the toe of the dump. SRK, therefore, recommends that FGMI pull back the toe of the dump and re-establish (to the extent practicable) the natural drainage in Spruce Creek. This will likely require some form of engineering evaluation prior to construction to determine the best and most stable design for this area. Once the material is removed, FGMI should continue monitoring existing seeps to determine if flow path has been modified.

In addition, SRK finds no reasonable, justification at this time, to modify the surface water monitoring points within the Spruce Creek drainage, and defers to the judgment of the ADEC in assessing the water quality and potential impact thereto.

Possible Salts Formed as a Result of Sulfide Oxidation in Central Pit

In recent years, discoloration has been observed in the Central Pit area. These 'salts' could be indicative of sulfide oxidation and acid neutralization, but no formal investigations of these areas have thus far been initiated. Precipitation runoff within the pits is likely infiltrating the ground (as evidenced by the disappearance of the former pit lake) and may be associated with the elevated sulfate concentrations measured in the spring that developed in the upper reaches of Spruce Creek following the disappearance of the 2005-2007 pit lake.

SRK Recommendation: FGMI should investigate the nature and extent of this discoloration to determine if it is indeed sulfide oxidation, and propose possible mitigation efforts, as necessary.

Pit Highwall Stability/Safety

The ADNR expressed concerns over the stability of the Central Pit highwalls with regard to public safety. Industry practice generally includes the construction of berms and the posting of warning signs around mine pit perimeters to deter the public from approaching the edge. There is generally no warning of potential safety hazards given in the interior of open pits, as access is generally restricted by the use of large berms and boulders. However, given the nature of the True North side-cut pits, this access restriction cannot be effectively implemented or maintained. SRK observed some evidence of rock fall and raveling of the pit highwalls, but does not feel that the threat is any more significant than most Department of Transport road cuts across America. However, given that the property is still under the control of a private entity, concern for public safety and company liability is reasonable.



SRK Recommendation: SRK recommends that FGMI include signs at the base of the highwalls warning the trespassing public of the dangers of falling rocks when FGMI no longer controls access. The placement of signs and berms should be part of the next audit provided that FGMI has relinquished access. Additional mechanical or structural mitigation does not appear necessary at this time.

True North Mine Permanent Closure

As originally stipulated in the ADNR (2002) approval of the True North Project, permanent closure of the facility is achieved when the following requirements are met: 1) Meet both applicable surface and ground water quality; 2) If required, the growth medium caps on the waste rock dumps and Hindenburg Pit bottom are in place; and 3) a 70 percent vegetative cover criteria has been achieved. Until the issue of water quality in the drainages below the mine, specifically that water quality in Spruce Creek, can be adequately and conclusively addressed by ADNR, ADEC, and FGMI, permanent closure of the facility does not appear to be imminent.

In addition, the continued movement and long-term stability of the waste rock dumps also needs to be addressed before the ADNR can release the site for the approved post-mining land use, which includes use by the general public.

Reclamation Awards

ADNR Reclamation Award

The ADNR awarded FGMI the *2000 Reclamation Award for Excellent Mine Reclamation on Fish Creek*. The award recognized the work performed by FGMI to reclaim historic placer mining remnants in the Fish Creek drainage which resulted in the re-establishment of a viable aquatic and wildlife habitat. Reclamation in the Fish Creek valley has restored stream channels, established wetlands and re-established vegetation.

Tileston Award

In 2009, the Fort Knox Mine (along with the ADF&G and three seafood processors in Unalaska) received the Second Annual Tileston Award. The award was presented to FGMI and the ADF&G for the fish habitat and Arctic grayling restoration work in Fish Creek, repairing the damage done to fish habitat from past activities of other mining operations in drainage. Their efforts were recognized for establishing a viable Arctic Grayling population in Fish Creek and reversing Fish Creek's listing as an Impaired Water Body (<http://www.tilestonaward.com/winner2009.html>).

4.1.4 Reclamation Cost Estimates

The 2011 environmental audit RFP requested an evaluation of the financial assurance calculations in the draft *Fort Knox Reclamation and Closure Plan* (2011) to determine if costs were reasonable and appropriate. To facilitate this evaluation, SRK was initially provided a copy of the ADNR's *DRAFT Mine Closure and Reclamation Cost Estimation Guidelines* (dated November 3, 2009). The purpose of these guidelines is to provide a consistent methodology for mining companies to use when estimating the amount of financial assurance required for the closure of a mine and the regulatory agencies to use when reviewing the closure cost estimates. However, SRK was later instructed by Mr. Ed Fogels, ADNR Deputy Commissioner, that this is an *unofficial guidance* that is currently under review, and not yet adopted by any agencies overseeing mine reclamation in the State of Alaska. As such, the environmental audit should not rely on this document for compliance, but rather look to best industry costs as the basis from which to complete the audit.

Fort Knox Mine

In accordance with 11 AAC 97.400, FGMI is required to post a reclamation performance bond with the ADNR commissioner to ensure complete compliance with relevant Alaskan statutes, regulations, and the approved reclamation plan. With the submission of an updated reclamation and closure plan (2011), FGMI also submitted a revised reclamation bond cost estimate, both of which are currently



under review by the ADNR. The Fort Knox Mine reclamation cost estimate increased dramatically from 2006 (\$20,551,994) to the proposed 2011 estimate of \$65,785,797.

An examination of the proposed labor and equipment rates found that the Fort Knox rates were within, but in many cases toward the lower end of the range of reasonable industry standard rates. This is likely attributed to the fact that most of the rates used for the Fort Knox calculations are based on third-party contractor quotes as opposed to generally higher government rates, such as Davis-Bacon Wage Determinations. In some cases, the Fort Knox rates were higher than industry standards. Table 4-5 provides a brief assessment of the major reclamation areas with respect to cost and rates.

Table 4-5: Fort Knox Mine Reclamation Cost Estimate Assessment

Item	Fort Knox Closure Cost Estimate (Feb. '11)
Costs for structure demolition or removal	In addition to building demolition and mill decommissioning, costs have been allocated for pipeline and power line removal. (p. 44) of the plan mentions "Fencing around reagent storage areas will remain in place until the reagents and chemicals are removed from the site" – however, an allocation for removal of reagents and chemicals or fuels and hazardous materials from site is not explicit at this time."
Equipment ownership and operating costs	Most of the equipment rates are based on third-party contractor quotes, and appear to be within industry standard costs as this time.
Labor rates	The labor classes of power equipment operator and laborer are allocated hourly rates of \$64.30 and \$65.50, respectively. These rates are higher than the rates in Pamphlet 600 - Issue 23, Effective September 1, 2011. (Appendix E, p. 8 of 37)
Logistical support costs	Given the scale of the mine site, it is assumed that the contract costs for the equipment listed are of long-term nature.
Monitoring costs, closure of any monitoring wells, and post closure water treatment and monitoring	Appendix E – Cost Support Calculations (<i>Fort Knox Mine Reclamation and Closure Plan</i>), p. 2 of 37 indicates post-closure monitoring between 2011 and 2040. However, this is scheduled in pages 3-4 as beginning in 2026 and ending in 2039 (14 years). There is no evidence that inflation has been accounted for given the repetition in figures from year to year in some intervals.
Road removal	This item has been included under the heading "Roads and Stockpads." (p. 52)
Miscellaneous structures	Power lines have been covered under "Pipeline and Power line Removal." (p. 52)
Materials handling plan, material volume estimates	It is beyond the scope of this audit to determine if the material volume estimates provided by FGMI are adequate for the proposed reclamation plan.
Materials handling plan, equipment selection	It is understood that, given the size of the mine

Item	Fort Knox Closure Cost Estimate (Feb. '11)
	site, use of "specialized pieces of equipment" is appropriate and necessary. These equipment are part of the third-party contractor quotes
Mobilization/demobilization costs	Mobilization/demobilization are categorically shown as indirect costs and are taken as 5%. (p. 52)
Profit and Overhead	The contractor profit and overhead are lumped into a single item and taken as 10%
Performance and payment bond	Both a performance bond and a payment bond are included at 1.5% (each) of the total direct costs. (p. 52)
Contract administration	Contract administration is at 8% of total direct costs (p. 52)
Liability insurance	Insurance premiums are taken as 1.5% of the total direct costs (p. 52)
Engineering redesign	Engineering/redesign costs are estimated as 4% of total direct costs (p. 52)
Contingency	Contingencies are estimated at 4% of the total direct costs, which may be low (p. 52)

True North Mine

FGMI submitted a revised reclamation and closure plan, including updated bond cost estimate, in 2011. Both items are currently under review by the ADNR. The original 2001 reclamation cost estimate for True North was \$2,238,419; even with all of the reclamation completed at the site since closure in 2007, the proposed 2011 estimate is \$3,225,840. Table 4-6 provides a brief assessment of the major reclamation areas with respect to cost and rates at True North.

Table 4-6: True North Mine Reclamation Cost Estimate Assessment

Closure Cost Item	True North Closure Cost Estimate (Jul. '11)
Costs for structure demolition or removal	All of the former structures at the True North site have been demolished. However, there remains some residual debris which, according to FGMI, is being removed by a third-part contractor. Until this is completed, additional costs should be added to the estimate.
Equipment ownership and operating costs	The work is currently being carried out by a third-party contractor, and costs in Appendix E are from quotes. This approach is acceptable under industry standards
Labor rates	The work is currently being carried out by a third-party contractor, and costs in Appendix E are from quotes. This approach is acceptable under industry standards.
Logistical support costs	Given the scale of the mine site, it is assumed that the contract costs for the equipment listed are of long-term nature.
Monitoring costs, closure of any monitoring wells, and post	Appendix B – Cost Support Calculations: Post-

Closure Cost Item	True North Closure Cost Estimate (Jul. '11)
closure water treatment and monitoring	closure monitoring (and the costs associated with it) are currently only scheduled for 5 years. While this is keeping with current industry practice, additional consideration of longer-term monitoring costs may be warranted.
Road removal	An allocation has been made for "Roads and Shop Pads" in the closure cost estimate.
Closure Cost Item	True North Closure Cost Estimate (Jul. '11)
Miscellaneous structures	This site is in closure and these items are no longer on site or are covered under other items.
Materials handling plan, material volume estimates	It is beyond the scope of this audit to determine if the material volume estimates provided by FGMI are adequate for the remaining site activities.
Materials handling plan, equipment selection	The work is currently being carried out by a third-party contractor, and costs in Appendix E are from quotes. This approach is acceptable under industry standards.
Mobilization/demobilization costs	Included as 5.0% of direct costs
Profit and Overhead	Contractor profit is not explicitly included. Much of the remaining site costs are provided as contractor quotes, which would include contractor profit.
Performance and payment bond	Included as 1.5% of direct costs
Contract administration	Included as 8% of direct costs
Liability insurance	Included as 1.5% of direct costs
Engineering redesign	Included as 4% of direct costs
Contingency	Included as 4% of direct costs

Closure Cost Conclusions

The Fort Knox proposed reclamation plan is predicated on a precise sequence of fluid management activities, which are in turn based on assumptions and numerical modeling of water chemistries for the pit lake, heap leach pad, and tailings impoundment over a period of less than 25 years. Water use authorizations (certifications) will need to be evaluated depending upon methods chosen for water management. Disruption of any of the individual parts of the mine site water management strategy could have profound implications for the duration and sequencing of the closure plan, which, in turn, would affect the overall cost of closure (and remediation, if necessary). The following is a summary of the water management strategy as presented in the Fort Knox Mine Reclamation and Closure Plan (FGMI, 2011).

Using the water balance model developed for closure planning, the key activities designed to protect all designated uses in the water supply reservoir on Fish Creek via pre-closure and closure water management activities across the mine site are as follows:

- *The tailings impoundment decant pond will initially be reduced in size by pumping water to the pit during which time the inflow of runoff water will mix with the residual decant water to provide dilution and improve water quality. Pumping will maintain the pond elevation such that sufficient storage volume will be available to contain the 100-year, 24-hour storm event, heap leach design release event and spring runoff volume with the required amount of freeboard.*
- *During this time, the seepage collection system will continue to operate and provide containment by maintaining the existing cone of depression at the toe of the [TSF] facility.*

Therefore the tailings impoundment will continue to function as a “zero-discharge facility” until the seepage meets water quality standards.

- *Water quality predictions suggest that after approximately two to three years, pumping from the tailings impoundment to the pit will be discontinued. Fresh surface water runoff will be allowed to accumulate in the water pond on the tailings. Once the pond recovers to an elevation of approximately 1529.7 feet amsl, pumping to the pit will recommence to provide adequate contingency storage in the [tailings] pond until the leach pad has been rinsed and closed.*
- *By the time the fresh water pond is allowed to reach the spillway elevation, the water quality predictions indicate the pond will meet standards for discharge, and water will be allowed to flow by gravity to a series of constructed wetland areas below the TSF along Fish Creek.*
- *Seepage collection at the toe of the tailings will continue to be discharged to the decant pond until it can be demonstrated that seepage collection water meets water quality standards in Fish Creek. Once the water meets Fish Creek water quality standards, seepage will be discharged to the creek.*
- *When heap leaching is complete, rinse and/or recirculation water will be applied to the spent ore until the water quality of the drainage is such that drainage can be allowed to flow by gravity to the fresh water pond on the tailings without impacting water quality standards and potentially preventing discharge. Until seepage meets water quality standards, drainage may be pumped to either the TSF pond or the pit.*
- *During rinsing and initial draindown of the heap, some water from the heap leach may be directed to either the TSF pond or the pit.*
- *The amount of water pumped to the pit from the tailings impoundment and/or the heap leach will be limited by the chemical mass in the water pumped. This will ensure that the water quality standards are met when the pit lake achieves discharge elevation.*

According to the Fort Knox current reclamation bond cost estimate, only five years of freshwater rinsing (at a cost of \$10.8 million) will be required before the heap leach pad will produce a drain-down quality suitable for discharge to the TSF. However, without the column rinsing data (first scheduled for 2006, and now by the end of 2011), the precise requirements for rinsing of the heap leach pad to meet water quality standards remains an unknown; so the current cost estimate could be lower, or much higher.

Likewise, the pumping of seepage from the TSF collection system (\$1.4 million) also only covers a five-year period (2017 to 2022). SRK believes that, so long as water is being maintained on the surface of the TSF (is as currently proposed for closure), seepage will emanate from the toe of the facility for longer than five years, and that a longer period of time will be required before this seepage meets water quality standards in Fish Creek.

Lastly, the pit lake water treatment is scheduled for a period of 15 years at around \$100,000 per year. Pit water treatment costs are based on estimate supplied by Water Management Consultants in a technical memorandum dated January 10, 2007.

While an overall 4 percent contingency has been built into the indirect costs for the project, it is SRK's opinion that the overall long-term fluid management costs at the Fort Knox Mine are insufficient to account for the uncertainties inherent in mine closure, and that alternative longer-term sureties may be appropriate in the situation.

At the moment, the conditions at the True North Mine are less uncertain than at Fort Knox, though the issue with water quality in Spruce Creek remains unresolved. Sufficient funds appear to be available in the proposed reclamation cost estimate to cover the remaining earthworks and monitoring at the site, particularly if SRK's recommendation to pull the Hindenburg Dump toe out of the Spruce Creek drainage is implemented. However, should it be determined that the pits and/or waste dumps are impacting surface waters, the bond is under-funded for this contingency. As was recommended for the Fort Knox Mine, FGMI and the regulatory agencies may want to investigate

the use of alternative longer-term sureties until the final water issues at the site are resolved and the site is permanently closed.

Water Management Trust Funds

An increasing trend among some state regulatory agencies, including the ADEC, is the establishment and use of trust funds to ensure that adequate financial sureties are available for long-term water management at mining sites. At the Fort Knox Mine (and possibly the True North Mine, though they currently do not have a permit mechanism in place) the ADEC acts as the jurisdictional agency over long-term water quality issues and has provision for financial surety under statute and regulations (18 AAC 60.265).

Examples of this type of longer-term surety would be the Post Closure Trust Fund proposed by Teck at the Red Dog Mine. The Red Dog Mine currently has a reclamation bond in place for approximately \$305 million that also provides initial "seed" money for the long-term fund. NANA Regional Corporation, Inc., (the joint-venture partner) is still negotiating with Teck and the State of Alaska about the specifics of the trust, but the parties involved, including the ADNR and ADEC, have approved the trust in concept, but need to review the final instrument once it is presented. According to the ADEC, they have the authority to accept a long-term trust fund and have done so in the past, with municipal landfills and the Ryan Lode Mine.

Another example of long-term trust funding for water management (including possible treatment) is at the Round Mountain Mine in Nevada (a Kinross subsidiary). As part of the approval for expansion of the operation, the Round Mountain Gold Corporation (RMGC) was required to create a long-term trust fund to assure performance of long-term post-closure monitoring and mitigation obligations at the site. The long-term trust fund was funded by an initial contribution of \$1,407,132 in 2010 and will be reviewed annually. Creation and funding of the long-term trust fund does not release RMGC from the responsibility to complete the long-term monitoring and mitigation obligations in the plan of operations, or preclude the Bureau of Land Management from requiring further reclamation, monitoring or mitigation pursuant to 43 C.F.R. Subpart 3809 should conditions warrant. If necessary, this long-term financial assurance may be used by the BLM to complete the post-closure obligations (BLM, 2010).

Given the uncertainty surrounding the complex closure program being proposed at the Fort Knox Mine, and the extended monitoring to determine if there are indeed surface water impacts at the True North Mine, the ADNR and ADEC would be advised to investigate this option, in addition to the standard surface reclamation sureties.

CERCLA 108(b)

In assessing closure costs and liabilities for the Fort Knox Mine site, the EPA's imminent rulemaking to develop an EPA-administered bonding program for hardrock mining should be considered. Based on currently available information, this new EPA bonding program would be in addition to the states' and the federal land management agencies' (i.e., USFS and BLM) bonding authorities and is likely to significantly increase financial assurance requirements for operating and closed mines. Appendix C provides some background based on the information that EPA has provided so far about the agency's plans for this new bonding program.

SRK Recommendation: FGMI and the agencies should consider the establishment of a trust fund as a financial security mechanism for post-closure water management issues.

4.1.5 Physical Stability

2010 Fort Knox Dam Failure Analysis

As part of the permitting process for a 52-foot lift on the Fort Knox TSF, increasing the height of the TSF dam from 314 feet to 366 feet, FGMI prepared a dam failure analysis in accordance with Alaska Administrative Code 11 AAC 93, Dam Safety. This code defines a hazard potential classification that is used to determine the minimum levels of design, inspection, and oversight that a dam will receive, as well as requirements for emergency planning. Like most dam classification systems, the Alaska system is based on potential problems that would occur if the dam were to fail; the classification is

not based on the physical condition of the structure. This dam failure analysis (SRK, 2010) was used as the basis for updating the Emergency Action Plan.

In keeping with that approach, the Guidelines for Cooperation with the Alaska Dam Safety Program (ADSP) recommends that the dam classification process be supported by “an evaluation of a hypothetical dam failure”. If the results indicate a Class II (significant) or Class I (high) hazard, the guidelines recommend development of an inundation map to support emergency action planning. The TSF has been reclassified to a Class II (significant) hazard classification.

The report concluded that a revision of the TSF dam’s hazard classification was warranted and the Emergency Action Plan should be updated and include provisions to protect affected parties in the zone of possible inundation.

SRK Recommendation: None

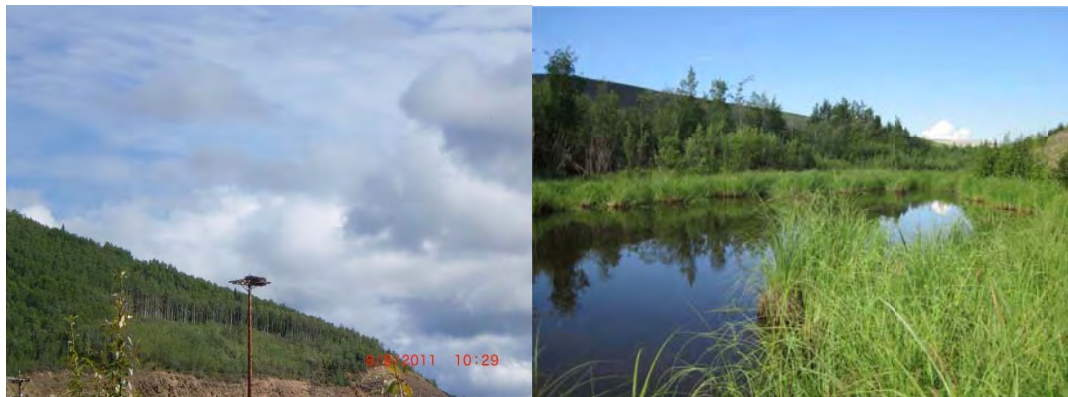
True North Waste Rock Dump Slump

See Section 4.1.3, Reclamation and Closure, for discussion and recommendations to mitigate the True North waste rock dump slumps.

4.1.6 Biological Resources

Fort Knox Mine

The success of FGMI’s practice of concurrent reclamation of inactive areas along the access and service roads, material sites, and exploration roads is evident with the diversity of vegetation and species of wildlife present in these areas. During the site visit, multiple species were present on the sites including, waterfowl, passerines, raptors, moose, squirrels, hoary marmot, and scat evidence of wolf and bear using the sites. The photograph below shows an active osprey nest and a view of the wetlands complex.



Fresh Water Supply Reservoir and Wetlands

The ADF&G continues their cooperative work on the WSR and associated wetlands. Annual Technical Reports issued by ADF & G systematically report on the self-sustaining populations of Arctic grayling and burbot that have been established in the WSR. The current fisheries have already eclipsed the post-mining goal for the Arctic grayling that was set at 800 to 1,600 fish >200 mm in length. The 2009 population estimate for Arctic grayling > 200 mm long was 3,223 fish and a bonus was the population in the stilling basin below the spillway that was estimated at 1,199 for fish > 200 mm. A goal for the burbot population was not set prior to construction, but a self-sustaining population currently exists. The photograph below shows a burbot (left side) and Arctic grayling on the right.



Additional work recommended by ADF&G to further enhance the fishery in the WSR and wetlands is ongoing or being considered and includes:

- Development of a second wetland complex along the north side of the Fish Creek valley;
- Conversion of the existing Gil causeway into vegetated islands;
- Additional civil work in Last Chance Creek to mitigate aufeis;
- Continued maintenance of the road down the valley between the TSF and the WSR;
- Remove the culvert that connects the north diversion channel from Pond A to the head of Pond C ;
- Construction of a passive water treatment wetlands below the TSF; and
- Removal of beaver dams to maintain fish passage for Arctic grayling spawning in the developed wetlands.

In 1993, an analysis of wetlands functions and values was performed as part of the Fort Knox development strategy. The analysis anticipated wetland and aquatic feature conditions after mine closure and functional values scores reflected anticipated long term net changes after reclamation and closure of the project. With the success of establishing the sustainable fisheries, concurrent reclamation and development of the wetland complex below the TSF, FGMI initiated another survey of the area. The report *Re-Assessment of Functions and Values for Wetlands and Aquatic Features associated with the Fort Knox Gold Mine, Fairbanks, Alaska as of July, 2004* reasonably concluded that results of wetlands and aquatic mitigation and remediation efforts are substantially ahead of schedule.

Conclusions of the 2004 re-assessment associated with the Fort Knox mine include:

- The current (interim) functional status of most mitigation/restoration measures is nearly at parity with overall functional impacts projected for the mine development in the 1993 analysis;
- Functional status of the Water Supply Reservoir is significantly higher than projected in all use support categories;
- Significant opportunities exist within the Stream Corridor Project Element Group for additional wetland and aquatic functional gains;
- Functional gains remaining as an obligation for FGMI, either under its final Reclamation Plan (to be implemented upon final mine closure) or by means of additional interim mitigation/restoration measures, are relatively minor compared to gains made to date;
- Very significant opportunities remain within the Tailings Disposal Area and the All Other Project Elements Group to exceed wetlands functional status to the extent that a form a Mitigation Bank is a real possibility;
- By a reasonable measure, the Fort Knox project is very significantly ahead of schedule in terms of meeting its mitigation obligations for wetlands functions and values.

The re-assessment also developed several recommendations to FGMI that include:

- Develop a “current account” of actual wetland impacts, as opposed to those projected from the original development plan;
- Continue with the aquatic biology monitoring program;

- Remove the culvert connecting the head of Pond C to the channel presently conveying high runoff on the north side of the road in the bottom of the Fish Creek;
- Continue implementing wetland rehabilitation and restoration work in the Stream Corridor area;
- Continue to systematically document wildlife and waterfowl use of wetlands, aquatic features and associated upland area until closure;
- Explore development of a “pilot” passive treatment constructed wetlands for the purpose of removing arsenic, antimony and other potential problem seepage water constituents;
- Coordinate with regulatory agency representatives in the development of a “Mitigation Bank”;
- Start planning and designing the future Fish Creek alignment from the tailings embankment to the small drainage on the north side of the Fish Creek valley bottom;
- Develop a plan and implementation schedule for the conversion of the existing causeway across the Fresh Water Reservoir into re-vegetated islands;
- Implement measures to accelerate re-vegetation of existing islands in the Fresh Water Reservoir.

SRK Recommendation: Consider implementing the conclusions of the *Re-Assessment of Functions and Values for Wetlands and Aquatic Features associated with the Fort Knox Gold Mine, Fairbanks, Alaska as of July 2004*.

True North Mine

The True North mine ceased operations in 2004 and reclamation began in 2005. By the end of 2010, 149 acres were graded, growth media placed on 52 acres, and 269.5 acres were scarified, seeded and fertilized. Monitoring of the site continues, but FGMI has worked to establish a diversified habitat for wildlife. The remaining highwalls of the open pit provide nesting habitat for raptors, and bird boxes are scattered over the reclaimed waste dumps for passerine nesting. Although no moose were visible during the audit, signs of browsing on young willow, birch, and alder trees were evident.

The diversity of habitat and natural succession of vegetation from grasses and forbes to woody species (willow, alder, birch, and spruce) will continue to provide food and cover for a variety of avian and terrestrial species at the site as shown in the photograph below.



SRK Recommendation: Continue monitoring of revegetation success.

4.1.7 Environmental Management Systems

FGMI established an Environmental Management System during initial permitting in 1994 that consisted of the:

- Project Description

- Water Resources Management Plan (WRMP)
- Reclamation Plan
- Monitoring Plan
- Solid Waste Management Plan,
- TSF and WSR Operating & Maintenance Manuals,
- Emergency Response Manual, and
- Spill Prevention Control and Countermeasure Plan (SPCC).

The combination of all these plans formed the approved Plan of Operations for the Fort Knox Mine. Kinross and FGMI have further augmented the Environmental Management System with a more comprehensive Environmental, Health and Safety System (EHSS). As plans have been updated and revised, additional plans have been added while others such as the WRMP and SPCC have been omitted due to the content being further augmented and incorporated into other plans or the regulatory requirement being dropped respectively. A comprehensive list of FGMI's specialized environmental plans is contained in Appendix D.

Fort Knox Mine

Current operations at the Fort Knox facilities are managed under an integrated system of the EHSS that includes the specialized environmental management plans. The pre-site visit review of the 18 specific environmental management plans for the Fort Knox site demonstrated a comprehensive system to manage, monitor, and maintain process components site wide. The site visit confirmed the implementation of the plans and further integration with the health and safety provisions of the broader EHSS. Not only are there specific environmental management plans as listed in Appendix D.1, but there are additional specific written guidance in the EHS Management System Implementation and Operation to protect the safety of staff, contractors, vendors, and visitors and comply with the regulatory and environmental standards established at the site.

Currently, the Fort Knox Reclamation Plan and associated Closure Cost Estimate are being reviewed by the ADNR, LMPT. A completion date of that review has not been determined.

The SWPPP is currently being revised and updated to reflect changes in operations and implementation of BMPs. A joint field inspection was conducted by ADEC and EPA on July 19, 2011, and although an inspection report is forthcoming, FGMI is incorporating suggested improvements to the plan that they received verbally during the inspection.

Acknowledging that a number of these documents are classified as "living" and require periodic revisions and updating, the basis of the management plans were found to be consistently implemented, policies understood and supported by all levels of management.

True North Mine

Operations at the True North site ceased in 2004, and the site has been undergoing demolition and removal of facilities, recontouring of waste rock facilities, seeding and final reclamation. With the cessation of ore hauling to the Fort Knox mill, operational and environmental plans addressing transportation and noise monitoring were no longer necessary and have been discontinued. However, FGMI still maintains environmental management plans listed in Table 4-7 and a list of compliance responsibilities within the EHSS (Appendix C.2). The list of compliance responsibilities is broader and more encompassing than current activities at the site require.

Table 4-7: List of True North Environmental Management Plans

Plan	Description	Latest Revision	Expiration / Renewal
Emergency Response Plan	Covers both Fort Knox and True North operations	January 2011	As Needed
True North Stormwater Pollution Prevention Plan	Requirements to meet conditions of the EPA Multi-Sector General Permit	November 2011	As Needed

Plan	Description	Latest Revision	Expiration / Renewal
True North Reclamation Plan	Project description and plans for potential temporary closure and concurrent and final reclamation	February 2011 and July 2011	As Needed
True North Monitoring Plan	Monitoring Plan addressing surface, ground, and potable water, waste rock and overburden and characterization for ARD, wildlife; QA/QC plus schedules and reporting	January 2011 ¹	As Needed
True North Project Description	Integral part of the Plan of Operations for the site.		N/A

¹ The revised True North Monitoring Plan was submitted to ADNR in January 2011, but was not distributed to the LMPT team

The True North environmental management plans have all been updated and re-issued in 2011. The True North Reclamation Plan and Closure Cost Estimate are currently being reviewed by the ADNR, LMPT. No timeline for completion of the review has been established by ADNR.

SRK Recommendation: None

4.2 Audit of the Agencies

4.2.1 Introduction

SRK communicated with following individuals during the audit presented in Table 4-8.

Table 4-8: Summary of Agency Personnel Participating in Audit

ADNR	ADEC	ADF&G	USACE
Tom Crafford Jack DiMarchi Steve McGroarty Brent Martellaro Stephanie Lovell Carolyn Curley Jim Voden Stoney Wright Charlie Cobb	Tim Pilon Pete McGee Marc Irwin Elizabeth Kerin Wes Ghromley Allan Nakanishi Kimberley Speckman Linda Grantham	Alvin Ott Bill Morris	Mary Romero

4.2.2 ADNR

Mining, Land, and Water

The ADNR Division of Mining, Land, and Water has experienced staff familiar with day-to-day mining operations, which adds to their efficacy as regulators. This experience allows this agency to work closely with the mining industry in their roles as permit writers and inspectors. In the case of FGMI's Fort Knox and True North mines, the inspections appear to be supportive and genuinely cooperative with FGMI. This has led to an amicable working relationship that has resulted in FGMI frequently correcting potential or regulatory issues before ADNR even leaves the site following inspections. Review time periods have generally been met under the coordination of Mr. Jack DiMarchi. However, there are exceptions to this overall generalization concerning the relationship between FGMI and the ADNR, as is discussed further below.

During the meeting with ADNR on August 10, SRK was provided with a draft document inventory of the reports, plans, permits, correspondence, etc. for the True North Mine [File Guide]. This document

assisted immensely to the completion of the audit, as documents could be specifically requested from ADNR and cross-referenced with files held by FGMI. The ADNR File Guide for the Fort Knox Mine was still under construction during the time of the site visit, but was provided at a later date, on August 22. This should significantly improve the record keeping at the agency, and make future data requests and regulatory audits easier, and was greatly appreciated by the SRK team. However, given that the Fort Knox Mine has been in operation since 1996, one would have expected for such an inventory to have been created many years ago. An opportunity also exists for the agency to move toward a more formal document management program in which all documents are scanned, inventoried to the appropriate project, and made available from any computer terminal within ADNR for instant access.

LMPT has taken too long to review, comment, and issue authorizations in a timely manner which has resulted in the ongoing delays (years) in the approval of the *True North Reclamation and Closure Plan* and reclamation cost estimate. The delay resulted in the reclamation activities being authorized under Miscellaneous Land Use Permits rather than the Plan of Operations. Further, prior to issuance of the 2007 *Fort Knox Plan of Operations Amendment*, FGMI may have been arbitrarily required to incorporate into their Reclamation Plan the requirement to place 12 inches of growth media on disturbed and recontoured areas without any relevant supporting scientific documentation as a basis.

It is the audit team's opinion that this discord may be affecting the overall efficacy of some important functions of the LMPT such as meeting review timelines and approvals.

Dam Safety Officer

A meeting with Charles Cobb, the State Dam Safety Officer was held in Anchorage on August 15, 2011 to review ADNR oversight of the Fort Knox facilities and FGMI's compliance with Dam Safety Certificates to Operate. The two largest dams in Alaska are located at the Fort Knox Mine, and ADNR has maintained a high degree of interest and oversight on the project because of the size of the dams and proximity to the City of Fairbanks and residential areas within the Fairbanks North Star Borough. FGMI maintains and regularly updates Operating & Maintenance Manuals and Emergency Action Plan (Water Supply Dam and Reservoir NID ID#AK00211, Fort Knox Tailings Dam NID ID#AK00212, Walter Creek Heap Leach Pad Dam NID ID#AK00310, and Pearl Creek Causeway Dam NID ID#AK00311) as required by ADNR.

Over the next couple of years FGMI will raise the TSF dam an additional 52 feet in height. At the time of the interview, FGMI was maintaining compliance with the provision of the State Dam Safety Office Certificate to Construct. ADNR was complimentary of FGMI efforts to maintain open and productive communication.

Several table top dam break exercises have been conducted by FGMI and ADNR with the most recent taking place in April 2011. The exercise indicated that ADEC was somehow omitted from the contact list and this deficiency was immediately corrected.

The Dam Safety Officer has comprehensive records and a very proactive approach to oversight of the Fort Knox mine site.

Water Resources Section – Water Use Authorizations

An interview with Carolyn Curley of the Water Resources Section of the ADNR, Division of Mining, Land and Water was conducted on August 10, 2011 to review the current status of water use authorizations at the Fort Knox and True North sites.

The True North Mine has a Temporary Water Use Authorization TWUP F2010-53 for Reclamation and Dust Control, and the permit will expire on September 20, 2015. This TWUP is the only permit issued for the True North site.

The Fort Knox Mine has both surface and subsurface water use authorizations with the main Permits to Appropriate (LAS 13986, LAS 13987, LAS 13988, and LAS 13989 which has been closed and the water use is now authorized under LAS 21760) being originally issued in February 1994, renewed in 2003, and again in 2010. Four additional water appropriations were submitted on July 20, 2011 for

additional mine dewatering capacity. Water usages from all sources are reported in *Fort Knox Annual Activity Report* as required by the Permits to Appropriate Water.

During the interview SRK noted that normally Permits to Appropriate Water after a predetermined period of time were required to provide proof of use; these permits are converted to Certificates of Appropriation. The language contained in the original Permits to Appropriate Water issued in 1994 stated:

A Water Rights Certificate of Appropriation will not be issued before design, construction, operation and maintenance schedule of all dams associated with this project have been approved by the Department of Natural Resources.

ADNR's general "policy," as explained during the interview, is for Permits to Appropriate Water are afforded two years to develop the source(s) and ten years to demonstrate use.

The *Statement of Beneficial Use* for LAS 13988 was received on September 21, 2011 and adjudication towards certification has begun. A copy of the Certificate of Approval to Operate a Dam has been supplied by the Dam Safety Unit to fulfill condition 7 on Permit to Appropriate LAS 13988. Since the existing permits do not expire until December 11, 2012, water metering information through December 2011, submitted in the Annual Report, will be used to determine the beneficial use for the remaining permits. FGMI must submit the Statement of Beneficial Use and associated fees for LAS 13986, LAS 13987, and LAS 21760.

Although FGMI maintains a priority use date for water rights in the project area and have demonstrated use, the Certificate of Appropriation is a "property right" that is associated with the Millsite Lease (Permit) and the private property.

4.2.3 ADEC

Division of Air Quality, Air Permits Program

Discussions with the ADEC – Division of Air Quality, Air Permits Program personnel were not particularly productive due to ignored requests for a phone conference and the need to bill FGMI for time spent by Division of Air Quality personnel. Further, SRK was told to request information through the Freedom of Information Act process.

This division performs audits on a five-year basis which allows potential non-compliance issues to continue unabated. Performing audits on a more frequent basis agreed to by FGMI and ADEC will allow for more timely evaluation and abatement of potential issues.

Spill Prevention and Response (SPAR)

FGMI was commended on timely and thorough reporting of spills. Mr. Wes Ghormley, Environmental Program Specialist with SPAR, provided examples of spills reported and an anonymous complaint against FGMI that was proved groundless.

The SPAR program and spill reporting requirements are some of the most stringent in the U.S. and through joint cooperation ADEC and FGMI have developed site-specific spill reporting requirements. Both entities acknowledge the excellent working relationship that has developed over the last 16 years.

The Fort Knox Mine experienced a release of of cyanide solution that resulted from process solution overflowing the barren tank in the carbon-in-column (CIC) building which is constructed as secondary containment. The spill of process solution containing cyanide was discovered by the mill operators at approximately 8:30 pm on May 4, 2010 by the mill operators. FGMI personnel determined that approximately 305,300 gallons of process solution had spilled into containment. The spill amount was determined based on flow meters that are installed on the pregnant solution line for the Heap Leach facility. The Mill Superintendent estimated that 35,000 gallons breached secondary containment and notified the Environmental Coordinator. FGMI's Environmental Coordinator reported the spill to the Alaska Department of Environmental Conservation (ADEC) via telephone at approximately 9:35 pm. The Mill Manager contacted the Environmental Manager at 10:30 pm to report the spill. A review of available information indicated that the amount of cyanide that was

released in the process solution exceeded the Reportable Quantity (RQ) of 10 pounds. The process solution released contained about 0.45 pounds of sodium cyanide per ton of solution which yields 0.24 pounds of free cyanide per ton of solution or 120 ppm (mg/L). The total quantity of free cyanide released was calculated to be approximately 34.8 pounds. The Environmental Manager placed a call to the National Response Center (NRC) at approximately 10:45 pm.

On May 5, FGMI personnel began excavating the contaminated soil and placing it on the heap leach pad. Once the soil was removed, the excavated area was sampled by FGMI to delineate the areas of concern and determine the need for additional excavation. FGMI identified from this testing that some areas required additional excavation. The excavation of contaminated material was completed on May 12. A total of 197 loads of excavated material were hauled to the heap leach pad. The surveyed volume of excavated soil was 2,640 cubic yards.

FGMI contracted Shannon & Wilson, Inc. to develop a work plan to verify site cleanup activities, collect confirmation samples, obtain approval of the plan by ADEC, and to perform the field sampling. The field confirmation samples were collected by Shannon & Wilson on May 13 and 14. On May 17, results were received from the analytical laboratory (SGS Environmental Services). A total of 37 samples were collected and 4 blind duplicates; only one sample which was from the sump area was above the Limit of Detection of 1.0 mg/kg. The sump sample was 14 mg/kg.

Several actions have been taken to prevent a reoccurrence of the events leading to this spill. They include:

- A monitor has been placed on the AC power to alarm the mill control room in the event of a loss of power.
- A second high level alarm has been installed in the CIC containment that operates off of a PLC in the refinery.
- Two cameras will be installed in the CIC to provide the mill control room with visual monitoring of the top of the carbon columns and the floor of the CIC.
- The by-pass valve on the pregnant solution line has been made operational, so that if there is a loss of communication with the CIC the pregnant solution flow is automatically re-circulated back to the in-heap storage pond.

Based on the final report prepared by Shannon and Wilson, Inc. and the field activities that they and FGMI personnel conducted provides evidence that all impacted material has been removed following the release. Laboratory data supports the conclusion that the areas impacted by the process solution release have been fully remediated and are not considered a threat to human health and the environment.

Division of Environmental Health – Drinking Water Program

Compliance samples and results of analyses for the Fort Knox potable water system are submitted electronically and monitored for compliance. The ADEC's Fairbanks office program supervisor noted a discrepancy in the FGMI Compliance Report produced by ADEC, and the error was corrected to show the facility drinking water sampling and analysis to be compliance.

A Sanitary Survey for Fort Knox Mine – 2010 PWS was conducted on October 29, 2010, and the final Sanitary Survey Follow-Up was sent to the mine on January 11, 2011. The one major and three minor deficiencies were corrected, and a submittal requesting Approval to Operate was received by ADEC on August 25, 2011. ADEC found the submittal was deficit and is awaiting additional drawings from FGMI.

Division of Water, Wastewater Discharge (Storm Water)

Storm Water Multi-Sector General Permit inspection of the Fort Knox was conducted jointly by ADEC and EPA on July 19, 2011. No issues with BMP implemented at the site were identified. ADEC acknowledged the field inspection report was not a priority to issue to FGMI since the facility was in compliance, and the SWPPP was currently being revised and updated. ADEC staff stated with the current work load providing inspection report to facilities in compliance was a lower priority than bringing other facilities into compliance.

4.2.4 ADF&G, Division of Habitat

Cooperation between ADF&G and FGMI continues as the developed wetlands and fisheries systems evolves and becomes more mature. ADF&G spends more time at the site performing population estimates and evaluating the system than all the other state and federal agencies. Mr. Alvin Ott, Operations Manager for the Division of Habitat, has been involved in the Fort Knox project since environmental baselines studies were initiated and has worked constructively to resolve issues and optimize the wetlands and WSR. The annual technical reports on the Fort Knox aquatic system have provided the most detailed record of the system in Alaska as it develops.

ADF&G still have issues with the removal and management of beaver in the wetlands and pond system that could be augmented with additional assistance by FGMI. ADF&G noted with significant changes to the Plan of Operations resulting from the heap leach, expansion of the pit, need to discharge pit dewatering into the WSR, and potential to impact Victoria Creek, the need to remain involved and focused on activities at the site are a priority with the Division of Habitat.

4.2.5 USACE

Review of the Fort Knox files located at the USACE office in Fairbanks was conducted on August 10, 2011 with Ms. Mary Romero, Corps Project Manager. Ms. Romero was in the process of consolidating the Fort Knox files and reconciling the disturbed wetland acres associated with 19 permit issuances and modifications. SRK requested through the Freedom of Information Act and received a CD with all the permits and associated documents for the Fort Knox project to assist in the audit review.

Since the initial permit was issued in 1994, there have been five different Corps Project Managers involved with the Fort Knox and True North mines, Ms. Romero has a good understanding of the different facets of the project and provided additional insight into the USACE role in the project. The fact that there have been a number of different project managers highlights the potential for the omission of facts and transfer of historical information important to USACE's oversight of the project.

4.3 Follow-Up From the 2004 Audit

4.3.1 FGMI's Compliance with Federal, State, Local Permits, and Authorization

Unless otherwise described, FGMI is in substantial compliance with those federal, state, and local permits reviewed during the audit as listed in RFP 2011-305 since the 2004 audit.

4.3.2 FGMI's Compliance with Specialized Environmental Plans

The Environmental Management System for FGMI's Fort Knox and True North sites consists of a specialized plans and procedure as listed in Appendix D. This extensive list of plans not only covers environmental and emergency response aspects of the operations, but also includes the "Operations and Maintenance" of major components (i.e., TSF dam, WSR dam, Pearl Creek Causeway, and the Walter Creek heap leach facility).

Review of the specialized environmental plans prior to the site visit highlighted that the documents are thorough and comprehensive given the current phase of mining. Permit requirements are imbedded within the documents as the basis to ensure compliance. Acknowledging that permit conditions, management practices, and facilities are subject to change, most of these plans are revised periodically and the revisions dates noted. During the audit site visit several areas inspected related directly to the implementation of these plans (i.e., Solid Waste Management Plan, Fort Knox Storm Water Pollution Prevention Plan, Fort Knox Monitoring Plan, etc.) and overall "on the ground" compliance was very evident.

A number of plans and procedures are currently being revised following suggestion by regulators after field inspections or to reflect modifications to process components, operating procedures, regulatory changes, or changes in corporate policies. The FGMI environmental staff's record of

being responsive to updating the multitude of documents is commendable. FGMI implementation of environmental standards, policies, and industry guidelines contained in the plans and manuals go beyond those normally found in the mining industry.

There are a number of examples where FGMI's revisions to environmental managements plans and field implementation are impeded by the ADNR and ADEC staff not completing agency reviews or issuing inspection reports in a timely manner (i.e. Reclamation/ Closure Plan and Closure Cost Estimate and joint ADEC/EPA Storm Water Compliance Inspection).

Additional information regarding specific plans is covered in Sections:

- 4.1.3, Reclamation and Closure
- 4.1.6, Air Quality
- 4.1.7, Hazardous Material and Waste
- 4.1.8, Emergency Management Systems

4.3.3 Reliability and Integrity of Information Relating to Environmental Reporting and Compliance

Direct field observations and discussions with agency and FGMI personnel have confirmed the adequacy of the overall reliability and integrity of the information collected and reported by FGMI. For example, environmental analyses are conducted by certified laboratories.

Housekeeping at a mine site is a key parameter that indicates how the management and mine employees view their safety and environmental responsibilities. The auditors noted that the Fort Knox site was a clean site with no trash, debris, or blowing paper observed during the tour. The roads were well-graded and clear of rock and material that could fall from haul trucks. Safety features such as signs, flaggers, and orange cones were evident and in use.

4.3.4 The Adequacy of State Oversight to Protect State Resources

The regulatory structure of Alaska that oversees mining is well thought out and has a well-defined process for permitting and regular review. The LMPT, headed by ADNR – Office of Project Management and Permitting, is responsible for coordinating the permitting activities for large mine projects in the state that want to voluntarily participate in the LMPT coordinating process. The ADNR is the lead agency for all matters relating to the exploration, development, and management of mining. In this capacity as lead agency, the LMPT coordinates all regulatory matters concerning mineral resource exploration, development, mining, and associated activities. Before a state agency takes action that may directly or indirectly affect the exploration, development, or management of mineral resources, the agency is required to consult with and draw upon the mining expertise of the LMPT.

The LMPT is an interagency group that works cooperatively with large mine applicants and operators, federal resource agencies, and the Alaskan public to ensure that projects are designed, operated and reclaimed in a manner consistent with the public interest. The project manager's primary responsibility is to ensure a coordinated process with minimum duplication. This often involves tailoring the process to fit specific project needs.

The LMPT for the Fort Knox and True North mines is comprised of staff from ADNR, ADEC, and ADF & G. As identified by the ADNR, the key concepts that drive permitting in Alaska include:

- The process doesn't guarantee a "yes".
- Rock chemistry drives water quality and hence mine design.
- Multiple permits are required from federal, state, and local agencies.
- Financial assurance is required prior to initiating mining.
- Interagency monitoring and inspection continues through operation and closure.

The auditors were able to meet with the key members of the LMPT during the site visit. Many of the team members have been working on the Fort Knox/True North projects for many years, bringing a depth of knowledge and continuity that is not usually found on projects of this duration.

When the team functions with each member in their specialized roles, the structure and regulatory framework are adequate to protect Alaska's natural resources. However, with ongoing budget cuts and increases in metals and price for coal, natural gas, and oil, the agencies, and hence the team members are overworked, which could lead to missed deadlines and potentially less thorough reviews of compliance reports.

4.3.5 Changes in Tailings Impoundment Geochemistry Due to Processing True North Ore

Golder (2004) reviewed water quality data with respect to conductivity and TDS, pH, major ions, trace metals, cyanide, and nutrients. The 2004 audit noted that "Spigotting of a combined Fort Knox and True North tailings has resulted in increases in tailings decant antimony, arsenic, copper, nitrate, phosphate, and selenium concentrations".

Tailings decant water analytical results were reviewed to discern potential differences between water qualities from 2001 to 2010. Graphical representations of these data are presented in Appendix E. The graphs support Golder's earlier finding of influence on the tailings decant chemistry by the addition of True North ore. However, as would be expected, this influence has subsided since the cessation of milling of the True North ore.

Antimony, a fingerprint in the True North ore, has recently been noted in the MWMP analytical results in increasing yet still low concentrations as described in Section 4.1.2. The antimony concentration in the tailings seepage showed a similar increasing trend due to the influence of True North ore but exhibited a two- to three-year lag period. Continued monitoring is recommended.

4.3.6 Changes in Tailings Impoundment Geochemistry Due to the Lead Nitrate Addition to the Milling Circuit

Lead nitrate was originally added to the milling circuit to remove sulfur from solution through the precipitation of a lead sulfate, thereby preventing the formation of thiocyanate. Golder (2004) concluded that the use of lead nitrate in tailings processing since April 2001 has not resulted in significant increases in tailings decant lead concentrations. The increase in peak nitrate levels in 2003 relative to previous years is likely only in part attributable to the use of lead nitrate. Higher cyanide use would also contribute to higher tailings decant nitrate concentrations through natural decay of cyanide.

Comparison of tailings decant water quality showed the lead concentration to remain consistent through the two time periods. The nitrate concentration increased slightly within the time period. The monitoring data for the decant water in the Fort Knox TSF do not indicate a noticeable effect from the addition of lead nitrate to the process stream. See graphs of lead and nitrate concentrations in Appendix E.

4.3.7 Changes in Tailings Impoundment Geochemistry Due to Operation of the New Tailings Thickener

The tailings thickener has been in operation since October 2002 and as described in 2004 (Golder) is located below the discharge point of the last CIL tank where the tailing slurry is thickened from 55 percent solids to 65 percent solids by weight. The thickener overflow system's design is to remove warm process water (50° F to 77° F) and the associated reagents (i.e., cyanide and calcium oxide). The thickened underflow slurry is diluted to approximately 45 percent solids with cold decant water pumped from the TSF. The diluted tailings slurry flows to the cyanide detoxification circuit. Diluting the tailing slurry with decant water lowers the cyanide concentration and results in less demand for detoxification and lowers reagent use.

After nine years in operation, the tailing thickener has demonstrated the positive influence of slurry temperature on gold leaching and absorption kinetics (Hollow-Hill 2005). The dilution of the tailing thickener underflow slurry has also proven to be more effective than originally anticipated. The tailings discharge cyanide levels remain below average the permit monthly discharge limit of 10 milligrams per liter (m/L) or less of cyanide measured by weak acid dissociable (WAD).

The INCO cyanide detoxification circuit remains on standby should cyanide levels increase or if permit limits are lowered per Section 1.7.2 of the Waste Management Permit 2006-DB0043.

The effective operation of the tailing thickener over the past nine years maintained lower WAD cyanide levels through dilution and has demonstrated the added benefit of not using ammonium bisulfate and copper sulfate. This has further limited the number of chemical constituents present in the tailings decant water. Tailings surface water chemistry samples in Appendix E indicate a decrease in a number of parameters associated with operation of the tailing thickener and resulting reduction in reagent use in the INCO cyanide detoxification circuit between 2000 and 2010.

- Calcium (Ca) concentration decreased 60 percent
- Copper (Cu) concentration decreased approximately 89 percent
- Sulfate (SO₄) concentration decreased 68 percent
- Total Dissolved Solids (TDS) decreased slightly over 56 percent

4.3.8 Operation of the Interceptor Well System to Maintain a Zero Discharge from the Tailings Impoundment

See Section 4.1.2 for a discussion on the interceptor wells. The audit concluded the TSF seepage collection and monitoring systems appear to be functioning according to design based on the currently available data and in compliance with permit conditions.

4.3.9 Reclamation Plan Alternatives Proposed for the Tailing Impoundment and Critical Areas at Both Fort Knox and True North

The USACE, ADEC, ADNR, and FGMI are still in discussions concerning the most appropriate closure scenarios for the TSF.

4.3.10 Adequacy of the Reclamation Financial Sureties for Both Sites

As discussed in Section 1.4.1, FGMI submitted a revised reclamation bond cost estimate for the Fort Knox Mine in 2011 which is currently under review by the ADNR. The Fort Knox Mine reclamation cost estimate increased dramatically from 2006 (\$20,551,994) to the proposed 2011 estimate of \$65,785,797. An examination of the proposed labor and equipment rates found that the Fort Knox rates were within but toward the lower end of the range of reasonable industry standard rates.

FGMI also submitted an updated bond cost estimate in 2011 for the True North Mine which is currently under review by the ADNR. The original 2001 reclamation cost estimate for the True North Mine was \$2,238,419; even with all of the reclamation completed at the site since closure in 2007, the proposed 2011 estimate is \$3,225,840. This amount is considered adequate to complete the physical reclamation and monitoring at the site; however, should long-term water quality sampling be required, this amount will have to be revisited.

4.3.11 Evaluate: the Extent and Functional Value of Developed Wetlands Created by FGMI as Mitigation for Lost Acres Beneath the Tailings Impoundment

This section from the previous audit was perplexing to SRK and to USACE during follow up discussion after the audit site visit. There appears to be no documentation or a formal request by FGMI to substitute reclaimed and enhanced habitat below the TSF for the mitigation required in

POA-1992-574 or subsequent modification to that permit. POA-1992-574 required mitigation of excavated and filled wetlands (480 acres) to construct the Fort Knox project to be on “top of the tailings bench” at the following proportions:

- 35 percent Wetlands (424.5 acres)
- 35 percent Ponds (454.5 acres)
- 30 percent Uplands (364 acres)

Although the successful reclamation and habitat enhancement of historic placer mining disturbances below the TSF is very apparent and acknowledged by agencies and NGOs (ADNR 2000 Reclamation Award for Excellent Mine Reclamation on Fish Creek and 2009 Peg and Jules Tileston Award), there has been no request by FGMI or indication that the USACE is contemplating the inclusion of the area below the TSF as mitigation in lieu of the original permit requirements.

4.3.12 Compliance with Recommendations made in the Last Audit

In the 2004 audit, Golder identified areas of concern and made recommendations to address these concerns. Table 4-8 lists the concerns identified by Golder and their recommendations to address these concerns. Only those concerns that had recommended follow-up actions are included

The purpose of the audit and recommendations was to inform the agencies what they may want to include as permit stipulations. These are not automatic requirements for the operator.

Table 4-9: Concerns and Recommendations Identified in the 2004 Audit

2004 Audit Concern	Details	Action Since 2004 Audit
True North Geochemistry – arsenic, antimony, sulfate, and selenium may be leachable and impact groundwater quality	1 Collect quantitative water quality data from the lysimeter monitoring program	1 Monitoring has continued in accordance with ADEC’s recommendation in a letter dated February 5, 2011 regarding Spruce Creek.
Tailings Geochemistry – increases in arsenic, antimony, selenium, and cyanide/cyanide degradation products	2 Processing the True North ore resulted in increases in concentrations in the tailings decant solution of As, Sb, and cyanide/cyanide degradation products	2 Milling of True North ore ceased in 2004.
Reclamation Plan	3 Plant demolition was not included in the reclamation cost estimate. 4 The post-mining use of the open pit as a recreational lake may not be viable due to the potential long-term rockfall hazard. 5 A consolidation analysis of the tailings is needed to support final design and planning of the post-reclamation topography, surface water management plan, and spillway design.	3 Plant demolition is no longer applicable for the Fort Knox Mine due to land ownership change. There are no longer any buildings at the True North site. 4 No action on use of post-mining lake as a recreational area. 5 No action on consolidation study to support proposed cover design from the 2011 <i>Reclamation and Closure Plan</i> , but the spillway design and final topography have been completed.
Wetlands	6 Additional wetland acres need to be developed below the tailings dam to increase the acres to the prescribed amount.	6 Wetland acres below the TSF were never a factor in the mitigation requirements established by the USACE that established post closure mitigation on the “top of the tailings bench”
Mitigation and Recommendations		
Monitoring Program Optimization	7 Continue monitoring decant water and seepage on a quarterly basis. 8 Collect a pond water sample at depth to be representative of pore water conditions which will be more representative of tailings seepage water quality and give insight into the homogeneity of the tailings pond water. 9 Continue monitoring the wells and present the data in Piper diagram format so the trends and changes in water signatures can be readily compared to tailings seepage and the IW-series wells.	7 Monitoring has continued. 8 A pond water sample has not been collected 9 Well monitoring has continued, but Piper diagrams were not included in the monitoring reports. The inclusion of Piper diagrams and pond water sample collection at depth were not required by ADEC in the Waste Management Permit #2006-DB0043.
Reclamation	10 Develop demolition plans for the milling facilities. 11 Develop a consolidation model for the TSF and finalize the surface water management plan, grading plan, and cover concepts. 12 Include a small surface water pond near the spillway.	10 Demolition requirement no longer applicable due to change in land ownership. 11 No action on consolidation study to support proposed cover design from the 2011 <i>Reclamation and Closure Plan</i> . 12 2011 <i>Reclamation and closure Plan</i> includes the

2004 Audit Concern	Details	Action Since 2004 Audit
	<p>13 Re-contour the TSF surface during the later stages of operations using thickened tailings.</p> <p>14 Perform studies and document the field trials of direct revegetation of the tailings.</p> <p>15 Develop detail-level reclamation plans for the True North site that incorporate the results of the reclamation studies.</p> <p>16 Develop a project reclamation schedule that considers reclamation and closure of the TSF considering the consolidation duration of the tailings could occur a period of years after the reclamation of other facilities.</p>	<p>13 surface water pond.</p> <p>13 2011 <i>Reclamation and closure Plan</i> includes final tailings deposition and grading of TSF.</p> <p>14 Initial field trials were conducted and terminated, the results of which were not available.</p> <p>15 Detail-level reclamation plans for True North have been developed and implemented.</p> <p>16 An updated reclamation schedule has been developed, but it does not include the results of a consolidation study.</p>
Reclamation Sureties	<p>17 Prepare a demolition cost estimate that includes time for cleanout and remediation of contaminated soils.</p> <p>18 Refine production rate estimate.</p> <p>19 Update unit rates for equipment.</p> <p>20 Review and update indirect costs.</p> <p>21 Re-evaluate riprap process, stockpiling, hauling and placement costs and equipment selection.</p>	<p>17 Demolition cost estimate no longer applicable due to change in land ownership.</p> <p>18 2011 reclamation cost estimate uses reasonable production rates.</p> <p>19 Unit rates were updated in 2011 <i>Reclamation and Closure Plan</i>.</p> <p>20 Indirect costs are within industry standards.</p> <p>21 2011 <i>Reclamation and Closure Plan</i> utilizes equipment and costs that are within industry standards for surface facilities but may not be appropriate for the TSF. Consolidation study will confirm trafficability.</p>
Dust Control	<p>22 Maintain the dust control program on the haul road.</p>	<p>22 FGMI continues to control dust on the haul roads by use of surfactants and water, and plowing snow onto the road in the winter. FGMI monitors opacity to maintain dust control.</p>
Noise Control	<p>23 Maintain the noise monitoring program.</p> <p>24 Continue to remove trucks that fail the compliance test from operation until the trucks meet the compliance standards (82 dBA at a distance of 50 feet from the roadway).</p>	<p>23 The noise monitoring program was discontinued in 2004 when the True North Mine ceased operations.</p> <p>24 Not applicable</p>
Wetlands	<p>25 FGMI not yet in full compliance with regards to replacement acres between the tailings dam and WSR.</p> <p>26 No wetland acres have been completed for the lake area within the pit and wetlands on the reclaimed TSF as this will be undertaken at closure.</p> <p>27 The approved plan for a mixture of wetlands, ponds, and uplands is not recommended because of long-term maintenance obligations of a jurisdictional dam. The approach will require dam</p>	<p>25 The USACE permit and permit revisions never allowed for acreage between the TSF and WSR to meet the mitigation requirements</p> <p>26 Mine and mill operations continue, but revisions to the <i>Fort Knox Reclamation and Closure Plan</i> (2011) incorporate the wetland mitigation.</p> <p>27 FGMI, state agencies, and the USACE continue discussions to mitigate dam safety concerns and long-term maintenance issues.</p> <p>28 FGMI commissioned Buell & Associates and</p>

2004 Audit Concern	Details	Action Since 2004 Audit
	<p>safety analysis and provisions to meet long-term maintenance obligations.</p> <p>28 A functional assessment should be undertaken to determine the functions and values of the created wetlands with respect to acres lost.</p> <p>29 Detailed hydrological and hydraulic analyses are necessary to determine the capacity of the wetland impoundments and channels for long-term maintenance of the ponds.</p> <p>30 Fish habitat monitoring should continue on an annual basis to continue to document Arctic grayling and burbot uses of the wetlands and the WSR.</p> <p>31 Add overburden to those areas on Pond C where riparian shrub is currently limited due to aufeis and the degree to which it grows each winter.</p> <p>32 Remove assorted metal pieces from the ponded areas.</p> <p>33 Review planting and seedings of the Last Chance Creek enhancement area to identify cause of low vegetative cover; continue monitoring.</p>	<p>Three Parameters Plus in 2004 to complete a Re-Assessment of Functions and Values</p> <p>29 ADF&G recommended establishing a channel on north side of Fish Creek Valley to route stormwater flows and stabilize pond and channels on south side</p> <p>30 ADF&G continues monitoring program and preparing Technical Reports on the system</p> <p>31 FGMI continues to monitor the area on Pond C as supported by ADF&G and aufeis formation to determine the most productive approach to increase riparian vegetation.</p> <p>32 The assorted metal pieces from historic mining activities in the area are not an issue with ADF&G regarding the viability of the wetland or fisheries.</p> <p>33 FGMI continues to monitor the Last Chance enhancement area to minimize aufeis and increase plant density in re-vegetated areas</p>

5 Conclusions

As previously stated, the audit was to determine if FGMI's environmental management systems and the regulatory controls in place provide reasonable assurances that the environmental objectives of the Plan of Operations and relevant permits and approvals are being met and that the controls are functioning as needed. SRK's role was not to solve issues but to bring them to light. The following sections present SRK's conclusions assessing if these objectives were met. Recommendations are also presented to aid the agencies and FGMI in further attaining their environmental compliance objectives.

5.1 Major Findings

5.1.1 Fort Knox Mine

Conclusions

Fort Knox Mine

- FGMI is in substantial compliance with those environmental permits and authorizations reviewed as part of this audit and appears to be very diligent in their operations.
- Heap rinsing studies need to be completed to better assess the Closure Plan and reclamation cost estimate.
- FGMI need to complete consolidation study to assess trafficability of heavy equipment on the TSF.
- State agencies and USACE need to come to an agreement for the closure requirements for the Fort Knox TSF.
- The Fort Knox tailings are exhibiting elevated levels of arsenic and antimony in MWMP testing.
- TSF seepage collection and monitoring systems appear to be functioning according to design based on the currently available data and in compliance with permit conditions.
- The current pit lake model is generally appropriate and provides a reasonable indication that concentrations in spill water will not exceed current water quality standards.
- A few administrative compliance deadlines were missed, but overall operational compliance is above industry standards.
- Environmental health and safety procedures in place with the environmental management system and cyanide code certification demonstrates pro-active management of the Fort Knox Mine.
- The reclamation schedule is very focused with limited flexibility to address uncertainties, i.e., changing water quality, unpredictable changes in climate, variability in exposed pit wall, tailings, and waste rock dump mineralogy. However, modifications to a "worst case" scenario are not reasonable.
- The reclamation cost estimates appear to be adequate to cover surface reclamation as proposed; however, the uncertainties surrounding long-term water quality and management, i.e., treatment, pumping, etc. are not clearly defined and may be substantially underestimated.

5.1.2 True North Mine

- Surface reclamation in particular recontouring and revegetation has been successful, with some minor exceptions:
 - Differential settlement due to permafrost melting within the waste rock dumps resulted in surface tension cracking. Golder's (2011) assessment of the available monitoring data of the North Shepard Slump and Hindenburg Road Sloughs does not indicate that the surface cracking and sloughing is anything other than

differential settling (as opposed to down-slope movement), and recommends further monitoring. Given that the risk of property damage or loss of life from the movement of these materials is negligible, SRK supports the recommendation that FGMI continues to monitor and repair, as needed. This may, however, need to be extended to include thermal and/or inclinometer monitoring;

- Reclamation of the Hindenburg waste rock facility blocked a segment of upper Spruce Creek resulting in minor upstream ponding and possible seepage through the waste rock.
- A small amount of debris remains at the site from building demolition.
- Limited baseline water quality data for Spruce Creek and more recent monitoring data indicate the need for continued monitoring.

5.1.3 Agencies

- Overall permitting and regulatory oversight of the mine and associated activities is reasonable and appropriate.
- LMPT has taken too long to review, comment, and issue authorizations in a timely manner.

5.2 Recommendations

As previously mentioned, SRK stated that the audit was a review of the company's compliance with permits and authorizations to look at what was and was not working. Further, SRK's role was not to solve issues. The following are general recommendations to address some of the issues identified during the audit:

5.2.1 Fort Knox

- Collect samples of TSF pond water at depth to assess redox conditions and how mobilization of arsenic, antimony, copper, and selenium may be affected;
- Continue monitoring the tailings seepage in accordance with Waste Management Permit #2006-DB0043 for the Fort Knox Mine to assess the "zero discharge" status for seepage flowing from the TSF to Fish Creek of Victoria Creek;
- Complete the column rinsing tests to determine final rinsing requirements for the Walter Creek Valley heap to assess long-term water quality and management.
- More detailed growth media balances should be developed as the site moves toward final reclamation and closure to prioritize placement as necessary.
- Complete the consolidation study to determine trafficability and how this affects the reclamation schedule, water management, cover placement, the rockfill channel design, and possible reactivity of the tailings.
- Re-examine the requirement for 12 inches of growth media placement during reclamation;
- Work with ADF&G to further enhance the fishery in the WSR and wetlands is ongoing or being considered and includes:
 - Development of a second wetland complex along the north side of the Fish Creek valley;
 - Conversion of the existing Gil causeway into revegetated islands;
 - Additional civil work in Last Chance Creek to mitigate aufeis;
 - Continued maintenance of the road down the valley between the tailings dam and the WSR;
 - Construction of a passive water treatment wetlands below the tailing dam; and
 - Removal of beaver dams to maintain fish passage for Arctic grayling spawning in the developed wetlands.

- FGMI and the agencies, particularly ADEC, should consider the establishment of a trust fund as a financial security mechanism for post-closure water management issues.

5.2.2 True North Mine

- Repair surface cracking on the True North waste rock facilities once movement has stabilized;
- Consider Golder's recommendations or alternatives concerning monitoring the temperatures within the True North waste rock slump areas and other mitigation;
- Evaluate the re-establishment of the Spruce Creek drainage by pulling back the toe of the Zeppelin/Hindenburg waste rock facility to allow surface water to free drain and bypass the waste rock;
- Investigate the nature and extent of this discoloration in the Central Pit area to determine if it is indeed sulfide oxidation, and propose possible mitigation efforts, as necessary.
- Install warning signs at the base of pit highwalls warning the public of the danger of falling rocks;
- Continue monitoring revegetation success;
- FGMI and agencies consider the establishment of a trust fund as a financial security mechanism for post-closure water monitoring/management issues.

5.2.3 Agencies

- Consider a computerized document tracking system for control
- Plan and implement adequate training and resources for ADNR staff to convert Permits to Appropriate to Certificates of Appropriation;

6 References

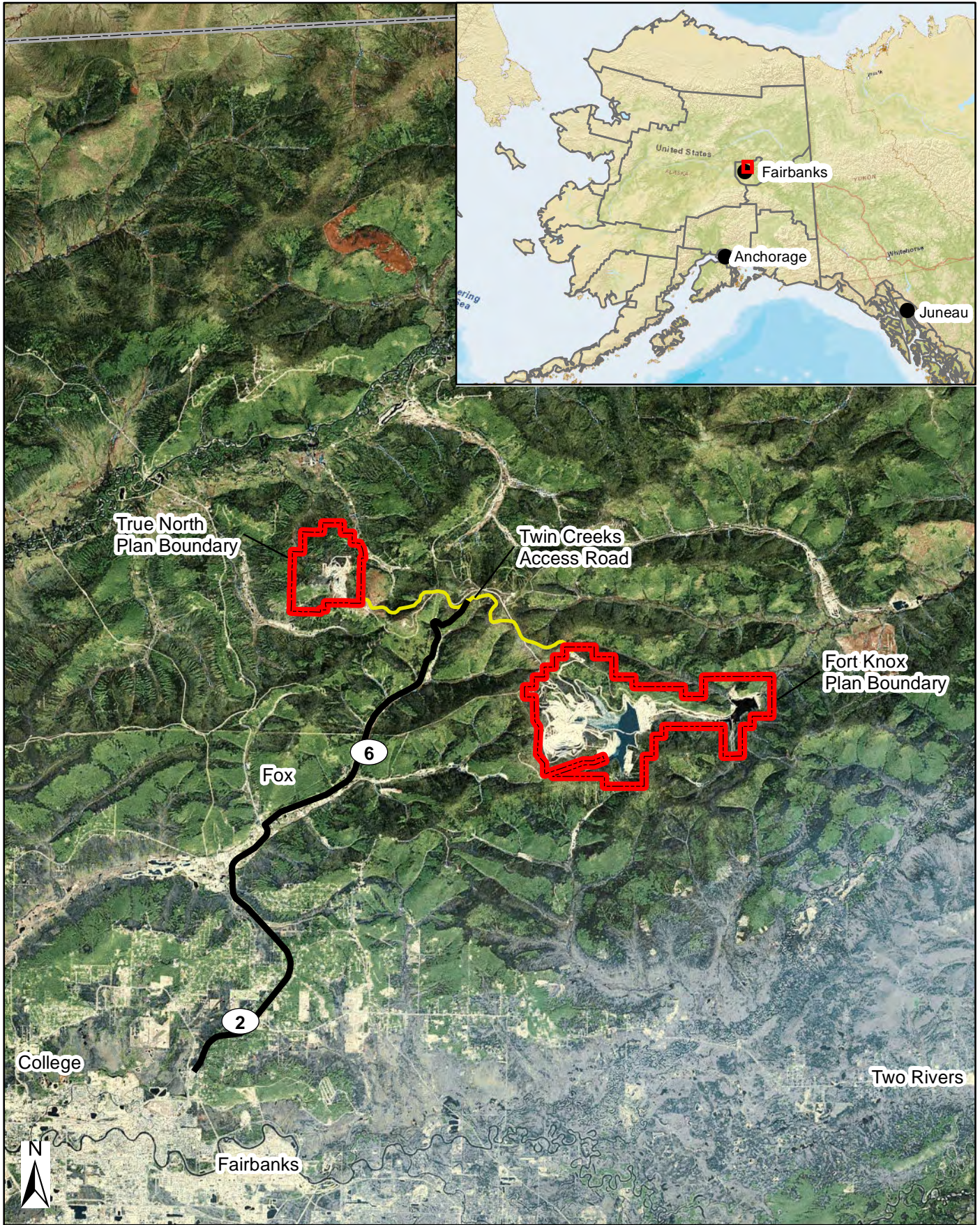
- Alaska Department of Environmental Conservation, Division of Air Quality, Air Permits Program, *Letter from Elizabeth Kerin (ADEC) to Lauren Roberts (FGMI) Failure to Comply, Air Quality Full Compliance Evaluation, Information Request to Fairbanks Gold Mining Inc., Fort Knox Mine, Permit Nos. AQ0053MSS01 and AQ0053MSS02, File No. 104.16.001, Enforcement Tracking No. 2011-0466-37-9255, April 4, 2011.*
- Alaska Department of Environmental Conservation, Division of Water, *Waste Management Permit 2006-DB0043, Fort Knox Mine, July 3, 2007*
- Alaska Department of Fish and Game, Division of Habitat, Alvin G. Ott and William A. Morris. 2009. *Arctic Grayling and Burbot Studies at the Fort Knox Mine 2008*. Technical Report No. 09-01. April 2009
- Alaska Department of Fish and Game, Division of Habitat, Alvin G. Ott and William A. Morris. 2009. *Arctic Grayling and Burbot Studies at the Fort Knox Mine 2009*. Technical Report No. 09-05. November 2009
- Alaska Department of Fish and Game, Division of Habitat, Alvin G. Ott and William A. Morris. 2010. *Arctic Grayling and Burbot Studies at the Fort Knox Mine 2010*. Technical Report No. 10-05. December 2010
- Alaska Department of Natural Resource, Division of Mining, Land and Water, 2007. *Fort Knox Mine Project Final Plan of Operations Amendment Approval Plan of Operations F20079852, July 3, 2007* Alaska Department of Natural Resources Land Administration System 2011: http://dnr.alaska.gov/projects/las/Case_Water.cfm
- Alaska Department of Natural Resources, Division of Mining, Land and Water, *Millsite Lease ADL 414960 and 414961, February 15, 1994*
- Alaska Department of Natural Resources, Division of Mining, Land and Water, *Amended and Restated Millsite Lease ADL 414960 and 414961, July 8, 2002*
- Alaska Department of Natural Resources, Division of Mining, Land and Water, *Addendum to the Fort Knox Millsite Lease ADL 414960 and 414961, July 3, 2007*
- Alaska Department of Natural Resources, Division of Mining, Land and Water, *First Amendment to Millsite Lease ADL 414960 and 414961, December 31, 2007*
- Alaska Department of Natural Resources, Division of Mining, Land and Water, *Second Amendment to Millsite Lease ADL 414960 and 414961, June 2, 2011*
- Alaska Department of Natural Resources, Division of Mining, Land and Water, *Upland Mining Lease ADL 535408, February 15, 1994*
- Alaska Department of Natural Resources, Division of Mining, Land and Water. 2002. Re: Approved Plan of Operation for the True North Project. Letter from Alaska Department of Natural Resources, Division of Mining and Water Management to Fairbanks Gold Mining, Inc. December 20, 2000.
- Alaska Department of Natural Resources, Division of Mining, Land and Water, *First Amendment to Upland Mining Lease ADL 535408, December 31, 2007*
- Alaska Department of Natural Resources, Office of Habitat Management and Permitting, Alvin G. Ott and William A. Morris. 2005. *Arctic Grayling and Burbot Studies at the Fort Knox Mine 2005*. Technical Report No. 05-06. December 2005
- Alaska Department of Natural Resources, Office of Habitat Management and Permitting, Alvin G. Ott and William A. Morris. 2006. *Arctic Grayling and Burbot Studies at the Fort Knox Mine 2006*. Technical Report No. 06-05. December 2006

- Alaska Department of Natural Resources, Office of Habitat Management and Permitting, Alvin G. Ott and William A. Morris. 2007. *Arctic Grayling and Burbot Studies at the Fort Knox Mine 2007*. Technical Report No. 07-01. December 2007
- Buell & Associates, Three Parameters Plus, 2005. *Reassessment of Functions and Values for Wetland and Aquatic Features associated with the Fort Knox Gold Mine*.
- Bureau of Land Management (BLM). 2010. RECORD OF DECISION and PLAN OF OPERATIONS AMENDMENT APPROVAL: Round Mountain Gold Corporation-Round Mountain Expansion Project. Plan of Operations #: NVN-072662; EIS#: NV065-EIS06-163. Bureau of Land Management, Battle Mountain District, Tonopah Field Office. June 30, 2010.
- Environ International Corp. 2011. *Summary Audit Report for the February 2011 International Cyanide Code Recertification Audit for Fairbanks Gold Mining Inc*. Submitted to International Cyanide Management Institute August 24, 2011.
- Environmental Resources Management. 2008. *Summary Audit Report for the October 2007 International Cyanide Code Audit for Fairbanks Gold Mining Inc*. Submitted to International Cyanide Management Institute February 11, 2008.
- Fairbanks Gold Mining, Inc. 2010, *Letter to Gary Prokosch, Chief of Water Resources Section, RE: Fort Knox Mine Water Rights Renewals and conversion of Permits to Appropriate to Certificates, July 20, 2010*
- Fairbanks Gold Mining, Inc., 2007. *2006 Annual Activity Report*, March, 2007. 18 pp.
- Fairbanks Gold Mining, Inc., 2009. *2008 Annual Activity Report*, February 20, 2009. 22 pp. Fairbanks Gold Mining, Inc., 2008. *2007 Annual Activity Report*, February 2008. 21pp.
- Fairbanks Gold Mining, Inc., 2010. *2009 Annual Activity Report*, February 22, 2010. 17 pp.
- Fairbanks Gold Mining, Inc., 2011. *2010 Annual Activity Report*, March 11, 2011. 21 pp.
- Fairbanks Gold Mining, Inc., 2011. *Fort Knox Mine Reclamation and Closure Plan*, January 2011.
- Fairbanks Gold Mining, Inc., 2011. *True North Gold Mine Reclamation and Closure Plan*, June 2011.
- Fairbanks Gold Mining, Inc., 2011. *Letter to Mr. Steve McGroarty, Alaska Department of Natural Resources Division of Mining, Land and Water from Delbert Parr*. Dated June 3, 2011
- Golder Associates Inc. 2000, *True North Waste Dump Site Investigation and Stability Evaluations. Prepared for Kinross Gold Exploration*. January 2000.
- Golder Associates Inc. 2004. *Final Five-Year Environmental Audit Fort Knox Mine, True North Mine and Twin Creek Road*, March 2004.
- Hollow, John, Hill, Eric, Lin, Hsing, and Walsh, Daniel. 2005. *Modeling the Influence of Slurry Temperature on Gold Leach and Adsorption Kinetics at the Fort Knox Mine, Fairbanks, Alaska*, SME Preprint 05-67 Revised per Comments from M&M - October 21, 2005.
- MWH. 2004. *Draft Fort Knox Mine Conceptual Chemical Stabilization Closure Plan*. July 2004.
- Schlumberger Water Services, 2011. *Fort Knox Mine Reclamation and Closure Plan*. Prepared for Fairbanks Gold Mining, Inc. February 2011.
- SRK.2000. *Review of Geochemical Issues True North Project, Fort Knox Mine*, December 2000.
- U.S. Environmental Protection Agency, Region 10 (EPA). 2006. RCRA Compliance Evaluation Inspection. Letter to Delbert Parr, Environmental Manager, Fairbanks Gold Mining, Inc.

Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (U.S.), Inc. (SRK) by Fairbanks Gold Mining Inc. (FGMI) as well as the Alaska Department of Natural Resources, the Alaska Department of Conservation, the Alaska Department of Fish and Game, and the U.S. Army Corps of Engineers. These opinions are provided in response to a specific request from the agencies and FGMI to do so. SRK has exercised all due care in reviewing the supplied information. While SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report.

Figures

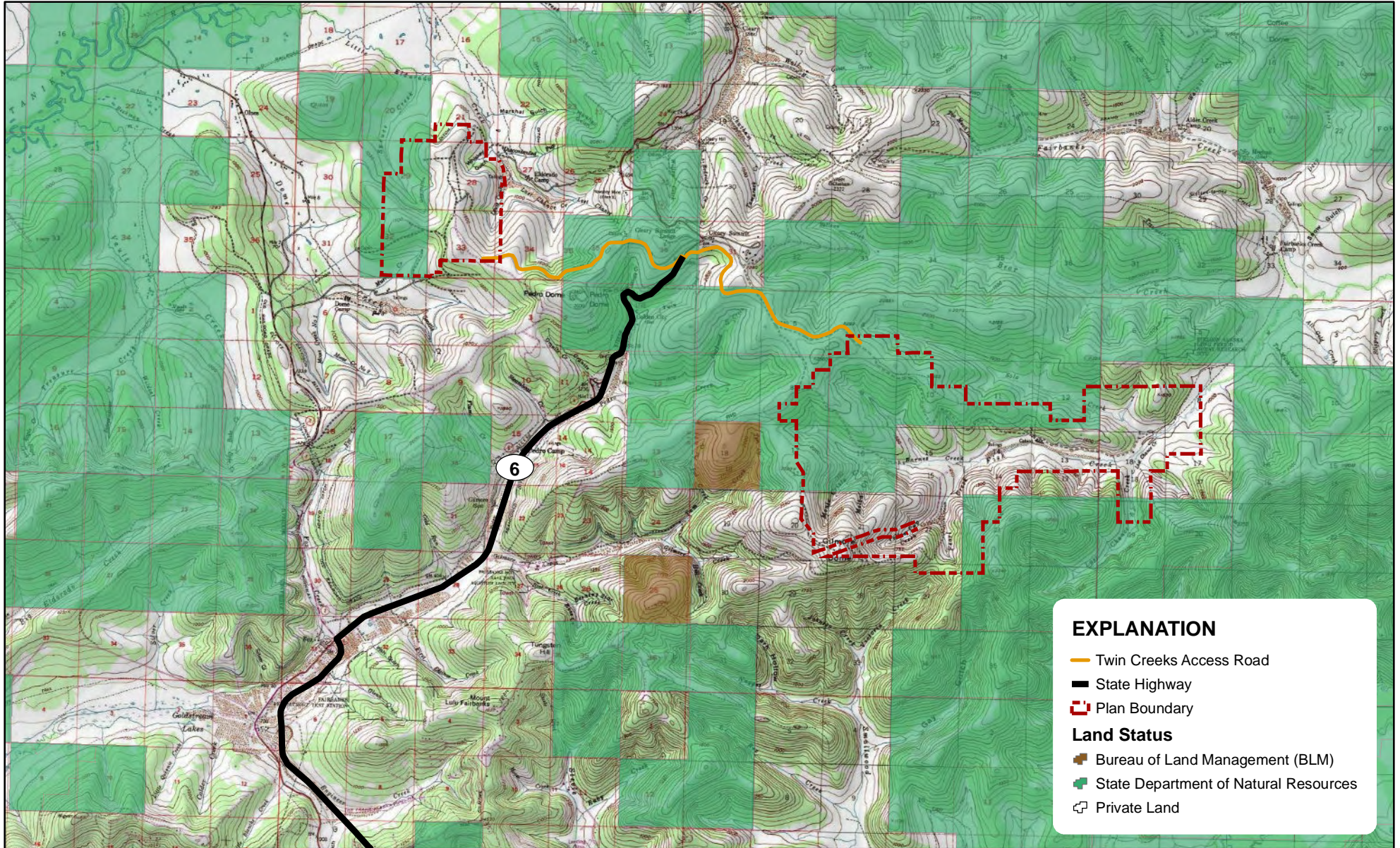


FAIRBANKS GOLD MINING, INC.

DRAWING TITLE: Location Map Fort Knox and True North Mines	
ISSUED FOR: 2011 AUDIT	
DRAWING NO. Figure 1	REVISION NO.
SRK JOB NO. 73400.070	A

NAD 1983 StatePlane Alaska 3 FIPS 5003 Feet			
DESIGN: ABR	DRAWN: ABR	REVIEWED: VS	
SCALE: NOT TO SCALE		DATE: 10/31/2011	
FILE: EnvAudit_Figure1_Location_ABR_20111018.mxd			

PATH: G:\Sites\Fort_Knox\Kinross_Gold\73400_070_Report\Prep\Revision_A\EnvAudit_Figure1_Location_ABR_20111018.mxd



0 2 Miles



NAD 1983 StatePlane Alaska 3 FIPS 5003 Feet

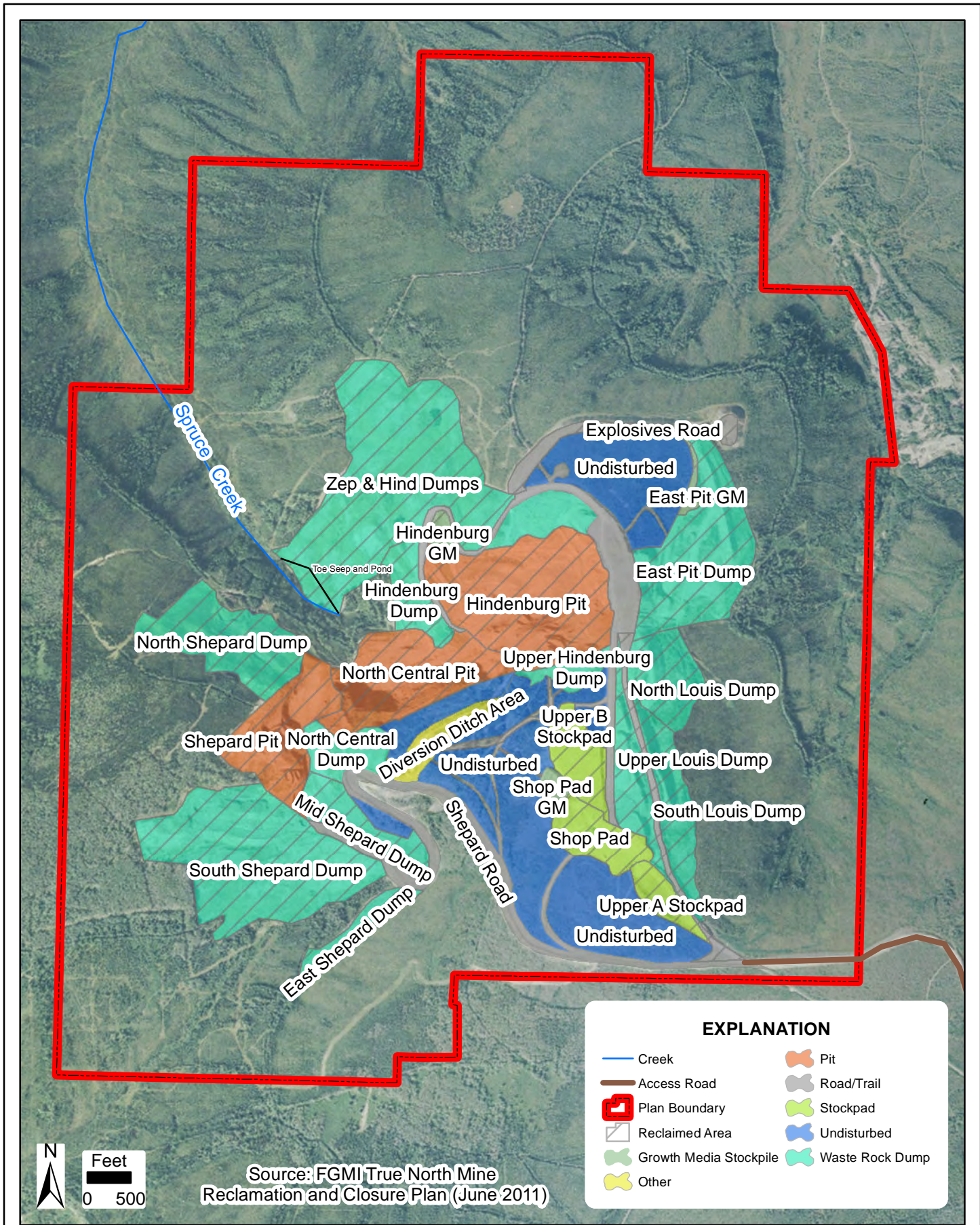
DESIGN: ABR DRAWN: ABR REVIEWED: VS

SCALE: 1 inch = 2 miles DATE: 10/31/2011

FILE: EnvAudit_Figure2_LandStatus_ABR_20111019.mxd

FAIRBANKS GOLD MINING, INC.

DRAWING TITLE: Land Status	
ISSUED FOR: Fort Knox and True North Mines	
ISSUED FOR: 2011 AUDIT	
DRAWING NO. Figure 2	REVISION NO.
SRK JOB NO. 73400.070	A



Source: FGMI True North Mine
Reclamation and Closure Plan (June 2011)

EXPLANATION	
	Creek
	Access Road
	Plan Boundary
	Reclaimed Area
	Growth Media Stockpile
	Other
	Pit
	Road/Trail
	Stockpad
	Undisturbed
	Waste Rock Dump



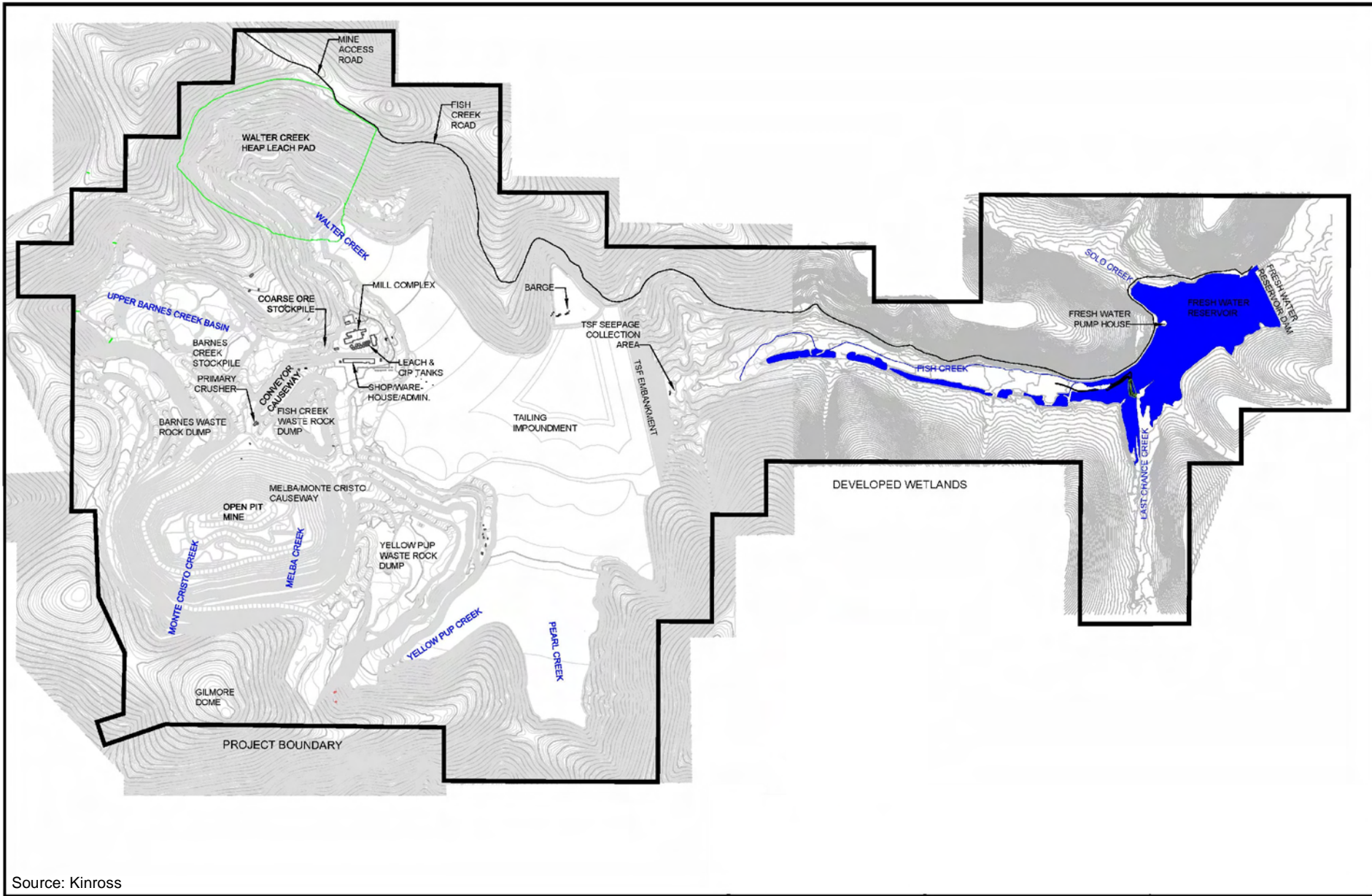
NAD 1983 StatePlane Alaska 3 FIPS 5003 Feet			
DESIGN: ABR	DRAWN: ABR	REVIEWED: VS	
SCALE: 1 inch = 1,500 feet		DATE: 10/31/2011	
FILE: EnvAudit_Figure3_TNFacilities_ABR_20111025 -.mxd			

FAIRBANKS GOLD MINING, INC.

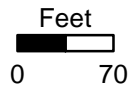
DRAWING TITLE:
Facilities - True North

ISSUED FOR: 2011 AUDIT	
DRAWING NO. Figure 3	REVISION NO.
SRK JOB NO. 73400.070	A

PATH: G:\Sites\Fort_Knox\KInross_Gold\73400_070_ReportPrep\Revision_A\EnvAudit_Figure3_TNFacilities_ABR_20111025 -.mxd



Source: Kinross



DESIGN:	ABR	DRAWN:	ABR	REVIEWED:	VS
SCALE:	NOT TO SCALE			DATE:	10/25/2011
FILE:	EnvAudit_Figure4_Facili_Topo_ABR_20111025.mxd				

FAIRBANKS GOLD MINING, INC.

DRAWING TITLE:
FACILITIES TOPO- Fort Knox

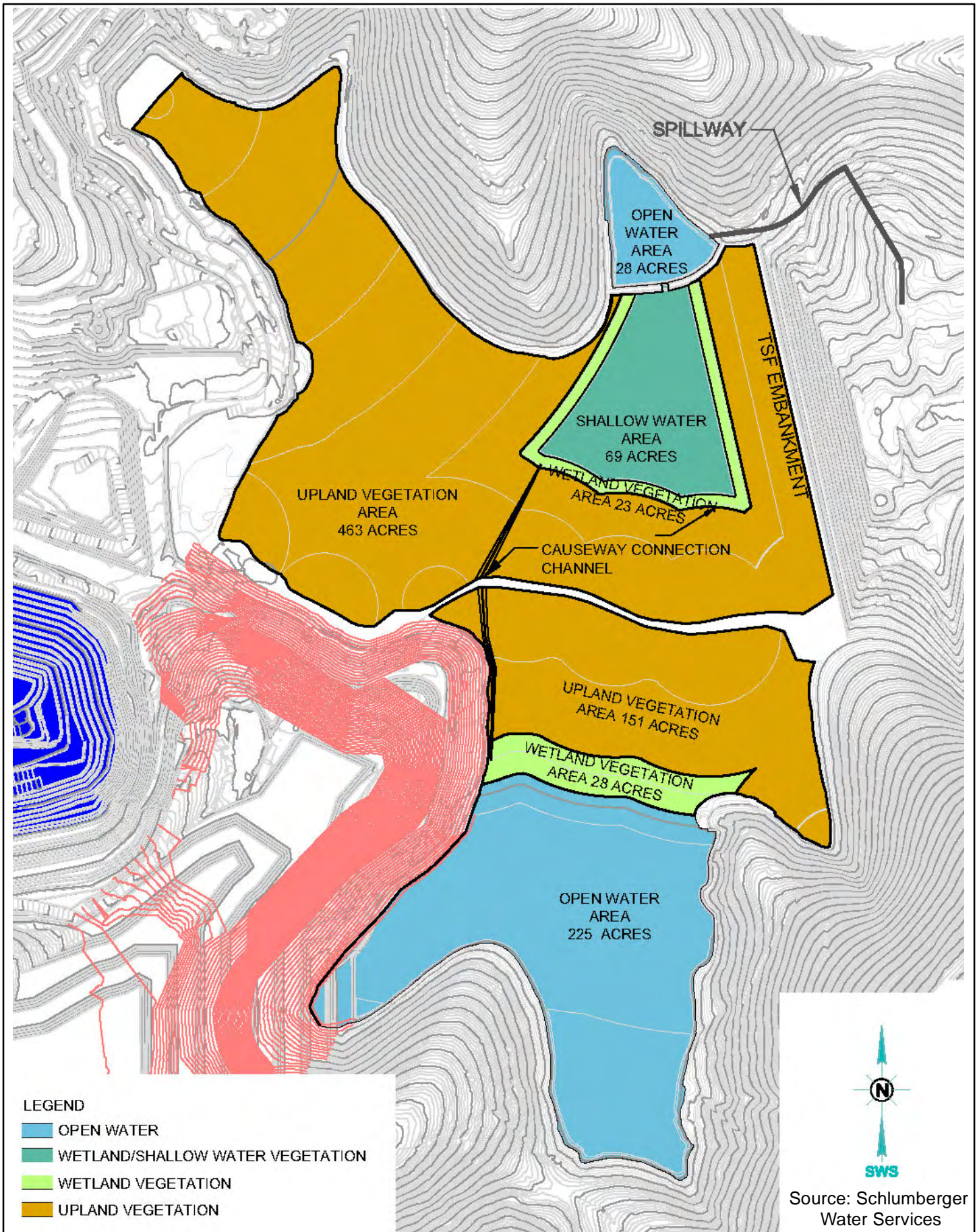
ISSUED FOR: **2011 AUDIT**

DRAWING NO. **FIGURE 4**

SRK JOB NO. **73400.070**

REVISION NO.

A



srk consulting			
DESIGN: ABR	DRAWN: ABR	REVIEWED: VS	
SCALE: NOT TO SCALE		DATE: 10/25/2011	
FILE: EnvAudit_Figure5_Tailings_ABR_20111025 -.mxd			

FAIRBANKS GOLD MINING, INC.

DRAWING TITLE: TAILINGS RECLAMATION- Fort Knox	
ISSUED FOR: 2011 AUDIT	
DRAWING NO. FIGURE 5	REVISION NO.
SRK JOB NO. 73400.070	A

Appendices

Appendix A: Appendix A: List of Permits

A.1: Fort Knox Mine Permits

A.2: True North Mine Permits

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
FEDERAL				
FCC	WPRW650	Radio Station Authorization FGMI EHS-E978	6/14/2011	3/2/2021
FCC	WPSH854	Radio Station Authorization FGMI EHS-E979	6/14/2011	5/2/2021
Nuclear Regulatory Commission	50-29098-01	Radio Active Materials License FGMI EHS-E905	4/12/2002	8/31/2011
Bureau Of Alcohol, Tobacco, And Firearms	9-AK-090-22- 2A-12031	License For Use Of Explosives FGMI EHS-E906	1/1/2003	1/1/2012
US Dept of Transportation & Public Safety	070706551054 0Q	Hazardous Materials Certificate of Registration Year(s) 2009 to 2012 FGMI EHS-E907	7/1/2009	7/30/2012
Fort Knox Mine Environmental Assessment	N/A	Fort Knox Environmental Assessment for the Initial ACOE permitting process FGMI EHS-E908	August 1993	Life of the Project
Corps of Engineers	POA-1992- 574-S	404 Permit Extension for construction, operation & closure of heap leach facility FGMI EHS-E909	10/31/2007	10/31/2012
Corps of Engineers	POA-1992- 574-T	Update & Renew Fort Knox Mine Reclamation & Closure Plan & Revise Language of Special Condition 9.a FGMI EHS-E910	1/25/2008	1/31/2013
Corps of Engineers	POA-1992- 574-Z	Jurisdictional Determination for NOAA Parcel A FGMI EHS-E911	10/31/2007	10/31/2012
Corps of Engineers	POA-1992- 574-9	Jurisdictional Determination for Walter Creek FGMI EHS-E912	10/31/2007	10/31/2012

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
Corps of Engineers	POA-1992-574-BB	Expansion of the pit at Fort Knox Mine FGMI EHS-E913	2/1/2008	2/28/2013
Corps of Engineers	POA-1992-574-M18	Prelim stages of reconstruction of TSF Dam in prep for future increase in height, storage capacity & excavation of material below shoreline of permitted storage area. FGMI EHS-E959	3/1/2010	3/31/2015
Corps of Engineers	POA-1992-574-M19	Construction to raise the Tailing Storage Facility dam 52 ft FGMI EHS-E957	3/4/2011	3/31/2016
Corps of Engineers	POA-2006-2047	Jurisdictional Determination for the Exploratory Drill Holes in Slippery and Johnson Creeks	6/15/2011	6/15/2016
Corps of Engineers	POA-1992-574-M20	Authorization to Expand Barnes Creek Waste Rock Dump FGMI EHS-E976	7/21/2011	7/21/2016
STATE				
ADEC NPDES	AKR050000	Notice of Intent EPA Tracking #AKR05CB48 FGMI EHS-E914	5/27/2009	When Notice of Termination is filed
ADEC	AQ0053MSS02	Final Air Quality Control Minor Permit with ORL on mill generators to 2500 FGMI EHS-E915	6/13/2008	No Expiration Date
ADEC	2006-DB0043	Waste Management Permit for Fort Knox Mine FGMI EHS-E916	7/3/2007	7/2/2012

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
ADEC	Ref# POA-1992-574-S	Certificate of Reasonable Assurance for construction and operation of Walter Creek Heap Leach Facility FGMI EHS-E918	7/12/2007	7/12/2012
ADEC	Ref# POA-1992-574-T	Certificate of Reasonable Assurance for closure of the planned Walter Creek Heap Leach Facility FGMI EHS-E919	7/12/2007	7/12/2012
ADEC	Ref# POA-1992-574-M19	Certificate of Reasonable Assurance for construction to raise TSF dam 52 ft FGMI EHS-E967	1/26/2011	
ADEC Division of Env. Health Drinking Water Program	PWSID: 314093 Source ID: WL001	New Well & Water Softener Class: Non-Transient Non-Community (NTNC), Class A; Source: Groundwater FGMI EHS-E917	3/4/2009	Review 8/19/2011
ADEC Drinking Water Office	ID #AK2314093	Sanitary Survey on Fort Knox Drinking Water FGMI EHS-E920	7/30/2005	12/31/2015
ADEC Drinking Water Office	PWSID #314093	Initial Waiver Approval for Synthetic Organic Contaminants (SOC) for 2008-2010 compliance period FGMI EHS-E966	3/25/2010	3/1/2012
ADEC Division of Water, Wastewater Discharge Authorization Program	Ref# POA-1992-574-M20	Certificate of Reasonable Assurance for Expansion of Barnes Creek Waste Rock Dump FGMI EHS-E975	7/21/2011	7/21/2016
Dept Of Fish & Game	FG93-III-0202	Fish Habitat Permit Solo Creek Culvert FGMI EHS-E921	2/15/1994	Upon Third Party Transfer

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
Dept Of Fish & Game	FG93-III-0203	Fish Habitat Permit Wetlands FGMI EHS-E922	2/15/1994	When Developed Wetlands are Complete
Dept Of Fish & Game	FG99-III-0097, 0098, 0099, 0100, 0101	Fish Habitat Permit Wetlands Channel #1, #2, #3, #4, #5 FGMI EHS-E923	5/14/1999, 5/15/1999, 6/1/99,6/9/99	Expires Upon Closure of Mine
Dept Of Fish & Game	FH11-III-0053	Fish Habitat Permit Fish Creek, Nugget Creek, APMA 9156 FGMI EHS-E960	3/1/2011	12/31/2014
ADNR	ADL 414960 ADL 414961	Second Amendment to Millsite Lease ADL 414960 & 414961 FGMI EHS-E974	6/1/2011	7/3/2012
ADNR	FH09-III-0052	In our helicopter supported drilling operation, drilling holes to a maximum depth of 500 ft, water withdrawal will be taken from Blackshell Creek at a rate of 1,000 gallons per day using a pump with an unknown intake size. FGMI EHS-E925	3/9/2009	12/31/2013
ADNR	FH11-III- 00111	Multi-Year 2011-2015, Hardrock Exploration Application APMA F11- 2157, Porcupine Creek, Bonanza Creek	4/28/2011	12/31/2015
ADNR	ADL 47229	Lease Of Water Rights, Fish Creek- Water Supply Reservoir FGMI EHS-E926	2/15/1994 Paid thru	2/15/2019
ADNR	LAS 13989	Lease Of Water Rights, Domestic Dewatering FGMI EHS-E927	2/11/1994	12/11/2012
ADNR	LAS 13988	Permit to Appropriate Water, Tailing Impoundment FGMI EHS-E928	2/6/2003	12/11/2012

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
ADNR	LAS 13987	Permit to Appropriate Water, Interceptor Wells FGMI EHS-E929	2/6/2003	12/11/2012
ADNR	LAS 13986	Permit to Appropriate Water, Water Supply Reservoir FGMI EHS-E930	2/6/2003	12/11/2012
ADNR	LAS 21760	Permit to Appropriate Water, Dewatering Wells FGMI EHS-E931	2/6/2003	12/11/2012
ADNR	AK00212	Certificate of Approval To Operate A Dam (Tailing Storage Facility), completed to ultimate design elevation FGMI EHS-E956	12/07/1999	4/21/2014
ADNR	AK00212	Certificate of Approval to Modify a Dam (Approval to raise dam by 52 feet in two successive stages in 2011 & 2013) FGMI EHS-E934	1/26/2011	End of Construction 2013
ADNR	AK00211	Certificate of Approval To Operate a Dam (Water Storage Reservoir) FGMI EHS-E933	10/26/2010	10/26/2015
ANDR	AK00310	Certificate of Approval To Operate a Dam (Walter Creek Heap Leach Pad Dam) FGMI EHS-E932	6/8/2010	10/30/2014
ADNR	AK00311	Certificate of Approval To Operate a Dam (Pearl Creek Causeway) FGMI EHS-E955	4/2/2010	12/31/2013
ADNR	AK00212	Certificate of Approval To Operate a Dam (Fort Knox Tailings Dam) FGMI EHS-E973	4/29/2011	10/6/2012

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
ADNR	ADL 535408	Fort Knox Upland Mining Lease FGMI EHS-E935	2/15/1994	2/14/2014
ADNR	ADL 414960 ADL 414961	Fort Knox Millsite Permit FGMI EHS-E936	2/15/1994	7/3/2012
ADNR	ADL 414960 & 414961 Addendum	Amended and Restated Millsite Lease FGMI EHS-E937	7/3/2007	7/3/2012
ADNR	F20079852	Final Plan of Operations Amendment Approval FGMI EHS-E938	7/3/2007	7/3/2012
ADNR	Plan of Operations Amendment	Re-routing segment of Fish Creek Road powerline & clearing of a 43-acre area to the N & E of topsoil stockpile for a sub-base material source FGMI EHS-E965	4/7/2011	7/3/2012??
ADNR	ADL 528271	In the name of Melba Creek Mining, Inc. lease renewed until August 31, 2019 FGMI EHS-E939	8/31/2009	8/31/2019
ADNR	ADL 415405	Land Use Permit Fish Creek And Fairbanks Creek Road Right Of Way FGMI EHS-E940	3/7/1995	3/7/2099
ADNR	APMA 9156	4 th of July Hill Reclamation (Multi-year 2010 – 2014 Misc Land Use Permit for Hardrock Exploration & Reclamation) FGMI EHS-E941	1/1/2010	12/31/2014
ADNR	APMA 9594	Multi-Year 2009 – 2013 Hardrock Exploration Application FGMI EHS-E942	1/1/2009	12/31/2013

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
ADNR	APMA 9945	Blackshell Creek Multi-Year 2009 - 2013 FGMI EHS-E943	1/1/2009	12/31/2013
ADNR	APMA 2157	Miscellaneous Land Use Permit for Hardrock Exploration Permit #2157	4/27/2011	12/31/2011
ADNR	TWUP F2010-60	To withdraw up to combined total of 14,000 gallons of water per day at a max rate of 10 gpm for Gil Project APMA F109156 FGMI EHS-E961	12/21/2010	12/31/2014
ADNR	TWUP F2010-51	To withdraw up to combined total of 64,800 gallons of water per day with a combined max of 72.585 acre feet of water per year for Gil Project APMA F109156 FGMI EHS-E962	12/21/2010	12/31/2014
ADNR	TWUP F2010-46	To create a cone of depression around the Fort Knox Mine Pit by withdrawing 5,645 acre-feet of water per year at a max of 3,500 gpm for each authorized year. FGMI EHS-E963	9/21/2010	9/20/2015
ADNR	TWUP F2011-11	To supply water in support of hardrock exploration diamond drilling and winter travel associated with APMA F119945 FGMI EHS-E964	3/31/2011	12/31/2013
ADNR	TWUP F2011-61	To supply water in support of hardrock exploration mining activities associated with APMA F112157 FGMI EHS-E968	7/13/2011	12/31/2015

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
ADNR	AK00311	Certificate of Approval to Modify a Dam Pearl Creek Causeway Dam FGMI EHS-E975	11/5/2010	One Year
Dept. Of Transportation	051601 550 014IK	Approval To Transport Hazardous Materials FGMI EHS-E944	7/10/2006	6/30/2012
Dept. Of Public Safety	N/A	Life And Fire Safety Plan Check	6/29/1999	Construction Approval Archived
Dept Of Labor	SEE FILES	Certificate Of Inspection For Fired And Unfired Pressure Vessel (S) FGMI EHS-E945	See Files	As Required
Dept Of Labor	EIN 061325565	Employer Identification FGMI EHS-E946	9/1991	N/A
Dept Of Community & Economic Dev.	BL 272545	Business License FGMI EHS-E947	1/21/2004	12/31/2011
Dept of Revenue	100051	FGMI Mining License FGMI EHS-E948	5/1/2010	4/30/2011
Div Of Forestry	No 96400	Fort Knox Burn Pit Permit FGMI EHS-E949	3/8/2010	9/30/2010
LOCAL				
FNSB	NA	FNSB Floodplain Permit FGMI EHS-E950	4/28/1994	NA
FNSB	CUO13-94	Conditional Use Permit (Tailing Disposal) FGMI EHS-E951	3/1/1994	NA
FNSB	CUO14-94	Conditional Use Permit (Solid Waste Landfill) FGMI EHS-E952	3/1/1994	NA

Appendix A.1

Fort Knox Permits, Licenses, Certificates and Authorizations

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	EXPIRATION/ RENEWAL DUE
FNSB	12441	Zoning Permit FGMI EHS-E953	4/21/1994	NA

Appendix A.2
True North Permits

AGENCY	PERMIT #	DESCRIPTION	DATE ISSUED	TERM/ EXPIRATION
STATE/PROVINCE/ REGION				
ADEC	AKR05CB49	Notice of Intent EPA Tracking FGMI EHS-TN904	5/27/2009	When Notice of Termination if filed
ADNR	TWUP F2010-53	Temporary Water Use Permit FGMI EHS-TN910	10/20/2010	10/20/2015
ADNR	ADL 416509	True North Mine Project Millsite Lease FGMI EHS-TN905	1/20/2001	Upon completion of requirements in Plan of Operations
DNR, TLO & FGMI	Reference: Millsite Lease ADL No. 416509	Agreement among parties for the construction, upgrade, use and maintenance of the True North Project Road FGMI EHS-TN907	1/20/2001	Until completion of final reclamation as required by Millsite lease
Alaska Department of Natural Resources – Division of Mining, Land and Water Management (DNR)	APMA 7522	Miscellaneous Land Use Permit for Reclamation and Approved Reclamation Plan (Pending)	PENDING	

Appendix B: Appendix B: Variance Between the 2006 and 2011 Reclamation and Closure Plans

B.1: Variances Between the 2006 and 2001 Fort Knox Reclamation and Closure Plans

B.2: Variances Between the 2006 and 2001 True Reclamation and Closure Plans

Comparison of Fort Knox Reclamation and Closure Plans (2006 and 2011)

Facility	2006 Plan	2011 Plan
Water Management	<ul style="list-style-type: none"> • TSF decant pond will be reduced in size and maintained to include storage volume for 100 yr 24 hr storm event and spring runoff volume. • Once water quality discharge standards are met, site run-off and drainage will be discharged to a wetland treatment system. • Two years following closure of the TSF, pumping from TSF decant pond to the pit will be discontinued and fresh water will be allowed to create a water pool on the tailings. • During rinsing and initial draindown of the heap, some water may be directed to the pit. 	<ul style="list-style-type: none"> • TSF decant pond will be reduced in size and maintained to include storage volume for 100 yr 24 hr storm event, spring runoff volume and heap leach design release event. • Seasonal discharges from the decant pond will be routed to the wetland treatment system. • Once the freshwater pond recovers to an elevation of 1529.7 ft amsl, pumping to the pit will recommence until the leach pad has been rinsed and closed. • During rinsing and initial draindown of the heap, some water from the heap leach may be directed to either the TSF pond or the pit.
Tailings Storage Facility	<ul style="list-style-type: none"> • One water pond covering most of tailings surface area that will seasonally fluctuate in size. • After the freshwater pond fills to the spillway elevation, water would be discharged to the wetland treatment system. • Final tailings surface 1,460-1,488 ft amsl and spillway elevation of 1,485 ft amsl. Beach width 300-500ft. Size of water pond will vary from 400 to 600 acres. 	<ul style="list-style-type: none"> • Two water ponds; one to the north connected to the spillway, and one in the south. Stormwater flows contributing to the south fresh water pond will be isolated from north pool and will not discharge directly. A connection channel and a coarse rockfill causeway will allow drain down/seepage to the north pool in response to climate. The south pool has capacity for PMP storm volume and will not contribute to storm flows in the north pond. • Once the water quality will not impact designated uses of surface water in Fish Creek, the spillway will be constructed to safely route seasonal flow from the tailings impoundment to an energy dissipation basin downstream of the embankment toe. Seasonal discharges will occur to the wetland system. • Final tailings surface 1,521-1,561 ft amsl and spillway elevation of 1,530 ft amsl. Beach width 800ft. Size of water pond will vary from 93 to 114 acres.
Seepage Interception System	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i> 	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i>
Pit Lake	<ul style="list-style-type: none"> • <i>No commitment for regular pit lake evaluation studies</i> 	<ul style="list-style-type: none"> • <i>New pit lake chemistry at closure data presented though assumption that final pit lake is expected to meet compliance standards by the time discharge occurs remain unchanged.</i> • <i>Pit lake evaluation studies will be conducted once every year until</i>

Facility	2006 Plan	2011 Plan
		final pit lake quality meets compliance standards. <ul style="list-style-type: none"> Treatment alternatives considered to control potentially elevated metals concentrations (e.g. treatment with ferrous sulfate)
Heap Leach Facility	<ul style="list-style-type: none"> Underdrain quality will be monitored via a well installed through the base platform and into the drainrock. During rinsing, it may be necessary to direct solution to the pit or to a treatment facility in order to manage the water balance and remove chemical mass from the system. <i>(NB: later text refs to discharge to the TSF – potentially just inconsistency within document).</i> 	<ul style="list-style-type: none"> Underdrain quality will be monitored by monitoring well in the base platform, bench of the in-heap storage pond embankment and in the crest of the in-heap storage pond embankment. During rinsing, it may be necessary to direct solution to the TSF, pit or to a treatment facility. It is preferred that if the solution needs to be redirected it will be sent to the TSF. The Heap Leach Road Tunnel will be reclaimed following regrading and placement of growth media on the Heap Leach.
Water Supply Reservoir, Solo Creek Causeway and Gil Causeway	<ul style="list-style-type: none"> <i>No differences between 2006 and 2011.</i> 	<ul style="list-style-type: none"> <i>No differences between 2006 and 2011.</i>
Roads	<ul style="list-style-type: none"> <i>No differences between 2006 and 2011.</i> 	<ul style="list-style-type: none"> <i>No differences between 2006 and 2011.</i>
Open Pit/ Melba Monte Cristo Causeway	<ul style="list-style-type: none"> The ultimate water surface elevation will be 1,470 feet amsl covering approximately 150 surface acres. Upon final mine closure, haul roads in and around the pit will be smoothed of all berms except those necessary for erosion control and safety. Road cuts and fills will be recontoured as much as feasible, and the roadbeds will be ripped and scarified where necessary. 	<ul style="list-style-type: none"> The ultimate water surface elevation will be 1,630 feet amsl covering approximately 280 surface acres. <i>No discussion of haul road reclamation in pit.</i>
Waste Rock Dumps	<ul style="list-style-type: none"> 790 acres of waste rock dumps Concurrent reclamation of waste rock dumps scheduled to begin in 2009. Minimum of six inches of growth media 	<ul style="list-style-type: none"> 950 acres of waste rock dumps Concurrent reclamation of waste rock dumps scheduled to begin in 2015. Requirement to place 12 inches of growth media but this can be modified in future revisions of the Reclamation and Closure Plan if FGMI demonstrates revegetation success with less.
Building and Equipment Sites	<ul style="list-style-type: none"> As facility components of the site are decommissioned, materials, equipment, and buildings will be removed. Non-hazardous and nontoxic solid waste such as lumber and non-salvageable metal scrap will be burned and/or disposed in the 	<ul style="list-style-type: none"> As facility components of the site are decommissioned, materials, equipment, and some buildings will be removed. Currently, the only buildings planned for removal include the tailings barge, tailings seepage building, primary crusher, belt conveyor / drive

Facility	2006 Plan	2011 Plan
	permitted solid waste landfill. Hazardous and toxic materials such as reagents, petroleum products, acids, and solvents will be moved off-site by licensed transporters and either returned to the vendor or disposed at licensed facilities.	tower, bulk fuel, leach tanks, CIL tanks and the water reclaim freshwater pumphouse. <ul style="list-style-type: none"> • <i>No discussion of management of hazardous or non-hazardous waste.</i>
Wells	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • <i>One additional monitoring hole (MW-8)</i>
Fence	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i> 	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i>
Electrical Power Facilities	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i> 	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i>
Borrow Areas	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i> 	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011.</i>
Growth Media	<ul style="list-style-type: none"> • Estimation of available growth media volumes approximately 7,900,000 cubic yards and a requirement for 6 inches of growth media over area. • <i>Barnes Creek Stockpile in West</i> • Water Supply Growth Media stockpile present. • Barnes Creek Phase 7 Growth Media Stockpile absent. 	<ul style="list-style-type: none"> • Estimation of available growth media volumes approximately 5,800,000 cubic yards and a requirement for 12 inches of growth media over area. <i>No comment about whether available material meets the volume requirements for growth media.</i> • Water Supply Growth Media stockpile absent. • Barnes Creek Phase 7 Growth Media Stockpile present.
Monitoring	<ul style="list-style-type: none"> • <i>No differences between 2006 and 2011 - cross reference to Fort Knox Mine Monitoring Plan (FGMI, 2005)</i> 	<ul style="list-style-type: none"> • <i>2011 - cross reference to same 2005 plan.</i>
Closure Cost	<ul style="list-style-type: none"> • \$20,551,994 	<ul style="list-style-type: none"> • \$65,785,797

Comparison of True North Reclamation and Closure Plans (2001 and 2011)

Facility	2001 Plan	2011 Plan
Mining Roads within Millsite Lease	<ul style="list-style-type: none"> Roads will be individually analyzed by the State and FGMI to determine which will be reclaimed dependent on post mining land use and site access requirements. 	<ul style="list-style-type: none"> All roads except those required for equipment access or monitoring will be reclaimed. The roads required for monitoring and equipment access will be reduced to one lane.
Pits	<ul style="list-style-type: none"> Mine roads in and around the pit will be smoothed of all berms except those necessary for erosion control and safety. Road cuts and fills will be recontoured as much as feasible, and the roadbeds will be ripped and scarified where necessary. The East pit will be backfilled with a 2 million ton development rock dump placed directly over the pit site. The preferred option for the Hindenburg, Central, Shepard, and Zeppelin pits is backfilling the pit to allow free drainage to prevent formation of a lake. If a pit lake were to occur, FGMI will provide predictions and supporting data concerning long-term pit water quality, and potential outflow from the pit lake. Within the pit, seedbeds will be prepared on selected benches and flat areas. Necessity, logistics, and safety will dictate growth medium placement and seeding. All pit highwalls will be stabilized where practicable based on FGMI engineering recommendations. 	<ul style="list-style-type: none"> The pit slopes will be left in a stable condition and the pit floors will be seeded but are not held to a standard.
Waste Rock Dumps	<ul style="list-style-type: none"> Grading and sloping of the dumps will entail rounding of the crests and pushing material outward to establish a slope of approximately 2.5H:1V – 3.0H:1V. Each lift will be sloped individually to partially fill the next lower bench. Some 12-inches of growth medium will be applied to promote establishment of a vegetative cover and minimize infiltration if required. If routine characterization of material indicates a potential for acid rock drainage, then a specific management plan for material handling will be immediately developed by FGMI. This plan will be submitted to ADNR and ADEC for approval, and the reclamation plan modified according to 11 AAC 97.240. 	<ul style="list-style-type: none"> Grading and recontouring the dumps will establish a slope of approximately 2.5H:1V or flatter. A minimum of 6 inches of growth media will be placed.
Building and	<ul style="list-style-type: none"> If growth medium is needed it will be applied at approximately a 	<ul style="list-style-type: none"> If growth media is needed it will be applied at a depth of

Facility	2001 Plan	2011 Plan
Equipment	6-inch cover layer.	approximately 12-inches.
Wells	<ul style="list-style-type: none"> <i>All other details are the same.</i> 	<ul style="list-style-type: none"> In October 2010, ADNR approved the closure of Monitoring wells 1, 5, 9 and 13, along with any thermistor wells found on site. Closure of these wells is planned to occur during the 2011 construction season.
Fence	<ul style="list-style-type: none"> Any fencing established on the True North Project site shall be removed upon closure. 	<ul style="list-style-type: none"> <i>No description of closure activities relating to fencing.</i>
Electrical Power Facilities	<ul style="list-style-type: none"> <i>No differences between 2001 and 2011 plans.</i> 	<ul style="list-style-type: none"> <i>No differences between 2001 and 2011 plans.</i>
Monitoring	<ul style="list-style-type: none"> Very limited monitoring information though map of monitoring locations provided. 	<ul style="list-style-type: none"> More monitoring information provided though monitoring maps show same locations.
Cost	<ul style="list-style-type: none"> \$2,238,419.00 	<ul style="list-style-type: none"> \$3,225,840

Appendix C: Summary of CERCLA 108(b)

CERCLA Section 108(b) Overview

The Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. Section 9601 et seq. – otherwise known as CERCLA or Superfund – establishes a mechanism for the United States, the States, Tribes, and private parties to seek recovery for response costs incurred in responding to releases or threats of releases of hazardous substances to the environment. CERCLA also establishes a "Superfund", the proceeds from which can be used in certain situations to clean-up hazardous substance sites.

Section 108(b) of CERCLA, 42 U.S.C. § 9608(b), authorizes the President to establish financial responsibility requirements. Executive Order 12580 delegates this responsibility to the EPA for non-transportation-related facilities. Specifically, CERCLA § 108(b) requires the President to:

"...promulgate requirements...that classes of facilities establish and maintain evidence of financial responsibility consistent with the degree and duration of risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances."

"...identify those classes for which requirements will be first developed and publish notice of such identification in the Federal Register."

EPA had made several previous attempts to implement Section 108(b), but never promulgated any regulations. Reports in the late 1990s and mid-2000s from EPA's Inspector General and the Congressional Government Accountability Office brought attention to the fact that EPA had not yet fulfilled its CERCLA § 108(b) responsibilities. An EPA study of the Superfund Program undertaken in 2004 recommended that EPA take action under Section 108(b). In response to this study, EPA began an evaluation to identify facility classes that should require CERCLA § 108(b) financial assurance.

On March 12, 2008, the Sierra Club, Great Basin Resource Watch, Amigos Bravos and the Idaho Conservation League, filed suit in the U.S. District Court for the Northern District of California to require EPA to fulfill its obligations under CERCLA § 108(b). On February 25, 2009, the court ordered EPA to publish a prioritized list in the Federal Register of the industries that would be the subject of a rulemaking to develop new financial assurance requirements under CERCLA § 108(b).

Financial Assurance Requirements

In response to the court's order, EPA published a Federal Register notice on July 28, 2009. This notice identified the hardrock mining industry as EPA's first priority industry that would be the subject of a rulemaking to establish CERCLA § 108(b) financial assurance requirements. For purposes of this rulemaking, EPA defined hardrock mining as follows:

"... hard rock mining is defined as the extraction, beneficiation or processing of metals (e.g., copper, gold, iron, lead, magnesium, molybdenum, silver, uranium, and zinc) and non-metallic, non-fuel minerals (e.g., asbestos, gypsum, phosphate rock, and sulfur)."

According to a presentation that Ms. Patty McGrath, EPA Region 10 Hardrock Mining Coordinator and EPA National Mining Team Co-Chair, gave in December 2009 at the Northwest Mining Association Annual Meeting, EPA is basing its selection of the hardrock mining industry as its first priority industry class on the following reasons:

- EPA contends that hardrock mining has a significant presence on the CERCLA National Priorities List of Superfund sites.
- EPA's analysis shows that of the 1,635 sites proposed, listed or deleted as of October, 2007, 90 (7%) are mining and/or smelting sites.
- EPA also reports that of the \$12.1 billion spent for all sites, \$2.4 billion (21%) was spent on mining.
- EPA is relying on the Toxic Release Inventory (TRI) and the reported releases for mining facilities.
- EPA is citing the fact that for the 2007 reporting year, the metal mining industry reported releasing nearly 1.15 billion pounds of toxic chemicals, or approximately 28 percent of all releases by U.S. industry required to report under TRI.
- EPA is concerned about common corporate structures and interrelated corporate failures within the hardrock mining industry that the Agency feels increases the likelihood of uncontrolled releases of hazardous substances being left unmanaged, thereby increasing risks.

CERCLA § 108(b) Rulemaking Status

The EPA is currently developing the proposed rule. The agency had originally intended to publish the draft rule in the Spring of 2011, to be promulgated within two years. This process has been delayed.

The statute directs EPA to consider the degree and duration of the risk associated with the production, transportation, treatment, storage, or disposal of hazardous substances in developing the CERCLA § 108(b) financial assurance rule. EPA's assessment of risk will be iterative. The Agency will establish an initial level of required financial assurance and will periodically review the scope of the financial assurance program to verify that it adequately addresses the identified risks.

EPA officials have stated that prior to developing the rule they will seek the advice of the commercial insurance industry to gain an understanding of the availability of financial insurance instruments. According to statute, the new CERCLA § 108(b) financial assurance program will accept insurance policies, surety bonds, letters of credit, or self-insurance for entities that can qualify.

The CERCLA § 108(b) financial assurance requirements will be implemented in phases over a four-year period from the date of promulgation. This phased implementation will probably establish annual increases in the amount of required financial assurance over the four -year phase-in period.

CERCLA § 108(b) does not provide for delegation to the states. Consequently, EPA must administer this program. This enhances the probability of overlap and duplication with state reclamation bonding programs.

EPA apparently thinks that federal land management agencies' bonding requirements are inadequate. In particular, EPA has been very critical of BLM and USFS waste characterization data requirements. As reflected in EPA's recent comments on NEPA documents for proposed mining projects on USFS- and BLM-administered lands. The EPA believes that the federal land management agencies rely on humidity cell tests that are terminated too soon (based partially on the findings presented in: Maest *et al.* . 2005. Predicting Water Quality at Hardrock Mines: Methods and Models, Uncertainties, and State-of-the-Art). Consequently, EPA maintains that

BLM and USFS underestimate the likelihood of future problems due to acid generation and metals leaching.

The Northwest Mining Association (NWMA) has had several meetings with EPA officials to discuss the industry's concerns about the impending CERCLA § 108(b) financial assurance rulemaking. Information obtained from these meetings suggests EPA is leaning towards establishing uniform, one-size-fits-all financial assurance requirements, rather than site-specific bonding requirements. Some EPA officials have stated that the agency will try to minimize duplication with existing state and federal programs. Others have suggested that some duplication is inevitable.

During these meetings NWMA has learned that EPA's discussions with the surety and insurance companies have revealed that there is little interest in underwriting policies to satisfy the CERCLA § 108(b) financial assurance requirements. Thus it is likely that most companies will have to provide letters of credit (i.e., a cash bond). Larger companies may be able to qualify for self-insurance using some sort of corporate guarantee.

Under the Small Business Regulatory Flexibility Act (SBREFA), EPA will have to quantify and mitigate the impact of the proposed CERCLA § 108(b) financial assurance rule on small business. SBREFA defines a small business as a company with fewer than 500 employees. Except for the large mining companies, many of the mining companies that will be impacted by this rule fall under this small business definition. NWMA is actively engaged in the SBREFA dialogue with the hopes of exerting significant pressure on EPA to minimize the impact of this rule.

EPA's proposed rule must include alternatives for mitigating the impacts on small business. It is hoped that the SBREFA mandate to limit impacts to small business will force EPA to propose a much more reasonable rule than what they originally envisioned. If the proposed rule creates significant unmitigated adverse impacts to small business, it is highly likely that one or more mining industry trade associations and/or companies that are small businesses will challenge the rule.

NWMA has also learned that the federal land management agencies have considerable concerns about EPA's CERCLA § 108(b) rulemaking. For example, in Nevada, BLM has made it clear to EPA that BLM does not agree with EPA that the amount of financial assurance should be discussed in Environmental Impact Statements.

Appendix D: List of Specialized Environmental Management Plans

APPENDIX D: LIST OF FORT KNOX SPECIALIZED ENVIRONMENTAL PLANS

The following table lists the various environmental management plans that are on file at the Fort Knox Mine. The Environmental Engineer shall revise this table as necessary to keep it up-to-date with the Fort Knox Mine regulatory requirements and the management plans that are maintained on site.

<i>FGMI LIST OF FORT KNOX SPECIALIZED ENVIRONMENTAL PLANS</i>			
Plan	Description	Latest Revision	Expiration / Renewal
Emergence Response Plan	Includes emergency response procedures and contact lists for the site.	January 2011	As Needed
Solid Waste Management Plan	Landfill design, construction, operation, and closure along with waste management procedures.	July 2007	July 2012
Dam Emergency Action Plan	Describes actions to be taken in the event of an embankment failure at the Water Storage Reservoir.	October 2010	As Needed
Water Balance	Site water balance includes mill, tailing impoundment, water reservoir, dewatering, and runoff.	Updated Monthly	N/A
Tailing Dam Operation and Maintenance Manual	Includes operation, maintenance, inspection, and record keeping procedures along with contingency plans for the tailing impoundment.	January 2010	As Needed
Water Dam Operation and Maintenance Manual	Includes inspection, monitoring, operating, and maintenance procedures along with contingency plans and an overview of the water dam.	January 2010	As Needed
Pearl Creek Causeway Operation and Maintenance Manual	Includes operation, maintenance, inspection, and record keeping procedures along with contingency plans for the causeway.	January 2010	As Needed
Heap Leach Operation and Maintenance Manual	Includes operation, maintenance, inspection, and record keeping procedures along with contingency plans for the heap leach.	February 2011	As Needed
PM10 Sampling & Meteorological Monitoring Plan	Utilized for PM10 monitoring during the first year of operation of the Fort Knox Mine.	April 1997	N/A
Fort Knox Mine Monitoring Plan	Describes monitoring procedures, analytes, and locations monitoring is completed for the entire site.	March 2008	As Needed
Fort Knox Mine Quality Assurance/Quality Control and Field Procedures Manual	Includes field and laboratory QA/QC procedures for environmental sample collection, chain-of-custody, shipment, and analysis.	March 2008	As Needed
Fort Knox Project Description	Integral part of the Plan of Operations for the site.	July 1997	N/A
Fort Knox Project	Includes the reclamation and closure	February 2011	PENDING

FGMI LIST OF FORT KNOX SPECIALIZED ENVIRONMENTAL PLANS

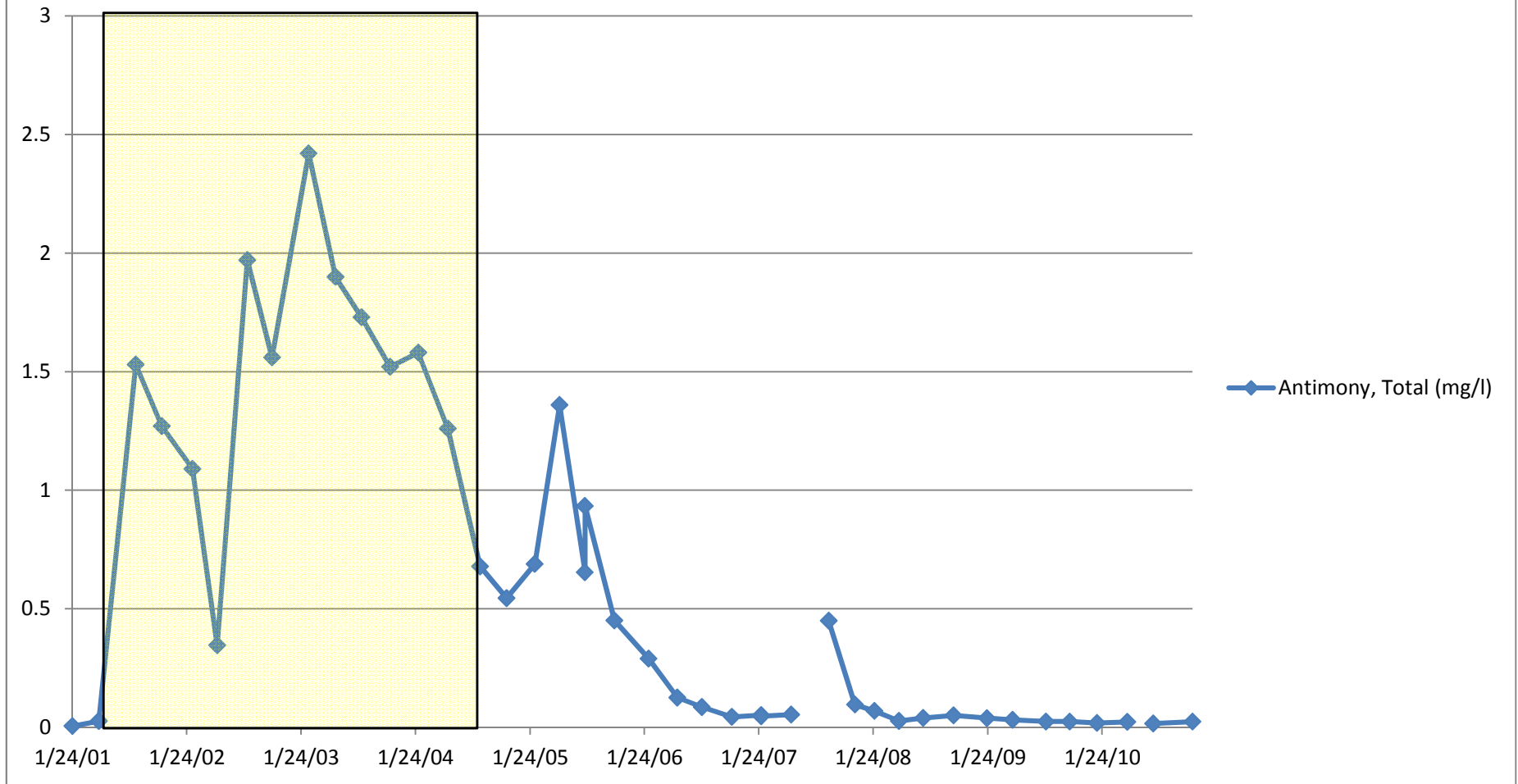
Reclamation Plan	plans for the entire site.		
Fort Knox TSF Closure Plan	Includes the reclamation and closure plans for the tailings facility	March 2011	As Needed
Fort Knox Heap Leach Closure Plan	Includes the reclamation and closure plans for heap leach facility	June 2006	As Needed
Fort Knox Pit Lake Model	Includes the reclamation and closure plans for pit.	February 2011	Annually
Fort Knox Storm Water Pollution Prevention Plan	Requirements to meet conditions of the Multi-Sector General Permit	April 2011	As Needed

Appendix E: Table and Graphs of Select Parameter Concentrations for Tailings Decant and Seepage Solutions

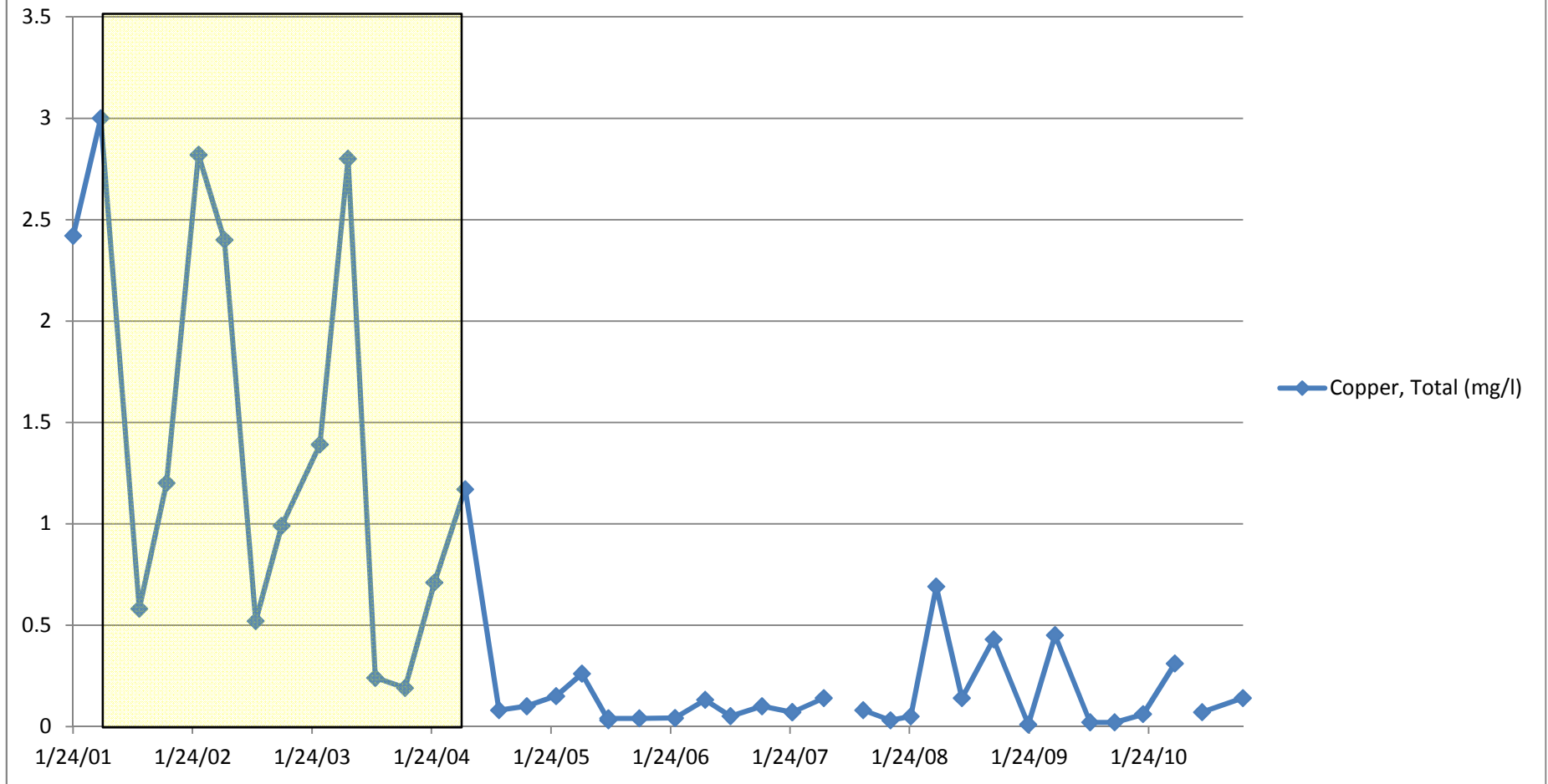
Comparison of Tailings Decant Chemistry In 2000 and 2010

Constituent	2010 Annual Report Surface Water Chemistry					2000 Tailing Decant Water Chemistry				
	10/12/2009	1/7/2010	4/14/2010	7/6/2010	11/8/2010	2/1/2000	4/19/2000	7/26/2000	10/23/2000	
pH	8.2	8.1	8.3	8.1	8.1	8	8	8	8	no change
Alk	75	75	87	73	65	75	66	55	41	Increase 127%
Sb	0.0244	0.0182	0.023	0.0163	0.024	0.0029	0.0028	0.0045	0.0039	Increases 600%
As	0.0166	0.0084	0.0125	0.0135	0.0213	0.012	0.015	0.028	0.014	no change
Ba	0.026	0.038	0.052	0.069	0.041	0.032	0.044	0.045	0.041	No change
Cyanide	0.073	2.01	1.25	0.101	3.6	0.06	0.53	0.41	0.16	Increases 485% (14% of permit limit)
Cd	<0.0001	<0.0001	<0.0001	<0.0001	0.132	<0.0005	<0.0005	0.009	<0.0005	No Change
Ca	52.7	49.6	55.1	48.8	50.8	104	133	152	125	Decrease 60%
Cl	28	20	29	27	43	30.7	34.8	28.7	23.5	No change
Cr	<0.01	<0.01	0.01	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	No change
Cu	0.02	0.06	0.31	0.07	0.14	0.35	1.81	1.17	1.12	Decrease 89%
F	0.6	0.3	0.6	0.6	0.7	0.29	0.31	0.3	0.23	Increase 198%
Fe	0.23	0.96	0.79	1.26	0.41	0.22	0.48	0.41	0.72	Increase 160%
Pb	0.0015	0.0015	0.0015	0.0038	0.0007	<0.002	<0.002	<0.002	<0.002	No change
Mg	6.5	7.1	6	4.8	4.6	7.05	5.61	4.09	5.1	Small increase 6%
Mn	0.099	0.196	0.137	0.107	0.073	0.132	0.048	0.024	0.05	Increases 193%
Hg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	No change
NH ₄	1.76	1.09	2.93	3.03	3.35	11	13	33.6	33.3	Decrease 89%
K	9.4	6.6	9.3	10.9	10.6	11.7	12.1	18.2	14	Decreases 31%
Se	0.0028	0.0019	0.004	0.0042	0.0062	<0.005	<0.005	<0.005	<0.005	no change
Si	7.1	6.4	8.8	9.7	8	5.3	5.3	7.8	7.2	no change
Ag	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	no change
Na	62.3	42.1	67.1	71	87.7	87.7	105	110	94	Decrease 33%
Sulfate	133	99	140	137	154	347	436	482	420	Decrease 68%
Zn	<0.01	0.02	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	No change
Nitrate	11	7.12	10.5	7	11.4	5	4.85	6.4	6.8	Increased 163%
Nitrite	1.11	0.37	0.32	0.72	0.89	0.93	0.78	0.77	0.43	Decreased 6%
Bi	<0.04	<0.04	<0.04	<0.04	<0.04	<0.02	<0.02	<0.02	<0.02	No change
TDS	380	310	420	380	450	800	940	990	840	Decrease 56%

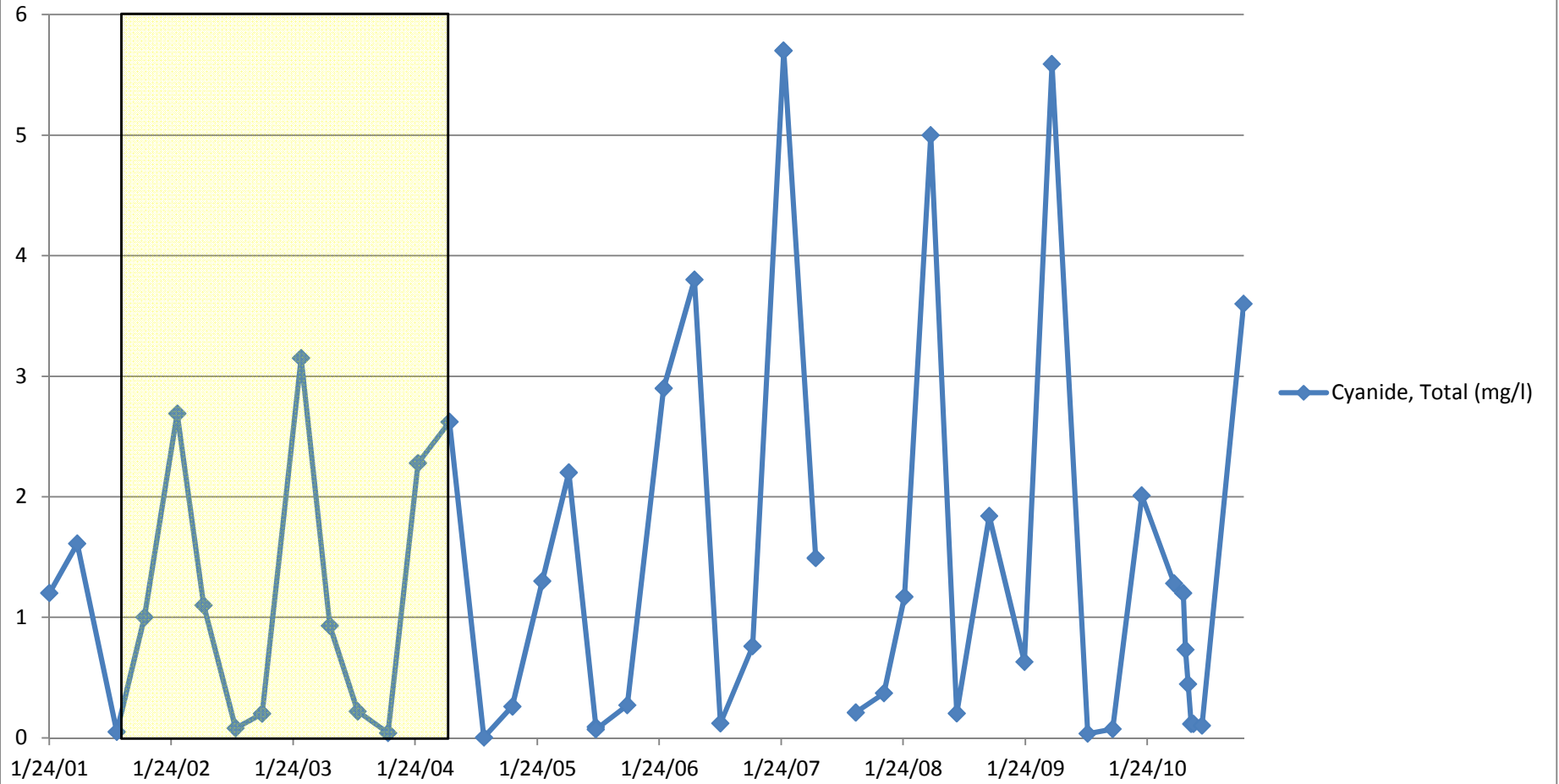
Antimony, Total (mg/l)



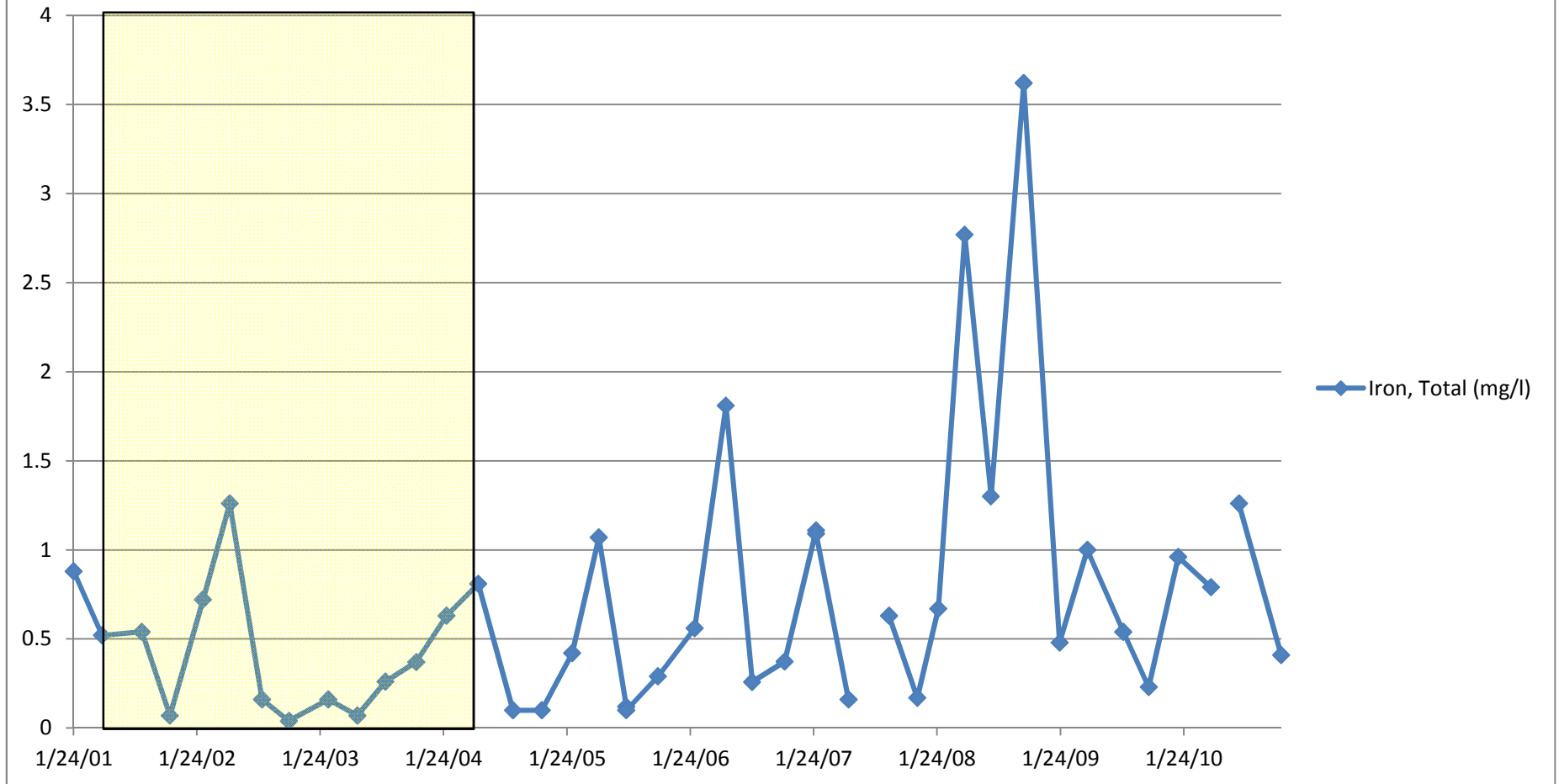
Copper, Total (mg/l)



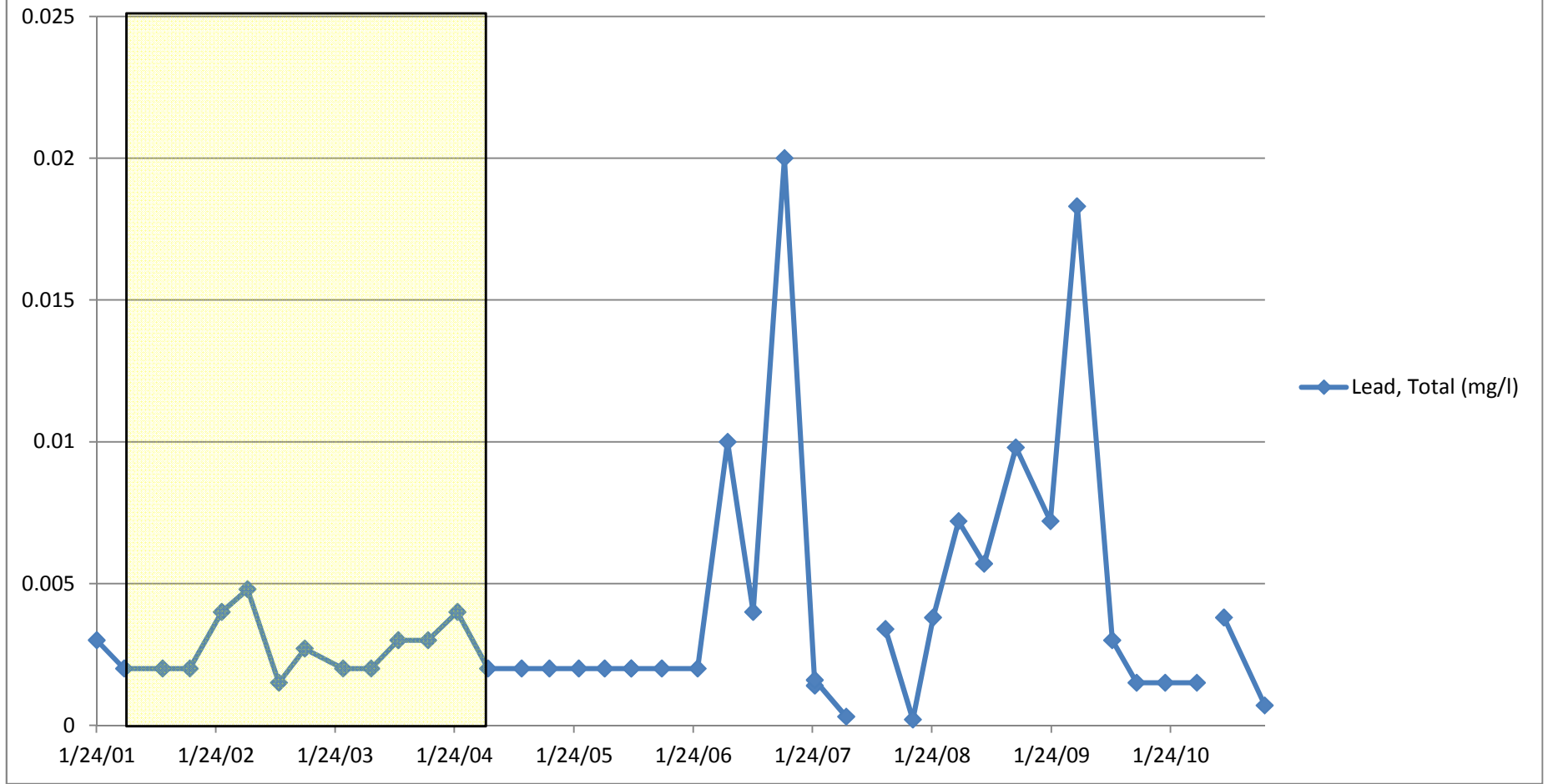
Cyanide, Total (mg/l)



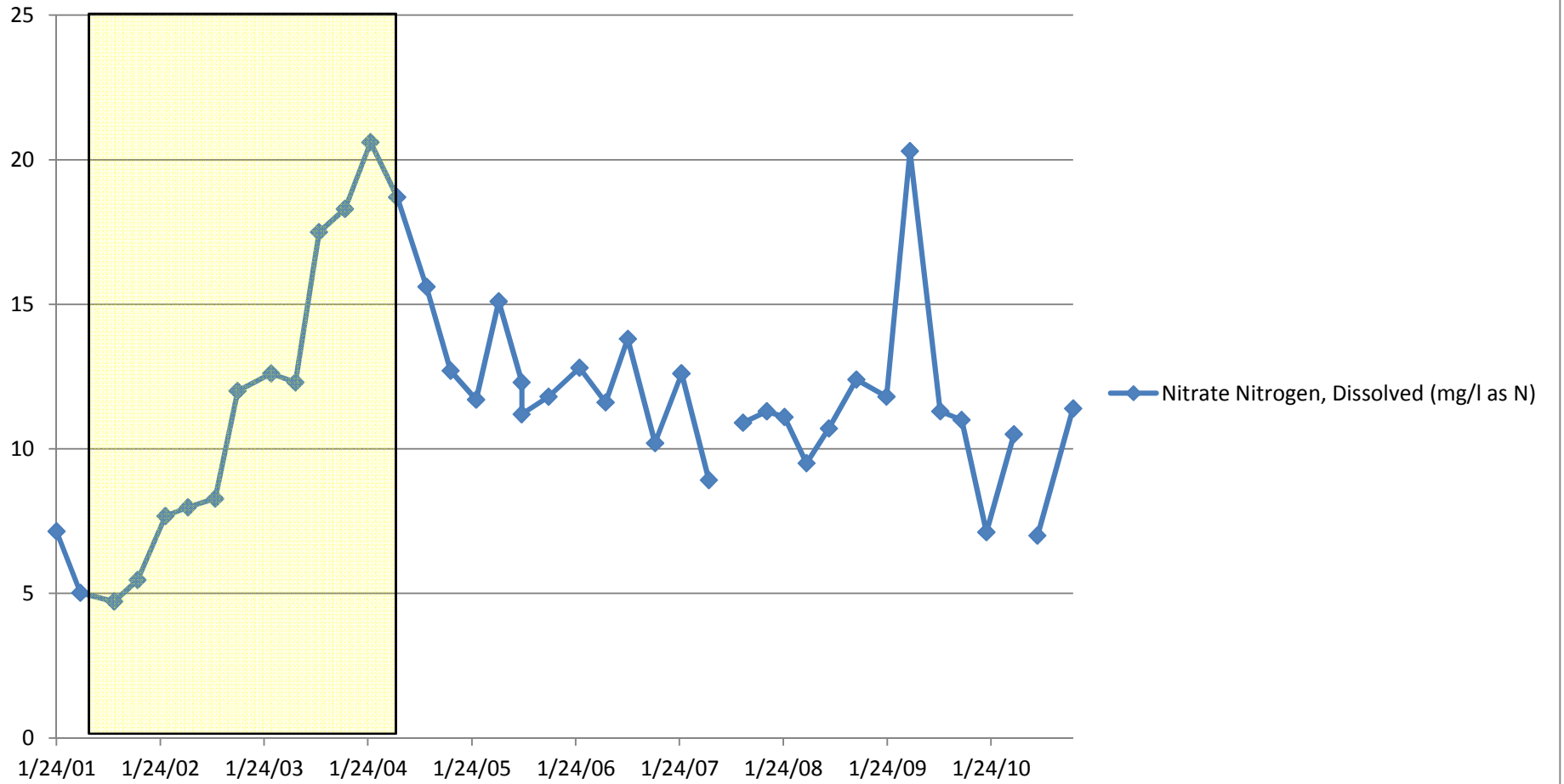
Iron, Total (mg/l)



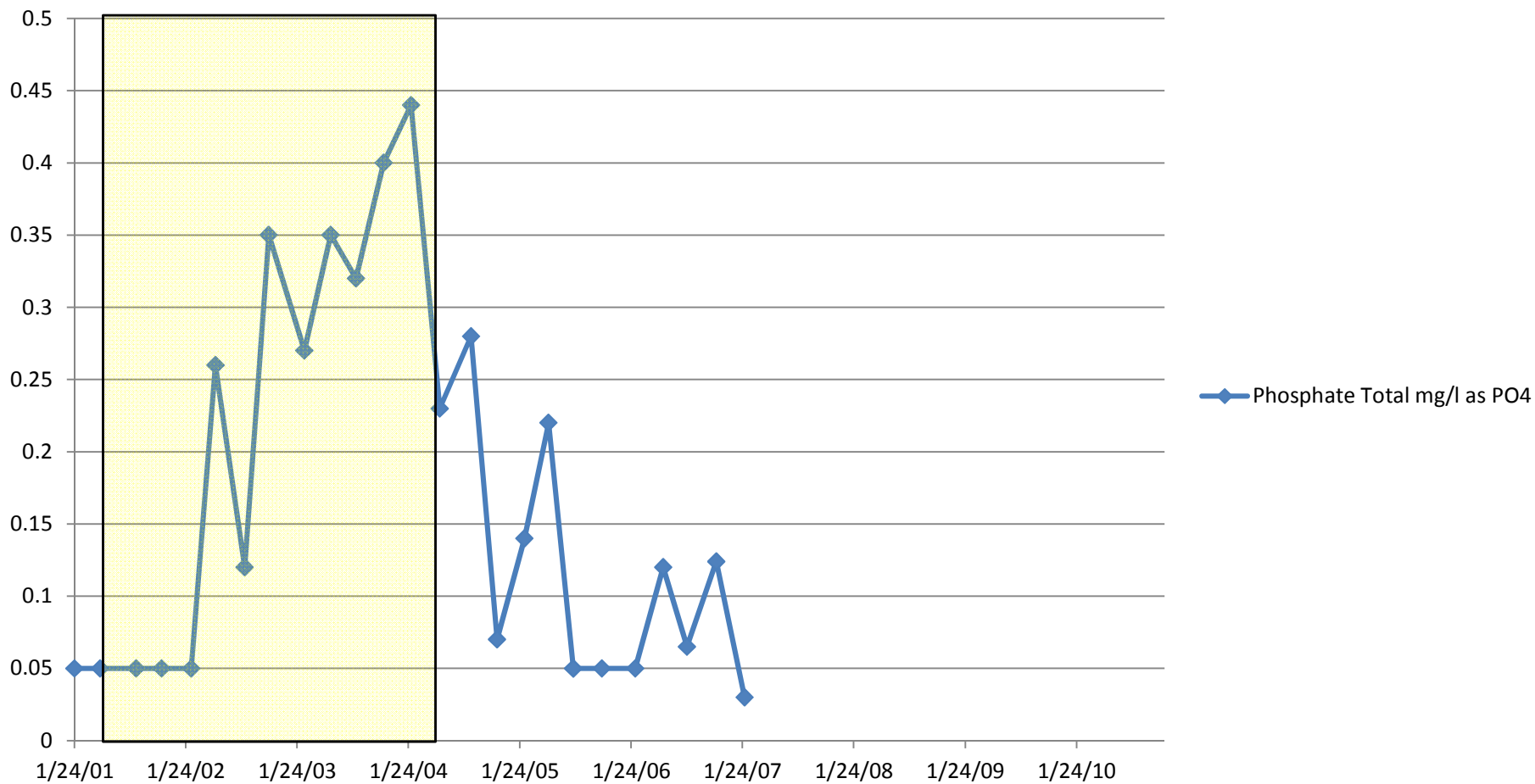
Lead, Total (mg/l)



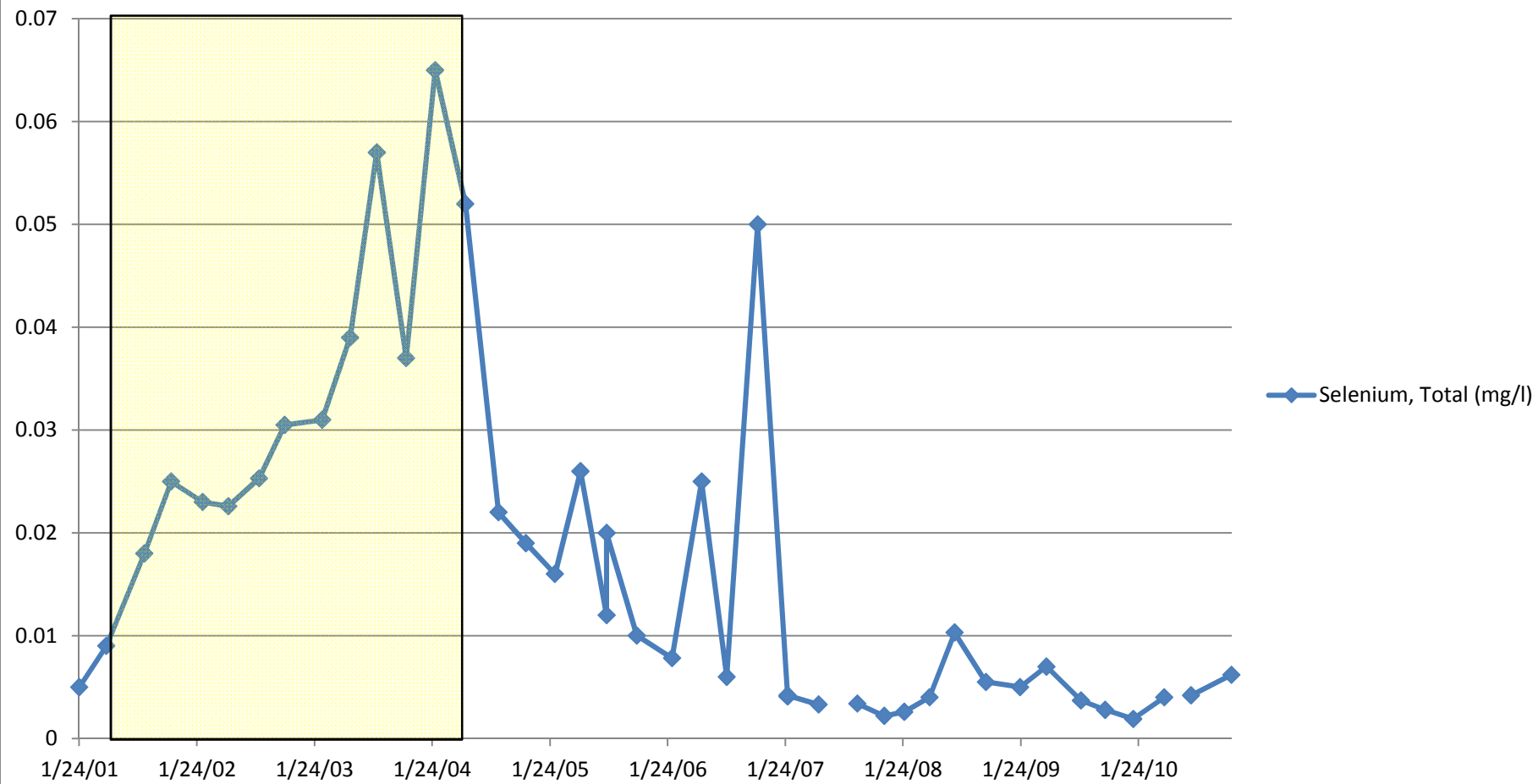
Nitrate Nitrogen, Dissolved (mg/l as N)



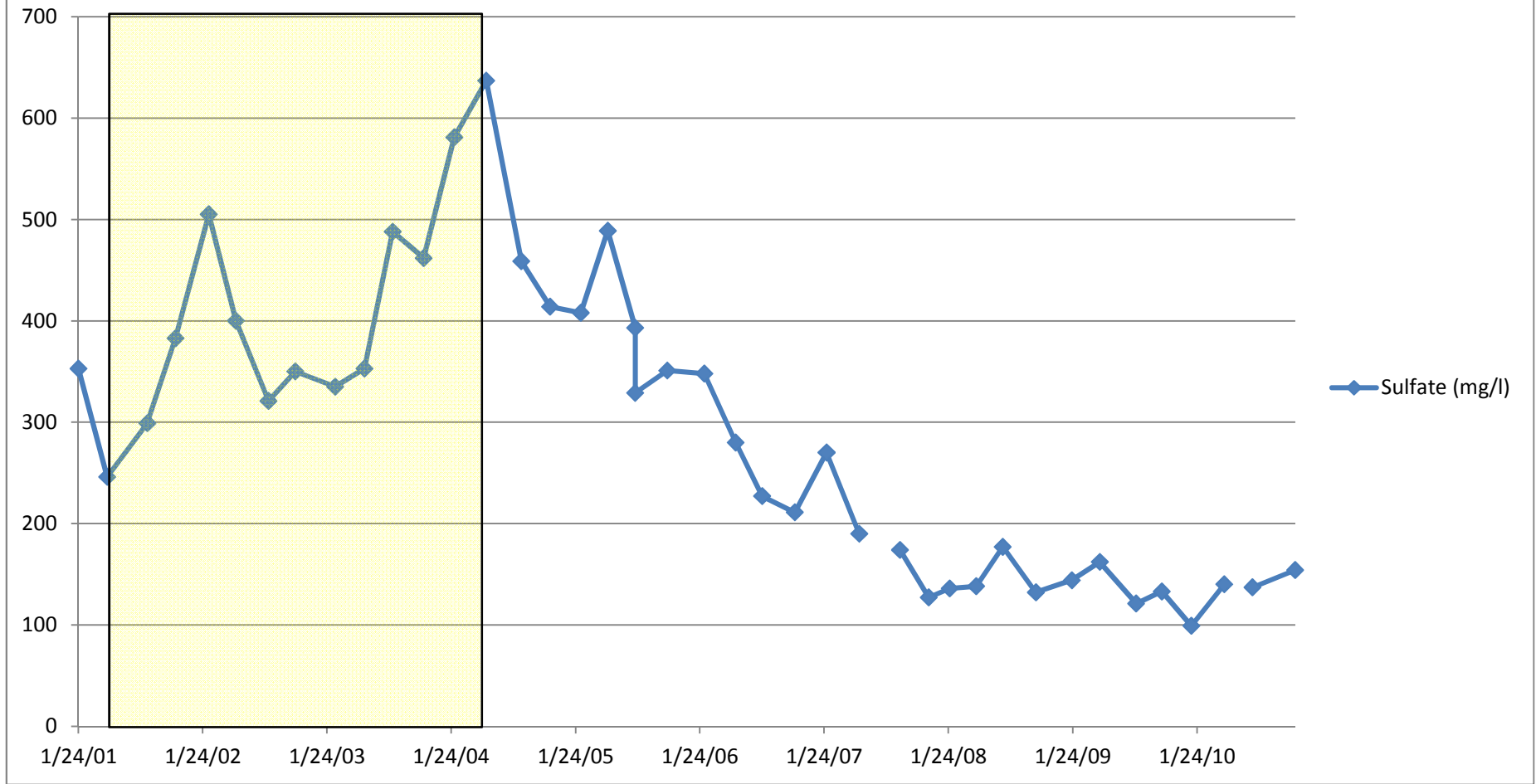
Phosphate Total mg/l as PO4



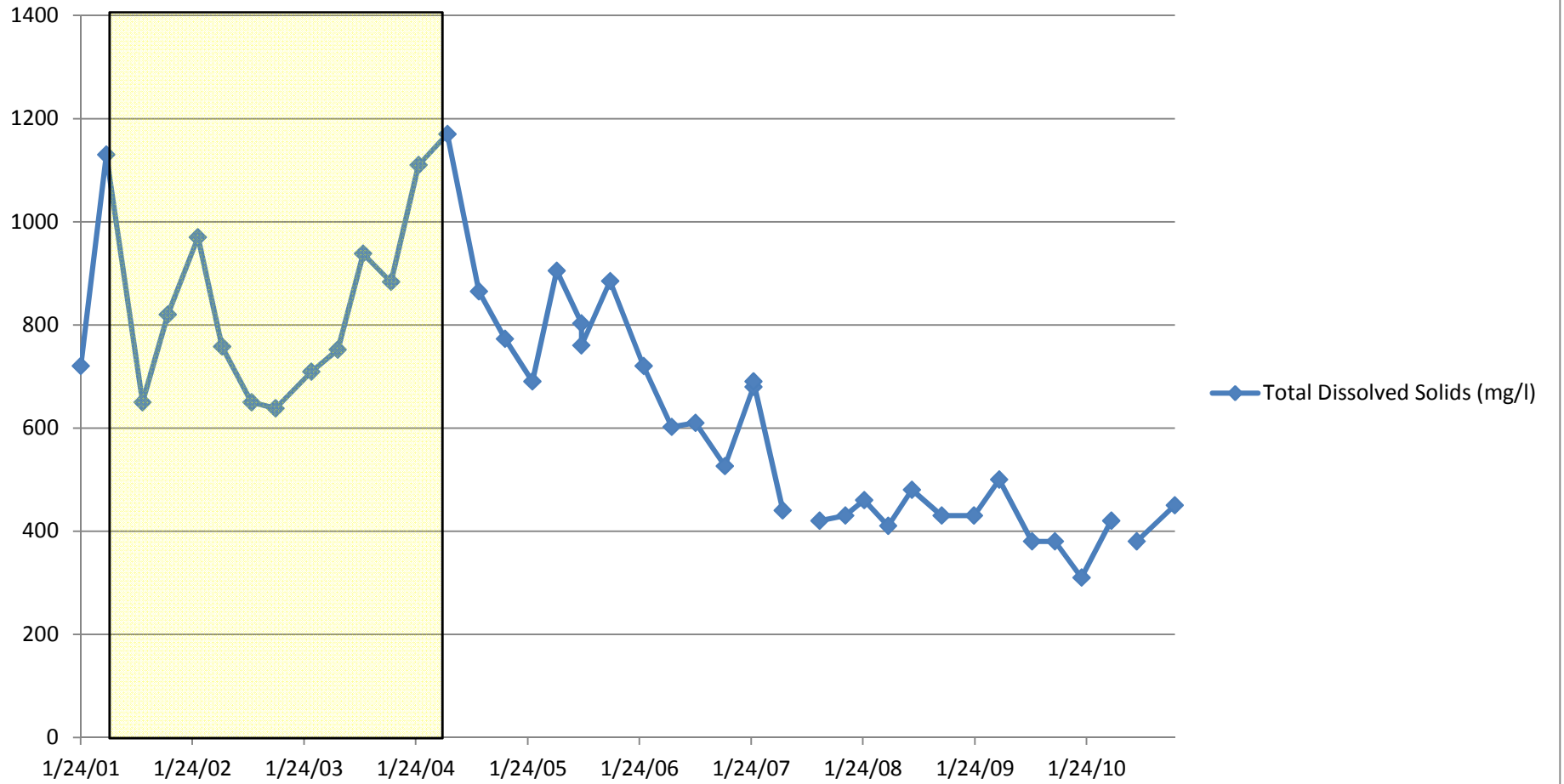
Selenium, Total (mg/l)



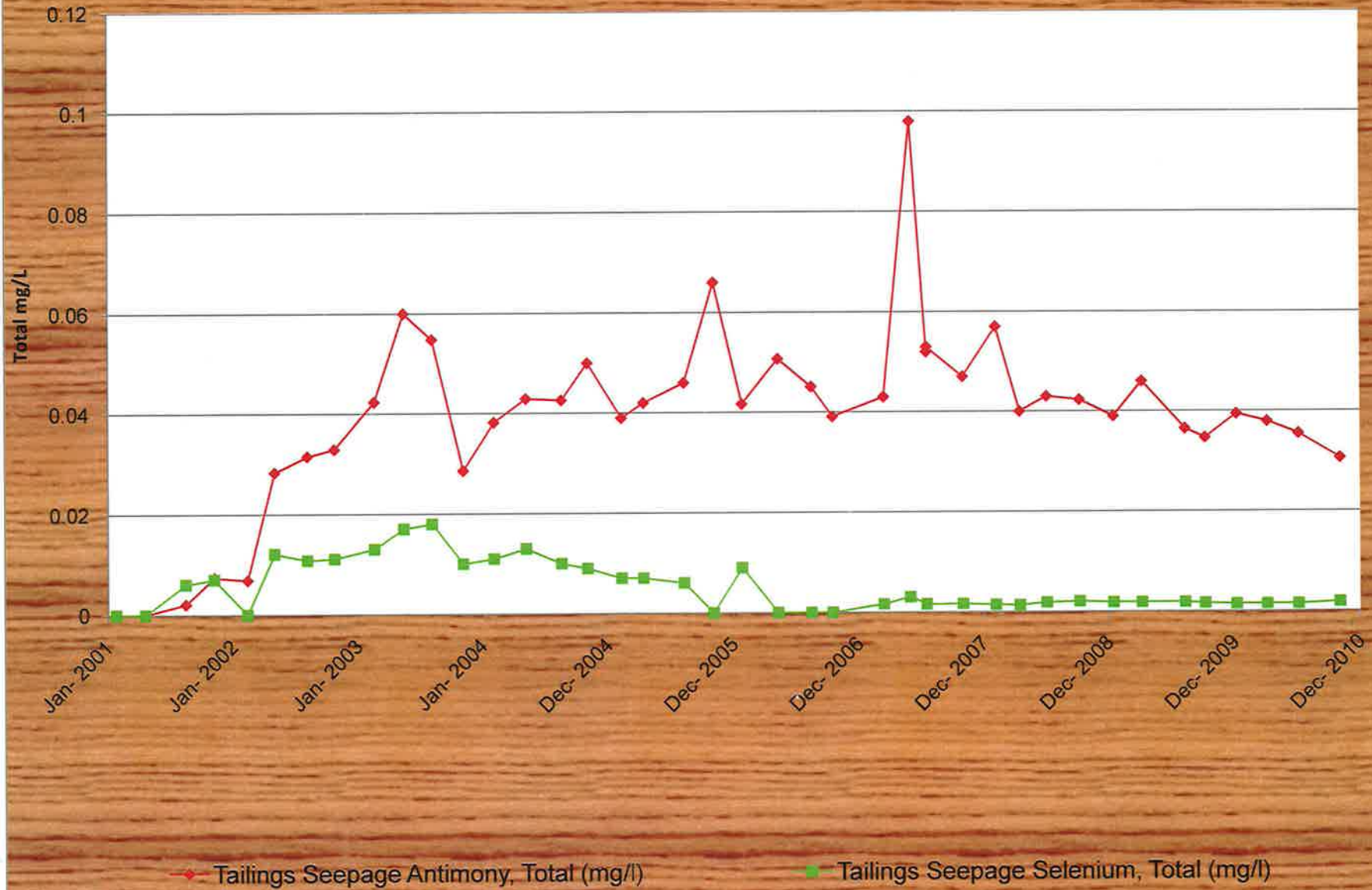
Sulfate (mg/l)



Total Dissolved Solids (mg/l)



Tailings Seepage Metals Antimony, Selenium



Source" FGMI 2010 Annual Monitoring Report