

**SITE ASSESSMENT REPORT  
NOWELL MILL SOIL SAMPLING  
SHEEP CREEK VALLEY, JUNEAU, ALASKA  
ADEC CS FILE No. 1513.38.013**

**JULY 27, 2014**



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## LIST OF ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
bgs	Below Ground Surface
CAP	Corrective Action Plan
CSM	Conceptual Site Model
COC	Contaminants of Concern
CY	Cubic Yards
DU	Decision Unit
E&E	Ecology and Environment, Inc.
EPA	Environmental Protection Agency
ERS	Eligible Responsible Sites
FSG	ADEC May 2010 <i>Draft Field Sampling Guidance</i>
Ft	Feet
F & B	Freidman and Bruya, Inc.
Sq ft	Square Feet
mg/Kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MI	Multi-increment
ppb	Parts Per Billion
ppm	Parts Per Million
SAP	Sampling and Analysis Plan



## 1.0 EXECUTIVE SUMMARY

In 2013, **NORTECH** was retained by the AJT Mining Properties Inc., (AJT) to complete site characterization activities at the area referred to as the Alaska Gastineau Mine Tailings, the Sheep Creek Mine Portal, and the former Nowell Mill locations; all located in the Thane area of Juneau, Alaska. A total of six decision units were identified and sampled during this investigation. Each area had been previously characterized by Ecology and Environment, Inc. (E&E) in 1988 and soil sampling data collected during that investigation indicated that mercury was present at the Nowell Mill Site.

The 2013 Site work was carried out in accordance with the Sampling and Analysis Plan between April 23, 2013 and June 3, 2013. **NORTECH's** Site Assessment Report (SAR) dated July 29, 2013 (attached as Appendix D), detailed the site investigation methodology, sampling results and recommendations. The investigation findings showed that the soil at the Nowell Mill sampling Site, identified as Decision Unit 2 (DU-2) contained arsenic, chromium, lead, mercury and silver in concentrations above the respective ADEC Cleanup Limits.

In the Spring of 2014, the Alaska Department of Environmental Conservation (ADEC) finalized their review of the SAR and determined that additional soil sampling was necessary to characterize the concentration of metals contaminants at the Nowell Mill Site. In April, 2014, **NORTECH**, ADEC and AJT personnel visited the Nowell Mill Site to view the Mill ruins, discuss additional sampling requirements and identify potential sampling locations.

On May 8, 2014, **NORTECH** completed the soil sampling at the Nowell Mill Site. A total of eleven soil/sediment samples (10 primary samples and one duplicate) were collected from the Site and analyzed for RCRA 8 Metals. Field mapping was conducted of the Site, the sampling locations and the foundation elements and relic features of the former Nowell Mill remaining at the Site.

The laboratory analysis results show that soil at the Site contain arsenic cadmium, chromium, lead, mercury, selenium and silver in concentrations exceeding the ADEC Cleanup Limits. In general, the contaminant concentrations are consistent with what is to be expected from an early twentieth century milling location that processed a metal laden sulfide ore body.

Arsenic was detected in each sample at concentrations exceeding the ADEC Cleanup Limit. However, with several exceptions, the arsenic concentrations, although elevated, were consistent with typical background concentrations for the Juneau area. Barium was not detected in any samples above the ADEC Cleanup Limits.

Total chromium concentrations in each sample also exceeded the ADEC Cleanup Limits. However, the total chromium concentrations were within the limit of naturally occurring total chromium concentrations typically found throughout Alaska. Although no laboratory analysis was completed of the soil samples to speciate the total Chromium as either naturally occurring trivalent chromium ( $\text{Cr}^{+3}$ ), or the toxic hexavalent chromium ( $\text{Cr}^{+6}$ ), there are no know industrial activities that were conducted at the Site that are typically associated with the formation of  $\text{Cr}^{+6}$ .

Cadmium was detected in three samples, selenium was detected in two samples and silver was detected in five samples which exceeded their respective Cleanup Limits. Lead concentrations were detected in five samples exceeding the Cleanup Limits. Mercury was detected in each project sample exceeding the ADEC Cleanup Limit.



In general, the metal concentrations detected at the Site are commensurate with the former use of the Site to process and mill ore laden with metals.

## **2.0 BACKGROUND**

### **2.1 Site Location and Description**

The Site is located in the Sheep Creek Valley surrounding the foundation remains of the former Nowell Mill. The Site is located at 58°16'7.23"N latitude, 134°19'23.19"W longitude. The Site is accessed via the AJT Mine Road. Figure 1 of Appendix A shows the general project location, while Figures 2 and 3 show the Site Vicinity and Nowell Mill Site Location. The Site is located approximately 300 feet southeast of the access road along Sheep Creek. From the road, the Site is accessed via a vegetated slope, generally as shown on Figure 3. The ruins are located at the base of the slope and on a narrow flat lying bench along Sheep Creek which is dominated by small spruce trees and associated secondary canopy vegetation

#### *Site Climate*

Juneau has a maritime climate (Koppen Cfb) marked by relatively long and cold winters and mild summers. The area receives an average of 230 days and 62.17 inches of precipitation annually. High and low temperatures are ameliorated by the proximity to the Pacific Ocean. The average annual temperature is 43 degrees Fahrenheit.

#### *Site Geology*

The Site is located in the Pacific Mountain System physiographic province of Alaska. This province is characterized by tightly folded coastal mountains primarily composed of Permian to Cretaceous aged accretionary marine sedimentary rocks and volcanic rocks which have been highly metamorphosed, primarily to greenschist. Plutonic rocks (diorite), metamorphosed volcanic-sediments (greenstones) and phyllite exist throughout the area as well as younger sedimentary rocks (sandstones and conglomerates) derived from these parent materials. The Terrane is extensively faulted and recently glaciated.

Site soils are of recently depositional origin and are comprised of colluvium derived from the surrounding mountains overlying glacio-fluvial deposits. The soils at the Site consist of a mixture of silts, silty-sands and angular gravels along the hill side, and organic rich silts and silty-sands near the base of hillside along Sheep Creek.

#### *Site Groundwater and Surface Water*

Sheep Creek lies along the southern border of the study area. Other surface water include several seasonally intermittent drainages which run roughly perpendicular to Sheep Creek and drain the hillside to the north to a narrow wet seep zone at the base of the slope immediately adjacent to Sheep Creek.

The entire Sheep Creek Valley is designated as a Zone C Drinking Water Protection Area by the US Environmental Protection Agency (EPA), while the middle portion, which includes the Nowell Mill Investigation Site, is classified as a Zone B Drinking Water Protection Area.



## 2.2 Site History

The *History of the Juneau Gold Belt, 1869 - 1965* (Earl Redman, United States Department of the Interior, Bureau of Mines) and the *Bureau of Mines Mineral Investigations in the Juneau Mining District, Alaska, 1984 – 1988, Volume 2.—Detailed Mine, Prospect, and Mineral Occurrence Descriptions* (United States Department of the Interior), the Ecology and Environment, Inc (E&E) Site Inspection Report dated May 1988, and interviews of the current property lessors, depict past and current Site uses.

## 2.3 Prior Site Activities

The ADEC Contaminated Sites database lists the Site as file number 1513.38.013. The ADEC database file lists surface soil sample results from 1987. The soil samples were taken by Echo Bay Mining Company during an effort to re-mine the tailings. The methods of sample locations, collection, and preservation methods for these samples are unknown and therefore the values listed may be arbitrary.

The Site, EPA identification number AKD981767320, is currently listed as non-NPL status: State-Lead Cleanup with Eligible Response Site (ERS) Exclusion in the EPA Superfund Site Information database. ERS exclusion sites are such that the provisions of CERCLA 105(h) and 128(b) do not apply. This means that EPA does not have to defer final listing of the site on the NPL at the request of the state. The E&E Site Inspection, performed under EPA directive, analyzed the following matrices: processed mine tailings, surface water, groundwater, soil/sediment, and biota tissue (marine mussels). The samples were analyzed for compounds and elements on EPA's Target Compound List and various metals using the Extraction Procedures Toxicity method. Results of the effort found that only arsenic and lead are present in the tailings dumps at elevated concentrations. In addition, they determined none of the identified elements detected were contributing to off-site surface water, groundwater, or surficial soil concentrations. E&E only collected one soil sample from the Nowell Mill Site; therefore the area was designated as needing further study.

In 2013, **NORTECH** completed an Assessment of the Alaska Gastineau Mine Tailings. This investigation was conducted to assess the concentrations of metals of concern at the six locations throughout the Sheep Creek Valley which had previously been assessed by E&E. Each sampling site (decision unit) was assessed using multi-increment (MI) sampling methodologies. The investigation findings showed that Decision Unit 2 (the Nowell Mill Site) had concentrations of arsenic, chromium, lead, mercury and silver in concentrations which exceeded the ADEC Cleanup Limits.

In the spring of 2014, ADEC requested additional soil sampling at the Nowell Mill site to characterize the metals concentrations at this Site. On April 29, 2014, **NORTECH** personnel Jason Ginter and Ron Pratt mobilized to the Nowell Mill site with Bill Corbus and Catherine Johnson, AJT Mining Properties Inc. (AJT), Bruce Howard (AVISTA Corp) and Sally Schlichting and Danielle Duncan (ADEC). During this Site visit, several drainages and low lying wet areas were observed surrounding the relic foundation remains of the former Nowell Mill and these areas were identified by ADEC personnel as locations for additional soil/sediment sampling.



### 3.0 PROJECT OBJECTIVES AND SCOPE OF WORK

The objective of the Site Assessment was to characterize the concentrations of metals of concern in the soil sediments of the drainages and wet areas surrounding the former Nowell Mill ruins that were identified during the April 29 Site visit. To accomplish this objective, a work plan was developed and submitted to ADEC which outlined the following Scope of Work for this investigation:

- Collect discrete sediment sample(s) from each distinct drainage identified during the April 29 Site visit
- Collect discrete sediment sample(s) from the low swampy area(s) identified during the April 29 Site visit
- Analyzed each sample for RCRA 8 Metals (arsenic, barium, cadmium, chromium, mercury, lead, selenium and silver)
- Provide an investigation Report which includes:
  - Discussion of site observations, context for sampling and sample results
  - Analytical results summary table
  - Photo documentation of each sampling location

In 2013 **NORTECH** completed a Conceptual Site Model (CSM) in accordance with ADEC requirements, included as Appendix C. The CSM consists of a scoping form and flow chart graphic, each of which is attached. These indicate the mechanism of exposure, the impacted and potentially impacted media, and the pathways that contamination may be able to reach receptors at the site (now or in the future). At the work plan level, the CSM is intended to outline the potential pathways without regard to corrective action and/or engineering controls.

The CSM reflects leachate from the tailings migrating downslope. The exposure pathways considered complete were:

- Incidental Soil Ingestion

AJT contracted **NORTECH** to conduct a Site Assessment of the Nowell Mill Site in accordance with 18 AAC 75 to determine whether elevated levels metals are present. The characterization was conducted in accordance with the SAP, the ADEC May 2010 Draft *Field Sampling Guidance (FSG)* and the ADEC September 2009 *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites*.

### 4.0 FIELD ACTIVITIES

Each of the drainages and wet swampy areas observed during the April 29 Site visit were photographed by ADEC personnel during this visit. On May 8, 2014, Ron Pratt and Jen Davis of **NORTECH**, and Danielle Duncan with ADEC mobilized to the Site to conduct the sediment sampling investigation. A total of ten discrete sampling locations were collectively determined by **NORTECH** and ADEC personnel and marked with pin flags prior to sample collection. Sample depths were also collectively determined by the **NORTECH** and ADEC personnel for each location. The sample locations and depth below ground surface (bgs) are shown on Figure 4. A random number generator was used to determine the location of the duplicate sample to be collected during this effort.



All field work for this investigation was completed by **NORTECH** personnel Ron Pratt and Jen Davis on May 8, 2014. Sediment samples were collected by advancing a clean sampling tool into the sediment at each of the previously determined locations, then transferring the sediment directly into clean sample jars provided by the laboratory. Each sample was labeled with a unique sample ID, the time and sample depths were recorded in the field notebook and a photograph was taken of each location. All sampling tools were decontaminated prior to collection of subsequent samples.

A total of 11 samples (10 primary samples and one blind duplicate sample) were collected during the investigation. All project samples were stored in a cooler with gel-ice subsequent to collection and prior to SGS Laboratory in Anchorage, Alaska under standard chain-of-custody protocol.

Field mapping was conducted subsequent to sample collection using a sextant and several 200 foot measuring tapes. Corner points A through C were established and marked in the field. Corner A was marked with a blaze on the tree that served as the common corner point for the 2013 and 2014 sampling areas. Corners B and C were marked with metal stakes driven into the ground. These corner points served as the basis for running swing-tie measurements to the sample locations, the remaining foundation elements and other relics from the former Nowell Mill. Site drainages and wet swampy areas were also mapped in the field (Figure 4).

## 5.0 METHODOLOGY

The characterization was conducted in accordance with the FSG and 18 AAC 75.

### 5.1 Contaminants of Potential Concern and Pertinent Cleanup Levels

The contaminants of concern for this site were limited to the RCRA 8 metals based on the historic Site uses.

The ADEC Method Two cleanup levels for soil are typically used as cleanup goals for sites managed through the ADEC contaminated sites program. ADEC has developed the Method 2 cleanup levels to be protective of human health and the environment under the wide range of conditions found in Alaska. Method Two soil cleanup levels for migration to groundwater in an Over 40 Inch Zone are being used to evaluate soil and water conditions at this Site. Therefore, the cleanup levels for Site contaminants of concern (COCs) are:

Table 1: ADEC Cleanup Levels

<i>Contaminant of Concern</i>	<i>Soil (mg/kg)</i>
Arsenic	3.9
Barium	1100
Cadmium	5.0
Chromium (total)	25
Lead	400
Mercury	1.4
Selenium	3.4
Silver	11.2





## 5.2 Laboratory Sampling Plan

**NORTECH** collects all laboratory soil samples in general accordance with the ADEC 2010 Field Sampling Guidance document (adopted by reference for sampling guidance, 18 AAC 78 regulations).

Soil samples are collected using disposable equipment such as scoops or spoons, gloves, and zip lock bags. After collection, samples are assigned a unique identification number and placed into laboratory certified clean sample jars, preserved if necessary, and then placed into a cooler with ice and a temperature blank for transportation under chain-of-custody to an ADEC approved laboratory. A minimum of one duplicate sample is collected for each ten samples submitted to the laboratory. Samples are shipped to SGS Anchorage for analysis for the following:

- RCRA 8 Metals by EPA Method 6020.

## 6.0 RESULTS AND DISCUSSION

A total of 11 soil sediment samples (10 primary samples and one duplicate) were collected during this investigation and submitted to SGS Laboratory for analysis of RCRA 8 metals by EPA Test Method 6020. Laboratory analysis results are summarized in Table 2 below. The complete Laboratory Analysis Report is attached as Appendix E. The laboratory analysis results are also summarized as a table in Figure 5.

Table 2  
 Soil Sample Laboratory Analysis Result Summary  
 May 8, 2014 Characterization Sampling -- Nowell Mine

Sample ID	Cleanup Level	Soil										
		NMM-01	NMM-02	NMM-03	NMM-04	NMM-05 <sup>1</sup>	NMM-06	NMM-07	NMM-08	NMM-09	NMM-10	NMM-11 <sup>1</sup>
Analyte	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
<b>RCRA 8 Metals</b>												
Arsenic	3.9	309	59.8	16.7	15.4	11.2	14.9	105	140	17.5	23.2	7.78
Barium	1100	532	388	95.9	102	57.7	218	468	1040	380	299	49
Cadmium	5.0	13.1	7.79	0.251 U	0.467	0.408	0.418	4.89	11.1	4.03	1.54	0.33
Chromium	25	72.7	81.4	75.4	52.2	63.5	53.6	100	61.7	67.0	60.5	79.3
Lead	400	3710	661	38.7	91.4	77.4	48.4	649	1330	1330	143	70.2
Mercury	1.4	78.1	8.87	2.16	2.51	4.29	1.28	10.1	85.4	15.9	2.80	3.11
Selenium	3.4	4.88	2.69	1.25 U	1.29 U	1.46 U	1.25 U	4.18 U	4.16	1.79	2.59 U	1.44 U
Silver	11.2	76.8	31.7	1.59	4.03	3.21	0.682	41.7	46.7	64.2	6.48	2.65

**Notes:** ADEC Method Two Cleanup Level for Soil, Precipitation >40 inch Zone, Migration to Groundwater (Tables B1 and B2--18 AAC 75)

# U	Analyte not detected at the listed limit of quantitation (PQL)
Shade	Analyte detected in concentration below the ADEC Cleanup level
Shade	Analyte detected in concentration above the ADEC Cleanup level
N/A	Not Applicable--Analysis not performed for this analyte
# <sup>1</sup>	Field Duplicate Pair 1

The laboratory results are discussed below for each of the metals of concern.

### *Arsenic*

Arsenic was detected in each of the project samples in concentrations exceeding the ADEC Cleanup Limits of 3.9 mg/kg. Arsenic concentrations ranged from 7.78 mg/kg in sample NMM-11 to 309 mg/kg in sample NMM-01. With the exception of samples NMM-01, NMM-02, NMM-07 and NMM-08, arsenic was found in concentrations that are considered to be within the normal background concentrations for the Juneau area.



Samples NMM-01, NMM-02, NMM-07 and NMM-08 contained arsenic in concentrations of 309 mg/kg, 59.8 mg/kg, 105 mg/kg and 140 mg/kg, respectively, which are elevated above the typical background concentrations.

#### *Barium*

Barium was detected in each of the project samples in concentrations below the ADEC Cleanup Limits of 1,100 mg/kg. Barium concentrations ranged from 49 mg/kg in sample NMM-11 to 1040 mg/kg in sample NMM-08.

#### *Cadmium*

Cadmium was detected in each of the project samples with the exception of sample NMM-03. Cadmium concentrations ranged from 0.33 mg/kg in sample NMM-11 to 13.1 mg/kg in sample NMM-01. Cadmium concentrations exceeded the ADEC Cleanup Limits of 5.0 mg/kg in three samples; NMM-01, NMM-02 and NMM-08.

#### *Chromium*

Total chromium was detected in each of the project samples in concentrations exceeding the ADEC Cleanup Limits of 25 mg/kg. The total chromium concentrations ranged from 52.2 mg/kg in sample NMM-04 to 100 mg/kg in sample NMM-07.

The ADEC cleanup level for total chromium are based on the concentration of hexavalent chromium ( $\text{Cr}^{+6}$ ), the toxic form of chromium produced as a by-product of certain industrial activities. The naturally occurring trivalent chromium ( $\text{Cr}^{+3}$ ) has an ADEC Cleanup limit of 124,000 mg/kg.

Although none of the project samples from this investigation were analyzed to speciate between  $\text{Cr}^{+3}$  and  $\text{Cr}^{+6}$ . The soil sample collected from DU-2 (the Nowell Mill Site) during the 2013 Characterization effort was analyzed to speciate the chromium in this sample and  $\text{Cr}^{+6}$  was not detected in that sample. Furthermore, no industrial activities typically associated with the formation of  $\text{Cr}^{+6}$  were known to exist at the Site. This provides multiple lines of evidence that the total chromium results for the Site reflect naturally occurring concentrations of  $\text{Cr}^{+3}$ .

#### *Lead*

Lead was detected in each of the project samples. Lead concentrations ranged from 38.7 mg/kg in sample NMM-03 to 3710 mg/kg in sample NMM-01. Lead concentrations exceeded the ADEC Cleanup Limits of 400 mg/kg in five samples; NMM-01, NMM-02, NMM-07, NMM-08 and NMM-09.

#### *Mercury*

Mercury was detected in each of the project samples in concentrations exceeding the ADEC Cleanup Limits of 1.4 mg/kg with the exception of sample NMM-06. Mercury concentrations ranged from 1.28 mg/kg in sample NMM-06 to 85.4 mg/kg in sample NMM-08.

#### *Selenium*

Selenium was detected in four of the project samples. Selenium concentrations ranged from 1.79 mg/kg in sample NMM-09 to 4.88 mg/kg in sample NMM-01. Two samples, NMM-01 and NMM-08 had selenium concentrations which exceeded the ADEC Cleanup Limit of 3.4 mg/kg.



*Silver*

Silver was detected in each of the project samples. Silver concentrations ranged from 0.682 mg/kg in sample NMM-06 to 76.8 mg/kg in sample NMM-01. Silver concentrations exceeded the ADEC Cleanup Limits of 11.2 mg/kg in five samples; NMM-01, NMM-02, NMM-07, NMM-08 and NMM-09.

A review of the laboratory report QA/QC was completed for the samples submitted during this investigation and a Laboratory Data Review Checklist completed for the laboratory report. No issues that affect the usability of the laboratory data for the intended purpose of this report were identified. The full laboratory analysis report and the Laboratory Data Review Checklist are located in Appendix E. The Duplicate Pair QC Summary is provided in Table 3 below.

**Table 3**  
**Soil Samples Duplicate Pair QC Summary**

Analyte	Dup Pair #1		
	NMM-05	NMM-11	RPD
	mg/kg	mg/kg	%
Arsenic	11.2	7.78	36.0%
Barium	57.7	49	16.31%
Cadmium	0.408	0.33	21.14%
Chromium	63.5	79.3	22.13%
Lead	77.4	70.2	9.76%
Mercury	4.29	3.11	31.9%
Selenium	1.46U	1.44U	NA
Silver	3.21	2.65	19.1%

**Notes:**

RPD            Relative Percent Difference  
NA            Not Applicable

The Nowell Mill Site is located at the base of a steep and densely vegetated slope along Sheep Creek. Access to the Site involves walking down the slope approximately 150 yards from the Sheep Creek Access Road. No trail exists to the Site and it is not easily accessible to the public. In addition, the Site is not accessible by motorized or mechanical equipment. Due to the remote nature of the Site excavation or capping are not feasible options.

The 1988 E&E Report refers to the use of mercury amalgamation to recover gold from the ore processed at the Nowell Mill and that an unknown quantity of mercury remained at the site after it was abandoned following the 1914 fire that burned the mill. This mercury was presumed to be the source of the mercury contamination existing at the Site. The existing body of data, including the previous sampling conducted at the Site, shows that metals contamination existing in the soil is commensurate with the former use of the Site to mill, concentrate and process ores containing various metals.



## 7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the available data, both historic and the results of this investigation, **NORTECH** has developed the following conclusions and recommendations for the site:

### Conclusions

- The Site contains arsenic, cadmium, chromium, lead, mercury, selenium and silver in the soil in concentrations which exceed the respective ADEC Cleanup Limits.
  - Total chromium concentrations are from naturally occurring Cr<sup>+3</sup> and are in concentrations that are considered background for the Juneau area.
- The metal concentrations at the Site are commensurate with historic mining and processing of metals laden ore deposits of the Juneau Mining District.
- The remote location of the Site precludes common public contact with the material, and the only exposure pathway that is complete is the incidental ingestion of site soils.
- Excavation of the metals bearing soil may cause opportunity for the material to be transported in to Sheep Creek.
- The remote location precludes capping the Site.

### Recommendations

- **NORTECH** request that institutional controls should be established for the Site which may include;
  - Appropriate placards warning potential visitors to the Site of:
    - Soil and sediments at the Site are contaminated with metals in concentrations that are potentially harmful to Human Health
    - Visitors should refrain from removing and/or handling the Nowell Mill relics remaining at the Site
    - Visitors should refrain from handling soil and sediments at the Site
    - Visitors should refrain from harvesting and/or eating vegetative matter from the Site

## 8.0 LIMITATIONS

**NORTECH** provides a level of service that is performed within the standards of care and competence of the environmental engineering profession. However, it must be recognized that limitations exist within any site investigation. This report provides results based on a restricted work scope and from the analysis and observation of a limited number of samples. Therefore, while these limitations are considered reasonable and adequate for the purposes of this report, actual site conditions may differ. Specifically, the unknown nature of exact subsurface physical conditions, sampling locations, the analytical procedures' inherent limitations, as well as financial and time constraints are limiting factors.



The report is a record of observations and measurements made on the subject site as described. The data should be considered representative only of the time the site investigation was completed. No other warranty or presentation, either expressed or implied, is included or intended. If it is made available to others, it should be for information on factual data only, and not as a warranty of conditions, such as those interpreted from the results presented or discussed in the report. The undersigned certify that except as specifically noted in this report, the statements and data appearing in this report are in conformance with ADEC's Standard Sampling Procedures. **NORTECH** has performed the work, made the findings, and proposed the recommendations described in this report in accordance with generally accepted environmental engineering practices.

## 9.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

**Ronald Pratt**, Senior Environmental Scientist for **NORTECH**, has a B.S. degree in Geography/Earth Science, a M.S. in Environmental Studies and over 20 years of professional environmental consulting experience in California, Washington and Alaska.

**Jason Ginter**, Juneau Technical Manager for **NORTECH**, has a B.S. in Chemistry and over 21 years of experience conducting hazardous materials investigations, property assessments, and other environmental fieldwork throughout Alaska.

A handwritten signature in black ink that reads "Ronald Pratt".

Ronald Pratt  
Senior Environmental Scientist

A handwritten signature in black ink that reads "Jason Ginter".

Reviewed By:  
Jason Ginter  
Principal, Juneau Technical Manager

# APPENDIX A

## FIGURES



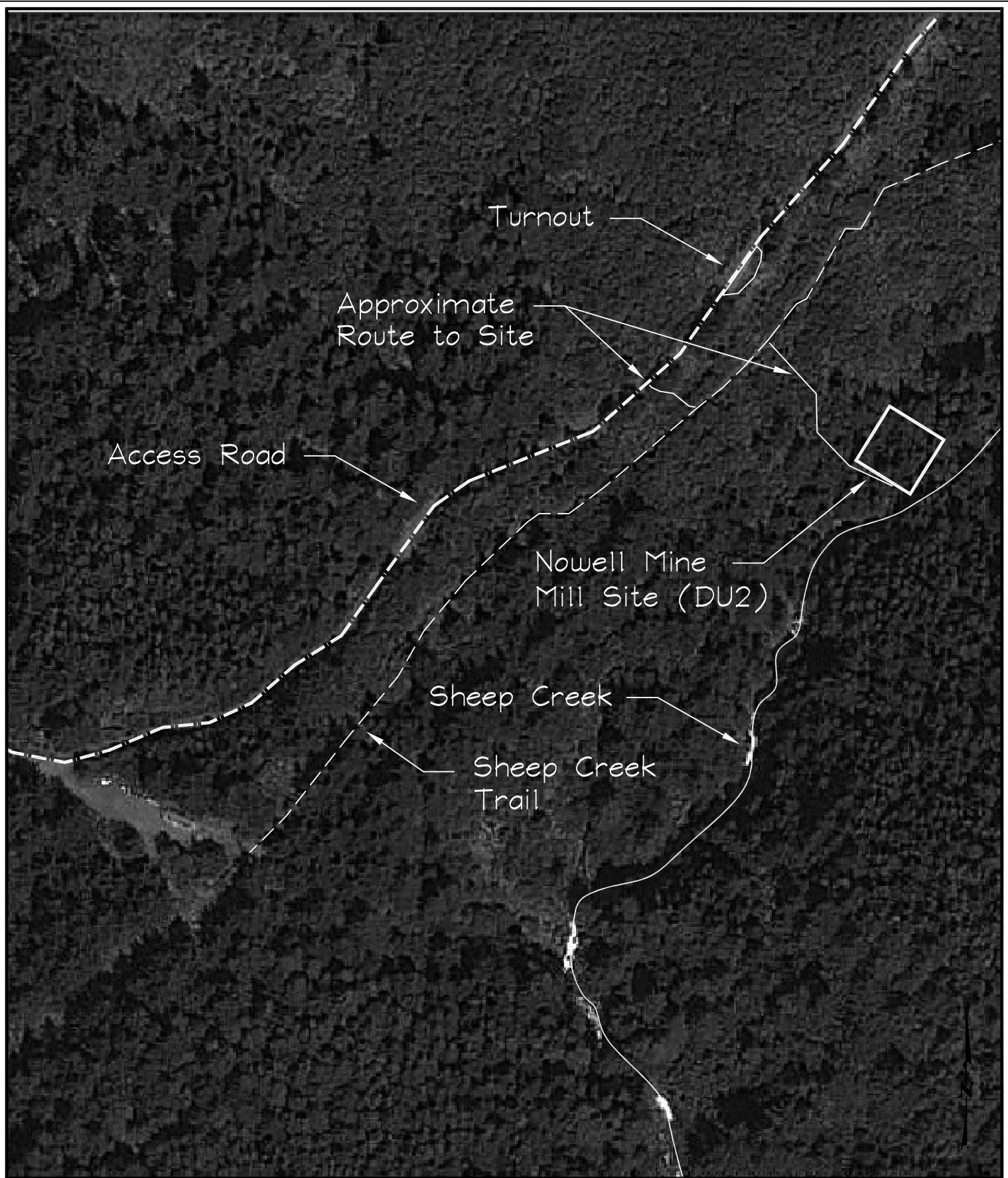


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Project Vicinity Map  
 Nowell Mine Mill Soil Assessment  
 Juneau, Alask

SCALE: 1" = 500'	FIGURE:
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DRAWN: RJP	
PROJECT NO: 13-1036	
DWG: 131036b(02)	
DATE: 5/10/2014	

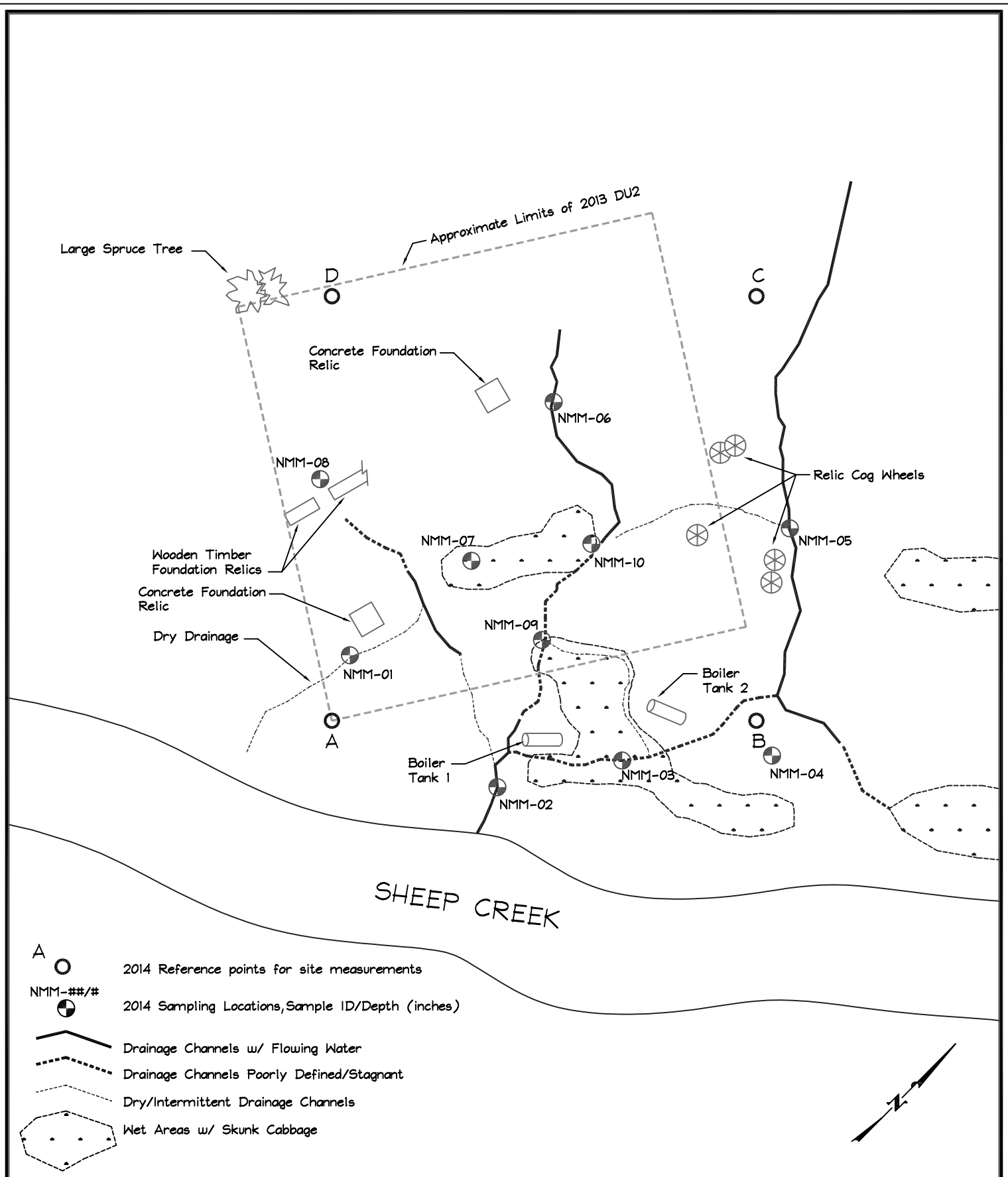




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Decision Unit 2  
 Nowell Mine Mill Soil Assessment  
 Juneau, Alaska

SCALE: 1" = 200'	FIGURE:
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DWG: 131036b(03)	
DATE: 5/10/2014	



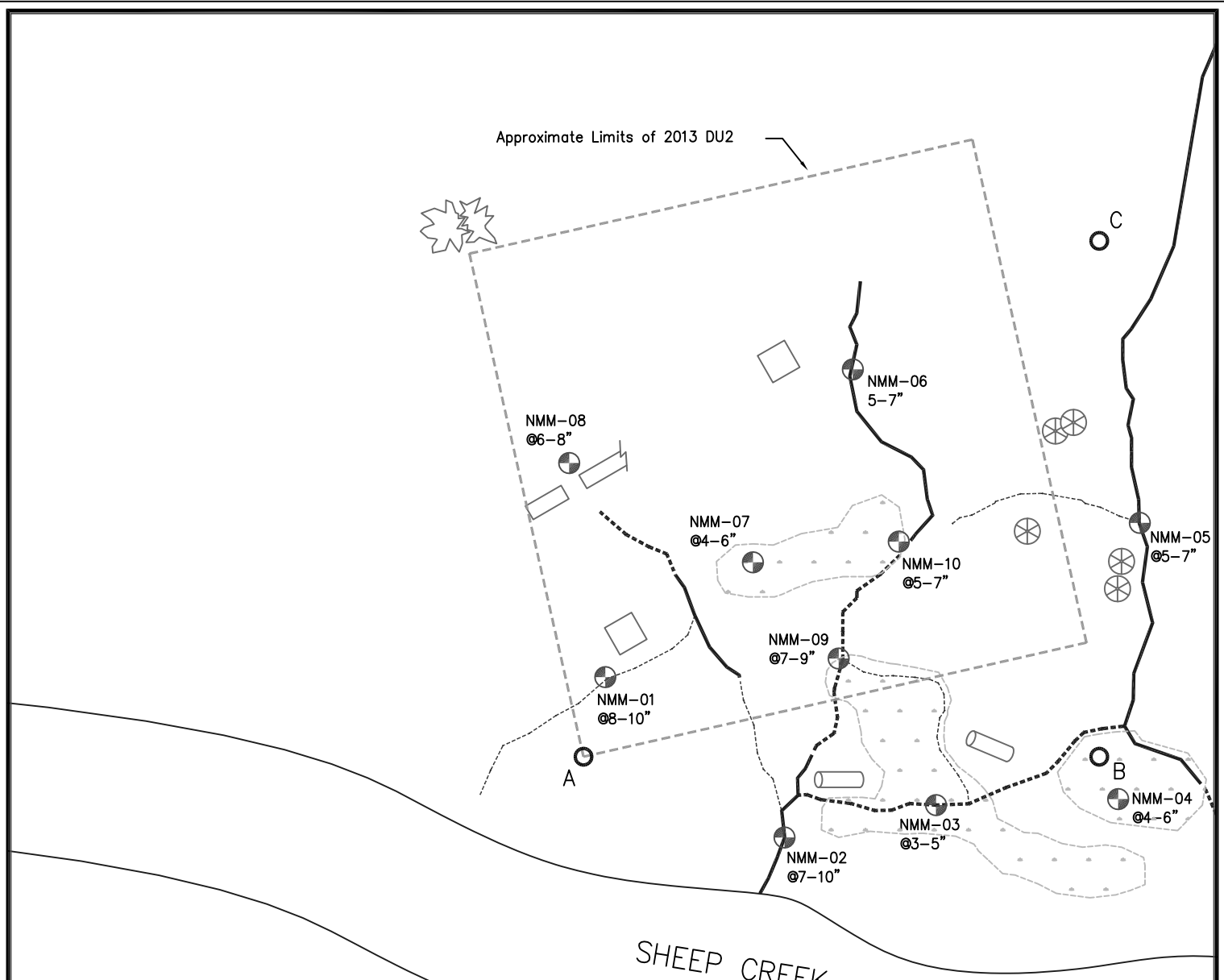
- A ○ 2014 Reference points for site measurements
- NMM-##/## ○ 2014 Sampling Locations, Sample ID/Depth (inches)
- Drainage Channels w/ Flowing Water
- - - Drainage Channels Poorly Defined/Stagnant
- ⋯ Dry/Intermittent Drainage Channels
- ⬡ Wet Areas w/ Skunk Cabbage



ENVIRONMENTAL ENGINEERING HEALTH & SAFETY  
 2400 College Road, Fairbanks, Alaska 99709 Ph: 907-452-5688  
 3105 Lakeshore Dr. Anch, Alaska 99517, Ph: 907-222-2445  
 5438 Shaune Dr., Juneau, Alaska 99801 Ph: 907-586-6813

Soil Sampling Diagram  
 Nowell Mine Mill Soil Assessment  
 Juneau, Alaska

SCALE: 1" = 30'	FIGURE:
DESIGN: JG	4
DRAWN: RJP	
PROJECT NO: 13-1036	
DWG: 131036b(04)	
DATE: 5/10/14	



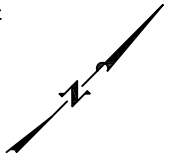
RCRA 8 Metal Analytes

	As	Ba	Cd	Cr	Pb	Hg	Se	Ag
Site Cleanup Limit	3.7	1,100	5.0	25.0	400	1.4	3.4	11.2
Sample ID	Laboratory Soil Sample Analysis Results (mg/Kg)							
NMM-01	309	532	13.1	72.7	3710	78.1	4.88	76.8
NMM-02	59.8	388	7.79	81.4	661	8.87	2.69	31.7
NMM-03	16.7	95.9	ND	75.4	38.7	2.16	ND	1.59
NMM-04	15.4	102	0.467	52.2	91.4	2.51	ND	4.03
NMM-05	11.2	57.7	0.408	63.5	77.4	4.29	ND	3.21
NMM-11 (Dup 05)	7.78	49.0	0.330	79.3	70.2	3.11	ND	2.65
NMM-06	14.9	218	0.418	53.6	48.4	1.28	ND	0.682
NMM-07	105	458	4.89	100	649	10.1	ND	41.7
NMM-08	140	1040	11.1	61.7	1330	85.4	4.16	46.7
NMM-09	17.5	380	4.03	67.0	1330	15.9	1.79	64.2
NMM-10	23.2	299	1.54	60.5	143	2.80	ND	6.48

Note: ### Results < ADEC Cleanup Limits  
 ### Results > ADEC Cleanup Limits

Legend

- A 2014 Reference points for site measurements
- NMM-## @ #" 2014 Sampling Locations, Sample ID @ Depth (inches)
- Drainage Channels w/ Flowing Water
- Drainage Channels Poorly Defined/Stagnant
- Dry/Intermittent Drainage Channels
- Wet Swampy Areas



NORTECH Sustainable Environment, Energy  
 Health & Safety Professional Services  
 2400 College Road, Fairbanks, Alaska 99709 Ph: 907-452-5688  
 3105 Lakeshore Dr. Ste. A106 Anchorage, Alaska 99517, Ph: 907-222-2445  
 5438 Shaune Dr. Ste. B, Juneau, Alaska 99801 Ph: 907-586-6813  
 1623 Mill Bay Rd. Ste. 5, Kodiak, Alaska 99615 Ph: 907-942-7700

Soil Sampling Results Diagram  
 Nowell Mine Mill Soil Assessment  
 Juneau, Alaska

SCALE: 1" = 30'	FIGURE: 5
DESIGN: JG	
DRAWN: RJP	
PROJECT NO: 13-1036	
DWG: 131036b(05)	
DATE: 5/10/14	

# APPENDIX B

## PHOTO PAGES



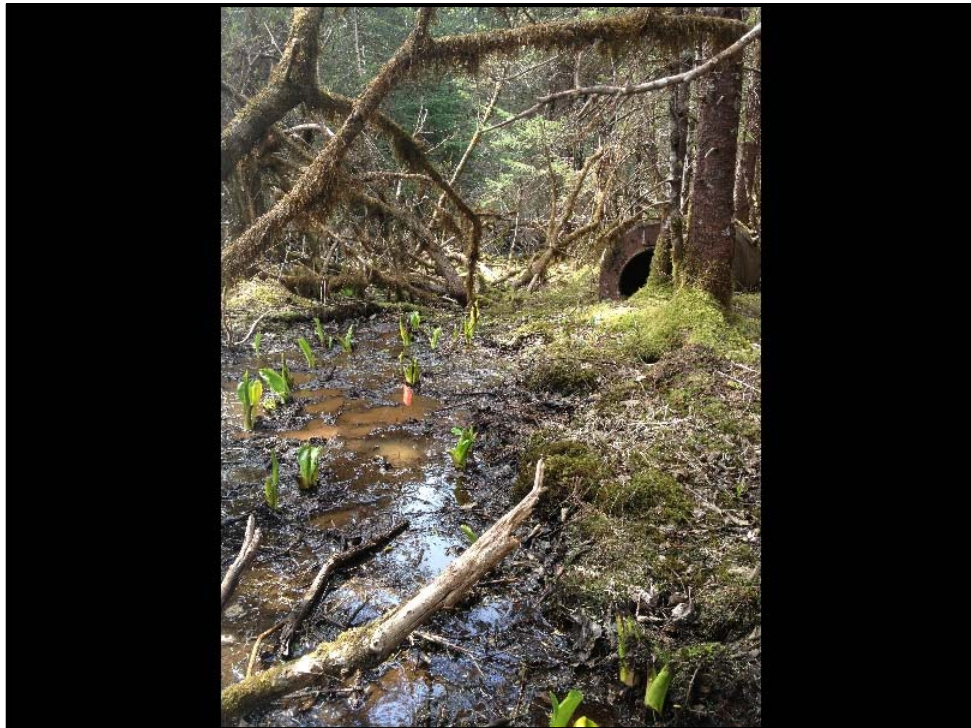
**Photo 1:** Looking northeast at sample location NMM-01 from the Reference corner point A (see photo 11).



**Photo 2:** Looking south at sample location NMM-02 from near the approximate location of sample NMM-09.



**Photo 3:** Looking northeast at sample location NMM-03. Note the relic Boiler Tank (#2) in background.



**Photo 4:** Looking west at sample location NMM-04. Note the relic Boiler Tank (#2) in background.



**Photo 5:** Looking west at sample location NMM-05 and NMM-11 (sample duplicate).



**Photo 6:** Looking north at Sample Location NMM-06. Note remnant relics from the Nowell Mill at image right.



**Photo 7:** Looking southwest at sample location NMM-07.



**Photo 8:** Looking north through the wooden timber foundation remnants at sample location NMM-08.





**Photo 9:** Looking south at sample Location NMM-09. Note the relic Boiler Tanks in background; #1 at right and #2 at left.



**Photo 10:** Looking northwest at sample location NMM-10.



**Photo 11:** Looking west at reference corner point A.



**Photo 12:** Looking east at relic Boiler Tanks #1 (foreground) and #2 (in background, top left).



**Photo 13:** Looking east at one of the remnant cog wheels located along the eastern edge of the sampling area. Note orange flag marking NMM-05 in top-center of image left of tree.



**Photo 14:** Looking northeast at the wooden timber foundation remnants of the former Nowell Mill (photo circa 2013).

# APPENDIX C

## CONCEPTUAL SITE MODEL

# Human Health Conceptual Site Model Scoping Form

**Site Name:**

**File Number:**

**Completed by:**

## Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

*General Instructions: Follow the italicized instructions in each section below.*

## 1. General Information:

**Sources** (*check potential sources at the site*)

- |                                                        |                                                                                       |
|--------------------------------------------------------|---------------------------------------------------------------------------------------|
| <input type="checkbox"/> USTs                          | <input type="checkbox"/> Vehicles                                                     |
| <input type="checkbox"/> ASTs                          | <input type="checkbox"/> Landfills                                                    |
| <input type="checkbox"/> Dispensers/fuel loading racks | <input type="checkbox"/> Transformers                                                 |
| <input type="checkbox"/> Drums                         | <input checked="" type="checkbox"/> Other: <input type="text" value="mine tailings"/> |

**Release Mechanisms** (*check potential release mechanisms at the site*)

- |                                 |                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Spills | <input type="checkbox"/> Direct discharge                                                                                                              |
| <input type="checkbox"/> Leaks  | <input type="checkbox"/> Burning                                                                                                                       |
|                                 | <input checked="" type="checkbox"/> Other: <input type="text" value="historic mining processes. documented to not have included cyanide nor mercury"/> |

**Impacted Media** (*check potentially-impacted media at the site*)

- |                                                                   |                                                      |
|-------------------------------------------------------------------|------------------------------------------------------|
| <input checked="" type="checkbox"/> Surface soil (0-2 feet bgs*)  | <input checked="" type="checkbox"/> Groundwater      |
| <input checked="" type="checkbox"/> Subsurface soil (>2 feet bgs) | <input checked="" type="checkbox"/> Surface water    |
| <input checked="" type="checkbox"/> Air                           | <input checked="" type="checkbox"/> Biota            |
| <input checked="" type="checkbox"/> Sediment                      | <input type="checkbox"/> Other: <input type="text"/> |

**Receptors** (*check receptors that could be affected by contamination at the site*)

- |                                                                                     |                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------|
| <input checked="" type="checkbox"/> Residents (adult or child)                      | <input checked="" type="checkbox"/> Site visitor      |
| <input checked="" type="checkbox"/> Commercial or industrial worker                 | <input checked="" type="checkbox"/> Trespasser        |
| <input checked="" type="checkbox"/> Construction worker                             | <input checked="" type="checkbox"/> Recreational user |
| <input checked="" type="checkbox"/> Subsistence harvester (i.e. gathers wild foods) | <input type="checkbox"/> Farmer                       |
| <input checked="" type="checkbox"/> Subsistence consumer (i.e. eats wild foods)     | <input type="checkbox"/> Other: <input type="text"/>  |

\* bgs - below ground surface

**2. Exposure Pathways:** *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.)

*If the box is checked, label this pathway complete:*

Complete

Comments:

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.)

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)?

*If both boxes are checked, label this pathway complete:*

Complete

Comments:

arsenic

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future?

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350.

*If both boxes are checked, label this pathway complete:*

Incomplete

Comments:

EP toxicity tests proved the metals are not leaching. Groundwater wells in the vicinity and Sheep Creek's surface water, including the water coming from the Sheep Creek Portal, was tested in the 1988 study.

## 2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future?

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities).

*If both boxes are checked, label this pathway complete:*

Incomplete

Comments:

surface water was assessed in 1988 study.

## 3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods?

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)?

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.)

*If all of the boxes are checked, label this pathway complete:*

Complete

Comments:

mussels assess in 1988 study; determined to not be affected by tailings

## c) Inhalation-

### 1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.)

Are the contaminants in soil volatile (see Appendix D in the guidance document)?

*If both boxes are checked, label this pathway complete:*

Incomplete

Comments:

## 2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminated soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures)

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)?

*If both boxes are checked, label this pathway complete:*

Incomplete

Comments:



**3. Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

**Dermal Exposure to Contaminants in Groundwater and Surface Water**

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

*Check the box if further evaluation of this pathway is needed:*

Comments:

**Inhalation of Volatile Compounds in Tap Water**

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

*Check the box if further evaluation of this pathway is needed:*

Comments:

## Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM<sub>10</sub>). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.
- Chromium is present in soil that can be dispersed as dust particles of any size.

Generally, DEC direct contact soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because it is assumed most dust particles are incidentally ingested instead of inhaled to the lower lungs. The inhalation pathway only needs to be evaluated when very small dust particles are present (e.g., along a dirt roadway or where dusts are a nuisance). This is not true in the case of chromium. Site specific cleanup levels will need to be calculated in the event that inhalation of dust containing chromium is a complete pathway at a site.

*Check the box if further evaluation of this pathway is needed:*

Comments:

## Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

*Check the box if further evaluation of this pathway is needed:*

Comments:

**4. Other Comments** (*Provide other comments as necessary to support the information provided in this form.*)

# APPENDIX D

JULY, 2013

SITE ASSESSMENT REPORT

# APPENDIX E

## LABORATORY REPORT AND LABORATORY DATA REVIEW CHECKLIST

## Laboratory Report of Analysis

To: Nortech  
2400 College Rd  
Fairbanks, AK 99709  
(907) 452-5688

Report Number: **1141873**

Client Project: **Nowell Mine Mill**

Dear Ron Pratt,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Jennifer at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,  
SGS North America Inc.



Alaska Division Technical Director

Stephen C. Ede

2014.05.23

16:49:20 -08'00'

Jennifer Dawkins  
Project Manager

Date

## Case Narrative

SGS Client: **Nortech**  
SGS Project: **1141873**  
Project Name/Site: **Nowell Mine Mill**  
Project Contact: **Ron Pratt**

Refer to sample receipt form for information on sample condition.

### **CCV for HBN 1542761 (MMS/8523) (1210773) CCV**

6020A - Metals - CCV recovery for selenium was outside of acceptance criteria (biased high). Sample concentration is less the LOQ.

\*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

Print Date: 05/23/2014 4:41:25PM

## Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. All work is provided under SGS general terms and conditions (<[http://www.sgs.com/terms\\_and\\_conditions.htm](http://www.sgs.com/terms_and_conditions.htm)>), unless other written agreements have been accepted by both parties.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020A, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035B, 6020, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040B, 9045C, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV	Continuing Calibration Verification
CL	Control Limit
D	The analyte concentration is the result of a dilution.
DF	Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
F	Indicates value that is greater than or equal to the DL
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
JL	The analyte was positively identified, but the quantitation is a low estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
M	A matrix effect was present.
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
Q	QC parameter out of acceptance range.
R	Rejected
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content. All DRO/RRO analyses are integrated per SOP.



### Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
NMM-01	1141873001	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-02	1141873002	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-03	1141873003	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-04	1141873004	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-05	1141873005	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-06	1141873006	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-07	1141873007	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-08	1141873008	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-09	1141873009	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-10	1141873010	05/08/2014	05/13/2014	Soil/Solid (dry weight)
NMM-11	1141873011	05/08/2014	05/13/2014	Soil/Solid (dry weight)

<u>Method</u>	<u>Method Description</u>
SM21 2540G	Percent Solids SM2540G
SW6020A	RCRA Metals by ICP-MS

### Detectable Results Summary

Client Sample ID: **NMM-01**  
 Lab Sample ID: 1141873001

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	309	mg/Kg
Barium	532	mg/Kg
Cadmium	13.1	mg/Kg
Chromium	72.7	mg/Kg
Lead	3710	mg/Kg
Mercury	78.1	mg/Kg
Selenium	4.88	mg/Kg
Silver	76.8	mg/Kg

Client Sample ID: **NMM-02**  
 Lab Sample ID: 1141873002

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	59.8	mg/Kg
Barium	388	mg/Kg
Cadmium	7.79	mg/Kg
Chromium	81.4	mg/Kg
Lead	661	mg/Kg
Mercury	8.87	mg/Kg
Selenium	2.69	mg/Kg
Silver	31.7	mg/Kg

Client Sample ID: **NMM-03**  
 Lab Sample ID: 1141873003

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	16.7	mg/Kg
Barium	95.9	mg/Kg
Chromium	75.4	mg/Kg
Lead	38.7	mg/Kg
Mercury	2.16	mg/Kg
Silver	1.59	mg/Kg

Client Sample ID: **NMM-04**  
 Lab Sample ID: 1141873004

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	15.4	mg/Kg
Barium	102	mg/Kg
Cadmium	0.467	mg/Kg
Chromium	52.2	mg/Kg
Lead	91.4	mg/Kg
Mercury	2.51	mg/Kg
Silver	4.03	mg/Kg

### Detectable Results Summary

Client Sample ID: **NMM-05**

Lab Sample ID: 1141873005

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	11.2	mg/Kg
Barium	57.7	mg/Kg
Cadmium	0.408	mg/Kg
Chromium	63.5	mg/Kg
Lead	77.4	mg/Kg
Mercury	4.29	mg/Kg
Silver	3.21	mg/Kg

Client Sample ID: **NMM-06**

Lab Sample ID: 1141873006

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	14.9	mg/Kg
Barium	218	mg/Kg
Cadmium	0.418	mg/Kg
Chromium	53.6	mg/Kg
Lead	48.4	mg/Kg
Mercury	1.28	mg/Kg
Silver	0.682	mg/Kg

Client Sample ID: **NMM-07**

Lab Sample ID: 1141873007

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	105	mg/Kg
Barium	468	mg/Kg
Cadmium	4.89	mg/Kg
Chromium	100	mg/Kg
Lead	649	mg/Kg
Mercury	10.1	mg/Kg
Silver	41.7	mg/Kg

Client Sample ID: **NMM-08**

Lab Sample ID: 1141873008

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	140	mg/Kg
Barium	1040	mg/Kg
Cadmium	11.1	mg/Kg
Chromium	61.7	mg/Kg
Lead	1330	mg/Kg
Mercury	85.4	mg/Kg
Selenium	4.16	mg/Kg
Silver	46.7	mg/Kg

### Detectable Results Summary

Client Sample ID: **NMM-09**

Lab Sample ID: 1141873009

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	17.5	mg/Kg
Barium	380	mg/Kg
Cadmium	4.03	mg/Kg
Chromium	67.0	mg/Kg
Lead	1330	mg/Kg
Mercury	15.9	mg/Kg
Selenium	1.79	mg/Kg
Silver	64.2	mg/Kg

Client Sample ID: **NMM-10**

Lab Sample ID: 1141873010

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	23.2	mg/Kg
Barium	299	mg/Kg
Cadmium	1.54	mg/Kg
Chromium	60.5	mg/Kg
Lead	143	mg/Kg
Mercury	2.80	mg/Kg
Silver	6.48	mg/Kg

Client Sample ID: **NMM-11**

Lab Sample ID: 1141873011

**Metals by ICP/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	7.78	mg/Kg
Barium	49.0	mg/Kg
Cadmium	0.330	mg/Kg
Chromium	79.3	mg/Kg
Lead	70.2	mg/Kg
Mercury	3.11	mg/Kg
Silver	2.65	mg/Kg

## Results of NMM-01

Client Sample ID: **NMM-01**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873001  
 Lab Project ID: 1141873

Collection Date: 05/08/14 11:25  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 37.2  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	309	2.50	0.776	mg/Kg	10		05/21/14 14:41
Barium	532	0.751	0.235	mg/Kg	10		05/21/14 14:41
Cadmium	13.1	0.500	0.155	mg/Kg	10		05/21/14 14:41
Chromium	72.7	1.00	0.300	mg/Kg	10		05/21/14 14:41
Lead	3710	10.0	3.10	mg/Kg	200		05/21/14 16:32
Mercury	78.1	2.00	0.601	mg/Kg	200		05/21/14 16:32
Selenium	4.88	2.50	0.776	mg/Kg	10		05/21/14 14:41
Silver	76.8	10.0	3.10	mg/Kg	200		05/21/14 16:32

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:41  
 Container ID: 1141873001-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.073 g  
 Prep Extract Vol: 50 mL

## Results of NMM-02

Client Sample ID: **NMM-02**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873002  
 Lab Project ID: 1141873

Collection Date: 05/08/14 11:33  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 37.7  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	59.8	2.64	0.818	mg/Kg	10		05/21/14 14:29
Barium	388	0.792	0.248	mg/Kg	10		05/21/14 14:29
Cadmium	7.79	0.528	0.164	mg/Kg	10		05/21/14 14:29
Chromium	81.4	1.06	0.317	mg/Kg	10		05/21/14 14:29
Lead	661	0.528	0.164	mg/Kg	10		05/21/14 14:29
Mercury	8.87	0.106	0.0317	mg/Kg	10		05/21/14 18:53
Selenium	2.69	2.64	0.818	mg/Kg	10		05/21/14 14:29
Silver	31.7	5.28	1.64	mg/Kg	100		05/21/14 16:29

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:29  
 Container ID: 1141873002-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.005 g  
 Prep Extract Vol: 50 mL

## Results of NMM-03

Client Sample ID: **NMM-03**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873003  
 Lab Project ID: 1141873

Collection Date: 05/08/14 11:46  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 73.8  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	16.7	1.25	0.389	mg/Kg	10		05/21/14 14:32
Barium	95.9	0.376	0.118	mg/Kg	10		05/21/14 14:32
Cadmium	0.251 U	0.251	0.0777	mg/Kg	10		05/21/14 14:32
Chromium	75.4	0.502	0.150	mg/Kg	10		05/21/14 14:32
Lead	38.7	0.251	0.0777	mg/Kg	10		05/21/14 14:32
Mercury	2.16	0.0502	0.0150	mg/Kg	10		05/21/14 18:55
Selenium	1.25 U	1.25	0.389	mg/Kg	10		05/21/14 14:32
Silver	1.59	0.251	0.0777	mg/Kg	10		05/21/14 14:32

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:32  
 Container ID: 1141873003-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.081 g  
 Prep Extract Vol: 50 mL

## Results of NMM-04

Client Sample ID: **NMM-04**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873004  
 Lab Project ID: 1141873

Collection Date: 05/08/14 11:55  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 70.8  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	15.4	1.29	0.399	mg/Kg	10		05/21/14 14:43
Barium	102	0.386	0.121	mg/Kg	10		05/21/14 14:43
Cadmium	0.467	0.258	0.0799	mg/Kg	10		05/21/14 14:43
Chromium	52.2	0.515	0.155	mg/Kg	10		05/21/14 14:43
Lead	91.4	0.258	0.0799	mg/Kg	10		05/21/14 14:43
Mercury	2.51	0.0515	0.0155	mg/Kg	10		05/21/14 18:40
Selenium	1.29 U	1.29	0.399	mg/Kg	10		05/21/14 14:43
Silver	4.03	0.258	0.0799	mg/Kg	10		05/21/14 14:43

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:43  
 Container ID: 1141873004-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.096 g  
 Prep Extract Vol: 50 mL



## Results of NMM-05

Client Sample ID: **NMM-05**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873005  
 Lab Project ID: 1141873

Collection Date: 05/08/14 12:02  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 63.7  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	11.2	1.46	0.453	mg/Kg	10		05/21/14 14:46
Barium	57.7	0.438	0.137	mg/Kg	10		05/21/14 14:46
Cadmium	0.408	0.292	0.0906	mg/Kg	10		05/21/14 14:46
Chromium	63.5	0.585	0.175	mg/Kg	10		05/21/14 14:46
Lead	77.4	0.292	0.0906	mg/Kg	10		05/21/14 14:46
Mercury	4.29	0.0585	0.0175	mg/Kg	10		05/21/14 18:45
Selenium	1.46 U	1.46	0.453	mg/Kg	10		05/21/14 14:46
Silver	3.21	0.292	0.0906	mg/Kg	10		05/21/14 14:46

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:46  
 Container ID: 1141873005-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.075 g  
 Prep Extract Vol: 50 mL

## Results of NMM-06

Client Sample ID: **NMM-06**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873006  
 Lab Project ID: 1141873

Collection Date: 05/08/14 12:15  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 78.1  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	14.9	1.25	0.386	mg/Kg	10		05/21/14 14:48
Barium	218	0.374	0.117	mg/Kg	10		05/21/14 14:48
Cadmium	0.418	0.249	0.0773	mg/Kg	10		05/21/14 14:48
Chromium	53.6	0.499	0.150	mg/Kg	10		05/21/14 14:48
Lead	48.4	0.249	0.0773	mg/Kg	10		05/21/14 14:48
Mercury	1.28	0.0499	0.0150	mg/Kg	10		05/21/14 18:48
Selenium	1.25 U	1.25	0.386	mg/Kg	10		05/21/14 14:48
Silver	0.682	0.249	0.0773	mg/Kg	10		05/21/14 14:48

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:48  
 Container ID: 1141873006-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.027 g  
 Prep Extract Vol: 50 mL

## Results of NMM-07

Client Sample ID: **NMM-07**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873007  
 Lab Project ID: 1141873

Collection Date: 05/08/14 12:25  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 23.0  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	105	4.18	1.29	mg/Kg	10		05/21/14 14:51
Barium	468	1.25	0.392	mg/Kg	10		05/21/14 14:51
Cadmium	4.89	0.835	0.259	mg/Kg	10		05/21/14 14:51
Chromium	100	1.67	0.501	mg/Kg	10		05/21/14 14:51
Lead	649	0.835	0.259	mg/Kg	10		05/21/14 14:51
Mercury	10.1	0.167	0.0501	mg/Kg	10		05/21/14 18:58
Selenium	4.18 U	4.18	1.29	mg/Kg	10		05/21/14 14:51
Silver	41.7	16.7	5.18	mg/Kg	200		05/21/14 16:36

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:51  
 Container ID: 1141873007-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.041 g  
 Prep Extract Vol: 50 mL

## Results of NMM-08

Client Sample ID: **NMM-08**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873008  
 Lab Project ID: 1141873

Collection Date: 05/08/14 12:37  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 25.7  
 Location:

## Results by Metals by ICP/MS

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	140		3.77	1.17	mg/Kg	10		05/21/14 14:53
Barium	1040		1.13	0.354	mg/Kg	10		05/21/14 14:53
Cadmium	11.1		0.754	0.234	mg/Kg	10		05/21/14 14:53
Chromium	61.7		1.51	0.452	mg/Kg	10		05/21/14 14:53
Lead	1330		0.754	0.234	mg/Kg	10		05/21/14 14:53
Mercury	85.4		1.51	0.452	mg/Kg	100		05/21/14 19:12
Selenium	4.16		3.77	1.17	mg/Kg	10		05/21/14 14:53
Silver	46.7		7.54	2.34	mg/Kg	100		05/21/14 19:12

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:53  
 Container ID: 1141873008-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.031 g  
 Prep Extract Vol: 50 mL

## Results of NMM-09

Client Sample ID: **NMM-09**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873009  
 Lab Project ID: 1141873

Collection Date: 05/08/14 12:50  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 56.1  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	17.5	1.76	0.546	mg/Kg	10		05/21/14 14:55
Barium	380	0.528	0.165	mg/Kg	10		05/21/14 14:55
Cadmium	4.03	0.352	0.109	mg/Kg	10		05/21/14 14:55
Chromium	67.0	0.704	0.211	mg/Kg	10		05/21/14 14:55
Lead	1330	3.52	1.09	mg/Kg	100		05/21/14 19:06
Mercury	15.9	0.0704	0.0211	mg/Kg	10		05/21/14 18:43
Selenium	1.79	1.76	0.546	mg/Kg	10		05/21/14 14:55
Silver	64.2	3.52	1.09	mg/Kg	100		05/21/14 19:06

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:55  
 Container ID: 1141873009-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.013 g  
 Prep Extract Vol: 50 mL

## Results of NMM-10

Client Sample ID: **NMM-10**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873010  
 Lab Project ID: 1141873

Collection Date: 05/08/14 12:57  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 37.4  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	23.2	2.59	0.803	mg/Kg	10		05/21/14 14:58
Barium	299	0.777	0.243	mg/Kg	10		05/21/14 14:58
Cadmium	1.54	0.518	0.161	mg/Kg	10		05/21/14 14:58
Chromium	60.5	1.04	0.311	mg/Kg	10		05/21/14 14:58
Lead	143	0.518	0.161	mg/Kg	10		05/21/14 14:58
Mercury	2.80	0.104	0.0311	mg/Kg	10		05/23/14 16:07
Selenium	2.59 U	2.59	0.803	mg/Kg	10		05/21/14 14:58
Silver	6.48	0.518	0.161	mg/Kg	10		05/21/14 14:58

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 14:58  
 Container ID: 1141873010-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.033 g  
 Prep Extract Vol: 50 mL

Analytical Batch: MMS8527  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/23/14 16:07  
 Container ID: 1141873010-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.033 g  
 Prep Extract Vol: 50 mL

## Results of NMM-11

Client Sample ID: **NMM-11**  
 Client Project ID: **Nowell Mine Mill**  
 Lab Sample ID: 1141873011  
 Lab Project ID: 1141873

Collection Date: 05/08/14 13:05  
 Received Date: 05/13/14 08:00  
 Matrix: Soil/Solid (dry weight)  
 Solids (%): 64.8  
 Location:

## Results by Metals by ICP/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Arsenic	7.78	1.44	0.447	mg/Kg	10		05/21/14 15:00
Barium	49.0	0.432	0.135	mg/Kg	10		05/21/14 15:00
Cadmium	0.330	0.288	0.0893	mg/Kg	10		05/21/14 15:00
Chromium	79.3	0.576	0.173	mg/Kg	10		05/21/14 15:00
Lead	70.2	0.288	0.0893	mg/Kg	10		05/21/14 15:00
Mercury	3.11	0.0576	0.0173	mg/Kg	10		05/23/14 16:09
Selenium	1.44 U	1.44	0.447	mg/Kg	10		05/21/14 15:00
Silver	2.65	0.288	0.0893	mg/Kg	10		05/21/14 15:00

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/21/14 15:00  
 Container ID: 1141873011-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.072 g  
 Prep Extract Vol: 50 mL

Analytical Batch: MMS8527  
 Analytical Method: SW6020A  
 Analyst: ACF  
 Analytical Date/Time: 05/23/14 16:09  
 Container ID: 1141873011-A

Prep Batch: MXX27676  
 Prep Method: SW3050B  
 Prep Date/Time: 05/20/14 09:55  
 Prep Initial Wt./Vol.: 1.072 g  
 Prep Extract Vol: 50 mL

## Method Blank

Blank ID: MB for HBN 1538171 [MXX/27676]  
Blank Lab ID: 1210284

Matrix: Soil/Solid (dry weight)

### QC for Samples:

1141873001, 1141873002, 1141873003, 1141873004, 1141873005, 1141873006, 1141873007, 1141873008, 1141873009, 1141873010, 1141873011

## Results by SW6020A

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Arsenic	0.500U	1.00	0.310	mg/Kg
Barium	0.150U	0.300	0.0940	mg/Kg
Cadmium	0.100U	0.200	0.0620	mg/Kg
Chromium	0.200U	0.400	0.120	mg/Kg
Lead	0.100U	0.200	0.0620	mg/Kg
Mercury	0.0200U	0.0400	0.0120	mg/Kg
Selenium	0.500U	1.00	0.310	mg/Kg
Silver	0.100U	0.200	0.0620	mg/Kg

## Batch Information

Analytical Batch: MMS8523  
Analytical Method: SW6020A  
Instrument: Perkin Elmer Sciex ICP-MS P3  
Analyst: ACF  
Analytical Date/Time: 5/21/2014 3:46:47PM

Prep Batch: MXX27676  
Prep Method: SW3050B  
Prep Date/Time: 5/20/2014 9:55:44AM  
Prep Initial Wt./Vol.: 1 g  
Prep Extract Vol: 50 mL



## Blank Spike Summary

Blank Spike ID: LCS for HBN 1141873 [MXX27676]

Blank Spike Lab ID: 1210285

Date Analyzed: 05/21/2014 15:49

Matrix: Soil/Solid (dry weight)

QC for Samples: 1141873001, 1141873002, 1141873003, 1141873004, 1141873005, 1141873006, 1141873007, 1141873008, 1141873009, 1141873010, 1141873011

## Results by SW6020A

Parameter	Blank Spike (mg/Kg)			CL
	Spike	Result	Rec (%)	
Arsenic	50	50.6	101	( 80-120 )
Barium	50	47.2	94	( 80-120 )
Cadmium	5	4.92	99	( 80-120 )
Chromium	20	19.8	99	( 80-120 )
Lead	50	52.2	104	( 80-120 )
Mercury	0.5	0.507	101	( 80-120 )
Selenium	50	54.7	109	( 80-120 )
Silver	5	4.98	100	( 80-120 )

## Batch Information

Analytical Batch: **MMS8523**

Analytical Method: **SW6020A**

Instrument: **Perkin Elmer Sciex ICP-MS P3**

Analyst: **ACF**

Prep Batch: **MXX27676**

Prep Method: **SW3050B**

Prep Date/Time: **05/20/2014 09:55**

Spike Init Wt./Vol.: 50 mg/Kg Extract Vol: 50 mL

Dupe Init Wt./Vol.: Extract Vol:

## Matrix Spike Summary

Original Sample ID: 1141847001  
 MS Sample ID: 1210287 MS  
 MSD Sample ID: 1210288 MSD

Analysis Date: 05/21/2014 15:51  
 Analysis Date: 05/21/2014 15:56  
 Analysis Date: 05/21/2014 15:58  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1141873001, 1141873002, 1141873003, 1141873004, 1141873005, 1141873006, 1141873007, 1141873008, 1141873009, 1141873010, 1141873011

## Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Arsenic	4.66	49.9	55.0	101	52.1	56.8	100	80-120	3.20	(< 20 )
Barium	58.6	49.9	102	88	52.1	119	116	80-120	15.10	(< 20 )
Cadmium	0.0669J	4.99	4.98	98	5.21	5.27	100	80-120	5.72	(< 20 )
Chromium	24.6	19.9	43.7	96	20.8	44.4	95	80-120	1.70	(< 20 )
Lead	3.48	49.9	54.9	103	52.1	58.0	105	80-120	5.27	(< 20 )
Mercury	0.0559	0.499	0.566	102	0.521	0.585	102	80-120	3.17	(< 20 )
Selenium	0.497U	49.9	53.6	107	52.1	55.9	107	80-120	4.15	(< 20 )
Silver	0.0995U	4.99	4.92	99	5.21	5.10	98	80-120	3.44	(< 20 )

## Batch Information

Analytical Batch: MMS8523  
 Analytical Method: SW6020A  
 Instrument: Perkin Elmer Sciex ICP-MS P3  
 Analyst: ACF  
 Analytical Date/Time: 5/21/2014 3:56:14PM

Prep Batch: MXX27676  
 Prep Method: Soils/Solids Digest for Metals by ICP-MS  
 Prep Date/Time: 5/20/2014 9:55:44AM  
 Prep Initial Wt./Vol.: 1.09g  
 Prep Extract Vol: 50.00mL

## Method Blank

Blank ID: MB for HBN 1537661 [SPT/9347]

Blank Lab ID: 1210167

Matrix: Soil/Solid (dry weight)

QC for Samples:

1141873001, 1141873002, 1141873003, 1141873004, 1141873005, 1141873006, 1141873007, 1141873008, 1141873009, 1141873010, 1141873011

## Results by SM21 2540G

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Solids	100			%

## Batch Information

Analytical Batch: SPT9347

Analytical Method: SM21 2540G

Instrument:

Analyst: MEV

Analytical Date/Time: 5/16/2014 9:06:00PM

Print Date: 05/23/2014 4:41:30PM

## Duplicate Sample Summary

Original Sample ID: 1141932001

Duplicate Sample ID: 1210168

Analysis Date: 05/16/2014 21:06

Matrix: Soil/Solid (dry weight)

QC for Samples:

1141873001, 1141873002, 1141873003, 1141873004, 1141873005, 1141873006, 1141873007, 1141873008, 1141873009, 1141873010, 1141873011

## Results by SM21 2540G

<u>NAME</u>	<u>Original ( )</u>	<u>Duplicate ( )</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	82.7	83.9	1.50	15.00

## Batch Information

Analytical Batch: SPT9347

Analytical Method: SM21 2540G

Instrument:

Analyst: MEV

Print Date: 05/23/2014 4:41:30PM



SGS North America Inc. CHAIN OF CUSTODY RECORD

1141873



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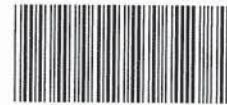
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Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

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CLIENT: NORTECH CONTACT: Ron Pratt PROJECT PWSID/ PERMIT#: 907 586 6813 NAME: Nowell Mine Mill REPORTS TO: NORTECH E-MAIL: rpratt@nortechengr.com INVOICE TO: NORTECH 5438 Shreve Dr. Ste B Juneau, AK QUOTE #: 13-1036 P.O. #: 13-1036		Section 3 # CONTAINERS Type C = COMP G = GRAB MI = Multi-Incremental S = Soils		Section 4 DOD Project? Yes/No Cooler ID: Requested Turnaround Time and/or Special Instructions:		Data Deliverable Requirements: Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT Temp Blank °C: _____ or Ambient [ ] (See attached Sample Receipt Form)	
Section 2 RESERVED for lab use SAMPLE IDENTIFICATION DATE mm/dd/yy TIME HH:MM MATRIX/MATRIX CODE		Section 3 # CONTAINERS Type C = COMP G = GRAB MI = Multi-Incremental S = Soils		Section 4 DOD Project? Yes/No Cooler ID: Requested Turnaround Time and/or Special Instructions:		Data Deliverable Requirements: Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT Temp Blank °C: _____ or Ambient [ ] (See attached Sample Receipt Form)	
Section 5 Relinquished By: (1) Relinquished By: (2) Relinquished By: (3) Relinquished By: (4)		Section 3 # CONTAINERS Type C = COMP G = GRAB MI = Multi-Incremental S = Soils		Section 4 DOD Project? Yes/No Cooler ID: Requested Turnaround Time and/or Special Instructions:		Data Deliverable Requirements: Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT Temp Blank °C: _____ or Ambient [ ] (See attached Sample Receipt Form)	





## SAMPLE RECEIPT FORM

Review Criteria:	Condition:	Comments/Action Taken:
Were <b>custody seals</b> intact? Note # & location, if applicable.	<input checked="" type="radio"/> Yes No N/A	
COC accompanied samples?	<input checked="" type="radio"/> Yes No N/A	
<b>Temperature blank</b> compliant* (i.e., 0-6°C after CF)? * Note: Exemption permitted for chilled samples collected less than 8 hours ago.	<input checked="" type="radio"/> Yes No N/A	
Cooler ID: _____ @ <u>2.5</u> w/ Therm.ID: _____		
Cooler ID: <u>1</u> @ <u>2.6</u> w/ Therm.ID: <u>203</u>		
Cooler ID: _____ @ _____ w/ Therm.ID: _____		
Cooler ID: _____ @ _____ w/ Therm.ID: _____		
Cooler ID: _____ @ _____ w/ Therm.ID: _____		
Note: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received <u>without</u> a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP" will be noted to the right. In cases where neither a temp blank <u>nor</u> cooler temp can be obtained, note "ambient" or "chilled."		
<b>If temperature(s) &lt;0°C, were all sample containers ice free?</b>	Yes No <input checked="" type="radio"/> N/A	
Delivery method (specify all that apply): USPS Alert Courier C&D Delivery <u>AK Air</u> Lynden Carlile ERA PenAir FedEx UPS NAC Other: → For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?	Note ABN/tracking # <input checked="" type="radio"/> See Attached or N/A <input checked="" type="radio"/> Yes No N/A	
→ For samples received with payment, note amount (\$) and cash / check / CC (circle one) or note: → For samples <b>received in FBKS</b> , ANCH staff will verify all criteria are reviewed.		<input checked="" type="radio"/> N/A <input checked="" type="radio"/> N/A
Were samples received within hold time? Note: Refer to form F-083 "Sample Guide" for hold time information.	<input checked="" type="radio"/> Yes No N/A	
Do samples <b>match COC</b> * (i.e., sample IDs, dates/times collected)? * Note: Exemption permitted if times differ <1hr; in that case, use times on COC.	<input checked="" type="radio"/> Yes No N/A	
Were analyses requested unambiguous?	<input checked="" type="radio"/> Yes No N/A	
Were samples in <b>good condition</b> (no leaks/cracks/breakage)? Packing material used (specify all that apply): <u>Bubble Wrap</u> Separate plastic bags Vermiculite <u>Other: cardboard</u>	<input checked="" type="radio"/> Yes No N/A	
Were all VOA vials <b>free of headspace</b> (i.e., bubbles ≤6 mm)?	Yes No <input checked="" type="radio"/> N/A	
Were all soil VOAs <b>field extracted</b> with MeOH+BFB?	Yes No <input checked="" type="radio"/> N/A	
Were <b>proper containers</b> (type/mass/volume/preservative*) used? * Note: Exemption permitted for waters to be analyzed for metals.	<input checked="" type="radio"/> Yes No N/A	
Were <b>Trip Blanks</b> (i.e., VOAs, LL-Hg) in cooler with samples?	Yes No <input checked="" type="radio"/> N/A	
For <b>special handling</b> (e.g., "MI" or foreign soils, lab filter, limited volume, Ref Lab), were bottles/paperwork flagged (e.g., sticker)?	Yes No <input checked="" type="radio"/> N/A	
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was <b>pH verified and compliant</b> ? If pH was adjusted, were bottles flagged (i.e., stickers)?	Yes No <input checked="" type="radio"/> N/A	
For <b>RUSH/SHORT Hold Time</b> , were COC/Bottles flagged accordingly? Was Rush/Short HT email sent, if applicable?	Yes No <input checked="" type="radio"/> N/A	
For <b>SITE-SPECIFIC QC</b> , e.g. BMS/BMSD/BDUP, were containers / paperwork flagged accordingly?	Yes No <input checked="" type="radio"/> N/A	
For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	Yes No <input checked="" type="radio"/> N/A	SRF Completed by: <u>C 20</u> PM = N/A
Was <b>PEER REVIEW</b> of sample numbering/labeling completed?	Yes No N/A	Peer Reviewed by: N/A
Additional notes (if applicable):		

Note to Client: Any "no" circled above indicates non-compliance with standard procedures and may impact data quality.



## Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1141873001-A	No Preservative Required	OK			
1141873002-A	No Preservative Required	OK			
1141873003-A	No Preservative Required	OK			
1141873004-A	No Preservative Required	OK			
1141873005-A	No Preservative Required	OK			
1141873006-A	No Preservative Required	OK			
1141873007-A	No Preservative Required	OK			
1141873008-A	No Preservative Required	OK			
1141873009-A	No Preservative Required	OK			
1141873010-A	No Preservative Required	OK			
1141873011-A	No Preservative Required	OK			

### Container Condition Glossary



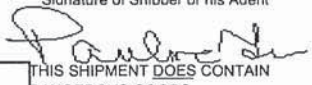
OK - The container was received at an acceptable pH for the analysis requested.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

BU - The container was received with headspace greater than 6mm.



Shipper's Name and Address Nortech 2400 College Rd Fairbanks, AK 99709 USA  Tel: 9074525688		Shipper's Account Number 27442126076  Customer's ID Number 10588		Not Negotiable  <b>Air Waybill</b> Issued By <div style="text-align: right;">                       ALASKA AIRLINES &amp; HORIZON AIR                      P.O. BOX 68900 SEATTLE, WA 98168                      800-225-2752 ALASKACARGO.COM                 </div>			
Consignee's Name and Address SGS North America Inc 200 W Potter Drive Anchorage, AK 99518 USA  Tel: 9075622343		Consignee's Account Number 27400215947		Also notify SLR AAU  Tel:			
Issuing Carrier's Agent and City  Agent's IATA Code  Account No.		Accounting Information Nortech 2400 College Rd Fairbanks, AK 99709 USA  SRN/NONE GoldStreak		10588  <div style="font-size: 2em; font-weight: bold;">1141873</div> 			
Airport of Departure (Addr. of First Carrier) and Requested Routing Juneau		Currency USD PX		Declared Value For Carriage NVD			
To By First Carrier ANC Alaska Airlines		To / By To / By		Declared Value For Customs NCV			
Airport of Destination Anchorage		Flight/Date AS 065/12		Amount of Insurance XXX			
Handling Information NEVADA CREEK MINE							
					SCI		
No of Pieces	Gross Weight	kg lb	Commodity Item No.	Chargeable Weight	Rate / Charge	Total	Nature and Quantity of Goods (Incl. Dimensions or Volume)
1	28.0	L		28.0		AS AGREED	SOIL SAMPLES  Dims: 24 x 13 x14 x 1
1	28.0					AS AGREED	GSX PER Volume: 2.528
Prepaid AS AGREED		Weight Charge Collect		Other Charges MYC 5.04 SCC 2.00			
Valuation Charge		Tax		Total Other Charges Due Agent		Shipper certifies that the particulars on the face hereof are correct and that insofar as any part of the consignment contains dangerous goods, such part is properly described by name and is in proper condition for carriage by air according to the applicable Dangerous Goods Regulations. I consent to the inspection of this cargo.	
Total Other Charges Due Carrier				For: Nortech		Signature of Shipper or his Agent 	
Total Prepaid AS AGREED		Total Collect		<input checked="" type="checkbox"/> THIS SHIPMENT DOES NOT CONTAIN DANGEROUS GOODS		<input type="checkbox"/> THIS SHIPMENT DOES CONTAIN DANGEROUS GOODS	
				Executed On (Date) 12 May 2014 09:48		at (Place) Juneau Alaska Airlines	
						Signature of Issuing Carrier or its Agent 027-1063 5903	

5/13

**Alert Expeditors Inc.**  
**DBA/Petroleum Courier Service**

**#344406**

Citywide Delivery • 440-3351  
8421 Flamingo Drive • Anchorage, Alaska 99502

Date \_\_\_\_\_  
From \_\_\_\_\_  
To \_\_\_\_\_

Collect <input type="checkbox"/>	Prepay <input type="checkbox"/> Account <input type="checkbox"/>	Advance Charges <input type="checkbox"/>
----------------------------------	---------------------------------------------------------------------	------------------------------------------

Job #	PO#
-------	-----

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

**1141873**



Shipped Signature \_\_\_\_\_

Received By: \_\_\_\_\_

Total Charge \_\_\_\_\_

Contaminated Sites Program  
Spill Prevention and Response Division  
Alaska Department of Environmental Conservation

**Laboratory Data Review Checklist for Air Samples**

Completed by:

Title:  Date:

CS Report Name:  Report Date:

Consultant Firm:

Laboratory Name:  Laboratory Report Number:

DEC File Number:  DEC Haz ID:

1. Laboratory

- a. Did a NELAP-certified laboratory receive and perform all of the submitted sample analyses?  
 Yes  No  N/A (Please explain.)

Comments:

- b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses NELAP-approved?  
 Yes  No  N/A (Please explain.)

Comments:

2. Chain of Custody (COC)

- a. Was the COC information completed, signed and dated (including released/received by)?  
 Yes  No  N/A (Please explain.)

Comments:

- b. Was the correct analyses requested?  
 Yes  No  N/A (Please explain.)

Comments:

3. Laboratory Sample Receipt Documentation

- a. Was the sample condition documented? Were samples collected in gas-tight, opaque/dark Summa canisters or other DEC-approved containers? Was the canister vacuum/pressure checked, recorded upon receipt and were there no open valves?

Yes  No  N/A (Please explain.)

Comments:

- b. If there were any discrepancies, were they documented? Examples include incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum, etc.

Yes  No  N/A (Please explain.)

Comments:

- c. Was the data quality or usability affected? (Please explain.)

Comments:

4. Case Narrative

- a. Is there a case narrative and is it understandable?

Yes  No  N/A (Please explain.)

Comments:

- b. Were there any discrepancies, errors or QC failures identified by the lab?

Yes  No  N/A (Please explain.)

Comments:

- c. Were all corrective actions documented?

Yes  No  N/A (Please explain.)

Comments:

- d. What is the effect on data quality/usability according to the case narrative?

Comments:

5. Samples Results

a. Was the correct analyses performed/reported as requested on COC?

Yes No N/A (Please explain.)

Comments:

b. Were the samples analyzed within 30 days of collection or within the time required by the method?

Yes No N/A (Please explain.)

Comments:

c. Are the reported PQLs less than the Target Screening Level or the minimum required detection level for the project?

Yes No N/A (Please explain.)

Comments:

d. Was the data quality or usability affected?

Comments:

6. QC Samples

a. Method Blank

i. Was one method blank reported per analysis and 20 samples?

Yes No N/A (Please explain.)

Comments:

ii. Were all method blank results less than PQL?

Yes No N/A (Please explain.)

Comments:

iii. If above PQL, what samples are affected?

Comments:

- iv. Do the affected sample(s) have data flags and, if so, are the data flags clearly defined?  
Yes No N/A (Please explain.)

Comments:

- v. Was the data quality or usability affected? (Please explain.)

Comments:

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

- i. Was there one LCS/LCSD or one LCS and a sample/sample duplicate pair reported per analysis and 20 samples?

Yes No N/A (Please explain.)

Comments:

- ii. Accuracy – Were all percent recoveries (%R) reported and within method or laboratory limits? What were the project specified DQOs, if applicable?

Yes No N/A (Please explain.)

Comments:

- iii. Precision – Were all relative percent differences (RPD) reported and were they less than method or laboratory limits? What were the project-specified DQOs, if applicable.

Yes No N/A (Please explain.)

Comments:

- iv. If the %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

- v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes No N/A (Please explain.)

Comments:

vi. Is the data quality or usability affected? (Please explain.)

Comments:

Data quality/usability not affected

c. Surrogates

i. Are surrogate recoveries reported for field, QC and laboratory samples?

Yes  No  N/A (Please explain.)

Comments:

ii. Accuracy – Are all percent recoveries (%R) reported and within method or laboratory limits?  
What were the project-specified DQOs, if applicable?

Yes  No  N/A (Please explain.)

Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes  No  N/A (Please explain.)

Comments:

iv. Was the data quality or usability affected? (Please explain.)

Comments:

d. Field Duplicate

i. Was one field duplicate submitted per analysis and 10 type (soil gas, indoor air, etc.) samples?

Yes  No  N/A (Please explain.)

Comments:

ii. Were they or was it submitted blind to the lab?

Yes  No  N/A (Please explain.)

Comments:

- iii. Precision – Were all relative percent differences (RPD) less than the specified DQOs?  
(Recommended: 25 %)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where  $R_1$  = Sample Concentration  
 $R_2$  = Field Duplicate Concentration

Yes  No  N/A (Please explain.)

Comments:

RPD for two of the metal analytes were greater than 25%; arsenic (36%) and mercury 31.9%

- iv. Was the data quality or usability affected? (Please explain.)

Comments:

Data quality/usability not affected. Both samples exceed cleanup limits and RPDs do not affect intended purpose of data characterizing contaminants at site.

- e. Field Blank (If not used, explain why.)

Yes  No  N/A (Please explain.)

Comments:

- i. Were all results less than the PQL?

Yes  No  N/A (Please explain.)

Comments:

- ii. If above PQL, what samples are affected?

Comments:

- iii. Was the data quality or usability affected? (Please explain.)

Comments:

## 7. Other Data Flags/Qualifiers

- a. Were other data flags/qualifiers defined and appropriate?

Yes  No  N/A (Please explain.)

Comments: