POGO MINE
SUMITOMO METAL MINING POGO LLC
MINING DONE RIGHT

P.O. Box 145, Delta Junction, AK 99737, USA
3204 International Street, Fairbanks, AK 99701, USA

Tel: +1 907 895 2841
Fax: +1 907 895 2866

February 24, 2014
COR-14-020
E-mailed

Jack DiMarchi, Large Project Manager
State of Alaska Department of Natural Resources
Office of Project Management and Permitting
3354 College Road
Fairbanks, Alaska 99709

Re: Request for Amendment to Plan of Operations F20129500 (Rev 9) by Sumitomo Metal Mining Pogo LLC (Pogo) for New CIP Tailings Storage Tank

Dear Mr. DiMarchi,

Sumitomo Metal Mining Pogo LLC (Pogo) is requesting to amend Plan of Operations F20129500 to allow Pogo to construct a new 750,000 gallon CIP Tailings Storage Tank with auxiliary equipment.

The existing CIP Tailings Storage Tank buckled while cleaning the tank in August 2012. Emergency repairs entailed filling the void between the secondary containment tank and the primary tank with concrete. This repair was successful to allow continuing operation, however, the secondary containment was lost. Pogo decided to construct a new CIP Tailing Storage Tank with secondary containment adjacent to the existing one. The proposed location of the new tank is shown in the revised Plan of Operations figures such as **Figure 1.3c** Mill and Camp Bench Area As-built and **Figure 6.2** Mill Plant as-built (attached).

The new CIP Tailings Storage Tank will be approximately 53-feet in height and 50-feet in diameter with 3-feet containment. The capacity of primary tank is 95,300 cubic feet or 750,000 gallons, and the secondary containment capacity will be 110% capacity of primary tank. The tank design will be compliant with API Standard 650, and the materials for shells will be carbon steel plate A516 Grade 70N. The foundation of the tank will be conventional ring footings bearing a minimum of 2-feet below grade, on a compacted structural fill a minimum of 2-feet thick. The containment tank ties within the annular ring from the new primary tank on proposed foundation. Potential overflow will be addressed by incorporating an overflow line on tank directed to the sump within the filter building. The tank will have hatched access for inspection and maintenance. The floor drain will be directed to the existing containment area. The construction design of the new tank is attached **Sheet 1385-S200** as well as 3-D image of the tank.

A geotechnical study was conducted By Shannon and Wilson Inc. in October 2013 to evaluate subsurface soil conditions at the proposed tank location. A copy of their report is attached.

Pogo proposes that this minor revision be documented by written request and tracked using revision number nine (9) in **Table 1.1**: Revisions and **Table 1.2**: Table of Significant Changes in Pogo's 2014 Plan of Operations. Pogo would address potential affect on reclamation and closure bond with next major revision or permit renewal.

If you have any questions, please give me a call at 907-895-2879 or email me at sally.mcleod@smmpogo.com.

Sincerely,

Sally S. McLeod, CEM, REM
Environmental Manager

Attachments:
POO Application Information Page
POO Table 1.1: Revisions
POO Table 1.2: Table of Significant Changes
Figure 1.3c Mill and Camp Bench Area As-built (figure for Plan of Operations, revised)
Figure 6.2 Mill Plant as-built Figure 1.3c (figure for Plan of Operations, revised)
Sheet 1385-S200 Construction design for new CIP Tailings Storage Tank
3-D Image of new CIP Tailings Storage Tank
Geotechnical Study New CIP Tail Stock Tank by Shannon & Wilson, Inc

Cc: Brent Martellaro, ADNR
Tim Pilon, ADEC

1.0 APPLICANT INFORMATION

1.1 Claim names

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

1.2 Individual Completing Application

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

Chris Kennedy, General Manager, Pogo Mine

2-24-14
Date

1.3 Business Address

Sumitomo Metal Mining Pogo LLC

P.O. Box 145

Delta Junction, Alaska 99737

1.4 Business Telephone

Phone: (907) 895-2834

Fax: (907) 895-2866

1.5 Corporate Information

Sumitomo Metal Mining Co., Ltd.

Tokyo, Japan

Sumitomo Corporation

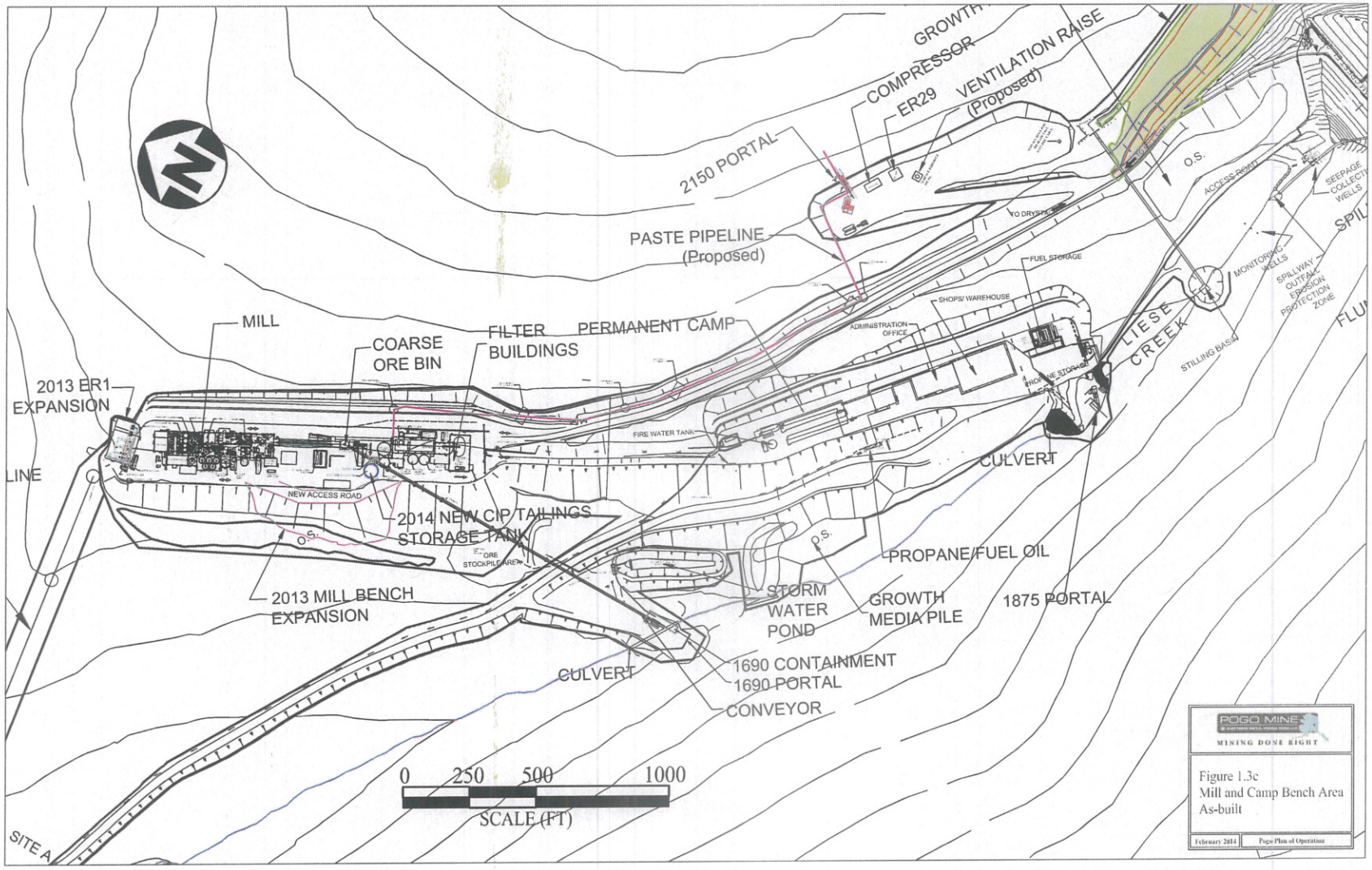
Tokyo, Japan

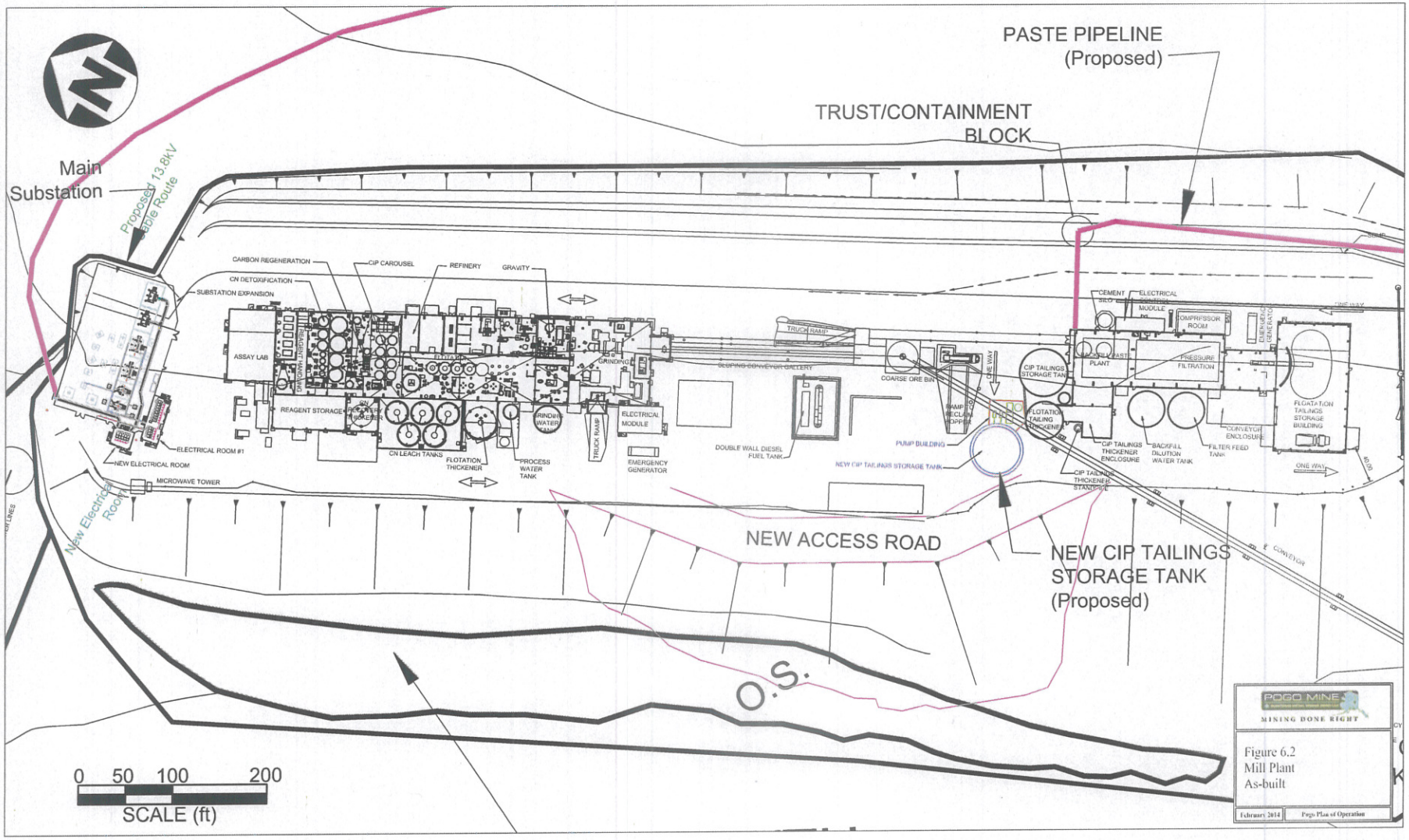
Table 1.1: Revisions

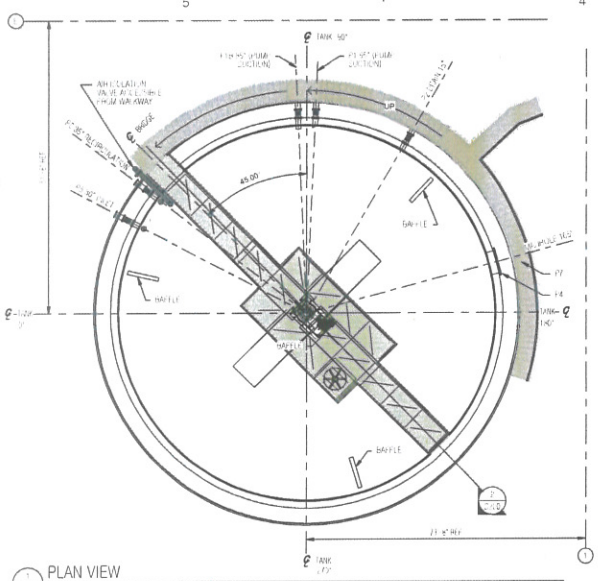
2012 Plan of Operations Revisions			
Revision #	**Date**	**Change**	**By**
1	February 2012	Addition to D-Wing Dorm at Lower Camp	Pogo
2	March 2012	DSTF Expansion and New Diversion Ditch	Pogo
3	May 2012	Extension to MWTP#2 for 2 New Sand Filters	Pogo
4	October 2012	Upgrade Section of ORTW Pipeline	Pogo
5	December 2012	East Deep Expansion Power Distribution System	Pogo
6	June 2013	Begin Mining East Deep Ore Zone	Pogo
7	October 2013	Mine Water Treatment Plant #3	Pogo
8	January 2014	Phase II ORTW Line	Pogo
9	February 2014	New CIP Tailings Storage Tank	Pogo

Table 1.2: Table of Significant Changes

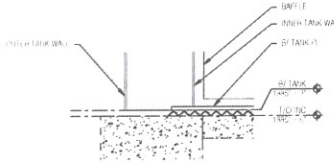
Revision #	Change Requested By	Description	Affected Section
1	Pogo	Add Dorm to Lower Camp	Section 4.6 Figure 1.3a
2	Pogo	Expand DSTF to 20 Mton capacity, build new diversion ditch and haul road, and close existing diversion ditch. Updated cost model.	Sections 4.6, 7.2.1, 7.2.2, and 12, Appendix B: Figures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


GROWTH
COMPRESSOR
ER29
VENTILATION RAISE
(Proposed)
2150 PORTAL
PASTE PIPELINE
(Proposed)
YO DRYSTACK
FUEL STORAGE
SHOPS/ WAREHOUSE
ADMINISTRATION OFFICE
MILL
COARSE ORE BIN
FILTER BUILDINGS
PERMANENT CAMP
2013 ER1 EXPANSION
FIRE WATER TANK
NEW ACCESS ROAD
2014 NEW CIP TAILINGS STORAGE TANK
ORE STOCKPILE AREA
2013 MILL BENCH EXPANSION
CULVERT
PROPANE/FUEL OIL
STORM WATER POND
GROWTH MEDIA PILE
1875 PORTAL
1690 CONTAINMENT
1690 PORTAL
CONVEYOR
CULVERT
O.S.
P.S.
ACCESS ROAD
SEEPAGE COLLECTION WELLS
MONITORING WELLS
SPILLWAY OUTFALL EROSION PROTECTION ZONE
STILLING BASIN
LTESE CREEK
0 250 500 1000
SCALE (FT)
POGO MINE
MINING DONE RIGHT
Figure 1.3c
Mill and Camp Bench Area
As-built
February 2014
Pogo Plan of Operation

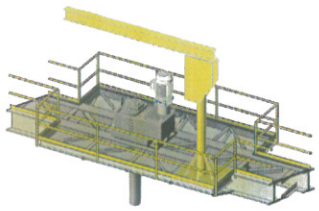

PASTE PIPELINE
(Proposed)
TRUST/CONTAINMENT
BLOCK
Main
Substation
Proposed 13.8KV
Cable Route
CARBON REGENERATION
CIP CAROUSEL
REFINERY
GRAVITY
CN DETOXIFICATION
SUBSTATION EXPANSION
ASSAY LAB
REAGENT STORAGE
CN LEACH TANKS
FLOTATION THICKENER
PROCESS WATER TANK
GRINDING
TRUCK RAMP
ELECTRICAL MODULE
EMERGENCY GENERATOR
SLOPING CONVEYOR GALLERY
COARSE ORE BIN
DOUBLE WALL DIESEL FUEL TANK
PUMP BUILDING
NEW CIP TAILINGS STORAGE TANK
CIP TAILINGS THICKENER STANDPIPE
CIP TAILINGS THICKENER ENCLOSURE
BACKFILL DILUTION WATER TANK
FILTER FEED Tank
CONVEYOR ENCLOSURE
FLOTATION TAILINGS STORAGE BUILDING
CEMENT
ELECTRICAL MODULE
COMPRESSOR ROOM
PRESSURE FILTRATION
ELECTRICAL ROOM #1
NEW ELECTRICAL ROOM
MICROWAVE TOWER
New Electrical Room
NEW ACCESS ROAD
NEW CIP TAILINGS
STORAGE TANK
(Proposed)
O.S.
ONE WAY
0 50 100 200
SCALE (ft)
POGO MINE
MINING DONE RIGHT
Figure 6.2
Mill Plant
As-built
February 2014
Pogo Plan of Operation

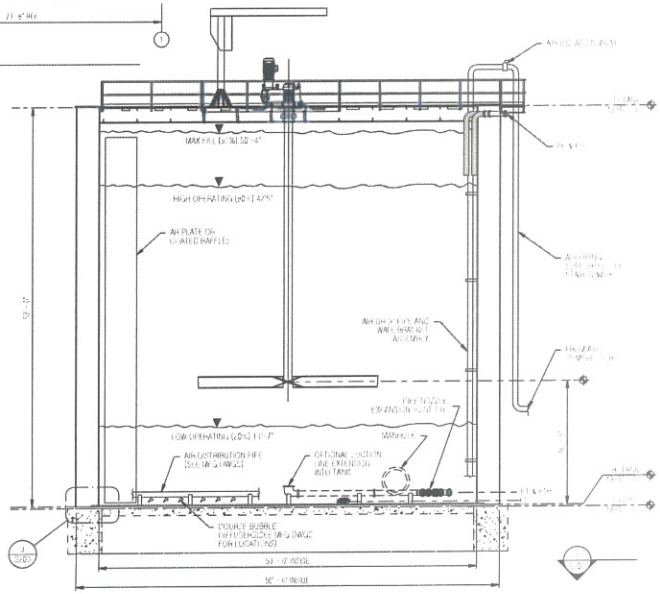


PLAN VIEW

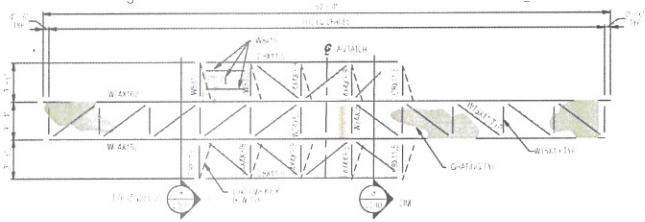


BOTTOM OF TANK DETAIL

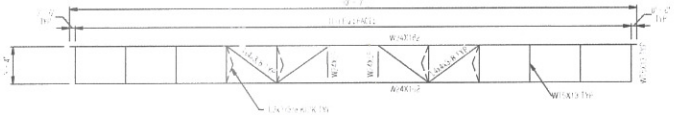




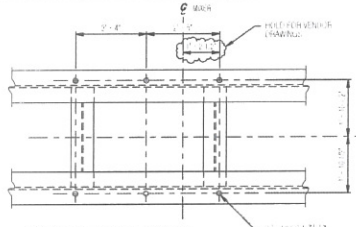
SECTION



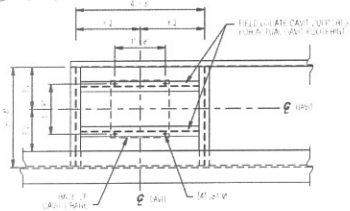
PLATFORM FRAMING PLAN AT TOS = 1938'-9"



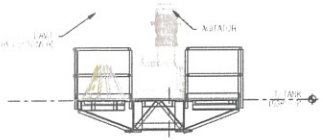
FRAMING PLAN AT BOTT OF GIRDER FLANGES



MIXER MOUNTING DETAIL



DAVIT CRANE MOUNTING DETAIL



SECTION DETAIL AT DAVIT SUPPORT

REV	DESCRIPTION	DATE	ISSUED BY
A	VERIFY AND REVIEW	12/3/13	K.NIELSON
B	CUSTOMER REVIEW	01/07/14	E. HOGGAN
C	CUSTOMER REVIEW	01/20/14	A.HIXSON
D	RELOCATED AND ROTATED TANK PER POGO COMMENTS, REMOVED LID	02/12/14	K.NIELSON

MILLCREEK ENGINEERING

1011 E Murray Holladay Rd
Suite 200
Salt Lake City, UT 84117
Phone: (801) 904-2260
Fax: (801) 904-2261
www.millcreekeng.com

CIP TAIL STOCK TANK AND CONTAINMENT

POGO MINE

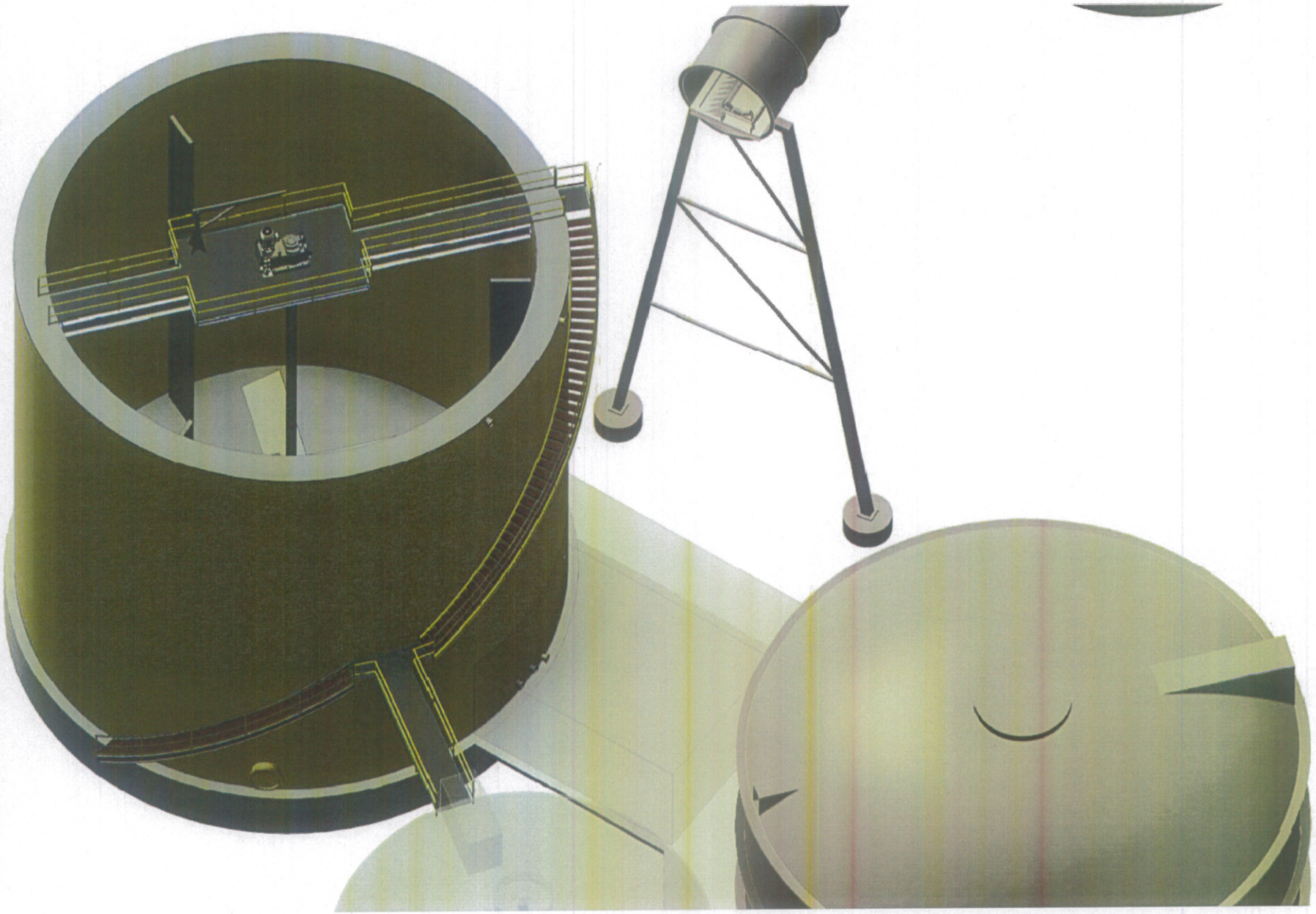
SMM - POGO LLC.

SCALE: AS NOTED

PROJECT #: 1385

SHEET #: 1385 - S200

REV: D



GEOTECHNICAL STUDY
NEW CIP TAIL STOCK TANK
POGO MINE, ALASKA

December 2013

Submitted To:
M2C1 Construction and Engineering
PO Box 1750
Delta Junction, Alaska 99737

By:
Shannon & Wilson, Inc.
2355 Hill Road
Fairbanks, Alaska 99709-5326

31-1-02377-001

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1
1.1 Project Understanding 1

2.0 FIELD STUDIES 1

3.0 SITE CONDITIONS 2
3.1 Geological Setting 2
3.2 Seismicity 2
3.3 Surface Conditions 3
3.4 Subsurface Conditions 3

4.0 DISCUSSION AND RECOMMENDATIONS 3
4.1 Footing Recommendations 4
4.2 Excavation and Site Preparation 4
4.3 Structural Fill 5
4.4 Drainage and Grading 6

5.0 LIMITATIONS 6

6.0 HARD COPY/ELECTRONIC COPY DISCLAIMER 7

FIGURES

1 Site Plan and Approximate Boring Locations
2 Log of Boring 13-01
3 Log of Boring 13-02
4 Log of Boring 13-03

APPENDICES

A Important Information About Your Geotechnical/Environmental Report

GEOTECHNICAL STUDY
NEW CIP TAIL STOCK TANK
POGO MINE, ALASKA

1.0 INTRODUCTION

This report presents the results of our foundation engineering study for the new Carbon-In-Pulp (CIP) tail stock tank at Pogo Mine near Delta Junction, Alaska. The purpose of our study was to evaluate subsurface soil conditions at the proposed tank location and develop geotechnical recommendations to assist in the design and construction of the new tank. Our services were provided in general accordance with our proposal dated October 2, 2013.

1.1 Project Understanding

We understand the containment of the existing tail stock tank has been filled with concrete and Sumitomo Metal Mining Pogo, LLC (SMM-Pogo) would like to replace the tank with a similar 50-foot diameter, 750,000 gallon tank that provides 110 percent tank-in-tank containment. The existing tail stock tank is located adjacent to the northern end of the Filter/Backfill Plant Building. We understand the new tank will be located northwest of the existing tank on the opposite side of the coarse ore feed conveyor.

2.0 FIELD STUDIES

The exploration program for this study consisted of logging three exploratory borings, oriented in a line roughly perpendicular to the long axis of the mill bench, near the proposed tank footprint, to assess the character and thickness of the site fills. Figure 1 shows a site map and the approximate boring locations.

SMM-Pogo subcontracted drilling directly to Boart Longyear Company (Boart). The borings were drilled November 16, 2013. Boart advanced the borings using a RS-350 truck-mounted sonic drill rig equipped with 6-inch inside diameter (ID) casing. Charles Schulz, an engineer with our firm, observed the drilling operations and logged the borings. As the borings progressed, we collected grab samples as soil conditions changed.

Logs of the borings including soil descriptions are presented in Figures 2 through 4.

3.0 SITE CONDITIONS

3.1 Geological Setting

The Pogo Mine area is within the physiographic province known as the Yukon-Tanana Uplands near Delta Junction, Alaska. The mine site is generally underlain by gneisses of the Lake George subterrane of the Yukon-Tanana terrane, which have been locally intruded by granitic plutons and dikes.

The Pogo Mine area is in a subarctic zone underlain by discontinuous permafrost. Permafrost is defined as ground that has remained at a temperature of 32°F or less for two or more years. The thickness of the "active layer," the portion of the ground at or near the surface that undergoes an annual freeze-thaw cycle, is largely dependent upon the type of ground cover and the snow depth, as well as other factors. Seasonal frost penetration commonly exceeds 10 feet beneath roads or parking areas kept free of snow during winter; whereas, in areas covered by thick mats of tundra or organic material, the thickness of the active zone is often 2 feet or less.

3.2 Seismicity

The Pogo Mine area lies between two, right-lateral shear systems: the Denali Fault System approximately 75 miles to the southeast and the Tintina Fault System approximately 100 miles to the north. The shear along these systems is believed to be the result of crustal adjustments in the North American Plate due to the convergence with the Pacific Plate along the Gulf of Alaska.

Seismicity in the interior of Alaska has historically been concentrated in clusters or bands with a northeast-southwest trend that indicates active faulting, although no faults with Holocene displacement have been recognized in the Delta Junction area (Page et al., 1991). These seismic zones include the Salcha Seismic Zone (SSZ) approximately 40 miles northwest, Fairbanks Seismic Zone (FSZ), and Minto Flats Seismic Zone. Page and others (1995) hypothesized these bands delineate the edges of blocks rotating clockwise between two right-lateral shear systems. Outside these northeast-trending linear seismic zones, recorded seismicity appears diffuse. Earthquakes in the interior typically occur at depths of less than 25 miles.

Within the past century, the interior has been subjected to three large earthquakes occurring in the Tanana Lowlands. On July 22, 1937, a Magnitude 7.6 (M_s) event occurred in the Salcha Seismic Zone (SSZ). This event, which was widely felt throughout central Alaska, produced extensive ground failures in the epicentral area (Page and others, 1995). Two other earthquakes, an October 15, 1947, M_s 7.2 event and an August 27, 1904, M_s 7.3 event are not correlated with

apparent seismic zones. Data from the October 15, 1947, M_s 7.2 event suggests thrust-faulting in contrast to the strike-slip faulting. The epicenter of the 1904 earthquake, which predates the College seismograph at the University of Alaska Fairbanks, is uncertain.

On November 3, 2002, a M_s 7.9 event on the Denali Fault was felt widely throughout central and southern Alaska and resulted in minor liquefaction in the interior. The peak horizontal ground acceleration of this event recorded on bedrock at the University of Alaska campus in Fairbanks was 0.09g.

Based on the results of the exploratory drilling, it is our opinion Site Class B conditions exist at the site as defined by the 2012 International Building Code (IBC).

3.3 Surface Conditions

The mill area is a cut-and-fill bench approximately 250 feet wide and 1,500 feet long. At the time of our field work the proposed location of the new tank was being used as access roads for equipment to maneuver around the mill site. The ground surface consisted of hard packed snow over a relatively thin layer of crushed aggregate surface material.

3.4 Subsurface Conditions

In each of the borings, we observed a thick section of gravelly, cobbley fill composed of gneiss and granite mine waste overlying bedrock. The gradation of the fill ranged from gravels with sand, silt, and cobbles to cobbles with sand. The depth to bedrock increased from approximately 20 feet below the ground surface (bgs) at Boring 13-01 to 38 feet bgs at Boring 13-03.

The fill materials appeared to be relatively durable and moderately to densely compact based on our observations of drill action and sample recovery.

We observed seasonally frozen ground to depths of approximately 4 feet in both borings. We did not observe groundwater in the borings.

4.0 DISCUSSION AND RECOMMENDATIONS

In the exploratory drilling we encountered a 20-foot to 38-foot thick section of gravelly, cobbley fill overlying bedrock, which roughly corresponds to the 3:1 ground slope reported at the mill site prior to the development of the mine. We did not observe any silty, ice-rich, colluvial or loesseal soils which indicate the mill bench was grubbed down to bedrock as described in prior geotechnical reports.

In our opinion, the proposed CIP tail stock tank can be founded on conventional shallow ring foundations bearing in the mill bench fill. Due to the silty, potentially frost-susceptible nature of the surficial fills, we recommend a section of controlled and compacted structural fill beneath the tank and footings.

Our foundation recommendations are presented in the following sections.

4.1 Footing Recommendations

We recommend founding the tank on conventional ring footings bearing a minimum of 2 feet below grade, on a compacted, granular structural fill a minimum of 2 feet thick. The structural fill should extend out laterally 4 feet from the edge of the footing.

If these recommendations are followed, the fills below the base of the tank should provide an allowable bearing capacity of 5,000 psf. This value assumes a minimum factor of safety of three under normal service conditions. The bearing capacity may be increased by up to one third for short duration dynamic loading such as seismic.

We estimate total settlement of the structure under static loading will be less than 1 inch. Differential settlement across the tank due to static loads is anticipated to be about one-half of the total settlement. We anticipate most of the settlement under static conditions will occur as the tank is filled.

4.2 Excavation and Site Preparation

Site preparation should include excavation of the existing fills to accommodate the structural fill section recommended beneath the tank. We recommend the contractor take proper precautions to avoid damaging existing footings.

The base of the excavation should be proof-rolled prior to placing the structural fill. Any soft or silty soils in the base of the excavation should be excavated and replaced with structural fill. We recommend an experienced geotechnical engineer from our firm be retained to observe the base of the excavation and compaction to determine whether conditions warrant additional excavation to replace localized areas of frozen, soft, or undesirable material.

If seasonally frozen ground is encountered in the base of the excavation, the frozen material should be excavated and replaced with thawed compacted fill, or be allowed to thaw. We recommend allowing the seasonal frost to thaw prior to construction on the site.

All excavations should be sloped sufficiently to provide a stable cut bank. We recommend the stability of the excavated slopes be made the responsibility of the contractor, as they will be most familiar with the conditions encountered in the excavations. The work should be accomplished in general accordance with applicable local, state, and federal standards. For planning purposes, we recommend that you assume unsupported excavation slopes no steeper than one vertical to one horizontal. It is also important to note that very steep, temporary excavation slopes made in seasonally frozen ground can become unstable as soils thaw.

4.3 Structural Fill

The structural backfill should consist of unfrozen, durable particles meeting the following gradation limits after compaction:

Size	Percentage Passing
3 inches	100
#4 sieve	30 – 60
#200 sieve	Less than 5 (based on the ¾-inch minus fraction)

If material with this gradation is not readily available at the mine, we will work with you to find an acceptable alternative using local material.

In general, structural fill should be placed in layers not exceeding 8 inches. The material should be compacted to achieve a density of at least 95 percent. The moisture-density relationship should be as determined by ASTM International (ASTM) D1577. In-place densities should be determined by ASTM D6938. Water content of the fill should be altered by wetting or drying as necessary to achieve the desired compaction.

The fill should consist of unfrozen materials and be placed at above-freezing air temperatures. If previously placed fill freezes, for instance overnight, the frozen material should be excavated and wasted or recompacted prior to placing additional fill.

We recommend fill placed within 5 feet of existing foundations be compacted with hand-operated compactors rather than self-propelled compaction equipment, to avoid damage to the foundation.

4.4 Drainage and Grading

The ground surface around the new tank should be sloped to drain and prevent ponding of water near the structure. Reducing the infiltration of water near the foundation will reduce the risk of frost-jacking and seasonal movement of the foundation system.

5.0 LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on site conditions as they presently exist and further assume that the exploratory borings are representative of the subsurface conditions throughout the site. If during construction subsurface conditions different from those encountered in the exploratory borings are observed or appear to be present beneath excavations, advise us at once so we can review these conditions and when necessary reconsider our recommendations.

Unanticipated soil conditions are commonly encountered and cannot be fully determined by merely taking soil samples or test borings. Such unexpected conditions frequently require additional expenditures be made to obtain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

If substantial time has elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at or adjacent to the site, we recommend this report be reviewed to determine the applicability of the conclusions and recommendations considering the time lapse or changed conditions.

If you desire, we will review those portions of the plans and specifications that pertain to earthwork and foundations to determine if they are consistent with our recommendations. In addition, we are available to observe construction, particularly the excavation of the site and compaction of backfill materials.

This report was prepared for the exclusive use of the owner and architect and/or engineer in the design of the subject facility. It should be made available to prospective contractors and/or the contractor for information on factual data only and not as a warranty of subsurface conditions, such as those interpreted from the boring logs and presented in discussions of subsurface conditions in this report.

6.0 HARD COPY/ELECTRONIC COPY DISCLAIMER

This report was prepared for the exclusive use of our client. All documents prepared by Shannon & Wilson are instruments of service with respect to the project for the sole use of our Client. Only our Client shall have the right to rely upon such documents. Such documents are not intended or represented to be suitable for reuse by our Client or others after the passage of time, on extensions of the project, or on any other project. Any such reuse without written verification or adaptation by Shannon & Wilson, as appropriate for the specific purpose intended, shall be at the user's sole risk.

Copies of documents that may be relied upon by our Client are limited to the printed copies (also known as hard copies) signed or sealed by Shannon & Wilson. Text, data, or graphics files in electronic media format are furnished solely for the convenience of our Client. Any conclusion or information obtained or derived from such electronic files shall be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

Because data stored in electronic media can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the Client should perform acceptance tests or procedures within 60 days after its receipt, after which, unless notice of any errors are given in writing to Shannon & Wilson, the Client shall be deemed to have accepted the data thus transferred. Any errors reported within the 60-day acceptance period shall be corrected by Shannon & Wilson. Shannon & Wilson shall not be responsible for maintaining documents stored in electronic media format after acceptance by the Client.

When transferring documents in electronic media format, Shannon & Wilson does not make any representations as to long-term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used for the document's creation.

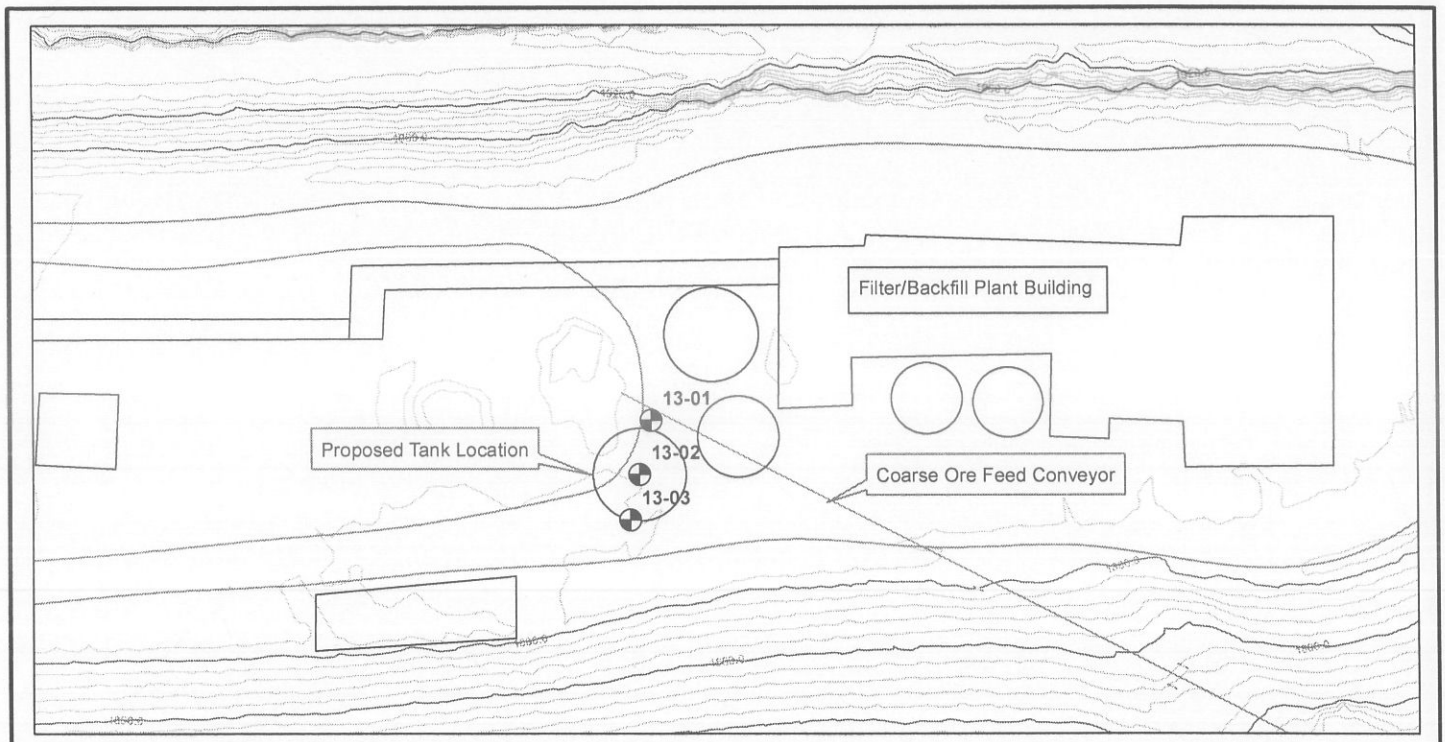
Shannon & Wilson, Inc., has prepared the attachment *Important Information About Your Geotechnical/Environmental Report* to assist you and others in understanding the uses and limitations of our reports.

We trust that this information is sufficient for your needs at the present time. If you have any questions, please do not hesitate to call.

Sincerely,

SHANNON & WILSON, INC.

Charles Schulz, PE
Sr. Geotechnical Engineer



LEGEND

Approximate Boring Locations

APPROXIMATE SCALE

0 50 100

Feet

N

Geotechnical Study
New CIP Tail Stock Tank
Pogo Mine, Alaska

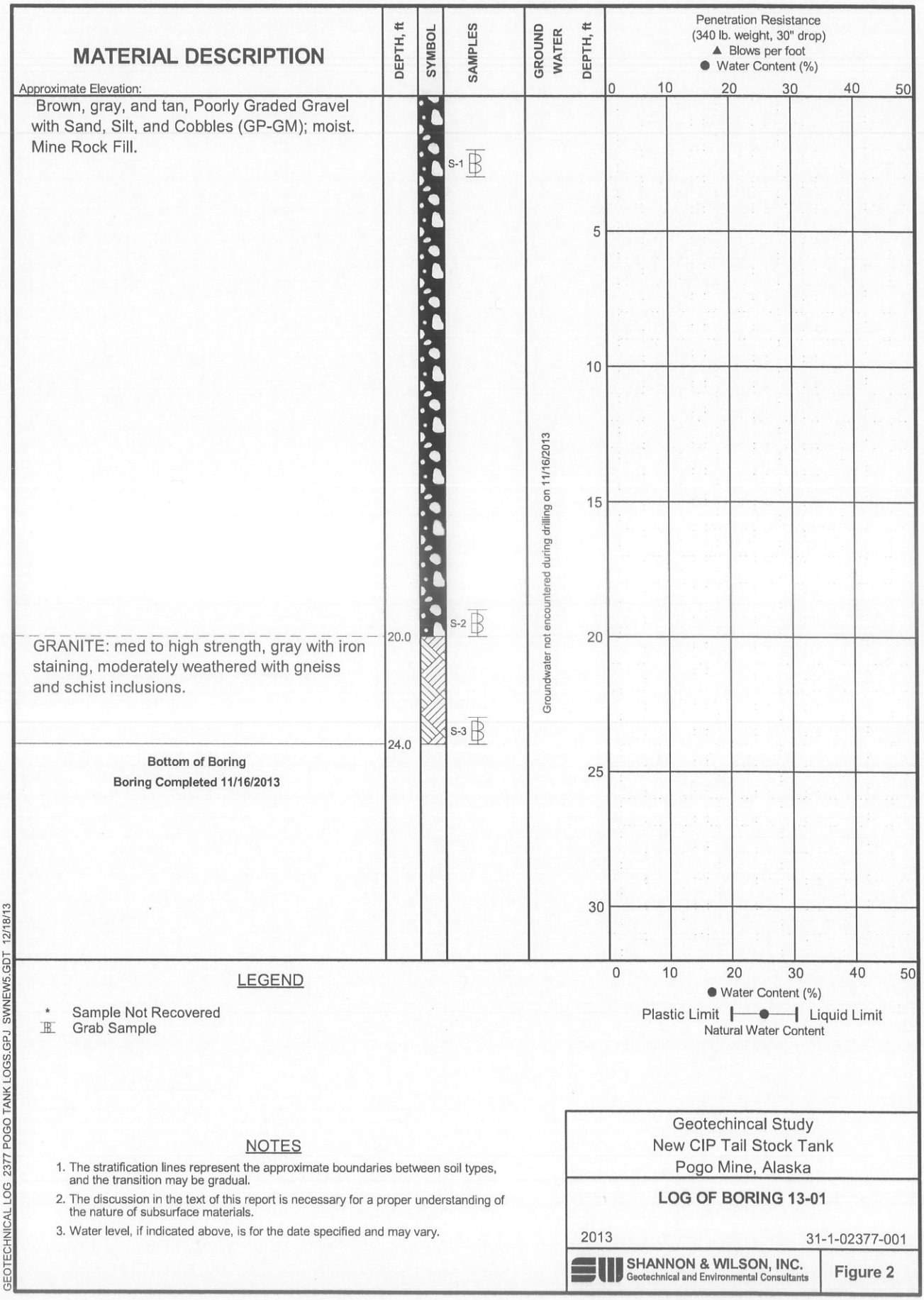
SITE PLAN AND APPROXIMATE BORING LOCATIONS

2013 31-1-02377-001

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1

Figure 1


MATERIAL DESCRIPTION
Approximate Elevation:
DEPTH, ft
SYMBOL
SAMPLES
GROUND WATER DEPTH, ft
Penetration Resistance
(340 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)
0 10 20 30 40 50
Brown, gray, and tan, Poorly Graded Gravel with Sand, Silt, and Cobbles (GP-GM); moist. Mine Rock Fill.
S-1
5
10
15
20
S-2
20.0
GRANITE: med to high strength, gray with iron staining, moderately weathered with gneiss and schist inclusions.
S-3
24.0
25
30
Bottom of Boring
Boring Completed 11/16/2013
Groundwater not encountered during drilling on 11/16/2013
0 10 20 30 40 50
● Water Content (%)
Plastic Limit Liquid Limit
Natural Water Content
LEGEND
* Sample Not Recovered
Grab Sample
NOTES
1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
Geotechincal Study
New CIP Tail Stock Tank
Pogo Mine, Alaska
LOG OF BORING 13-01
2013
31-1-02377-001
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
Figure 2
GEOTECHNICAL LOG 2377 POGO TANK LOGS.GPJ SWNEW5.GDT 12/18/13

MATERIAL DESCRIPTION Approximate Elevation:	DEPTH, ft	SYMBOL	SAMPLES	GROUND WATER DEPTH, ft
Brown, gray, and tan, Poorly Graded Gravel with Sand, Silt, and Cobbles (GP-GM); moist. Mine Rock Fill.				Groundwater not encountered during drilling on 11/16/2013

Penetration Resistance
(340 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 10 20 30 40 50

5 10 15 20 25 30

CONTINUED NEXT PAGE

LEGEND

* Sample Not Recovered
Grab Sample

0 10 20 30 40 50
● Water Content (%)
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

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2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Geotechincal Study
New CIP Tail Stock Tank
Pogo Mine, Alaska

LOG OF BORING 13-02

2013 31-1-02377-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Figure 3
Sheet 1 of 2

GEOTECHNICAL LOG 2377 POGO TANK LOGS.GPJ SWNEW5.GDT 12/18/13

MATERIAL DESCRIPTION Approximate Elevation:	DEPTH, ft	SYMBOL	SAMPLES	GROUND WATER DEPTH, ft
GNEISS: med to high strength, gray with iron staining, moderatly weathered.	32.0		S-1 S-2	Groundwater not encountered during drilling on 11/16/2013
			S-3	
Bottom of Boring **Boring Completed 11/16/2013**	41.0			

Penetration Resistance
(340 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)

0 10 20 30 40 50

35 40 45 50 55 60

0 10 20 30 40 50
● Water Content (%)
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

LEGEND

* Sample Not Recovered
Grab Sample

NOTES

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2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Geotechincal Study
New CIP Tail Stock Tank
Pogo Mine, Alaska

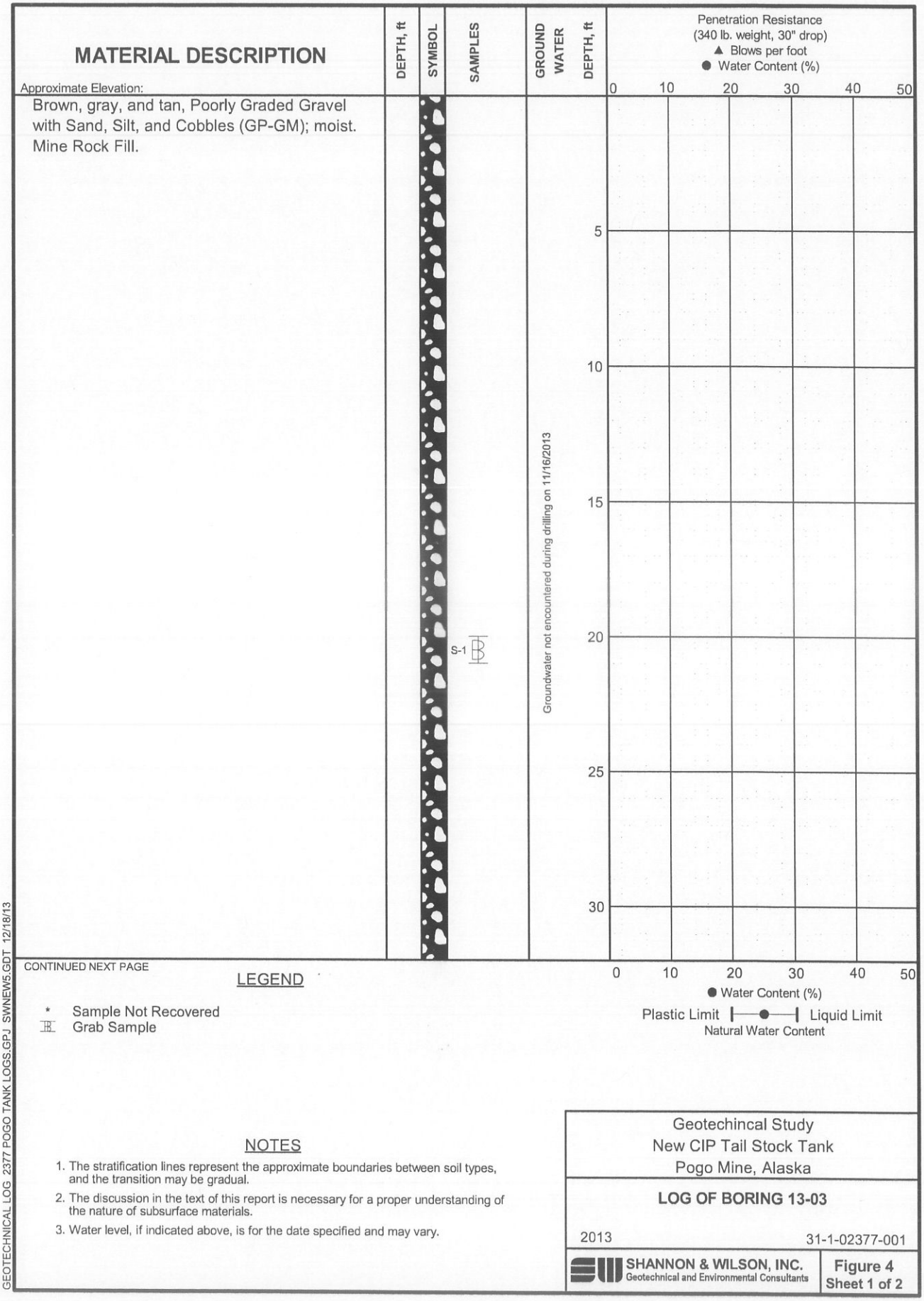
LOG OF BORING 13-02

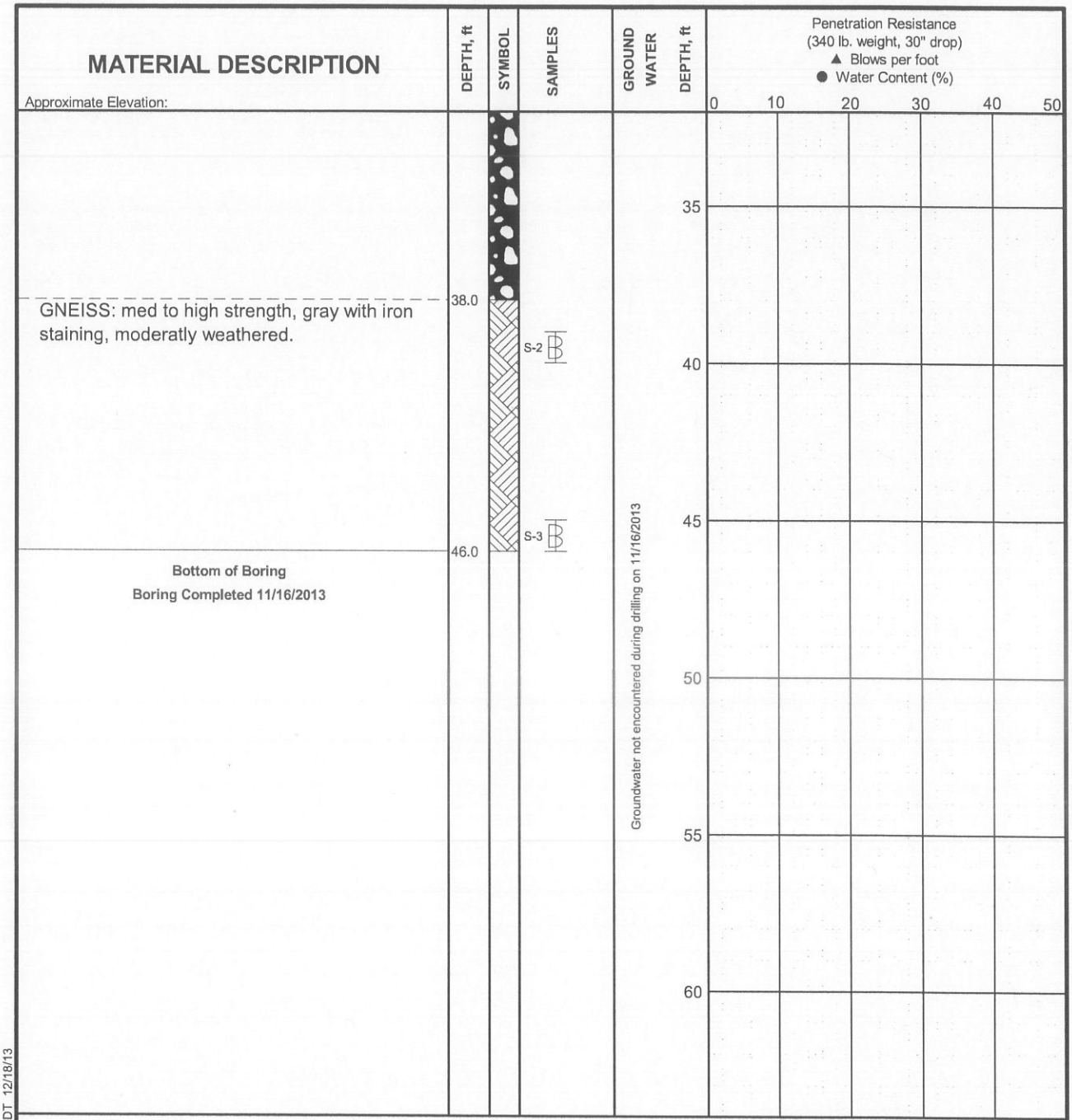
2013 31-1-02377-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Figure 3
Sheet 2 of 2

GEOTECHNICAL LOG 2377 POGO TANK LOGS.GPJ SWNEW5.GDT 12/18/13


MATERIAL DESCRIPTION
Approximate Elevation:
DEPTH, ft
SYMBOL
SAMPLES
GROUND WATER DEPTH, ft
Penetration Resistance
(340 lb. weight, 30" drop)
▲ Blows per foot
● Water Content (%)
0 10 20 30 40 50
Brown, gray, and tan, Poorly Graded Gravel with Sand, Silt, and Cobbles (GP-GM); moist. Mine Rock Fill.
S-1
Groundwater not encountered during drilling on 11/16/2013
5
10
15
20
25
30
CONTINUED NEXT PAGE
LEGEND
* Sample Not Recovered
Grab Sample
0 10 20 30 40 50
● Water Content (%)
Plastic Limit Liquid Limit
Natural Water Content
NOTES
1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
Geotechincal Study
New CIP Tail Stock Tank
Pogo Mine, Alaska
LOG OF BORING 13-03
2013
31-1-02377-001
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants
Figure 4
Sheet 1 of 2
GEOTECHNICAL LOG 2377 POGO TANK LOGS.GPJ SWNEW5.GDT 12/18/13



NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Geotechincal Study
New CIP Tail Stock Tank
Pogo Mine, Alaska

LOG OF BORING 13-03

2013 31-1-02377-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Figure 4
Sheet 2 of 2

GEOTECHNICAL LOG 2377 POGO TANK LOGS.GPJ SWNEW5.GDT 12/18/13

APPENDIX A

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 31-1-02377-001

Date: December, 2013
To: Mr. Dave Kennedy, PE
RE: Geotechnical Study
New CIP Tail Stock Tank
Pogo Mine, Alaska

Important Information About Your Geotechnical/Environmental Report

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, which 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