

STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND AND WATER
Statewide Abatement of Impaired Land Section



This Preliminary Decision (PD) is the State's preliminary best interest finding regarding a proposed disposal of interest in state land. The public is invited to comment on this PD. The deadline for commenting is **5:00 pm** May 30th, 2023. Please see the Public Notice section of this decision for requirements related to submitting comments for consideration.

Requested Action

Roger Burggraf submitted a request to the Department of Natural Resources (DNR), Division of Mining, Land & Water (DMLW) for consent to conduct activities necessary for the Department of Environmental Conservation (DEC) to close a contaminated site with Activity and Use Limitations (AULs), or Institutional Controls (ICs) that include land use controls (LUCs). DEC contaminated site closure with AULs requires DNR's signature on an Environmental Covenant (EC) associated with State-owned, DMLW-managed land in perpetuity unless the EC is amended or terminated in compliance with AS 46.04.325 and AS 46.04.330 and signed by DNR and DEC. The contaminated site proposed for closure with AULs is a former tailings impoundment at the former Grant Mine site in Fairbanks on Saint Patrick Road, within the Fairbanks Meridian, 1 North, 2 West, Section 28. A map showing the location is included as Attachment A. The purpose of this request is to allow for protection of human health and the environment by maintaining a closed and capped deregulated tailings impoundment and managing the flow of surface water at the site.

Proposed Action

DNR proposes to sign an EC in accordance with the Uniform Environmental Covenants Act (UECA). DNR's signature on the EC would fulfill DEC's requirements for site closure with AULs that protect human health and the environment. AULs would include maintaining the administrative record for the site in DNR's publicly available Land Administration System (LAS) and online map applications, requirements to monitor and maintain a cap over the closed tailings impoundment, water management controls, and land use restrictions. An AUL monitoring form is included as Attachment B.

Scope of Decision

The scope of this decision is to determine if it is in the State's best interest to issue a Restricted Use Authorization (RUA), sign an EC, and consent to AULs. The administrative review for this authorization is defined by AS 38.05.035(e)(1)– (2) and limited to (1) reasonably foreseeable, significant effects of the uses to be authorized; (2) applicable statutes and regulations; (3) the facts pertaining to the land or resources; and (4) any issues that are material to the determination.

Authority

This RUA is being adjudicated pursuant to AS 38.05.020, Authority and duties of the commissioner; AS 38.05.035, Powers and duties of the director; and AS 38.05.945, Notice. The authority to execute the Final Finding and Decision (FFD), RUA, and the EC has not been delegated to the DMLW Director, therefore, if issued, the FFD, RUA, and EC will be signed by the DNR Commissioner.

Administrative Record

The administrative record for the proposed action consists of the Constitution of the State of Alaska, the Alaska Land Act as amended, applicable statutes and regulations referenced here-in, the 2015 Eastern Tanana Area Plan, and the casefile for the requested action serialized by DNR as ADL 421226. The administrative record also includes an Application for Permits to Mine in Alaska (APMA) serialized by DNR as F20187130 and F20237130, and DNR's Decision to Deregulate Grant Mine Tailings Dam (ID #AK00409). Information related to contamination on site can be found in DNR's potentially hazardous site file, ADL 421028, and DEC file 100.38.182 and Hazard ID 731.

Location Information

Geographic Location: This parcel is located northwest of Fairbanks, at approximately 1.2-mile Saint Patrick Road, as shown in Attachment A.

Legal Description: A tract of land located within Government Lot 2 of the U.S. Government Plat of Survey accepted 1/5/1964 within Section 28, Township 1 North, Range 2 West, Fairbanks Meridian.

Municipality: The site location is within the Fairbanks North Star Borough, though no borough lands are impacted.

Regional/Village Corporation: The site is located within the Doyon Limited region. No corporation lands are involved.

Approximate Lat/Long: 64° 52' 48.07" North, 147° 57' 36.53" West.

Title

The State obtained tentative approval to the subject parcel under state selection general grant, GS 958, F-028735, dated February 20, 1985 (document no. 1985-0052) and March 3, 1998 (document no. 1998-0037). Temporary approval was made subject to a right-of-way for ditches or canals and rights-of-way for power transmission lines to Golden Valley Electric Association (F-86327 and F-90548).

Third Party Interests

The applicant holds state mining claims within the boundaries of the subject parcel (ADL 315145, ADL 536566, ADL 536567, and ADL 313580).

Golden Valley Electric Association holds a public utility easement on the eastern edge of the subject parcel. The eastern edge of the deregulated tailings dam (also referred to as primary

tailings impoundment prior to capping and subsequent deregulation) is approximately 65 feet from the west boundary of the 100-foot-wide easement.

Adjacent Landowners

The lands immediately adjacent are state land, as shown in Attachment C.

See the Public Notice section for a list of landowners in the vicinity who will be mailed Public Notice of this Preliminary Decision.

Planning and Classification

The subject parcel is located within the Eastern Tanana Area Plan (ETAP), within the Fairbanks Region, and within classification unit F-19. This unit is designated as Minerals, and Public Recreation-Dispersed lands and is to be managed for its mineral and public recreation values (ETAP p. 3-35).

The management intent for the Management Unit F-19 is primarily for recreation if that does not interfere with mining activities (ETAP 3-35). Any mineral development must consider potential impacts on recreational and residential uses and provide appropriate avoidance or minimization practices (ETAP 3-35). Mineral designated lands are those areas considered to have mineral potential and for which mining is considered to be an appropriate use. Mineral designated lands are to remain in state ownership, except under AS 38.05.195-.275 (ETAP 3-9).

Public Recreation-Dispersed designated lands are areas that have a high potential for dispersed recreation or tourism and where dispersible recreation conditions are scattered or widespread rather than localized. Lands are to be retained in public ownership in an undisturbed, natural state except for improvements related to public health, safety, or recreation. Utilities, roads, and other uses may be appropriate with appropriate design if recreation functions can be maintained, the use can be compatible with management intent, and is determined to be in the best interest of the state (ETAP 3-10). Land designated Public Recreation-Dispersed is typically not considered appropriate for land use authorizations unless necessary for public health, safety, or recreation (ETAP 3-10).

The proposed AULs and EC will serve to minimize the effects of prior mining activity on state land and are necessary to protect public health and safety, and recreation. Therefore, the proposed land use restrictions imposed through implementation of AULs and DNR signature on an EC is consistent with the classification, designation, and management intent of ETAP for the subject parcel.

Access

Functional legal access to the state land discussed herein exists via Saint Patrick Road. Access onto the capped impoundment is impeded and deterred by strategically placed brush and root wads on the surface of the cap.

Access Along Navigable and Public Waters

The proposed RUA does not require reservation of public access along navigable and public waters pursuant to AS 38.05.126(a).

Public Trust Doctrine

The Public Trust doctrine does not apply to the proposed RUA because the site is not near a navigable waterway.

Reservation of Mineral Estate

In accordance with section 6(i) of the Alaska Statehood Act and AS 38.05.125, the state, in this decision, reserves unto itself the mineral estate, including oil and gas, and the rights expressed in the reservation clause of the statute, that being the right to reasonable access to the surface for purposes of exploring for, developing and producing the reserved mineral resources. Exploration and development, if any, which could occur, would be consistent with AS 38.05.130 and other applicable statutes and regulations.

Mineral Orders

The proposed RUA does not fall within an area delineated in an Administrative Mineral Closing Order (MCO).

Agency Review

An agency review was conducted on June 21, 2022. The deadline for agency comments was July 13, 2022.

The following agencies were included in the review:

- Dept. Natural Resources (DNR), Division of Mining, Land, & Water (DMLW);
- DNR, DMLW, Mineral Property Management;
- DNR, DMLW, Mining
- DNR, DMLW, Resource Assessment & Development (RADS);
- DNR, DMLW, Survey
- DNR, DMLW, Water
- DNR, DMLW, Water-Dam Safety Program
- DNR, Mental Health Trust Land Office (MHTLO)
- Department of Administration, Division of Risk Management;
- Department of Transportation and Public Facilities (DOT & PF)
- Office of History and Archaeology (OHA);
- Department of Environmental Conservation (ADEC), Commissioners Office;
- ADEC Contaminated Sites Program;
- ADEC Solid Waste;
- Department of Fish & Game (ADF&G), Habitat Division;
- U.S. Fish and Wildlife Service
- Bureau of Land Management (BLM).

Agency Review Comment and Response

Comment Received

Alaska Department of Transportation & Public Facilities replied with no comment.

DNR Response

Thank you for your review.

No other agency comments were received.

Background

History

The site was originally owned by the Bureau of Land Management (BLM). In 1985 title transferred to the state of Alaska. The site is currently managed by DNR. The applicant has held mining claims at the site since 1972. From 1980 to 1983 Silverado Gold Mining, Inc. operated a pilot mill for metallurgical testing. Tailings from the pilot mill were placed in the initial tailings area (approximately 1 acre) also known as the secondary tailings impoundment. The pilot mill recovered gold through gravity separation; no cyanide was used during the operation of the pilot mill. From 1985-1989 Tri-Con Mining operated a new mill and began using cyanide process for gold extraction. A primary tailings impoundment, lined with compacted silt and bordered by a 45-foot berm, was built in 1985 to contain the waste slurry. In 1988, cyanide-containing tailings were accidentally discharged upslope of the primary tailings impoundment. Cyanide migrated down an abandoned on-site production well and was later found in groundwater. In 1989, DEC identified portions of the Grant Mine as a contaminated site. That year DEC collected water samples from domestic wells in the Ester Dome area and none of the samples showed detectable levels of cyanide. In 1991 groundwater samples from two wells on the mine site were found to contain cyanide concentrations above the federally established Maximum Contaminant Level of 0.2 mg/ L. Site investigations completed by the Environmental Protection Agency (EPA) from 1994-1996 found high concentrations of metals in the tailings impoundment and adjacent areas. EPA's 1995 site investigation showed again that contaminants in groundwater were not detected above background levels in nearby domestic wells. The environmental consultant Shannon & Wilson was hired in 2008 and began sampling groundwater from down gradient monitoring wells in 2018-2019 and surface water and soil samples in 2019. On November 29, 2021, DEC approved the Groundwater-Quality Assessment Summary (Attachment D) which showed there have been three consecutive sampling events where free cyanide was non-detect or below the DEC groundwater clean-up levels. This demonstrates that the compacted silt lining of the tailings impoundment prevents migration of contaminants to groundwater, even prior to capping of the impoundment. Currently, arsenic concentrations are below previously established background concentrations for arsenic at the site, but do exceed DEC cleanup level in groundwater.

Physical Site Settings

The site slopes gently to the east and is vegetated with a mixed forest. A 1985 pre-construction geotechnical investigation by Shannon & Wilson specified that seasonal frost was encountered at the soil surface and extended to depths varying from 2.0 to 6.5 feet, but there was no permafrost. Soil is categorized as 60 feet of loess that mantles schist bedrock. The site is within the Happy Creek watershed. Surface runoff that does not infiltrate or evaporate joins Happy Creek

approximately one mile downhill to the east of the site. Groundwater is located between 180 feet to 240 feet below the ground surface. Contaminants of concern include antimony, arsenic, free cyanide, manganese, mercury, and silver. Only antimony and arsenic exceed the DEC human health risk cleanup levels in the tailings. Oxidation of arsenopyrite in sheared gold-bearing quartz veins is the primary source of elevated arsenic concentrations in groundwater at Ester Dome. Due to the naturally high arsenic and mineral values the groundwater is considered non-potable. The area surrounding the site is undeveloped land and low-density residential housing.

Remedy

In March 2020, DNR Dam Safety and Construction Unit determined the Grant Mine Tailings Facility was a Class II (significant) hazard potential dam as defined by AS 46.17.900 3(B) and 11 AAC 93.1579(a)(2). 11 AAC 93.167 requires that owners of dams constructed prior to 1987 obtain a Certificate of Approval to Operate a Dam in accordance with 11 AAC 93.173. Alaska Statute 46.17 was promulgated in 1987 and Article 3 of 11 AAC 93 was first promulgated in 1989. Therefore, an application for *Certificate of Approval to Abandon a Dam* in accordance with 11 AAC 93.172 was submitted by the applicant. The Certificate of Approval to Abandon a Dam was courtesy public noticed on June 28, 2021, no appeals were filed. The planned remedy for this site satisfied DNR Dam Safety's requirement for approval. DNR Dam Safety's December 8, 2022 decision determined that the impoundment in its current configuration no longer meets the statutory definition of a dam as defined in AS 46.17 (Attachment E). Therefore, the site is no longer a risk as a dam.

To facilitate dam deregulation and isolate the mine tailings from potential receptors such as inhalation and ingestion and limit infiltration of water, Shannon & Wilson developed a final capping and abandonment plan to construct a compacted silt cap over the primary tailings impoundment. The previously constructed base of the primary impoundment is a compacted silt structure used to contain the tailings from past mining operations and eliminate the potential for contact with the tailings. The cap is approximately 30-inches thick which exceeds the 24-inch cover thickness recommended in the DEC Solid Waste regulations. The cap is graded to a 3% grade and sloped to the east and domed to minimize the accumulation of standing water and encourage radial flow of water from the tailings. Any organic material removed from the ground surface was stockpiled and spread over the surface of the cap to encourage the growth of native vegetation. The surface of the cap was tracked to encourage the accumulation of seeds and allow for revegetation. A new diversion ditch was established on the uphill side of the capped area to carry runoff to the north then east away from the site. During the fall of 2019, the secondary (initial) impoundment tailings were excavated and added to the primary tailings in preparation for the placement of the cap.

All remedial work for associated with the final capping and abandonment plan is consistent with Alaska Mine Reclamation statutes (AS 27.19) and regulations promulgated thereunder (11 AAC 97).

Discussion

It is in the best interest of the State to provide written consent to the proposed AULs and implement an EC under UECA.

DNR understands that there is a low likelihood of direct contact with groundwater from residential wells due to high natural levels of arsenic and minerals that discourage residents from drinking groundwater. Cyanide contamination was not detected in off-site residential wells. Although low, there is a potential for contaminants to impact down gradient domestic wells. Onsite groundwater sampling does not show contamination of cyanide above DEC cleanup levels. The buried tailings are contaminated with antimony, free cyanide, mercury, and silver, but because of the soil cap and compacted silt liner it is unlikely that contamination would leave the site. Snowmelt and rainwater will no longer accumulate in the primary tailings impoundment because the cap is in place.

Direct contact with contaminated soil is no longer an exposure pathway because the cap is in place. Following the most stringent Method 2 cleanup levels for the under 40-inches of precipitation climate zone, the approved cleanup levels for free cyanide in soil is 0.2 mg/kg. The maximum contaminant concentrations of free cyanide remaining in the soil of the capped tailings impoundment is 0.7 mg/kg. In subsurface soil, cyanide at low concentrations will biodegrade into other chemical forms by microorganisms under both aerobic and anaerobic conditions. Therefore, the remaining free cyanide over time will be negligible and fall below the cleanup levels. Vegetation is expected to grow on the cap but significant uptake is not expected.

Conditions will be placed on the site to prevent exposure to any remaining contamination. At the time of DEC closure, soil contamination remaining on the property will be subject to the following standard and site-specific conditions and/or ICs, which are equivalent to AULs. DEC will likely include the following in their decision to close the contaminated site:

1. The Grantor (DNR) shall not take any action that may negatively impact or interfere with either the response action or any operation, maintenance, inspection or monitoring of that response action without prior written approval from DEC (18 AAC 75.395). “Response action” shall mean “any action taken to respond to a release or threatened release of a contaminant, including mitigation, cleanup, or removal.”
2. The Grantor shall not take any action that may increase the risks to human health, safety, welfare, or of the environment at the site without prior written approval from DEC. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as part of the remedial action or that creates a new exposure pathway for residual contamination remaining.
3. Construct, modify, or use buildings on the contaminated area of the Property.
4. Grade, excavate, dig, till, or otherwise disturb the contaminated area of the Property.
5. Use the Property for residential purposes including child day care, educational facilities, playgrounds, hospitals, or similar facilities.
6. Subdivide or replat of the Property.

7. The Grantor shall ensure the cap is inspected every month for five years between the months of April through October following site closure and maintained as needed to prevent contact with subsurface contaminated soil, and to prevent the infiltration of water and potential leaching of contaminants. Following the first five years, the cap will be inspected every five years by DNR. The Grantor shall report any damage to the cap to DEC within ten (10) days after discovery. Grantor shall ensure the cap is repaired as quickly as possible. Documentation of the repairs shall be submitted to DEC within 30 days after discovery.
8. In the event that contaminated soil on the site becomes accessible in the future, the Grantor shall notify DEC, characterize the contamination, and, if determined necessary by DEC, cleanup the soil pursuant to DEC's Site Cleanup Rules.
9. DEC approval is required prior to moving soil where contamination remains above applicable cleanup levels. If DEC approval for movement is granted, any moved soil must still be characterized and managed following regulations applicable at that time. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 Water Quality Standards is prohibited.

Economic Benefit and Development of State Resources

DMLW gives preference to uses that will be of greatest economic benefit to the State and development of its resources. In consideration of these factors, approval of this RUA will not prevent development of resources but provide the greatest economic benefit to the State. An EC will clearly define requirements regarding contamination on site and instruct the public and prospective users how to readily obtain information on use restrictions in place via publicly available documents.

Performance Guaranty

A performance guaranty is intended to incentivize performance of the conditions of the RUA and provide a mechanism for the State to ensure that the applicant shares in the financial burden in the event of noncompliance (including fee payment, survey, appraisal, etc.), restoration (interim and final), and any associated costs after termination or expiration of the RUA. To meet the requirements to deregulate the dam, the site was configured into a stable landform. In addition, the cap design exceeds the DEC solid waste program requirements for capping similar sites. Therefore, there is a low risk associated with the proposed authorization and a separate performance guaranty is not required at this time. DMLW reserves the right to require a performance guaranty during the terms of the RUA.

History of Compliance

DNR Land Administration System records indicate that the applicant is in compliance with the terms of other DMLW-issued authorizations. In addition, the applicant has been very proactive in taking measures to expedite and implement corrective action to eliminate environmental risk at this site.

Insurance

Insurance is a means to protect the state from liabilities incurred through the use of state property, or from damage to state property as a result of accidental or catastrophic events. This type of protection is necessary in the event of an accident or negligence that was consequentially connected to activities conducted on state land, and/or if the state is named in a lawsuit as a result of an accident or negligence. The applicant shall be required to submit proof of insurance in the amount the insurance company determines necessary to protect both the State and the applicant from risks associated with the planned activities under the RUA for ADL 421226. The applicant is responsible for maintaining the insurance necessary during the term of the authorization. The insurance may be adjusted to reflect updates and changes in the associated project, and the applicant may be required to furnish additional insurance if DMLW determines there to be additional risk to the State. A certificate of insurance listing the State of Alaska, Department of Natural Resources as an additional insured on the policy, or other insurance acceptable to the State, must be submitted to DMLW prior to entry on State land and maintained throughout the term of the authorization.

Survey

Survey instructions were provided to the Grantee by the DMLW Survey Section. The applicant is required to submit a preliminary draft as-built survey a minimum of one year after the signature of the EC to allow adequate time for DMLW's review and approval. The final approved as-built survey will be submitted to DMLW a minimum of two years after issuance of the RUA.

Fees

As a new authorization type, DMLW does not yet have regulations or policy setting out equitable fees for a RUA. Thus, DMLW has determined that no fees will be required.

Public Notice

Pursuant to AS 38.05.945, this PD will be advertised for a 30-day public comment period, starting on May 1st, 2023. In addition, the post office(s) located near the proposed leasehold will be requested to post the notice pursuant to AS 38.05.945(b)(3)(C). The notice will also be posted on the State of Alaska Online Public Notice website pursuant to AS 38.05.945(b)(3)(B) located at: <https://aws.state.ak.us/OnlinePublicNotices/>.

In accordance with AS 38.05.946, a municipality or a corporation entitled to receive notice under AS 38.05.945(c) may hold a hearing within 30 days after the receipt of the notice.

The public is invited to comment on this PD. All comments received during the public comment period will be considered in the FFD. A copy of the FFD, along with instructions on filing an appeal, will be sent to all persons who comment on the PD. If public comments result in significant changes to the PD, additional public notice may be given.

To be eligible to appeal, a person affected by the FFD must provide written comments during the public comment period per AS 38.05.035(i).

Public Notice will also be mailed to landowners in the vicinity of the proposed RUA, as shown in Attachment C, including:

- 537 Saint Patrick Road, private landowner; and
- 531 Saint Patrick Road, private landowner.
- Golden Valley Electric Association

Written comments about this project must be received in this office no later than 5:00 PM on May 30th, 2023 to be considered.

To submit comments please choose one of the following methods:

Mail: Department of Natural Resources
DMLW SAIL Section
ATTN: Alyssa Millard
3700 Airport Way
Fairbanks, AK 99709

Email: alyssa.millard@alaska.gov

Signature page follows:

Recommendation

Based on the information provided by the applicant and other agencies, as well as review of planning documents, statutes, and regulations, I recommend issuing this RUA to the applicant. and DNR signature on an EC which consents to implementation of AULs.

I recommend proceeding to public notice for the purpose of providing the members of the public and those entities identified in AS 38.05.945 an opportunity to review and submit comments.



Alyssa Millard, Natural Resource Manager 1
Statewide Abatement of Impaired Land Section,
Division of Mining, Land and Water

4/28/23

Date

Preliminary Decision:

It is the determination of the Division of Mining, Land and Water that it may be in the State's best interest to issue a RUA to the applicant, as described above. This application shall now proceed to public notice.



Patty Burns, Natural Resource Manager 3
Statewide Abatement of Impaired Land Section,
Division of Mining, Land and Water

4/28/23

Date

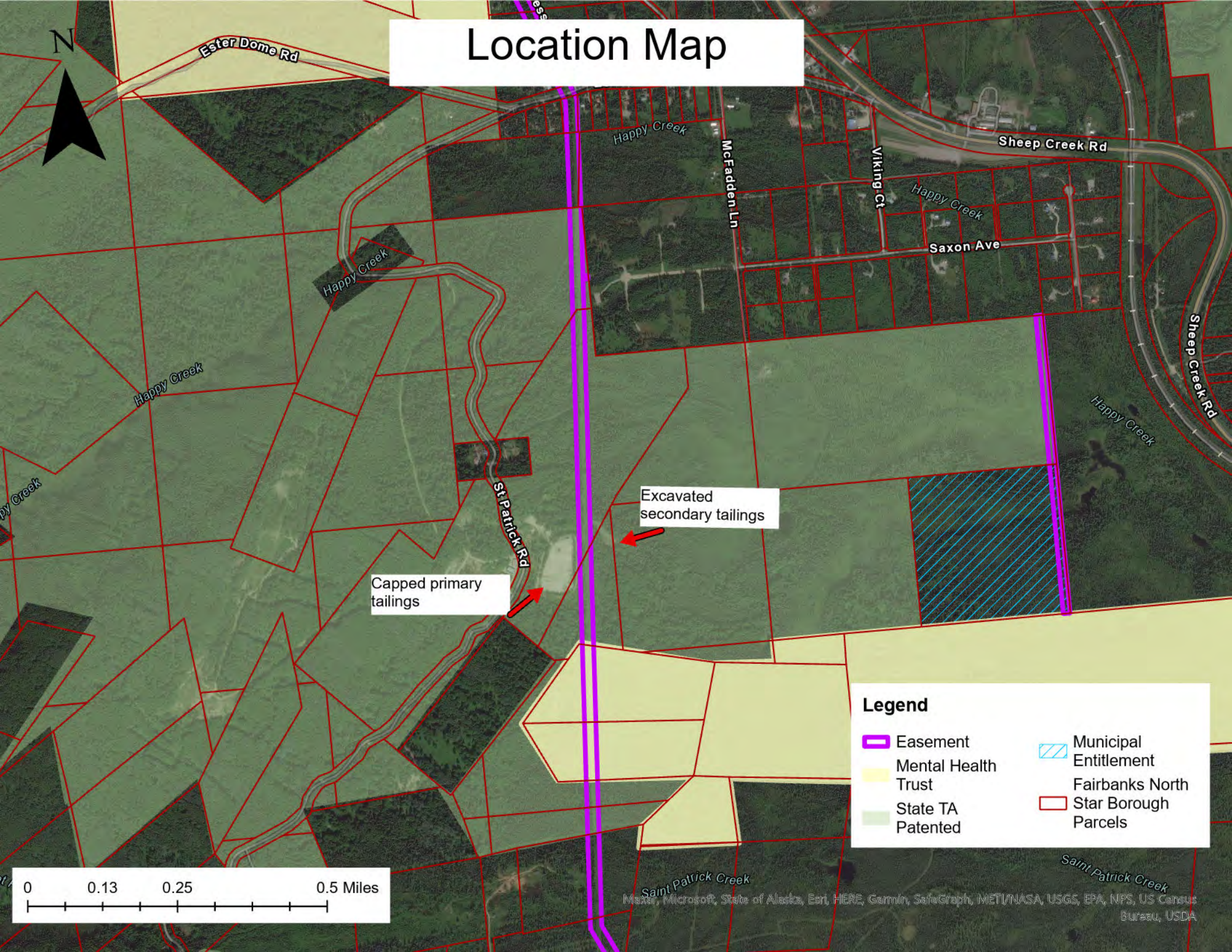
Attachments

- Appendix A: Location Map
- Appendix B: Shannon & Wilson Grant Mine Closure Report with AUL Monitoring Form
- Appendix C: Third Party Interests Map
- Appendix D: DEC approved Groundwater-Quality Assessment Summary
- Appendix E: DNR Dam Safety Decision to Deregulate the Grant Mine Tailings Dam
- Appendix F: Draft Environmental Covenant

Appendix A

Location Map

Location Map



Legend

- Easement
- Mental Health Trust
- State TA Patented
- Municipal Entitlement
- Fairbanks North Star Borough Parcels

0 0.13 0.25 0.5 Miles

Maxar, Microsoft, State of Alaska, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Appendix B
Shannon & Wilson Grant Mine Closure Report with AUL Monitoring Form

SUBMITTED TO:

Mr. Roger Burggraf
830 Sheep Creek Road
Fairbanks, Alaska 99709

BY:

Shannon & Wilson
2355 Hill Road
Fairbanks, Alaska 99709

(907) 479-0600

www.shannonwilson.com

CONTAMINATED SITE CLOSURE REPORT

Grant Mine Primary Mine Tailings Impoundment

ESTER DOME, ALASKA

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Submitted To: Mr. Roger Burggraf
830 Sheep Creek Road
Fairbanks, Alaska 99709

Subject: CONTAMINATED SITE CLOSURE REPORT, GRANT MINE PRIMARY MINE
TAILINGS IMPOUNDMENT, ESTER DOME, ALASKA

Shannon & Wilson prepared this report and participated in this project as a consultant to Mr. Roger Burggraf. Our scope of services was specified in our proposal dated June 2, 2022. This report presents the results of the primary tailings impoundment capping and abandonment and was prepared by the undersigned.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON

Andrew Frick
Environmental Scientist

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- Figure 3: Proposed Area for Restricted Use Authorization

Appendices

- Appendix A: Photo Log
- Appendix B: Stutzmann As-Builts
- Appendix C: Compaction Testing Results
- Appendix D: L.A. Abrasion Test Results
- Appendix E: Cumulative Risk Assessment Data
- Appendix F: Post-Closure Monitoring Form
- Important Information

ACRONYMS

ACRONYMS

18 AAC 75	18 Alaska Administrative Code 75
18 AAC 60	18 Alaska Administrative Code 60
AWR	AWR Engineering, LLC
BLM	Bureau of Land Management
C&A Plan	Capping and Abandonment Plan
CSM	conceptual site model
Dam Safety	DNR Dam Safety and Construction Unit
DEC	Alaska Department of Environmental Conservation
DNR	Alaska Department of Natural Resources
EPA	Environmental Protection Agency
MCL	maximum contaminant level
mg/L	milligrams per liter
Silverado	Silverado Gold Mines, Inc.
Stutzmann	Stutzmann Engineering Associates, Inc.
TCM	TriCon Mining, Inc.
ug/L	micrograms per liter
WAD	weak-acid-dissociable

1 INTRODUCTION

This report documents the capping/abandonment of the primary mine-tailings impoundment at the Grant Mine located on Ester Dome, northwest of Fairbanks, Alaska (Figure 1). The claim holder, Mr. Roger Burggraf, secured our services for the purpose of pursuing closure of the tailings impoundment through the Alaska Department of Environmental Conservation (DEC) contaminated sites program and the Alaska Department of Natural Resources (DNR) Dam Safety and Construction Unit (Dam Safety) without the assistance of the former operators. The contaminated sites database file number for the Grant Mine site is 100.38.182, Hazard ID 731; the Nation Inventory of Dams (NID) number is AK00409. The contaminated site comprises the primary tailings impoundment, the former secondary tailings area, and a cyanide release to groundwater.

DEC approved the *Final R2 Capping and Abandonment Plan, Grant Mine Primary Mine Tailings Impoundment, Ester Dome, Alaska* (C&A Plan) in a letter dated June 11, 2021. Dam Safety issued a *Certificate of Approval to Abandon a Dam, Grant Mine Tailings Dam* (NID# AK00409) on June 28, 2021, and issued a determination that the dam was deregulated in their December 8, 2022 *Decision to Deregulate Grant Mine Tailings Dam* (NID# AK00409) document.

2 SITE DESCRIPTION

The Grant Mine is located along St. Patrick Road approximately 1.2 miles from the intersection with Ester Dome Road, near Fairbanks, Alaska; latitude 64.8802 north, longitude 147.9602 west. The former mine facility and tailings impoundment are located on the eastern flank of Ester Dome, approximately 780 feet above mean sea level. The area around the mine slopes gently to the east and is vegetated with spruce, hardwoods, and shrubs.

The property is underlain by as much as 60 feet of loess (aeolian silt) that mantles schist bedrock. The schist is cut by gold-bearing quartz veins. The mineral assemblage in the vein consisted of free-milling gold, arsenic and antimony oxides, arsenopyrite, and galena (Bundtzen and Kline; 1981). According to Youcha (2003), the groundwater on Ester Dome is present in unconfined bedrock aquifers, localized by regional faults, fractures, and joints. The Environmental Protection Agency (EPA) found elevated concentrations of arsenic, barium, copper, manganese, selenium, and zinc in background groundwater samples; background arsenic concentrations exceeded 1,000 micrograms per liter ($\mu\text{g/L}$). According to Verplanck et al., (2007) oxidation of arsenopyrite in sheared gold-bearing quartz veins is the primary source of elevated arsenic concentrations in groundwater at Ester Dome.

The primary tailings impoundment occupies approximately 4 acres (Figure 2). The secondary (initial) tailings impoundment was located about 400 feet to the east and was about one acre.

The land use around the mine is a mix of undeveloped land and low-density residential housing. Residents in the area are not connected to a municipal water system but instead obtain water from deliveries to holding tanks and/or from wells. It is unknown how many wells are used for drinking water; naturally high arsenic and mineral levels render the groundwater non-potable.

3 SITE HISTORY

Roger Burggraf has held the mining claims surrounding the Grant Mine since 1972. The land was previously owned by the Bureau of Land Management and the State of Alaska obtained tentative approval in 1985 and 1998. The site is currently managed by DNR. Silverado Gold Mines (Silverado)/Tri-con Mining Alaska (TCM) leased the claims from Mr. Burggraf from 1978 to 2019. Between 1980 and 1983, Silverado operated a pilot mill for metallurgical testing; the tailings from the pilot mill were placed in the secondary tailings area.

Silverado/TCM submitted an *Application to Construct or Modify a Dam* to Dam Safety on January 11, 1985. Dam Safety issued an *Approval to Construct the Grant Mine Tailings Impoundment* on July 11, 1985. The tailings impoundment, lined with compacted silt and bordered by a 45-foot-high earthen berm, was designed by Shannon & Wilson, Inc. and built by TCM in 1985. The dam was constructed in a single raise. The primary tailings impoundment had a capacity of approximately 130,000 cubic yards. TCM prepared a Solid Waste Disposal Permit Application in 1985; there is no record that the permit was obtained.

TCM/Silverado operated the mill at the Grant Mine from 1985 to 1989 using a cyanide process for gold extraction. The cyanide process involved mixing crushed ore with sodium cyanide and lime solution thereby extracting the gold. This generated a slurry containing waste rock, lime, sodium cyanide, and water. The slurry was piped into primary tailings impoundment; the discharge point of the piping was manually moved to distribute the tailings throughout the impoundment.

The mine came to the attention of DEC in 1988 when TCM applied for a rezone, and water samples from two water supply wells adjacent to the impoundment contained cyanide concentrations above the federally established maximum contaminant level (MCL) of 0.2 milligrams per liter (mg/L). According to TCM employees, the cyanide-rich tailings slurry was accidentally discharged upslope of the impoundment, allowing the tailings to reach

groundwater through the former water supply well. TCM removed the well casing and sealed the boring by pressure grouting in 1989.

Monitoring wells, M-1 and M-2, shown in Figure 2 were installed in 1989 and 1990, respectively, to monitor cyanide in groundwater downgradient of the impoundment. The wells were routinely sampled for total cyanide and/or weak-acid-dissociable (WAD) cyanide concentrations. Mr. Burggraf sampled monitoring wells, M-1 and M-2 until the cyanide concentration did not exceed the DEC cleanup for three consecutive sampling events.

3.1 1994 EPA Site Investigation

In July of 1994, EPA sampled tailings from the primary and secondary tailings impoundments, groundwater from on-site monitoring wells, and groundwater from off-site domestic wells. Two soil and two groundwater samples were collected from upgradient, off-site sources to represent background analyte concentrations.

Arsenic, cyanide, lead, manganese, mercury, and silver were detected above DEC cleanup levels in groundwater from on-site monitoring wells. Contaminants were detected above background in upgradient domestic wells, suggesting elevated metals concentrations were naturally occurring.

The EPA site investigation characterized the tailings as a mixture of waste rock, lime, and process wastewater which contained cyanide and identified metals above background concentrations in both the primary and secondary tailings impoundments. The tailings in the primary tailings impoundment contained arsenic, antimony, and mercury exceeding the DEC migration-to-groundwater cleanup levels. Total cyanide was detected at a maximum concentration of 8.6 mg/kg, but free cyanide wasn't analyzed during the investigation. The tailings in the secondary tailings area contained arsenic exceeding the DEC cleanup level.

3.2 1996 TCM Site Investigation

TCM collected samples from the primary tailings impoundment in 1996. Their sampling revealed similar concentrations of metals as found by the 1995 EPA investigation. They analyzed the tailings for total, WAD, and free cyanide. Results indicate concentrations of free cyanide in the tailings exceeded current DEC migration-to-groundwater soil cleanup levels but did not exceed human health cleanup criteria. The sampling also indicated the tailings had a pH ranging from 8.7 to 9.9, likely due to the addition of lime during the ore processing.

3.3 1998 TCM Closure Plan

In 1998, Silverado/TCM prepared a *Mine Tailings Impoundment Closure Plan*. The plan proposed constructing a compacted silt cap over the mine tailings to isolate the tailings from potential receptors and limit infiltration. This plan was not carried out.

4 SITE CLOSURE

4.1 Groundwater

DEC established a 1.5 ug/L groundwater cleanup level for free cyanide with their November 6, 2016 revision of the 18 AAC 75. Additional sampling was required since the previous samples were only analyzed for total and/or WAD cyanide. Free cyanide was not detected in the groundwater samples collected from either M-1 or M-2 in October 2019, June 2021, and September 2021. The limits of detection were below the DEC cyanide cleanup level in these three sampling events; the results of these samples were presented in Shannon & Wilson's report *Groundwater-Quality Assessment Summary, Grant Mine, Ester Dome, Alaska* dated October 26, 2021. In a letter dated November 29, 2021, DEC accepted this report and concluded that additional sampling of the monitoring wells would not be required.

On September 15, 2022, Mr. Burggraf submitted Shannon & Wilson's *Monitoring Well Decommissioning Work Plan, Grant Mine Site, Ester Dome, Alaska*; DEC approved the plan in a letter dated September 16, 2022. The wells are scheduled to be decommissioned in the spring of 2023.

4.2 Secondary Tailings Area

In October 2019, Mr. Burggraf moved the tailings from secondary tailings area into the primary tailings area prior to capping. Details of the secondary tailing area cleanup and the results of soil sampling at the limits of the excavation are presented in Shannon & Wilson, Inc.'s letter report entitled *Post-Excavation Sampling, Secondary Tailings Impoundment Revision 2, Grant Mine, Ester Dome, Alaska, DEC File #100.38.182, Hazard ID 731* dated April 13, 2020. In a letter dated April 20, 2020 DEC accepted the closure of the secondary tailings impoundment based on the post-excavation sampling.

4.3 Primary Tailings Impoundment

Mr. Burggraf began the closure construction on July 28, 2021 using his own equipment and staff. Stutzmann Engineering Associates, Inc. (Stutzman) laid out survey control; Mr. Burggraf's crew removed the fence, stripped the berm of vegetation, and contoured the tailings surface to mimic the final cap surface. Once the vegetation was stripped, the operator began dismantling the earthen berm and spreading the silt from the berm over the tailings. Generally, the operator spread the soil in the east to west direction to optimize the compaction with the loaded, rubber-tired loader; compaction testing results are discussed in Section 4.3.1. The capping advanced from the south to the north.

The drainage diversion channel was constructed in accordance with the specifications of the C&A Plan, with only the exception noted in Section 4.3.2. Photos of the closure construction are presented in Appendix A. Stutzmann surveyed the site on September 16, 2022 after the capping and diversion channel was completed and prepared the *Record Drawing As Built* presented in Appendix B. Based on Stutzmann's survey, the thickness of the cap is at least 24 inches.

4.3.1 Compaction

18 AAC 60.455 requires a capped monofill to include an infiltration layer of at least 18 inches of earthen material with a permeability no greater than 1×10^{-5} centimeters per second (cm/sec). In situ permeability testing of undisturbed samples during construction of the tailings impoundment was found to range from 2×10^{-5} to 5.8×10^{-5} cm/sec. Compacted samples of the same material had a permeability of 8.7×10^{-6} cm/sec at a compaction of about 94.5 percent of Standard Proctor. The C&A Plan called for compacting the natural material to 92 percent based on Standard Proctor test, using a wet density of 98.1 pounds per cubic foot (pcf); dry density of 82.6 pcf; and water content of about 19 percent to yield a permeability of less than 1×10^{-5} cm/sec.

On July 22, 2021, Stephen Chase, a laboratory technician with Shannon & Wilson, Inc. used a nuclear densometer to assess the compaction of an eight-inch lift in accordance with the specifications. The results of the compaction testing indicated the density was 106 percent of Standard Proctor, exceeding the 92 percent recommendation. Therefore, the capping density meets or exceeds the infiltration permeability requirement of less than 1×10^{-5} cm/sec. The test result is presented in Appendix C.

The results of the testing indicated the specified compaction was met by rolling of the capping material with a minimum of two passes of the loaded, rubber-tired loader. As the cap was installed, the entire area was subjected to at least two passes of the loader.

4.3.2 Placement of Riprap in Drainage Diversion Channel

In accordance with the C&A Plan specifications, Mr. Burggraf placed 460 cubic yards of Class I riprap in two sections of the drainage diversion channel as specified by AWR Engineering, LLC. The local source of rip rap varied slightly from the specifications; the material was more tabular than blocky. In an e-mailed dated September 22, 2021, Ms. Janie Dusel, PE, with AWR concurred the material was acceptable for use in the diversion ditch.

On August 10, 2021, Shannon & Wilson, Inc. subjected a subsample of the riprap to L.A. abrasion test (ASTM C131/C535 AASHTO T96). The results indicate the material met the soundness requirements set forth in design; the test results are presented in Appendix D.

4.3.3 Seeding

Once the earthwork was complete, Shannon & Wilson staff spread a seed mixture a rate of 1.5 pounds per 1,000 square feet. The seed mixture contained 50-percent Nortran Tufted Hairgrass, 35-percent Arctared Fescue, 10-percent Wainwright Wheatgrass, and 5-percent Annual Rye. The seed was placed in the unlined ditches and the exposed top of the berm in accordance with the specifications. Natural vegetation has begun to populate the disturbed area.

5 CONTAMINANTS OF POTENTIAL CONCERN DISCUSSION

Contaminants of potential concern (COPCs) at the site include metals and cyanide. For the purpose of this proposed site closure and associated institutional controls implemented, we understand that the DEC human health cleanup levels are appropriate for evaluating potential exposure risks from COPCs remaining at the site.

5.1 Metals

Based on our review of historical soil sampling data, only antimony and arsenic were detected at concentrations greater than DEC human health cleanup levels in soil sampled at the site.

5.1.1 Chromium Speciation

Chromium was detected in samples collected by DEC, EPA, and TCM in the 1990s. As a point of clarification, the chromium present in the tailings is assumed to be chromium III; there's no documented source of hexavalent chromium at the site.

5.2 Cyanide

Total cyanide is the sum of free cyanide, weak metal cyanide complexes, and strong metal cyanide complexes. Free cyanide is highly toxic and the most bioavailable of the expected cyanide species, with toxicity moderated through complexation with other compounds (Redman and Santore, 2012). DEC has only established soil or groundwater cleanup levels for free cyanide.

5.2.1 Groundwater

Groundwater samples collected previous to 2009 were analyzed for total cyanide. Groundwater samples collected from 2009 to June 2018 were analyzed for total cyanide and WAD cyanide. Groundwater samples collected after June 2018 were analyzed for free cyanide. Free cyanide was not detected in the last three groundwater sampling events.

5.2.2 Soil

Cyanide analysis was performed on samples collected at the primary tailings impoundment in 1989, 1994, and 1996 by AMAX, EPA, and TCM, respectively. Analysis of free cyanide was only requested for the 1996 samples.

Free cyanide was not detected at concentrations above the DEC human health soil cleanup level in the 1996 soil samples, and the reported free cyanide concentrations were less than 5 percent of total cyanide concentrations. This indicates a low bioavailability potential for cyanide present at the site.

6 CUMULATIVE RISK ASSESSMENT

We performed a cumulative risk assessment using analytical sample results from the primary tailings impoundment, the secondary tailings impoundment, and groundwater at the site. In accordance with the February 2018 DEC *Procedures for Calculating Cumulative Risk* guidance document, we identified COPCs detected at concentrations greater than one-tenth of their human health cleanup level for each dataset; the maximum concentration of each analyte was used for this evaluation.

Data used for our cumulative risk assessment are presented in Exhibit 6-1 below. The analytical results tables from which we sourced this data are included in Appendix E.

Exhibit 6-1: Cumulative Risk Data Summary

Dataset	Cumulative Risk Calculated	Analyte ¹	Result ²	Sample Date	Sample Name
Primary Tailings Impoundment	Yes	Antimony	1,950 mg/kg	7/19/1994	SS001
		Arsenic	6,310 mg/kg	4/1/1996	SSCP751040196
		Lead	399 mg/kg	4/1/1996	SSCP769040196
		Manganese	393 mg/kg	7/19/1994	SS001
		Mercury	2.11 mg/kg	4/1/1996	SSCP760040196
Secondary Tailings Impoundment ³	No	Arsenic	110 mg/kg	10/22/2019	GM19-3
Groundwater ⁴	Yes	Arsenic	196 µg/L	9/14/2018	M-2
		Mercury	0.249 µg/L	9/14/2018	M-1

NOTES:

- 1 Only analytes detected at greater than one-tenth of the DEC human health cleanup level are presented.
- 2 The maximum concentration from each dataset are presented.
- 3 Post-excavation confirmation sample results were used to evaluate cumulative risk for the Secondary Tailings Impoundment.
- 4 The most recent analytical groundwater sample results for each analyte were evaluated.

6.1 Exceptions from the Cumulative Risk Assessment

In our April 2020 *Post-Excavation Sampling, Secondary Tailings Impoundment* report, we concluded that concentrations of arsenic detected in the Secondary Tailings Impoundment confirmation samples were comparable to background concentrations expected on Ester Dome. Additionally, the detection of 196 µg/L of arsenic at monitoring well M-2 was less than 20 percent of the 1,040 µg/L and 1,180 µg/L background concentrations reported for arsenic in the 1994 site investigation conducted by EPA.

We consider the arsenic detected in Secondary Tailings Impoundment and groundwater at the site to be attributable to naturally occurring background concentrations. In accordance with the 2018 DEC cumulative risk guidance document, arsenic was not included in our cumulative risk assessment for these datasets. Therefore, a cumulative risk calculation was not necessary for the Secondary Tailings Impoundment dataset because no other analytes were detected at concentrations greater than one-tenth of their DEC human health cleanup level. The cumulative risk calculation for groundwater included only mercury as a COPC.

6.2 Cumulative Risk Assessment Results

The cumulative risk assessment for the primary tailings impoundment indicated concentrations of COPCs exceed the cumulative carcinogenic risk standard of 1 in 100,000 and the cumulative non-carcinogenic hazard index of 1 for a residential land use scenario. The land use restrictions and institutional controls discussed below will eliminate potential exposure pathways and mitigate associated exposure risk.

The cumulative risk assessment for groundwater indicated concentrations of COPCs were below the cumulative carcinogenic risk standard of 1 in 100,000 and the cumulative non-carcinogenic hazard index of 1.

The cumulative risk values are presented in Appendix E.

7 FUTURE LAND USE RESTRICTIONS

Shannon & Wilson presented an updated conceptual site model (CSM) in our *Revised Site Characterization Report, Grant Mine Tailings Impoundment, 1.2 Mile St. Patrick Road, Fairbanks, Alaska* dated August 2019. The exposure medium of concern at the site described in the CSM was the uncapped mine tailings. With the capping of the tailings and implementation of the future land restrictions discussed below, the potential exposure pathways will be removed along with the risk of exposure to receptors.

The capped tailings within the impoundment exceed DEC's human health risk cleanup levels for antimony and arsenic and will not be removed from the site. Under the Alaska Uniform Environmental Covenants Act, an environmental covenant is required to ensure future land use will not adversely affect or disturb the cap. Because the environmental covenant constitutes a disposal of interest in real property, DNR must prepare a written best interest finding and preliminary decision regarding the covenant and, in accordance with AS 38.05.945, provide notice. We understand Mr. Burggraf has requested a Restricted Use Authorization (RUA) from DNR to initiate their decision process. The boundaries of the area surrounding the capped tailings are currently being surveyed and will be available for inclusion in the RUA/covenants document. The proposed area of the RUA is shown in Figure 3.

According to Section 46.04.300 of the Alaska Statutes:

(a) An environmental covenant is required if the department makes a remedial decision as part of an environmental response project and that environmental response project results in

(1) residual contamination remaining in the environment in concentrations that are safe

for some, but not all, uses; or

(2) an engineered feature or structure that requires monitoring, maintenance, or operation, or that will not function as intended if disturbed.

(b) An environmental covenant may be held by one or more holders. A holder may own an interest in the real property subject to an environmental covenant. The interest of a holder is an interest in real property.

We understand Mr. Burggraf is working with DEC and DNR to develop an environmental covenant for the portion of the property surrounding the primary mine tailings impoundment.

8 POST-CAPPING MONITORING AND REPORTING

Mr. Burggraf will be responsible for monthly monitoring of the capped tailings impoundment for a period of 5 years following the completion of the cap. We understand that Mr. Burggraf is planning to contract Shannon & Wilson to perform the inspections.

The monthly inspections will include monitoring for settlement and erosion of the impoundment cap and will also include photographing vegetative growth on berms and unlined ditches to document revegetation. The post-closure inspection form is presented in Appendix F. Mr. Burggraf proposes the monitoring period be between April and October due to the prevalence of snow cover and freezing conditions during the winter months.

At the end of the post-capping monitoring period, Mr. Burggraf will submit a report to the DEC Contaminated Sites Program and DNR that describes site conditions and summarizes the information collected. We understand DNR will then monitor the site yearly for five years, and every five years after. We also understand DNR may take over the monitoring at an earlier date if Mr. Burggraf is unable to complete the proposed five-year monthly post-closure monitoring period.

9 REFERENCES

Alaska Administrative Code 18 AAC 60 *Solid Waste Management*, April 2022.

Alaska Administrative Code 18 AAC 75 *Oil and Other Hazardous Substances Pollution Control*, January 2022.

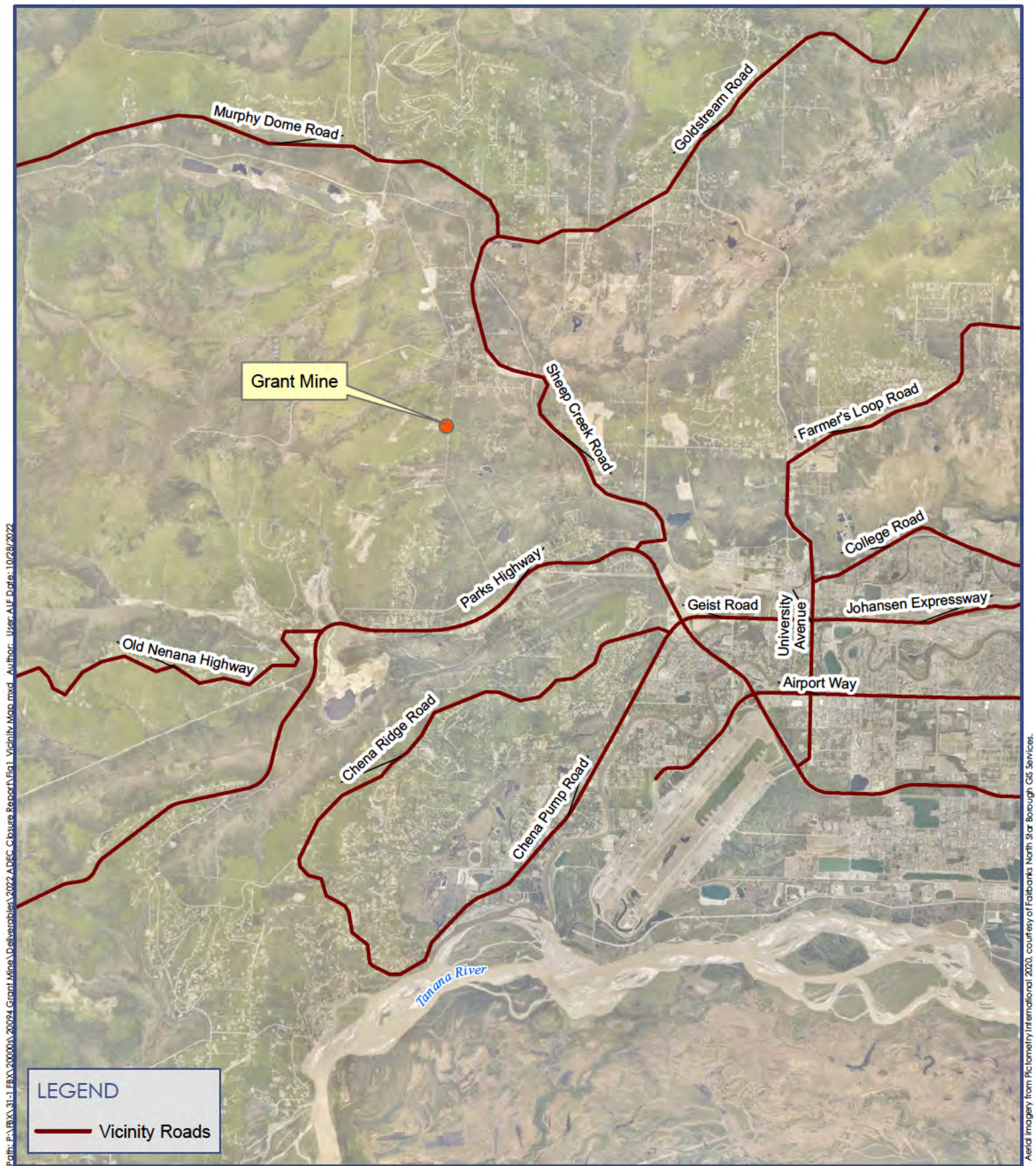
Bundtzen, T.K. and Kline, J.T.; *Geologic mine map, Grant gold mine, Fairbanks mining district: Alaska Division of Geological and Geophysical Surveys Open-File Report 141*, 1981.

Redman, A. and Santore, R.; *Bioavailability of Cyanide and Metal-Cyanide Mixtures to Aquatic Life*; 2012.

Tri-Con Mining, Inc., *Sediment Sampling and Analysis, Ester Dome Project, Former Grant Mine Tailings Pond*, 1996.

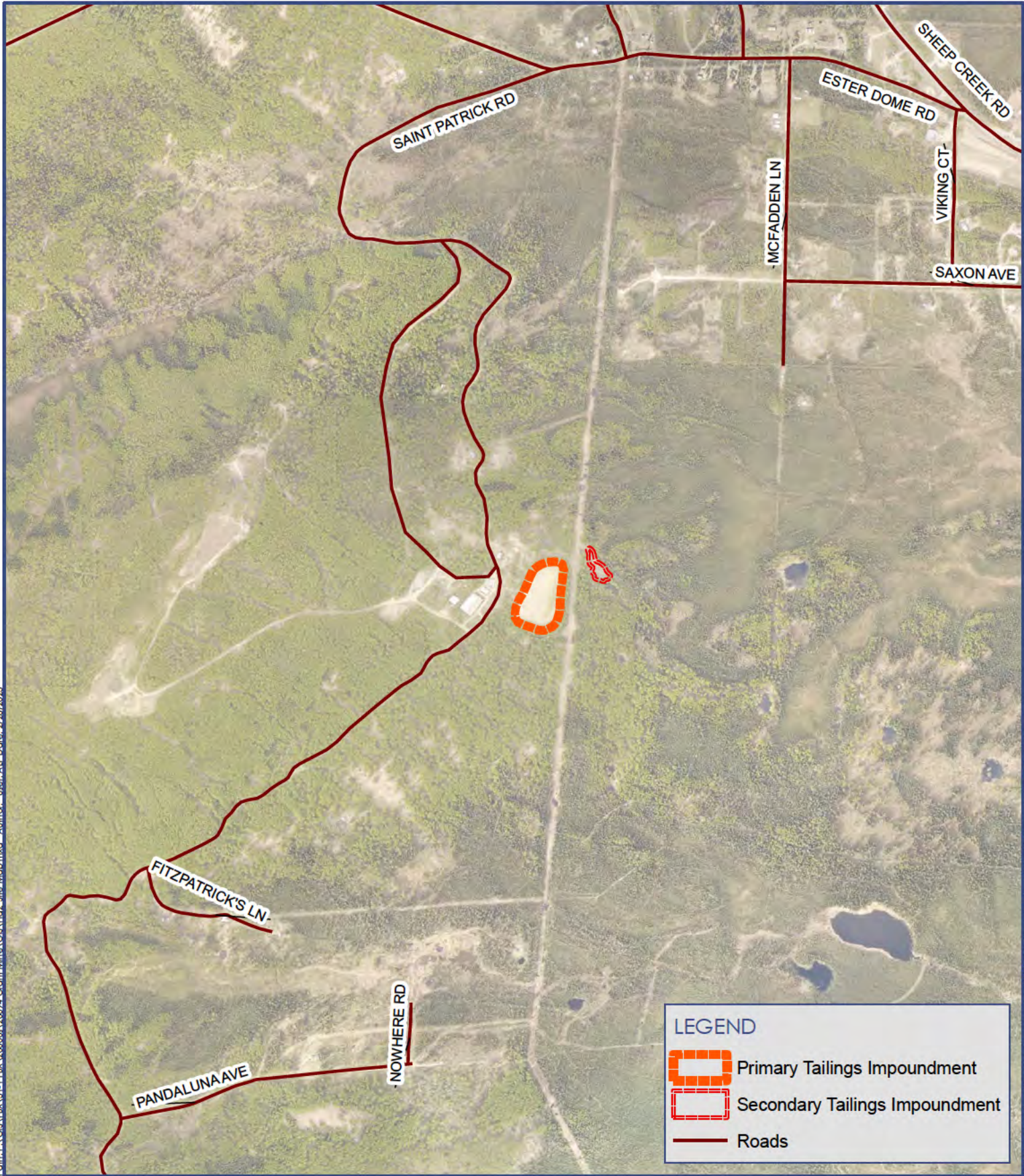
Verplanck, P.L., et al., IMWA Symposium, 2007, *Elevated arsenic in groundwater, Ester Dome, Alaska*.

Youcha, E.K., University of Alaska, MSc Thesis, 2003, *A Geohydrologic analysis of an upland-bedrock aquifer system: Application to interior Alaska, Fairbanks, Alaska*.



Path: PA\BXA\3112\BXA\200904\2004 Grant Mine\Deliverables\2022 ADEC Closure Report\Fig 1 Vicinity Map.mxd Author: User ALE Date: 10/28/2022

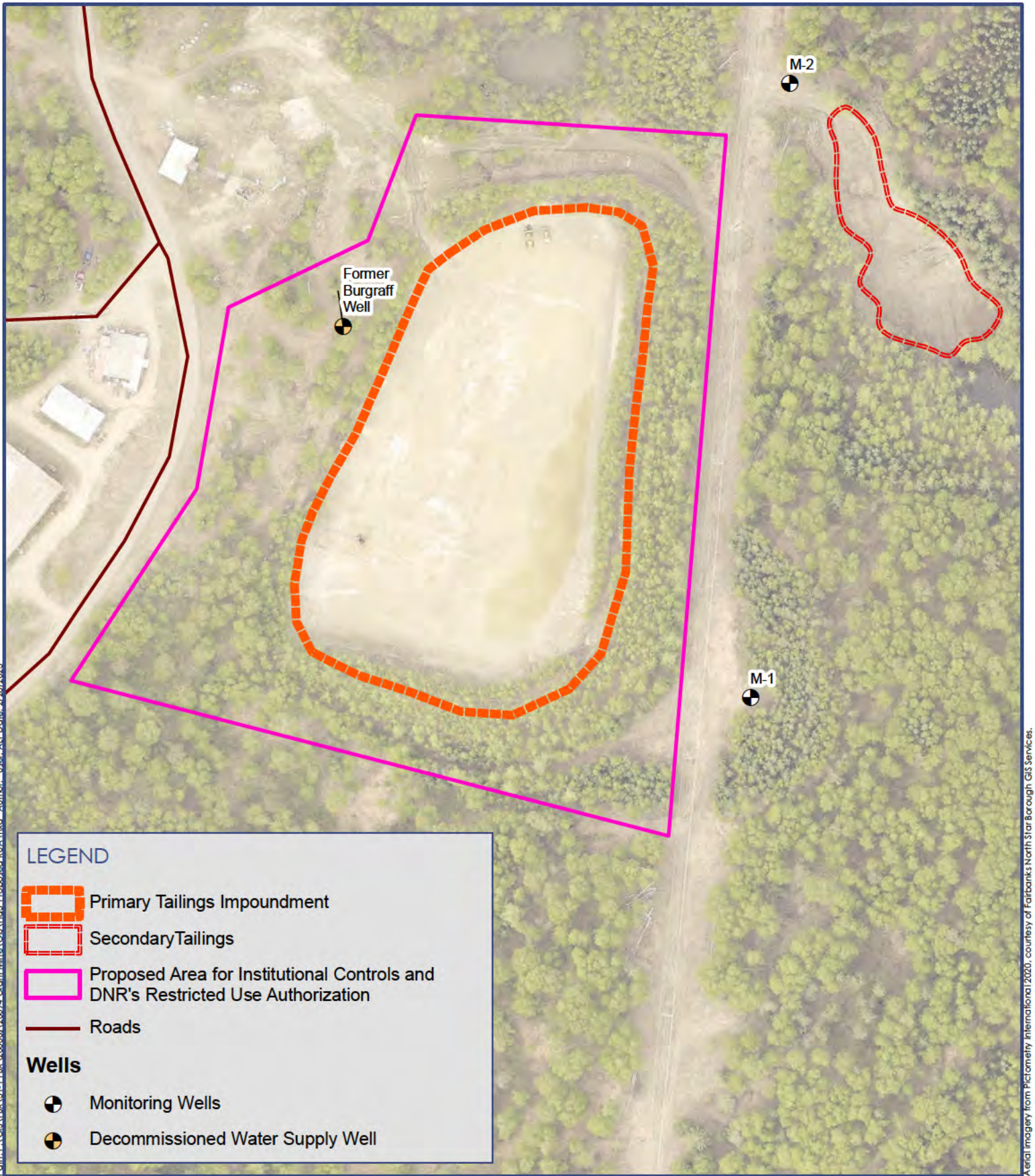
Aerial Imagery from Pictometry International 2020, courtesy of Fairbanks North Star Borough GIS Services.



Path: PA-GIS-ERX-3-1-1-ERX-200003-20024-Grant Mine\GIS-ERX-2-File Map.mxd Author: User: ALE Date: 2/28/2023

Aerial Imagery from Pictometry International 2020, courtesy of Fairbanks North Star Borough GIS Services.

March 2023
SITE MAP
Figure 2



Appendix A

Photo Log

APPENDIX A: PHOTO LOG



Photo 1: 20210728 Initial Lifts looking south



Photo 2: 20210804 Dismantling southern berm



Photo 3: 20210921 Dismantling northern berm



Photo 4: 20210927 final surface looking east



Photo 5: 20210928 End of 2021 activities looking south



Photo 6: 20220511 Northern portion looking east



Photo 7: 20220511 Southern portion looking east



Photo 8: 20220630 Beginning of Diversion Ditch looking North



Photo 9: 20220723 Placing Riprap looking west



Photo 10: 20220811 Final Surface looking south



Photo 11: 20220811 northern portion looking east



Photo 12: 20220811 southern portion looking east



Photo 13: 20220824 looking NE complete



Photo 14: 20220831 Drone looking SW



Photo 15: 20220916 lower portion of channel



Photo 16: 20220916 Natural Revegetation



Photo 17: 20220916 upper portion of channel

Appendix B

Stutzmann As-Builts

APPENDIX B: STUTZMANN AS-BUILTS

Grant Mine

FAIRBANKS NORTH STAR BOROUGH, ALASKA

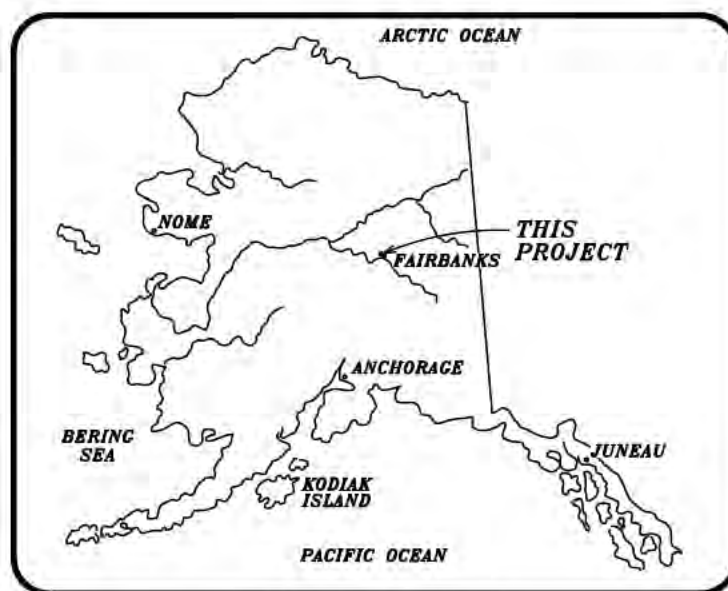
TAILINGS IMPOUNDMENT CLOSURE

RECORD DRAWING
AS BUILT

September 16, 2022

TABLE OF CONTENTS

1 RECORD DRAWING AS BUILT CLOSURE



LOCATION MAP



PROJECT 19-087

PREPARED FOR:
ROGER BURGGRAF

PREPARED BY:

STUTZMANN
ENGINEERING
ASSOCIATES, INC.

C 627
P.O. BOX 71429
FAIRBANKS, AK 99707
(907) 452-4094

LEGEND

⊕ Survey Control Point

--- Shoulder

— Toe

Ⓜ Monitoring Well

— Culvert

SURVEY CONTROL TABLE				
	NORTHING	EASTING	HEIGHT	TYPE
GPS-1	3980940.476	1335488.622	813.440	HUB & MAG NAIL
GPS-2	3980615.795	1335186.345	818.276	HUB & MAG NAIL
OTHER SIGNIFICANT SHOTS				
112	3981172.86	1336090.08	751.14	LATH T2
113	3981255.33	1336073.11	756.25	MON. WELL M2
114	3980619.61	1336037.76	757.36	MON. WELL M1

- NOTES:
- As-built site topographic data collected via RTK GPS methods, September 2022.
 - Horizontal Datum: NAD83 (2011) CORS epoch 2010.0, projected within Alaska State Plane Zone 3, U.S. Survey Feet, derived from NGS OPUS solutions for control points GPS-1 and GPS-2 on October 3, 2019.
 - Vertical Datum: NAVD 1988, Geoid 12B, U.S. Survey Feet, from OPUS solutions.
 - Site is located within the SE 1/4, Sec. 28, T1N, R2W, F.M., Alaska. Longitude 147.9603 W, Latitude 64.8800 N. Fairbanks North Star Borough TL 2808, 499 Saint Patrick Road.
 - Certificate of Approval to Abandon Dam, dated June 28, 2021, Grant Mine Tailings Dam (NID ID#AK00409)

RECORD DRAWING

AS BUILT

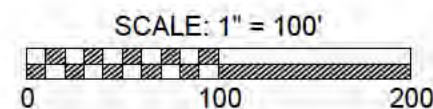
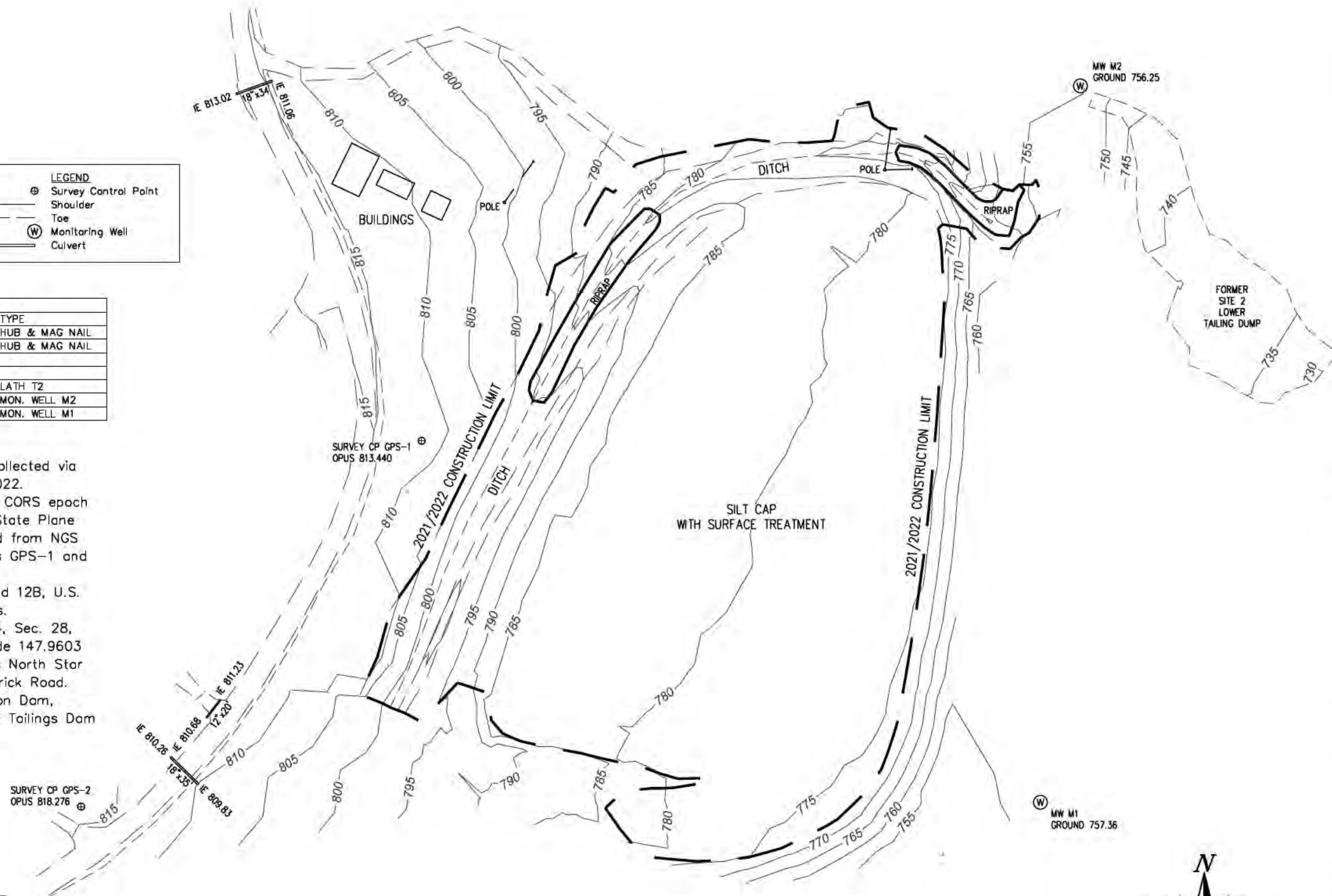
9/16/22

M.A. Smiley, P.E.

Stutzmann Engineering Associates

Notes:

1. Not all utilities shown. Locate before future digging.



ENGINEERS

SURVEYORS

PLANNERS

STUTZMANN

ENGINEERING

ASSOCIATES, INC.

P.O. BOX 71429, FAIRBANKS, AK 99707

9 ADAK AVENUE, FAIRBANKS, AK 99701

(907) 452-4094 (C 627)

LOCATION:

Grant Mine

RECORD DRAWING

AS BUILT

CLOSURE

FOR: BURGGRAF

DRAWN:

MAS

CHECKED:

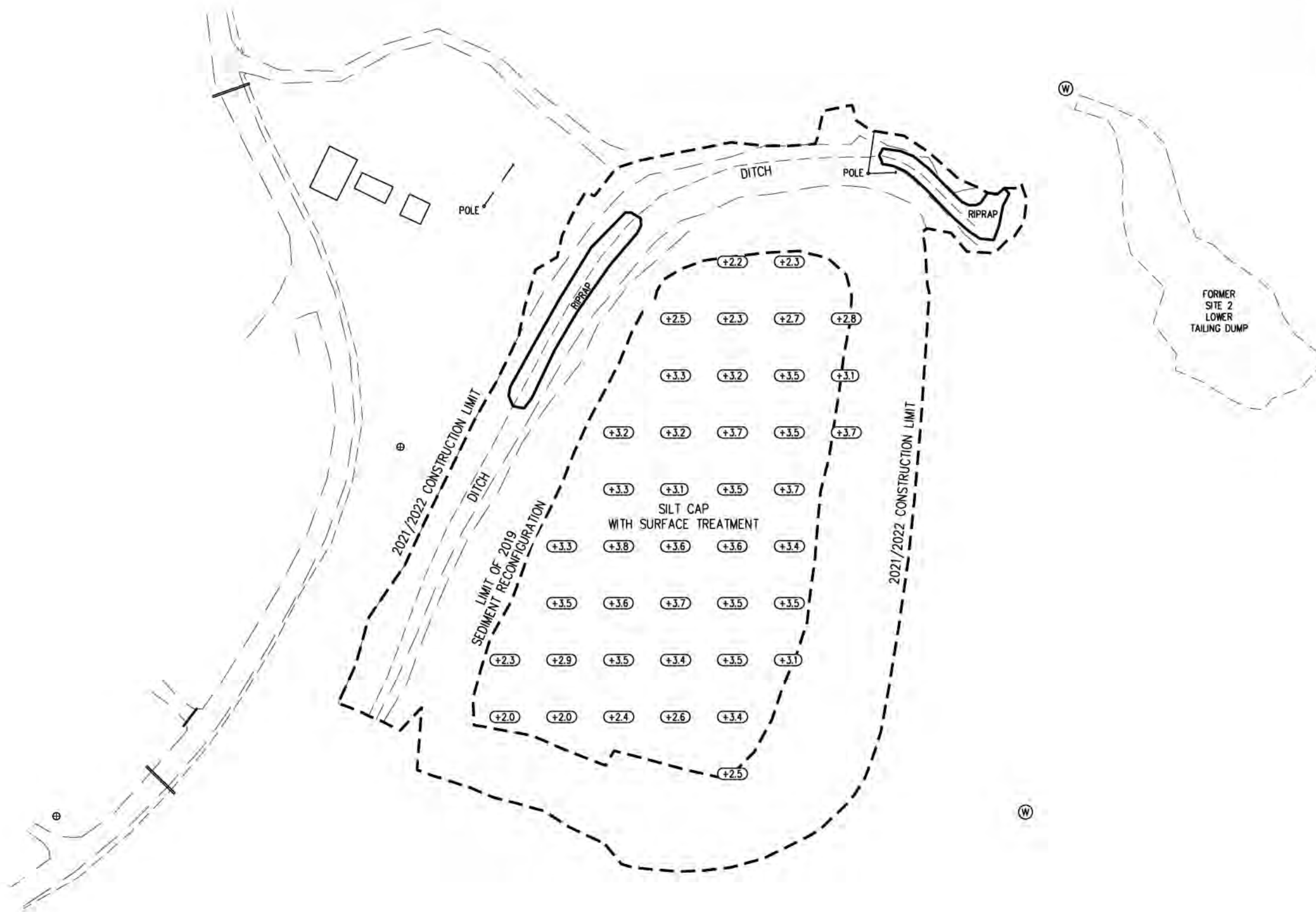
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9/16/22

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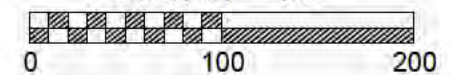
C627



NOTES:
1. This sheet shows cap thickness in feet comparing as-built survey September 16, 2022 to progress as-built survey November 11, 2019 of sediment reconfiguration.



SCALE: 1" = 100'



STUTZMANN ENGINEERING ASSOCIATES, INC.
ENGINEERS SURVEYORS PLANNERS
P.O. BOX 71429, FAIRBANKS, AK 99707
9 ADAK AVENUE, FAIRBANKS, AK 99701
(907) 452-4094 (C 627)

Grant Mine

AS-BUILT CAP THICKNESS

DRAWN: MAS

CHECKED:

DATE: 10/25/22

2

FOR: BURGGRAF

Appendix C

Compaction Testing Results

APPENDIX C: COMPACTION TESTING RESULTS

PROJECT NO. 31-1-20094-009

DATE 7/22/2021

REPORT NO. 1

S&W FIELD REP. Stephen Chase

COMPACTION TEST WORKSHEET

PROJECT NAME/LOCATION	Grant Mine
-----------------------	------------

WORKSHEET SUBMITTED TO	CONTRACTOR NAME AND CONTACT
Client Grant Mine	General
CC	Subcontractors

MAKE/MODEL OF NUCLEAR GAUGE	3411b
GAUGE SERIAL NUMBER	11137

	MOISTURE STANDARD	DENSITY STANDARD	DATE OF TEST
CURRENT STANDARD VALUES	584	1742	7/22/2021
MAXIMUM ACCEPTABLE STANDARDS			
MINIMUM ACCEPTABLE STANDARDS			
AVERAGE OF PREVIOUS FOUR			
PREVIOUS FOUR STANDARD VALUES			

COMPACTION TEST RESULTS

INDEX NO.	TIME	LOCATION	LIFT (ELEV.)	TEST NO.	MAT'L CODE	RETEST	TEST DEPTH (in)	PROCTOR DENSITY (pcf)	WET DENSITY (pcf)	DRY DENSITY (pcf)	M.C. (%)	% COMP.
1	2:15	1/3 North, 2/3 Right of Entrance	1	1	ML	---	6	98.1	120.7	104.0	16.0	106.0

LIMITATIONS: The Shannon & Wilson field representative is present on site solely to provide compaction testing services and keep our client informed of the preliminary test results. The presence and activities of the Shannon & Wilson field representative and our acceptance of any non-conforming work or failure to reject any non-conforming work does not relieve the contractor from complying with its contract documents. Shannon & Wilson does not have the authority to direct the contractor's work. Any information provided by the Shannon & Wilson field technician is intended solely to advise the contractor of the preliminary test results. The contractor is solely responsible for its means, methods, sequences, procedures, construction site safety, quality of work, and adherence to the contract documents.

REVIEW BY (initial/date)

wap 7/22/2021

Appendix D

L.A. Abrasion Test Results

APPENDIX D: L.A. ABRASION TEST RESULTS

PROJECT NO. 31-1-20094
 START/END DATE 8-10-2021/8-12-2021
 WORK ORDER 4274
 TEST METHOD ASTM C131/C535 AASHTO T96

L.A. ABRASION WORKSHEET

PROJECT NAME/LOCATION	Grant Mine
-----------------------	------------

CLIENT INFORMATION	S&W LAB TECHNICIANS	EQUIPMENT USED
Contact	Sample wash DMS	Balance(s) 269
Client	Gradation DMS	LA Abrasion
Address	LA Abrasion DMS	Oven(s) 187088
Email	Calculations DMS	Sieve(s) 123,76147e,134,135, 154
Phone	Data entry DMS	

SAMPLE IDENTIFICATION	
-----------------------	--

SIZE FRACTION		GRADING							SAMPLE MASS
PASSING	RETAINED	A	B	C	D	1	2	3	
3"	2 1/2"					2500 ± 50			
2 1/2"	2"					2500 ± 50			
2"	1 1/2"					5000 ± 50	5000 ± 50		
1 1/2"	1"	1250 ± 25					5000 ± 50	5000 ± 50	1243
1"	3/4"	1250 ± 25						5000 ± 50	1196*
3/4"	1/2"	1250 ± 10	2500 ± 10						1251
1/2"	3/8"	1250 ± 10	2500 ± 10						365*
3/8"	1/4"			2500 ± 10					
1/4"	NO. 4			2500 ± 10					
NO. 4	NO. 8				5000 ± 10				
TOTAL MASS (g)		5000 ± 10	5000 ± 10	5000 ± 10	5000 ± 10	10,000 ± 100	10,000 ± 100	10,000 ± 100	4055
NUMBER OF SPHERES		12	11	8	6	12	12	12	12
MASS OF SPHERES (g)		5000 ± 25	4584 ± 25	3330 ± 20	2500 ± 15	5000 ± 25	5000 ± 25	5000 ± 25	4993

SPHERE MASS (g)			
394	424	433	417
417	418	418	393
416	418	416	429
TOTAL MASS (g)			
4993			

MASS RETAINED ON THE NO. 12 SIEVE (g)	2789
LOSS (g)	1266
PERCENT LOSS	31%

NOTES: * Sample mass is below standard specification for mass fraction per sieve size.
 3/4" sample mass is below specification by 29g
 3/8" sample mass is below specification by 875g

REVIEW BY (initial/date)

Appendix E

Cumulative Risk Assessment Data

APPENDIX E: CUMULATIVE RISK ASSESSMENT DATA

TABLE 1
GRANT MINE TAILINGS IMPOUNDMENT CLOSURE
2018-2021 GROUNDWATER SAMPLE RESULTS

Analytical Method	Analyte	ADEC Cleanup Level	Units	M-1	M-101	M-2	M-1	M-2	M-102	M1	M2	M202	M1	M2	M101	M1	M2	M101
				9/14/2018	9/14/2018	9/14/2018	6/20/2019	6/20/2019	6/20/2019	10/17/2019	10/17/2019	10/17/2019	6/16/2021	6/16/2021	6/16/2021	9/27/2021	9/27/2021	9/27/2021
SW9016	Cyanide (free CN-)	1.5	µg/L	<0.544	<0.544	<0.544	1.04 J	1.42 J	1.55 J [†]	<0.544	<0.544	<0.544	<0.544	<0.544	<0.544	<0.544	<0.544	<0.544
SW6020A (Metals)	Antimony	7.8	µg/L	<1.50	<1.50	<1.50	—	—	—	—	—	—	—	—	—	—	—	—
	Arsenic	0.52	µg/L	61.5	65.1	196	—	—	—	—	—	—	—	—	—	—	—	—
	Barium	3,800	µg/L	42.8	44.8	12.2	—	—	—	—	—	—	—	—	—	—	—	—
	Cadmium	9.2	µg/L	<1.00	<1.00	<1.00	—	—	—	—	—	—	—	—	—	—	—	—
	Chromium	22,000	µg/L	<2.00	<2.00	<2.00	—	—	—	—	—	—	—	—	—	—	—	—
	Lead	15	µg/L	0.456 J	0.495 J	1.41	—	—	—	—	—	—	—	—	—	—	—	—
	Mercury	0.52	µg/L	0.249	0.237	<0.100	—	—	—	—	—	—	—	—	—	—	—	—
	Selenium	100	µg/L	<10.0	<10.0	<10.0	—	—	—	—	—	—	—	—	—	—	—	—
	Silver	94	µg/L	<1.00	<1.00	<1.00	—	—	—	—	—	—	—	—	—	—	—	—

Notes:

Regulatory groundwater cleanup levels were obtained from the November 2021 18 AAC 75.345 *Table C. Groundwater Cleanup Levels*.

Sample *M-101* is a field-duplicate of sample *M-1*.

Sample *M-102* is a field-duplicate of sample *M-2*.

Sample *M202* is a field-duplicate of sample *M2*.

The most recent analytical results for each location were assessed for inclusion in the cumulative risk evaluation.

ADEC Alaska Department of Environmental Conservation

µg/L micrograms per liter

— Analyte not requested.

< Analyte not detected; result listed as less than the limit of detection (LOD).

J Estimated concentration, detected greater than the LOD and less than the limit of quantitation (LOQ). Flag applied by the laboratory.

Bold Detected concentration exceeds the ADEC Human Health groundwater cleanup level.

Result Maximum concentration detected for the analyte in the dataset.

Red Bold Maximum concentration detected for the analyte in the dataset exceeds one-tenth of the DEC human health cleanup level.

[†] Cyanide was not included in the cumulative risk evaluation; though cyanide was detected in 2019, it was not detected in subsequent samples.

Site-specific Risk Models

Groundwater Inputs

1

Variable	Value
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m ³	0.5
I _{sc} (apparent thickness of stratum corneum) cm	0.001
ED _{res} (exposure duration - resident) year	26
ED _{child} (exposure duration - child) year	6
ED _{adult} (exposure duration - adult) year	20
ED ₁ (mutagenic exposure duration first phase) year	2
ED ₂ (mutagenic exposure duration second phase) year	4
ED ₃ (mutagenic exposure duration third phase) year	10
ED ₄ (mutagenic exposure duration fourth phase) year	10
EF _{res} (exposure frequency) day/year	350
EF _{child} (exposure frequency - child) day/year	350
EF _{adult} (exposure frequency - adult) day/year	350
EF ₁ (mutagenic exposure frequency first phase) day/year	350
EF ₂ (mutagenic exposure frequency second phase) day/year	350
EF ₃ (mutagenic exposure frequency third phase) day/year	350
EF ₄ (mutagenic exposure frequency fourth phase) day/year	350
ET _{age} (age-adjusted exposure time) hour/event	0.67077
ET _{mutagenic} (mutagenic age-adjusted exposure time) hour/event	0.67077
ET _{res} (exposure time) hour/day	24
ET _{child} (dermal exposure time - child) hour/event	0.54
ET _{adult} (dermal exposure time - adult) hour/event	0.71
ET _{child} (inhalation exposure time - child) hour/day	24
ET _{adult} (inhalation exposure time - adult) hour/day	24
ET ₁ (mutagenic inhalation exposure time first phase) hour/day	24
ET ₂ (mutagenic inhalation exposure time second phase) hour/day	24
ET ₃ (mutagenic inhalation exposure time third phase) hour/day	24
ET ₄ (mutagenic inhalation exposure time fourth phase) hour/day	24
ET ₁ (mutagenic dermal exposure time first phase) hour/event	0.54
ET ₂ (mutagenic dermal exposure time second phase) hour/event	0.54
ET ₃ (mutagenic dermal exposure time third phase) hour/event	0.71
ET ₄ (mutagenic dermal exposure time fourth phase) hour/event	0.71
BW _{res} (body weight - adult) kg	80

Site-specific Risk Models

Groundwater Inputs

2

Variable	Value
BW_{FPCSWR} (body weight - child) kg	15
BW_{N2} (mutagenic body weight) kg	15
BW_{2R} (mutagenic body weight) kg	15
$BW_{\text{R-1R}}$ (mutagenic body weight) kg	80
$BW_{\text{1R-2R}}$ (mutagenic body weight) kg	80
IFW_{FPCSWR} (adjusted intake factor) L/kg	327.95
$IFWM_{\text{FPCSWR}}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{FPCSWR} (water intake rate - child) L/day	0.78
IRW_{FPCSWR2} (water intake rate - adult) L/day	2.5
IRW_{N2} (mutagenic water intake rate) L/day	0.78
IRW_{2R} (mutagenic water intake rate) L/day	0.78
$IRW_{\text{R-1R}}$ (mutagenic water intake rate) L/day	2.5
$IRW_{\text{1R-2R}}$ (mutagenic water intake rate) L/day	2.5
EV_{FPCSWR} (events - adult) per day	1
EV_{FPCSWR2} (events - child) per day	1
EV_{N2} (mutagenic events) per day	1
EV_{2R} (mutagenic events) per day	1
$EV_{\text{R-1R}}$ (mutagenic events) per day	1
$EV_{\text{1R-2R}}$ (mutagenic events) per day	1
DFW_{FPCSWR} (age-adjusted dermal factor) $\text{cm}^2\text{-event/kg}$	2610650
$DFWM_{\text{FPCSWR}}$ (mutagenic age-adjusted dermal factor) $\text{cm}^2\text{-event/kg}$	8191633
SA_{FPCSWR} (skin surface area - child) cm^2	6365
SA_{FPCSWR2} (skin surface area - adult) cm^2	19652
SA_{N2} (mutagenic skin surface area) cm^2	6365
SA_{2R} (mutagenic skin surface area) cm^2	6365
$SA_{\text{R-1R}}$ (mutagenic skin surface area) cm^2	19652
$SA_{\text{1R-2R}}$ (mutagenic skin surface area) cm^2	19652

Site-specific Risk Models

Groundwater Cumulative Risk

Groundwater

3

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

***The sum of PFOS and PFOA concentrations should not exceed 0.07 ug/L.**

Chemical	Mutagen?	Volatile?	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ³)	Chronic RfC Ref	Ingestion SF (mg/kg-day) ⁻¹	SFO Ref	Inhalation Unit Risk (μg/m ³) ⁻¹	IUR Ref	GIABS	MW	log K _{ow} (unitless)	In EPD?
Mercury (elemental)	No	Yes	1.60E-04	C	3.00E-04	I	-		-		1	200.59	6.20E-01	Yes
*Total Risk/Hi			-		-		-		-		-	-	-	

Concentration (μg/L)	Ingestion Noncarcinogenic CDI Child	Inhalation Noncarcinogenic (Volatiles) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child
2.49E-01	1.24E-05	1.19E-04	5.47E-08	-	-	-	7.76E-02	3.98E-01
-	-	-	-	-	-	-	7.76E-02	3.98E-01

Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Dermal Risk	Carcinogenic Risk
3.42E-04	4.76E-01	-	-	-	-
3.42E-04	4.76E-01	-	-	-	-

TABLE 2
GRANT MINE TAILINGS IMPOUNDMENT CLOSURE
PRIMARY TAILINGS IMPOUNDMENT HISTORICAL SOIL SAMPLE RESULTS

SHANNON & WILSON, INC.

Analyte	ADEC Cleanup Level	Sample ID: Sampler: Units	88021004 ADEC 2/17/1988 Sediment	88021005 ADEC 2/17/1988 North Edge Pit	AGI#840 AMAX 5/1/1989 Tailings	SS001 EPA 7/19/1994 South Pit	SS002 EPA 7/19/1994 North Pit	SS002 ^a EPA 7/19/1994 North Pit	SSCP769040196 Tri-Con 4/1/1996 Surface Composite	SSCP760040196 Tri-Con 4/1/1996 Mid-depth Composite	SSCP760040196D ^b Tri-Con 4/1/1996 Mid-depth Composite	SSCP751040196 Tri-Con 4/1/1996 Deep Composite	SSCP751040196D ^c Tri-Con 4/1/1996 Deep Composite
Antimony	41	mg/kg	0.278	0.250	--	1950	1320	870	24.0	18.0	10.6	<MDL	<MDL
Arsenic	8.8	mg/kg	3020	3980	548	3600J	3230J	3210J	4410	4830	4770	6310	5630
Barium	20000	mg/kg	16.9	36.1	--	54.5J	12.3J	15.5J	30.7	24.0	26.1	39.9	37.9
Beryllium	200	mg/kg	--	--	--	0.47J	0.310J	0.320J	0.350	0.240	0.270	0.350	0.320
Cadmium	92	mg/kg	<1.00	<1.00	0.420	--	--	--	2.40	1.90	1.80	2.20	2.00
Chromium	1.0 x 10 ³	mg/kg	8.96	14.7	--	31.7	16.6	16.0	22.2	9.90	10.8	15.8	15.6
Cobalt	—	mg/kg	--	--	--	8.0J	6.60J	6.20J	--	--	--	--	--
Copper	4100	mg/kg	21.3 ^d	27.7 ^d	12.7	45.9	31.5	30.4	29.4	26.4	25.7	30.5	30.2
Cyanide (total)	—	mg/kg	--	--	5.87	8.60	<1.10	<1.10	4.31	0.97	2.46	14.60	16.5
Cyanide (WAD)	—	mg/kg	--	--	<0.0400	--	--	--	2.18	0.56	0.400	3.74	4.35
Cyanide (free)	34	mg/kg	--	--	--	--	--	--	0.0800	<MDL	<MDL	0.7	0.670
Lead	400	mg/kg	16.9	29.0	85.2	188	100	83.0	399	106	112	216	217
Manganese	2700	mg/kg	--	--	--	393	312	267	--	--	--	--	--
Mercury	3.1	mg/kg	<0.500	0.730	0.0000720	1.00	<0.110	1.30	0.850	2.11	0.600	0.110	0.110
Nickel	2000	mg/kg	--	--	--	30.4	29.0	23.7	23.8	11.3	11.4	14.3	13.8
Selenium	510	mg/kg	--	--	--	--	--	--	4.80	2.60	2.80	3.30	3.50
Silver	510	mg/kg	--	--	--	5.70J	9.60J	6.00J	<MDL	<MDL	<MDL	<MDL	<MDL
Thallium	1.0	mg/kg	--	--	--	--	--	--	<MDL	<MDL	<MDL	<MDL	<MDL
Vanadium	510	mg/kg	--	--	--	12.0J	7.70J	7.80J	--	--	--	--	--
Zinc	30000	mg/kg	27.8	36.8	36.5	78.5	78.5	54.3	78.5	36.4	87.5	44.4	39.9
Total Solids	—	%	--	--	--	--	--	--	75.8	88.5	88.4	77.0	76.6
pH	—	--	--	--	--	--	--	--	8.7	9.8	9.8	9.8	9.9

Notes:

ADEC Soil Cleanup Levels from 18 AAC 75.341: Table B1. Method Two - Human Health (Under 40-Inch Zone)

^a Sample SS002^a is a field duplicate of sample SS002.

^b Sample SSCP760040196D^b is a field duplicate of sample SSCP760040196.

^c Sample SSCP751040196D^c is a field duplicate of sample SSCP751040196.

^d Analyte concentration may be lower due to unknown analytical interferences.

ADEC Alaska Department of Environmental Conservation

mg/kg milligrams per kilogram

J Estimated concentration

< Analyte not reported above limit of detection.

-- Analysis not requested

— ADEC cleanup level not established for this analyte.

Bold Detected concentration exceeds the ADEC Human Health (Under 40-Inch Zone) soil cleanup level.

Result Maximum concentration detected for the analyte in the dataset.

Red Bold Maximum concentration detected for the analyte in the dataset exceeds one-tenth of the DEC human health cleanup level.

TABLE 3
GRANT MINE TAILINGS IMPOUNDMENT CLOSURE
SECONDARY TAILINGS IMPOUNDMENT OCTOBER 2019 SOIL SAMPLE RESULTS

ADEC Cleanup Level →		Antimony 41 mg/kg	Arsenic 8.8 mg/kg	Barium 20,000 mg/kg	Cadmium 92 mg/kg	Chromium 100,000 mg/kg	Lead 400 mg/kg	Mercury 3.1 mg/kg	Selenium 510 mg/kg	Silver 510 mg/kg
19GM-DU1		<0.560	13.8	184	0.268	26.8	9.85	0.0496 J	0.733 J	0.115 J
19GM-DU2		0.601 J	55.1	174	0.251	26.8	14.1	0.0436 J	0.705 J	0.28
19GM-DU3	Replicate A	<0.565	15.2	178	0.26	26.2	11.6	0.0400 J	0.741 J	0.117 J
	Replicate B	<0.565	18.9	205	0.284	26.5	11	0.0401 J	0.694 J	0.130 J
	Replicate C	<0.565	19.8	176	0.235	25.9	9.95	0.0454 J	0.631 J	0.137 J
	95% UCL	<0.565	24.1	227	0.321	27.0	12.95	0.0496 J	0.828 J	0.154 J
GM19-1		<0.570	11.5	194	0.161 J	28.6	9.46	0.0407 J	0.607 J	0.118 J
GM19-10		<0.545	15.0	184	0.247	25.7	10.3	0.0409 J	0.464 J	0.136 J
GM19-2		<0.580	9.09	183	0.252	31.4	9.75	0.0468 J	0.518 J	0.101 J
GM19-3		0.763 J	110	171	0.177 J	28.9	15.1	0.0629 J	0.740 J	0.324
GM19-4		<0.595	50.0	152	0.157 J	31.5	8.82	0.0721 J	0.836 J	0.150 J
GM19-5		<0.565	8.22	168	0.188 J	28.3	9.38	0.0423 J	0.544 J	0.127 J
GM19-6		<0.575	13.9	209	0.205 J	28.8	9.53	0.0332 J	0.696 J	0.117 J
GM19-7		<0.620	12.3	216	0.217 J	30.4	9.41	0.0349 J	0.527 J	0.0899 J
GM19-8		<0.575	14.6	211	0.163 J	28.7	9.94	0.0323 J	0.644 J	0.113 J
GM19-9		<0.565	14.8	186	0.254	26.8	10.4	0.0450 J	0.517 J	0.144 J

Notes: ADEC Soil Cleanup Levels from 18 AAC 75.341: *Table B1. Method Two - Human Health (Under 40-Inch Zone)*
Sample GM19-10 is a field duplicate of sample GM19-1.
Sample results presented in milligrams per kilogram.

ADEC Alaska Department of Environmental Conservation
mg/kg milligrams per kilogram
95% UCL 95% upper confidence limit of mean concentration
J Estimated concentration, detected greater than the limit of detection (LOD) and less than the limit of quantitation (LOQ). Flag applied by the laboratory.
< Analyte not detected; result listed as less than the limit of detection (LOD).
Bold Detected concentration exceeds the ADEC Human Health (Under 40-Inch Zone) soil cleanup level.

Result Maximum concentration detected for the analyte.
Red Bold Maximum concentration detected for the analyte in the dataset exceeds one-tenth of the DEC human health cleanup level.

Site-specific Risk Models

Resident Soil (<40 in. Zone) Inputs

1

Variable	Value
ED _{res} (exposure duration - resident) yr	26
ED _{resc} (exposure duration - child) yr	6
ED _{resca} (exposure duration - adult) yr	20
ET _{res} (exposure time - resident) hr/day	24
ET _{resc} (exposure time - child) hr/day	24
ET _{resca} (exposure time - adult) hr/day	24
BW _{res} (body weight - adult) kg	80
BW _{resc} (body weight - child) kg	15
SA _{resca} (skin surface area - adult) cm ² /day	6032
SA _{resc} (skin surface area - child) cm ² /day	2373
LT (lifetime - resident) yr	70
EF _{res lt AN in} (exposure frequency - resident) day/yr	270
EF _{resc lt AN in} (exposure frequency - child) day/yr	270
EF _{resca lt AN in} (exposure frequency - adult) day/yr	270
IRS _{resca} (soil intake rate - adult) mg/day	100
IRS _{resc} (soil intake rate - child) mg/day	200
AF _{resca} (skin adherence factor - adult) mg/cm ²	0.07
AF _{resc} (skin adherence factor - child) mg/cm ²	0.2
IFS _{res lt AN in arli} (age-adjusted soil ingestion factor) mg/kg	28350
DFS _{res lt AN in arli} (age-adjusted soil dermal factor) mg/kg	79758
IFSM _{res lt AN in arli} (mutagenic age-adjusted soil ingestion factor) mg/kg	128700
DFSM _{res lt AN in arli} (mutagenic age-adjusted soil dermal factor) mg/kg	330372
AF _{0.7} (skin adherence factor) mg/cm ²	0.2
AF _{7.6} (skin adherence factor) mg/cm ²	0.2
AF _{6.16} (skin adherence factor) mg/cm ²	0.07
AF _{16.76} (skin adherence factor) mg/cm ²	0.07
BW _{0.7} (body weight) kg	15
BW _{7.6} (body weight) kg	15
BW _{6.16} (body weight) kg	80
BW _{16.76} (body weight) kg	80
ED _{0.7} (exposure duration) yr	2
ED _{7.6} (exposure duration) yr	4
ED ₆₋₁₆ (exposure duration) yr	10

Site-specific Risk Models

Resident Soil (<40 in. Zone) Inputs

2

Variable	Value
ED ₁₆₋₂₆ (exposure duration) yr	10
EF _{0.7 # 40 in} (exposure frequency) day/yr	270
EF _{2.5 # 40 in} (exposure frequency) day/yr	270
EF _{6-16 # 40 in} (exposure frequency) day/yr	270
EF _{16-26 # 40 in} (exposure frequency) day/yr	270
ET _{0.7} (exposure time) hr/day	24
ET _{2.5} (exposure time) hr/day	24
ET ₆₋₁₆ (exposure time) hr/day	24
ET ₁₆₋₂₆ (exposure time) hr/day	24
IRS _{0.7} (soil intake rate) mg/day	200
IRS _{2.5} (soil intake rate) mg/day	200
IRS ₆₋₁₆ (soil intake rate) mg/day	100
IRS ₁₆₋₂₆ (soil intake rate) mg/day	100
SA _{0.7} (skin surface area) cm ² /day	2373
SA _{2.5} (skin surface area) cm ² /day	2373
SA ₆₋₁₆ (skin surface area) cm ² /day	6032
SA ₁₆₋₂₆ (skin surface area) cm ² /day	6032
A _e (acres)	0.5
Q/C _{un} (g/m ² -s per kg/m ³)	93.7736
PEF (particulate emission factor) m ³ /kg	1.36E09
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V(fraction of vegetative cover) unitless	0.5
U _m (mean annual wind speed) m/s	4.69
U _t (equivalent threshold value)	11.32
F(x) (function dependent on U _m /U _t) unitless	0.194
A _e (acres)	0.5
Q/C _{un} (g/m ² -s per kg/m ³)	93.7736
foc (fraction organic carbon in soil) g/g	0.001
p _s (dry soil bulk density) g/cm ³	1.5
p _c (soil particle density) g/cm ³	2.65
Theta _w (water-filled soil porosity)L _{water} /L _{soil}	0.15

Site-specific Risk Models

Resident Soil (<40 in. Zone) Inputs

3

Variable	Value
Theta _a (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	16.2302
B (VF Dispersion Constant)	18.7762
C (VF Dispersion Constant)	216.108

Site-specific Risk Models

Resident Cumulative Risk

Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),

max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility

I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Mutagen?	Volatile?	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ³)	Chronic RfC Ref	Ingestion SF (mg/kg-day) ⁻¹	SFO Ref	Inhalation Unit Risk (μg/m ³) ⁻¹	IUR Ref	GIABS	ABS	MW	ρ (g/cm ³)
Antimony (metallic)	No	No	4.00E-04	I	-		-		-		0.15	-	121.76	6.68E+00
Arsenic, Inorganic	No	No	3.00E-04	I	1.50E-05	C	1.50E+00	I	4.30E-03	I	1	0.03	74.922	4.90E+00
Lead and Compounds	No	No	-		-		-		-		1	-	207.2	1.13E+01
Manganese (Non-diet)	No	No	2.40E-02	S	5.00E-05	I	-		-		0.04	-	54.938	7.30E+00
Mercury (elemental)	No	Yes	1.60E-04	C	3.00E-04	I	-		-		1	-	200.59	1.35E+01
<i>*Total Risk/HI</i>			-		-		-		-		-	-	-	-

Site-specific Risk Models

Resident Cumulative Risk

Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),

max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility

I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

D _{ia} (cm ² /s)	D _{iw} (cm ² /s)	H [*]	Volatilization Factor (m ³ /kg)	K _{gc} (cm ³ /g)	K _d (cm ³ /g)	Particulate Emission Factor (m ³ /kg)	RBA	Concentration (mg/kg)	Ingestion Noncarcinogenic	Inhalation Noncarcinogenic (Volatiles)
									CDI Child	CDI Child
-	-	-	-	-	4.50E+01	1.36E+09	1.00E+00	1.95E+03	1.92E-02	-
-	-	-	-	-	2.90E+01	1.36E+09	6.00E-01	6.31E+03	3.73E-02	-
-	-	-	-	-	9.00E+02	1.36E+09	1.00E+00	3.99E+02	-	-
-	-	-	-	-	6.50E+01	1.36E+09	1.00E+00	3.93E+02	3.88E-03	-
3.07E-02	6.30E-06	3.52E-01	4.77E+04	-	5.20E+01	1.36E+09	1.00E+00	2.11E+00	2.08E-05	3.27E-05
-	-	-	-	-	-	-	-	-	-	-

Site-specific Risk Models

Resident Cumulative Risk

Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),

max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility

I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Inhalation Noncarcinogenic (Particulates) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Inhalation (Particulates) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child	Inhalation (Particulates) HI Child	Dermal HI Child
-	-	-	-	-	-	4.81E+01	-	-	-
3.43E-06	4.43E-03	4.20E-03	-	1.27E-03	5.91E-04	1.24E+02	-	2.29E-01	1.48E+01
-	-	-	-	-	-	-	-	-	-
2.14E-07	-	-	-	-	-	1.62E-01	-	4.28E-03	-
1.15E-09	-	-	-	-	-	1.30E-01	1.09E-01	3.83E-06	-
-	-	-	-	-	-	1.73E+02	1.09E-01	2.33E-01	1.48E+01

Site-specific Risk Models

Resident Cumulative Risk

Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
 max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility

I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
4.81E+01	-	-	-	-	-
1.39E+02	6.30E-03	-	5.48E-06	8.86E-04	7.19E-03
-	-	-	-	-	-
1.66E-01	-	-	-	-	-
2.39E-01	-	-	-	-	-
1.88E+02	6.30E-03	-	5.48E-06	8.86E-04	7.19E-03

Appendix F

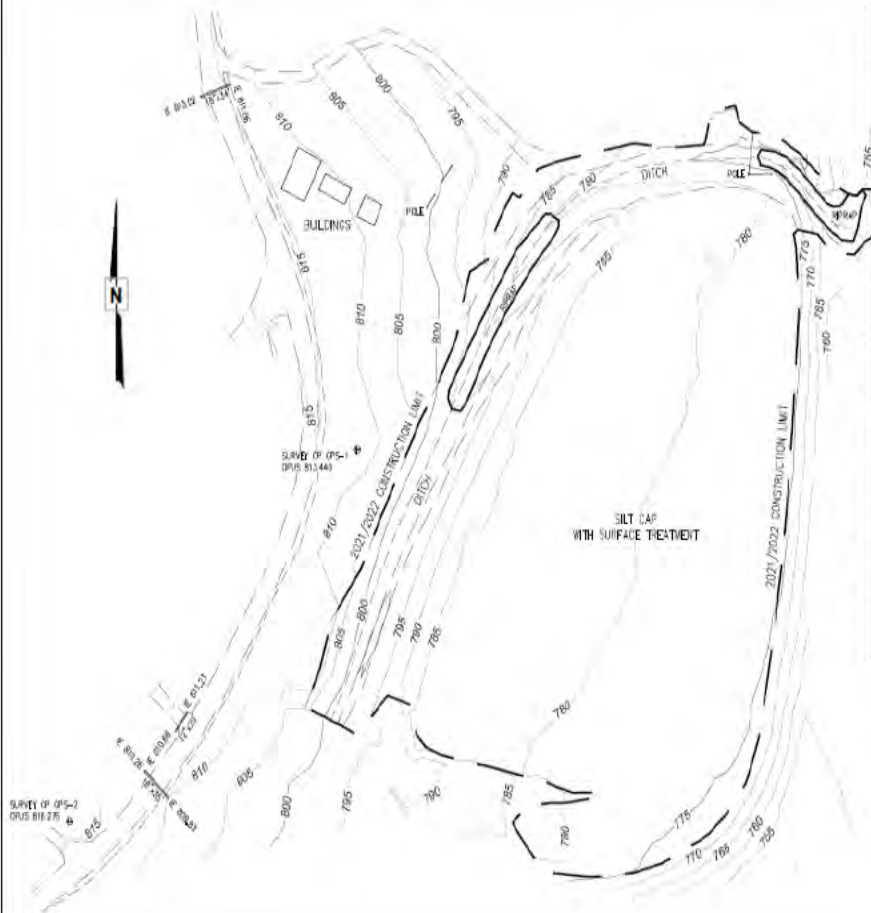
Post-Closure Monitoring Form

APPENDIX F: POST-CLOSURE MONITORING FORM

POST-CLOSURE MONITORING FORM

GRANT MINE TAILINGS IMPOUNDMENT ESTER, ALASKA

This form is to be used to document post-closure monitoring required for the Grant Mine Tailings Impoundment. Post-closure inspections will be performed by a person/entity who is familiar with the site and closure requirements. Inspections will be performed monthly for a period of 5 years following closure. Monitoring will be limited to the months from April to October due to the prevalence of snow cover and freezing conditions during the winter months. DNR-DMLW will then monitor the site yearly for 5 years, and every five years after. Reports will be provided to ADEC and DNR-DMLW SAIL Section.



1. Note the following, if present, on the figure . Document with photos as appropriate.

- Any signs of erosion, settlement, or slumping of the impoundment cap or perimeter embankment.
- Areas of grass and other vegetative ground-cover greater than approximately 50% on impoundment cap and unlined ditches.
- Signs of surface water runoff (overland flow) on the impoundment cap surface and apparent direction of flow.
- Pooling water.

2. Note the observer's route or observation points during the site inspection.

3. Is vegetative growth well established on the perimeter embankment (trees/shrubs)?	<u>Yes / No</u>
4. Are brush barriers on the impoundment cap surface in place and in a suitable state to limit traversable routes.	<u>Yes / No</u>
5. Are there signs of degradation of the terraces/scarification on the impoundment cap surface.	<u>Yes / No</u>
6. Are surface drainage system components in good condition (culverts clear and functioning, drainage ditch erosion/sedimentation, roadbed integrity). Alert DOT&PF if road maintenance is needed to protect drainage plan.	<u>Yes / No</u>

Actions Taken Since Previous Inspection: _____

Actions Indicated by Current Inspection: _____

Personnel _____

Weather _____

Company _____

Date _____

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged

to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

IMPORTANT INFORMATION

Appendix C
Third Party Interests Map

Third Party Interests

Legend

- Fairbanks North Star Borough Parcels
- Easement
- Mental Health Trust
- State TA Patented

531 Saint Patrick
Private Residence

537 Saint Patrick
Private Residence

GVEA Easement

Excavated
secondary tailings

Capped primary
tailings

BLM Mineral
Survey 2485

Survey ASLS No. 79-246

0 0.05 0.1 0.2 Miles

Appendix D
DEC approved Groundwater-Quality Assessment Summary



THE STATE
of **ALASKA**
GOVERNOR MIKE DUNLEAVY

Department of Environmental
Conservation

SPILL PREVENTION & RESPONSE
Contaminated Sites Program

610 University Avenue
Fairbanks, Alaska 99709
Main: 907.451.2143
Fax: 907.451.2155
www.dec.alaska.gov

File: 100.38.182

November 29, 2021

Electronic Distribution Only

Roger Burggraf
3180 Peger Road, Suite 270
Fairbanks, Alaska 99709

RE: ADEC Comments – Groundwater-Quality Assessment Summary, Grant Mine, Ester Dome, Alaska

Dear Mr. Burggraf:

The Alaska Department of Environmental Conservation, Contaminated Sites Program (ADEC) has reviewed the above-referenced document provided to our office October 26, 2021. There have been three consecutive sample events where Free Cyanide was non-detect or below our groundwater cleanup levels. This satisfies our remaining requirements and ADEC will not require additional sampling of the groundwater for free cyanide. Site closure can proceed after ADEC receives a closure plan and final cleanup report from your consultant and determines final compliance. ADEC approves the above-referenced report and requests a plan to decommission groundwater monitoring wells.

Thank you for your efforts at this site. Please contact me at (907) 451-2911 or via email at laura.jacobs@alaska.gov if you have any questions or concerns about this letter.

Sincerely,

A handwritten signature in cursive script, appearing to read "Laura Jacobs".

Laura Jacobs
Environmental Program Specialist

cc (via email): Mark Lockwood, Shannon & Wilson
Patty Burns, MLW-SAIL, ADNR
Alyssa Millard, MLW-SAIL, ADNR

Doug Buteyn, Solid Waste Program, ADEC

Appendix E
DNR Dam Safety Decision to Deregulate the Grant Mine Tailings Dam



THE STATE
of **ALASKA**
GOVERNOR MIKE DUNLEAVY

Department of Natural Resources

DIVISION OF MINING, LAND & WATER
Water Resources Section

550 West 7th Avenue, Suite 1020
Anchorage, Alaska 99501-3579
Main: 907.269.8600
TDD: 907.269.8411
Fax: 907.269.8904

December 8, 2022

Mr. Roger Burggraf
830 Sheep Creek Road
Fairbanks, AK 99709

RE: DECISION TO DEREGULATE GRANT MINE TAILINGS DAM (NID# AK00409)

Dear Mr. Burggraf:

The Dam Safety and Construction Unit of the Alaska Department of Natural Resources (ADNR) has determined that Grant Mine Tailings Dam (ID#AK00409) is no longer under regulation per Article 3 Dam Safety of Chapter 93 in Title 11 of the Alaska Administrative Code (11 AAC 93). It is determined by ADNR that the barrier in its current configuration no longer meets the statutory definition of a dam defined in AS 46.17.

ADNR's decision to deregulate this barrier is based on the completion of the modifications approved in *Certificate of Approval to Abandon a Dam (FY2021-31-AK00409)* and satisfaction of the associated special conditions. This decision does not alleviate you of any legal obligations that may be required by local, state, or federal agencies, including other units of ADNR and the Alaska Department of Environmental Conservation (ADEC). Nor does this decision address the disposition of on-site contamination. You may remain subject to other state agency oversight, which may require undertaking action with respect to such contamination.

An eligible person affected by this decision, and who provided timely written comment or public hearing testimony to the department, may appeal the decision to the DNR Commissioner per AS 44.37.011 and 11 AAC 02. Any appeal must be received within twenty (20) calendar days after issuance of this decision under 11 AAC 02.040. An eligible person must first appeal a decision to the Commissioner before seeking relief in superior court. The Alaska State Courts establish its own rules for timely appealing final administrative orders and decisions of the department.

Appeals may be mailed or hand-delivered to the DNR Commissioner's Office, 550 W. 7th Avenue, Suite 1400, Anchorage, Alaska, 99501; or faxed to (907)-269-8918; or sent by electronic mail to dnr.appeals@alaska.gov. Appeals must be accompanied by the fee established in 11 AAC 05.160(d)(6), which has been set at \$200 under the provisions of 11 AAC 05.160 (a)-(b). A .pdf or print copy of 11 AAC 02 may be obtained by contacting Erik Fossum via phone at (907) 269-8429, via email at erik.fossum@alaska.gov, and is also available on the department's website at <https://dnr.alaska.gov/mlw/pdf/DNR-11-AAC-02.pdf>. This decision takes effect immediately. If no appeal is filed by the appeal deadline, this decision becomes a final administrative order and decision of the department on the 31st calendar day after issuance. An eligible person must first appeal this decision in accordance with 11 AAC 02 before appealing this decision to Superior Court. A copy of 11 AAC 02 may be obtained from any regional information office of the Department of Natural Resources.

Please contact the Dam Safety and Construction Unit before making any modifications that would potentially change the jurisdictional status of the barrier. Thank you for your continued attention to the safety of the Grant Mine Tailings Dam.

Respectfully,



Ben Wagner, P.E.
State Dam Safety Engineer

Enclosures— *Hazard Potential Classification and Jurisdictional Review form*

Cc:

Tom Barrett (ADNR)
Jeanne Pigors (ADNR)
Stephen Buckley (ADNR)
Alyssa Millard (ADNR)
Janice Wieger (ADEC)
Laura Jacobs (ADEC)



Alaska Dam Safety Program

HAZARD POTENTIAL CLASSIFICATION AND JURISDICTIONAL REVIEW

This form is used to review and indicate the hazard potential classification of an artificial barrier in accordance with 11 AAC 93.157 and to determine if the barrier is a dam under the jurisdiction of the Alaska dam safety regulations, based on the definition articulated under Alaska Statute 46.17.900 (3), and summarized as follows:

- “Dam” includes an artificial barrier, and its appurtenant works, which may impound or divert water and which...
- has or will have an impounding capacity at maximum water storage elevation of 50 acre-feet and is at least 10 feet in height measured from the lowest point at either the upstream or downstream toe of the dam to the crest of the dam; or
 - is at least 20 feet in height measured from the lowest point at either the upstream or downstream toe of the dam to the crest of the dam; or
 - poses a threat to lives and property as determined by the department after an inspection.

In accordance with 11 AAC 93.151, an artificial barrier with a Class I or Class II designation is determined to meet the third definition of a dam, regardless of its geometry.

Please complete items 1 through 20. Attach additional information as necessary. This form must be certified and stamped on page 3 by an Alaska-registered professional engineer, qualified in accordance with 11 AAC 93.193.

1. Name of barrier: Grant Mine Tailings Impoundment
- National Inventory of Dams (NID) number: AK00409 (Assigned by Department)
- Name of stream: NA - located on ridge top
- General location and region: Longitude 147.9603 W, Latitude 64.8800 N
- Legal location: Township 1 N Range 2 W Section 28 Meridian Fairbanks
- Purpose and type of barrier: Mine tailings impoundment
- This barrier is: ☒ Existing ☐ Proposed ☐ Under construction
- Current hazard potential classification: ☐ I ☐ II ☒ III ☐ Not assigned
2. Owner: Mr. Roger Burggraf
- Address: 830 Sheep Creek Road
- Fairbanks, Alaska 99709
- Contact name: Roger Burggraf
- Phone: 907-874-3904
3. Is barrier federally owned, or regulated by the Federal Energy Regulatory Commission?
- ☐ Yes (stop here) ☒ No (complete form)

4. Maximum crest height of barrier: 20 feet
Measured from: ☐ Upstream toe ☒ Downstream toe ☐ Offstream toe
Basis of height: ☐ Conceptual design drawing ☐ Detailed design drawing
☒ As-built drawing ☐ Field measurement ☐ NID data
5. Maximum impoundment volume: 66 acre-feet
Surface area of reservoir at maximum storage: 3.3 acres
Average depth of reservoir above bottom of barrier: 20 feet (live storage)
Basis of volume estimate: ☐ Surface area multiplied by average depth
☐ Bathymetry
☐ NID data
☒ Other: 2022 Stutzmann Engineering Design Asbuilt
6. Downstream development: ☐ Yes ☐ No ☐ Unknown
Type of development (check all that apply):
☐ Homes ☒ Power or communication utilities
☐ School ☐ Water or wastewater treatment facilities or lines
☐ Community halls, churches, etc. ☐ Overnight campgrounds
☐ Industrial or commercial property ☐ Public parks or trails
☐ Major highway ☐ Fish hatchery or processor
☐ Primary roads ☐ Barrier owner's property or facilities
☐ Secondary or rural roads ☐ Other utilities: _____
☐ Railroads ☐ Other development: _____
Basis of observations: ☐ Ground reconnaissance ☐ Aerial reconnaissance
☐ Aerial photo ☒ Other: GoogleEarth/USGS Map
Date of observations: 12-6-19
7. Proximity of development to downstream channel (add maps or other information as necessary):
Distance downstream from barrier: ~1.5 miles
Distance from stream bed: NA
Relative elevation above streambed: NA
8. Is development in the inundation zone of a flood from an uncontrolled release of water from the barrier?
☐ Yes ☒ No ☐ Unknown
9. Was a dam break analysis conducted? ☐ Yes ☒ No
What model was used to determine inundation zone: : _____
(Please attach calculations)
Maximum depth and velocity of flow through development: _____
10. Is development at risk from improper operation or a "sunny day" failure?
☐ Yes ☒ No ☐ Unknown
11. Is development at risk from an incremental increase in the flood if the barrier fails under flood conditions?
☐ Yes ☒ No ☐ Unknown
Flood condition evaluated: ☐ 100 year ☐ ½ PMF ☐ PMF ☐ Other No ability to impound water.

12. Could an uncontrolled release cause other significant property damage or loss?

☐ Yes ☒ No ☐ Unknown

Description: Barrier is a land form and cannot impound water.

13. Could an uncontrolled release effect public health?

☐ Yes ☒ No ☐ Unknown

Description: _____

14. Is the reservoir created by the barrier the primary water supply for a community of more than 500 residents?

☐ Yes ☒ No ☐ Unknown

Is a backup water supply available?

☐ Yes ☐ No ☐ Unknown ☒ N/A

15. Is barrier located on waters important to anadromous fish?

☐ Yes ☒ No ☐ Unknown

Are anadromous fish waters at risk of damage or loss if an uncontrolled release occurs?

☐ Yes ☐ No ☐ Unknown ☒ N/A

16. Does the barrier contain mine mill tailings, process water or contact water?

☒ Yes ☐ No

17. Proposed hazard potential classification: ☐ Class I (High) ☐ Class II (Significant) ☒ Class III (Low)

18. Basis of classification:

- ☐ Quantitative - Numerical dam break analysis conducted
☒ Qualitative - Limited engineering calculations
☐ Preliminary - No engineering calculations

19. Comments: The barrier has no capacity to impound water in the current closure configuration.

Barrier meets Class III (Low) hazard potential described in 11 AAC 93.157(a)(3) and is not a dam as defined in AS 46.17.900.

20. Certified by: Ben Wagner (Print name)

Date: December 5, 2022

Company: Alaska Department of Natural Resources

Phone: 907-269-8636



Notes:

1. This form must be certified and stamped by an Alaska-registered professional engineer qualified in accordance with 11 AAC 93.193.
2. The information presented in this form may be overruled based on current data that reveals a higher level of confidence in the quality of information necessary to make the appropriate determinations.
3. Anadromous fish waters are determined in accordance with 11 AAC 195.010 (a).
4. Alaska dam safety regulations are articulated under 11 AAC 93.151 through 11 AC 93.291 (Article 3).

FOR DEPARTMENT USE ONLY

Jurisdictional Status of Barrier:

☐ Dam under state jurisdiction☒ Barrier is not a dam under state jurisdiction

Reasons:

- ☐ Height
- ☐ Height and storage volume
- ☐ Hazard potential classification
- ☐ Anadromous fish stream
- ☐ Other: _____

Reasons:

- ☐ Height
- ☒ Height and storage volume
- ☒ Hazard potential classification
- ☐ Federal ownership or regulation
- ☐ Other: _____

Concur with proposed hazard potential classification:

☒ Yes☐ No

Hazard potential classification based on current information:

☒ Yes☐ No

Official hazard potential classification:

☐ Class I (High) ☐ Class II (Significant) ☒ Class III (Low)

Comments: _____

Reviewed by:

Tom Barrett

Title:

Natural Resource Manager 3

Signature:

Tom Barrett

Date:

12-8-2022

Appendix F
Draft Environmental Covenant



Alaska Department of Environmental Conservation

Environmental Covenant

Instructions and Covenant Template (Rev. April 2022)

INSTRUCTIONS FOR USE

1. **Track Changes:** Please keep this document in Microsoft Word® format and track any changes **until final revisions are agreed upon** between the Grantor and the Alaska Department of Environmental Conservation (DEC).
2. **Identify the Parcel(s) and Legal Description(s):** Identify the parcels subject to the covenant and a sufficient legal description for conducting a title search. Note: the boundaries of a contaminated site subject to an environmental covenant may encompass more than one parcel of real property. Therefore, a covenant will need to be filed for every parcel of real property with a sufficient legal description for each parcel. If multiple parcels are impacted by the contamination, you are responsible for coordinating with the landowners and ensuring that each contaminated parcel has a covenant.
3. **Title Search:** You must have a professional title search (often called a Limited Liability Report) performed by a title company for each parcel that will be subject to the covenant. The title search is necessary to verify the ownership of each parcel and any relevant property interests held by other parties or other encumbrances. A copy of the title report must be provided to DEC.
4. **Subordination:** The title report will identify any prior interests in the property that would supersede the covenant, such as liens, mortgages, easements, surface or subsurface land rights, or other encumbrances. If there are such property interests, DEC may require that you obtain a signed subordination agreement from the prior interest holder to subordinate their interest to the environmental covenant.
5. **Identify the Grantor(s) and Grantee(s):** The owner(s) of a parcel subject to the covenant is named as the grantor(s). The holder is named as the grantee. The holder may be the grantor, a third party, a municipality or other unit of government, or another person that expressly has the power to enforce the environmental covenant.
6. **Identify who will sign the covenant.** The Commissioner of DEC (or delegated department representative), every holder, and, unless waived by DEC, every owner of the fee simple real property subject to the covenant must sign. For an environmental covenant affecting a land or mineral interest of the Alaska Department of Natural Resources (DNR), the signature of the Commissioner of the DNR (or delegated department representative) may not be waived. In addition, DEC may require a specified person who has an interest in the real property that is

the subject of the covenant to sign.

7. **Identify who will receive a copy of the covenant.** A copy of the recorded covenant must be provided to:
 - a. each signer of the covenant;
 - b. each entity holding a recorded interest in the property;
 - c. each owner of the property;
 - d. the municipal government(s), if any part of the property is located within the boundaries of a city or borough; and
 - e. any other party stipulated by DEC.
8. **DEC Documentation.** If not already listed on the DEC Contaminated Sites Database, the property that is the subject of the covenant will be added to the DEC Contaminated Sites Database in “Informational” status after the covenant is recorded, and the property will be displayed on the Contaminated Sites Program (CSP) webmap. *[Include this paragraph only if the property is not already listed on the CSP database.]*
9. **Recording the covenant.** When the covenant has been signed by all parties, the Grantor must record the entire covenant, but not these instructions, with the DNR Recorder’s office. Some requirements for recording documents there are below. For more details please visit <http://dnr.alaska.gov/ssd/recoff/preparingDocs.cfm>.
 - **Legibility:** Document text must be of consistent clarity (no broken characters, or severe light and dark zones in text) to ensure that the camera can measure a strong light and dark contrast between text and background.
 - **Fee:** The appropriate fee should be submitted based on the charges identified on the current fee schedule. (See http://dnr.alaska.gov/ssd/recoff/fees_RO.cfm).
 - **“Return To” Name and Address:** “Return To” information must contain the name and complete mailing address (including zip code) of the person to whom the document may be returned after recording. If “Return To” information is in a cover letter, the letter may be recorded with the document (becoming part of the public record), provided the requisite fee is included. Failure to clearly identify the “Return To” information will result in non-acceptance. Please do not put “Return To” information in the margin area of the document.
 - **Signatures/Acknowledgment:** Document must be signed, and all signatures present must be originals (unless the document is a copy authorized to be recorded by other law). Conveyances, powers of attorney, contracts for sale or purchase of real property, and options for the purchase of real property must also be acknowledged. Please Note: Recording staff have no authorization to notarize documents.
 - **Mailing Addresses:** Environmental Covenant documents must contain complete mailing addresses of all persons who grant or acquire an interest.

- **Book and Page or Serial Number Reference:** Any document that amends, corrects, extends, modifies, assigns, or releases a previously recorded document must contain the book and page or serial number reference of the prior recording.
- **Document size and Media:** Documents must be submitted on OPAQUE WHITE paper stock no larger than 8.5" x 14" in size.
- **Legal Description:** On a document where a legal description is present, the legal description must be complete enough that a particular parcel can be geographically located and identified. A legal description is sufficient for purposes of recording if it contains, at a minimum, a section, township, range and meridian designation, or in the case of subdivided property the lot, block, and subdivision name, or plat number of the parcel.
- **Margins, Type Size, Paper:** Document must have a two-inch margin at top of first page, with one-inch margins on all remaining sides and on all subsequent pages of the same document. A \$50.00 non-standard document fee can be paid in addition to the appropriate recording fee if a document can't meet these margin requirements. Please note: Taping, gluing or stapling one page onto a bigger page to meet margins requirements is not acceptable and you will be charged the non-standard document fee if submitted in this fashion. The non-standard fee will also be charged for documents with two-hole punches at the top of any page. Type size must be no smaller than 10-point font.

For more information on recording requirements, fees, or office locations, please visit the DNR Recorder's Office at: www.recorder.alaska.gov



**This Property is subject to an Environmental Covenant
approved by the Alaska Department of Environmental Conservation**

ENVIRONMENTAL COVENANT

Grantor(s): State of Alaska, Department of Natural Resources
Division of Mining, Land, & Water
3700 Airport Way
Fairbanks, AK 99709

Holder/Grantee(s): State of Alaska, Department of Natural Resources
Division of Mining, Land, & Water
3700 Airport Way
Fairbanks, AK 99709

Check the following:

- ☒ Original Covenant
☐ Amendment of Covenant

RECITALS

- I. This document is an environmental covenant (hereafter "Covenant") executed pursuant to Alaska Statute (AS) 46.04.300–46.04.390, the Alaska Uniform Environmental Covenants Act (hereafter, "the Act"), and Title 18 of the Alaska Administrative Code (AAC) 75.325–390, (the "Site Cleanup Rules").
- II. The Property that is the subject of this Covenant is situated in Fairbanks, Alaska, is shown on the map attached as Appendix A, and is legally described as follows:

Government Lot 2 of the U.S. Government Plat of Survey accepted 1/5/1964 within Section 28, Township 1 North, Range 2 West, Fairbanks Meridian (the "Property").

- III. Hazardous substances, pollutants, and/or contaminants are present on or within the Property. As a result, all or part of the Property is a DEC-listed contaminated site. The contaminated site here is commonly known as follows:

DEC Site Name: Grant Mine (the "Site")

DEC Hazard ID: 731

Site Address: 1.2 miles up Saint Patrick Road, Ester Dome, Fairbanks, AK 99708

The current boundaries of the contaminated area are shown in the map attached as Appendix A. In

the event the contamination moves, the Site boundaries will shift as needed to encompass the contamination in accordance with the definition of “site” in 18 AAC 75.990(115) and 18 AAC 78.995(134).

- IV. This Covenant subjects the Property to certain activity and use limitations and requires the Grantor to comply with those limitations as set forth herein and in accordance with the Act. The applicable activity and use limitations described in this Covenant are necessary to protect human health, safety, welfare, or the environment and to ensure the integrity of the cleanup remedy conducted at the Site. Environmental documents pertaining to the cleanup are available from the Alaska Department of Environmental Conservation (DEC or “Department”) at the Contaminated Sites Program Website at <http://dec.alaska.gov/spar/csp/>.
- V. The Site is the subject of an environmental response project under the Site Cleanup Rules (18 AAC 75.325–18 AAC 75.390). This Covenant is required because following completion of a cleanup, residual contamination remains on the Property, which is safe for some, but not all, activities and uses; and because an engineered feature—a 30-inch compacted silt cap—is present on the Site that will not function as intended if disturbed and requires ongoing monitoring. Residual contamination remaining on the Property includes the following hazardous substances, pollutants, or contaminants (Contaminants):

<u>Media</u>	<u>Contaminants</u>
Soil	<i>Metals: antimony, free cyanide, mercury, and silver</i>

- VI. The Department enters into this Covenant as a “department” under the Act, with all attendant rights of a “department” under the Act, which include but are not limited to the right to enforce this Covenant. This is not an ownership interest and the rights of DEC under the Act are not an interest in real property.
- VII. For purposes of indexing in the Alaska Department of Natural Resources (DNR) Recorder’s office Grantor-Grantee index only, DNR shall be considered the **Grantor**, and DNR shall be considered the **Grantee(s)**.

COVENANT

Grantor hereby grants to the Grantee and its successors and assignees, the following requirements and restrictions and declares that the Property described in the legal description above shall hereinafter be bound by, held, sold, and conveyed subject to the activity and use limitations set forth below, which shall run with the Property in perpetuity and be binding on the Grantor and all parties now or subsequently having any right, title or interest in the Property, or any part thereof, and any persons using the land, as described herein. Furthermore, it is the intent of the Grantor that such requirements and restrictions shall supersede any prior interests in the Property.

Summary of Environmental Actions – The Property contains portions of the Grant Mine where a response action was performed by Roger Burggraf due to past milling and underground mining operations. A primary tailings impoundment was constructed in 1985, which consisted of a compacted silt constructed liner bordered by a 45-foot-high earthen berm. The impoundment received the tailings from the cyanide process used to extract gold from 1985 to 1989. The tailings

slurry contained waste rock, lime, sodium cyanide, and water. In 1985, two supply wells uphill from the tailings impoundment were found to have concentrations of cyanide above the federally established maximum contaminant level of 0.2 milligrams per liter. The wells were sampled after tailings were accidentally discharged upslope of the impoundment, allowing tailings to reach the groundwater through one of the supply wells. The well casing was removed and sealed with pressure grouting in 1989. Site characterization under 18 AAC 75.335 began with sampling of the adjacent supply well and two monitoring wells installed downgradient from the primary tailings impoundment. Groundwater was monitored from the upgradient supply wells from 1988 to 1989 and documented decreasing levels of total cyanide. Groundwater was then monitored in the downgradient wells from 1989 to September 2021 when three consecutive monitoring events resulted in free cyanide levels and all other contaminants except arsenic below DEC cleanup levels. Although arsenic was present above the groundwater cleanup levels, the concentration was less than 20 percent of the background concentrations reported in the 1994 EPA site investigation. The remaining tailings held in the unlined secondary tailings impoundment were excavated in October 2019 and deposited into the lined facility of the primary tailings impoundment. In 2021 the earthen berm surrounding the impoundment was dismantled and spread over the tailings. The tailings impoundment was then capped in accordance with DEC Solid Waste regulations, 18 AAC 60.455 which defines mining waste, and 18 AAC 60.485 which presents capping/cover criteria for industrial waste. The concentrations of antimony, free cyanide, mercury, and silver in soil are above the DEC approved cleanup levels in the capped tailings impoundment.

Activity and Use Limitations - By acceptance and recordation of this Covenant, the Property is hereby subject to the following requirements and restrictions, now or at any time in the future:

Grantor, its successors and assigns, all present and subsequent owners, and current and future occupants, lessees or other persons holding or acquiring an interest in the Property shall not take any of the following actions without prior written approval from DEC:

- 1) Any action that may negatively impact or interfere with either the response action or any operation, maintenance, inspection or monitoring of that response action (18 AAC 75.395). "Response action" shall mean "any action taken to respond to a release or threatened release of a contaminant, including mitigation, cleanup, or removal."
- 2) Any action that may increase the risks to human health, safety, welfare, or to the environment at the Property. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as part of the remedial action or that creates a new exposure pathway for residual contamination remaining on the Property.
- 3) Construct, modify, or use buildings on the contaminated area of the Property.
- 4) Grade, excavate, dig, till, or otherwise disturb the contaminated area of the Property.
- 5) Use the Property for residential purposes including child day care, educational facilities, playgrounds, hospitals, or similar facilities.
- 6) Subdivide or replat of the Property.

- A. Grantor, its successors and assigns, all present and subsequent owners, and current and future occupants, lessees or other persons holding or acquiring an interest in the Property shall:
- 1) Ensure the engineered feature is inspected every month for five years between the months of April through October following closure and maintained as needed to prevent contact by humans or animals with subsurface contaminated soil, and to prevent the infiltration of water and potential leaching of contaminants. Following the first five years, the engineered feature will be inspected once every five years. Grantor shall report any damage to the engineered feature to DEC using the contact info below within ten (10) days after discovery. Grantor shall ensure the engineered feature is repaired as quickly as possible. Documentation of the repairs shall be submitted to DEC within 30 days after discovery.
 - 2) Notify DEC if contaminated soil on the Property becomes accessible in the future, characterize the contamination, and, if determined necessary by DEC, cleanup the soil pursuant to DEC's Site Cleanup Rules.
- B. DEC approval is required prior to moving soil where contamination remains above applicable cleanup levels. If DEC approval for movement is granted, any moved soil must still be characterized and managed following regulations applicable at that time. Movement or use of contaminated material in a manner that results in a violation of 18 AAC 70 Water Quality Standards is prohibited.

Included in Appendix A is/are a Site Survey or Diagram(s) drawn to scale that shows the Property boundaries, locations of existing structures, the area that has been cleaned up, the approximate location and extent of remaining soil and/or groundwater contamination which is subject to the activity and use limitations described in this Covenant

Conveyance of Interest - The Grantor, when conveying any interest in any part of the Property, including but not limited to title, easement, leases, or other interests must notify DEC at least 30 days prior to conveyance, and must include in any conveyance document, a complete copy of this Covenant and Appendices.

Successors - The requirements, terms, conditions, and restrictions of this Covenant shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall continue as a servitude running in perpetuity with the Property. The term "Grantor", wherever used herein, and any pronouns used in place thereof, shall include the persons and/or entities named at the beginning of this document, identified as "Grantor" and their personal representatives, heirs, successors, and assigns. The term "Grantee", wherever used herein, and any pronouns used in place thereof, shall include the persons and/or entities named at the beginning of this document, identified as "Grantee" and their personal representatives, heirs, successors, and assigns. The rights of the Grantee under this instrument are freely assignable, subject to the notice provisions contained in this Covenant.

Prior Notification for Changes in Land Use, including Proposed Construction - No less than 30 days before taking action on the contaminated area of the property, the Grantor shall notify DEC

of the following:

- Its intent to propose changes in use of the Property that may affect exposure to contaminants, and what those changes will be.
- Its intent to apply for a building permit for activities that may affect exposure to contaminants on the Property, and what those activities will be.
- Its intent to propose any work affecting the contamination on the Property, and what that work will be.

Reporting - Grantor shall report to DEC every five (5) years to document the status of compliance with the activity and use limitations described in this Covenant.

Reporting - Any notice, demand, request, consent, approval, or communication that a party desires or is required to give to another party shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Grantor:
Department of Natural Resources
Division of Mining, Land & Water:
3700 Airport Way
Fairbanks, AK 99709

To Roger Burggraf:
[REDACTED]

To DEC:
Alaska Department of Environmental Conservation
Division of Spill Prevention and Response
Contaminated Sites Program
Attention: Institutional Controls Unit
P.O. Box 111800
Juneau, AK 99811-1800
Or be submitted electronically to CS.Submittals@alaska.gov.

Authorizations - Grantor shall restrict authorizations, including leases, for any portion of the Property to only those uses and activities consistent with this Covenant. Further, Grantor shall notify all authorized users of the Property of all requirements and restrictions on the use of the Property.

Consent to Access - Grantor hereby consents to employees, contractors, and authorized representatives of DEC and Mr. Burggraf to enter and have continued access to the Property at reasonable times for the purpose of:

- A. Implementing, operating, and maintaining the environmental response project;
- B. Monitoring and conducting periodic reviews of the environmental response project, including and without limitation: sampling air, water, groundwater, sediments and soils;

- C. Verifying any data or information submitted to DEC or Mr. Burggraf; and
- D. Verifying that no action is being taken on the Property in violation of the terms of this Environmental Covenant, the environmental response project, or of any federal or state environmental laws or regulations.

Nothing in this Environmental Covenant shall limit or otherwise affect DEC or Mr. Burggraf's rights of entry and access for the purpose of emergency response actions under CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations (C.F.R.) Part 300 – 399), or other federal and state law.

Enforcement - The Department and other parties, including parties to the Covenant, described in AS 46.04.335 are empowered to administer and enforce the terms of this Covenant using civil authority granted to them in AS 46.03. In addition, the Department may use administrative authority granted by AS 46.03.

Waiver of Certain Defenses - This Covenant may not be extinguished, limited, or impaired through issuance of a tax deed, foreclosure of a tax lien, or application of the doctrine of adverse possession, prescription, abandonment, waiver, lack of enforcement, acquiescence, or any similar doctrine as set forth in AS 46.04.325(f).

Representations and Warranties - Grantor hereby represents and warrants to DEC, holder(s), Grantor(s), Grantee(s), and any other signatories to this Covenant that, at the time of execution of this Covenant, the Grantor lawfully manages, controls, and holds title to the Property on behalf of the State of Alaska; that Grantor has a good and lawful right and power to bind the Property as provided in this Environmental Covenant; and that the Property is free and clear of encumbrances.

Amendment or Termination - This Covenant runs with the land and is perpetual, unless amended or terminated pursuant to AS 46.04.325 or 46.04.330. This covenant may be amended or terminated if signed consent is given by DEC and the then-current Holder. Other than DEC, all signers who are not the Holder at the time of amendment or termination waive the right to consent to an amendment or termination of the Covenant. If consent for amendment or termination cannot be obtained, the procedures under AS 46.04.325 apply.

Controlling Law - This Covenant shall be construed according to and governed by the laws of the State of Alaska.

Liberal Construction - Any general rule of construction to the contrary notwithstanding, this Covenant shall be liberally construed in favor of the establishment of activity and use limitations that run with the land to effect the purpose of this Covenant and the policy and purpose of the environmental response project and its authorizing legislation. If any provision of this Covenant is found to be ambiguous, an interpretation consistent with the purpose of this Covenant that would render the provision valid shall be favored over any interpretation that would render it invalid.

Joint Obligation - If there are two or more parties identified as Grantor herein, the obligations imposed by this Covenant upon them shall be joint and several.

Effective Date - This Covenant is effective on the date it is recorded with the appropriate

recorders' office.

List of Appendices:

**Appendix A – Legal Description, Map(s) of the Property and Diagram(s) Showing
Location of the Contamination**

DRAFT

Appendix A

**Legal Description, Map(s) of the Property and Diagram(s) Showing
Location of the Contamination (drawn to scale)**

DRAFT

GRANTOR(S) SIGNATURE BLOCK

The undersigned Grantor warrants she/he holds the title to _____ [property] _____
OR _____ [easement, right-of-way or other on the property] _____ and has
authority to execute this instrument.

EXECUTED this _____ day of _____, 20____.

Printed Name

Title

Signature

Date

-----INDIVIDUAL

THIS IS TO CERTIFY that on this _____ day of _____ 20____ the undersigned personally
appeared before me, acknowledged that she/he is the individual described herein and who signed and
executed the within and foregoing instrument at her/his free and voluntary act and deed pursuant to
AS 46.04.300-46.04.390 for the uses and purposes therein.

WITNESS my hand and official seal this _____ day of _____ 20 ____ at
_____, Alaska.

Notary Public in and for the State of Alaska

My Commission Expires: _____

-----CORPORATION

THIS IS TO CERTIFY that on this _____ day of _____ 20____ the undersigned personally
appeared before me, acknowledged that she/he is the _____ [title] _____ of the
corporation described herein and who signed and executed the within and foregoing instrument by
free and voluntary act and deed of said corporation, pursuant to AS 46.04.300-46.04.390 for the uses
and purposes therein.

WITNESS my hand and official seal this _____ day of _____ 20 ____ at

_____, Alaska.

Notary Public in and for the State of Alaska

My Commission Expires: _____

-----Representative

THIS IS TO CERTIFY that on this ____ day of _____ 20____ the undersigned personally appeared before me, acknowledged that she/he is the _____ [type of representative] _____ of _____ [name of Grantor] _____ described herein and who signed and executed the within and foregoing instrument to be the free and voluntary act and deed of the Grantor pursuant to AS 46.04.300-46.04.390 for the uses and purposes therein.

WITNESS my hand and official seal this ____ day of _____ 20 ____ at _____, Alaska.

Notary Public in and for the State of Alaska

My Commission Expires: _____

Notice Approved by Authorized DEC Representative Date

Printed Name of Authorized DEC Representative

Title