GENERAL PLAN OF OPERATIONS

APPENDIX 3
Tailings Disposal Facility Management Plan

June 2014

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ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
APDES	Alaska Pollutant Discharge Elimination System
ARD	acid rock drainage
EA	Environmental Assessment
FEIS	Final Environmental Impact Statement
GPO	General Plan of Operations
HDPE	high-density polyethylene pipe
HGCMC	Hecla Greens Creek Mining Company
IMP	Integrated Monitoring Plan
KCB	Klohn Crippen Berger, Ltd.
MSHA	Mine Safety and Health Administration
NEPA	National Environmental Policy Act
QA	assurancequality
QC	quality control
SOP	Standard Operating Procedure
TDF	Tailings Disposal Facility
USDA	United States Department of Agriculture
USFS	United States Forest Service
WMP	Waste Management Permit

1.0 INTRODUCTION

Operation of the Greens Creek Mine is carried out by Hecla Greens Creek Mining Company (HGCMC) in accordance with the General Plan of Operations (GPO) approved by the United States Forest Service (USFS), hereafter referred to as the Forest Service. The GPO is divided into appendices which describe the management activities conducted at the Greens Creek Mine, the location and timing of those activities, and how the environment and resources in the area are protected through compliance with federal and state requirements. This document, GPO Appendix 3 Tailings Disposal Facility Management Plan, provides information on the management objectives, operations, and monitoring and inspection requirements for the Greens Creek Mine Tailings Disposal Facility (TDF).

Table 1. RECORD OF CHANGES AND AMENDMENTS

Date	Section(s) Changed or Amended
August 2000	Submittal by Kennecott Greens Creek Mining Company
April 2004	Submittal by Kennecott Greens Creek Mining Company Revisions associated with the Record of Decision and Final Environmental Impact Statement (FEIS) supporting an expansion of the tailings disposal facility (Stage 2 expansion). Updated pertinent information and references (USFS 2003).Acknowledged criteria associated with 2003 Waste Management Permit identifying a total projected tailings footprint area of 62.2 acres.
February 2014	Submittal by Hecla Greens Creek Mining Company. Revisions associated with Record of Decision and FEIS supporting an expansion of the tailings disposal facility (Stage 3 expansion). Updated pertinent information and references (USFS 2013).

* The original GPO was developed in 1984, with GPO revision in 1996 under a previous owner/operator.

Certain areas of the mine's operation are subject to federal and state permits and approvals issued by other federal and state agencies. The State of Alaska Department of Environmental Conservation (ADEC) regulates mill tailings and waste rock disposal facilities at the Greens Creek Mine as well as other aspects of the operation primarily through Title 18 of the Alaska Administrative Code (AAC), Chapters 50, 60, 70, 72 and 80. ADEC's Waste Management Permit (WMP) authorizes tailings and waste rock disposal and prescribes monitoring, reporting,

closure, post-closure and financial responsibility requirements. The Forest Service has issued special use permits and leases for various aspects of the operations.

Closure requirements for the Greens Creek Mine, including temporary and permanent closure, are described in more detail in GPO Appendix 14 (Reclamation Plan). The Alaska Department of Natural Resources (ADNR) regulates the reclamation of the TDF, by issuing the Reclamation Plan approval for the entire site, including the tailings and waste rock disposal sites 11 AAC 97.310. The Forest Service also sets requirements for reclamation. Permits and authorizations are further discussed in Section 2.1.

Objectives associated with the TDF management consider risk due to potential acid rock drainage (ARD) and metals leaching, and geotechnical stability, all of which can potentially create adverse environmental conditions. These risks are evaluated with respect to local hydrology, climate, geochemistry, and other associated factors to ensure the employment of practices best matched to site-specific conditions while providing the operational flexibility to incorporate systems improvement. Specific aspects of the operational practices used to achieve management objectives outlined in this document are presented in the TDF standard operating procedure (SOP) provided in Attachment A. The SOP format allows flexibility for regular updates as site conditions and needs change. Modifications to the SOP are summarized in the annual report, and as substantial modifications are identified which may affect the WMP, this GPO appendix is updated through coordination with the USFS and ADEC. If there is a conflict between this GPO and the regulations or the WMP, then the regulations or the permit, as the case may be, take precedence unless otherwise specified.

2.0 BACKGROUND

The mill at the Greens Creek Mine generates approximately 1,800 dry tons of filter-pressed tailings per day, or approximately 650,000 tons of tailings annually. These tailings are dewatered in a filter press at the mill, with about 50% of the tailings being mixed with cement and hauled back into the underground mine for disposal in mined-out areas as mine backfill. The remaining 50% of the tailings are trucked from the mill on the B road and placed in a surface disposal area (TDF). The TDF is situated near Hawk Inlet (refer to Attachment B, Figures 1 and 2). Placement utilizes dry-stack tailings disposal techniques (refer to Attachment A, SOP).

Standard development and placement methodologies at the existing tailings area have been reviewed and established, and will be continued for future construction activities. All designs for expansion and placement since 1998 have been accomplished by Klohn Crippen Berger Ltd. (KCB). Design processes address foundation, operations, and closure geotechnical stability factors, as well as water management. Construction plans are submitted to agencies for approval prior to implementation of expansion efforts.

A summary of the TDF historical waste placement areas is provided in Attachment B, Figure 3. Refer to the Greens Creek Mine annual reports for further details.

2.1 Permits and Authorizations

The Forest Service and the ADEC regulate the TDF. Additionally, under the ADEC APDES program, the marine outfall used for discharge of waters from the water treatment facility is permitted. The ADNR-Mining Section issues the Reclamation approval for the tailings facility, and ADNR Dam Safety issues the Certificate of Approval to operate the water treatment facility Pond 7 dam. The USFS also sets requirements for reclamation. For a complete summary of federal, state, and local agencies involved in the permitting approval processes for Greens Creek Mine, refer to the 2013 Final Environmental Impact Statement (USFS 2013).

NEPA/EIS Processes

The initial FEIS for Greens Creek Mine was completed in 1983 (USFS 1983). Eight alternatives were identified in the 1983 FEIS with number six being selected as the preferred alternative. Under the preferred alternative, tailings generated by the milling process would be transported and disposed as slurry into a settling pond within a 150 acre tailings basin.

In 1988, two major changes were introduced by then Greens Creek Mine ownership regarding development and operation of the mine. The proposed changes were addressed in the 1988 Environmental Assessment (EA) for Proposed Changes to the General Plan of Operation for the Development and Operation of the Greens Creek Mine (USFS 1988). Under the EA proposed action alternative, tailings generated by the milling process would be dewatered at the mill site and transported by truck to a smaller dry tailings basin. Wastewater from the mill site would be transported through an eight-inch, single-walled, high-density, polyethylene (HDPE) pipeline to a 3.5 acre settling pond within the tailings basin. The Greens Creek Mine TDF was constructed according to guidelines consistent with the 1988 EA Decision Notice (USFS 1988).

Greens Creek Mine applied for an expansion of the existing TDF in January 2001, the expansion area was referred to as the Stage 2 expansion area. The Forest Service issued a Record of Decision on October 24, 2003 which approved the expansion of the TDF area using Alternative C in the FEIS (USFS 2003). With approval of the expansion based on a thorough National Environmental Policy Act (NEPA) review, Greens Creek Mine updated the GPO Appendix 3, Tailings Disposal Facility Management Plan. The subsequent revision of this GPO was undertaken concurrent with the renewal of the Waste Management Permit.

In late 2010, Greens Creek Mine under the ownership of HGCMC applied for further expansion of the TDF; the expansion area was referred as the Stage 3 expansion area. The Forest Service issued a Record of Decision on August 30, 2013, which approved the expansion of the TDF area using Alternative D with modifications as described in the Record of Decision and FEIS (USFS 2013). This decision allows for expansion of the TDF south of the existing facility to accommodate an additional 10 to 15 years of tailings disposal. The decision also allows for quarry rock site

development, reclamation material storage site development, and expanding the existing wastewater management pond (Pond 7).

ADEC Solid Waste Management Processes

The ADEC determined on July 26, 1999 that tailings placed in the TDF are subject to the 18 AAC 60, Solid Waste Management regulations, which included the need to acquire a Waste Management Permit (WMP). Mining waste is regulated under the monofill standards, Article 4 (18 AAC 60.455), which allows ADEC discretion to incorporate applicable provisions of 18 AAC 60 into a WMP. A waste that is not specifically addressed in Article 4 (i.e. tailings) will be classified by the ADEC and assigned the most applicable waste category.

The WMP contains applicable provisions of Article 1 and 2 (18 AAC 60.010 to 60.265) that have to do with general standards, limitations, prohibitions and administrative procedures to be followed by every disposal facility regulated under the chapter. Additionally, the WMP will apply relevant locational, operational, and design related requirements from the monofill standards in Article 4 (18 AAC 60.400 to 60.495.) The monofill requirements also include closure and post-closure plans, notifications, monitoring and reporting..

Furthermore, the Greens Creek Mine facilities are subject to Article 6 (18 AAC 60.700 to 60.730), user fees and Article 7, monitoring and corrective action requirements (18 AAC 60.800 to 60.865). In Article 7, monitoring requirements specify visual, surface water and groundwater requirements. Detection monitoring, and if necessary, assessment monitoring is also required under Article 7. Specific inspection and monitoring requirements are detailed in Section 3.0 of this document. Lastly, the facilities at Greens Creek Mine are open to waivers to any provision of the chapter under 18 AAC 60.900.

2.2 Tailings Characterization

The geochemical characteristics of tailings affect the design, operation, monitoring, environmental performance, and eventual closure and reclamation of the dry stack tailings disposal site. Given that the Greens Creek Mine ore is from a high-grade sulfide-hosted polymetallic deposit, pyritic

sulfur levels are elevated in the tailings. mineralogy and geochemical studies have established the nature of tailings material.

Material weathering characteristics and classification of acid generating and/or neutralization potential are discussed in the Greens Creek Mine GPO Appendix 1, Integrated Monitoring Plan (IMP) (HGCMC 2012). Inspections and monitoring requirements for the tailings facility, including water levels, water quality, and geochemical testing of the tailings and production rock, are described in the IMP.

ABA analyses on tailings indicate that they are acid generating (HGCMC 2012; Petros 2011). However, the high carbonate content of the tailings indicates there is substantial buffering capacity remaining in the tailings. These results remain consistent with previous studies of the mine's tailings. Samples of weathered tailings (after approximately 12 years of exposure) have been shown to still retain a considerable amount of neutralization potential, equivalent to approximately 20% calcium carbonate. This suggests that the potential lag time to acid generation of exposed tailings is on the order of decades. This long lag time allows time for construction and adequate closure of the site (including covering the pile with a composite soil cover designed to minimize oxygen ingress). Actual oxidation rates are likely to be much less under field conditions due to passivation of reactive surfaces, reduced oxygen supply, and lower temperature.

Under the neutral pH conditions, concentrations of metals (particularly zinc) can be released in a soluble form into water that contacts the tailings. To a lesser degree, other metals such as cadmium, nickel, lead, and metalloids (selenium and arsenic) are found in water that infiltrates through tailings.

3.0 TAILINGS DISPOSAL FACILITY MANAGEMENT

HGCMC manages the TDF under its Surface Operations Department. Management responsibility will transfer to the Environment Department upon completion of closure activities. Wastes that may be disposed of in the TDF are defined by the WMP. Per the 2003 WMP (ADEC 2003), the following wastes are acceptable; note, this list may change with the pending 2014 WMP – refer to the most recent WMP for updates:

- mill tailings;
- production rock;
- up to 5% of waste may be non-hazardous incidental wastes including:
  - settled solids from sumps, ditches, degrits
  - settled solids from the water treatment plant
  - dewatered sewage sludge
  - incinerator ash/residue
  - ash from wood/cardboard waste
- production or salvage rock for internal roads and erosion control at surface; and
- other types require written approval from land manager (Forest Service) and the ADEC.

Facility management also includes implementing management controls to maintain surface and ground water quality. This requires a thorough understanding of the site water balance. Site water balance components are periodically evaluated through modeling the primary elements of the mine that include the underground mine, the mill, the TDF, the TDF water treatment plant, and the Hawk Inlet Camp water treatment plant (EDE 2010).

Attachment B, Figure 2 includes the 2013 TDF as-built for reference; refer to HGCMC annual reports for the most recent facility as-built.

3.1 Management Objectives

HGCMC plans, designs, constructs, operates, monitors and will eventually close the TDF with the intent of meeting the following management objectives:

- Construct facility expansions per approved construction drawings.
- Safely receive approved waste material within the designed TDF capacity constraints during the operational period of the mine.
- Minimize run-on water from entering the TDF from upgradient sources.
- Maintain water management system components as designed with an understanding of geochemical and hydrological processes. Control surface water, ground water, and interior facility waters in order to prevent offsite water quality impacts.
- Minimize fugitive dust impacts from the TDF operations to surrounding land and wetland areas.
- Maintain pile geotechnical stability (short-term and long-term).
- Reduce impacts to the receiving environment and ultimately return the land to natural use.

3.2 Surface Operations

HGCMC surface operations place tailings in the facility using specific criteria established by KCB in 1999 for the placement of tailings in the TDF (KCB 1999). Criteria include:

- Tailings shall be placed in a cellular format and the pile is divided into a number of cells.
- New tailings shall not be placed on uncompacted saturated tailings,
- Tailings shall be placed in small areas, one or two adjacent cells at a time.
- The tailings shall be placed in lifts and immediately compacted with a smooth drum roller to a Standard Proctor Density of no less than 90%. If the tailings cannot be placed and compacted upon arrival at the tailings facility, they shall be stockpiled to minimize any additional moisture absorption during wet periods, or drying during warm periods. The tailings shall be handled such that specified placement densities are achieved,

- The top surface of the cells shall be graded away from access roads to ensure surface water runs off, and compacted with a smooth drum roller to minimize infiltration from ruts or indentations,
- Placement shall then continue at another location/cell to allow time for any construction pore pressures, which may exist in the originally placed tailings, to dissipate, and,
- Construct with compacted outside side slopes that are no steeper than 3H:1V. Slopes during operation may be less than 3:1 if future operation or slope work is planned, or HGCMC receives approval for steeper slopes provided pile stability requirements are met.

HGCMC has established a SOP based on the specific criteria established by KCB and with the intent of achieving the TDF management objectives presented in Section 3.1. A copy of the SOP is provided in Attachment A.

HGCMC uses off-highway, lidded trailer trucks to transport the tailings to the surface placement area. Temporary access roads are constructed as required to access the placement areas. The material is end dumped, spread and compacted using a bulldozer, followed by compaction with a smooth-drum vibratory compactor. Compaction checks are typically performed using a water balloon method and field samples are collected for moisture determination by the HGCMC lab to confirm the resultant performance in the placement area. Proper placement requires achievement of 90 percent or greater compaction relative to a standard Proctor density.

HGCMC places tailings into discreet cells at the tailings disposal facility to provide for better control over compaction, drainage control, and pore-pressure dissipation. The term cell is used to refer to relatively small areas within the tailings facility, and they are established on a grid pattern as part of the onsite engineering and management of the facility. Due to the limited placement area, lifts are adjusted to maximize cell placement and slope consistency. Placement then progresses to another area. This provides time for the dissipation of any construction pore pressures that may have built up in the originally placed tailings.

Water management at the facility consists of a complex network of drains under the pile, bentonite slurry walls around the perimeter of the site, and ditches to divert up-slope water and collect surface

runoff. The site is underlain by a low permeability silt/clay till and other glacial/marine deposits or an engineered HDPE liner. These features minimize the potential for the downward migration of contact waters. An upward hydrologic gradient under portions the site further aids in contact water collection.

Codisposal practices at the TDF have been approved by the agencies (HGCMC 2009). Codisposal refers to the placement of a mixture of waste rock and tailings. The primary purpose of codisposal is to reduce pyrite oxidation and metal leaching from waste rock by surrounding it with a matrix of fine-grained material (tailings). The geotechnical, geochemical and operational aspects of codisposal have been studied, and the results demonstrate that codisposal of waste rock and tailings will significantly improve the drainage quality at uncontained inactive waste rock sites by relocating this material to the TDF, without negatively impacting tailings drainage compositions, and can be done in a manner that minimizes effects on the environment.

3.3 Monitoring and Inspections

All monitoring shall be conducted in accordance with the WMP, 18 AAC 60.820-860 (surface water and ground water), GPO Appendix 1, IMP (HGCMC 2012). GPO Appendix 1 contains information regarding water quality compliance monitoring, including monitoring requirements, test procedures, frequency, parameters, field procedures, and QA/QC plans.

Visual observations and material sampling are used to ensure that construction of the facility is according to approved construction plans. Monitoring hub, inclinometer, piezometer and topographic survey data are used in conjunction with engineering assessments to determine if the site is stable in the short and long term. Visual observations and routine maintenance ensure that the water management system is functioning as designed. Water quality data, flow and level monitoring, material sampling and information from site meteorology stations are used to define geochemical and hydrologic processes occurring at the site. This information is evaluated with respect to design expectations, and modifications are made, if necessary, to minimize effects on the receiving environment in the short and long term.

Monthly visual checks of the facility are performed when operations are in process, using an inspection checklist (refer to Attachment C). Daily and weekly visual inspections are made routinely as part of operation for which an inspection checklist is not required or used. A person who is familiar with the WMP requirements conducts the inspection. Visual monitoring is conducted on routine facility operations, leachate collection and diversion systems, leachate pumping systems, and the facility perimeter, where possible. Structural changes or leakage noted during the inspections shall be documented. Visual monitoring shall include but may not be limited to the following:

- signs of damage or potential damage to any component of the facility from settlement, ponding, leakage, thermal instability, frost action, erosion, slip failure, thawing of the waste, or operations that contribute to a problem;
- exceptions to conditions of the waste management permit;
- escape of waste or leachate;
- unauthorized waste disposal;
- damage to the structural integrity of a monitoring device, containment or seepage structure; retaining wall, erosion control or diversion structure; and,
- evidence of death or stress to fish, wildlife, or vegetation caused by the facility.

Any structural change in or damage to the facility, or any exception to the waste management permit conditions observed during the visual monitoring program shall be reported to the ADEC within 10 days and appropriate action shall be taken to correct the exception or damage, prevent the escape of waste or leachate, and clean up any improper waste disposal. The USFS should also be notified timely.

HGCMC submits annual reports on the TDF to the ADEC per WMP requirements, and the Forest Service in consideration of the GPO. These reports include:

- an as-built topographic survey (in plan and cross section);
- a running total of tailings and other materials placed at the site and a current remaining

volume estimate;

- a summary of piezometer readings;
- a summary of key activities, observations, problems and corrective actions;
- a summary of water and tailings monitoring, including a description of the geochemical and hydrological processes occurring at the site; and
- a summary of pertinent reclamation/closure activities and studies.

The waste management permit includes a summary table of all reporting items in the reporting requirements section.

4.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC) Division of Air and Water Quality, Waste Water Discharge Program. *Waste Management Permit 0211-BA001, Kennecott Greens Creek Mining Company*. November 7, 2003.

Environmental Design Engineering (EDE) Consultants. *Hecla Greens Creek Mine 2010 Site Water Balance.* Prepared for HGCMC. February 2010.

Hecla Greens Creek Mining Company (HGCMC). *Site E Removal and Waste Rock\ Tailings Co-Disposal Plan*, April 14, 2009.

HGCMC GPO Appendix 1. *Integrated Monitoring Plan (IMP).* Prepared by HGCMC in consultation with SRK Consulting. 2012.

Klohn Crippen Berger Ltd. (KCB), Kennecott Greens Creek Mine – Evaluation of Tailings Pile, Final Report, July 1999.

Petros GeoConsulting. *2011 Greens Creek Mine Stage III Tailings Expansion Drainage Geochemistry Assessment.* Report from Petros GeoConsulting Inc. to HGCMC. August 22, 2011.

United States Forest Service (USFS). *Greens Creek Final Environmental Impact Statement (FEIS).* Alaska. Region. Admin. Doc. Number 115. January. 1983

USFS. *Environmental Assessment (EA) for Proposed Changes to the General Plan of Operation for the Development and Operation of the Greens Creek Mine, Admiralty Island National Monument, Alaska. Chatam Area, Tongass national Forest*. March 1988.

USFS. Tongass National Forest R10-MB-482a.*Greens Creek Tailings Disposal – Final Environmental Impact Statement (FEIS).* November 2003.

USFS, R10-MB-744c. *Greens Creek Mine Tailings Disposal Facility Expansion, Final Environmental Impact Statement and Record of Decision. Tongass National Forest, Admiralty Island National Monument, Juneau, Alaska.* September 2013.

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ATTACHMENT A

TAILINGS DISPOSAL FACILITY

STANDARD OPERATING PROCEDURE

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Tailings Disposal Facility Standard Operating Procedure

Hecla Greens Creek Mining Company (HGCMC) uses the following operational procedures for the tailings disposal facility:

General Requirements

- Only those wastes approved in the Waste Management (WMP) will be disposed of at the facility.
- Facility expansions shall be per agency approved construction design drawings and specifications, within the permitted lease boundary and footprint approved by the USFS. Expansion designs shall be adequate to ensure geotechnical stability.
- Best management practices shall be utilized with regards to storm water and sediment management (refer to GPO Appendix 5).

Safety

- Conduct operations per HGCMC and MSHA safety standards. This includes:
  - Safety berms per MSHA standards.
  - Adequate lighting for night operations.
  - Proper signage for traffic .
  - Radio or visual contact with site operator.
  - Awareness of uneven surfaces, slips trips and falls.

Site Access

- Construct internal access roads on the surface of the tailings material with quarry rock, waste rock, or tailings to access placement areas. These roads are known as "dirty roads" and are needed to prevent rutting of tailings material, particularly during wet weather. The number and extent of internal cross roads vary given cell size and weather conditions. Successful compaction supports truck traffic (particularly in dry weather) making it practical to limit the number of crossroads; however, during wet weather, cross roads are used.
- Recover road rock where practical for use in new road construction. If areas of rock cannot be recovered, ensure they are isolated from connection to surface drainage by at least two feet of tailings or codisposal material.
- Require vehicles to remain on dirty roads and trafficable areas on the tailings pile and to pass through a truck wheel-wash facility prior to leaving the facility and accessing a clean road or the B road. This prevents tracking of tailings material away from the contained facility.
- During winter/freezing conditions, the truck wheel-wash is not used due to safety restrictions including potential for creating icy roads and creating a situation where the brakes of the trucks may freeze. Instead, operations ensure that the roads are in good

condition within the tails facility with the intent of keeping tailings off the rock roads. The truck tires have minimal potential to pick-up and transport/track tails materials with the frozen conditions, and operations monitors by visual observations.

Placement Methods

- Placement methods are designed to minimize water infiltration, sediment runoff, oxygen intrusion, and potential for development of acid rock drainage conditions. Per 18 AAC 60.485(c), construct outer slopes at a minimum of 3H:1V to ensure slopes are stable and do not erode or slough.
- Placement cells are defined as placement areas and generally do not exceed 2500 to 3000 sf with average dimensions of 250-ft x 100-ft. Prior to actual tailings placement, ensure that positive surface drainage is secured for each cell to prevent water pooling or ponding. And that during winter , snow has been removed from the placement area.
- Deliver tailings from the mill with moisture content of around 10 to 12%. Alternative moisture contents may be accepted based on material properties and ability of placement methods to meet compaction standards.
- Spread tailings in approximate one-foot lifts on the near flat areas that have been graded for drainage and compact by several passes with a bulldozer, followed by at least two overlapping passes of the vibratory roller (compactor). This compaction is designed to promote runoff, reduce the potential for oxygen and water infiltration, and ensure geotechnical stability. Tailings are graded for drainage to prevent water pooling or ponding.
- Placement will routinely shift from cell to cell to allow dissipation of construction pore pressures.
- Compaction in placement areas will be verified by field measurements of wet density used to calculate the dry unit weight after determining the moisture content. The calculated dry unit weight is then compared against the maximum dry unit weight as determined by the lab. Compaction verification methods vary based on appropriate technology; typically the water balloon method is utilized.
- When waste rock is delivered to the tailings facility, material is to be blended to achieve a target co-disposal ratio of 1:1 (waste rock to tailings). Codisposal areas are not amenable standard density testing due variability in particle densities.
- Place Class 1 waste rock on outer slopes, if available.

Water Management

- Divert surface runoff from undisturbed areas around the tailings facility.
- Within the facility provide diversion ditches to prevent surface water from running into placement areas, and ensure site runoff is conveyed via designed and appropriately sized conveyance tube or collection ditches to retention ponds or discharge points to minimize erosion and sediment loss.

- Collect and route runoff on the tailings facility via ditching and piping into a stormwater facility (currently Pond 7) for water treatment and subsequent discharge into Hawk Inlet.
- Minimize tailings contact with groundwater using acceptable engineering practices which may include installing liners, and finger and blanket drains beneath the tailings, and/or slurry walls surrounding to the facility.

Fugitive Dust Control

- Monitor fugitive dust from the tailings facility, where possible.
- Install wind breaks such as fencing and/or other appropriate mechanical controls on the crest of the tailings pile to reduce wind speed and dust dispersal through this area.
- Limit snow removal to only active placement areas.
- Cover interim slopes with rock or interim cover materials, if available.
- Hydroseeded outer slopes, where appropriate.
- Use dust suppression aids where approved/appropriate.
- Maintain roads properly.

Sediment Control

- Maintain access roads in a manner that minimizes sediment production
- Construct and maintain rock settling basins to reduce sediment loading in site drainage.
- Use flocculent aids where approved/appropriate.

Snow Removal

- Do not place tailings on snow or ice.
- Remove snow from active placement zones prior to placement.
- Avoid mixing tailings with snow during snow removal.
- Construct and maintain rock settling basins to reduce sediment loading in site drainage.

Reclamation

- Temporary and permanent closure requirements are provided in the current ADEC waste management permit.
- Conform to stipulations in GPO Appendix 14 (reclamation plan).
- Conduct operations in a manner that minimizes closure/reclamation liability.
- Manage materials to maximize availability for reclamation use (separate and stockpile where appropriate).

- Grade final slopes to design specifications and hydroseed with approved seed mix.
- Construct approved reclamation cover when slopes are at final configuration and potential for contamination of cover surface is low (applies to concurrent reclamation).
- Ensure ditches meet design closure specification.

Emergency Action Plan

- Issues identified during inspections shall be addressed in a timely manner before an emergency situation arises. In the event of unforeseen facility slope movement and/or water control, and issues, the following procedure will be followed:
  - Remove non-critical personnel from the area and mark off the area with flagging.
  - For slope movement issues, assess the site condition with input from a geotechnical engineer. Prepare an action plan as appropriate for the identified site condition and proceed with implementation.
  - For water control issues, work with the surface operations or water treatment personnel to prepare an action plan appropriate for the identified site condition and proceed with implementation.

Monitoring

Monitoring includes visual inspections, environmental, and water quality monitoring. Inspections and environmental monitoring shall be performed per the current Integrated Monitoring Plan (IMP) (refer to GPO 1). This includes following activities:

- Inspections
  - Construction according to approved plans
  - Monitor for signs of instability
  - Water management controls implemented
  - Drainage observations
  - Note: Implement corrective actions as appropriate for any deficiencies.
- Surface water, groundwater and wet wells sites
  - Compliance monitoring for tailings facility per freshwater monitoring program
- Lysimeters
  - Suction lysimeters sampled for field parameters, major ions and trace elements
- ABA/geochemistry
  - ABA modified Sobek method, Leco C and S and iron assay
  - ABA from mill tailings loadout

  - Paste pH ABA for in-situ samples, typically taken aerially distributed, from oldest areas of the pile, top 6” containing tailings only (no waste rock materials) to determine remaining buffering capacity
  - ABA, paste pH, and ICP on mill samples
- Water levels (wells, piezometers)
  - Water levels (wells and pneumatic or vibrating wire piezometers) at least annually, some sites monthly or quarterly
- Met stations
  - Ensure met station components are functioning properly
  - Data recorded by data logger

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ATTACHMENT B

FIGURES

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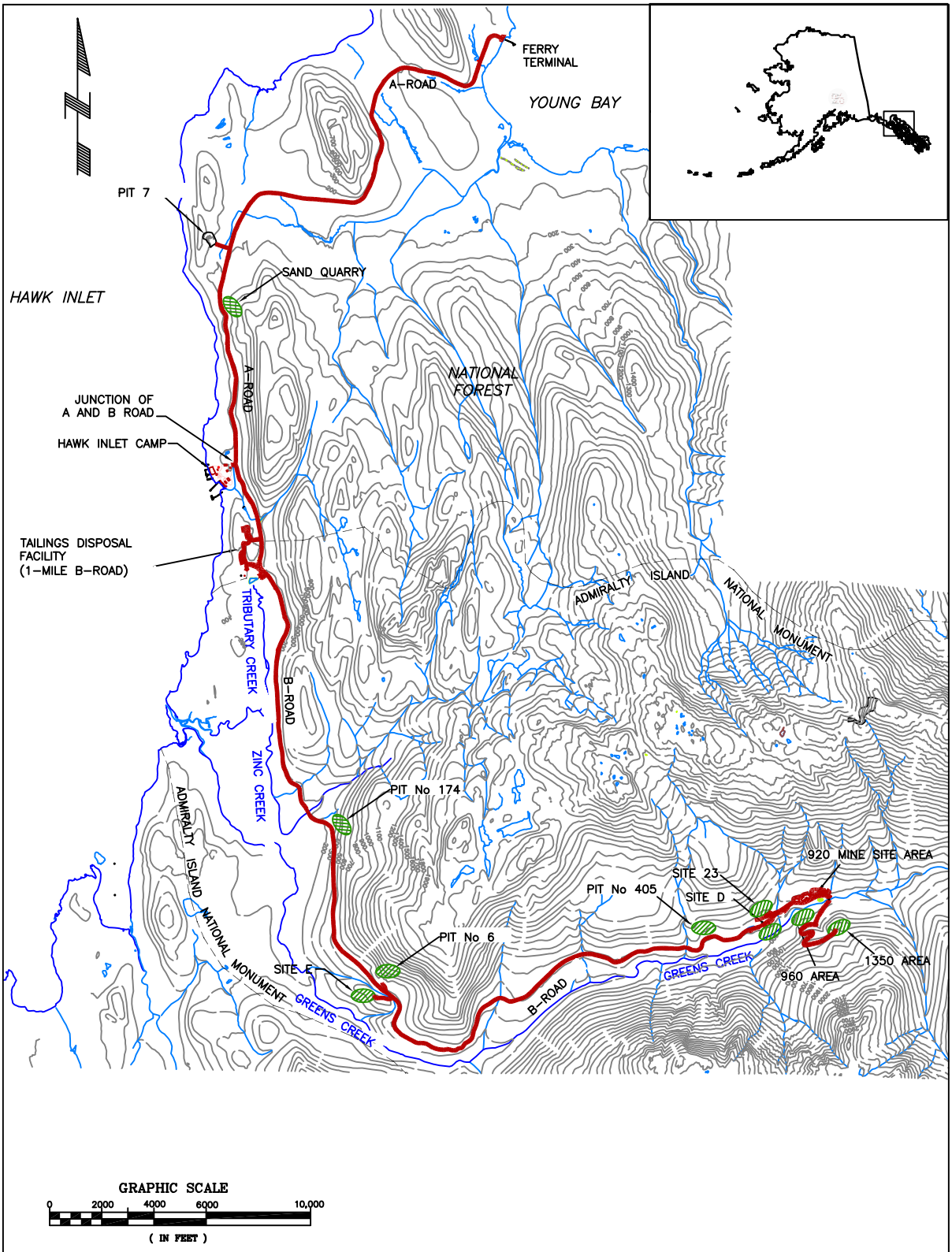

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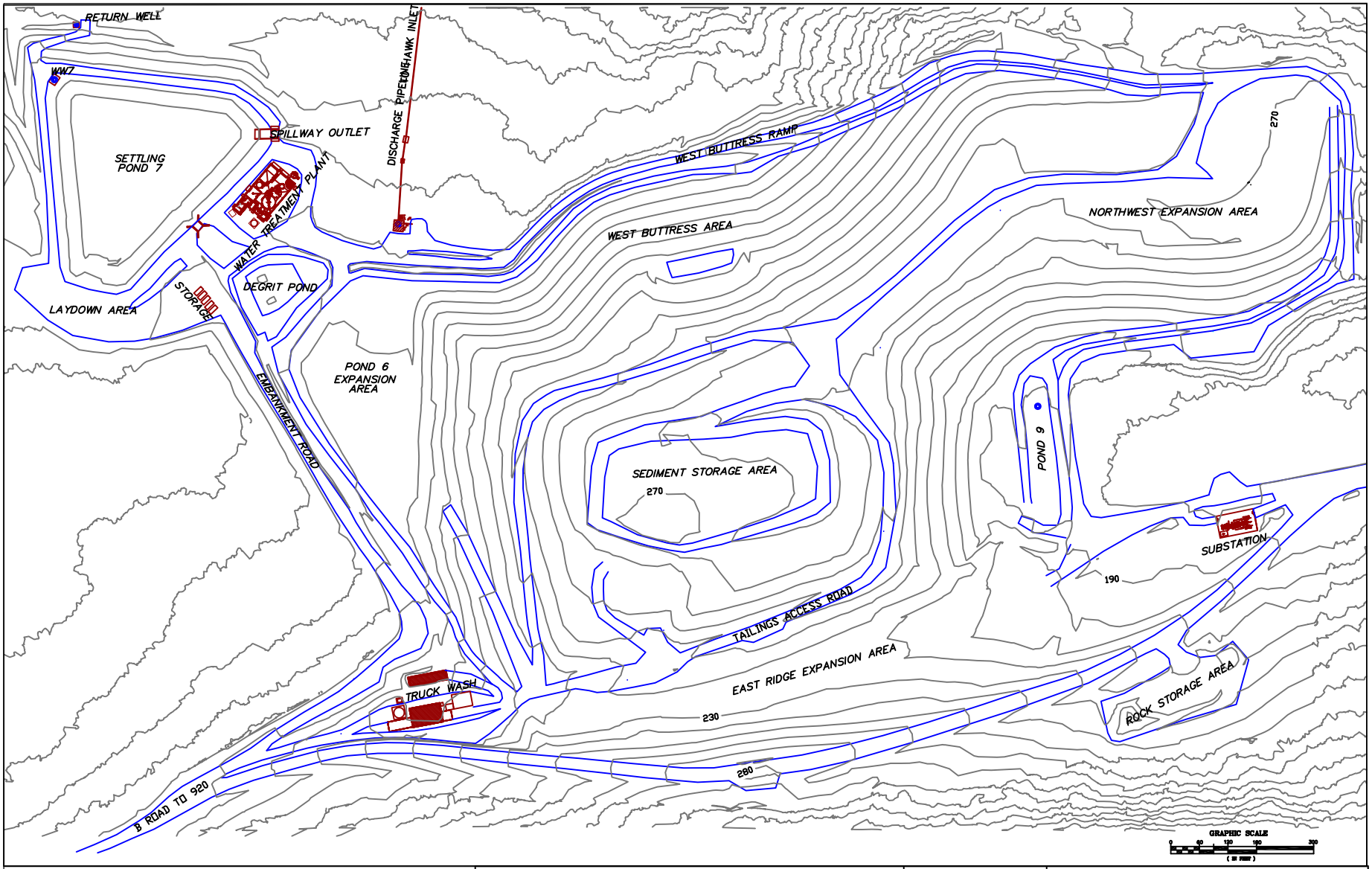
DRAWING BY: S.EDWARDS
DESIGN BY: ------
REVIEWED BY: BLP
PROJ REF: GPO

TITLE:

MINE SITE LOCATION MAP

DATE: 12/31/13

FIGURE: 1



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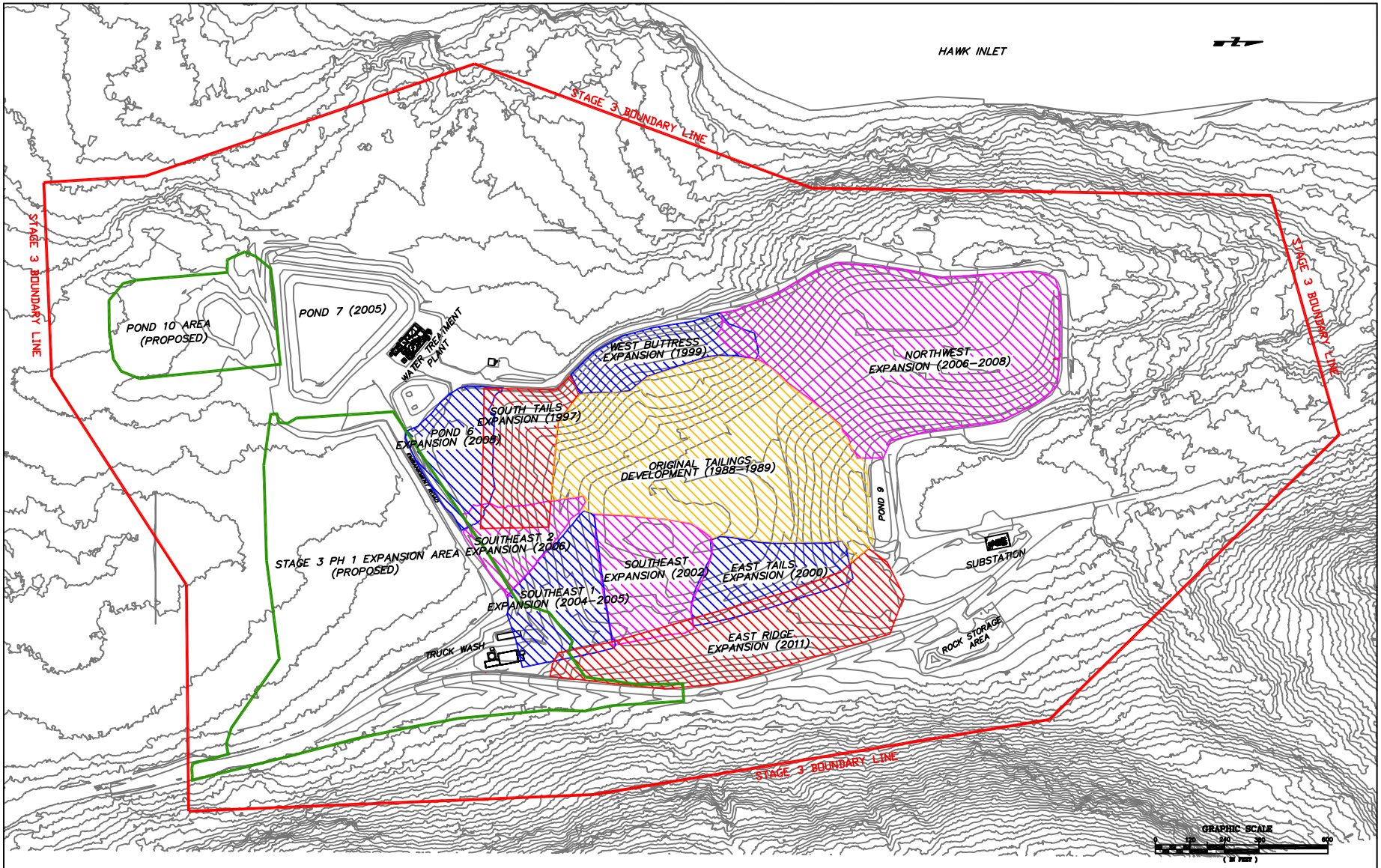
DRAWING BY: S.EDWARDS
DESIGN BY: ----
REVIEWED BY: BLP
PROJ REF: GPO

TITLE:

TAILINGS FACILITY AS-BUILT
- 2013 -

DATE: 12/31/13

FIGURE: 2



HECLA GREENS CREEK MINING CO.

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PHONE:(907) 789-8100

DRAWING BY: S.EDWARDS
DESIGN BY: ----
REVIEWED BY: BLP
PROJ REF: GPO

TITLE:
TAILINGS FACILITY
EXPANSION AREAS

DATE: 12/31/13

FIGURE: 3

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ATTACHMENT C

INSPECTION FORMS

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Monthly Tails Inspection

Yes	No	N/A	Please note all enviromental deficiencies below.
			Are the ditches at 0.8 tails entrance free of debris and sediment?
			Is the north retention pond, level and in good condition, screen clear?
			Are the ditches on the backside of tails free of debris and sediment?
			Is tails placement and compaction according to plan?
			Is the area free of visible fugitive dust?
			Is the the color, and flow rate of seeps, remaining stable?
			Has snow removal been done properly?
			Are the wells, piezometers and lysimiters functiong with good stickups?
			Is pond 7, WTP, and surrounding area free of open totes, barrels, debris, etc?
			Is pond 7 embankment free of tension crack or seeps.
			Is pond 7, laydown area free of open totes, barrels, debris, etc?
			Is the truck wash and surrounding area free of open totes, barrels, debris etc?
			Is the 1.2 Truck wash spill response tote stocked?
			Is the departure apron for the truck wash free of fugitive tails?
			Is the truck wash degrit basin sediment at an acceptable level?
			Are test plots, test boxes and test columns intact?
			Are the B road ditches clear (both sides)?
			Is transformer containment empty, drain if necessary.

Comments:

Inspected By Date