

Site Characterization and Limited Soil Removal Report Kolmakof Mine Site, Alaska

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SITE CHARACTERIZATION AND LIMITED SOIL REMOVAL REPORT, KOLMAKOF MINE SITE, ALASKA

Prepared for:

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ACRONYMS

°C	degrees Celsius
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AK	Alaska Method
ATV	all-terrain vehicle
bgs	below ground surface
BLM	Bureau of Land Management
Calista	Calista Corporation
COC	constituent of concern
DRO	diesel range organics
EE/CA	engineering evaluation / cost analysis
E&E	Ecology & Environment
J	indicates an estimated quantity
KMS	Kolmakof mine site
LOD	limit of detection
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
NAC	Northern Air Cargo
PA/SI	preliminary assessment/site investigation
PID	photoionization detector
QAR	quality assurance review
QA/QC	quality assurance/quality control
RPD	relative percent difference
RSD	relative standard deviation
RSI	removal site inspection
SGS	SGS North America, Inc.
TKC	The Kuskokwim Corporation
UCL	upper confidence limit
USEPA	U.S. Environmental Protection Agency
XRF	X-ray fluorescence analyzer

1 INTRODUCTION

During the summer of 2015, Brice Environmental Services Corporation (Brice) conducted characterization, excavation and transport and disposal activities in association with the former Kolmakof Mine Site (KMS or Site) near Aniak, Alaska (Figure 1). These activities were performed under a work plan prepared in May, 2015 (Brice, 2015).

1.1 SITE DESCRIPTION

The KMS is an abandoned cinnabar mine on the north bank of the Kuskokwim River. The site is located approximately 19.5 miles east of Aniak and approximately 10 miles west of Napaimute, Alaska, (the nearest known inhabited area). The legal description for the KMS is: North ½, Section 6, Township 17N, Range 53W, Seward Meridian, Alaska. A small, unnamed creek passes by portions of the site and flows into the Kuskokwim River near the Camp Area portion of the site (Figure 2). There are no roads to the site or aircraft landing strip nearby; access is by boat only.

The mine has three developed areas: a “Camp Area” on the bank of the Kuskokwim River; an upland “Mill Area”; and an open-pit/surface stripping mining area on the bluff above the river where waste rock was dumped down the bluff onto the river bank. The Camp Area is approximately 1.75 miles from the Mill Area. (Figure 2). The two areas are connected by a dirt road which parallels an unnamed creek that drains directly into the Kuskokwim River. From the Mill Area, the road continues uphill to the Mine Pit. Since the mine closure, the KMS became overgrown with vegetation and the roads narrowed to foot paths. During the 2006 BLM site inspection, the Mill Area was found to contain a collapsing ball mill structure with water flowing under and through it. Two sheds were found nearby, one containing about a dozen metal bottles which appeared to be empty mercury flasks. USEPA correspondence to BLM had mentioned a retort operation at the “upper camp” so it was assumed that the flasks indicated that the shed may have housed a retort or that one was nearby. Photos taken during the 2000 BLM site visit showed the larger shed housed an electric generator that had been removed by persons unknown by the 2006 BLM site visit. Numerous empty drums and fuel cans were found scattered around both inside and outside the sheds. The unnamed creek formed a small pond a few feet from the mill, and the source of the creek was reported to be water coming to the ground surface above and around the mill building from the steep hillside/berm immediately adjacent. An old pickup truck was found abandoned a short distance away. The former dynamite shed was represented by a pile of ash and burned metal debris. No evidence of spills, stains, odors or distressed vegetation beyond the ash at the former dynamite shed was noted by BLM. It also appeared that waste rock and tailings were dumped over the bluff into the Kuskokwim River from the mill building and the mining pit areas uphill and behind the river bluff.

The Camp Area structures were observed by the BLM to be deteriorating and contained a significant volume of discarded household debris. The remnant of a potential mercury retort, consisting of a metallic beer keg secured to rotting wood beams was found near the Camp Area. A firebrick pit was found located adjacent to the keg.

1.2 SITE BACKGROUND

The KMS is an abandoned cinnabar (mercury ore) mine on the North Bank of the Kuskokwim river near the village of Napaimute, Alaska, and is scheduled to be conveyed to The Kuskokwim Corporation (TKC) (surface estate) and Calista Corporation (Calista) (subsurface estate) in accordance with the Alaska Native Claims Settlement Act. Until conveyance, the land is administered by the U.S. Bureau of Land Management (BLM). A preliminary assessment/site investigation (PA/SI) was initiated by the United States Environmental Protection Agency (USEPA) in 1999, and two site inspections and removal actions were conducted by the BLM in 2000 and 2006. A Removal Site Inspection (RSI) was subsequently performed by Ecology and Environment, Inc. (E&E) in 2007 to identify facility features, inventory abandoned mine-related equipment and debris, and identify contaminants requiring possible remediation and or removal prior to transfer of the land to TKC and Calista. The RSI identified mercury as the primary contaminant of concern and identified the need for further investigation to further characterize the site for metals, petroleum hydrocarbons, and explosives, as well as the need for characterization and removal of hazardous and non-hazardous site materials. The RSI identified four areas of concern (AOC) within the site: Camp Area, Mill Area, Mine Pit, and Waste Rock/Tailings Dump Areas.

MACTEC Engineering and Consulting Inc. (MACTEC) conducted initial investigative removal activities in 2008, including metal background concentration investigations, a geophysical survey for a potential mono-fill location, explosives residue sampling, mercury speciation analysis, and an asbestos and lead-based paint survey. Field activities included removal and disposal of various hazardous and non-hazardous materials from abandoned waste containers and equipment.

In 2011, AMEC Environment & Infrastructure (AMEC, formerly MACTEC) prepared an Engineering Evaluation/Cost Analysis (EE/CA) work plan to complete site characterization activities required to delineate the extent of remaining contamination in each of the areas of concern (AOC) (AMEC, 2011). Field work including investigation of metals, petroleum hydrocarbons, and other contaminants of concern as well as a biological survey was conducted between September 25th and October 1st, 2011.

The EE/CA, completed in 2012 and subsequent 2013 Removal Action Memorandum identified oil, hazardous substances, and non-hazardous solid waste removal actions that were warranted within the mill, mine pit, and camp areas. The EE/CA results showed that removals of constituent of concern (COC) metals-contaminated soils were warranted in Investigation Areas (IAs) IA-1, IA-2, IA-3, IA-4, IA-5, IA-6, IA-8, and IA-13. IA-8 also required DRO impacted soil removal. Hazardous substances to be removed included mercury, arsenic, and chromium in soil as the contaminants of concern in both the Camp Area and the Mill Area, and localized petroleum hydrocarbon contamination of soil in the Mill Area (IA-8 only). Non-hazardous solid waste located within the Mine Pit, Mill Area, and Camp Area required removal as well (AMEC, 2012).

In 2012 BLM contracted with Brice to conduct Limited Removal Actions at the KMS during the 2013 field season. During the 2013 field season, Brice removed all camp buildings, infrastructure, and waste materials. Limited excavation was performed during the 2013 field activities to remove metals and fuel-contaminated soil in the areas noted in the EE/CA. Soil sampling analytical results indicated closure was obtained at all areas except IA-1 and IA-2. A

total of 46 cubic yards of COC metals-contaminated soil (including cinnabar residue from decontamination) was removed from IA-2, IA-3, IA-5, IA-6, and IA-8 of the Mill Area. An additional 14 cubic yards were removed from IA-1 at the Camp Area. This material was loaded into supersacks and transported off site for proper disposal. A landspread area was constructed with 23 cubic yards of DRO-impacted soil from IA-8. Initial baseline DRO concentrations were documented for the landspread area. Initial sampling of the landspread area indicated DRO concentrations exceeding the cleanup level of 250 milligrams per kilogram (mg/kg) and continued sampling was warranted. A landspread area maintenance and sampling and analysis plan was developed to formalize continued operation of the landspread area (Brice, 2014a).

In 2014, BLM contracted with Brice to conduct additional removal at the KMS during the 2014 field season. Brice prepared an addendum to the work plan used for the Limited Removal Actions performed in 2013 to plan the 2014 field activities (Brice, 2014b). During the 2014 season, Brice removed 6 cubic yards of soil from the site at the Upper Mill Area (IA-2) and 94 cubic yards of soil from the Retort Mound (IA-1). Confirmation sampling conducted at IA-2 indicated exceedance of the Alaska Department of Environmental Conservation (ADEC) cleanup level for mercury along the northeast sidewall of the excavation, and exceedances of the cleanup levels for chromium and mercury along the southwest sidewall of the excavation. Excavation confirmation soil sampling conducted at IA-1 indicated lateral exceedances of cleanup levels for mercury, arsenic, and chromium in soils surrounding the 2014 excavation area. Bedrock was encountered along the north and northeast walls of the excavation and further excavation in these directions should be limited to lateral removal to depths of placed material only. The presence of the firebrick platform, beads of elemental mercury, and buried burned ore suggest the retort facility described in the original PA/SI may be present in this area, but was buried by mine operations before the “beer keg retort” was placed there. Bedrock was encountered across the floor of the 2014 excavation limits at IA-1, and further removal of soil in this area is not warranted. Sampling results at the landspread area indicated DRO concentrations were reduced below the applicable cleanup level of 250 mg/kg and that final site closure had been met (Brice, 2014c).

1.3 PROJECT OBJECTIVES

The objectives of the work performed and discussed in this report include:

- Removal of up to 14 cubic yards of soil in 2-cubic-yard increments from the Upper Mill Area to meet ADEC cleanup levels established for this site; and
- Advancing test pits and sampling soils in the immediate vicinity of the Retort Mound to re-characterize the distribution of arsenic, chromium, mercury, and nickel in this area. Remove the balance of 14 cubic yards of soil from the Retort Mound if cleanup levels are met at the Upper Mill Area.

2 REGULATORY CRITERIA

ADEC regulations applicable to this project are contained in Title 18 of the Alaska Administrative Code (AAC), Chapter 75, Oil and Other Hazardous Substances Pollution Control (18 AAC 75), as updated on June 17, 2015 (ADEC, 2015).

2.1 SOIL REGULATORY CRITERIA

At the KMS, arsenic, chromium (total), mercury, and nickel have been identified as COCs. Background sampling of AOCs determined that naturally occurring metal concentrations at some of the AOCs is higher than the ADEC's most stringent action level (Method 2 Migration to Groundwater). For purposes of defining cleanup levels as they pertain to background metal concentrations, the AOCs have been divided into the Camp Area and the Mill Area. A summary of the action levels for COC metals at both of the AOCs is presented below:

Parameter	Method	Camp Area Soil Cleanup Level (mg/Kg)	Mill Area Soil Cleanup Level (mg/Kg)
Arsenic	EPA Method SW6020	10.7	12.7
Chromium, (Total)	EPA Method SW6020	29.2	30
Mercury	EPA Method SW7471	1.4	1.99
Nickel	EPA Method SW6020	86	53.9

Analytical results for arsenic, chromium, mercury and nickel were screened and evaluated using the site-specific cleanup levels calculated during the background study (AMEC, 2011) and ADEC Method Two, Table B1, Migration to Groundwater, whichever was greater for each metal.

3 FIELD ACTIVITIES

A site visit was conducted on 2-4 June, 2015 to coordinate local labor and equipment in Aniak, and to inspect the ramp at the site to determine whether ramp improvement work would be necessary prior to commencement of field work. Based on observed site conditions, no ramp repair work was deemed necessary.

On June 15, 2015, Brice mobilized to the Site to load the barge for starting work on June 16, 2015. Field activities continued until demobilization on June 27, 2015. All activities were performed under the ADEC-approved work plan prepared in May, 2015 (Brice, 2015). BLM Project Manager Larry Beck performed Project Inspector duties on-site 15-25 June, 2015.

Field activities were recorded in a bound field logbook. A photocopy of the field logbook is presented in Appendix A. Photographs of field activities are presented in Appendix B.

3.1 MOBILIZATION

On June 15, 2015, Brice Site Superintendent Dennis Olson mobilized to Aniak to support equipment logistics for the work at KMS. Equipment, fuel, and materials were staged at the Aniak barge landing on June 15 for loading. On June 16, the loaded barge was driven up to the KMS. On June 16, the barge arrived at the KMS with the following gear:

- Kubota® BX25 tractor with loader bucket and backhoe attachments
- 3-seat Polaris® XP-900 four-wheel-drive all-terrain vehicle (ATV)
- 5-gallon capacity fuel cans for additional equipment fuel
- 5-gallon capacity plastic buckets with lids and empty sand bags
- 1-fish tote with tools and supplies
- 14 Supersacks and pallets.

The Polaris® ATV, Kubota® tractor, and the tote of supplies was mobilized from Anchorage using Northern Air Cargo (NAC) prior to crew mobilization in June, 2015. All other equipment used on this project originated in Aniak. Brice mobilized one laborer and one equipment operator to the site on June 16, and the barge was unloaded at the KMS barge ramp. Minor ramp improvements were performed after landing to improve access to the barge.

3.2 EXCAVATION AND CHARACTERIZATION ACTIVITIES

Mill Area:

Excavation activities were conducted at the Mill Area (IA-2) on June 17, June 19, and June 23, 2015. On June 17, 2.6 cubic yards were excavated from the east and west sides of the 2014 excavation area until the only remaining sidewall was on the south side of the excavation. Excavated soils were transported to the barge and containerized in supersacks. The excavation

was advanced to original grade as established in 2014 and then scraped another 2-inches prior to screening using the X-Ray fluorescence analyzer (XRF). The floor of the southwest side of the excavation was determined to be clean in 2014. Additional soil was removed and stockpiled on site pending receipt of analytical results. On-site stockpiling was performed to expedite soil removal because of the three-day turnaround time for analytical results. Five confirmation samples, including one quality control (QC) duplicate were collected and submitted for analysis on the afternoon of June 17. Brice remobilized to the Mill Area on June 19 and excavated an additional 3.4 cubic yards from the southeast and southwest portion of the Mill Area excavation. Confirmation soil sample results from this area indicated mercury exceedance in the sidewall on the southeast side of the excavation. The stockpiled material from June 19 was moved to supersacks on the barge on June 22 and June 23, 2015 and an additional 4 cubic yards were excavated from floor and wall of the southeast area. Two cubic yards were transported to the barge and 2 cubic yards were stockpiled pending analytical results for samples collected on June 23. Analytical results for samples collected on June 23 indicated soil cleanup levels had been met and the final two cubic yards of soil were transported to supersacks on the barge. In all, ten cubic yards of soil were removed from IA-2 in 2015. Figure 3 shows final 2015 excavation limits and final sampling locations at the Mill Area with respect to limits of excavation during work conducted in 2014. Photographs of the excavation work are presented in the photo log in Appendix B.

Retort Mound Area:

Soil characterization and removal activities were conducted at the Retort Mound Area (IA-1) from June 18 through June 25, 2015. Characterization activities at IA-1 commenced on June 18 with the excavation of four test pits, and one step-in test pit, located radially around the retort mound area. Three of these test pits, pits 1 through 3, were sampled on June 18. In addition, 1.5 cubic yards of soil within the area known to be contaminated were excavated and bagged on the barge. On June 19, the remaining four test pits, pits 5 through 8, were installed and sampled, with the exception of Test pit 4, around the retort mound area to comprise the first full set of characterization test pits surrounding the retort mound. Test pit 4, installed on June 18th, was sampled on June 23rd. An additional 1.5 cubic yards of soil were excavated from IA-1 and containerized on the barge. Analytical results from the first set of test pits were available on June 23 and a set of step out pits were installed and sampled on June 24th. Test pit depths ranged from 14" at Test Pit 7 to 48" at Test Pit 3 (Figure 4). One final cubic yard of soil was removed from IA-1 on June 25 to complete contracted soil removal quantities.

A total of four cubic yards of soil were excavated from IA-1, transported to the barge and bagged for transport to Aniak. Bedrock or native clay soil was encountered at the total depth of all test pits. Figure 4 shows the location of test pits excavated during 2015 characterization work conducted at IA-1. Photographs of a typical test pit is presented in the photo log in Appendix B.

3.2.1 FIELD SCREENING

Soil was screened using both visual observation and an XRF. Field screening samples were screened in-situ at the frequency and locations as described in Table 2B of the "Draft Field Sampling Guidance" (ADEC, 2010). A minimum of 10 screening samples were collected from the first 250 square feet and a minimum of one screening sample per each additional 100 square feet of excavated area was collected. Sidewall samples were collected at a minimum rate of one sample per 10 linear feet for excavations greater than three inches depth below

ground surface. Samples were collected directly from the excavation footprint. Test pits were screened at each depth indicating a visual change in soil type or suspected COC metals contamination as indicated by color.

Soil was screened for arsenic, chromium, mercury and nickel using a handheld XRF analyzer as well as visual observation of the red cinnabar-impacted soil. The Thermo Scientific Niton® Model XL3t 600 XRF was used according to SW-846 Method 6200 for in-situ field screening analysis (USEPA, 2007). This unit has limits of detection (LOD) below the action levels for arsenic, chromium and nickel; however, the lowest anticipated LOD for mercury with this instrument was approximately 5 parts per million (ppm) which is above the mercury cleanup level of 1.4 mg/Kg for the Camp Area and 1.99 mg/Kg for the Mill Area. None of the XRF instruments available on the market can attain sensitivity down to 1.4 ppm. Therefore, a non-detect reading for mercury did not confirm that mercury cleanup levels had been achieved. Confirmation soil samples for COC metals analyses were collected from the locations where XRF field screening results indicate both non-detect for mercury and the highest levels of arsenic and chromium.

3.2.2 SOIL CONFIRMATION SAMPLING

Following soil removal, confirmation soil sampling was conducted within each excavation footprint. Soil confirmation samples were collected and screened per the frequency described in the work plan. For the excavation area at IA-2, a minimum of two confirmation samples plus one duplicate sample were collected from the first 250 square feet of excavation floor and one sample per each additional 250 square feet of excavation. Sidewall confirmation samples were collected within the excavation footprint at a minimum frequency of one sample per 20 linear feet. Confirmation samples were collected from the locations yielding the highest field screening results for the COCs within each excavation area. Test pit characterization samples only were collected at IA-1.

Confirmation and characterization soil samples were collected in amber jars and placed into coolers with frozen gel packs at the site. Four sets of confirmation soil samples were transported to Anchorage via air cargo and submitted to SGS on June 18, June 20, June 24, and June 26, 2015. Analytical results were compared to the cleanup levels established for the site as shown in Section 2.

Field duplicate samples were collected for field precision evaluation at a rate of one per 10 soil confirmation samples collected. Sampling protocols, sample handling, custody, and transporting procedures followed those specified in the work plan.

3.2.3 SOIL CONTAINERIZATION AND TRANSPORT

Following excavation, soils were either temporarily stockpiled to await sample results or directly loaded into sand bags or 5-gallon buckets for transport via ATV to the barge deck where they were transferred to palletized 1-cubic-yard supersacks. Initial sand bags and buckets were weighed so each supersack would not be filled over its 2,200-pound rated capacity. Following loading, the soils were shipped via barge transport under non-hazardous waste manifest to Aniak. Upon arrival in Aniak, the supersacks were loaded onto a flatbed trailer and transported to the Aniak Airport. The soils were weighed again at the airport and loaded onto aircraft

operated by Northern Air Cargo for transport to Anchorage. Transport continued from Anchorage to the Port of Seattle via barge, and then via rail to the Columbia Ridge landfill in Arlington, Oregon. The 14 sacks were shipped under non-hazardous waste manifests to the Columbia Ridge disposal facility. Photographs of the field process to containerize soils are presented in Appendix B.

3.2.4 DEMOBILIZATION

The load of 14 supersacks were barged downriver from the site to Aniak with all project equipment on June 26, 2015. Grading and reseeding of the mill and camp areas were also completed on June 26. The Brice Site Superintendent left Aniak for Fairbanks on June 27, 2015. The Polaris® ATV and Kubota® tractor were flown back to Anchorage on June 29, and July 6, respectively.

3.3 QUALITY ASSURANCE AND QUALITY CONTROL

Quality assurance/quality control (QA/QC) procedures were maintained throughout the sampling activities. QA procedures included the analysis of field duplicates and preparation of a laboratory data QA review (QAR) by qualified Brice staff. The QAR included the completion of an ADEC Laboratory Data Review Checklist for each analytical report included in Appendix C. QC procedures included adherence to appropriate sample collection methodology as described in Brice's ADEC approved work plan (Brice, 2015). Any discrepancies associated with the soil confirmation samples collected from the Site were identified in the QAR (Appendix D) and are summarized in Section 4.1.2.1.

3.4 WASTE MANAGEMENT

Facility-signed non-hazardous waste manifests returned from the Columbia Ridge landfill are presented in Appendix E as documentation of proper disposal of all 14 sacks of soil removed from the KMS in 2015. All soils excavated in 2015 were transported and disposed of under facility-approved waste profiles developed for the soils from the same AOCs in 2013 and renewed by the receiving facility in 2014.

4 FIELD SCREENING AND ANALYTICAL RESULTS

This section describes the findings of sampling conducted in support of the 2015 removal action and characterization performed at the KMS. The nomenclature for sample IDs and AOCs for this project are defined below:

15KTM = 2015 Sample from Kolmakof Top of Mill (IA-2)

15KRM = 2015 sample from Kolmakof Retort Mound (IA-1)

Field notes included in Appendix A provide a detailed account of the field screening and sampling activities conducted at the Site. The following sections detail the results for sampling conducted at each area at KMS in 2015.

4.1 EXCAVATION SAMPLING RESULTS

The following sections discuss findings of excavation and test pit sampling activities from the Mill Area (IA-2) and the Retort Mound Area (IA-1).

4.1.1 MILL AREA (IA-2)

Soil sampling at the IA-2 excavation limits was conducted on June 17, after 2.6 cubic yards of soil were removed. During this sampling effort, four confirmation samples, and one QC field duplicate, were collected. Sample results are presented in Table 1 and the field samples for this effort were 15KTM-01 through 15KTM-05. All samples were submitted to SGS for rush analysis of arsenic, total chromium, mercury, and nickel using USEPA Method 6020A. The field duplicate pair collected on June 17, 2015 included primary sample 15KTM-01 and duplicate 15KTM-02. Complete laboratory analytical reports are provided in Appendix C. Completed ADEC laboratory data checklists and a quality assurance review of the laboratory data are included as Appendix D.

Detectable concentrations of all target metal analytes were found in all samples collected on June 17. The site-specific cleanup level for mercury was exceeded in samples 15KTM-01, 15KTM-02, 15KTM-04, and 15KTM-05. Sample 15KTM-03 from the southwest wall of the excavation did not exceed cleanup levels and excavation in that area was complete. Analytical results for soil samples collected from the floor of the southwest excavation area in 2014 did not exceed cleanup levels for target metals.

Prior to receipt of these soil analytical results, Brice continued excavation activities at IA-2 in the southeast and southwest areas and collected soil samples at new limits of the excavation on June 19, 2015 after the removal of an additional 3.4 cubic yards of soil from the southeast portion of the excavation and 1 cubic yard of soil from the southwest portion of the excavation. Samples 15KTM-06 through 15KTM-08 were collected and submitted for analysis. Upon receipt of analytical results from sampling conducted on June 17, Brice instructed the laboratory not to analyze samples 15KTM-07 and 15 KTM-08 because analytical results for sample 15KTM-03 from the southwest sidewall indicated target metal concentrations below cleanup levels at the sidewall of the June 17 limit of excavation. Arsenic, chromium, mercury, and nickel results for sample 15KTM-03 were 8.82 mg/kg, 26.3 mg/kg, 1.84 mg/kg, and 26.1 mg/kg, respectively. The

3.4 cubic yards noted above from the southeast excavation sidewall represented by sample 15KTM-06, which exceeded cleanup levels, were transported to the barge and containerized on June 22 and 23. The 1 cubic yard excavated from the southwest portion of the excavation was used to construct a ramp.

Excavation work continued at the southeast portion of the excavation on June 23. Two rounds of excavation were performed with confirmation sampling performed after each round. Sample 15KTM-09 represented the excavation floor after the first two cubic yards, and samples 15KTM-10, and 15KTM-11 represented the wall and floor of the final limits of excavation, respectively. The first two cubic yards of soil were transported and containerized on June 23. On June 25, Brice was informed by SGS that samples 15KTM-10 and 15KTM-11 were below the cleanup levels for all target analytes and associated soil was transported the barge that day. Arsenic, chromium, mercury, and nickel results for sample 15KTM-10 were 9.82 mg/kg, 28.1 mg/kg, 0.983 mg/kg, and 24.6 mg/kg, respectively. Arsenic, chromium, mercury, and nickel results for sample 15KTM-11 were 5.68 mg/kg, 21.4 mg/kg, 0.825 mg/kg, and 17.9 mg/kg, respectively.

4.1.2 RETORT MOUND AREA (IA-1) TEST PITS

Two sets of test pits were installed around the retort mound at IA-1 in 2015. Test pits TP-1 through TP-4 were installed on June 18th. Test pits TP-1 through TP-3 were sampled on June 18th, and TP-4 was sampled on June 23rd. Test pits TP5 through TP-8 were installed and sampled on June 19. Analytical results for the first set of test pits, with the exception of TP-4, were available on June 23rd. A set of step-out test pits were installed and sampled, with the exception of test pit TP-10 which was not sampled, based on the analytical results of the first set of test pits on June 24th.

Metal concentrations in soil confirmation samples collected from test pits in the vicinity of the Retort Mound are presented in Table 1. Complete laboratory analytical reports are provided in Appendix C. Completed ADEC laboratory data checklists and a quality assurance review of the laboratory data are included as Appendix D. The limits of excavation at the Retort Mound and soil analytical data are presented on Figure 4. Confirmation soil sample survey data are presented in Appendix F.

Detectable concentrations of all target metal analytes were found in all samples.

Arsenic concentrations ranged from 6.99 mg/kg in sample 15KRM16 to 12.2 mg/kg in sample 15KRM-05. Arsenic was detected above the ADEC cleanup level in confirmation samples 15KRM-04, 15KRM-05, 15KRM-06, 15KRM-10, and 15KRM-13.

Chromium concentrations ranged from 27.6 mg/kg in sample 15KRM-03 to 50.1 mg/kg in sample 15KRM-11. Chromium was detected above the ADEC cleanup level in all soil samples except 15KRM-03, 15KRM-12, and 15KRM-16.

Mercury concentrations ranged from 0.220 mg/kg in sample 15KRM-16 to 217 mg/kg in sample 15KRM-11. Mercury was detected above the ADEC cleanup level in soil samples 15KRM-01, 15KRM-02, 15KRM-04, 15KRM-05, 15KRM-07, 15KRM-10, 15KRM-11, 15KRM-12, 15KRM-14, and 15KRM-15.

Nickel concentrations ranged from 19.4 mg/kg in sample 15KRM-16 to 69.3 mg/kg in sample 15KRM-11. Nickel was not detected above the ADEC cleanup level in any of the test pit soil samples collected from the vicinity of the retort mound at IA-1 in 2015.

Confirmation soil sampling indicated the exceedances of ADEC cleanup levels for one or more of the target metals at all sample locations except 15KRM-13 at TP-3, and 15KRM-16 at TP-11.

4.1.2.1 Analytical Data Quality

The laboratory reports for all samples are presented in Appendix C. Although the data were deemed acceptable for use, there were precision goals for mercury in work order 1152938 that were not met by the analytical laboratory. These are described in detail in Brice's QAR in Appendix D and discussed briefly here:

- The relative percent difference (RPD) for MS/MSD analyses in work order 1152938 met control limits except for mercury. The matrix is non-homogeneous for mercury and mercury data in work order 1152938 are qualified as estimated "J" values. Affected samples are 15KTM-01, 15KTM-02, and 15KTM-04.
- Laboratory duplicates did not meet <20% RPD for mercury in samples 15KTM-01, 15KTM-02, and 15KTM-04 in Work Order 1152938, and mercury data in these samples were qualified "J" to indicate estimated quantities.
- The RPD between primary samples and the field duplicates were in agreement in all cases except for mercury in work order 1152938. The RPD of 57% for mercury between parent sample 15KTM-01 (2.67 mg/kg) and duplicate sample 15KTM-02 (4.8 mg/kg) was greater than 50%. Both results were considered estimates with an unknown bias due to sample heterogeneity. Mercury results in work order 1152938 are considered to be estimated "J" values. Affected samples are 15KTM-01, 15KTM-02, 15KTM-03, 15KTM-04, and 15KTM-05.

5 CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations are presented below.

5.1 CONCLUSIONS

5.1.1 MILL AREA (IA-2)

The limits of the excavation conducted at IA-2 in 2015 extended to soils meeting cleanup levels established for the site. Excavation sidewall sampling in the southwest portion of the excavation conducted on June 17, 2015 indicated COC metal concentrations below ADEC cleanup levels. Excavation sidewall and floor sampling in the southeast portion of the excavation conducted on June 23, 2015 indicated COC metal concentrations below ADEC cleanup levels.

5.1.2 RETORT MOUND AREA (IA-1)

Test pit confirmation soil sampling conducted in the vicinity of the retort mound at IA-1 indicate that further contaminated media removal is required. The test pits installed at IA-1 in 2015 did not extend to soils meeting cleanup levels generally to the north or southwest despite extending significantly beyond the limits of excavation identified in the EE/CA (Figure 4).

Analytical results for arsenic and chromium in soil samples collected from test pits on the outer perimeter of, or within an inferred area of, excavation were within or near the upper range of values observed from soil samples collected from the Camp Area during the background study conducted by AMEC in 2008 (AMEC, 2011). Concentrations of arsenic and chromium that are elevated relative to the cleanup levels established for the Camp Area do not correlate with exceedances for the mercury cleanup level established for that area. Therefore, elevated arsenic and chromium concentrations are likely associated with background variation in the occurrence of these COC metals.

The inferred area of soil at IA-1 with mercury concentrations exceeding the Camp Area cleanup level of 1.4 mg/kg is presented in Figure 4. The total area bounded by the actual and inferred boundary, based on sample analytical results, is approximately 3,800 square feet. Based on an average soil thickness of approximately 3 feet to bedrock or undisturbed soil, Brice estimates there are approximately 402 in-situ cubic yards of soil exceeding the Camp Area cleanup level. During soil removal actions in 2013 and 2014, 110 cubic yards of ex-situ soils were removed from within this area. Based on a 25 percent swell factor of excavated soils, the removal efforts deduct 70 cubic yards from the 402 in-situ cubic yard estimate above. The resulting in-situ volume of soil remaining above the Camp Area cleanup level for mercury is, therefore, approximately 332 cubic yards. Assuming an excavated soil swell factor of 25 percent, the volume of soils requiring ex-situ management to attain cleanup levels is approximately 415 cubic yards. This estimate does not include additional excavation beyond the inferred excavation limits presented in Figure 4.

5.2 RECOMMENDATIONS

5.2.1 MILL AREA (IA-2)

Brice recommends no further investigation or remediation activities take place at IA-2 based on sampling analytical results obtained from the southwest excavation wall on June 17, and from the southeast excavation area wall and floor on June 23, 2015. Brice recommends closure of IA-2.

5.2.2 RETORT MOUND AREA (IA-1)

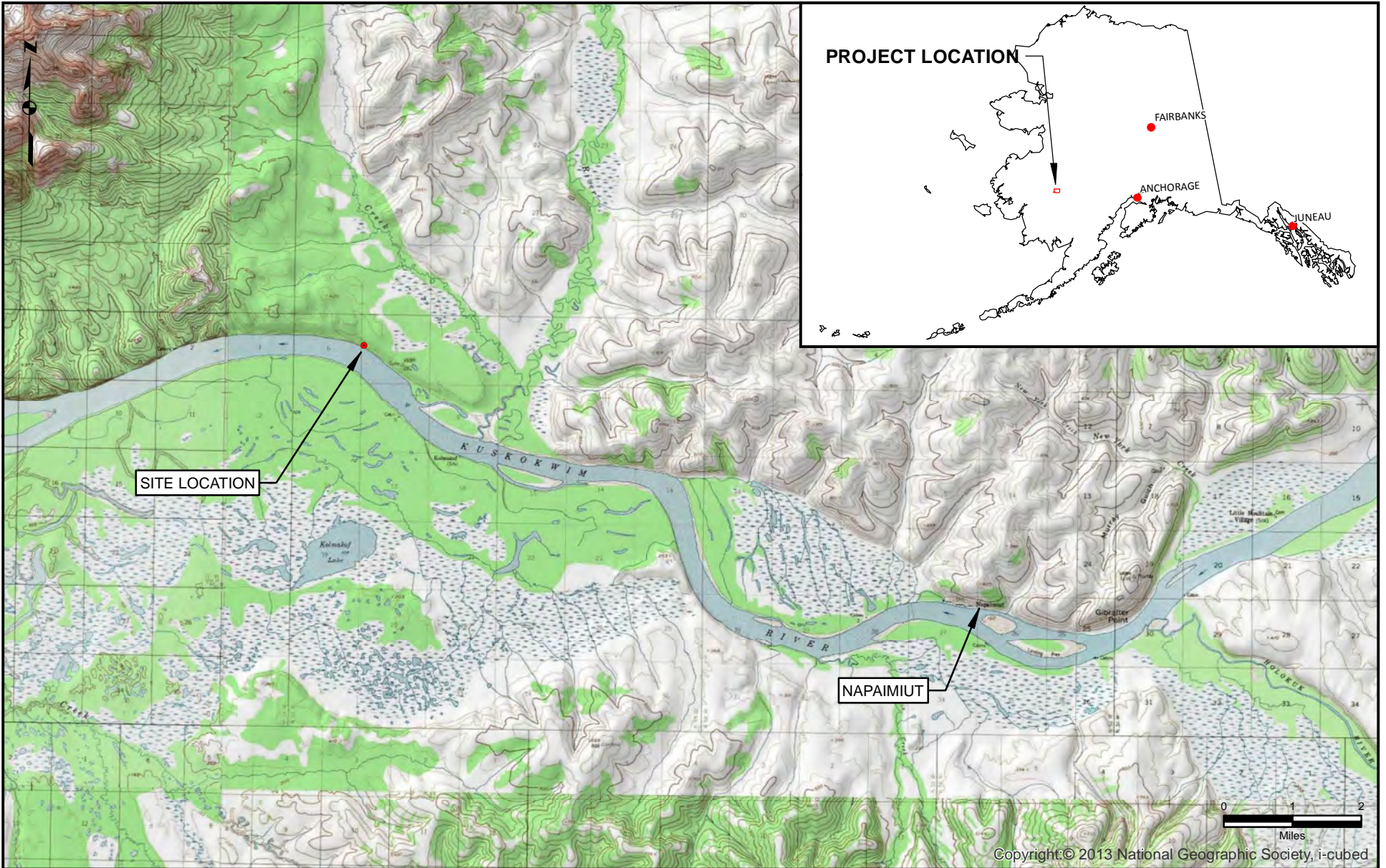
Brice recommends the use of mercury data only as guide for cleanup at IA-1. Brice recommends the removal, transport, and disposal of up to 415 cubic yards of soil not meeting the mercury cleanup level of 1.4 mg/kg from the vicinity of the retort mound at IA-1. Removal of this material should be limited by the occurrence of underlying bedrock or undisturbed soils.

Given the linear extent of excavation perimeter characterized as “inferred” due to analytical results in outer test pits exceeding the 1.4 mg/kg cleanup level (Figure 4), Brice recommends an additional 50 cubic yard in-situ contingency factor for planning purposes. This volume corresponds to an additional 65 cubic yards of ex-situ soil requiring management as a contingency toward attainment of the mercury cleanup level.

6 REFERENCES

- ADEC, 2010, *Draft Field Sampling Guidance*. May.
- ADEC, 2015. Alaska Administrative Code (18 AAC 75), *Oil and Other Hazardous Substances Pollution Control*, as amended through June 17.
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- AMEC, 2012. Engineering Evaluation/Cost Analysis, Kolmakof Mine Site, Napaimute, Alaska. May.
- Brice Environmental Services Corporation (Brice), 2013. BLM, Kolmakof Mine Site Interim Removal Action Work and Management Plan, Final. May.
- Brice, 2014a. Kolmakof Mine Site Interim Removal Action. April.
- Brice, 2014b. Proposed Addendum to Kolmakof Mine Site – 2013 Interim Removal Action, BLM Contract No. L12PC00215, Work and Management Plan. July.
- Brice, 2014c. 2014 Kolmakof Mine Site Interim Removal Action Report, Kolmakof Mine Site, Alaska. December.
- Brice, 2015. Site Characterization and Limited Soil Removal, Kolmakof Mine Site, Near Aniak, Alaska, Work and Management Plan. May.
- United States Environmental Protection Agency, 2007. *Method 6200, Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846, (3rd edition, final update IV).

FIGURES



SITE CHARACTERIZATION AND LIMITED SOIL REMOVAL
 KOLMAKOF MINE SITE, NAPAIMUTE, ALASKA

STATE AND SITE VICINITY

DATE:
10/8/2015

PROJECT No.:

DRAWN:
D.H.

FIGURE:

1



SITE CHARACTERIZATION AND LIMITED SOIL REMOVAL
KOLMAKOF MINE SITE, NAPAIMUTE, ALASKA

SITE OVERVIEW

DATE:
10/30/2015

PROJECT No.:

DRAWN:
D.H.

FIGURE:

2

NOTE:

EAST AND WEST EXCAVATION SIDEWALLS
REMOVED TO GRADE OF EXCAVATION FLOOR.
SOUTH SIDEWALL WAS APPROXIMATELY 3 FEET.



TOP OF FORMER
MILL

15KRM-03 (24"bgs) (SIDEWALL)	
As	8.82
Cr	26.3
Hg	1.84
Ni	26.1

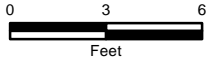
15KRM-11 (36"bgs) (FLOOR)	
As	5.68
Cr	21.4
Hg	0.825
Ni	17.9

15KRM-10 (24"bgs) (SIDEWALL)	
As	9.82
Cr	28.1
Hg	0.983
Ni	24.6

LEGEND

- ⊙ 2015 CONFIRMATION SOIL SAMPLE
- ▤ 2013 EXCAVATION LIMITS
- ▨ 2014 EXCAVATION LIMITS
- ▩ 2015 EXCAVATION LIMITS

bgs BELOW GROUND SURFACE
ALL RESULTS IN mg/kg



SITE CHARACTERIZATION AND LIMITED SOIL REMOVAL
KOLMAKOF MINE SITE, NAPAIMUTE, ALASKA

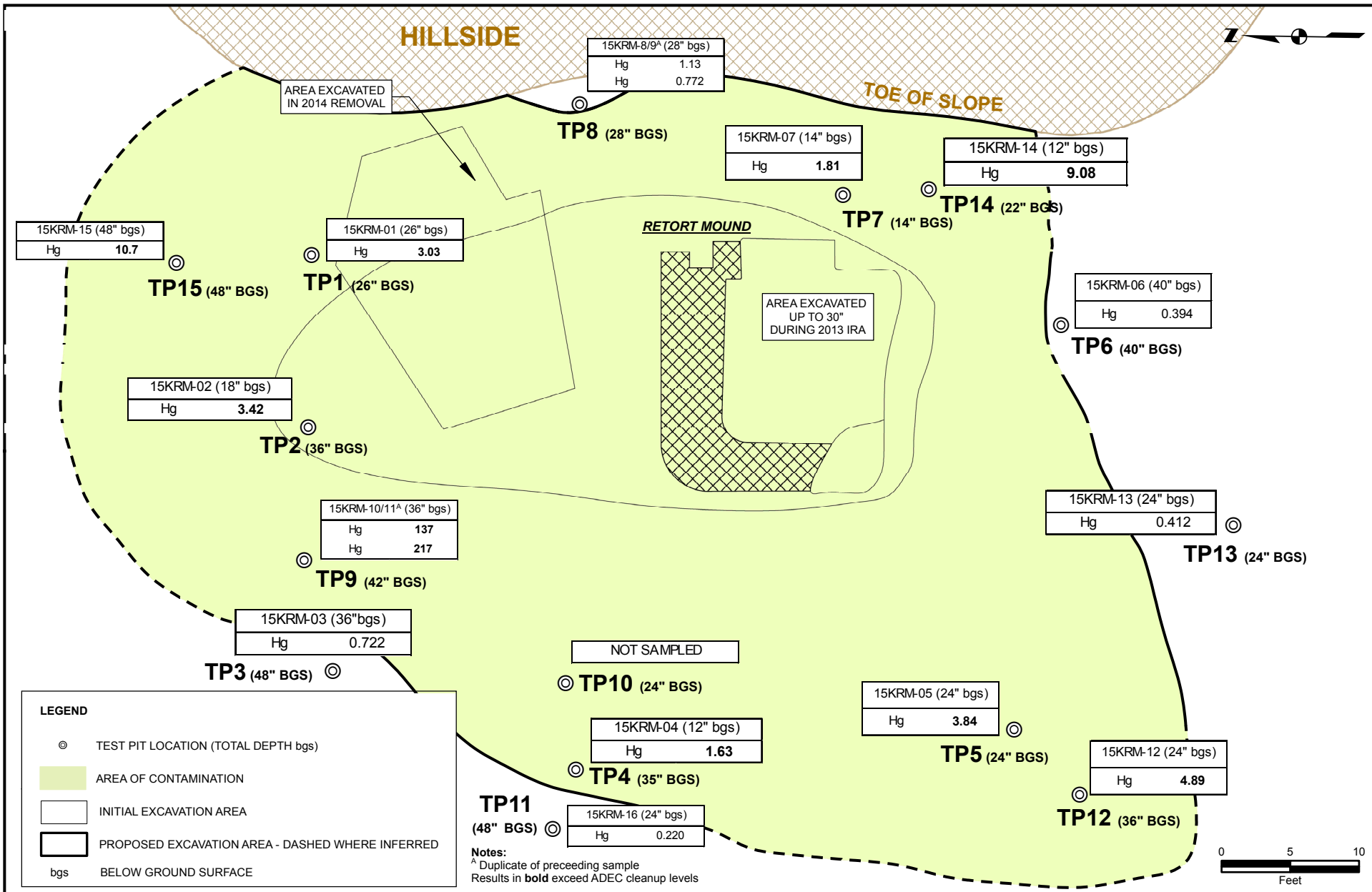
TOP OF MILL (IA-2) EXCAVATION DIAGRAM

DATE:
11/6/2015

PROJECT No.:
BE

DRAWN:
D.H.

FIGURE:
3



SITE CHARACTERIZATION AND LIMITED SOIL REMOVAL
 KOLMAKOF MINE SITE, ALASKA

CAMP AREA SOIL SAMPLING RESULTS AND PROPOSED EXCAVATION AREA

DATE:
10/21/2015

PROJECT No.:
BE

DRAWN:
D.H.

FIGURE:

4

TABLES

Table 1
Analytical Methods and Soil Cleanup Levels
2015 Kolmakof Mine Site Characterization and Limited Removal

Field Sample ID	Sample Location	Date Sampled	USEPA Method 6020A			
			Arsenic (mg/kg)	Chromium (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)
Mill Area Cleanup Levels			12.7	30	1.99	86
15KTM-01	SW Wall	6/17/2015	9.22	28.9	2.67 J	33.2
15KTM-02 ^A	SW Wall	6/17/2015	9.79	27.4	4.8 J	31.1
15KTM-03	SW Wall	6/17/2015	8.82	26.3	1.84 J	26.1
15KTM-04	SE Floor	6/17/2015	8.51	26.8	2.71 J	23.8
15KTM-05	SE Wall	6/17/2015	8.16	25.9	2.57 J	22.8
15KTM-06	SE Wall	6/19/2015	7.93	27.9	30.7	25.0
15KTM-09	SE Floor	6/23/2015	6.32	21.9	2.81	20.0
15KTM-10	SE Wall	6/23/2015	9.82	28.1	0.983	24.6
15KTM-11	SE Floor	6/23/2015	5.68	21.4	0.825	17.9
Camp Area Cleanup Levels			10.7	29.2	1.4	86
15KRM-01	Test Pit 1 @ 26" bgs	6/18/2015	9.00	29.9	3.03	40.4
15KRM-02	Test Pit 2 @ 18" bgs	6/18/2015	9.44	31.0	3.42	39.3
15KRM-03	Test Pit 3 @ 36" bgs	6/18/2015	8.95	27.6	0.722	33.4
15KRM-04	Test Pit 4 @ 12" bgs	6/23/2015	10.9	29.8	1.63	32.6
15KRM-05	Test Pit 5 @ 24" bgs	6/19/2015	12.2	30.5	3.84	26.4
15KRM-06	Test Pit 6 @ 40" bgs	6/19/2015	12.1	29.3	0.394	27.2
15KRM-07	Test Pit 7 @ 14" bgs	6/19/2015	8.14	29.9	1.81	40.4
15KRM-08	Test Pit 8 @ 28" bgs	6/19/2015	10.5	31.1	1.13	45.7
15KRM-09 ^A	Test Pit 8 @ 28" bgs	6/19/2015	8.91	31.1	0.772	46.7
15KRM-10	Test Pit 9 @ 36" bgs	6/24/2015	10.9	35.3	137	52.3
15KRM-11 ^A	Test Pit 9 @ 36" bgs	6/24/2015	8.83	50.1	217	69.3
15KRM-12	Test Pit 12 @ 24" bgs	6/24/2015	9.48	28.8	4.89	31.8
15KRM-13	Test Pit 13 @ 24" bgs	6/24/2015	11.0	29.7	0.412	35.3
15KRM-14	Test Pit 14 @ 12" bgs	6/24/2015	10.6	30.2	9.08	41.3
15KRM-15	Test Pit 15 @ 48" bgs	6/24/2015	8.78	30.1	10.7	39.0
15KRM-16	Test Pit 11 @ 24" bgs	6/24/2015	6.99	28.8	0.220	19.4

Notes:

^A Duplicate of preceding sample
Results in **bold** exceed ADEC cleanup levels

Abbreviations:

-- - not analyzed
ADEC - Alaska Department of Environmental Conservation
AK - Alaska Method
bgs - below ground surface
J - estimated value
mg/kg - milligrams per kilogram
ND - not detected at or above the [Limit of Detection]

APPENDIX A

FIELD LOG BOOK

Site Characterization and Limited Soil Removal Report
Kolmakof Mine Site, Alaska

Bureau of Land Management Alaska State Office

4700 BLM Road

Anchorage, AK 99507-2591

November 2015

Kalmat Mine Site

16 June 2015

0800 Leave camp to pick up Men, Patrice and Leroy. Old remains materials and equipment from airport down to barge on the Kuskokwim.

0930 Depart for site in skiff. Barge underway upriver.

1030 Arrive on site, walk site and determine where to land barge. Dross planned made. Swinging barge. ETA is approx 2:30 PM

1700 Barge arrives. Much later than anticipated. Unload Kubota and Ranger after building up ramp and setting damage to support equipment of load.

1830 Done at site. Depart in skiff.

1945 Arrive back at Aniwake.

2000 Done for the day.



Scale: 1 square =

Kalmat Mine Site

17 June 2015

0800 Pick up crew and depart for site.

Sunny. Light wind upriver. Safety meeting and begin hauling gear to top of mill site in the 900 Rangers.

1030 Clearing trees from excavation area.

Begin digging soil from KIMCO sample area and stockpiling on digger. Soil then to be placed in bags/buckets and transferred

down to barge and placed in supersacks.

1st sandbag filled using snachube. WT. 43#

Calibrate / check scalebacks on XRF

Conduct ore Hg 47.2K XRF Sample #5
As 1043
Cr 84
Ni 319

1230 Finished 1st sandbag load hauled down to barge loaded 6 bags in bottom of supersacks

RURR SWL. As 335 +/- 18 Au 21 / 15

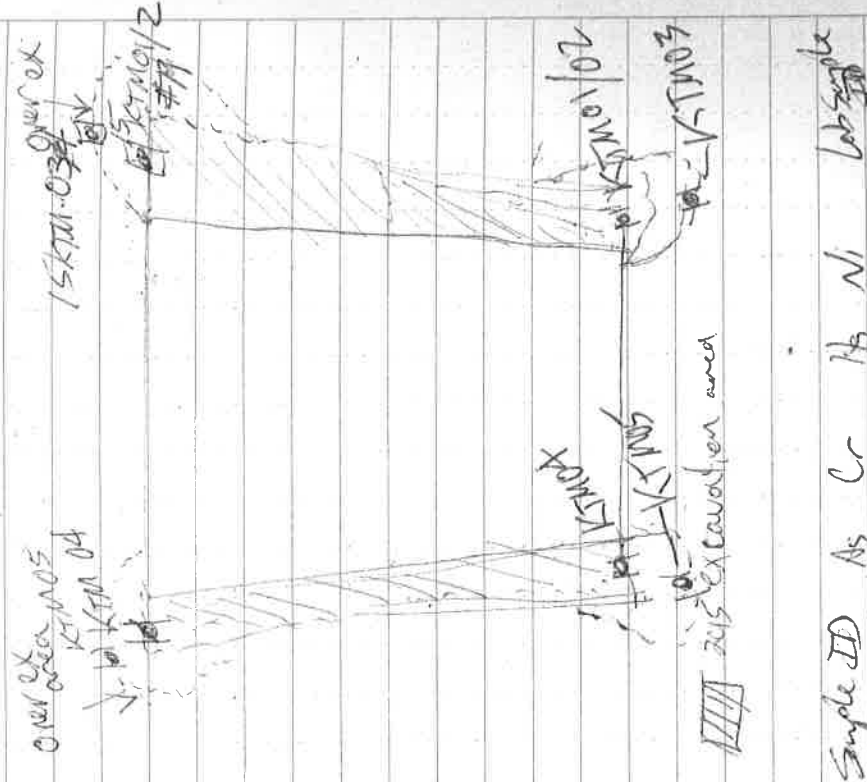
#22 Cr 199 +/- 17 Fe 80 / 12

Pb 405 +/- 21 Se 410 / 15

Scale: 1 square =

Kalmat Mine

KTM Excavation / Sample locations



Sample ID	As	Cr	Hb	Ni	lab sample
13					
15					
17					
18					
19					
20					

Scale: 1 square = 1 square meter

RF #	Sample ID	Time	As	Cr	Hb	Ni	lab sample
21	nd(5.7)	67	nd(2.6)	nd(30.7)	nd(6.7)	nd(24.6)	03
32	8	97	nd(7.7)	-	-	-	
34	nd(5.5)	106	nd(8.2)	-	-	-	
35	7	108	nd(7.5)	-	-	-	
36	11	87	nd(8.1)	-	-	-	
37	7	88	nd(8.1)	-	-	-	
38	7	92	nd(8.3)	nd(40.1)			
39	7	67	nd(8.2)	nd(33.3)			
40	nd(5.7)	63	nd(8.1)	nd(38.6)			
41							

Lab Samples	Date	Time	Depth	loc	Notes
15KTM01	6/17/15	15:20 on 20"	20"	SW	Dupe
15KTM02	6/17/15	15:31 PM	"	SW	Piped
15KTM03	6/17/15	16:45 on 24"	24"	SW	over ex area! reserve!
15KTM04		16:10	"	SW	
15KTM05		17:25	"	SW	over ex reserve!

Scale: 1 square = 1 square meter

RF #

Kolmakof Mine

13 June 2015

Rebet Moved Screening

Camp Area cleanup levels

$A_s = 0.7$ $C_r = 29.2$ $H_g = 1.4$ $N_i = 80$

sample # A_s C_r H_g N_i N_i (loc) soil type

TP

Kolmakof Mine Site

15 June 2015

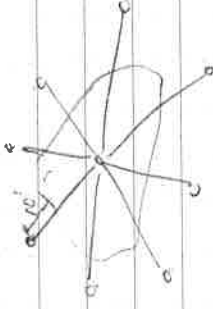
0900 Leave camp to pick up crew.

0930 Depart Aniak for site. Arrive, subdivide.

Begin work. Sunny, warm, light breeze. River level dropped a few inches since yesterday.

1100 Begin excavating soil for removal from JA (Rebet mound). Plan out test pits to be placed radially from center of area ~ 10' from previous excavation areas.

Approach



If test pits allow for in-situ will screen directly on surface. If not, will screen lifts from buckets.

Place 8 initial test pit marked with pin flags. Distance from each TP to center pin written on rebet mound figure.

1130 Lunch

1200 Resume test pit work. Complete boring log and sample results pages.

1700 Finished 4 initial test pits and one step-in.

TP-1, 1-2, 2, 3 + 4 completed.

1730 Depart site.

Boring Log

TP #	Depth	Notes	W/F #
1-A	0-1'	dark brown silt/gravel	52
1-B	1-2'	silty clay with organic matter	53
	2-3'	clay and broken shale	54 (from bucket)
	3-4'	gravel and broken shale	55
2-A	0-1'	gravel over clay layer	56
2-B	1-2'	silty gravel	57
2-C	2-3'	soil with silt/gravel	58
2-D	3-4'	Refusal - bedrock	-
3	0-1'	silty soil with organics	59
	1-2'	silty soil with gravel	60
	2-3'	silty soil with gravel	61
	3-4'	bedrock at 3'	-
3	0-1'	brown soil with organics	62 (by note)
	1-2'	brownish yellow soil w/gravel	64
	2-3'	brownish yellow soil w/gravel	-
	3-4'	brownish yellow soil w/gravel	65
A	0-1'	brown soil w/gravel	66
	2-3'	brown soil w/gravel	67
	3-4'	bedrock (refusal @ 3.5')	-
5	0-1'	ground/rock on organic layer	74
	1-2'	soil w/gravel	75
	2-3'	soil w/gravel	77
	3-4'	soil w/gravel	78

Scale: 1 square =

Soils IDAS

Soils IDAS	As	Cc	Its	Ni	Lab Sample
52	(7.9)	57	(11.0)	(57.0)	
53	(7.4)	74	(11.3)	(56.2)	
54	(7.5)	73	(12.3)	(54.1)	
55	(7.2)	88	(9.5)	(47.7)	15KRM-15-6/2
56	(6.4)	59	(9.9)	(49.6)	(1420)
57	(6.7)	62	(10.2)	(49.7)	
58	(7.3)	71	(10.4)	(54.1)	15KRM-01-5/5
59	(5.5)	96	(8.6)	(38.6)	
60	(6.7)	63	(9.6)	51	15KRM-02-1/55
61	(6.7)	73	(9.0)	(49.0)	
62	(6.7)	51	(9.9)	(45.4)	
63					
64	2.0				
65	8	77	(10.4)	(48.9)	15KRM-03-1/80
66	12	74	(10.2)	48.9	15KRM-04-1/80
67	(5.8)	71	(9.0)	(42.6)	4/25
74	(5.1)	45	(8.3)	(40.8)	6/19
75	6	62	(7.1)	(33.9)	6/19
77	8	58	7	(32.7)	15KRM-05-1/35
78	7	68	(6.0)	(29.0)	
79	7	56	(6.9)	(33.1)	

Scale: 1 square =

15KRM-01-5/5

6/19/15

TRF#	Depth	Notes	XRF#
68	0-1	0-12" silty gravel fractured rock	68
	1-2	" "	69
	2-3	Bedrock at 28"	
	3-4		
70	0-1	0-12" silty gravel / fine rock	70
	1-2	Bedrock at 14"	
	2-3		
	3-4		
71	0-1	soil with silt + gravel	71
	1-2	soil with silt and gravel	72
	2-3	soil with gravel + rock	73 (153)
	3-4	Bedrock / fractured rock at 40"	

Scale: 1 square =

6/19/15

Sample ID	As	Cr	Hg	Ni	Lab Sample
68	nd(5.9)	1.27	nd(8.7)	nd(41.5)	15KRM-08/69
69	9	50	nd(3.7)	nd(64)	1310/1912 Super
70	nd(7.3)	65	nd(11.4)	nd(54.4)	15KRM-07/255
71	7	63	nd(10.9)	nd(44.5)	
72	12	64	nd(10.8)	nd(53.7)	15KRM-06/1240
73	8	91	nd(7.4)	nd(37.0)	

Scale: 1 square =

Plot on 20' Rain

Kelmelet Mine

19 June 2015

0800 Leave to pick up crew.

0930 Arrive on site. Safety meeting.

Sunny, calm, bugs. Shaded at Rebert mound.
0950 Begin test pitting. Start today at TP#8
and continue around according to TP#5.

To allow for soil removal activities from
the mound, TP#5 is located in direct path
of soil removal.

Screening intervals are 1' lifts and

120 second analysis on XRF (60 s for low range
metals, 60 seconds for main metals).

1112 Beginning TP 5. Completed 6, 7, and 8.

Changed screening times on XRF.

Low metals from 60 s to 30 s

Main range metals from 60 s to 120 s

Screening sample #73 exposed main range

for 90 s and by LOD decreased to 7 ft.

Possibly lower LOD more with larger

detection times.

Collect samples from TP #4 & 5

15KRM04 + 15KRM05.

1150 Lunch

1230 Continue collecting samples from TPs 6, 7 & 8

Duplicate sample 15KRM08 + 15KRM09.

1300 Fill buckets of soil from RM.

Scale: 1 square =

Kelmelet Mine

19 June 2015

1400 Call to SGS for KRM results

As CC Hg Ni

15KRM01 2.67

02 4.8

03

04 2.71

05

Since Hg > 1.99, need to run second
samples 03 & 05. Requested to run.

Will call lab Saturday for results

Decision made to stop work at IA1(RM)
and focus effort at IA2 Top of mill.

Will excavated and stockpile additional
from wall on both sides and face of

mill ex. screen and collect new

conf samples.

1645 Called and spoke with forest at

SGS. He will be at lab on Saturday.

Call him at 1300 for update on KRM03+05

results. Also, he will pick up KRM

samples and new KRM samples from

air cargo. Need to give him airway

bill. Samples will be run Thursday, then

results Tuesday.

Scale: 1 square =

Kalmukof Mine

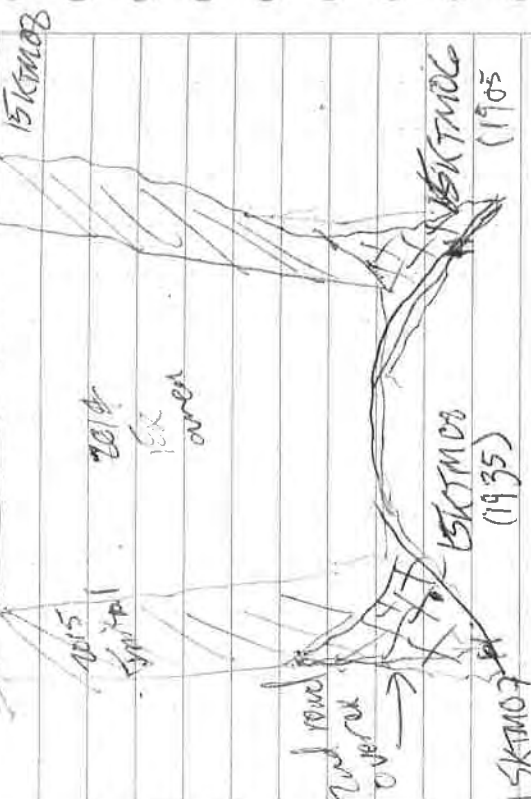
19 June 2015

1600 Move back up to Top of mill site.

Begin excavating on E + W sides.

Stacking soil on N/S green within excavation footprint.

Removed approx 1.5 CY from West side and 1 CY from East side. Screened w/ xref and collected sidewall 15KTM08, sidewall 15KTM08 and floor 15KTM08



Screened As Cr | Hg Ni soil type split

Scale: 1 square =

Kalmukof Mine

19 June 2015

Will hold samples until results available for the following:

If 15KTM05 dirty, then run 06

If 15KTM03 dirty, then run 07 + 08.

Will have results on 6/20. Call Forest for results.

10:44 AM

2000 Begin packing up for the day. Sealing supersacks that are full. Duct-taping liner and tie off outer bags. Field over partial bags to prevent rainwater from entering.

2030 Depart site.

Pack KRM and KTM samples in one cooler for air freight out on 6/20.

Scale: 1 square =

Return on Rain

[Handwritten signature]

Kalamaker Mine

20 June 2015

0745 Define cooler w/ samples to
R4W Air for shipment to Anchorage.
Coordinate with Forest at SAS
to pick up samples and ship out
an additional cooler with 6 empty
pails.

1105 Receive call from SAS with

15KTM 03 + 05 results. 03 is
below cleanup levels for all 4 COCs,
05 is above H₂ cleanup level.

Decision made to standby for the day
and Sunday to await results of
15KTM06. IF 06 is below then
no more excavation is necessary at
KTM Top of mill.

1130 Attempt to get on flight but too
late.

Will fly out Sunday and return
on Monday. Back to site on Tuesday
6/23 when 15KTM06 and retest
mend sample results will be ready.
Depending on results, will remove additi
soil at mill or finish removal at retest
mend. Dig add'l test pits based on

Scale: 1 square =

Kalamaker Mine

20 June 2015

KTM results.

Organize gear and ready for
work to resume on Tuesday.
Purchase return ticket to Aniak
for Monday.



Scale: 1 square =

Kalamaker Mine

Kolmakof Mine

21 June 2015

1130 Return to Anchorage
Off day

Kolmakof Mine

22 June 2015

0800 Anchorage airport

0930 Return to Aniak

Assemble gear, pickup sample
cooler from RAIN. Freeze gel pickles.
Ready for 6/23.
Coordinate with SCS

Scale: 1 square =

Scale: 1 square =

Return to Rain

Kalmarok Mine KTM Sample logs

Sample ID	Loc.	Depth	Material
15KTM09	Floor	100' 3' bgs	silty clay
15KTM10	Sidewall	100' 24" bgs	" "
15KTM11	Floor	114' 3' bgs	silty clay
15KTM12	Sidewall	105' 22" bgs	loamy silty
15KTM13	N	146' 22" bgs	" (dipped)

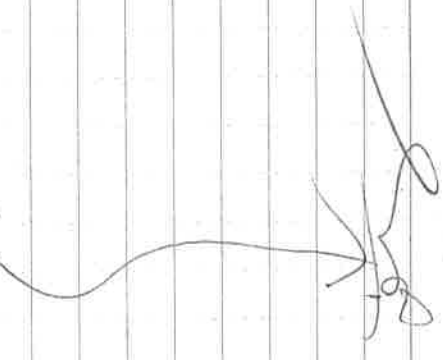
Scale: 1 square =

Kalmarok Mine

23 June 2015

Pulled 2nd 20's & soil off wall after collecting 15KTM09 + 10. Screened and collected back up/concreteness samples 15KTM11, 12, 13 (upper), JP 09 + 10 not clean, will run 11, 12 + 13. 12 + 13 is third duplicate pairings. 1700 Return down to report name to collect sample from JP#4 which was not previously sampled. Collected 15KTM-07

1730 Return to Aniak. Confirm times for cargo with RAMM. Will deliver cooler w/ samples at 1730 on Wed. Complete CEC + pack samples for shipment. 1915 Done for the day.



Scale: 1 square =

Return to Rain

Kelmeleaf Mine

24 June 2015

0715 Deliver samples to RAW for O300 cargo

Flight back to Anchorage. E-mail

Carl at Brice and Forest at SAS with

the airway bill and copy of COC along

with instructions. Carl will coordinate

rush w/ SAS. Results ETA Thurs

for 15KRM09 or 10.

0900 Leave for site. Will collect RM

TP samples then shoot locations

w/ GPS.

Test pit logs on next page.

Assigned second round of test pits

based on 1st round results.

* Rename TP#1-A to TP#15.

Begin digging test pits. 9, 10, 11, 12, 13

& 14. TP15 was dug earlier in the week.

Was previously labeled as TP1-A.

1200 Lunch

1300 Resume test pit screenings w/ xrf.

1345 Finished digging test pits.

Begin sampling

1400 Finished sampling. Collect GPS Trimble

Test pit locations

Scale: 1 square =

Kelmeleaf Mine Being Log on 24 June 2015

TP#

* If 15KRM-04 is

clean - run 15KRM-16

dirty - run 15KRM-17

Call for results on Thurs morning.
6/25.

Scale: 1 square =

Plot in on plan

Boring Log 6/24/15
 Lab Sample Notes

Depth	Notes	SR#
9 0-1'	top 1/2" to 1" soil w/ frac rock @ 1"	103
1-2'	"	104
2-3'	* large rock with soil (metal debris)	106
3-4'	" bedrock at 4'	107
10 0-1'	brown soil with organics	108
1-2'	* brown grey soil with clay	109 DM
2-3'	Dark green	110 DM
11 0-1'	silty sandy soil w/ gravel	111
1-2'	* brown soil	112
2-3'	brown soil w/ gravel	113
3-4'	clay and soil	114
12 0-1'	Silty gravel / fractured bedrock	115
1-2'	* gravel w/ fract rock	116
2-3'	greyish yellow soil w/ rock	117
3-4'	greyish soil	
13 0-1'	Silty gravel w/ frac rock	118
1-2'	* brown soil with gravel	119
2-3'	brown soil with clay and gravel	123
3-4'		
14 0-1'	* silty sandy gravel	122
1-2'	bedrock at 22"	
2-3'		
3-4'		

Scale: 1 square =

SR#	As	C	H	N	Lab Sample
103	7	104	(9.9)	(49.2)	
104	(6.3)	81	(11.0)	(48.9)	
106	10	69	(9.9)	(47.7)	SKRM-10 15KRM-1104 (1345) (1346)
107	(7.5)	93	(11.4)	(54.2)	
108	(6.0)	97	(8.9)	(43.0)	
109	10	71	(12.1)	(56.8)	DM SKRM-16 (1355)
110					
111	7	49	(10.9)	(53.0)	SKRM-16
112	8	54	(10.9)	(53.3)	15KRM-17
113	(6.5)	116	(10.4)	(50.5)	DM SKRM-16 (1452)
114	(7.4)	67	(8.0)	(38.6)	
115	(6.8)	71	(10.3)	(50.2)	
116	8	75	(12.0)	(57.3)	SKRM-12 (1350)
117	(7.0)	48	(9.4)	(48.2)	
118	9	66	(9.6)	(49.2)	
119	(5.1)	68	(7.6)	(37.5)	SKRM-13 (1355)
123	(6.4)	59	(9.1)	(44.3)	
122	7	63	(10.0)	(45.4)	SKRM-14 (1402)

Scale: 1 square =

Return

Kolmarhof Mine

25 June 2015

1200 Call SIS for latest KTM results

Chuck Holmstead, Forest Taylor

15KTM09 AS Cir ^{2.81} N₂ floor

15KTM10 - 140.983

15KTM11 - 0.825 ✓ floor

15KTM12 - 2.28 } Did not

15KTM13 - 2.87 } report

15KRM04 - 1.63

Delay on instrument. Late afternoon for results. Call back at 3:30 then 4:30.

~~400 110 # 1153662 - DM~~

Don't run sample from TP#10

Run ~~15KRM10~~ because it is the step out from 15KRM04 (TP#4)

Submit 15KRM-16 (TP#11)

Discarded sample from TP#10. (Not sampled).

Scale: 1 square =

Kolmarhof Mine

25 June 2015

1630 Called SIS for results. Results

listed on prior page

Completed at mill site. Move down

to Rebit mound to finish soil removal.

Completed 14 CYs removal. 14 bags on big

1930 Report site.

Page labeled with:

"Non-regulated solid (Soil)"

Kolmarhof Mine

BLM

(907) 388-5481

2030 Arrive back on Aniak.

Heavy snow and wind on mile back to Aniak.

Scale: 1 square =

Kolmarhof Mine

APPENDIX B

PROJECT PHOTOGRAPHS

**Site Characterization and Limited Soil Removal Report
Kolmakof Mine Site, Alaska**

Bureau of Land Management Alaska State Office

4700 BLM Road

Anchorage, AK 99507-2591

November 2015



Excavating Soil on Southwest Sidewall at IA-2



Filling sandbag at IA-2 excavation during removal of west sidewall. View to north.



Soils from IA-2 Excavation Prepared for Transport to Barge Landing



Sampling Soil on Southeast Sidewall at IA-2 Excavation



Barge Loading at Ramp



Test Pit near Retort Mound



Demobilizing Gear and Supersacks of Excavated Soil

APPENDIX C

LABORATORY ANALYTICAL DATA REPORTS

Site Characterization and Limited Soil Removal Report Kolmakof Mine Site, Alaska

Bureau of Land Management Alaska State Office

4700 BLM Road

Anchorage, AK 99507-2591

November 2015



Laboratory Report of Analysis

To: Environmental Comp. Consultants (ECC)
1500 Post Road
Anchorage, AK 99501
(907)644-0428

Report Number: **1152938**

Client Project: **Kolmakof**

Dear Don Maloney,

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 ten 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 Forest 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.

Forest Taylor
Project Manager
Forest.Taylor@sgs.com

Date

Print Date: 06/22/2015 3:54:08PM

Case Narrative

SGS Client: **Environmental Comp. Consultants (ECC)**

SGS Project: **1152938**

Project Name/Site: **Kolmakof**

Project Contact: **Don Maloney**

Refer to sample receipt form for information on sample condition.

1152938001(1272003DUP) (1272007) DUP

6020A - Metals - MS/MSD and PS/DUP RPD for mercury was outside of acceptance limits. Sample is non-homogeneous for mercury.

1152938001(1272003MS) (1272004) MS

6020A - Metals - MS recoveries for barium(150%) and chromium(123%) were outside of acceptance criteria. Post digestion spike was successful.

1152938003-A(1272227MS) (1272230) MS

6020A - Metals - MS recovery for mercury(159%) was outside of acceptance criteria. Post digestion spike was successful.

1152938001(1272003MSD) (1272005) MSD

6020A - Metals - MS recoveries for barium(174%), mercury(663%) and chromium(124%) were outside of acceptance criteria. Post digestion spike was successful.

6020A - Metals - MS/MSD and PS/DUP RPD for mercury was outside of acceptance limits. Sample is non-homogeneous for mercury.

1152938003-A(1272227MSD) (1272231) MSD

6020A - Metals - MSD recoveries for mercury(170%) and chromium(124%) were outside of acceptance criteria. Post digestion spike was successful.

*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: 06/22/2015 3:54:12PM

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. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 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
CCCV	Closing 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>
15 KTM-01	1152938001	06/17/2015	06/18/2015	Soil/Solid (dry weight)
15 KTM-02	1152938002	06/17/2015	06/18/2015	Soil/Solid (dry weight)
15 KTM-04	1152938003	06/17/2015	06/18/2015	Soil/Solid (dry weight)
15 KTM-03	1152938004	06/17/2015	06/18/2015	Soil/Solid (dry weight)
15 KTM-05	1152938005	06/17/2015	06/18/2015	Soil/Solid (dry weight)

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

Print Date: 06/22/2015 3:54:16PM

Detectable Results Summary

Client Sample ID: **15 KTM-01**

Lab Sample ID: 1152938001

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	9.22	mg/Kg
Chromium	28.9	mg/Kg
Mercury	2.67	mg/Kg
Nickel	33.2	mg/Kg

Client Sample ID: **15 KTM-02**

Lab Sample ID: 1152938002

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	9.79	mg/Kg
Chromium	27.4	mg/Kg
Mercury	4.80	mg/Kg
Nickel	31.1	mg/Kg

Client Sample ID: **15 KTM-04**

Lab Sample ID: 1152938003

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.51	mg/Kg
Chromium	26.8	mg/Kg
Mercury	2.71	mg/Kg
Nickel	23.8	mg/Kg

Client Sample ID: **15 KTM-03**

Lab Sample ID: 1152938004

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.82	mg/Kg
Chromium	26.3	mg/Kg
Mercury	1.84	mg/Kg
Nickel	26.1	mg/Kg

Client Sample ID: **15 KTM-05**

Lab Sample ID: 1152938005

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.16	mg/Kg
Chromium	25.9	mg/Kg
Mercury	2.57	mg/Kg
Nickel	22.8	mg/Kg



Results of 15 KTM-01

Client Sample ID: **15 KTM-01**
Client Project ID: **Kolmakof**
Lab Sample ID: 1152938001
Lab Project ID: 1152938

Collection Date: 06/17/15 15:20
Received Date: 06/18/15 12:50
Matrix: Soil/Solid (dry weight)
Solids (%):81.6
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	9.22	1.11	0.344	mg/Kg	10		06/19/15 12:46
Chromium	28.9	0.444	0.133	mg/Kg	10		06/19/15 12:46
Mercury	2.67	0.0444	0.0133	mg/Kg	10		06/19/15 12:46
Nickel	33.2	0.222	0.0688	mg/Kg	10		06/19/15 12:46

Batch Information

Analytical Batch: MMS8963
Analytical Method: SW6020A
Analyst: ACF
Analytical Date/Time: 06/19/15 12:46
Container ID: 1152938001-A

Prep Batch: MXX28794
Prep Method: SW3050B
Prep Date/Time: 06/19/15 08:44
Prep Initial Wt./Vol.: 1.105 g
Prep Extract Vol: 50 mL



Results of 15 KTM-02

Client Sample ID: **15 KTM-02**
Client Project ID: **Kolmakof**
Lab Sample ID: 1152938002
Lab Project ID: 1152938

Collection Date: 06/17/15 15:21
Received Date: 06/18/15 12:50
Matrix: Soil/Solid (dry weight)
Solids (%):81.3
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	9.79	1.14	0.354	mg/Kg	10		06/19/15 13:00
Chromium	27.4	0.457	0.137	mg/Kg	10		06/19/15 13:00
Mercury	4.80	0.0457	0.0137	mg/Kg	10		06/19/15 13:00
Nickel	31.1	0.229	0.0709	mg/Kg	10		06/19/15 13:00

Batch Information

Analytical Batch: MMS8963
Analytical Method: SW6020A
Analyst: ACF
Analytical Date/Time: 06/19/15 13:00
Container ID: 1152938002-A

Prep Batch: MXX28794
Prep Method: SW3050B
Prep Date/Time: 06/19/15 08:44
Prep Initial Wt./Vol.: 1.076 g
Prep Extract Vol: 50 mL



Results of 15 KTM-04

Client Sample ID: **15 KTM-04**
Client Project ID: **Kolmakof**
Lab Sample ID: 1152938003
Lab Project ID: 1152938

Collection Date: 06/17/15 16:10
Received Date: 06/18/15 12:50
Matrix: Soil/Solid (dry weight)
Solids (%):81.5
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.51	1.14	0.355	mg/Kg	10		06/19/15 13:02
Chromium	26.8	0.458	0.137	mg/Kg	10		06/19/15 13:02
Mercury	2.71	0.0458	0.0137	mg/Kg	10		06/19/15 13:02
Nickel	23.8	0.229	0.0710	mg/Kg	10		06/19/15 13:02

Batch Information

Analytical Batch: MMS8963
Analytical Method: SW6020A
Analyst: ACF
Analytical Date/Time: 06/19/15 13:02
Container ID: 1152938003-A

Prep Batch: MXX28794
Prep Method: SW3050B
Prep Date/Time: 06/19/15 08:44
Prep Initial Wt./Vol.: 1.072 g
Prep Extract Vol: 50 mL



Results of 15 KTM-03

Client Sample ID: **15 KTM-03**
Client Project ID: **Kolmakof**
Lab Sample ID: 1152938004
Lab Project ID: 1152938

Collection Date: 06/17/15 15:45
Received Date: 06/18/15 12:50
Matrix: Soil/Solid (dry weight)
Solids (%):79.7
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.82		1.16	0.360	mg/Kg	10		06/19/15 21:03
Chromium	26.3		0.464	0.139	mg/Kg	10		06/19/15 21:03
Mercury	1.84		0.0464	0.0139	mg/Kg	10		06/19/15 21:03
Nickel	26.1		0.232	0.0720	mg/Kg	10		06/19/15 21:03

Batch Information

Analytical Batch: MMS8964
Analytical Method: SW6020A
Analyst: ACF
Analytical Date/Time: 06/19/15 21:03
Container ID: 1152938004-A

Prep Batch: MXX28801
Prep Method: SW3050B
Prep Date/Time: 06/19/15 17:05
Prep Initial Wt./Vol.: 1.081 g
Prep Extract Vol: 50 mL

Results of 15 KTM-05

Client Sample ID: **15 KTM-05**
 Client Project ID: **Kolmakof**
 Lab Sample ID: 1152938005
 Lab Project ID: 1152938

Collection Date: 06/17/15 17:25
 Received Date: 06/18/15 12:50
 Matrix: Soil/Solid (dry weight)
 Solids (%):81.3
 Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.16	1.12	0.349	mg/Kg	10		06/19/15 21:06
Chromium	25.9	0.450	0.135	mg/Kg	10		06/19/15 21:06
Mercury	2.57	0.0450	0.0135	mg/Kg	10		06/19/15 21:06
Nickel	22.8	0.225	0.0697	mg/Kg	10		06/19/15 21:06

Batch Information

Analytical Batch: MMS8964
 Analytical Method: SW6020A
 Analyst: ACF
 Analytical Date/Time: 06/19/15 21:06
 Container ID: 1152938005-A

Prep Batch: MXX28801
 Prep Method: SW3050B
 Prep Date/Time: 06/19/15 17:05
 Prep Initial Wt./Vol.: 1.094 g
 Prep Extract Vol: 50 mL

Method Blank

Blank ID: MB for HBN 1711321 [MXX/28794]
Blank Lab ID: 1272001

Matrix: Soil/Solid (dry weight)

QC for Samples:
1152938001, 1152938002, 1152938003

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
Chromium	0.200U	0.400	0.120	mg/Kg
Mercury	0.0200U	0.0400	0.0120	mg/Kg
Nickel	0.100U	0.200	0.0620	mg/Kg

Batch Information

Analytical Batch: MMS8963
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: ACF
Analytical Date/Time: 6/19/2015 12:41:13PM

Prep Batch: MXX28794
Prep Method: SW3050B
Prep Date/Time: 6/19/2015 8:44:04AM
Prep Initial Wt./Vol.: 1 g
Prep Extract Vol: 50 mL

Print Date: 06/22/2015 3:54:34PM

Duplicate Sample Summary

Original Sample ID: 1272003
Duplicate Sample ID: 1272007

Analysis Date: 06/19/2015 12:48
Matrix: Solid/Soil (Wet Weight)

QC for Samples:

1152938001, 1152938002, 1152938003

Results by SW6020A

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Mercury	2.18	2.81	mg/Kg	25.10*	(< 20)

Batch Information

Analytical Batch: MMS8963
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: ACF

Prep Batch: MXX28794
Prep Method: SW3050B
Prep Date/Time: 6/19/2015 8:44:04AM

Print Date: 06/22/2015 3:54:36PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1152938 [MXX28794]

Blank Spike Lab ID: 1272002

Date Analyzed: 06/19/2015 12:43

Matrix: Soil/Solid (dry weight)

QC for Samples: 1152938001, 1152938002, 1152938003

Results by SW6020A

Parameter	Blank Spike (mg/Kg)			CL
	Spike	Result	Rec (%)	
Arsenic	50	47.5	95	(80-120)
Chromium	20	19.0	95	(80-120)
Mercury	0.5	0.503	101	(80-120)
Nickel	50	47.1	94	(80-120)

Batch Information

Analytical Batch: **MMS8963**

Analytical Method: **SW6020A**

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

Analyst: **ACF**

Prep Batch: **MXX28794**

Prep Method: **SW3050B**

Prep Date/Time: **06/19/2015 08:44**

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

Dupe Init Wt./Vol.: Extract Vol:



Matrix Spike Summary

Original Sample ID: 1272003
MS Sample ID: 1272004 MS
MSD Sample ID: 1272005 MSD

Analysis Date: 06/19/2015 12:46
Analysis Date: 06/19/2015 12:50
Analysis Date: 06/19/2015 12:53
Matrix: Solid/Soil (Wet Weight)

QC for Samples: 1152938001, 1152938002, 1152938003

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Arsenic	7.52	48.5	55.7	99	48.9	56.3	100	80-120	1.03	(< 20)
Chromium	23.6	19.4	47.5	123 *	19.6	47.9	124 *	80-120	1.00	(< 20)
Mercury	2.18	0.485	2.67	101	0.489	5.43	663 *	80-120	68.10	* (< 20)
Nickel	27.1	48.5	74.9	99	48.9	78.3	105	80-120	4.42	(< 20)

Batch Information

Analytical Batch: MMS8963
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: ACF
Analytical Date/Time: 6/19/2015 12:50:47PM

Prep Batch: MXX28794
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/19/2015 8:44:04AM
Prep Initial Wt./Vol.: 1.03g
Prep Extract Vol: 50.00mL

Print Date: 06/22/2015 3:54:39PM



Bench Spike Summary

Original Sample ID: 1272003
MS Sample ID: 1272006 BND
MSD Sample ID:

Analysis Date: 06/19/2015 12:46
Analysis Date: 06/19/2015 12:55
Analysis Date:
Matrix: Solid/Soil (Wet Weight)

QC for Samples: 1152938001, 1152938002, 1152938003

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Chromium	23.6	113	147	109				80-120		
Mercury	2.18	2.26	4.65	109				80-120		

Batch Information

Analytical Batch: MMS8963
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: ACF
Analytical Date/Time: 6/19/2015 12:55:37PM

Prep Batch: MXX28794
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/19/2015 8:44:04AM
Prep Initial Wt./Vol.: 1.11g
Prep Extract Vol: 50.00mL

Print Date: 06/22/2015 3:54:39PM

Method Blank

Blank ID: MB for HBN 1711370 [MXX/28801]

Blank Lab ID: 1272228

QC for Samples:

1152938004, 1152938005

Matrix: Soil/Solid (dry weight)

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
Chromium	0.200U	0.400	0.120	mg/Kg
Mercury	0.0200U	0.0400	0.0120	mg/Kg
Nickel	0.100U	0.200	0.0620	mg/Kg

Batch Information

Analytical Batch: MMS8964

Analytical Method: SW6020A

Instrument: Perkin Elmer Sciex ICP-MS P3

Analyst: ACF

Analytical Date/Time: 6/19/2015 8:44:37PM

Prep Batch: MXX28801

Prep Method: SW3050B

Prep Date/Time: 6/19/2015 5:05:40PM

Prep Initial Wt./Vol.: 1 g

Prep Extract Vol: 50 mL

Print Date: 06/22/2015 3:54:39PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1152938 [MXX28801]
Blank Spike Lab ID: 1272229
Date Analyzed: 06/19/2015 20:46

Matrix: Soil/Solid (dry weight)

QC for Samples: 1152938004, 1152938005

Results by SW6020A

Parameter	Blank Spike (mg/Kg)			CL
	Spike	Result	Rec (%)	
Arsenic	50	50.0	100	(80-120)
Chromium	20	19.4	97	(80-120)
Mercury	0.5	0.529	106	(80-120)
Nickel	50	49.0	98	(80-120)

Batch Information

Analytical Batch: **MMS8964**
Analytical Method: **SW6020A**
Instrument: **Perkin Elmer Sciex ICP-MS P3**
Analyst: **ACF**

Prep Batch: **MXX28801**
Prep Method: **SW3050B**
Prep Date/Time: **06/19/2015 17:05**
Spike Init Wt./Vol.: 50 mg/Kg Extract Vol: 50 mL
Dupe Init Wt./Vol.: Extract Vol:



Matrix Spike Summary

Original Sample ID: 1272227
MS Sample ID: 1272230 MS
MSD Sample ID: 1272231 MSD

Analysis Date: 06/19/2015 20:49
Analysis Date: 06/19/2015 20:54
Analysis Date: 06/19/2015 20:56
Matrix: Solid/Soil (Wet Weight)

QC for Samples: 1152938004, 1152938005

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Arsenic	8.13	46.3	52.8	97	49.0	52.4	91	80-120	0.74	(< 20)
Chromium	21.8	18.5	43.2	116	19.6	46.1	124 *	80-120	6.50	(< 20)
Mercury	1.59	0.463	2.32	159 *	0.490	2.42	170 *	80-120	4.15	(< 20)
Nickel	23.9	46.3	67.2	94	49.0	66.2	87	80-120	1.51	(< 20)

Batch Information

Analytical Batch: MMS8964
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: ACF
Analytical Date/Time: 6/19/2015 8:54:04PM

Prep Batch: MXX28801
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/19/2015 5:05:40PM
Prep Initial Wt./Vol.: 1.08g
Prep Extract Vol: 50.00mL

Print Date: 06/22/2015 3:54:41PM



Bench Spike Summary

Original Sample ID: 1272227
MS Sample ID: 1272232 BND
MSD Sample ID:

Analysis Date: 06/19/2015 20:49
Analysis Date: 06/19/2015 20:58
Analysis Date:
Matrix: Solid/Soil (Wet Weight)

QC for Samples: 1152938004, 1152938005

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Chromium	21.8	107	135	105				80-120		
Mercury	1.59	2.15	3.89	107				80-120		

Batch Information

Analytical Batch: MMS8964
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: ACF
Analytical Date/Time: 6/19/2015 8:58:50PM

Prep Batch: MXX28801
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/19/2015 5:05:40PM
Prep Initial Wt./Vol.: 1.16g
Prep Extract Vol: 50.00mL

Print Date: 06/22/2015 3:54:41PM



Method Blank

Blank ID: MB for HBN 1711319 [SPT/9636]
Blank Lab ID: 1271994

Matrix: Soil/Solid (dry weight)

QC for Samples:
1152938001, 1152938002, 1152938003, 1152938004, 1152938005

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: SPT9636
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R
Analytical Date/Time: 6/18/2015 5:13:00PM

Print Date: 06/22/2015 3:54:43PM



Duplicate Sample Summary

Original Sample ID: 1152929004

Duplicate Sample ID: 1271995

QC for Samples:

Analysis Date: 06/18/2015 17:13

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	85.1	85.3	%	0.21	(< 5)

Batch Information

Analytical Batch: SPT9636

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 06/22/2015 3:54:43PM

Duplicate Sample Summary

Original Sample ID: 1152929007

Duplicate Sample ID: 1271996

QC for Samples:

1152938001, 1152938002, 1152938003, 1152938004, 1152938005

Analysis Date: 06/18/2015 17:13

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	84.2	83.5	%	0.80	(< 5)

Batch Information

Analytical Batch: SPT9636

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 06/22/2015 3:54:43PM



Duplicate Sample Summary

Original Sample ID: 1152938005

Duplicate Sample ID: 1271997

QC for Samples:

1152938001, 1152938002, 1152938003, 1152938004, 1152938005

Analysis Date: 06/18/2015 17:13

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	81.3	81.5	%	0.27	(< 5)

Batch Information

Analytical Batch: SPT9636

Analytical Method: SM21 2540G

Instrument:

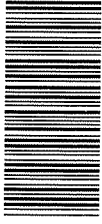
Analyst: A.R

Print Date: 06/22/2015 3:54:43PM



SGS North America Inc.
CHAIN OF CUSTODY RECORD

1152938



Locations Nationwide
Alaska
New Jersey
North Carolina
West Virginia
Maryland
New York
Indiana
Kentucky
www.us.sgs.com

CLIENT: ECC

CONTACT: Don Maloney
PHONE NO.: (907) 830-1225
PROJECT PWSID/ PERMIT#: (907) 310-2724

PROJECT NAME: Kolmakof
REPORTS TO: Don/ECC
E-MAIL: don@ccalaska.com

INVOICE TO: ECC
QUOTE #:
P.O. #:

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE
①A	15KTM-01	6/17/15	1520	Soil
②A	15KTM-02	6/17/15	1521	Soil
③A	15KTM-03	6/17/15	1545	Soil
④A	15KTM-04	6/17/15	1610	Soil
⑤A	15KTM-05	6/17/15	1725	Soil

Section 2

Section 3	Type	CONTAINER	Preservative	REMARKS/ LOC ID
#	C = COMP G = GRAB M = Multi-Incremental S = Soils			
1	G	X		
2	G	X		
3	G	X		
4	G	X		
5	G	X		

Handwritten notes in Section 3:
- 6020 Ni
- 12721
- 12721
- See sp instructions

Section 4

Section 4	DOD Project?	Yes	No	Data Deliverable Requirements:

Section 5

Relinquished By: (1) [Signature]
Relinquished By: (2) [Signature]
Relinquished By: (3) [Signature]
Relinquished By: (4) [Signature]

Date 6/18/15
Time 0800

Received By: [Signature]
Date 6/18/15
Time 1230

Requested Turnaround Time and/or Special Instructions:
*RUSH 24 HR TAT - Sample 5 # 15KTM01, 02, 04, 05
IF 01 or 02 hrs > 1.99, then analyze 03. If 04, 05
IF 01 or 02 hrs > 1.99, then analyze 05

Temp Blank °C: 1.4/4/10
Chain of Custody Seal: (Circle)
INTACT **BROKEN** **ABSENT**

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

Page 1 of 1

AIRPORT OF DEPARTURE ANI

06/18/15

07:55

002279

808 6847266

Frgt

SHIPPER'S NAME, ADDRESS & PHONE

DON MALONEY

SHIPPER'S ACCOUNT NUMBER

NOT AIR WAYBILL



4700 Old International Airport Road Anchorage, Alaska 99502

It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT AS LISTED IN THE COMPANIES TARIFFS. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIERS' LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required.

ANIAK

AK

CONSIGNEE'S NAME, ADDRESS & PHONE

SGS

CONSIGNEE'S ACCOUNT NUMBER

ANCHORAGE

AK

9075622343

Received in Good Condition

Place _____ Date _____

TO EXPEDITE MOVEMENT, SHIPMENT MAY BE DIVERTED TO MOTOR OR OTHER CARRIER AS PER TARIFF RULE UNLESS SHIPPER GIVES OTHER INSTRUCTION HEREON

ISSUING CARRIER'S AGENT NAME, CITY & PHONE

ALSO NOTIFY NAME & ADDRESS

1152938



AGENT'S IATA CODE

ACCOUNT NO.

ACCOUNTING INFORMATION 6983401

AIRPORT OF DEPARTURE Aniak

Declared Value \$ 0.00

Insured Amount \$ 0.00

Card VI 9552 Exp 0518

ROUTING AND DESTINATION

TO	BY FIRST	TO	BY	TO	BY
----	----------	----	----	----	----

COMMENTS

AIRPORT OF DESTINATION Anchorage

FOR CARRIER USE ONLY

FLIGHT/DATE

FLIGHT/DATE

No. Of Pieces Rcp	Gross Weight	kg lb	Rate Class	Commodity Item No.	Chargeable Weight	Rate/Charge	Total	Nature and Quantity of Goods
1	12	l..	F		1	\$29.18	\$29.18	blue cooler/soil samples
1	12						\$29.18	

PREPAID	WEIGHT CHARGE	COLLECT
\$29.18		
VALUATION CHARGE		
\$0.00		
FEDERAL EXCISE TAX		
\$1.82		
TOTAL OTHER CHARGES DUE AGENT		
\$0.00		
TOTAL OTHER CHARGES DUE CARRIER		
\$0.00		
TOTAL PREPAID	TOTAL COLLECT	
\$31.00		

OTHER CHARGES AND DESCRIPTION

AMOUNT	DESCRIPTION



HAZMAT No

Shipper certifies that the particulars on the face hereof are correct, agrees to the CONDITIONS AS LISTED IN THE COMPANIES TARIFFS, accepts that carrier's liability is limited as stated in the companies tariffs and accepts such value unless a higher value for carriage is declared on the face hereof subject to an additional charge and that insofar as any part of the consignment contains restricted articles, such part is described by name and is in proper condition for carriage by air according to applicable national governmental regulations, and for international shipments, the current International Air Transport Association's Restricted Articles Regulations.

Printed Name and Title
Signature

STATION NUMBERS ANCHORAGE - (907) 243-2761 ANIAK - (907) 675-4572 BARROW - (907) 852-5300 BETHEL - (907) 543-3825 DEADHORSE - (907) 659-9222

FAIRBANKS - (907) 450-7250 GALENA - (907) 656-1875 KOTZEBUE - (907) 442-3020 NOME - (907) 443-7595 ST. MARYS - (907) 438-2247 UNALAKLEET - (907) 624-3595

Printed at 07:58:14 on 6/18/2015 at ANI-2 10.6.0.7

Consignee Copy

Alert Expeditors Inc.

#357262

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

Date 6/18/15
From D. McInney
To 565

Collect <input type="checkbox"/>	Prepay <input type="checkbox"/> Account <input type="checkbox"/>	Advance Charges <input type="checkbox"/>
Job #	PO#	

1 Carton
10847266
Low



Shipped Signature

Received By: [Signature] Total Charge
6/18/15 11350



1152938

SAMPLE RECEIPT FORM

Review Criteria:	Yes	N/A	No	Comments/Action Taken:
Were custody seals intact? Note # & location, if applicable. COC accompanied samples?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Exemption permitted if sampler hand carries/delivers.</i>
Temperature blank compliant* (i.e., 0-6°C after CF)? <i>If >6°C, were samples collected <8 hours ago?</i> <i>If <0°C, were all sample containers ice free?</i> Cooler ID: <u>1</u> @ <u>1.4</u> w/ Therm.ID: <u>240</u> Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ 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."	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Exemption permitted if chilled & collected <8 hrs ago.</i> <i>Note: Identify containers received at non-compliant temperature. Use form FS-0029 if more space is needed.</i>
Delivery method (specify all that apply): <input type="checkbox"/> Client (hand carried) <input type="checkbox"/> USPS <input type="checkbox"/> Lynden <input type="checkbox"/> AK Air <input checked="" type="checkbox"/> Alert Courier <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input checked="" type="checkbox"/> RAVN <input type="checkbox"/> C&D Delivery <input type="checkbox"/> Carlife <input type="checkbox"/> Pen Air <input type="checkbox"/> Warp Speed <input type="checkbox"/> Other: _____ → For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Yes				
Were samples received within hold time? Do samples match COC* (i.e., sample IDs, dates/times collected)? Were analyses requested unambiguous?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Note: Refer to form F-083 "Sample Guide" for hold times.</i> <i>Note: If times differ <1hr, record details and login per COC.</i>
Were samples in good condition (no leaks/cracks/breakage)? Packing material used (specify all that apply): <input checked="" type="checkbox"/> Bubble Wrap <input type="checkbox"/> Separate plastic bags <input type="checkbox"/> Vermiculite <input type="checkbox"/> Other:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were proper containers (type/mass/volume/preservative*) used? Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples? Were all VOA vials free of headspace (i.e., bubbles ≤6 mm)? Were all soil VOAs field extracted with MeOH+BFB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <i>Exemption permitted for metals (e.g., 200.8/6020A).</i>
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was pH verified and compliant ? If pH was adjusted, were bottles flagged (i.e., stickers)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
For special handling (e.g., "MI" soils, foreign soils, lab filter for dissolved..., lab extract for volatiles, Ref Lab, limited volume), were bottles/paperwork flagged (e.g., sticker)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
For RUSH/SHORT Hold Time , were COC/Bottles flagged accordingly? Was Rush/Short HT email sent, if applicable?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rush due 6/22
For SITE-SPECIFIC QC, e.g. BMS/BMSD/BDUP , were containers / paperwork flagged accordingly?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	SRF Completed by: EDJ PM notified:
Was PEER REVIEW of <i>sample numbering/labeling completed?</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Peer Reviewed by: KPV
Additional notes (if applicable): Rush 24 hours for samples 15 KTM-01 + 15 KTM-02 + 15 KTM-04. If 01 or 02 Hg>1.99, then analyze 03. If 04 Hg> 1.99 then analyze 05. HG will be ran via the 6020 method. Not the 7471 method, which is noted on the COC Hg results were >1.99 for all three samples. Schedule remainder of samples. FT 6/19/15 Data is due on 6/20/15 per client. Weekend work approved. FT 6/19/15				
<i>Note to Client: Any "no" answer above indicates non-compliance with standard procedures and may impact data quality.</i>				



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>
1152938001-A	Cool to 4 C	OK			
1152938002-A	Cool to 4 C	OK			
1152938003-A	Cool to 4 C	OK			
1152938004-A	No Preservative Required	OK			
1152938005-A	No Preservative Required	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates that an inappropriate container was submitted.

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.



Laboratory Report of Analysis

To: Environmental Comp. Consultants (ECC)
1500 Post Road
Anchorage, AK 99501
(907)644-0428

Report Number: **1153196**

Client Project: **Kolmakof**

Dear Don Maloney,

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 ten 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 Forest 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.

Forest Taylor
Project Manager
Forest.Taylor@sgs.com

Date

Print Date: 07/02/2015 4:32:13PM

Case Narrative

SGS Client: **Environmental Comp. Consultants (ECC)**

SGS Project: **1153196**

Project Name/Site: **Kolmakof**

Project Contact: **Don Maloney**

Refer to sample receipt form for information on sample condition.

CB for HBN 1712166 (MMS/8977) (1274551) CB

6020A - Metals analyte mercury is detected in the CB above the LOQ. The associated sample concentrations are either less than the LOQ or 10 times greater than the concentration in the CB.

1153098002DUP (1273802) DUP

6020A - Metals - MS/MSD RPD for lead (28) does not meet QC criteria. Sample duplicate RPD (50) also does not meet QC criteria. Sample appears to be non-homogeneous for lead.

1153098002MS (1274128) MS

6020A - Metals MS recoveries for barium (123%), chromium (168%) and lead (245%) do not meet QC criteria. The post digestion spike was successful.

1153098002MSD (1274129) MSD

6020A - Metals MSD recovery for lead (28%) does not meet QC criteria. The post digestion spike was successful.

6020A - Metals MS/MSD RPDs for chromium (29.7) and lead (66.7) do not meet QC criteria. Refer to sample duplicate for chromium RPD requirements. Sample duplicate RPD for lead (50) also does not meet QC criteria. Sample appears to be non-homogeneous for lead.

*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: 07/02/2015 4:32:15PM

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. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 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
CCCV	Closing Continuing Calibration Verifica
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>
15KRM-10	1153196001	06/24/2015	06/26/2015	Soil/Solid (dry weight)
15KRM-11	1153196002	06/24/2015	06/26/2015	Soil/Solid (dry weight)
15KRM-12	1153196003	06/24/2015	06/26/2015	Soil/Solid (dry weight)
15KRM-13	1153196004	06/24/2015	06/26/2015	Soil/Solid (dry weight)
15KRM-14	1153196005	06/24/2015	06/26/2015	Soil/Solid (dry weight)
15KRM-15	1153196006	06/24/2015	06/26/2015	Soil/Solid (dry weight)
15KRM-16	1153196007	06/24/2015	06/26/2015	Soil/Solid (dry weight)

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

Print Date: 07/02/2015 4:32:17PM

Detectable Results Summary

Client Sample ID: **15KRM-10**

Lab Sample ID: 1153196001

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	10.9	mg/Kg
Chromium	35.3	mg/Kg
Mercury	137	mg/Kg
Nickel	52.3	mg/Kg

Client Sample ID: **15KRM-11**

Lab Sample ID: 1153196002

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.83	mg/Kg
Chromium	50.1	mg/Kg
Mercury	217	mg/Kg
Nickel	69.3	mg/Kg

Client Sample ID: **15KRM-12**

Lab Sample ID: 1153196003

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	9.48	mg/Kg
Chromium	28.8	mg/Kg
Mercury	4.89	mg/Kg
Nickel	31.8	mg/Kg

Client Sample ID: **15KRM-13**

Lab Sample ID: 1153196004

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	11.0	mg/Kg
Chromium	29.7	mg/Kg
Mercury	0.412	mg/Kg
Nickel	35.3	mg/Kg

Client Sample ID: **15KRM-14**

Lab Sample ID: 1153196005

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	10.6	mg/Kg
Chromium	30.2	mg/Kg
Mercury	9.08	mg/Kg
Nickel	41.3	mg/Kg

Client Sample ID: **15KRM-15**

Lab Sample ID: 1153196006

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.78	mg/Kg
Chromium	30.1	mg/Kg
Mercury	10.7	mg/Kg
Nickel	39.0	mg/Kg

Client Sample ID: **15KRM-16**

Lab Sample ID: 1153196007

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	6.99	mg/Kg
Chromium	28.8	mg/Kg
Mercury	0.220	mg/Kg
Nickel	19.4	mg/Kg

Results of 15KRM-10

Client Sample ID: **15KRM-10**
 Client Project ID: **Kolmakof**
 Lab Sample ID: 1153196001
 Lab Project ID: 1153196

Collection Date: 06/24/15 13:45
 Received Date: 06/26/15 13:53
 Matrix: Soil/Solid (dry weight)
 Solids (%):81.8
 Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	10.9	1.16	0.360	mg/Kg	10		06/30/15 16:34
Chromium	35.3	0.465	0.139	mg/Kg	10		06/30/15 16:34
Mercury	137	0.930	0.279	mg/Kg	200		06/30/15 19:33
Nickel	52.3	0.232	0.0721	mg/Kg	10		06/30/15 16:34

Batch Information

Analytical Batch: MMS8977
 Analytical Method: SW6020A
 Analyst: EAB
 Analytical Date/Time: 06/30/15 16:34
 Container ID: 1153196001-A

Prep Batch: MXX28831
 Prep Method: SW3050B
 Prep Date/Time: 06/29/15 13:45
 Prep Initial Wt./Vol.: 1.052 g
 Prep Extract Vol: 50 mL

Results of 15KRM-11

Client Sample ID: **15KRM-11**
 Client Project ID: **Kolmakof**
 Lab Sample ID: 1153196002
 Lab Project ID: 1153196

Collection Date: 06/24/15 13:46
 Received Date: 06/26/15 13:53
 Matrix: Soil/Solid (dry weight)
 Solids (%):80.7
 Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.83	1.22	0.377	mg/Kg	10		06/30/15 16:37
Chromium	50.1	0.487	0.146	mg/Kg	10		06/30/15 16:37
Mercury	217	0.973	0.292	mg/Kg	200		06/30/15 19:35
Nickel	69.3	0.243	0.0754	mg/Kg	10		06/30/15 16:37

Batch Information

Analytical Batch: MMS8977
 Analytical Method: SW6020A
 Analyst: EAB
 Analytical Date/Time: 06/30/15 16:37
 Container ID: 1153196002-A

Prep Batch: MXX28831
 Prep Method: SW3050B
 Prep Date/Time: 06/29/15 13:45
 Prep Initial Wt./Vol.: 1.018 g
 Prep Extract Vol: 50 mL



Results of 15KRM-12

Client Sample ID: **15KRM-12**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153196003
Lab Project ID: 1153196

Collection Date: 06/24/15 13:50
Received Date: 06/26/15 13:53
Matrix: Soil/Solid (dry weight)
Solids (%):81.9
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	9.48		6.04	1.87	mg/Kg	50		06/30/15 19:45
Chromium	28.8		2.42	0.725	mg/Kg	50		06/30/15 19:45
Mercury	4.89		0.242	0.0725	mg/Kg	50		06/30/15 19:45
Nickel	31.8		1.21	0.374	mg/Kg	50		06/30/15 19:45

Batch Information

Analytical Batch: MMS8977
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/30/15 19:45
Container ID: 1153196003-A

Prep Batch: MXX28831
Prep Method: SW3050B
Prep Date/Time: 06/29/15 13:45
Prep Initial Wt./Vol.: 1.011 g
Prep Extract Vol: 50 mL



Results of 15KRM-13

Client Sample ID: **15KRM-13**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153196004
Lab Project ID: 1153196

Collection Date: 06/24/15 13:55
Received Date: 06/26/15 13:53
Matrix: Soil/Solid (dry weight)
Solids (%):83.0
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	11.0	6.02	1.86	mg/Kg	50		06/30/15 19:47
Chromium	29.7	2.41	0.722	mg/Kg	50		06/30/15 19:47
Mercury	0.412	0.241	0.0722	mg/Kg	50		06/30/15 19:47
Nickel	35.3	1.20	0.373	mg/Kg	50		06/30/15 19:47

Batch Information

Analytical Batch: MMS8977
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/30/15 19:47
Container ID: 1153196004-A

Prep Batch: MXX28831
Prep Method: SW3050B
Prep Date/Time: 06/29/15 13:45
Prep Initial Wt./Vol.: 1.002 g
Prep Extract Vol: 50 mL



Results of 15KRM-14

Client Sample ID: **15KRM-14**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153196005
Lab Project ID: 1153196

Collection Date: 06/24/15 14:02
Received Date: 06/26/15 13:53
Matrix: Soil/Solid (dry weight)
Solids (%):86.3
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	10.6	5.65	1.75	mg/Kg	50		06/30/15 19:49
Chromium	30.2	2.26	0.678	mg/Kg	50		06/30/15 19:49
Mercury	9.08	0.226	0.0678	mg/Kg	50		06/30/15 19:49
Nickel	41.3	1.13	0.350	mg/Kg	50		06/30/15 19:49

Batch Information

Analytical Batch: MMS8977
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/30/15 19:49
Container ID: 1153196005-A

Prep Batch: MXX28831
Prep Method: SW3050B
Prep Date/Time: 06/29/15 13:45
Prep Initial Wt./Vol.: 1.025 g
Prep Extract Vol: 50 mL



Results of 15KRM-15

Client Sample ID: **15KRM-15**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153196006
Lab Project ID: 1153196

Collection Date: 06/24/15 14:20
Received Date: 06/26/15 13:53
Matrix: Soil/Solid (dry weight)
Solids (%):82.0
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.78		5.95	1.85	mg/Kg	50		06/30/15 19:52
Chromium	30.1		2.38	0.714	mg/Kg	50		06/30/15 19:52
Mercury	10.7		0.238	0.0714	mg/Kg	50		06/30/15 19:52
Nickel	39.0		1.19	0.369	mg/Kg	50		06/30/15 19:52

Batch Information

Analytical Batch: MMS8977
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/30/15 19:52
Container ID: 1153196006-A

Prep Batch: MXX28831
Prep Method: SW3050B
Prep Date/Time: 06/29/15 13:45
Prep Initial Wt./Vol.: 1.024 g
Prep Extract Vol: 50 mL



Results of 15KRM-16

Client Sample ID: **15KRM-16**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153196007
Lab Project ID: 1153196

Collection Date: 06/24/15 14:35
Received Date: 06/26/15 13:53
Matrix: Soil/Solid (dry weight)
Solids (%):66.7
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	6.99	1.48	0.460	mg/Kg	10		07/02/15 11:53
Chromium	28.8	0.593	0.178	mg/Kg	10		07/02/15 11:53
Mercury	0.220	0.0593	0.0178	mg/Kg	10		07/02/15 11:53
Nickel	19.4	0.296	0.0919	mg/Kg	10		07/02/15 11:53

Batch Information

Analytical Batch: MMS8978
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 07/02/15 11:53
Container ID: 1153196007-A

Prep Batch: MXX28831
Prep Method: SW3050B
Prep Date/Time: 06/29/15 13:45
Prep Initial Wt./Vol.: 1.012 g
Prep Extract Vol: 50 mL

Method Blank

Blank ID: MB for HBN 1711998 [MXX/28831]
Blank Lab ID: 1273800

Matrix: Soil/Solid (dry weight)

QC for Samples:

1153196001, 1153196002, 1153196003, 1153196004, 1153196005, 1153196006, 1153196007

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
Chromium	0.200U	0.400	0.120	mg/Kg
Mercury	0.0210J	0.0400	0.0120	mg/Kg
Nickel	0.100U	0.200	0.0620	mg/Kg

Batch Information

Analytical Batch: MMS8977
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 6/30/2015 5:42:15PM

Prep Batch: MXX28831
Prep Method: SW3050B
Prep Date/Time: 6/29/2015 1:45:31PM
Prep Initial Wt./Vol.: 1 g
Prep Extract Vol: 50 mL

Print Date: 07/02/2015 4:32:22PM



Duplicate Sample Summary

Original Sample ID: 1153098002

Duplicate Sample ID: 1273802

QC for Samples:

1153196001, 1153196002, 1153196003, 1153196004, 1153196005, 1153196006, 1153196007

Analysis Date: 06/30/2015 17:54

Matrix: Soil/Solid (dry weight)

Results by SW6020A

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Chromium	27.9	34.0	mg/Kg	19.50	(< 20)

Batch Information

Analytical Batch: MMS8977

Analytical Method: SW6020A

Instrument: Perkin Elmer Sciex ICP-MS P3

Analyst: EAB

Prep Batch: MXX28831

Prep Method: SW3050B

Prep Date/Time: 6/29/2015 1:45:31PM

Print Date: 07/02/2015 4:32:23PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1153196 [MXX28831]

Blank Spike Lab ID: 1273801

Date Analyzed: 06/30/2015 17:44

Matrix: Soil/Solid (dry weight)

QC for Samples: 1153196001, 1153196002, 1153196003, 1153196004, 1153196005, 1153196006, 1153196007

Results by SW6020A

Parameter	Blank Spike (mg/Kg)			CL
	Spike	Result	Rec (%)	
Arsenic	50	52.5	105	(82-118)
Chromium	20	21.9	110	(83-119)
Mercury	0.5	0.513	103	(74-126)
Nickel	50	52.2	104	(84-119)

Batch Information

Analytical Batch: **MMS8977**

Analytical Method: **SW6020A**

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

Analyst: **EAB**

Prep Batch: **MXX28831**

Prep Method: **SW3050B**

Prep Date/Time: **06/29/2015 13:45**

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

Dupe Init Wt./Vol.: Extract Vol:



Matrix Spike Summary

Original Sample ID: 1153098002
MS Sample ID: 1274128 MS
MSD Sample ID: 1274129 MSD

Analysis Date: 06/30/2015 17:47
Analysis Date: 06/30/2015 17:49
Analysis Date: 06/30/2015 17:51
Matrix: Soil/Solid (dry weight)

QC for Samples: 1153196001, 1153196002, 1153196003, 1153196004, 1153196005, 1153196006, 1153196007

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Arsenic	6.52	49.5	58.6	105	47.9	55.1	101	82-118	6.25	(< 20)
Chromium	27.9	19.8	61.1	168 *	19.2	45.3	91	83-119	29.70	* (< 20)
Mercury	0.0195J	0.495	0.560	109	0.479	0.528	106	74-126	5.95	(< 20)

Batch Information

Analytical Batch: MMS8977
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 6/30/2015 5:49:21PM

Prep Batch: MXX28831
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/29/2015 1:45:31PM
Prep Initial Wt./Vol.: 1.05g
Prep Extract Vol: 50.00mL

Print Date: 07/02/2015 4:32:24PM

Bench Spike Summary

Original Sample ID: 1153098002
 MS Sample ID: 1273803 BND
 MSD Sample ID:

Analysis Date: 06/30/2015 17:47
 Analysis Date: 06/30/2015 17:56
 Analysis Date:
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1153196001, 1153196002, 1153196003, 1153196004, 1153196005, 1153196006, 1153196007

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Chromium	27.9	128	169	110				80-120		

Batch Information

Analytical Batch: MMS8977
 Analytical Method: SW6020A
 Instrument: Perkin Elmer Sciex ICP-MS P3
 Analyst: EAB
 Analytical Date/Time: 6/30/2015 5:56:26PM

Prep Batch: MXX28831
 Prep Method: Soils/Solids Digest for Metals by ICP-MS
 Prep Date/Time: 6/29/2015 1:45:31PM
 Prep Initial Wt./Vol.: 1.01g
 Prep Extract Vol: 50.00mL

Print Date: 07/02/2015 4:32:24PM



Method Blank

Blank ID: MB for HBN 1711971 [SPT/9645]

Matrix: Soil/Solid (dry weight)

Blank Lab ID: 1273705

QC for Samples:

1153196001, 1153196002, 1153196003, 1153196004, 1153196005, 1153196006, 1153196007

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: SPT9645

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Analytical Date/Time: 6/26/2015 7:59:00PM

Print Date: 07/02/2015 4:32:25PM

Duplicate Sample Summary

Original Sample ID: 1153080001

Duplicate Sample ID: 1273706

QC for Samples:

1153196001, 1153196002, 1153196003

Analysis Date: 06/26/2015 19:59

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	99.5	99.4	%	0.04	(< 5)

Batch Information

Analytical Batch: SPT9645

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 07/02/2015 4:32:26PM



Duplicate Sample Summary

Original Sample ID: 1153196003

Duplicate Sample ID: 1273707

QC for Samples:

1153196001, 1153196002, 1153196003, 1153196004, 1153196005, 1153196006, 1153196007

Analysis Date: 06/26/2015 19:59

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	81.9	82.4	%	0.56	(< 5)

Batch Information

Analytical Batch: SPT9645

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 07/02/2015 4:32:26PM



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1153196



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CLIENT: *ECC*

CONTACT: *Don Maloney* PHONE NO: *(907) 830-1225*

PROJECT PWSID/ PERMIT#: _____

PROJECT NAME: *Kolmakof*

REPORTS TO: *Don Maloney* E-MAIL: *don@ccalaska.com*

INVOICE TO: *ECC* QUOTE #: _____ P.O. #: _____

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

Section 1

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX MATRIX CODE	# CONTAINERS	Type C = COMP G = GRAB MI = Multi-Incre-mental Soils	Section 3	Section 4	Section 5
① A	15 KRM-10	6/24/15	1345	Sof	1	G	<i>Preserve (Nide)</i>		
② A	15 KRM-11	6/24/15	1346		1		<i>Mercury</i>		
③ A	15 KRM-12	6/24/15	1350		1				
④ A	15 KRM-13	6/24/15	1355		1				
⑤ A	15 KRM-14	6/24/15	1402		1				
⑥ A	15 KRM-15	6/24/15	1420		1				
⑦ A	15 KRM-16	6/24/15	1435	X	1	G			

Section 2

Section 3

Section 4

Section 5

Relinquished By: (1) *[Signature]* Date: 6/26/15 Time: 1353

Relinquished By: (2) Date: Date / Time

Relinquished By: (3) Date: Date / Time

Relinquished By: (4) Date: 6/26/15 Time: 1353

Temp Blank °C: *1.5 at 240*

Requested Turnaround Time and/or Special Instructions: *Standard TAT H3 SUMMO ASE AMM 250 04 6020. TAT 6/24/15*

Chain of Custody Seal: (Circle) *INTACT* BROKEN ABSENT

Page *1* of *1*



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>
1153196001-A	No Preservative Required	OK			
1153196002-A	No Preservative Required	OK			
1153196003-A	No Preservative Required	OK			
1153196004-A	No Preservative Required	OK			
1153196005-A	No Preservative Required	OK			
1153196006-A	No Preservative Required	OK			
1153196007-A	No Preservative Required	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates that an inappropriate container was submitted.

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.



Laboratory Report of Analysis

To: Environmental Comp. Consultants (ECC)
1500 Post Road
Anchorage, AK 99501
(907)644-0428

Report Number: **1153146**

Client Project: **Kolmakof**

Dear Don Maloney,

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 ten 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 Forest 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.

Forest Taylor
Project Manager
Forest.Taylor@sgs.com

Date

Print Date: 07/07/2015 8:41:06AM

Case Narrative

SGS Client: **Environmental Comp. Consultants (ECC)**

SGS Project: **1153146**

Project Name/Site: **Kolmakof**

Project Contact: **Don Maloney**

Refer to sample receipt form for information on sample condition.

*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: 07/07/2015 8:41:07AM

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. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

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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: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 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
CCCV	Closing Continuing Calibration Verifica
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>
15KRM-04	1153146001	06/23/2015	06/24/2015	Soil/Solid (dry weight)
15KTM-09	1153146002	06/23/2015	06/24/2015	Soil/Solid (dry weight)
15KTM-10	1153146003	06/23/2015	06/24/2015	Soil/Solid (dry weight)
15KTM-11	1153146004	06/23/2015	06/24/2015	Soil/Solid (dry weight)
15KTM-12	1153146005	06/23/2015	06/24/2015	Soil/Solid (dry weight)
15KTM-13	1153146006	06/23/2015	06/24/2015	Soil/Solid (dry weight)

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

Print Date: 07/07/2015 8:41:09AM

Detectable Results Summary

Client Sample ID: **15KRM-04**

Lab Sample ID: 1153146001

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	10.9	mg/Kg
Chromium	29.8	mg/Kg
Mercury	1.63	mg/Kg
Nickel	32.6	mg/Kg

Client Sample ID: **15KTM-09**

Lab Sample ID: 1153146002

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	6.32	mg/Kg
Chromium	21.9	mg/Kg
Mercury	2.81	mg/Kg
Nickel	20.0	mg/Kg

Client Sample ID: **15KTM-10**

Lab Sample ID: 1153146003

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	9.82	mg/Kg
Chromium	28.1	mg/Kg
Mercury	0.983	mg/Kg
Nickel	24.6	mg/Kg

Client Sample ID: **15KTM-11**

Lab Sample ID: 1153146004

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	5.68	mg/Kg
Chromium	21.4	mg/Kg
Mercury	0.825	mg/Kg
Nickel	17.9	mg/Kg



Results of 15KRM-04

Client Sample ID: **15KRM-04**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153146001
Lab Project ID: 1153146

Collection Date: 06/23/15 17:15
Received Date: 06/24/15 13:27
Matrix: Soil/Solid (dry weight)
Solids (%):81.3
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	10.9	1.17	0.364	mg/Kg	10		06/25/15 15:57
Chromium	29.8	0.469	0.141	mg/Kg	10		06/25/15 15:57
Mercury	1.63	0.0469	0.0141	mg/Kg	10		06/25/15 15:57
Nickel	32.6	0.235	0.0727	mg/Kg	10		06/25/15 15:57

Batch Information

Analytical Batch: MMS8970
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/25/15 15:57
Container ID: 1153146001-A

Prep Batch: MXX28814
Prep Method: SW3050B
Prep Date/Time: 06/24/15 12:08
Prep Initial Wt./Vol.: 1.048 g
Prep Extract Vol: 50 mL



Results of 15KTM-09

Client Sample ID: **15KTM-09**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153146002
Lab Project ID: 1153146

Collection Date: 06/23/15 16:02
Received Date: 06/24/15 13:27
Matrix: Soil/Solid (dry weight)
Solids (%):72.3
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	6.32		1.25	0.389	mg/Kg	10		06/25/15 15:59
Chromium	21.9		0.501	0.150	mg/Kg	10		06/25/15 15:59
Mercury	2.81		0.0501	0.0150	mg/Kg	10		06/25/15 15:59
Nickel	20.0		0.251	0.0777	mg/Kg	10		06/25/15 15:59

Batch Information

Analytical Batch: MMS8970
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/25/15 15:59
Container ID: 1153146002-A

Prep Batch: MXX28814
Prep Method: SW3050B
Prep Date/Time: 06/24/15 12:08
Prep Initial Wt./Vol.: 1.104 g
Prep Extract Vol: 50 mL



Results of 15KTM-10

Client Sample ID: **15KTM-10**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153146003
Lab Project ID: 1153146

Collection Date: 06/23/15 16:10
Received Date: 06/24/15 13:27
Matrix: Soil/Solid (dry weight)
Solids (%):81.0
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	9.82	1.22	0.378	mg/Kg	10		06/25/15 16:01
Chromium	28.1	0.488	0.146	mg/Kg	10		06/25/15 16:01
Mercury	0.983	0.0488	0.0146	mg/Kg	10		06/25/15 16:01
Nickel	24.6	0.244	0.0756	mg/Kg	10		06/25/15 16:01

Batch Information

Analytical Batch: MMS8970
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/25/15 16:01
Container ID: 1153146003-A

Prep Batch: MXX28814
Prep Method: SW3050B
Prep Date/Time: 06/24/15 12:08
Prep Initial Wt./Vol.: 1.012 g
Prep Extract Vol: 50 mL



Results of 15KTM-11

Client Sample ID: **15KTM-11**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153146004
Lab Project ID: 1153146

Collection Date: 06/23/15 16:40
Received Date: 06/24/15 13:27
Matrix: Soil/Solid (dry weight)
Solids (%):71.0
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	5.68	1.29	0.399	mg/Kg	10		06/25/15 16:04
Chromium	21.4	0.515	0.155	mg/Kg	10		06/25/15 16:04
Mercury	0.825	0.0515	0.0155	mg/Kg	10		06/25/15 16:04
Nickel	17.9	0.258	0.0799	mg/Kg	10		06/25/15 16:04

Batch Information

Analytical Batch: MMS8970
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/25/15 16:04
Container ID: 1153146004-A

Prep Batch: MXX28814
Prep Method: SW3050B
Prep Date/Time: 06/24/15 12:08
Prep Initial Wt./Vol.: 1.093 g
Prep Extract Vol: 50 mL

Method Blank

Blank ID: MB for HBN 1711702 [MXX/28814]
Blank Lab ID: 1272886

Matrix: Soil/Solid (dry weight)

QC for Samples:
1153146001, 1153146002, 1153146003, 1153146004

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
Chromium	0.200U	0.400	0.120	mg/Kg
Mercury	0.0200U	0.0400	0.0120	mg/Kg
Nickel	0.100U	0.200	0.0620	mg/Kg

Batch Information

Analytical Batch: MMS8970
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 6/25/2015 3:52:23PM

Prep Batch: MXX28814
Prep Method: SW3050B
Prep Date/Time: 6/24/2015 12:08:33PM
Prep Initial Wt./Vol.: 1 g
Prep Extract Vol: 50 mL

Print Date: 07/07/2015 8:41:12AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1153146 [MXX28814]

Blank Spike Lab ID: 1272887

Date Analyzed: 06/25/2015 15:54

Matrix: Soil/Solid (dry weight)

QC for Samples: 1153146001, 1153146002, 1153146003, 1153146004

Results by SW6020A

Parameter	Blank Spike (mg/Kg)			CL
	Spike	Result	Rec (%)	
Arsenic	50	50.5	101	(82-118)
Chromium	20	19.7	98	(83-119)
Mercury	0.5	0.542	108	(74-126)
Nickel	50	49.9	100	(84-119)

Batch Information

Analytical Batch: **MMS8970**

Analytical Method: **SW6020A**

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

Analyst: **EAB**

Prep Batch: **MXX28814**

Prep Method: **SW3050B**

Prep Date/Time: **06/24/2015 12:08**

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

Dupe Init Wt./Vol.: Extract Vol:



Matrix Spike Summary

Original Sample ID: 1272943
MS Sample ID: 1272946 MS
MSD Sample ID: 1272947 MSD

Analysis Date: 06/25/2015 16:18
Analysis Date: 06/25/2015 16:20
Analysis Date: 06/25/2015 16:23
Matrix: Solid/Soil (Wet Weight)

QC for Samples: 1153146001, 1153146002, 1153146003, 1153146004

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Arsenic	4.07	47.3	53.1	104	49.7	57.6	108	82-118	8.12	(< 20)
Chromium	22.0	18.9	43.9	116	19.9	44.5	113	83-119	1.29	(< 20)
Nickel	23.6	47.3	73.5	105	49.7	79.1	112	84-119	7.36	(< 20)

Batch Information

Analytical Batch: MMS8970
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 6/25/2015 4:20:45PM

Prep Batch: MXX28814
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/24/2015 12:08:33PM
Prep Initial Wt./Vol.: 1.06g
Prep Extract Vol: 50.00mL

Print Date: 07/07/2015 8:41:13AM



Method Blank

Blank ID: MB for HBN 1711751 [SPT/9642]
Blank Lab ID: 1273116

Matrix: Soil/Solid (dry weight)

QC for Samples:
1153146001, 1153146002, 1153146003, 1153146004

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: SPT9642
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R
Analytical Date/Time: 6/24/2015 3:26:00PM

Print Date: 07/07/2015 8:41:14AM

Duplicate Sample Summary

Original Sample ID: 1153028067

Duplicate Sample ID: 1273120

QC for Samples:

Analysis Date: 06/24/2015 15:26

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	82.6	81.5	%	1.30	(< 5)

Batch Information

Analytical Batch: SPT9642

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 07/07/2015 8:41:15AM



Duplicate Sample Summary

Original Sample ID: 1153028078

Duplicate Sample ID: 1273121

QC for Samples:

1153146001, 1153146002, 1153146003, 1153146004

Analysis Date: 06/24/2015 15:26

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	81.2	81.7	%	0.61	(< 5)

Batch Information

Analytical Batch: SPT9642

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 07/07/2015 8:41:15AM

Taylor, Forest (Anchorage)

From: Don Maloney [don@eccalaska.com]
Sent: Wednesday, June 24, 2015 8:22 AM
To: Taylor, Forest (Anchorage)
Cc: Carl Benson
Subject: Kolmakof samples en route 6/24
Attachments: COC - Kolmakof 6-24.pdf; ATT00001.htm

Hi Forest,

The next cooler of samples is en route to Anchorage on RAVN air cargo and should be available for pick up about 11AM. Chain of custody is attached. Instructions are below and were not included on the COC.

RAVN Airway bill: 8086850677
RAVN cargo phone: 243-2761

The KTM samples are dependent on the results we get today. Carl will have some additional instructions but here are the basics:

All samples are on a quick turn.

- If 15KTM-09 or -10 has total mercury above 1.99 mg/Kg, then run 15KTM-11, -12, and -13.
- Run 15KRM-04 as is

Thanks
Don

Don Maloney
Project Manager
ECC, Inc.
(907) 830-1225
don@eccalaska.com



SHIPPER'S NAME, ADDRESS & PHONE DON MALONEY		SHIPPER'S ACCOUNT NUMBER E6175	NOT AIR WAYBILL (AIR CONSIGNMENT NOTE)	Ravn ALASKA	4700 Old International Airport Road Anchorage, Alaska 99502
ANI AK			It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT AS LISTED IN THE COMPANIES TARIFFS. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIERS' LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required.		

CONSIGNEE'S NAME, ADDRESS & PHONE SGS		CONSIGNEE'S ACCOUNT NUMBER 9075622343	Received in Good Condition _____ Place _____ Date _____
ANCHORAGE AK			TO EXPEDITE MOVEMENT, SHIPMENT MAY BE DIVERTED TO MOTOR OR OTHER CARRIER AS PER TARIFF RULE UNLESS SHIPPER GIVES OTHER INSTRUCTION HEREON


ISSUING CARRIER'S AGENT NAME, CITY & PHONE	ALSO NOTIFY NAME & ADDRESS
--	----------------------------

AGENT'S IATA CODE	ACCOUNT NO.	ACCOUNTING INFORMATION 6985453
AIRPORT OF DEPARTURE Aniak	Declared Value \$ 0.00	Insured Amount \$ 0.00
		Acc#: E6175 ECC, INC.

ROUTING AND DESTINATION				COMMENTS			
TO	BY FIRST	TO	BY	TO	BY		
AIRPORT OF DESTINATION Anchorage		FOR CARRIER USE ONLY		FLIGHT/DATE 0		FLIGHT/DATE	

No. Of Pieces Rep	Gross Weight	kg lb	Rate Class	Commodity Item No.	Chargeable Weight	Rate/Charge	Total	Nature and Quantity of Goods
1	11	l.	F		1	\$29.18	\$29.18	blue cooler of samples
1	11						\$29.18	

1153146



PREPAID	WEIGHT CHARGE	COLLECT	OTHER CHARGES AND DESCRIPTION	
\$29.18			AMOUNT	DESCRIPTION
	VALUATION CHARGE			
\$0.00				
	FEDERAL EXCISE TAX			
\$1.82				
	TOTAL OTHER CHARGES DUE AGENT			
\$0.00				
	TOTAL OTHER CHARGES DUE CARRIER			
\$0.00				
TOTAL PREPAID		TOTAL COLLECT		
\$31.00				

STATION NUMBERS ANCHORAGE - (907) 243-2761 ANI AK - (907) 675-4572 BARROW - (907) 852-5300 BETHEL - (907) 543-3825 DEADHORSE - (907) 659-9222	FAIRBANKS - (907) 450-7250 GALENA - (907) 656-1875 KOTZEBUE - (907) 442-3020 NOME - (907) 443-7595 ST. MARYS - (907) 438-2247 UNALAKLEET - (907) 624-3595	Shipper certifies that the particulars on the face hereof are correct, agrees to the CONDITIONS AS LISTED IN THE COMPANIES TARIFFS, accepts that carrier's liability is limited as stated in the companies tariffs and accepts such value unless a higher value for carriage is declared on the face hereof subject to an additional charge and that insofar as any part of the consignment contains restricted articles, such part is described by name and is in proper condition for carriage by air according to applicable national governmental regulations, and for international shipments, the current International Air Transport Association's Restricted Articles Regulations.
Printed at 07:30:49 on 6/24/2015 at ANI-1 10.6.0.6		Printed Name and Title _____ Signature _____

Consignee Copy

Alert Expeditors Inc.

#357339

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

Date 6-24-15
From Don Maloney
To 545

Collect Prepay Advance Charges
Account
Job # PO#

1 Copy
6850677 Ruon



Shipped Signature

Received By: Grant Clida

Total Charge

13.27



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>
1153146001-A	Cool to 4 C	OK			
1153146002-A	Cool to 4 C	OK			
1153146003-A	Cool to 4 C	OK			
1153146004-A	Cool to 4 C	OK			
1153146005-A	Cool to 4 C	OK			
1153146006-A	Cool to 4 C	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates that an inappropriate container was submitted.

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.



Laboratory Report of Analysis

To: Environmental Comp. Consultants (ECC)
1500 Post Road
Anchorage, AK 99501
(907)644-0428

Report Number: **1153002**

Client Project: **Kolmakof**

Dear Don Maloney,

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 ten 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 Forest 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.

Forest Taylor
Project Manager
Forest.Taylor@sgs.com

Date

Print Date: 06/25/2015 7:29:17AM

Case Narrative

SGS Client: **Environmental Comp. Consultants (ECC)**

SGS Project: **1153002**

Project Name/Site: **Kolmakof**

Project Contact: **Don Maloney**

Refer to sample receipt form for information on sample condition.

1153002004MS (1272490) MS

6020A - Metals - MS recoveries for chromium (121%), barium (138%), and mercury (386%) were outside of acceptance criteria. Post digestion spike was successful.

1153002004MSD (1272491) MSD

6020A - Metals - MSD recoveries for barium (134%) and mercury (366%) were outside of acceptance criteria. Post digestion spike was successful.

*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: 06/25/2015 7:29:18AM

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. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 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
CCCV	Closing Continuing Calibration Verifica
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>
15KRM01	1153002001	06/18/2015	06/20/2015	Soil/Solid (dry weight)
15KRM02	1153002002	06/18/2015	06/20/2015	Soil/Solid (dry weight)
15KRM03	1153002003	06/18/2015	06/20/2015	Soil/Solid (dry weight)
15KRM05	1153002004	06/19/2015	06/20/2015	Soil/Solid (dry weight)
15KRM06	1153002005	06/19/2015	06/20/2015	Soil/Solid (dry weight)
15KRM07	1153002006	06/19/2015	06/20/2015	Soil/Solid (dry weight)
15KRM08	1153002007	06/19/2015	06/20/2015	Soil/Solid (dry weight)
15KRM09	1153002008	06/19/2015	06/20/2015	Soil/Solid (dry weight)
15KTM-06	1153002009	06/19/2015	06/20/2015	Soil/Solid (dry weight)
15KTM-07	1153002010	06/19/2015	06/20/2015	Soil/Solid (dry weight)
15KTM-08	1153002011	06/19/2015	06/20/2015	Soil/Solid (dry weight)

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

Print Date: 06/25/2015 7:29:23AM

Detectable Results Summary

Client Sample ID: **15KRM01**

Lab Sample ID: 1153002001

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	9.00	mg/Kg
Chromium	29.9	mg/Kg
Mercury	3.03	mg/Kg
Nickel	40.4	mg/Kg

Client Sample ID: **15KRM02**

Lab Sample ID: 1153002002

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	9.44	mg/Kg
Chromium	31.0	mg/Kg
Mercury	3.42	mg/Kg
Nickel	39.3	mg/Kg

Client Sample ID: **15KRM03**

Lab Sample ID: 1153002003

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.95	mg/Kg
Chromium	27.6	mg/Kg
Mercury	0.722	mg/Kg
Nickel	33.4	mg/Kg

Client Sample ID: **15KRM05**

Lab Sample ID: 1153002004

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	12.2	mg/Kg
Chromium	30.5	mg/Kg
Mercury	3.84	mg/Kg
Nickel	26.4	mg/Kg

Client Sample ID: **15KRM06**

Lab Sample ID: 1153002005

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	12.1	mg/Kg
Chromium	29.3	mg/Kg
Mercury	0.349	mg/Kg
Nickel	27.2	mg/Kg

Client Sample ID: **15KRM07**

Lab Sample ID: 1153002006

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.14	mg/Kg
Chromium	29.9	mg/Kg
Mercury	1.81	mg/Kg
Nickel	40.4	mg/Kg

Client Sample ID: **15KRM08**

Lab Sample ID: 1153002007

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	10.5	mg/Kg
Chromium	31.1	mg/Kg
Mercury	1.13	mg/Kg
Nickel	45.7	mg/Kg

Detectable Results Summary

Client Sample ID: **15KRM09**

Lab Sample ID: 1153002008

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	8.91	mg/Kg
Chromium	31.1	mg/Kg
Mercury	0.772	mg/Kg
Nickel	46.7	mg/Kg

Client Sample ID: **15KTM-06**

Lab Sample ID: 1153002009

Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Arsenic	7.93	mg/Kg
Chromium	27.9	mg/Kg
Mercury	30.7	mg/Kg
Nickel	25.0	mg/Kg



Results of 15KRM01

Client Sample ID: **15KRM01**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153002001
Lab Project ID: 1153002

Collection Date: 06/18/15 15:15
Received Date: 06/20/15 14:05
Matrix: Soil/Solid (dry weight)
Solids (%):85.3
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result</u>	<u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	9.00		1.17	0.363	mg/Kg	10		06/22/15 17:14
Chromium	29.9		0.468	0.140	mg/Kg	10		06/22/15 17:14
Mercury	3.03		0.0468	0.0140	mg/Kg	10		06/22/15 17:14
Nickel	40.4		0.234	0.0726	mg/Kg	10		06/22/15 17:14

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/22/15 17:14
Container ID: 1153002001-A

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 06/22/15 10:59
Prep Initial Wt./Vol.: 1.001 g
Prep Extract Vol: 50 mL



Results of 15KRM02

Client Sample ID: **15KRM02**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153002002
Lab Project ID: 1153002

Collection Date: 06/18/15 15:55
Received Date: 06/20/15 14:05
Matrix: Soil/Solid (dry weight)
Solids (%):84.3
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	9.44	1.12	0.349	mg/Kg	10		06/22/15 16:57
Chromium	31.0	0.450	0.135	mg/Kg	10		06/22/15 16:57
Mercury	3.42	0.0450	0.0135	mg/Kg	10		06/22/15 16:57
Nickel	39.3	0.225	0.0697	mg/Kg	10		06/22/15 16:57

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/22/15 16:57
Container ID: 1153002002-A

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 06/22/15 10:59
Prep Initial Wt./Vol.: 1.055 g
Prep Extract Vol: 50 mL

Results of 15KRM03

Client Sample ID: **15KRM03**
 Client Project ID: **Kolmakof**
 Lab Sample ID: 1153002003
 Lab Project ID: 1153002

Collection Date: 06/18/15 16:30
 Received Date: 06/20/15 14:05
 Matrix: Soil/Solid (dry weight)
 Solids (%):90.1
 Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.95	1.05	0.325	mg/Kg	10		06/22/15 17:00
Chromium	27.6	0.419	0.126	mg/Kg	10		06/22/15 17:00
Mercury	0.722	0.0419	0.0126	mg/Kg	10		06/22/15 17:00
Nickel	33.4	0.209	0.0649	mg/Kg	10		06/22/15 17:00

Batch Information

Analytical Batch: MMS8966
 Analytical Method: SW6020A
 Analyst: EAB
 Analytical Date/Time: 06/22/15 17:00
 Container ID: 1153002003-A

Prep Batch: MXX28807
 Prep Method: SW3050B
 Prep Date/Time: 06/22/15 10:59
 Prep Initial Wt./Vol.: 1.06 g
 Prep Extract Vol: 50 mL



Results of 15KRM05

Client Sample ID: **15KRM05**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153002004
Lab Project ID: 1153002

Collection Date: 06/19/15 11:35
Received Date: 06/20/15 14:05
Matrix: Soil/Solid (dry weight)
Solids (%):78.9
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	12.2	1.18	0.365	mg/Kg	10		06/22/15 16:31
Chromium	30.5	0.470	0.141	mg/Kg	10		06/22/15 16:31
Mercury	3.84	0.0470	0.0141	mg/Kg	10		06/22/15 16:31
Nickel	26.4	0.235	0.0729	mg/Kg	10		06/22/15 16:31

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/22/15 16:31
Container ID: 1153002004-A

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 06/22/15 10:59
Prep Initial Wt./Vol.: 1.078 g
Prep Extract Vol: 50 mL



Results of 15KRM06

Client Sample ID: **15KRM06**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153002005
Lab Project ID: 1153002

Collection Date: 06/19/15 12:40
Received Date: 06/20/15 14:05
Matrix: Soil/Solid (dry weight)
Solids (%):78.8
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	12.1	1.18	0.367	mg/Kg	10		06/22/15 17:02
Chromium	29.3	0.474	0.142	mg/Kg	10		06/22/15 17:02
Mercury	0.349	0.0474	0.0142	mg/Kg	10		06/22/15 17:02
Nickel	27.2	0.237	0.0734	mg/Kg	10		06/22/15 17:02

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/22/15 17:02
Container ID: 1153002005-A

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 06/22/15 10:59
Prep Initial Wt./Vol.: 1.071 g
Prep Extract Vol: 50 mL

Results of 15KRM07

Client Sample ID: **15KRM07**
 Client Project ID: **Kolmakof**
 Lab Sample ID: 1153002006
 Lab Project ID: 1153002

Collection Date: 06/19/15 12:55
 Received Date: 06/20/15 14:05
 Matrix: Soil/Solid (dry weight)
 Solids (%):89.0
 Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.14	1.06	0.328	mg/Kg	10		06/22/15 17:04
Chromium	29.9	0.424	0.127	mg/Kg	10		06/22/15 17:04
Mercury	1.81	0.0424	0.0127	mg/Kg	10		06/22/15 17:04
Nickel	40.4	0.212	0.0657	mg/Kg	10		06/22/15 17:04

Batch Information

Analytical Batch: MMS8966
 Analytical Method: SW6020A
 Analyst: EAB
 Analytical Date/Time: 06/22/15 17:04
 Container ID: 1153002006-A

Prep Batch: MXX28807
 Prep Method: SW3050B
 Prep Date/Time: 06/22/15 10:59
 Prep Initial Wt./Vol.: 1.061 g
 Prep Extract Vol: 50 mL



Results of 15KRM08

Client Sample ID: **15KRM08**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153002007
Lab Project ID: 1153002

Collection Date: 06/19/15 13:10
Received Date: 06/20/15 14:05
Matrix: Soil/Solid (dry weight)
Solids (%):86.3
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	10.5	1.15	0.358	mg/Kg	10		06/22/15 17:07
Chromium	31.1	0.461	0.138	mg/Kg	10		06/22/15 17:07
Mercury	1.13	0.0461	0.0138	mg/Kg	10		06/22/15 17:07
Nickel	45.7	0.231	0.0715	mg/Kg	10		06/22/15 17:07

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/22/15 17:07
Container ID: 1153002007-A

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 06/22/15 10:59
Prep Initial Wt./Vol.: 1.005 g
Prep Extract Vol: 50 mL



Results of 15KRM09

Client Sample ID: **15KRM09**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153002008
Lab Project ID: 1153002

Collection Date: 06/19/15 13:12
Received Date: 06/20/15 14:05
Matrix: Soil/Solid (dry weight)
Solids (%):85.8
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	8.91	1.09	0.337	mg/Kg	10		06/22/15 17:09
Chromium	31.1	0.435	0.131	mg/Kg	10		06/22/15 17:09
Mercury	0.772	0.0435	0.0131	mg/Kg	10		06/22/15 17:09
Nickel	46.7	0.218	0.0674	mg/Kg	10		06/22/15 17:09

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/22/15 17:09
Container ID: 1153002008-A

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 06/22/15 10:59
Prep Initial Wt./Vol.: 1.071 g
Prep Extract Vol: 50 mL



Results of 15KTM-06

Client Sample ID: **15KTM-06**
Client Project ID: **Kolmakof**
Lab Sample ID: 1153002009
Lab Project ID: 1153002

Collection Date: 06/19/15 19:05
Received Date: 06/20/15 14:05
Matrix: Soil/Solid (dry weight)
Solids (%):81.8
Location:

Results by Metals by ICP/MS

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Arsenic	7.93	1.18	0.365	mg/Kg	10		06/22/15 17:12
Chromium	27.9	0.471	0.141	mg/Kg	10		06/22/15 17:12
Mercury	30.7	0.235	0.0706	mg/Kg	50		06/22/15 17:30
Nickel	25.0	0.235	0.0730	mg/Kg	10		06/22/15 17:12

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 06/22/15 17:12
Container ID: 1153002009-A

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 06/22/15 10:59
Prep Initial Wt./Vol.: 1.039 g
Prep Extract Vol: 50 mL

Method Blank

Blank ID: MB for HBN 1711605 [MXX/28807]
Blank Lab ID: 1272488

Matrix: Soil/Solid (dry weight)

QC for Samples:

1153002001, 1153002002, 1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

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
Chromium	0.200U	0.400	0.120	mg/Kg
Mercury	0.0200U	0.0400	0.0120	mg/Kg
Nickel	0.100U	0.200	0.0620	mg/Kg

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 6/22/2015 4:27:12PM

Prep Batch: MXX28807
Prep Method: SW3050B
Prep Date/Time: 6/22/2015 10:59:44AM
Prep Initial Wt./Vol.: 1 g
Prep Extract Vol: 50 mL

Print Date: 06/25/2015 7:29:48AM

Duplicate Sample Summary

Original Sample ID: 1153002004

Duplicate Sample ID: 1272493

QC for Samples:

1153002001, 1153002002, 1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

Analysis Date: 06/22/2015 16:39

Matrix: Soil/Solid (dry weight)

Results by SW6020A

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Mercury	3.84	4.41	mg/Kg	13.80	(< 20)
Nickel	26.4	26.5	mg/Kg	0.50	(< 20)
Arsenic	12.2	10.1	mg/Kg	18.70	(< 20)
Chromium	30.5	29.0	mg/Kg	5.05	(< 20)

Batch Information

Analytical Batch: MMS8966

Analytical Method: SW6020A

Instrument: Perkin Elmer Sciex ICP-MS P3

Analyst: EAB

Prep Batch: MXX28807

Prep Method: SW3050B

Prep Date/Time: 6/22/2015 10:59:44AM

Print Date: 06/25/2015 7:29:49AM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1153002 [MXX28807]

Blank Spike Lab ID: 1272489

Date Analyzed: 06/22/2015 16:29

Matrix: Soil/Solid (dry weight)

QC for Samples: 1153002001, 1153002002, 1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

Results by SW6020A

Parameter	Blank Spike (mg/Kg)			CL
	Spike	Result	Rec (%)	
Arsenic	50	51.0	102	(80-120)
Chromium	20	19.7	98	(80-120)
Mercury	0.5	0.517	103	(80-120)
Nickel	50	50.9	102	(80-120)

Batch Information

Analytical Batch: **MMS8966**

Analytical Method: **SW6020A**

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

Analyst: **EAB**

Prep Batch: **MXX28807**

Prep Method: **SW3050B**

Prep Date/Time: **06/22/2015 10:59**

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

Dupe Init Wt./Vol.: Extract Vol:



Matrix Spike Summary

Original Sample ID: 1153002004
MS Sample ID: 1272490 MS
MSD Sample ID: 1272491 MSD

Analysis Date: 06/22/2015 16:31
Analysis Date: 06/22/2015 16:34
Analysis Date: 06/22/2015 16:36
Matrix: Soil/Solid (dry weight)

QC for Samples: 1153002001, 1153002002, 1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Arsenic	12.2	57.9	69.1	98	62.4	73.5	98	80-120	6.28	(< 20)
Chromium	30.5	23.2	58.6	121 *	25.0	59.8	118	80-120	2.11	(< 20)
Mercury	3.84	0.579	6.07	386 *	0.624	6.12	366 *	80-120	0.76	(< 20)
Nickel	26.4	57.9	91.4	112	62.4	93.8	108	80-120	2.57	(< 20)

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 6/22/2015 4:34:16PM

Prep Batch: MXX28807
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/22/2015 10:59:44AM
Prep Initial Wt./Vol.: 1.09g
Prep Extract Vol: 50.00mL

Print Date: 06/25/2015 7:29:52AM



Bench Spike Summary

Original Sample ID: 1153002004
MS Sample ID: 1272492 BND
MSD Sample ID:

Analysis Date: 06/22/2015 16:31
Analysis Date: 06/22/2015 16:41
Analysis Date:
Matrix: Soil/Solid (dry weight)

QC for Samples: 1153002001, 1153002002, 1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

Results by SW6020A

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Chromium	30.5	147	183	103				80-120		
Mercury	3.84	2.94	6.98	107				80-120		

Batch Information

Analytical Batch: MMS8966
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 6/22/2015 4:41:23PM

Prep Batch: MXX28807
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 6/22/2015 10:59:44AM
Prep Initial Wt./Vol.: 1.08g
Prep Extract Vol: 50.00mL

Print Date: 06/25/2015 7:29:52AM



Method Blank

Blank ID: MB for HBN 1711647 [SPT/9640]
Blank Lab ID: 1272651

Matrix: Soil/Solid (dry weight)

QC for Samples:

1153002001, 1153002002, 1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

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: SPT9640
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R
Analytical Date/Time: 6/22/2015 8:52:00PM

Print Date: 06/25/2015 7:29:53AM



Duplicate Sample Summary

Original Sample ID: 1153002002

Duplicate Sample ID: 1272652

QC for Samples:

1153002001, 1153002002, 1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

Analysis Date: 06/22/2015 20:52

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	84.3	72.8	%	14.60*	(< 5)

Batch Information

Analytical Batch: SPT9640

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 06/25/2015 7:29:54AM



Duplicate Sample Summary

Original Sample ID: 1153004002

Duplicate Sample ID: 1272677

QC for Samples:

1153002003, 1153002004, 1153002005, 1153002006, 1153002007, 1153002008, 1153002009

Analysis Date: 06/22/2015 20:52

Matrix: Soil/Solid (dry weight)

Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	84.5	88.5	%	4.60	(< 5)

Batch Information

Analytical Batch: SPT9640

Analytical Method: SM21 2540G

Instrument:

Analyst: A.R

Print Date: 06/25/2015 7:29:54AM



SGS North America Inc.
CHAIN OF CUSTODY RECORD

1153002



Locations Nationwide
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www.us.sgs.com

Section 1

CLIENT: *ECC*

CONTACT: *Don Maloney* PHONE NO: *(907) 830-1275*
(907) 310-2324

PROJECT PWSID/ PERMIT#: *Kalmuk*

REPORTS TO: *Don Maloney* E-MAIL: *don@ecobaska.com*

INVOICE TO: *ECC* QUOTE #: P.O. #:

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/MATRIX CODE
1A	15KRM-01	6/18/15	1515	Soil
2A	15KRM-02	6/18/15	1555	
3A	15KRM-03	6/18/15	1630	
4A	15KRM-04			
5A	15KRM-05	6/19/15	1135	
6A	15KRM-06	6/19/15	1240	
7A	15KRM-07	6/19/15	1255	
8A	15KRM-08	6/19/15	1310	
9A	15KRM-09	6/19/15	1312	
10A	15KRM-06	6/19/15	1905	

Section 3

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

Type	CONTAINERS	Matrix	Preservative	REMARKS/LOC ID
C = COMP	1	Soil		
G = GRAB	1	Soil		
MH = Multi-Incremental Soils	1	Soil		

Section 4

Section ID: *12*

DOD Project? Yes No

Cooler ID: *12*

Requested Turnaround Time and/or Special Instructions: *14 HR RUSH on all samples - Run all KRM samples. Hold 15KRM-06, -07, -08 for verbal approval to start.*

Data Deliverable Requirements:

Temp Blank °C: *5.4 03*

Chain of Custody Seal: (Circle) *INTACT* *BROKEN* *ABSENT*

(See attached Sample Receipt Form)

Section 5

Relinquished By: (1) *[Signature]* Received By: *[Signature]*

Relinquished By: (2) *[Signature]* Received By: *[Signature]*

Relinquished By: (3) *[Signature]* Received By: *[Signature]*

Relinquished By: (4) *[Signature]* Received For Laboratory By: *[Signature]*



SGS North America Inc.
CHAIN OF CUSTODY RECORD

1153002



Locations Nationwide
Alaska
Maryland
New Jersey
North Carolina
West Virginia
Indiana
Kentucky

www.us.sgs.com

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

Page 2 of 2

CLIENT: <i>EC</i> CONTACT: <i>Don Maloney</i> PROJECT NAME: <i>Kolnakef</i> REPORTS TO: <i>Don Maloney</i> INVOICE TO: <i>EC</i>		PHONE NO: <i>(907) 830-1225</i> PROJECT PWSID/ PERMIT#: <i>(907) 310-2724</i> E-MAIL: <i>don@ccalaska.com</i> QUOTE #: _____ P.O. #: _____		Section 1 Preservative											
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 Incre- mental Soils		REMARKS/ LOC ID	
<i>QA</i>		<i>15KTM-07</i>		<i>6/19/15</i>		<i>1920</i>		<i>Soil</i>		<i>1</i>		<i>Asenic, Chromium</i>			
<i>QA</i>		<i>15KTM-08</i>		<i>6/19/15</i>		<i>1935</i>		<i>Soil</i>		<i>1</i>		<i>Mercury 2421</i>			
Relinquished By: (1) <i>DM</i>		Date <i>6/20/15</i>		Time 		Received By:		Section 4 DOD Project? Yes/No <input checked="" type="checkbox"/> No		Data Deliverable Requirements:		Cooler ID:		Requested Turnaround Time and/or Special Instructions: <i>Run all CRM samples. All samples 24HR TAP</i> <i>Hold 15KTM-06,07,08 for verbal approval to start</i>	
Relinquished By: (2)		Date		Time		Received By:		Temp Blank °C: <i>5.4</i> <i>03</i> or Ambient []		Chain of Custody Seal: (Circle) <input checked="" type="checkbox"/> INTACT <input type="checkbox"/> BROKEN <input type="checkbox"/> ABSENT		(See attached Sample Receipt Form)		(See attached Sample Receipt Form)	
Relinquished By: (3)		Date		Time		Received By:		Section 5							
Relinquished By: (4)		Date <i>6/20/15</i>		Time <i>1405</i>		Received For Laboratory By: <i>Jewett</i>									

Taylor, Forest (Anchorage)

From: Don Maloney [don@eccalaska.com]
Sent: Saturday, June 20, 2015 10:39 AM
To: Taylor, Forest (Anchorage)
Subject: Kolmakof samples - RAVN 6/20/15



Hi Forest,

I sent a cooler today on RAVN cargo with 11 soil samples for the As, Cr, Ni, Hg totals. It should be available for pickup by 1:30PM.

RAVN airway bill #: 8086848798
RAVN cargo phone: 243-2761

The KRM samples are ready to analyze. The KTM samples are dependent on the results we get today. Here are the instructions:

- If 15KTM-05 total mercury is above 1.99 mg/Kg, then run 15KTM-06
- If 15KTM-03 total mercury is above 1.99 mg/Kg, then run 15KTM-07 and -08

Additional sample jars on RAVN: When you pick up the samples, would you mind sending out a small cooler today with 6 more 4 ounce jars and some bubble wrap with rubber bands and 2 gel packs?

Send to: Don Maloney
Aniak
(907) 310-2724

That should do it. I can be reached today at 907-310-2724.

Thanks
Don

Don Maloney
Project Manager
ECC, Inc.
(907) 830-1225
don@eccalaska.com

SHIPPER'S NAME, ADDRESS & PHONE
DON MALONEY

SHIPPER'S ACCOUNT NUMBER
E6175

ANI

NOT AIR WAYBILL
Ravn 4700 Old International Airport Road Anchorage, Alaska 99502
ALASKA

It is agreed that the goods described herein are accepted in apparent good order and condition (except as noted) for carriage SUBJECT TO THE CONDITIONS OF CONTRACT AS LISTED IN THE COMPANIES TARIFFS. THE SHIPPER'S ATTENTION IS DRAWN TO THE NOTICE CONCERNING CARRIERS' LIMITATION OF LIABILITY. Shipper may increase such limitation of liability by declaring a higher value for carriage and paying a supplemental charge if required.

Received in Good Condition *EREST JAMES Fairly*
Place _____ Date 6/20/15 1405

TO EXPEDITE MOVEMENT, SHIPMENT MAY BE DIVERTED TO MOTOR OR OTHER CARRIER AS PER TARIFF RULE UNLESS SHIPPER GIVES OTHER INSTRUCTION HEREON

CONSIGNEE'S NAME, ADDRESS & PHONE
SGS


CONSIGNEE'S ACCOUNT NUMBER
9075622343

ANCHORAGE

ISSUING CARRIER'S AGENT NAME, CITY & PHONE

ALSO NOTIFY NAME & ADDRESS

1153002



ACCOUNTING INFORMATION 6984354
Acc#: E6175 ECC, INC.

AGENT'S IATA CODE

ACCOUNT NO.

AIRPORT OF DEPARTURE
Aniak

Declared Value \$ 0.00 Insured Amount \$ 0.00

ROUTING AND DESTINATION

TO	BY FIRST	TO	BY	TO	BY

AIRPORT OF DESTINATION
Anchorage

FOR CARRIER USE ONLY


FLIGHT/DATE	FLIGHT/DATE
0	

COMMENTS

No. Of Pieces Rcp	Gross Weight	kg lb	Rate Class	Commodity Item No.	Chargeable Weight	Rate/Charge	Total	Nature and Quantity of Goods
1	20	1.	F		1	\$29.18	\$29.18	COOLER/SOIL SAMPLE
1	20						\$29.18	

PREPAID	WEIGHT CHARGE	COLLECT
\$29.18		
	VALUATION CHARGE	
	\$0.00	
	FEDERAL EXCISE TAX	
	\$1.82	
	TOTAL OTHER CHARGES DUE AGENT	
	\$0.00	
	TOTAL OTHER CHARGES DUE CARRIER	
	\$0.00	
TOTAL PREPAID		TOTAL COLLECT
\$31.00		

OTHER CHARGES AND DESCRIPTION	
AMOUNT	DESCRIPTION



HAZMAT
No

STATION NUMBERS
ANCHORAGE - (907) 243-2781
ANI - (907) 675-4572
BARROW - (907) 852-5300
BETHEL - (907) 543-3825
DEADHORSE - (907) 659-9222

FAIRBANKS - (907) 450-7250
GALENA - (907) 656-1875
KOTZEBUE - (907) 442-3020
NOME - (907) 443-7595
ST. MARYS - (907) 438-2247
UNALAKLEET - (907) 624-3595

Printed at 14:03:26 on 6/20/2015 at ANC-FRT2 10.14.14.3

Shipper certifies that the particulars on the face hereof are correct, agrees to the CONDITIONS AS LISTED IN THE COMPANIES TARIFFS, accepts that carrier's liability is limited as stated in the companies tariffs and accepts such value unless a higher value for carriage is declared on the face hereof subject to an additional charge and that insofar as any part of the consignment contains restricted articles, such part is described by name and is in proper condition for carriage by air according to applicable national governmental regulations, and for international shipments, the current International Air Transport Association's Restricted Articles Regulations.

Printed Name and Title _____

Signature _____

1153002

SGS North America Inc
Courier Slip

Date/Time: 6/20/15 1405

Signature: Justin Taylor

Deliver To/Pick-UP From:

RAVN

Description:
1 COWLER FROM ECC



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>
1153002001-A	No Preservative Required	OK			
1153002002-A	No Preservative Required	OK			
1153002003-A	No Preservative Required	OK			
1153002004-A	No Preservative Required	OK			
1153002005-A	No Preservative Required	OK			
1153002006-A	No Preservative Required	OK			
1153002007-A	No Preservative Required	OK			
1153002008-A	No Preservative Required	OK			
1153002009-A	No Preservative Required	OK			
1153002010-A	No Preservative Required	OK			
1153002011-A	No Preservative Required	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates that an inappropriate container was submitted.

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.

APPENDIX D

ADEC CHECKLISTS AND QUALITY ASSURANCE REPORT

Site Characterization and Limited Soil Removal Report Kolmakof Mine Site, Alaska

Bureau of Land Management Alaska State Office

4700 BLM Road

Anchorage, AK 99507-2591

November 2015

Laboratory Data Review Checklist

Completed by:	Brice Environmental Services, Inc., Carl Benson		
Title:	Environmental Scientist	Date:	7/10/2015
CS Report Name:	Kolmakof Mine Site Characterization	Report Date:	6/22/2015
Consultant Firm:	Environmental Compliance Consultants		
Laboratory Name:	SGS Anchorage, AK	Laboratory Report Number:	1152938
ADEC File Number:	2404.383.014	ADEC RecKey Number:	

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes No NA (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 ADEC CS approved?

Yes No NA (Please explain) Comments:

Samples were not transferred.

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes No NA (Please explain) Comments:

b. Correct analyses requested?

Yes No NA (Please explain) Comments:

COC requested Method 7471 for Hg, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ}$ C)?

Yes No NA (Please explain) Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain) Comments:

Cool

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain) Comments:

All OK

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes No NA (Please explain) Comments:

e. Data quality or usability affected? (Please explain)

Comments:

No

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain) Comments:

MS/MSD recoveries indicated non-homogeneous mercury distribution in non-project samples.

c. Were all corrective actions documented?

Yes No NA (Please explain) Comments:

Post digestion spikes were successful.

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

Comments:

None

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain)

Comments:

COC requested Method 7471, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

b. All applicable holding times met?

Yes No NA (Please explain)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain)

Comments:

e. Data quality or usability affected? (Please explain)

Comments:

No

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain)

Comments:

iii. If above PQL, what samples are affected?

Comments:

N/A

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

Yes No NA (Please explain) Comments:

Method blanks did not have detections above PQL for target metals.

v. Data quality or usability affected? (Please explain) Comments:

No

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

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain) Comments:

Inorganic analyses by EPA 6020 only in this work order. LCS met QC limits. No LCSD performed.

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain) Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

LCS recoveries within QC control limits.

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/DMSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

Laboratory sample duplicate and MS/MSD indicated samples are non-homogeneous for mercury. Post digestion spikes and laboratory duplicate OK for 15KTM-03 and 15KTM-05.

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

Comments:

15KTM-01, 15KTM-02, 15KTM-04

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain) Comments:

Mercury results for samples 15KTM-01, 15KTM-02, 15KTM-04 qualified "J" as estimated.

vii. Data quality or usability affected? (Please explain) Comments:

Data quality qualified as estimated, but usable for project.

c. Surrogates - Organics Only

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1152938.

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1152938.

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1152938.

iv. Data quality or usability affected? (Use the comment box to explain.).

Comments:

N/A

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1152938.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1152938.

iii. All results less than PQL?

Yes No NA (Please explain.)

Comments:

Inorganic analyses only in work order 1152938.

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

No

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain)

Comments:

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes No NA (Please explain)

Comments:

RPD for mercury was 57% between samples KTM-01 and KTM-02.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Yes No NA (Please explain)

Comments:

Reported mercury results in Work Order 1152938 estimated "J". Results are usable for project purposes.

f. Decontamination or Equipment Blank (if applicable)

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

i. All results less than PQL?

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

No

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain)

Comments:

N/A - None reported.

Reset Form

Laboratory Data Review Checklist

Completed by:	Brice Environmental Services, Inc., Carl Benson		
Title:	Environmental Scientist	Date:	7/10/2015
CS Report Name:	Kolmakof Mine Site Characterization	Report Date:	7/2/2015
Consultant Firm:	Environmental Compliance Consultants		
Laboratory Name:	SGS Anchorage, AK	Laboratory Report Number:	1153196
ADEC File Number:	2404.383.014	ADEC RecKey Number:	

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes No NA (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 ADEC CS approved?

Yes No NA (Please explain) Comments:

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes No NA (Please explain) Comments:

b. Correct analyses requested?

Yes No NA (Please explain) Comments:

COC requested Method 7471, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ}$ C)?

Yes No NA (Please explain) Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain) Comments:

Cool

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain) Comments:

All OK

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes No NA (Please explain) Comments:

None noted

e. Data quality or usability affected? (Please explain)

Comments:

No

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain) Comments:

c. Were all corrective actions documented?

Yes No NA (Please explain) Comments:

Bench spikes and laboratory duplicates were performed when sample heterogeneity caused RPD or spike recovery failure.

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

Comments:

None.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain)

Comments:

COC requested Method 7471, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

b. All applicable holding times met?

Yes No NA (Please explain)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain)

Comments:

e. Data quality or usability affected? (Please explain)

Comments:

No

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain)

Comments:

Mercury reported in method blank at 0.0210 mg/kg, between the LOQ and the DL.

iii. If above PQL, what samples are affected?

Comments:

N/A - all reported results were either below the concentration reported in the blank, or were more than ten times the blank result. No data were qualified.

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

Yes No NA (Please explain) Comments:

Sample results were greater than 10X the concentration observed in the method blank.

v. Data quality or usability affected? (Please explain) Comments:

No

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

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain) Comments:

Inorganic analyses by EPA 6020 only in this work order. Only an LCS performed.

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain) Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

LCS recoveries within QC control limits.

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/DMSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

RPD for target analytes met using MS/MSD and laboratory duplicate results.

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

Comments:

N/A

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain) Comments:

None affected - Sample duplicate precision goal for chromium were met if MS/MSD RPDs were affected by samples being non-homogeneous for target metals.

vii. Data quality or usability affected? (Please explain)

Comments:

No

c. Surrogates - Organics Only

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153196.

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153196.

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153196.

iv. Data quality or usability affected? (Use the comment box to explain.).

Comments:

N/A

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1153196.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1153196.

iii. All results less than PQL?

Yes No NA (Please explain.)

Comments:

Inorganic analyses only in work order 1153196.

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

No

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.)

Comments:

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes No NA (Please explain.)

Comments:

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Yes No NA (Please explain.)

Comments:

RPD goals met for all target metals between sample 15KRM10 and duplicate 15KRM11.

f. Decontamination or Equipment Blank (if applicable)

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

i. All results less than PQL?

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

No

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain)

Comments:

N/A - None reported.

Reset Form

Laboratory Data Review Checklist

Completed by:	Brice Environmental Services, Inc., Carl Benson		
Title:	Environmental Scientist	Date:	7/10/2015
CS Report Name:	Kolmakof Mine Site Characterization	Report Date:	7/7/2015
Consultant Firm:	Environmental Compliance Consultants		
Laboratory Name:	SGS Anchorage, AK	Laboratory Report Number:	1153146
ADEC File Number:	2404.383.014	ADEC RecKey Number:	

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes No NA (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 ADEC CS approved?

Yes No NA (Please explain) Comments:

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes No NA (Please explain) Comments:

b. Correct analyses requested?

Yes No NA (Please explain) Comments:

COC requested Method 7471, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ}$ C)?

Yes No NA (Please explain) Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain) Comments:

Cool

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain) Comments:

All OK

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes No NA (Please explain) Comments:

None noted

e. Data quality or usability affected? (Please explain)

Comments:

No

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain) Comments:

None noted.

c. Were all corrective actions documented?

Yes No NA (Please explain) Comments:

None noted.

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

Comments:

None

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain)

Comments:

COC requested Method 7471, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

b. All applicable holding times met?

Yes No NA (Please explain)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain)

Comments:

e. Data quality or usability affected? (Please explain)

Comments:

No

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain)

Comments:

iii. If above PQL, what samples are affected?

Comments:

N/A

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

Yes No NA (Please explain) Comments:

Method blanks did not have detections for target metals.

v. Data quality or usability affected? (Please explain) Comments:

No

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

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain) Comments:

Inorganic analyses by EPA 6020 only in this work order.

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain) Comments:

One LCS for accuracy, and one MS/MSD pair run for precision. No laboratory duplicate noted.

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

LCS recoveries within QC control limits.

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/DMSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

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

Comments:

N/A

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain) Comments:

None affected

vii. Data quality or usability affected? (Please explain) Comments:

No

c. Surrogates - Organics Only

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153146.

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153146.

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153146.

iv. Data quality or usability affected? (Use the comment box to explain.).

Comments:

N/A

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1153146.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1153146.

iii. All results less than PQL?

Yes No NA (Please explain.)

Comments:

Inorganic analyses only in work order 1153146.

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

No

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.)

Comments:

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

Primary/duplicate sample pairs 15KRM-08/15KRM-09 in Work Order 1153002 and 15KRM10/15KRM11 in Work Order 1153196 cover the samples in this Work Order.

iii. Precision - All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes No NA (Please explain.)

Comments:

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Yes No NA (Please explain.)

Comments:

See checklist for Work Orders 1153002 and 1153196 field duplicate documentation.

f. Decontamination or Equipment Blank (if applicable)

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

i. All results less than PQL?

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

No

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain)

Comments:

N/A - None reported.

Reset Form

Laboratory Data Review Checklist

Completed by:	Brice Environmental Services, Inc., Carl Benson		
Title:	Environmental Scientist	Date:	7/10/2015
CS Report Name:	Kolmakof Mine Site Characterization	Report Date:	6/25/2015
Consultant Firm:	Environmental Compliance Consultants		
Laboratory Name:	SGS Anchorage, AK	Laboratory Report Number:	1153002
ADEC File Number:	2404.383.014	ADEC RecKey Number:	

1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes No NA (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 ADEC CS approved?

Yes No NA (Please explain) Comments:

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes No NA (Please explain) Comments:

b. Correct analyses requested?

Yes No NA (Please explain) Comments:

COC requested Method 7471, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?

Yes No NA (Please explain) Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain) Comments:

Cool

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain) Comments:

All OK

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes No NA (Please explain) Comments:

None noted

e. Data quality or usability affected? (Please explain)

Comments:

No

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain) Comments:

MS/MSD recoveries exceeded QC limits. Post digestion spikes were successful.

c. Were all corrective actions documented?

Yes No NA (Please explain) Comments:

Post digestion spikes were successful indicating adequate laboratory accuracy.

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

Comments:

None

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain)

Comments:

COC requested Method 7471, but laboratory used Method 6020A. Analyses OK. Reporting limits OK.

b. All applicable holding times met?

Yes No NA (Please explain)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain)

Comments:

e. Data quality or usability affected? (Please explain)

Comments:

No

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain)

Comments:

iii. If above PQL, what samples are affected?

Comments:

N/A

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

Yes No NA (Please explain) Comments:

Method blanks did not have detections for target metals.

v. Data quality or usability affected? (Please explain) Comments:

No

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

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain) Comments:

Inorganic analyses by EPA 6020 only in this work order. LCS QC within control limits.

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain) Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

LCS recoveries within QC control limits. MS/MSD spike recoveries verified with bench spikes.

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/DMSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain) Comments:

Laboratory sample duplicate RPD OK. MS/MSD RPD OK.

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

Comments:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain) Comments:

Post-digestion spikes indicate the MS/MSD RPD issues were sample heterogeneity and not analytical.

vii. Data quality or usability affected? (Please explain) Comments:

No

c. Surrogates - Organics Only

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153002.

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153002.

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

Yes No NA (Please explain) Comments:

Inorganic analyses only in work order 1153002.

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

N/A

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1153002.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes No NA (Please explain.) Comments:

Inorganic analyses only in work order 1153002.

iii. All results less than PQL?

Yes No NA (Please explain.)

Comments:

Inorganic analyses only in work order 1153002.

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

No

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.)

Comments:

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes No NA (Please explain.)

Comments:

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Yes No NA (Please explain.)

Comments:

Precision goals met for all target analytes in sample/duplicate pair 15KRM-08 and 15KRM-09.

f. Decontamination or Equipment Blank (if applicable)

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

i. All results less than PQL?

Yes No NA (Please explain)

Comments:

Not performed, all sampling equipment was single-use.

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

No

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain)

Comments:

N/A - None reported.

Reset Form

**LABORATORY DATA
QUALITY ASSURANCE SUMMARY
Kolmakof Mine Site Characterization and Limited Removal Action
2015**

Project Number: BE1501
ADEC Contaminated Site Number: 2404.38.014

This report summarizes a review of analytical results for work order numbers 1152938, 1153002, 1153146, and 1153196 for samples collected on 6/17/2015, 6/19/2015, 6/23/2015, and 6/24/2015, respectively. Samples were collected by Environmental Compliance Consultants (ECC) under the oversight of Brice Environmental Services Corporation (Brice), and submitted to SGS Environmental Services (SGS), Alaska. Samples were analyzed for the following parameters:

- Arsenic, Chromium, Mercury, and Nickel using EPA Method 6020A

Quality Assurance Program

A quality assurance (QA) program was followed that addressed project administration, sampling protocols, data review, and data QA. Sample QA was provided by Brice through strict adherence to sampling protocols. Chain-of-custody (COC) procedures were followed as an integral part of the QA program.

Data validation consisted of the following:

- Verifying that quality control (QC) blanks were properly prepared, identified, and analyzed.
- Reviewing COC records for completeness, signatures, and dates.
- Verifying that surrogate analyses (when applicable) are within recovery acceptance limits.
- Verifying that Laboratory Control Samples (LCS) and Laboratory Control Sample Duplicates (LCSD) are within recovery acceptance limits.
- Verifying that Matrix Spike (MS) and Matrix Spike Duplicate (MSD) recoveries and relative percent differences (RPDs) are within recovery acceptance criteria.
- Verifying that Laboratory Duplicate results (when appropriate) are within RPD acceptance criteria.
- Reviewing the Continuing Calibration Verification (CCV) recoveries are within recovery criteria.
- Evaluating the result RPD between original and blind field duplicate (QC) samples.
- Providing an overall assessment of laboratory data quality and qualifying sample results if necessary.

Data Qualifications

The comments presented in this report refer to the field procedures and the laboratory's performance in meeting the QC specifications. The sample results were reviewed using the following documents:

- ADEC, 18 AAC 75 Oil and Other Hazardous Substances Pollution Control (ADEC, Revised as of June 17, 2015).
- ADEC, Underground Storage Tanks Procedure Manual Guidance for Treatment of Petroleum – Contaminated Soil and Water and Standard Sampling Procedures (ADEC, November 2002).
- ADEC, Draft Field Sampling Guidance (ADEC, May 2010).
- ADEC, Technical Memorandum, Environmental Laboratory Data and Quality Assurance Requirements (ADEC, March 2009).
- EPA Document 530/SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, fourth edition (EPA, November 1991).
- EPA Document 540-10-011R, USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (EPA, January 2010).

Data Validation

Data Package

The data packages were checked for transcription errors, omissions, or other anomalies. No anomalies were found, except as noted below:

- The type of data package was not identified on the Chain of Custody or Sample Receipt Form.
- All samples were analyzed for mercury using Method 6020A in lieu of Method 7471 as requested on Chain of Custody form. Method 6020A has adequate sensitivity to analyze samples from the Kolmakof Mine Site for compliance with site-specific mercury cleanup levels.

Holding Times and Preservation

Samples were appropriately preserved upon collection and were submitted to SGS. Sample analyses were conducted within holding time criteria. No issues were noted in regard to sample preservation or handling.

Laboratory Method Blanks

Laboratory method blanks were analyzed at the appropriate frequencies. No analytes were detected in method blanks at or above the method reporting limits (MRL). Mercury was detected in the laboratory method blank in work order No. 1153196 at a concentration of 0.0210 milligrams per kilogram (mg/kg), below the limit of quantitation (LOQ) of 0.040 mg/kg. All sample results were greater than 10 times this concentration and no qualification was necessary.

Trip Blanks

No trip blanks were included in the subject work orders.

Surrogate Recovery Results

Surrogate analyses were not performed under Method 6020A. Analytical method sensitivity checks were performed using LCS analyses.

Continuing Calibration Verification

Continuing calibration verifications (CCVs) were performed at the required frequencies, and percent recoveries were within EPA and SGS percent recovery acceptance limits.

Field Duplicates

The following field duplicates were collected:

- 15KTM-02 is the field duplicate of 15KTM-01 in Work Order 1152938;
- 15KRM-09 is the field duplicate of 15KRM-08 in Work Order 1153002; and,
- 15KRM11 is the field duplicate of sample 15KRM10 in Work Order 1153196.

For analytes detected above the MRL, duplicate/parent RPDs are summarized below.

RELATIVE PERCENT DIFFERENCES

Parent sample (Duplicate sample) Analyte RPD (%)

15KTM-01 (15KTM-02) Mercury RPD = 57.0%

Parent sample and field duplicate results exceed the RPD QC limit of 50% for mercury in work order 1152938. Mercury results in Work Order 1152938 are qualified "J" to indicate estimated quantities. Duplicate sample RPDs for arsenic, chromium, and nickel were below 50% and no further qualification was required.

Parent sample and field duplicate RPD results in work orders 1153002 and 1153196 were below 50% for all analytes and no qualification was required.

Matrix Spike/Matrix Spike Duplicates

Matrix spike/matrix spike duplicate (MS/MSD) samples were performed at the required frequencies, and percent recoveries and RPDs were within EPA and SGS acceptance limits with the following exceptions:

- Work order 1152938 – MS/MSD recovery for chromium and mercury were outside acceptance criteria. The post-digestion spike was successful and no qualification was required. RPD was outside the 20% acceptance criterion for mercury in samples 15KTM-01, 15KTM-02, and 15KTM-04. Laboratory duplicate also did not meet <20% RPD for mercury in samples 15KTM-01, 15KTM-02, and 15KTM-04 and mercury data in these samples were qualified "J" to indicate estimated quantities.
- Work order 1153002 – MSD recovery for chromium, barium, and mercury were outside acceptance criteria. Post digestion spike was successful and barium was not a target analyte. No qualification required. MSD recovery for barium and mercury were outside of acceptance criteria. Post digestion spike was successful and barium was not a target analyte. No qualification required.
- Work order 1153146 – MS/MSD recoveries were met for target analytes, no data qualification was required.

- Work order 1153196 – MS recoveries for barium, chromium and lead were outside acceptance criteria. The post-digestion spike was successful and no data qualification was required. The MSD recovery for lead did not meet the QC criterion. The post-digestion spike was successful and no data qualification was required. The laboratory duplicate RPD was within the acceptance criterion for chromium. No data qualification was necessary.

Laboratory Control Samples/Laboratory Control Duplicate Samples

Laboratory Control Samples (LCSs) were analyzed for all inorganic analyses were analyzed at the appropriate frequencies. All LCS results in work orders 1152938, 1153002, 1153146, and 1153196 met percent recovery acceptance limits.

Laboratory Duplicate Samples

Laboratory duplicate samples were analyzed for work orders 1152938, 1153002, 1153146, and 1153196. All results were within acceptance criteria except for the laboratory duplicate analysis of mercury in work order 1152938 as noted above, and lead in work order 1153196. Lead was not a target analyte. Affected mercury data in samples 15KTM-01, 15KTM-02, and 15KTM-04 are qualified “J” to indicate estimated quantities.

APPENDIX E

RECORDS OF DISPOSAL

Site Characterization and Limited Soil Removal Report
Kolmakof Mine Site, Alaska

Bureau of Land Management Alaska State Office

4700 BLM Road

Anchorage, AK 99507-2591

November 2015

NON-HAZARDOUS
WASTE MANIFEST

1. Generator ID Number
AKR000004317

2. Page 1 of
3

3. Emergency Response Phone
907-830-1225

4. Waste Tracking Number
2015-00206

5. Generator's Name and Mailing Address
BLM-KOLMAKOF MINE SITE
4700 BLM ROAD
ANCHORAGE, AK 99507
Generator's Phone: 907-267-1226

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name
NORTHERN AIR CARGO

U.S. EPA ID Number
AKD003845526

7. Transporter 2 Company Name
ECC, INC.

(907) 644-0428

U.S. EPA ID Number
AKR000202408

8. Designated Facility Name and Site Address
WM COLUMBIA RIDGE LANDFILL
18177 CEDAR SPRINGS LANE
ARLINGTON, OR 97182-6512
Facility's Phone:

(541) 454-2030

ORD987173457

9. Waste Shipping Name and Description

10. Containers

11. Total
Quantity

12. Unit
Wt./Vol.

1. NON-REGULATED SOLID (SOIL)

No.

Type

1

CM

30,000

P

13. Special Handling Instructions and Additional Information

1. WM100638AK 13KMS0006-0018

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name

Don Maloney

Signature

on behalf of BLM

Month Day Year

7 | 7 | 15

15. International Shipments Import to U.S. Export from U.S.

Transporter Signature (for exports only):

Port of entry/ext.
Date leaving U.S.

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name

Jiang

Signature

[Signature]

Month Day Year

7 | 7 | 15

Transporter 2 Printed/Typed Name

Jackie Donoho

Signature

[Signature]

Month Day Year

7 | 7 | 15

17. Discrepancy

17a. Discrepancy Indication Space

Quantity

Type

Residue

Partial Rejection

Full Rejection

Manifest Reference Number:

U.S. EPA ID Number

17b. Alternate Facility (or Generator)

Facility's Phone:

17c. Signature of Alternate Facility (or Generator)

Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name

Sarah Mastriona

Signature

Sarah Mastriona

Month Day Year

07 | 23 | 15

**NON-HAZARDOUS WASTE MANIFEST
(Continuation Sheet)**

19. Generator ID Number
AKR000004317

20. Page
3 OF 3

21. Waste Tracking Number
2015-00206

22. Generator's Name

BLM-KOLMAKOF MINE SITE

23. Transporter 5 Company Name

R TRANSPORT

U.S. EPA ID Number

WAH000028388

24. Transporter 6 Company Name

Union Pacific Railroad Co.

U.S. EPA ID Number

NED001792910

HM 25. Waste Shipping Name and Description

26. Containers

No. Type

27. Total
Quantity

28. Unit
Wt./Vol.

HM	25. Waste Shipping Name and Description	26. Containers		27. Total Quantity	28. Unit Wt./Vol.
		No.	Type		

29. Special Handling Instructions and Additional Information

30. Transporter 5 Acknowledgment of Receipt of Materials

Printed/Typed Name

Cindi Cress

Signature

Cindi Cress

Month Day Year
7 26 15

31. Transporter 6 Acknowledgment of Receipt of Materials

Printed/Typed Name

Y

Signature

Month Day Year

32. Discrepancy

GENERATOR

TRANSPORTER

DESIGNATED FACILITY



COLUMBIA RIDGE LANDFILL & RECYCLING CENTER

18177 Cedar Springs Lane
Arlington, OR 97812
541-454-2030

November 3, 2015

Environmental Compliance Consultants Inc.
1500 Post Road
Anchorage AK 99501

CERTIFICATE OF DISPOSAL

Waste Management, Inc. dba Columbia Ridge Landfill has received NON HAZARDOUS Waste material from Environmental Compliance Consultants Inc.

Date of Disposal: July 23, 2015
Generator: US DOI BLM Kolmakof Mine Site
Site Address: 4700 BLM Rd – Anchorage AK 99507
Profile #: 100638AK
Total Containers: 1
Total Tons Disposed: 14.99
Waste Description: Metals Impacted Soil

The non hazardous waste material described above was managed in compliance with all applicable laws.

Julie Valdez

Julie Valdez
Operations Specialist

APPENDIX F

SAMPLE LOCATION SURVEY DATA

Site Characterization and Limited Soil Removal Report Kolmakof Mine Site, Alaska

Bureau of Land Management Alaska State Office

4700 BLM Road

Anchorage, AK 99507-2591

November 2015

GPS Data

Horizontal Datum: NAD83(2011)
 Coodinate System: Alaska State Plane Zone 6
 Vertical Datum: NAVD88 (Derived with GEOID12A)
 Units: U.S. Survey Feet

Data Collection Equipment: Trimble Geo 7X with External Antenna

<u>Point Id</u>	<u>Northing</u>	<u>Easting</u>	<u>Elevation</u>	<u>Pit Depth</u>	<u>Feature Type</u>	<u>Vertical Precision</u>	<u>Horizontal Precision</u>	<u>Standard Deviation</u>	<u>Max PDOP</u>	<u>Correction Type</u>	<u>Creation Date</u>
KMS7	2776679.7	1473293.1	262.4	-	BORING	1.4	1.1	0.4	2.4	Postprocessed Carrier Float	06/26/15
KMS8	2776679.5	1473296.7	261.3	-	BORING	1.1	0.8	0.1	2.6	Postprocessed Carrier Float	06/26/15
KMS9	2776675.6	1473308.0	260.7	-	BORING	3.4	2.6	0.2	2.3	Postprocessed Carrier Float	06/26/15
KMS9	2776674.8	1473308.0	260.0	-	BORING	1.1	0.8	0.1	2.4	Postprocessed Carrier Float	06/26/15
KMS10	2776673.9	1473309.1	261.1	-	BORING	1.5	1.2	0.3	2.5	Postprocessed Carrier Float	06/26/15
KMS11	2776674.2	1473307.4	259.5	-	BORING	1.8	1	0.7	2.5	Postprocessed Carrier Float	06/26/15
TP1	2775341.3	1476125.3	125.2	2.17	BORING	4.3	5.5	0.0	2.5	Postprocessed Code	06/24/15
TP2	2775341.5	1476112.8	125.1	3.00	BORING	3.4	3.2	0.1	2.3	Postprocessed Carrier Float	06/24/15
TP3	2775339.8	1476094.9	123.0	4.00	BORING	4.3	5.1	0.1	2.3	Postprocessed Code	06/24/15
TP4	2775322.1	1476087.8	122.1	2.92	BORING	2.8	2.5	0.1	2	Postprocessed Carrier Float	06/24/15
TP5	2775290.2	1476090.7	120.2	2.00	BORING	2.6	2.2	0.1	2.4	Postprocessed Carrier Float	06/24/15
TP6	2775286.8	1476120.2	122.8	3.33	BORING	2.6	2.2	0.1	2.1	Postprocessed Carrier Float	06/24/15
TP7	2775302.6	1476129.7	124.4	1.17	BORING	2.3	1.9	0.1	2.5	Postprocessed Carrier Float	06/24/15
TP8	2775321.8	1476136.3	124.7	2.33	BORING	3.2	2.3	0.1	2.5	Postprocessed Carrier Float	06/24/15
TP9	2775341.8	1476103.0	124.0	3.50	BORING	3.3	3.1	0.0	2	Postprocessed Code	06/24/15
TP10	2775322.8	1476094.1	123.1	2.00	BORING	2.7	2.4	0.0	2	Postprocessed Carrier Float	06/24/15
TP11	2775323.7	1476083.4	121.7	4.00	BORING	3	2.8	0.1	2	Postprocessed Carrier Float	06/24/15
TP12	2775285.4	1476086.0	119.2	2.00	BORING	2.7	2.4	0.1	2.3	Postprocessed Carrier Float	06/24/15
TP13	2775274.2	1476105.6	121.1	1.83	BORING	2.5	2.1	0.1	2.4	Postprocessed Carrier Float	06/24/15
TP14	2775296.4	1476130.1	123.7	1.83	BORING	2.4	1.9	0.1	2.1	Postprocessed Carrier Float	06/24/15
TP15	2775351.1	1476124.7	125.6	3.00	BORING	2.9	2.6	0.1	3.2	Postprocessed Code	06/24/15
WEST SIDE DOWN GRADIENT	2775307.1	1476100.1	123.5		TOPO	3.2	2.4	0.1	2.8	Postprocessed Carrier Float	06/24/15

GPS Data

Horizontal Datum: NAD83(2011)
Coordinate System: Alaska State Plane Zone 6
Vertical Datum: NAVD88 (Derived with GEOID12A)
Units: U.S. Survey Feet

Data Collection Equipment: Trimble Geo 7X with External Antenna

<u>Point Id</u>	<u>Northing</u>	<u>Easting</u>	<u>Elevation</u>	<u>Pit Depth</u>	<u>Feature Type</u>	<u>Vertical Precision</u>	<u>Horizontal Precision</u>	<u>Standard Deviation</u>	<u>Max PDOP</u>	<u>Correction Type</u>	<u>Creation Date</u>
NORTH END HIGH POINT	2775329.4	1476099.6	120.8		TOPO	4.4	5.1	0.1	2.8	Postprocessed Code	06/24/15
SOUTHERN HIGH POINT	2775292.6	1476113.0	123.2		TOPO	2.6	2	0.2	2.1	Postprocessed Carrier Float	06/24/15
CP	2775322.6	1476115.2	121.6	4.00	TOPO	3.8	2.6	0.2	2.7	Postprocessed Carrier Float	06/24/15
HIGHEST POINT	2775310.8	1476120.2	128.4		TOPO	2	1.6	0.2	2	Postprocessed Carrier Float	06/24/15