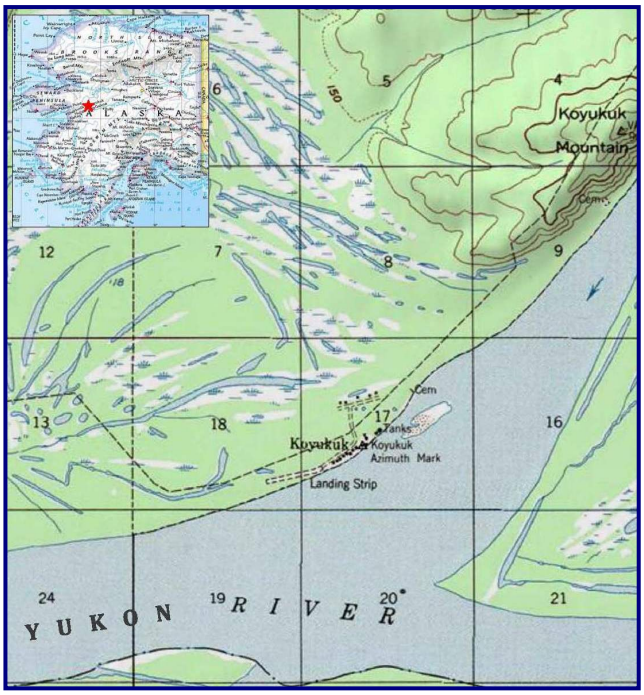
Alaska Department of Environmental Conservation

Reuse & Redevelopment Initiative

Brownfield Assessment



ENVIRONMENTAL MANAGEMENT PLAN

Koyukuk Former Generator Building

Koyukuk, Alaska

Submitted to:
Department of Environmental Conservation
Brownfield Program

By:
SLR International Corp
June 2009

ENVIRONMENTAL MANAGEMENT PLAN
KOYUKUK FORMER GENERATOR BUILDING
KOYUKUK, ALASKA

Prepared for

Alaska Department of Environmental Conservation
Contaminated Sites Program
Division of Spill Prevention and Response
610 University Avenue
Fairbanks, AK 99709-3643

June 2009

Prepared by

SLR
4601 Business Park Blvd., Suite K42
Anchorage, Alaska 99503

3455 Rewak Drive, Suite 103
Fairbanks, Alaska 99709

SLR Project Number
005.0065.09002

DRAFT
ENVIRONMENTAL MANAGEMENT PLAN
KOYUKUK FORMER GENERATOR BUILDING
KOYUKUK, ALASKA

This document has been prepared by SLR International Corp. The material and data in this report were prepared under the supervision and direction of the undersigned.

Christina Bentz
Project Geologist

Carl Benson
Project Manager

CONTENTS

CONTENTS (CONTINUED)

CONTENTS (CONTINUED)

TABLE

FIGURES

APPENDICES

ACRONYMS

AAC	Alaska Administrative Code
ADF&G	Alaska Department of Fish and Game
AK	Alaska Method
BGES	Braunstein Geological & Environmental Services
bgs	below ground surface
BIA	Bureau of Indian Affairs
BTEX	benzene, toluene, ethylbenzene, and xylenes
CFR	Code of Federal Regulations
CSM	conceptual site model
cy	cubic yards
DBA	DEC Brownfield Assessment
DCCED	Alaska Department of Commerce, Community and Economic Development
DEC	Alaska Department of Environmental Conservation
DNR	Alaska Department of Natural Resources
DRO	diesel range organics
EMP	environmental management plan
EPA	U.S. Environmental Protection Agency
ESA	environmental site assessment
ETM	exposure tracking model
GRO	gasoline range organics
HAZWOPER	Hazardous Waste Operations and Emergency Response
IGAP	Indian General Assistance Program
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NEC	notice of environmental contamination
PAH	polynuclear aromatic hydrocarbons
PID	photoionization detector
ppm	parts per million
RACM	regulated asbestos containing material
RRO	residual-range organics
SLR	SLR International Corp
STRP	State Tribal Response Program

ACRONYMS (CONTINUED)

TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
VOC	volatile organic compound
YRITWC	Yukon River Inter-tribal Watershed Council

EXECUTIVE SUMMARY

SLR International Corp is pleased to submit this Environmental Management Plan (EMP) to the Alaska Department of Environmental Conservation (DEC) for the Koyukuk Former Generator Building site in Koyukuk, Alaska. The Koyukuk Former Generator Building is located on Block 10, Koyukuk Townsite Subdivision, of U.S. Survey No. 4488 and will be referred to as the Site for the remainder of this plan.

The objective of this EMP is to provide information aimed at advancing the Site through the Brownfield process to beneficially reuse the Site. The Site has had at least two documented hydrocarbon releases, both occurring in 2002. The first spill was reported to DEC in January 2002 when a day tank emergency shutdown switch failed and caused the tanks to overfill. The spill, estimated at 500 gallons, flowed out of a vent onto the roof and ran onto the ground under and adjacent to the building; the ground under the building was saturated with heating fuel. Approximately one to two months later, the same system failed and the tank again overfilled. The volume of the second spill was also estimated at 500 gallons. The duration and the rate of product loss are not known for either spill.

Interested parties in this EMP are the City of Koyukuk, the Koyukuk Tribal Council, and the Yukon River Inter-Tribal Watershed Council. The City intends to reuse the Site for a new tribal clinic.

Estimated extents of contamination were developed based on historical sampling data for the release areas at the Site. The remedial alternative of landfarming for ultimate use as landfill cover was chosen for soils excavated from the suspected release areas. A cost estimate for guiding future funding requests was prepared for the preferred remedial alternative based on the nearest heavy equipment contractor, and labor available in Koyukuk.

1. INTRODUCTION

In the spring of 2008, the Koyukuk Tribal Council submitted an Alaska Department of Environmental Conservation (DEC) Brownfield Assessment (DBA) request form to the Alaska Department of Environmental Conservation (DEC) to address contamination concerns at the Site. The DBA request form is included as Appendix A. The property in question contains a former generator building. The Koyukuk Former Generator Building is owned by the City of Koyukuk and is located on Block 10, Koyukuk Townsite Subdivision, of U.S. Survey No. 4488. The DBA request form identified fuel contamination from former activities at the Site as a health concern precluding reuse of the land. The Tribal Council's stated reuse objective for the Site is to provide the community with a new health clinic. Specific information for the clinic was not provided in the DBA request form.

This Environmental Management Plan (EMP) was written by SLR International Corp (SLR) on behalf of DEC in response to the Koyukuk Tribal Council's Brownfield Assessment request to provide background, regulatory and remedial option information suitable to progress the Site through the Brownfield process.

Funding for this work was provided by the DEC using the State Tribal Response Program (STRP) grant program, which is sponsored by the U.S. Environmental Protection Agency (EPA). Future funding to address cleanup has not been identified for this site at this time, although the EPA Brownfield Program has national competitive cleanup grants for which this project may be eligible.

1.1 PURPOSE OF PROJECT

The purpose of this EMP is to provide background, regulatory and remedial option information appropriate for advancing the Site through cleanup and redevelopment. The stated reuse objective for the Site is to provide the community with reusable property to support the development of a new health clinic.

1.2 SCOPE OF SERVICES SUMMARY

SLR completed the following tasks to develop this EMP.

1.2.1 TASK 1 – STAKEHOLDER SCOPING AND PLANNING MEETING

In February 2009, SLR participated in a stakeholder and planning teleconference with stakeholders in the project. Attendees included representatives from the Koyukuk Tribal Council, the City of Koyukuk, DEC, EPA, SLR, the Yukon River Inter-Tribal Watershed Council (YRITWC), and the Indian General Assistance Program (IGAP). The purpose of the

meeting was to define the cleanup objectives and approach to a solution within the context of the existing environmental impacts. The meeting also identified the path through the Brownfield process to reuse the Site. SLR prepared a summary record of the meeting and provided it to the stakeholders and DEC. A copy of this summary and the EMP Contact List is included in Appendix B.

1.2.2 TASK 2 – SUBMIT AN OUTLINE OF THE EMP TO DEC

In March 2009, SLR submitted an outline of the proposed EMP document. The outline consolidated information from DEC site files, the Phase I and Limited Phase II Site Assessment previously prepared for the sites (BGES, 2008), an interview plan, and other information to gain an understanding of known Site conditions and local and regional resources for managing the Site. The outline summarized the information planned for inclusion in the final draft of the EMP document. On March 31, 2009, SLR received comments from DEC on the submitted outline.

1.2.3 TASK 3 – DRAFT AND FINAL EMP PREPARATION

The development of the EMP followed outline preparation. This EMP summarizes a comprehensive summary based on the inventory of existing background documents, interviews, and meeting summaries. The intent of this EMP is to supply all interested stakeholders with a guideline document suitable for progressing the Koyukuk Site through the Brownfield.

1.3 OBJECTIVES

The following objectives were used to guide the preparation of this EMP:

- Compiling demographic information about the Village of Koyukuk; current Site ownership information; prior and current use; and reuse objectives for the land;
- Preparing a summary of contaminant history and assessment activities performed to date; and
- Developing an execution plan and a cost estimate for a feasible remedial alternative permitting the land's reuse objective to be met.

2. COMMUNITY OVERVIEW AND INFORMATION

This section provides information about the community of Koyukuk, home of the Koyukon Athabascans. It provides pertinent information on the stakeholders and summarizes the community involvement for the site.

2.1 COMMUNITY GENERAL INFORMATION

The area experiences extreme temperature differences; average daily high temperatures (measured in degrees Fahrenheit) in July are in the low 70s and average daily low temperatures in January range from 10 degrees to below zero. Sustained temperatures of 40 degrees below zero are common in the winter. Annual precipitation is 13 inches, with 60 inches of annual snowfall. The Yukon River is ice free from the middle of May through the middle of October (DCCED, 2009).

The City of Koyukuk is subject to regular flooding. The highest flood on record was in 1963, when the City was submerged by approximately 16.7 feet of flood water (BGES, 2008). Residents want to relocate the City of Koyukuk due to the severe flooding events (DCCED, 2009).

No homes have complete plumbing, most use honey buckets and outhouses. The City provides treated well water at the washeteria (DCCED, 2009). Most Koyukuk residents currently haul water from the washeteria, which is supplied by the community well. This is the only well registered in the community and no residents own or operate wells of their own (DEC, 2009b). The drill log prepared for this well is provided in Appendix C.

2.1.1 LOCATION

Koyukuk is located on the Yukon River, near the mouth of the Koyukuk River, 30 miles west of Galena, Alaska and 290 air miles west of Fairbanks. Figure 1 shows the location of Koyukuk, located in the Nulato Recording District. The community is at approximately 64.880930º North Latitude and -157.701030º West Longitude using North American Datum 1983 (Section 17, Township 7 South, Range 6 East of the Kateel River Meridian). The area encompasses 6.2 square miles of land and 0.1 square miles of water.

2.1.2 POLITICAL ORGANIZATIONAL STRUCTURE

In 1973, Koyukuk became one of 116 incorporated second class cities within Alaska (DCRA, 2009). This incorporation indicates that the City has fewer than 400 residents and is governed by a seven-member Council, known in Koyukuk as the Koyukuk Tribal Council (http://www.dced.state.ak.us/dca/logon/muni/muni-structure.htm). The city council oversees

the administration and operation of municipal services and infrastructure such as water, sewer, and electricity services.

There is a seven-member village council that administers programs in the village. These programs are defined in compacts with the Bureau of Indian Affairs (BIA). Some examples of village programs under contract with the BIA are tribal family youth programs, IGAP, and transportation.

2.1.3 STAKEHOLDERS

Stakeholders for this project include the City of Koyukuk, the Koyukuk Tribal Council, DEC, EPA, and the YRITWC. A summary of the project stakeholders and their involvement in the Brownfield process for the Site in Koyukuk is provided below.

2.1.3.1 The City of Koyukuk

Koyukuk City Council is the governing body for administering municipal services in the City of Koyukuk. The City of Koyukuk owns the land comprising the Site, and is considered an eligible applicant for EPA Brownfield assessment and cleanup grants.

2.1.3.2 The Koyukuk Tribal Council

The Koyukuk Tribal Council administers the IGAP program through a grant from EPA. The IGAP provides an opportunity for tribes to build capacity and management capability to implement environmental programs administered by the Tribe. In 2008, following the Phase I and Limited Phase II Environmental Site Assessment (ESA), the Environmental Coordinator for the Koyukuk Tribal Council filed a DBA request form requesting assistance to address the cleanup of this site.

2.1.3.3 The Yukon River Inter-Tribal Watershed Council

The YRITWC consists of 66 First Nations and Tribes and is dedicated to the protection and preservation of the Yukon River Watershed. The council provides Yukon First Nations and Alaska Tribes in the Yukon Watershed with technical assistance such as facilitating the development and exchange of information; coordinating efforts between First Nations and Tribes; undertaking research; and providing training, education and awareness programs to promote the health of the watershed and its Indigenous peoples.

Since receiving Section 128(a) Tribal Response Program funding in 2005, the YRITWC Program has partnered with 36 tribes, working with them to identify, prioritize, and assess potential Brownfields. In the spring of 2008, the Koyukuk Tribal Council applied for an ESA through the YRITWC Brownfield Program. This project site was ranked as a high priority and the council selected the Koyukuk site to receive an ESA. The YRITWC also completed an action plan for the Site, with the purpose of providing the Koyukuk community with background information and proposed site control and cleanup options.

The YRITWC operates a backhaul program to several villages. Koyukuk is served by this backhaul program with barges. The YRITWC coordinates the process for the backhaul program. The village IGAP coordinator submits the YRITWC with a list of material

requiring backhaul. The program provides all of the cost for the backhaul using funds provided through the EPA.

The removal is generally coordinated with other big projects in the village (construction, large shipment) especially for Hughes. This dramatically cuts the cost of having to contract a special carrier just for the removal. In this manner, debris can be staged for transport by the empty carrier after delivery of the goods for the other project.

2.1.3.4 Alaska Department of Environmental Conservation

DEC administers an STRP program on behalf of the State of Alaska through a federal grant from EPA. A portion of the grant is used by DEC to fund specific projects based on a prioritization of all DBA request forms received annually from communities with Brownfield concerns. The DEC Division of Spill Prevention and Response has also been active in Koyukuk responding to concerns regarding potentially contaminated sites. There are currently three active contaminated sites in Koyukuk and one is on the subject property for this EMP.

2.1.3.5 U.S. Environmental Protection Agency

The EPA funds state and tribal Brownfield Programs. The STRP plays a significant role in cleaning up Brownfields across the country and Alaska. The continued demand for Brownfield cleanup and redevelopment in communities throughout the country, coupled with increasingly limited state and tribal resources, makes access to federal funding critical. The law authorizes EPA to provide up to $50 million in grants to states and tribes to establish or enhance their response programs. Generally, these response programs address the assessment, cleanup, and redevelopment of Brownfields (USEPA, 2009).

EPA's Brownfield Program empowers tribes, states, and communities by providing money and technical assistance to prevent, assess, safely cleanup, and sustainably reuse Brownfields. EPA is proud of its partnership with the more than 60 tribes that are creating and enhancing Tribal Response Programs to address the cleanup and reuse of contaminated property in Indian country. Through these response programs, tribes are taking an active role in combating environmental issues, while creating self-sufficient organizations for environmental protection (USEPA, 2009).

2.1.4 COMMUNITY DEMOGRAPHICS

Historically, the Koyukon Athabascans moved with the migration of game and had temporary spring, summer, fall, and winter camps in the vicinity of Koyukuk. The group inhabited 12 summer fish camps on the Yukon River between the Koyukuk River and the Nowitna River. In 1939, the first school was constructed and after this, several families began to live in Koyukuk year round. The City was incorporated in 1973 and is currently 91.1 percent Alaska Native or part Native. During the 2000 U.S. Census, the population of Koyukuk was reported at 101 persons and there were 55 housing units, with 16 of the units being used only seasonally (DCCED, 2009).

There are very few full time jobs in the community. The City, tribe, clinic, school, and store provide the only year round employment. Seasonal jobs often conflict with subsistence opportunities. The unemployment rate at the time of the 2000 Census was 23.08 percent, the median household income was $19,375, and per capita income was $11,342.

2.2 COMMUNITY INVOLVEMENT

During the DEC 2008 Brownfield Assessment application process, a project team was developed, identifying community involvement in the desired cleanup of the Koyukuk contaminated site. Members of the Koyukuk Tribal Council and the City of Koyukuk are active participants (DEC, 2008d). The contact list for the project is included as Appendix B of this plan. Within the DBA request form, community concerns were identified, including the concern that the Site is in close proximity to the community well (estimated in the application as being 75 feet away). It was also expressed that the Site was close to the Ella B. Vernetti School. Also, the community expressed concern that there was a high potential for fire. The community's desire to reuse the land is based on the need for a new health clinic in the village. The application stated that tribal members believe it is important to construct a new clinic as the current clinic is too small, has numerous deficiencies, and does not meet state standards.

The City of Koyukuk has held meetings regarding the reuse of the land since 2006 (DEC, 2008d). Community members of the project team have committed to assisting in the planning and logistics of the needed work. As part of this involvement, residents have provided interviews for the development of the ESA (BGES, 2008), the YRITWC Action Plan, and this EMP.

2.2.1 STAKEHOLDER MEETING SUMMARY

In February 2009, a stakeholder and planning teleconference was held and included attendees from the Koyukuk Tribal Council, the City of Koyukuk, DEC, EPA, SLR, the YRITWC, and the IGAP. The purpose of the meeting was to define the cleanup objectives and approaches to a solution within the context of the existing environmental impacts. The meeting also identified the path through the Brownfield process to reuse the Site. SLR prepared a summary record of the meeting and provided it to the stakeholders and DEC. A copy of this summary is included in Appendix B.

2.2.2 PROPOSED COMMUNITY DEVELOPMENT AND LAND USE

Community plans for the development and use of the Site include the construction of a new community clinic to be used by Koyukuk residents. Currently, the property is not used and is unoccupied by residents.

2.2.3 INTERVIEWS AND COMMUNITY INPUT

As part of the EMP, an individual familiar with the Site was interviewed. The interview is described below.

Shanda Krista (IGAP Coordinator, Koyukuk Tribal Council) – Ms. Krista provided information on equipment, contractors, and upcoming work within the community. Ms. Krista indicated that there is a dump truck, loader, and CAT in Koyukuk, but they may or may not be operational. Ms. Krista also indicated that there are several individuals in Koyukuk who are qualified equipment operators. The nearest contractor is Ruby Construction, which is located approximately 90 miles upriver; Ruby Construction sent equipment to Koyukuk in 2008 via barge. Ms. Krista indicated that there is no known upcoming construction activity; the runway was upgraded in 2008.

3. PROPERTY/SITE OVERVIEW

This section provides the historical overview of the site including the historical and current use of the site and its geologic setting. It also summarizes the records review conducted for this work.

3.1 HISTORICAL OVERVIEW OF SITE PROPERTIES

The Koyukuk Former Generator Building is owned by the City of Koyukuk and located on Block 10, Koyukuk Townsite Subdivision, of U.S. Survey No. 4488. The site vicinity is shown on Figure 2. In a 1984 aerial photograph, the subject property was not paved and appeared to be mostly clear of vegetation (BGES, 2008). A tank farm was located adjacent to, and south of the former generator building; the school and washeteria building are across Vista Road to the west of the subject property (BGES, 2008). An aboveground pipeline that supplied fuel to both the former generator building and the school tank farm extends east-west under Vista Road (BGES, 2008). In 1993, aerial photography reveals that the site was covered in vegetation and several drums were located in the vicinity of the former generator building (BGES, 2008).

3.2 GEOLOGIC SETTING

According to the ESA (BGES, 2008), the surficial geology of the soil underlying the City of Koyukuk and the river basin is characterized as young flood plain deposits. The eco-region in the vicinity of Koyukuk is described as containing steep habitats with willow and alder thickets along gravel bars and strands of cottonwood and white spruce on higher ground. The land is interspersed with bogs, tundra, grass lakes, and black spruce (BGES, 2008).

The documentation for the community well was reviewed for lithological information; the community water well is the only registered water well located for the Koyukuk area. The well log indicates frozen silty sand and sandy silt from 1 foot below ground surface (bgs) to 28 feet bgs. First water is indicated between 35 feet and 53 feet bgs in a silt and sandy silt unit. Below 53 feet bgs, gravels, heaving sands, and silts are encountered with bedrock between 186 feet and 190 feet bgs. Three bail-down tests were conducted according to the well log.

Koyukuk is subject to flooding. According to the U.S. Army Corp of Engineers (USACE) Flood Hazard Data, the highest flood of record, which occurred in 1963, submerged the village with approximately 16.7 feet of flood water. A flood also occurred in 1989, but no water elevation is available for this flood (USACE, 2009).

3.3 PROPERTY USE

Figure 3 shows the Site plan and the Braunstein Geological & Environmental Services (BGES) soil-screening locations. Currently, the City of Koyukuk owns the Site comprising the former generator building. The Site is centrally located in Koyukuk, in close proximity to the washeteria and the community well.

3.3.1 HISTORICAL USE

During the ESA (BGES, 2008), a review of historical aerial photographs, including a 1963 photograph, indicated that the Site was not paved and appeared to be mostly clear of vegetation. A tank farm was adjacent to and south of the former generator building. The school and washeteria building are across Vista Road to the west of the subject property. An aboveground pipeline that supplied fuel to both the former generator building and the school tank farm extends east-west under Vista Road. In 1993, aerial photography reveals that the site was covered in vegetation and several drums were located in the vicinity of the former generator building (BGES, 2008).

3.3.2 CURRENT USE

Current use at the site is minimal. However, as depicted in Figure 2, the property is in the center of town, in close proximity to the school, city offices, city well, and the washeteria. Residents occasionally traverse the property en route to other destinations (BEGS, 2008).

3.4 RECORDS REVIEW

Since the BGES 2008 review of the DEC contaminated sites database, the City of Koyukuk generator day tank site listing has been modified to include the January 2009 EPA approval for the Brownfield process. It has also been updated to include the results of the ESA (BGES, 2008).

Records reviewed to prepare this EMP also included files from DEC's Drinking Water program. As a Class C public water system in Alaska, the water well at Koyukuk is sampled regularly by the community per the requirements of the Drinking Water Program in DEC's Division of Environmental Health's Drinking Water Program. The Drinking Water Program maintains a database of well sampling results going back to 1995 for the community of Koyukuk. These data indicate deviations in the monitoring schedule, but no reportable concentrations of volatile organic compounds (VOCs) using EPA Method 524.2. Analysis for VOCs in the community well water is scheduled annually at Koyukuk. The most recent VOC results for the Koyukuk community well are provided in Appendix D.

4. ENVIRONMENTAL REVIEW AND SUMMARY OF FINDINGS

This section summarizes previous environmental review conducted for the site. It also provides the summary of the findings of this report.

4.1 PREVIOUS WORK AND EXISTING SITE DATA

DEC's Spill Response personnel responded to two diesel spill events reported in early 2002. These were documented as spill number 02309902601 (approximately 500 gallons) on January 26, 2002, and spill number 02309906001 (approximately 55 gallons) on March 1, 2002. DEC personnel visited the site in May 2002 to assess impacts and reported contamination within and on the ground surrounding the generator building.

BGES was retained by the YRITWC in 2008 to conduct a Phase I and Limited Phase II ESA of the areas containing the former generator building (BGES, 2008). A summary of the findings of the ESA taken from the BGES report (2008) is described below.

The ESA found that the Site had previously operated as the city's primary power plant with at least two documented releases associated with the power plant day tank. Overturned drums and stained soil were observed. BGES advanced hand borings and collected field screening samples in the vicinity of the former generator building, the drum spill area, and in the low-lying area south of the former generator building. Soil screening samples from south and east of the building all exhibited elevated photoionization detector (PID) readings. Field screening results were verified by analytical results. Contamination above DEC soil cleanup levels was confirmed south of the generator building and in near-surface soils associated with the drums. Contamination south of the building appeared to extend to permafrost, which was encountered at approximately 6 feet bgs. BGES estimated that approximately 200 cubic yards (cy) of soil had been impacted. Contamination consisted primarily of diesel range organics (DRO), with residual range organics (RRO), gasoline range organics (GRO), benzene, toluene, ethylbenzene, xylenes, and naphthalene detected over a smaller area (i.e. closest to the south side of generator building).

Koyukuk operates a Class C Public Water System from its community well, the location of which is noted on Figure 2. The DEC Division of Environmental Health's Drinking Water Program currently requires annual sampling of this well for VOCs. The latest well water analytical results are presented in Appendix D.

Analytical and field screening data from this work is described in the Conceptual Site Model (CSM) presented as Appendix E. Table 2 in the BGES ESA contains the field screening results and analytical results for hand borings at the Site.

During the 2008 site work, frozen soil was encountered between 2 feet bgs and 6 feet bgs in the vicinity of the generator building.

4.2 POTENTIAL SOURCE AREAS

An estimated contaminant extent was prepared based on the ESA report (BGES, 2008). This is included as Figure 3. Figure 3 depicts the two source areas where soil removal should be performed. The two identified source areas were a drum handling area and the area beneath and south of the generator building potentially impacted by day tank overfills. Section 5.2 presents estimated soil removal volumes for each of these areas, assuming an excavation depth of 5 feet bgs, the estimated depth to permafrost.

4.3 KNOWN OR PERCEIVED DATA GAPS

The primary data gaps existing for characterizing the contamination at the Site is the magnitude of soil impact and ground water impact, if present. Ground water was not encountered during the advancement of hand borings, which reached a depth of 6 feet bgs (BGES, 2008). Assumptions were used to develop estimated soil removal volumes in Section 5.2.

4.4 CONCEPTUAL SITE MODEL

SLR developed a CSM to qualitatively assess the risk to potential human and ecological receptors from petroleum hydrocarbons in soil at the Site. The CSM is based upon the available data for this site collected by BGES (2008) and describes the potential exposure scenarios for current and future Site receptors. The CSM is included as Appendix E of this report.

The CSM identified the following potentially complete exposure pathways:

- Direct contact exposure pathway via incidental soil ingestion,
- Dermal absorption of contaminants from soil,
- Ingestion of ground water,
- Inhalation of outdoor air,
- Inhalation of indoor air, and
- Ingestion of surface water.

A complete discussion of these pathways is provided in Appendix E.

DEC's Contaminated Sites Program developed the Exposure Tracking Model (ETM) to assist the program in prioritizing sites that have the greatest potential of a risk of exposure. The ETM is a revision to the Alaska Hazard Ranking Model, historically used to prioritize all contaminated sites. The ETM provides a preliminary evaluation using available information and data on all sites and provides a ranking of each site according to possibility of human and

ecosystem exposure to the contaminants. Prioritization for a site can change over time as new information becomes available, and as cleanup actions decrease the potential for exposure.

DEC has provided the ETM for this EMP. The results summary of the model found that there are three exposure pathways with high potential for exposure for human receptors, and ecological receptors have a high potential for exposure. Human receptors have a high potential for exposure via direct contact with surface soil, direct contact with subsurface soil, and outdoor air inhalation. On November 1, 2007, on a scale of 1 to 10, with 10 representing highest priority, the ETM ranked the Koyukuk site with a score of 1. The ETM is included as Appendix F.

4.5 CLEANUP CRITERIA

The current DEC soil and ground water cleanup levels are contained in Title 18 of the Alaska Administrative Code (AAC) Chapter 75, Table C, *Oil and Hazardous Substances Pollution Control Regulations* (DEC, 2008b). Current DEC surface water cleanup levels are outlined in 18 AAC 70 Water Quality Standards (DEC, 2008c).

Risk-based removal of contaminated soils at the site may target higher cleanup thresholds, based on inhalation or ingestion exposure pathways. Past assessment work at the Site has used the cleanup levels cited below for screening comparison purposes.

4.5.1 SOIL CLEANUP LEVELS

Migration to ground water cleanup levels were previously cited for the sampling performed at the Site. These levels have been updated to reflect the current lowest cleanup levels from Tables B1 and B2 of 18 AAC 75 for the under 40-inch zone (DEC, 2008b) and are listed below:

- Benzene, 0.025 milligrams per kilogram (mg/kg) (migration to ground water)
- Toluene, 6.5 mg/kg (migration to ground water)
- Ethylbenzene, 6.9 mg/kg (migration to ground water)
- Total xylenes, 63 mg/kg (migration to ground water)
- GRO, 300 mg/kg (migration to ground water)
- DRO, 250 mg/kg (migration to ground water)
- RRO, 10,000 mg/kg (ingestion)
- Lead (if gasoline is targeted), 400 mg/kg (direct contact)
- 1,2-Dibromoethane (if gasoline is targeted - lead scavenger compound), 0.00016 mg/kg (migration to ground water)
- 1,2-Dichloroethane (if gasoline is targeted - lead scavenger compound), 0.016 mg/kg (migration to ground water)
- Polynuclear aromatic hydrocarbon (PAH) compounds at varying concentrations listed in 18 AAC 75.

During preparation of this EMP, all information indicates that fuel handling at the site was limited to diesel fuel. If gasoline is ultimately targeted, and lead scavengers are suspected, samples should be analyzed for VOCs and lead.

Higher cleanup levels may be adopted if soil removal and remediation, and institutional controls, can allow soils at the site to exhibit contaminant levels at or below concentrations prescribed by the inhalation of outdoor air exposure pathway.

4.5.2 GROUND WATER AND SURFACE WATER

Ground water and surface water samples should be compared to 18 AAC 70 and 18 AAC 75 cleanup levels.

4.5.2.1 Ground Water

Ground water samples should be collected from the community well, located northwest of the Site, and the results should be compared against prior monitoring results for that location using EPA Method 524.2 for VOCs.

Applicable 18 AAC 75 Table C ground water cleanup levels would be used for the contaminants listed for ground water. Table C ground water cleanup levels are listed below:

- Benzene, 0.005 milligrams per liter (mg/L)
- Toluene, 1.0 mg/L
- Ethylbenzene, 0.7 mg/L
- Total xylenes, 10 mg/L
- GRO, 2.2 mg/L
- DRO, 1.5 mg/L
- RRO, 1.1 mg/L
- Lead (if gasoline is targeted), 0.015 mg/L
- 1,2-Dibromoethane (if gasoline is targeted - lead scavenger compound), 0.00005 mg/L
- 1,2-Dichloroethane (if gasoline is targeted - lead scavenger compound), 0.005 mg/L
- PAH compounds at varying concentrations listed in 18 AAC 75 Table C.

4.5.2.2 Surface Water

Analytical data from samples collected from surface waters, if present outside the proposed limits of excavation depicted in Figure 3, should be compared to water quality criteria published in 18 AAC 70 (DEC, 2008c). Analyses of surface water samples should include total aromatic hydrocarbons (TAH) using EPA Method 624, and PAHs using EPA Method 610. The sum of TAH and PAH results from these two methods yield a total aqueous hydrocarbon (TAqH) that can be compared to water quality criteria in 18 AAC 70.

Samples to determine concentrations of TAH and TAqH should be collected in marine and fresh waters below the surface and away from any observable sheen as required by 18 AAC 70.020.

DEC records indicate that the Site hosts ephemeral melt water ponds. This water accumulates immediately on the areas targeted for soil removal and would not require sampling.

4.5.3 OTHER REGULATED CLEANUP CRITERIA

All material to be removed off site should be inventoried prior to the handling of the waste. If regulated asbestos containing material (RACM) or non-RACM asbestos waste is found, it must be removed prior to any necessary excavation. A certified asbestos removal contractor will be required to remove all asbestos containing waste. Alternatively, one-time asbestos containing waste disposal operation may be possible through the acquisition of a DEC Solid Waste General Permit; General Permit Number SWG0301000 is issued for a one-time disposal of asbestos containing waste.

The DEC Division of Environmental Health's Solid Waste Program (DEC Solid Waste Program) should also be contacted regarding the removal and disposal of lead paint and other hazardous materials. Hazardous material that does not include asbestos or scrap metal debris and does not exceed a total of 1,000 cy of waste may be disposed of by obtaining DEC Solid Waste Program's General Permit Number SWG0303000. This permit may only be used for disposal of wastes in locations that are more than 100 miles from the nearest permitted landfill. In the event the new landfill at Koyukuk is permitted prior to this removal and excavation activity, this permit should not apply.

4.5.4 NON-REGULATED CLEANUP CRITERIA

For non-hazardous, non-regulated waste material, cleanup criteria do not include the acquisition of a DEC Solid Waste Permit. Material including, but not limited to, cement, rebar, crushed glass, brick, and mortar are usually not regulated.

4.6 GENERAL ENVIRONMENTAL OVERVIEW

Based on the CSM provided in Appendix E of this plan, the documented contaminant levels in soil at this Site, and the planned land re-use objective (location of new clinic), remedial action is necessary to reduce the risk to human receptors prior to re-use. Near-surface soil contamination poses a risk to human receptors through incidental ingestion or direct contact with Site soils and inhalation of outdoor air.

Because the site is centrally located within the community, and the stated re-use objective of a new community health clinic will involve the presence and congregation of children from the community, cleanup activities would significantly reduce the potential exposure to contaminants by human and ecological receptors. The recommended cleanup activities should also reduce exposure to the environment by removing the former generator building and near-surface soil contamination from potential flood exposure.

5. RECOMMENDED ACTIONS

The following sections summarize the actions necessary to reuse the land at Block 10 for the purposes of a community clinic in Koyukuk.

Although the planned soil removal should ultimately help improve ground water conditions, the sanitation improvement and well relocation projects are outside the scope of work of this EMP.

5.1 DEBRIS REMOVAL

Any management alternative for contaminated soil at the site should be preceded by the management, reduction, and removal or disposal of construction debris, the former generator building, steel drums, and other material. Figures 2 and 3 show the location of this material that must be removed off site. This material includes, but is not limited to, the following items.

- **The Former Generator Building**, including the generator and the cooling system, the electrical breaker panel, and potentially a dry transformer may require disposal. Liquid wastes associated with previous operation of this generator building such as radiator coolant or used oil in buckets should be managed under the liquid waste management section below. This building appears from site photographs to be of wood frame construction on a wood piling or post and beam foundation. Potentially hazardous materials in the former generator building including polychlorinated biphenyls in some fluorescent light ballasts, mercury in some thermostats, fluorescent light bulbs and lamps, pilot light sensors, electric switches, and space heaters may require disposal according to all applicable state, federal and local regulations.
- Several **marked and unmarked abandoned drums** are located near the former generator building. These drums should be disposed of according to all applicable state, federal, and local regulations. If possible, the drums can be reused within the community.

All activities for the removal of materials off site should be conducted in accordance with all applicable state, federal, and local regulations. Procedures for tank decommissioning should follow the DEC Underground Storage Tanks (UST) Regulation, 18 AAC 78, as amended in October 2006 (DEC, 2006). The best alternative for removal and recycling or disposal of the materials listed above would either be through the YRITWC backhaul program, or disposal in the village landfill. Scrap metal can be shipped off site for recycling without waste characterization since processed scrap metal destined for recycling is not considered solid

waste if it meets the exemption criterion under 40 Code of Federal Regulation (CFR) 261.4(a)(13) for processed scrap metal.

5.2 CONTAMINATED SOIL EXCAVATION

All treatment options begin with removing contaminated soils from the Site designated for re-use. The limits of excavation should be driven by risk posed by contamination levels left on Site. Prior to excavation, a utility clearance must be performed to avoid damaging buried utilities.

The preliminary limits of excavation are depicted in Figure 3. These limits are based on the data summarized in Section 4.1. The total in-place volume of the proposed excavation area(s) is approximately 850 cy based on a site-wide 5-foot excavation depth. Excavation of frozen soil below 5 feet should only be continued if soils indicate high levels of petroleum hydrocarbon impact. During removal, field screening samples should be taken to guide the lateral extent of the excavation. Further excavation beyond the preliminary limits may be deemed necessary based on the field screening. Once field screening indicates that contaminated soil has been removed, confirmation samples should be collected from the excavation sidewalls. Excavation screening sampling frequency, field screening procedures, and analytical methods, are discussed in Section 6.

Due to the absence of complete delineation data for the presumed source areas, assumptions were used to develop the excavation limits presented on Figure 3. These assumptions are presented listed below, for each of the presumed release areas:

- The area underneath the southern half of the former generator building has been impacted by fuel releases from the day tank.
- The area of impact extends approximately 5 feet further south than GBS3 and approximately 30 feet in each direction from the line made from GBS1 through GBS3 (based on field screening data). The total area is assumed to be 50 feet by 80 feet.
- The impacted area associated with the drums is approximately 25 feet by 25 feet.
- A 5-foot excavation depth is assumed based, which is at or below the estimated frost depth in late summer.
- Excavation should not proceed beyond the property boundaries presented in the ESA (BGES, 2008).

These soil volumes are in-place estimates. Due to the swell of soils during handling, the anticipated ex situ management volume is expected to increase by 30 percent to approximately 1,110 cy. An additional 10 percent contingency for additional excavation beyond the preliminary limits of excavation would require the management of an estimated 1,220 cy of soil. Based on the BGES depths of thaw noted in 2008, the excavation depth of 5 feet is expected to be primarily below the frost line over most of the excavation area identified in this EMP. Excavation to frost line in mid- to late-August should remove the majority of petroleum hydrocarbon impact. The depth of thaw over much of the excavation

area may be shallower than 5 feet. Areas exhibiting higher levels of petroleum hydrocarbon impact may have deeper thaw depths and excavation may proceed to 6 or 7 feet in these areas without significantly affecting the total volume estimate.

These removal dimensions and volumes were developed to eliminate or reduce exposure through the incidental soil ingestion and dermal absorption of contaminants from soil exposure pathways. This remediation is not intended to eliminate the potential exposure pathways associated with the ingestion of ground water or surface water. Efforts to remediate the ground water within the impacted area would require more aggressive and costly approaches. Efforts outside of this work include feasibility studies toward the remediation of the impacted ground water and the relocation of the community well.

In addition, the inhalation of outdoor and indoor air exposure pathways may remain complete and may need to be managed through administrative controls and construction practices, respectively. Examples of administrative controls are notices of environmental contamination (NECs) and deed notices. Deed notices and NECs allow future construction workers to be aware of the presence of contamination and what measures to take if excavation activities are necessary. NECs are filed with the DNR recorder's office for filing with a rural property record and deed notices are recorded on the property deed. The indoor air pathway can be eliminated if future structures placed on the property use elevated foundations.

Prior to excavation backfill, an impermeable liner material should be placed along the base of the excavation. The purpose of this liner would be threefold: 1) it would serve as a barrier to migration of soil gas to the surface; 2) provide a marker for the location of contaminated soil and serve as a cautionary marker for future construction workers; and 3) decrease infiltration of contaminated water in the source area, thus reducing migration of contaminants to ground water.

5.3 SOIL MANAGEMENT ALTERNATIVES

The results of the evaluation of the selected soil remedial actions are presented in Table 1. The following alternatives were considered for the management of contaminated soil.

- **Passive Biopile Construction** – In this option, excavated soils are mixed with clean soil, placed on a treatment area, and covered. Aeration is provided passively through perforated pipe extending into the pile. The pile is covered and a leachate collection sump is included to manage water if the cover is damaged. The pile is left until the soils meet specified cleanup levels for land spreading or beneficial reuse.
- **Road Base Encapsulation** – This method would only apply to Koyukuk if the use of a barrier to provide zero net infiltration is part of the design along with other requirements of 18 AAC 75.360(11)(G). However, the use of silt as road base material is unlikely. Since the contaminated soil in Koyukuk is mostly a silt matrix, and since silt is not generally used as road base material, this option is most likely not feasible for Koyukuk because it would require blending with significant amounts of uncontaminated material to meet construction specifications.

Table 1
Evaluation of Remedial Alternatives for Soil

Alternative	Environmental Protection	Regulatory Compliance	Effectiveness	Implement-ability	Cost	Overall Rating
No Action	Fair	Fair	Poor	Excellent	Good; site ground water monitoring required	Fair
Passive Biopile Construction	Good	Good	Fair	Fair	Good	Fair
Road Base Encapsulation	Good	Good	Good	Fair; Best if pavement is used in road construction. The contaminated soil is silt which is likely unsuitable for road base use.	Fair	Fair
Daily Landfill Cover	Fair	Fair	Fair	Good	Good	Good
Landfarming	Fair	Fair	Fair	Fair	Good	Good
Thermal Remediation	Fair	Fair	Good	Fair	Poor; extremely high cost for small projects	Fair

- **Daily Landfill Cover** – Under this option, contaminated soils could be used for landfill cover. This option requires permission from DEC Solid Waste Program, and typically is contingent on pre-treatment of soil prior to use as landfill cover. This alternative is a common form of beneficial reuse of contaminated soil, is less expensive than many other options at remote sites, and effectively manages risks associated with contaminated soil. For Koyukuk, this method would require the construction of a temporary soil stockpile near the landfill to store the material until it is used as cover material.
- **Landfarming** – This method includes spreading the contaminated soil into a 1-foot thick layer. The soil is tilled monthly during the summer months using a roto-tiller. Tilling aerates the soils to promote aerobic degradation of contaminants in the soil. The addition of fertilizer is also used to promote biological activity. Initial landfarm characterization samples are collected to document contaminant levels at the time of placement. Characterization samples are collected on an annual basis to determine when cleanup goals are met. The DEC Solid Waste Program should specify the cleanup requirements prior to using landfarmed soils as daily landfill cover.
- **Thermal Remediation** – Thermal remediation of contaminated soil is generally expensive at remote locations both to ship in treatment equipment and for the fuel required, and is most likely not a feasible option for Koyukuk.
- **Shipment Off Site for Treatment or Disposal** – This option is employed if soils cannot be reasonably treated on Site and is most feasible when inexpensive transportation is available. If soils are determined to be hazardous, or no appropriate area exists for on site treatment, it may have to be containerized and transported to a facility for treatment or disposal. In these instances, treatment typically involves incineration, and disposal typically involves placement in a permitted landfill.

5.4 PREFERRED ALTERNATIVE

The matrix for remedial option selection is presented in Table 1. The alternatives are ranked according to the five parameters of environmental protection, regulatory compliance, effectiveness, implementability, and cost. Remediation options with the best overall rating are compared for use at a particular site.

Although this is not an UST site, the ex situ remedial option may involve bioremediation and the development of a corrective action plan in general compliance with the terms of 18 AAC 78.250(e)(12)(E).

The preferred alternative for contaminated soils at Koyukuk is landfarming followed by use as daily landfill cover. Precedence exists for using contaminated soils as landfill cover in rural communities, but it requires approval by DEC's Solid Waste Program. Solid Waste Program requires that contaminated soil be managed prior to use as landfill cover. Landfarming should be implemented to reduce contaminant levels to acceptable thresholds.

This process typically takes two to three years. Koyukuk currently has an unpermitted landfill.

5.5 INSTITUTIONAL CONTROLS

Since this excavation and soil treatment alternative may not remove all contamination from the Site, additional controls could be required to protect future site workers or residents. These controls, also known as institutional controls, may involve deed notices if a deed exists, or NECs, and notices on the community plan for the affected properties. Deed notices and NECs serve to notify future land users of the presence of residual soil contamination, thus protecting excavation workers from exposure to residual contamination. In addition, institutional controls establish guidelines for future construction on a site that can eliminate the indoor air inhalation pathway. Development of institutional controls appropriate for this Site is presented in the DEC guidance document *Site Closure Policy and Procedures* (DEC, 2008a).

5.6 LONG-TERM SOIL TREATMENT LOCATIONS IN KOYUKUK

Landfarming is considered a long-term treatment option because it typically takes years to meet required cleanup or soil reuse objectives. Site conditions at Koyukuk make the landfill location the ideal location for implementing this remedial alternative. This location limits contact with village residents and reduces the potential for exposure of contaminants to surface water or ground water. The criteria for selection were based on the following:

- Elevation above the river to prevent erosion during future flooding events;
- Distance from the village to limit contact with residents during course of treatment;
- Soils beneath the selected area could require some preparatory work (i.e., leveling of area for landfarm construction can take place during land fill development); and
- Depth to ground water to prevent contamination of ground water resources (the depth to ground water at the landfill location is anticipated to be much greater than in the lower-lying village area).

Due to the additional cost of handling contaminated soil more than once, storage, or stockpiling, of soil prior to landfarming should only be required in the event of unforeseen delays to the project schedule, or if the storage is a means of staging the material for a future, currently unidentified, beneficial use. Stockpile construction is frequently a long term or short term intermediate step to developing soil treatment options and must be constructed in accordance with 18 AAC 78.274.

5.7 SOURCE OF BACKFILL MATERIAL

Backfill sources for the excavations described in this plan have been identified as bluff material, or river gravels dredged from the Yukon river.

Use of river bank gravels requires a permit from the Alaska Department of Natural Resources (DNR). This Material Sale Contract carries a cost of $1.50 per cy for material taken from below the normal high water line of the Yukon River and is payable to DNR.

The Alaska Department of Fish and Game (ADF&G) Habitat Division requires a Fish Habitat Permit which is informational only and is not fee-based (i.e., there is no cost for this permit).

The USACE also requires a permit to operate below the normal high water line of the Koyukuk River for the purpose of resource extraction. Contact information for these agencies follow:

- DNR – Material Sale Contracts - Frank Maxwell, (907) 451-2728
- ADF&G – Habitat Division – Mac McLean, (907) 459-7281
- USACE – USACE Permit – Mary Leykom – (907) 753-2711

Coordination with the Koyukuk Village Council regarding the availability of sufficient quantities of backfill material should be coordinated during the planning stage of any excavation work.

5.8 WATER MANAGEMENT OPTIONS

Ground water, if encountered, should not be removed from the excavations. Excavation should not proceed below the static water level if water is encountered above 5 feet bgs. Landfarming is intended to manage soils with field moisture only and the incorporation of water, if encountered, would increase the possibility of leaching contaminants from the landfarm to underlying soils; therefore, excavation to below the ground water elevation is to be avoided. The 5-foot excavation depth was selected because, based on BGES hand auger information in 2008, it is a conservative depth for thaw in late summer. No excavation dewatering is proposed as part of this EMP.

Liquid wastes may be generated during final decommissioning and purging of drums, fuel lines, pumps, or stationary equipment (i.e., fuels and glycols). These liquids should be characterized for energy recovery, recycling, or disposal at the time of generation. Waste management is discussed in Section 7.

5.9 EQUIPMENT AND LABOR REQUIREMENTS

The equipment and labor requirements to implement the preferred alternative require the use of an excavator capable of reaching at least 6 feet in depth, haul trucks capable of carrying up to 10 cy of material, and a loader to spread the soil at the landfarm location. These activities can be carried out simultaneously to minimize the time required to complete the work. In this manner, the excavator should fill haul trucks that dump at the landfarm location while a loader consolidates the material to the 1-foot depth specification. A loader/backhoe piece of equipment can also be used, but will result in phasing the work to occur over a longer period of time.

5.10 AVAILABLE RESOURCES IN KOYUKUK AREA

This section describes the equipment currently available in the Koyukuk area. As a cost control, site remediation should be timed with other large construction activities within the community, if possible, in order to take advantage of resource leveraging opportunities.

5.10.1 EQUIPMENT

At the time of writing this EMP, one dump truck was available for use within the City of Koyukuk. However, most large projects use heavy equipment shipped by barge from Ruby, Alaska.

5.10.2 LABOR

Several village residents currently have 40-hour Hazardous Waste Operation and Emergency Response (HAZWOPER) training, but all require their 8-hour refresher class prior to being eligible to work on a contaminated site. It was indicated that several qualified equipment operators are available in Koyukuk.

5.10.3 RESOURCE LEVERAGING OPPORTUNITIES

There are no projects currently planned for the 2009 or 2010 construction seasons in Koyukuk. During the community planning meeting for this EMP, the village equipment in Tanana was noted to be non-operational. Ruby Construction, in the Village of Ruby up stream on the Yukon River from Koyukuk, could be the likely source of equipment and operators for this project.

5.10.4 PERSONNEL QUALIFICATIONS

Personnel working on the field component of this project must be trained to the HAZWOPER standard per the Occupational Safety and Health Administration (OSHA) requirement in 29 CFR 1910.120. Equipment operators must have certification with a commercial driver's license and be able to verify their training and experience to operate equipment required for this project.

6. EXCAVATION SAMPLING AND SCREENING

This section discusses an appropriate analytical approach to document the excavation and transport of contaminated soils to the landfarming site.

6.1 ANALYTICAL METHODS

The following analytical methods should be used to characterize excavated soils and for confirmation samples from excavation floor and sidewalls:

- GRO by Alaska Method (AK) 101
- DRO by AK102
- RRO by AK103
- PAHs at selected locations by EPA 8270
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA 8021B (target volatile analytes if gasoline or solvents were not stored or used at these facilities)
- VOCs by EPA 8260 (target analytes only in the event evidence emerges that solvents or gasoline was stored or used at this facility)
- Lead by SW-846 7421 (target analyte only in the event evidence emerges that gasoline was stored at this facility)

Analysis of soils for lead or VOCs should not be performed if there is no history of gasoline or solvent storage or use at the former generator building.

6.2 SITE MEDIA CHARACTERIZATION

Excavation sampling should be done using field screening to guide the excavation work, and using laboratory analysis to confirm contaminated soil has been removed from the target areas.

6.2.1 SCREENING AND SAMPLING OF EXCAVATION

Excavation sampling locations and frequency should be performed in accordance with the DEC UST Regulations (DEC, 2006).

6.2.1.1 Excavation Screening

Screening of soils during removal should be performed to guide excavation activities and to maximize the amount of contaminant removed during the excavation process. The frequency

of excavation screening shall be tailored to the frequency requirements in the DEC UST Procedures Manual (DEC, 2002) of one sample every 10 cy of excavated soil.

Excavation field screening should be conducted using headspace analysis, as well as analysis for total petroleum hydrocarbons (TPH) using EPA Method 9074. PID heated headspace screening should be performed on all samples, consisting of placing a representative soil sample in a resealable plastic bag and warming for a sufficient time to raise the soil temperature to at least 40 degrees Fahrenheit, but preferably to 60 degrees Fahrenheit. After warming, the sealed soil sample is agitated (shaken) for 15 to 20 seconds, after which a PID probe is inserted into the bag and the highest reading recorded.

EPA Method 9074 (PetroFLAG® turbidimetric screening method) is expected to produce conservative DRO concentration results, which is to say concentrations are higher than those obtained from laboratory results using Alaska Method 102. Disadvantages of EPA Method 9074 are that the method is more susceptible to interference from biogenic material in the soil, and this method, although it produces a quantitative TPH concentration, is considered to be most suitable for qualitative analysis (USEPA, 1998). If biogenic interference is suspected, clean soil of the same type from background areas should be analyzed to attempt to quantify the response attributed to biogenic material.

Samples should be collected to determine if the removal activity is meeting the required cleanup levels, and to help minimize the uncontaminated material removed. Soil samples from the excavation should be field screened by visual observation, by use of a PID, and with the PetroFLAG® turbidimetric screening method. Soil samples with elevated PID levels or PetroFLAG® readings, or otherwise suspected to be contaminated with petroleum, should be identified, and additional soil should be removed. PID readings of 40 parts per million (ppm) and PetroFLAG® readings of 150 ppm should be used as cutoff points during the excavation guidance.

6.2.1.2 Sampling at Limits of Excavation

After PID and PetroFLAG® results indicate that contaminated soil has been removed, confirmation soil samples should be collected from the excavation lateral sidewalls and base for laboratory analysis. Approximately one confirmation sample should be collected for every 20 feet of excavation sidewall, and one excavation base soil sample for each 250 square feet of excavation area. The excavation limits and sample locations should be measured and noted.

This sampling should document the location and chemical concentrations at the final limits of excavation prior to backfill. Excavation sampling should follow guidance for excavation closure sampling provided in 18 AAC 78.090(d)(B).

6.2.2 LANDFARM CHARACTERIZATION SAMPLES

Soil samples collected from the base of the excavations should serve to characterize initial contaminant concentrations of soils placed for landfarming. Subsequently, annual in-

treatment land farm characterization sampling shall be compared to the initial results to measure treatment success.

The number of characterization samples collected for initial characterization, annual in-treatment, and final verification grab samples required for characterization of the excavated material should comply with Table C cited in 18 AAC 78.605(b). In this manner, post-treatment landfarm sampling should be analogous to post-treatment stockpile sampling.

Landfarm characterization samples should be collected annually until screening or analytical results indicate residual contaminant levels permit use of the soil as landfill cover as specified by the DEC Solid Waste Program. Values may range from 2,000 mg/kg to as high as 10,000 mg/kg.

6.3 GROUND WATER SAMPLING

The Koyukuk water supply well should be sampled to characterize impact with target compounds identified in Section 4.5.2. The drinking water method (EPA Method 524.2) should be used to compare current results against previous sampling. Currently, the Koyukuk water supply well is sampled on an annual basis for EPA Method 524.2 compounds. The most recent sampling event on December 16, 2008, did not detect VOCs at concentrations above their respective reporting limits.

In addition to the drinking water analytical methods, the water supply well should be sampled using methods used for soil analyses to track the migration of fuel hydrocarbons from past operations at the Site. These methods include AK101 (GRO), AK102 (DRO), AK103 (RRO), EPA Method 8260 (VOCs), and EPA Method 8270 (PAHs).

Based on depths of frozen ground encountered by BGES in 2008, ground water is not expected to be encountered during excavation work at the former generator building.

6.4 SAFETY AND SITE CONTROL

Excavation activities have objective hazards that must be addressed in the field. Barricades and working notices must be established in the field during all excavation work. Open excavations must be barricaded off to clearly indicate the hazard. Equipment, when not in use, must be parked in a safe area. Community meetings should be held to alert all residents of upcoming activities and their duration.

With the anticipated depth of the excavation to 5 feet bgs, the excavation should be considered confined space and should not be entered for sampling. All screening and characterization samples from excavations must be collected via mechanical means.

6.5 SAMPLE HANDLING AND RECORDS MANAGEMENT

Proper sample handling and procedures should be adhered to during remediation efforts. Also, deliverables should be reviewed for quality control.

6.5.1 SAMPLE PACKAGING AND SHIPPING

Disposable sampling equipment is generally used to collect screening and characterization samples from the excavation.

Chain-of-custody procedures and proper sample handling and packaging methods must be used for all samples shipped to Anchorage or Fairbanks, or elsewhere on a regional carrier. U.S. Department of Transportation requirements for hazardous material shipment must be observed when shipping any dangerous goods to or from the community of Koyukuk. The laboratory must be notified of all in-bound sample shipments at the time of shipment from the community.

6.5.2 DATA QUALITY ASSESSMENT

All data generated during soil management must be assessed using the DEC data quality control procedures. Each data deliverable package, laboratory work order, must be reviewed and have a completed data review checklist and quality control summary (DEC, 2009a).

7. WASTE STREAM MANAGEMENT

This section discusses the types of waste expected to be generated during the course of this project and the recommended method of management.

7.1 CONSTRUCTION DEBRIS

Anticipated non-liquid waste consists of construction debris, an abandoned building, and steel drums. The steel drums should be cut and/or crushed for disposal or recycling via backhaul. Liquid drum contents are discussed below.

Construction debris could comprise a significant portion of project waste. As noted in Section 5.1, the former generator building, and steel drums should all require management as waste or be reused in the village. DEC general permit options for bulk waste management are outlined in Section 4.5.3 and may or may not apply to construction debris generated during this project. One re-use option for the abandoned generator building is use as dry cold storage. If re-use options are not possible for large debris, the YRITWC barge-based backhaul program may coordinate transport. This would permit recycling of the empty drums or other large debris.

During the planning stage of the project, the IGAP environmental coordinator in Koyukuk should send the YRITWC an inventoried list for the removal. The YRITWC's efforts in debris removal from Koyukuk would be project-specific and require a lead time to coordinate barge transport.

7.2 LIQUID WASTES

Liquid wastes including emulsions in drain pans, drum contents, pipe purging, and generator coolant and crank case fluids may be inspected. Identification and consolidation of liquid wastes on site should be an element of fieldwork. Once identified and consolidated, liquid wastes can be re-used, if possible, or disposed of in accordance with regulatory requirements. The IGAP coordinator and the solid waste program manager should consolidate liquid wastes and arrange for back haul and disposal. Because of its high value, all recovered fuel should be used by the village.

Used sampling equipment may be disposed of as trash for local disposal at the landfill.

8. COST

The cost was developed using the preferred alternative and estimated volume of contaminated soil.

8.1 SOIL EXCAVATION AND LANDFARMING

A preliminary cost estimate for soil and waste management is provided in Appendix H. Appendix H includes assumptions for all phases of the work. Appendix H includes assumptions and associated costs for all phases of the work outlined in this EMP. The preliminary cost estimate for contaminated soils and construction debris management in Koyukuk is $284,402 and includes a 10 percent contingency. The primary scheduling assumptions for the project require one season to excavate and build the landfarm, two subsequent seasons of landfarm maintenance, and a fourth season to collect characterization samples and obtain DEC approval to begin spreading the soil as landfill cover.

9. CONCLUSIONS

The potential contamination identified at the Site can best be managed through excavation and the remedial option of landfarming followed by use as landfill cover with approval from the DEC Solid Waste Program. This approach was based on equipment availability from the nearest general contractor in the area, Ruby Construction, and labor located within the Village of Koyukuk and consultant assistance with reporting and project scoping. Waste and debris management; excavation; and landfarm preparation can be implemented in one field season. It is estimated that three successive field seasons of landfarm fertilization, tilling, and sampling should be required to meet closure standards established by the DEC's Solid Waste Program. The preliminary cost estimate for this work is $284,402. The project should rely on consultant assistance for documentation and reporting to DEC, and on a certified tank contractor for assistance with inserting, cutting, and cleaning the steel tanks at the Site.

10. REFERENCES

Alaska Department of Commerce, Community, and Economic Development (DCCED), Division of Community and Regional Affairs (DCRA), 2009, www.commerce.state.ak.us/deca/commdb/CIS.cfm , March.

Alaska Department of Environmental Conservation (DEC), 2009a, Environmental Laboratory Data and Quality Assurance Requirements Technical Memorandum, March.

DEC, Division of Environmental Health, Drinking Water Program, 2009b, www.dec.state.ak.us/eh/dw/index.htm, April.

DEC, 2008a, *Site Closure Policy and Procedures*, Draft Final, November.

DEC, 2008b, 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control*, October.

DEC, 2008c, 18 AAC 70 Water Quality Standards, July.

DEC, 2008d, *Brownfield Assessment Request Form for Koyukuk, Alaska (Submitted by the Koyukuk Tribal Council)*, Spring.

DEC, 2006, 18 AAC 78, *Underground Storage Tanks*, October.

DEC, 2002, 18 AAC 78, *Underground Storage Tanks Procedure Manual*, November.

Alaska Department of Natural Resources, Division of Mining, Land and Water Alaska Hydrologic Survey Well Log Tracking System (WELTS), 2009, http://www.navs.alaska.gov/welts/ April.

Braunstein Geological & Environmental Services (BGES), 2008, *Former Generator Building Koyukuk, Alaska Phase I and Limited Phase II Environmental Site Assessment,* August.

SLR International Corp, 2009, *Koyukuk Environmental Management Plan Stakeholder Meeting Summary*, February 26.

U.S. Army Corps of Engineers (USACE), 2009. http://www.poa.usace.army.mil/en/cw/fld_haz/koyukuk.htm May.

U.S. Bureau of the Census, Census 2000.

U.S. Environmental Protection Agency (USEPA), 2009, State and Tribal Response Program, http://www.epa.gov/Brownfields/state_tribal.htm

USEPA, 1998, *SW-846 Method 9074 Turbidimetric Screening Method for Total Recoverable Petroleum Hydrocarbons in Soil,* January.

Yukon River Inter-Tribal Watershed Council Brownfields Tribal Response Program, 2008, *Former Generator Building Action Plan, Koyukuk, Alaska,* September 30.

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

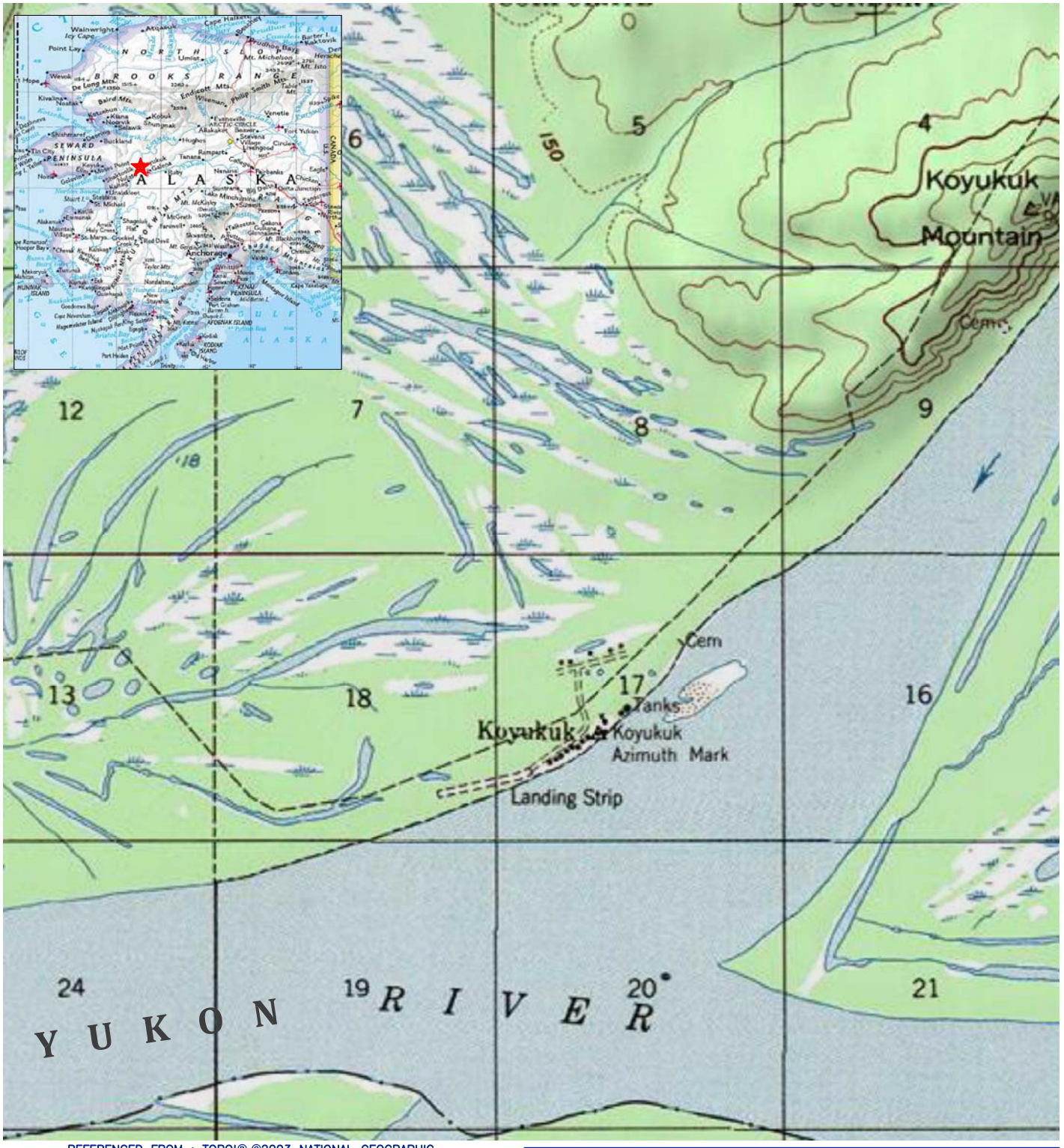
The purpose of an environmental assessment is to reasonably evaluate the potential for or actual impact of past practices on a given site area. In performing an environmental assessment, it is understood that a balance must be struck between a reasonable inquiry into the environmental issues and an exhaustive analysis of each conceivable issue of potential concern. The following paragraphs discuss the assumptions and parameters under which such an opinion is rendered.

No investigation is thorough enough to exclude the presence of hazardous materials at a given site. If hazardous conditions have not been identified during the assessment, such a finding should not therefore be construed as a guarantee of the absence of such materials on the site, but rather as the result of the services performed within the scope, limitations, and cost of the work performed.

Environmental conditions may exist at the site that cannot be identified by visual observation. Where subsurface work was performed, our professional opinions are based in part on interpretation of data from discrete sampling locations that may not represent actual conditions at unsampled locations.

Except where there is express concern of our client, or where specific environmental contaminants have been previously reported by others, naturally occurring toxic substances, potential environmental contaminants inside buildings, or contaminant concentrations that are not of current environmental concern may not be reflected in this document.

FIGURES



REFERENCED FROM : TOPO!® ©2003 NATIONAL GEOGRAPHIC

N

SCALE: 1" = 0.5mi
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

0 0.5 1.0 1.5mi

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR

Alaska Department of Environmental Conservation
Contaminated Sites Program
Division of Spill Prevention and Response
611 University Avenue
Fairbanks, AK 99709-3643

Report: Environmental Management Plan
Koyukuk Former Generator Building
Koyukuk, Alaska

Drawing: Location Map

Date: June 1, 2009	Scale: 1"=0.5mi	Fig. No. 1
File Name: F1 KOYUKUK	Project No.: 005.0065.09002	

REFERENCED FROM : BGES 2008 PHASE I AND LIMITED PHASE II ENVIRONMENTAL ASSESSMENT REPORT

N

SCALE: 1" = 100'

WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

0 100 200 300'

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

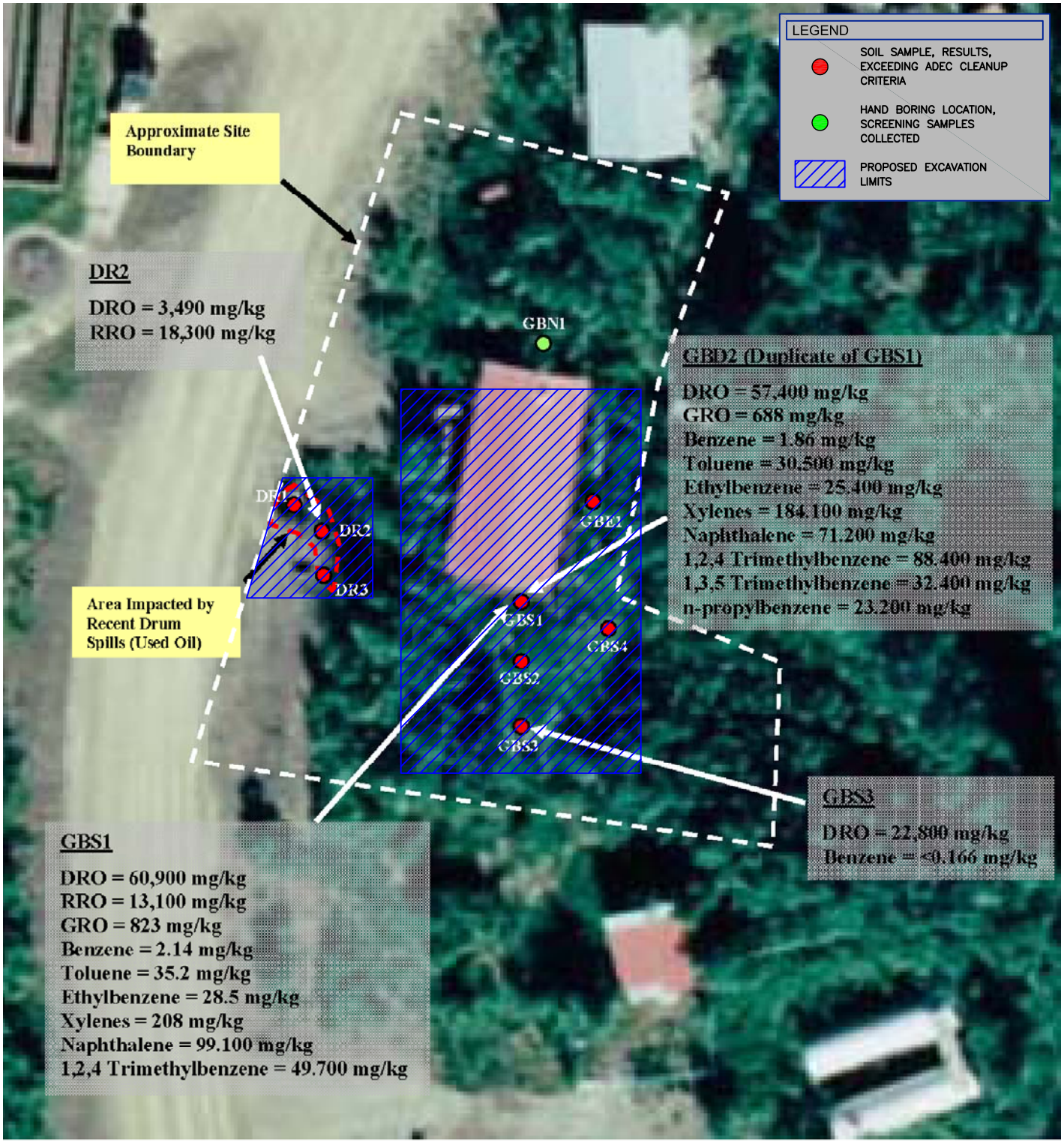
SLR

Alaska Department of Environmental Conservation
Contaminated Sites Program
Division of Spill Prevention and Response
611 University Avenue
Fairbanks, AK 99709-3643

Report: Environmental Management Plan
Koyukuk Former Generator Building
Koyukuk, Alaska

Drawing: Site Vicinity Map

Date: June 1, 2009	Scale: 1"=100'	Fig. No. 2
File Name: F2 KOYUKUK	Project No.: 005.0065.09002	



REFERENCED FROM : BGES 2008 PHASE I AND LIMITED PHASE II ENVIRONMENTAL ASSESSMENT REPORT

N

SCALE: 1" = 30'

WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

0 30 60 90'

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR

Alaska Department of Environmental Conservation
Contaminated Sites Program
Division of Spill Prevention and Response
611 University Avenue
Fairbanks, AK 99709-3643

Report: Environmental Management Plan
Koyukuk Former Generator Building
Koyukuk, Alaska

Drawing: Site Plan and Soil Sampling Locations

Date: June 22, 2009	Scale: 1"=30'	Fig. No. 3
File Name: F3 KOYUKUK	Project No.: 005.0065.09002	

APPENDIX A

DEC BROWNFIELD ASSESSMENT REQUEST FORM – 2008

DEC BROWNFIELDS ASSESSMENT REQUEST FORM – 2008

Please check the appropriate box for each question at the top of this page, and then answer questions 1–5 by inserting text in the blank area under each question, using as much space as you need. The deadline for receipt of requests is April 30, 2008.

Eligibility Determination—General Questions:

Is the applicant in any way responsible for the potential contamination at the site, or related to those who may be responsible?

☐ Yes ☒ No

Is the site federally owned?

☐ Yes ☒ No

Has the site or facility received funding for remediation from the Leaking Underground Storage Tank (LUST) Trust Fund?

☐ Yes ☒ No ☐ Unknown

If you answered "yes" to any of the above questions, we recommend that you please call DEC to discuss the specifics of your eligibility determination.

To the best of your knowledge, is the *owner* of the property in question:

☐ Private ☒ City/Public ☐ State ☐ Native Corp ☐ Tribal ☐ Unknown

Known or suspected contaminant(s) (check one):

☐ Hazardous Substances ☐ Petroleum Only ☒ Hazardous Substances and Petroleum

Is this site currently listed on DEC's *contaminated sites* database?

☒ Yes ☐ No ☐ Unknown

If yes, please list the project name, if known:

---

1. Applicant/Owner

a) ***Applicant*** - Provide the name and address of the organization applying for a DBA, the name of the contact person, email, telephone, and fax numbers.

Koyukuk Tribal Council

PO Box 109

Koyukuk, AK 99754

Contact Person: Hazel Lolnitz

Koyukuk_environmental@yahoo.com

(907)927-2234 Fax (907)927-2220

b) ***Project Team*** - Because no one person can be responsible for all aspects of a brownfield project, we request that you form a *project team* to ensure continued action beyond this DBA. Attach a letter from each team member acknowledging their support and willingness to participate. (Team members may include: city or village government representatives, tribal council representatives, environmental managers, elders or other community leaders, and other interested parties.)

Koyukuk Tribal Council will form a project team that will be members of the City Council and the Koyukuk Tribal Council. The Koyukuk Environmental Staff will spearhead the efforts to organize the team. Both organizations are willing to work together on the project. See attached letters.

c) ***Property Owner*** **-** The owner of the property must allow DEC access to the site. If the applicant is different from the owner, include written consent for access from the owner. (*Note: the applicant must be able to secure access for DEC and its contractors to conduct the assessment.*)

The City of Koyukuk owns the old generator site and approved access to the site to conduct brownfields activities. See attach letter.

2. Site Information

a) ***Historical Site Use*** **-** Describe, to the best of your ability, the previous known uses of the site, when the different activities occurred, and any historic or cultural significance of the property. Identify when and how the site became or may have become contaminated, with what substance(s), and where the contamination is likely to be found.

The Koyukuk Tribal Council is applying to have the City of Koyukuk Old Power Plant site assessed, tested, cleaned and demolished. The Old City Power Plant is located in the center of the community across from the school, washateria and primary water supply. It is an abandoned site that is 50x80 square feet. This site has a generator building that was built in the 70's. Inside the building are three old generators the building is completely contaminated with gasoline, diesel, lead acid batteries, and 55 gallon barrels of hazardous substances.

In 2003 the day tank automatic shut off switch failed and caused an overflow of fuel. The volume estimated was 500 gallons on two different occasions. There is still a large pond adjacent to the area the pond has a slight sheen and mud smells of fuel. The building is saturated with fuel as well as the ground beneath the building. The building would need to be demolished before the soil can be excavated.

The ground water in and around power plant is contaminated and there is a high possibility of the community water source being contaminated. This can be a serious human health threat. With the site being so close the Ella B. Vernetti School there is a high potential of children playing in or around the area. The building is a fire hazard and this can be a very dangerous threat with it being located in the middle of the community. Koyukuk doesn't have any fire equipment to respond to fires.

Koyukuk is located in the flood plain and has experienced flooding every five years. The next time Koyukuk floods the contamination can spread to other areas. During the

summer months there is a strong odor near the site and the odor increases during higher temperatures.
The site has no cultural or historical significance.

b) ***Current Site Condition and Use -*** Provide the common name of the site, address, approximate acreage, zoning, and types of buildings. Please attach a site map or aerial photograph showing the site's location in the community, adjacent land use, and areas of known or suspected contamination. Identify approximate property boundaries.

The old generator site is located near 300 Vista Road. 300 Vista Road is where the City Office Building is located. The area is 50 x 80 square feet. It has a generator building that was built it the 70's. See attached map of the area. The site is shown where the number nine is on the map. Which covers the area.

c) ***Prior Environmental Assessment Activities*** - Please describe any prior site assessment or cleanup activities at the site and briefly state what you know about the findings of that work. Attach the summary or conclusion sections of the reports if available. If reports are not available, provide the consultant, client, approximate date of the study, and any other pertinent information.

The Yukon River Inter-Tribal Watershed Council did a Brownfields Survey in May 2007 and determined the site to be a possible Brownfields site. They determined the site to be a 10 high concern. No further environmental assessment or clean-up activities have occurred at the site.

3. <u>Environmental Concerns</u>

a) ***Reason for Concern*** - What is the reason for concern by the community, and what do you hope to gain by our involvement? Is there specific information that you are seeking? Please discuss community concerns in general, and identify any specific problems if possible.

The community is very concerned that the ground water in and around the powerplant may reach the community water source that is located within 75 feet of the area. This can be a serious human health threat. The site is also located next to the Ella B. Vernetti School and there is a high potential of children playing in the area. The building is a fire hazard and this can be a very dangerous threat with it being located in the center of the community. Koyukuk doesn't have any fire equipment to respond to fires.

b) ***Proposed Project Need*** - Describe to the best of your ability what your project team believes are the needed assessment activities, and what result you would like to see from this project. Indicate any constraints as to when this work must be completed (e.g., to meet construction timeline, property transaction pending, etc.).

The project team would like to have a thorough assessment done of the area and identify the contaminates, amount and what it would take to clean the area. After the assessment

is done a plan of action will need to be developed to address the cleanup efforts. Both the City and the Tribe would like to have the area developed for reuse.

After the assessment is completed a community meeting can be done to discuss any constraints to the project.

4. Community Planning and Reuse Goals

a) ***Other Community Plans or Projects*** - It is helpful to know if other state or federal agencies are planning work in your community. List any community *plans* that may exist or are in development, such as: economic development plans, hazard mitigation plans, or erosion studies. Describe any other community *projects* that may be scheduled or pending, such as: water and sewer construction, a new landfill, road or airport construction, a new school or addition, fuel-storage tank farms, new housing, or other facilities.

Koyukuk Tribal Council applied for the Yukon River Inter-Tribal Watershed Brownfields grant and recently received notice that the request was approved. The Koyukuk Tribal Council would like to combine this proposal with YRITWC efforts to better address the needs of cleaning the old generator site.

City of Koyukuk and the Koyukuk Tribal Council are in the process of developing a hazard mitigation plan. The community reviewed the first draft April 28, 2008. The projected completion date is September, 2008.

The Corp of Engineers is in the process of finalizing a flood and erosion assessment report. The entire community of Koyukuk is located within the floodplain.

Koyukuk Tribal Council is also in the process of finalizing a Ten Year Long Range Comprehensive Plan. The plan identifies community projects.

Tanana Chiefs Conference submitted a request to Village Safe Water to add on to the washeteria that will contain a new water holding tank. The project was approved and will proceed this summer.

b) ***Reuse or Redevelopment Plans*** - Does the community have well defined plans for how they would like to reuse this site if it were not for the real or perceived environmental problems? Is this site affecting the use of adjacent properties, subsistence habitat, or other resources? Do reuse plans include the incorporation of greenspace or sustainable, green building practices? If so, please describe.

Koyukuk's number one community facilities project is to build a new clinic as identified in the Long Range Comprehensive Plan. This site would be an idea area for the building. It can be easily hooked up to the water and sewer facilities. A business plan was developed in 2004 for the clinic and back then there was a conflict with the site identified in the plan. The building would be designed to be energy efficient.

5. Public Involvement

a) ***Public Benefit*** - Briefly discuss how your proposed reuse or redevelopment plans for the property will provide a benefit to the public. Why is this important to your community? (Things to consider: creation of jobs, preservation of historically or culturally significant property, preservation of subsistence habitat, reuse or recycling of materials, cost savings to the community, or increased property values.)

As mentioned the community would like to use the area to construct a new clinic. The current clinic is too small and has numerous deficiencies and does not meet state standards.

b) ***Community Support*** - Is the community strongly supportive of this project? Please identify other organizations in your community with whom you are coordinating on this reuse or redevelopment project. (Providing names and phone numbers of contacts is helpful here, and include resolutions or letters of support as applicable.)

Yes, see attached letter of support from the Koyukuk Tribal Council and a portion of the community comprehensive plan.

c) ***Community Resources*** - Our assessment often requires local assistance with site visits, lodging, excavation equipment, and transportation. Describe local resources that are available for this project. Does the community have financial or other resources to supplement this DBA or for other phases of the project, such as equipment, in-kind services, or funding for cleanup or new construction? Can this DBA be used to leverage other funding or services for the project?

The Koyukuk Tribal Council will be dedicating the environmental staff to assist with the project. The project is an identified component in the FY 09-10 IGAP grant scope of work.

The selection of a site for a DBA in no way implies that DEC is accepting liability for any contamination that may exist at the site, nor is DEC responsible for any necessary cleanup of hazardous substances that may be found at the site. Liability for contamination on a property is specifically addressed in Alaska Statute (AS) 46.03.822, which outlines those who are liable for the release of a hazardous substance. The general liability categories include: (1) those with an ownership interest in the property; (2) those in control of the substance at the time of the release; or (3) those who arrange for disposal or transport of the substance.

Submit Completed Forms by April 30, 2008, to:

By email: Sonja.Benson@alaska.gov or
John.Carnahan@alaska.gov
By fax: (907) 451-2155 c/o Sonja Benson or John Carnahan

Or by regular mail:

DEC Brownfield Assessments
c/o Sonja Benson or John Carnahan
Department of Environmental Conservation
610 University Avenue
Fairbanks, Alaska 99709

If you have questions, call Sonja Benson at (907) 451-2156 or John Carnahan at (907) 451-2166.

APPENDIX B

STAKEHOLDER MEETING MINUTES AND COMMUNITY CONTACT LIST

Meeting Summary

Date: February 26, 2009, 10:00 A.M. to 10:55 P.M.

Re: Koyukuk Brownfield Environmental Management Plan (EMP) Planning Meeting

Attendees: Hazel Lolnitz, Environmental Coordinator, Koyukuk
Shanda Krista, Tribal Council IGAP Coordinator, Koyukuk
Cindy Pilot, Tribal Council Tribal Administrator, Koyukuk
Marylyn Roberts, City Administrator, City of Koyukuk
John Carnahan, Brownfield Coordinator, ADEC
Deborah Williams, ADEC
Sonja Benson, ADEC
Mary Goolie, USEPA Region 10 Brownfield Project Officer
Michael Rieser, Program Director, SLR
Carl Benson, Project Manager, SLR
Rose Hewitt, YRITWC
Leah Anderson, YRITWC

Meeting Opening:

The planning meeting was opened up with brief introductions from each of the meeting attendees. Mr. Carnahan then spoke briefly about the EPA-funded Brownfields program and included a brief description of how the Brownfields program benefits the upcoming project. Mr. Carnahan summarized this project as the follow up to the Braunstein Geological and Environmental Services, Inc. (BGES) Phase I and Limited Phase II work conducted in Koyukuk in 2008 with the Yukon River Inter-tribal Watershed Council (YRITWC). Mr. Carnahan mentioned that Ms. Goolie's Brownfield program with the United States Environmental Protection Agency (USEPA) provided the State and Tribal Response Program (STRP) grant being used to fund the preparation of the environmental management plan (EMP) in Koyukuk. Mr. Carnahan asked Ms. Goolie if she would be the contact for this project and Ms. Goolie said she would be, but that Ms. Susan Morales of USEPA was the official project manager.

Mr. Carnahan then concluded the introduction portion of the meeting by emphasizing that the purpose of the EMP is to seek funding for cleanup and redevelopment funds for the former generator building area. Specifically, the intent is to build a new tribal clinic on this property once it is cleaned up. Mr. Carnahan said the funding could come from three possible sources:

- the State of Alaska could provide funding if Koyukuk is deemed "not viable" to adequately fund the project
- economic stimulus funds given the project meets the definition of "shovel ready"
- USEPA Brownfield competitive cleanup process in 2010.

Mr. Carnahan concluded by saying the EMP will be a critical tool to pursue funding using any of these sources.

A project briefing was then given by Mr. Rieser from SLR.

SLR Project Summary:

Mr. Rieser summarized the 2008 work performed by BGES and YRITWC which documented 2003 generator building overfills, used oil staining on the property, and observations of sheen on ponded spring melt water in the area. Mr. Rieser continued by saying that the EMP process will arrive at an implementation plan to address contamination on site. The EMP will detail how soil will be identified and removed from the site. The EMP will include site history, a discussion of community demographics, maps, figures, and assumptions used to develop the estimated soil volumes to be managed under the remediation project. Mr. Rieser emphasized that communication with local Koyukuk community members would be critical to quantify available equipment and labor.

Mr. Rieser said that the 2008 BGES report discussed the land farming of contaminated soils previously in Koyukuk. This option would be considered on higher ground either near the permitted landfill, where treated soil could be subsequently used for landfill cover, or as longer-term biocells. SLR would have to discuss areas available for soil treatment with the community. Mr. Rieser said there would be several factors driving the remedial option chosen for soils at the site, and chief among these would be location with respect to surface water bodies, the location of human receptors, the risk of contaminating soils at the treatment site, and the availability of heavy equipment owned either by the community or a contractor.

Ms. Pilot noted at this time that the generator building had been used up until 2006 when the new generation plant was put on line. She then asked whether the demolition of the former generator building would be included in the EMP work scope. Mr. Carnahan pointed out that the EMP would discuss how the building and site soils would be managed. The building would have to be removed to access contaminated soils underlying it.

Ms. Pilot asked if the estimated costs would be part of the plan. Mr. Carnahan said cost estimates would be a critical part of the EMP since it would serve as the basis for a remediation funding request. Mr. Carnahan noted that because the site is not on state property, the city will be reviewed for financial viability to perform the cleanup. If the city is deemed not viable, the state may take on the funding without seeking reimbursement from the city.

Ms. Pilot said the business plan for the new clinic development located the structure adjacent to, not over, the cleanup target area. She said that Mr. Jeff Wilkes at the Denali Commission had prepared a proposal for the community to apply for matching funds for the clinic. Mr. Carnahan

asked Ms. Pilot if the Denali Commission could CC ADEC with copies of documents related to redevelopment of the property. Ms. Pilot said the location of the proposed clinic area is critical because of its proximity to the washeteria facility. The washeteria is just across the street from the proposed clinic area, and Ms. Pilot noted that the clinic must be within 150-feet of water and sewer facilities to qualify for Denali Commission funding. Ms. Pilot noted that the City of Koyukuk had a comprehensive plan on the Department of Community and Regional Affairs web site.

Ms. Pilot asked about the long-term or short-term stockpiling of contaminated soils. Mr. Rieser said the details would be included in the EMP after concerns and questions had been discussed with the City of Koyukuk. Mr. Rieser said that interviews would be critical to make sure the plan had viable options. Mr. Rieser said the schedule for the project began with this meeting and would run through the end of the state's fiscal year, or June 30, 2009. Mr. Carnahan said that Ms. Hazel Lolnitz would be the point of contact for technical questions and she would provide answers or would solicit information from appropriate members of the community. Mr. Rieser said that Ms. Williams at ADEC would be copied on all communications with the City of Koyukuk.

Mr. Carnahan and Ms. Goolie discussed funding mechanisms and schedules given the new stimulus money being issued in 2009. The conclusion was that both federal and state Brownfield programs would benefit. Mr. Carnahan noted that Brownfield funding using stimulus money will waive matching requirements, and that the EMP will be critical to defining the scope and cost of the project for this funding source.

Mr. Carnahan asked if there were any questions and Ms. Pilot noted that there is no functioning community-owned heavy equipment in Koyukuk at this time. Ms. Pilot asked how many individuals should be trained for HAZWOPER qualification to support the remediation work. Mr. Rieser said that two to four individuals would be adequate, but training more people would help in the event some individuals could not be present when the work is scheduled.

Ms. Pilot noted that heavy equipment had been mobilized from Ruby, Ruby Construction, in 2008 for a project in Koyukuk. Mr. Carnahan said that heavy equipment availability would be a critical element in planning the work scope defined in the EMP.

Meeting Closing:

The meeting was closed at the end of the various discussions. Mr. Carnahan concluded the meeting with requests for SLR to prepare the meeting notes, and asked Ms. Pilot to provide a list of the meeting attendees in Koyukuk in a response to an e-mail she would receive from Ms. Williams at ADEC.

2009 Koyukuk Environment Management Plan Contact List

Name	Affiliation	Title	e-mail	Phone
Hazel Lolnitz	Koyukuk Tribal Council	Environmental Coordinator	Koyukuk_environmental@yahoo.com	(907) 927-2234
Shanda Krista	Koyukuk Tribal Council	IGAP Coordinator	Koyukuk_environmental@yahoo.com	(907) 927-2234
Cindy Pilot	Koyukuk Tribal Council	Tribal Administrator	cynthia.pilot@tananachiefs.org	(907) 927-2253
Marilyn Roberts	City of Koyukuk	City Administrator	cityofkoyukuk@hotmail.com	
Mary Goolie	USEPA Region 10	Brownfield Project Officer	goolie.mary@epa.gov	(907) 271-3414
John Carnahan	ADEC	Brownfield Coordinator	john.carnahan@alaska.gov	(907) 451-2166
Deborah Williams	ADEC	Brownfield Project Manager	deborah.williams@alaska.gov	(907) 451-5174
Sonja Benson	ADEC	Brownfield Project Manager	sonja.benson@alaska.gov	(907) 451-2156
Rose Hewitt	YRITWC	Environmental Technician	rhewitt@yritwc.org	(907) 451-2552
Leah Anderson	YRITWC	Environmental Technician	landerson@yritwc.org	(907) 451-2552
Mike Rieser	SLR	Program Manager	mrieser@slrcorp.com	(907) 222-1112
Carl Benson	SLR	Project Manager	cbenson@slrcorp.com	(907) 455-9005

APPENDIX C

COMMUNITY WELL LOG

ADL 46330 23207
KZD 1/11/96
T7S, R6E, KRM, Sec 17
NW¼NE¼SW¼ Sec 17
Ch. N35 W58
1975 well, may be different.

WATER WELL FOR KOYUKUK VILLAGE SAFE WATER FACILITY

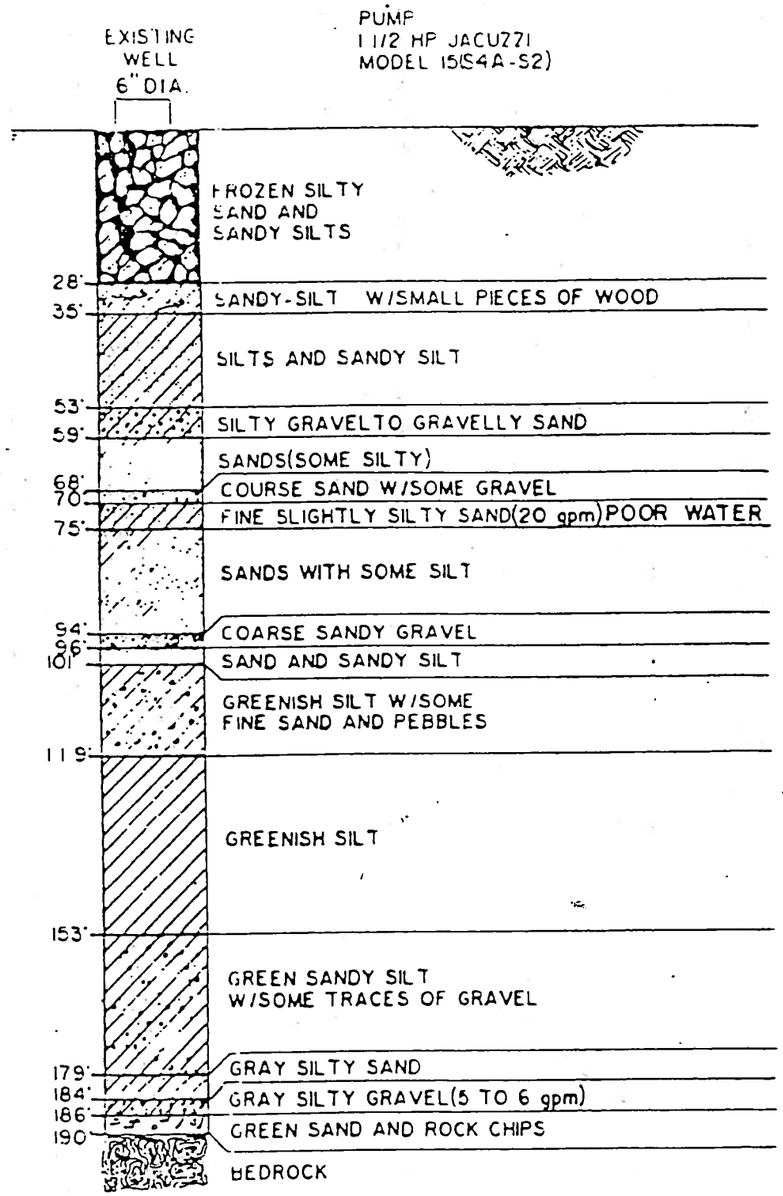
SUMMARY OF DRILLING LOG

Depth	Description
0-1	Root mat
1-28	Silty sands & sandy silts - frozen
28-35	Sandy silty w/small pieces of wood
35-53	Silts & sandy silt - some water seepage
53-59	Silty gravel to gravelly sand - heaves - some water
59-68	Sands - some silty - heaves - some water
68-70	Coarse sand w/some gravel - heaves - some water
70-75	Fine slightly silty sand - Test bailed when casing at 75' bailed 20 gpm for 3 min. w/5' of drawdown below the static level of 20' - 4' heave.
75-94	Sands w/some silt - heaving - some water
94-96	Coarse sandy gravel - heaving
96-101	Sand & sandy silt - able to drill ahead
101-119	Greenish silt w/some fine sand & occasional pebbles; seeping enough water for drilling - static level 20-35'
119-153	Greenish silt - making enough water for drilling
153-179	Green sandy silt w/some traces of gravel - some water - static level 23'
179-184	Gray silty sand - at 183' bailed 10± gpm for 5 min. w/drawdown to 115'. Recovery 1"/min.
184-186	Gray silty gravel w/some coarse rock. Bail test at 14± gpm for 5+ minutes caused drawdown to 70'±. At 67', recovery was 3'/min. or 4-1/2 to 5 gpm.
186-190	Green sand & rock chips - bedrock.

LOCAL NO. KD7-6-17CAB
SITE ID

over →

Koyukuk well



NOTE: WELL CURRENTLY PRODUCES 7 GPM

FIGURE 6 WELL LOG

WELL LOG - KOYUKUK November 12, 1975

DEPTH (Ft.)	SOIL DESCRIPTION
0-1	Root mat
1-28	Silty sands and sandy silts - frozen
28-35	Sandy - silty with small pieces of wood
35-53	Silts and sandy silt - some water seepage
53-59	Silty gravel to gravelly sand - heaving due to water
59-68	Sands - some silty - heaving due to water
68-70	Coarse sand with some gravel - heaving due to water
70-75	Fine slightly silty sand - 20 gpm poor quality
75-94	Sands with some silt
94-96	Coarse sandy gravel - heaving
96-101	Sand and sandy silt
101-119	Greenish silt with some fine sand and occasional pebbles
119-153	Greenish silt
153-179	Green sandy silt with some traces of gravel
179-184	Gray silty sand
184-186	Gray silty gravel with some coarse rock - 5 to 6 gpm
186-190	Green sand and rock chips - bedrock

CHEMICAL REPORT October 23, 1975

Total Hardness	92.5 mg/l
Iron	0.8 mg/l *
Manganese	0.26 mg/l
Nitrate	4.8 mg/l

* Iron is 0.3 mg/l at present

APPENDIX D

COMMUNITY WELL ANALYTICAL DATA

Water System

Water System No.:	AK2360214	**Federal Type**	C
Water System Name:	KOYUKUK SAFEWATER FACILITY	**State Type:**	C
Principal County Served:	YUKON-KOYUKUK	**Primary Source:**	GW
Status:	A	**Activity Date:**	1997-01-01 00:00:00.0

Non-Coliform Sample Results

Lab Sample No. :	VO*F0812254-02A	**Collection Date**	12-16-2008

Analyte Code	Analyte Name	Method Code	Less than Indicator	Level Type	Reporting Level	Concentration Level	Monitoring Period Begin Date	Monitoring Period End Date	MCL
2378	1,2,4-TRICHLOROBENZENE	524.2	Y	MRL	1.000000000 UG/L		01-01-2008	12-31-2008	0.070000000 MG/L
2380	CIS-1,2-DICHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.070000000 MG/L
2955	XYLENES, TOTAL	524.2	Y	MRL	1.000000000 UG/L		01-01-2008	12-31-2008	10.00000000 MG/L
2964	DICHLOROMETHANE	524.2	Y	MRL	2.000000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2968	O-DICHLOROBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.600000000 MG/L
2969	P-DICHLOROBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.075000000 MG/L
2976	VINYL CHLORIDE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.002000000 MG/L
2977	1,1-DICHLOROETHYLENE	524.2	Y	MRL	1.000000000 UG/L		01-01-2008	12-31-2008	0.007000000 MG/L
2979	TRANS-1,2-DICHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.100000000 MG/L
2980	1,2-DICHLOROETHANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2981	1,1,1-TRICHLOROETHANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.200000000 MG/L
2982	CARBON TETRACHLORIDE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2983	1,2-DICHLOROPROPANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2984	TRICHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2985	1,1,2-TRICHLOROETHANE	524.2	Y	MRL	1.000000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2987	TETRACHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2989	CHLOROBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.100000000 MG/L
2990	BENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.005000000 MG/L
2991	TOLUENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	1.000000000 MG/L
2992	ETHYLBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.700000000 MG/L
2996	STYRENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.100000000 MG/L

Total Number of Records Fetched = 21

APPENDIX E

SLR'S CONCEPTUAL SITE MODEL, SCOPING FORM, AND DIAGRAM

This Conceptual Site Model (CSM) was developed to qualitatively assess the risk to potential human and ecological receptors from petroleum hydrocarbons in soil at the Site. This CSM is based upon available site data collected in 2008, and by Alaska Department of Environmental Conservation (DEC) representatives during site visits, and describes the potential exposure scenarios for current and future site receptors. This CSM was prepared in accordance with the DEC *Draft Guidance on Developing Conceptual Site Models* (DEC, 2005) using the DEC Draft Human Health Conceptual Site Model Scoping Form. The DEC Draft Human Health Conceptual Site Model Diagram was used to summarize the results of the checklist. All cleanup levels referenced in this CSM are with respect to DEC Method Two cleanup levels.

1.1 Impacted Media

Impacted media at the Site is the environmental substance to which a contaminant is directly released (DEC, 2005). Analytical results from the Phase I and Limited Phase II ESA (BGES, 2008) for the Koyukuk Former Generator Buildings and Tank Farm as well as data from the community well collected quarterly reviewed in order to determine what media have been impacted as a result of historic activities at the Site. Contaminant concentrations from 2008 are assumed to be unchanged since the time the samples were collected for development of this CSM. Soil data collected at a depth of 2 feet is discussed in both the surface and subsurface soil sections of this CSM. Field screening and analytical data used to support this CSM are presented in Table 2 of the BGES Phase I and II ESA report (2008).

1.1.1 Surface Soil

Surface soil is defined as the interval from 0 foot to 2 feet below ground surface (bgs) (DEC, 2005). A release or discharge associated with the historic activities would directly affect surface soil. Therefore, for this CSM, surface soil is considered an impacted media.

Eleven field screening and three analytical (plus one duplicate) samples were collected from the surface soil interval in 2008; of these samples, seven of the field screening and two of the analytical samples were collected from two feet bgs and are also discussed in Section 1.1.2. Heated headspace field screening results ranged from 0 ppm to over 1,000 parts per million (ppm) with five samples having photoionization detector (PID) results greater than 100 ppm (BGES, 2008).

Analytical results for diesel range organics (DRO) were detected above DEC soil cleanup levels in all samples collected from this interval with concentrations ranging from 3,490 milligrams per kilogram (mg/kg) to 60,900 mg/kg. Gasoline range organics (GRO) was detected above DEC soil cleanup levels in one sample and its duplicate at concentrations up to 823 mg/kg. Residual range organics (RRO) were also detected above DEC soil cleanup levels in two samples at concentrations up to 18,3000 mg/kg (BGES, 2008).

Benzene, toluene, ethylbenzene, and xylenes (BTEX), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-propylbenzene, and naphthalene were also detected in one sample and/or the corresponding duplicate at concentrations in excess of DEC soil cleanup levels (BGES, 2008). Concentrations of these analytes were only detected at concentrations above cleanup levels at

one location, GBS1, which was located directly adjacent to the south side of the former generator building (Figure 2).

1.1.2 Subsurface Soil

Subsurface soil is defined as the interval from 2 feet to 15 feet bgs (DEC, 2005); soil below 15 feet bgs is not considered in this CSM because it is below the depth interval for direct contact by human or ecological receptors. Subsurface soil contamination has been confirmed to be present at the Site, so subsurface soil is confirmed to be an impacted media in this CSM.

Fourteen PID field screening and two analytical (plus one duplicate) samples were collected from this interval in 2008; of these samples, seven of the field screening and all analytical samples were collected from 2 feet bgs and are also discussed in Section 1.1.1. No analytical samples were collected from depths greater than 2 feet bgs. PID field screening results ranged from 0 ppm to over 1,000 ppm with nine samples having PID results greater than 100 ppm. Field screening results from greater than 2 feet bgs ranged from 110 ppm to 859 ppm indicating contaminant concentrations extend beyond 2 feet bgs. Strong hydrocarbon odors and staining were noted at eight of the samples collected from this interval. Permafrost was noted at depths of 2 feet bgs and 6 feet bgs (BGES, 2008).

Analytical results for DRO were detected above DEC soil cleanup levels in all samples collected from this interval with concentrations up to 60,900 mg/kg at a depth of 2 feet bgs. GRO was detected above DEC soil cleanup levels in one sample and its duplicate at concentrations up to 823 mg/kg. RRO was also detected above DEC soil cleanup levels in one sample at concentrations up to 13,100 mg/kg (BGES, 2008).

BTEX, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, n-propylbenzene, and naphthalene were also detected at one location, GBS1, as described in Section 1.1.1.

1.1.3 Ground Water

Routine sampling of the community water well was conducted. The well was drilled to a depth of 185 feet bgs, however, the depth of the screened interval was not noted on the well log (Appendix C). The washeteria, which derives its water from the City Well, is located approximately 75 feet from the closest site boundary. Routine major monitoring violations have been issued for volatile organic compounds (VOCs); however, these violations pertain to deviations in the required sample collection schedule. The most recent monitoring results from December 16, 2008, indicated that all concentrations were less than the method reporting limits (DEC, 2009b).

It is not anticipated that ground water would be used from the Site since the community has a well located approximately 75 feet away, which supplies water for the majority of the population.

No known ground water samples have been collected from the Site. For the purposes of this CSM, ground water is considered an exposure media.

1.1.4 Surface Water

A release at the Site would not directly affect surface water since the receiving media would be soil rather than surface water. For this CSM, surface water is not considered an impacted media however, surface water is an exposure media based on the potential for overland or subsurface migration of contaminants to surface water. The Site is subject to flooding, with recorded events in 1963 and 1989, increasing the risk of overland migration of contaminants.

No known surface water samples have been collected from the Site.

1.1.5 Sediment

A release at the Site would not directly affect sediments associated with nearby surface water. Therefore, for this CSM, sediment is not considered an impacted media.

No known sediment samples have been collected from the Site.

1.2 Transport Mechanisms and Exposure Media

Transport mechanisms are the pathways through which contaminants may move from impacted media to other exposure media. Exposure media are the media to which contaminants are transported, which may result in exposure of human or ecological receptors to the contaminants. Five transport mechanisms were identified at the Site including migration or leaching to subsurface, migration or leaching to ground water, volatilization, runoff or erosion, and uptake by plants and animals. Based on the impacted media and transport mechanisms, five exposure media (soil, air, ground water, surface water, and biota) are present.

Possible transport mechanisms and exposure media are depicted on the ADEC Draft Human Health Conceptual Site Model Diagram included at the end of this CSM.

1.3 Exposure Pathways

Each potential exposure pathway was evaluated using the DEC Draft Human Health Conceptual Site Model Scoping Form. Based on this evaluation, six potentially complete exposure pathways were identified. These pathways include incidental soil ingestion, dermal absorption of contaminants from soil, ingestion of ground water, inhalation of outdoor air, inhalation of indoor air, and ingestion of surface water. The determination of complete or incomplete exposure pathways is explained in the following sections.

1.3.1 Complete or Potentially Complete Exposure Pathways

The direct contact exposure pathway via incidental soil ingestion is considered complete because soil contamination exists between 0 foot and 15 feet bgs and although the Site is not currently used by human receptors, it is the site of a proposed clinic, and is, therefore, expected to be used by human receptors in the future.

The dermal absorption of contaminants from soil pathway is complete because polynuclear aromatic hydrocarbons (PAHs), which can permeate the skin, are present in the soil between 0 foot and 15 feet bgs.

The ingestion of ground water pathway is considered potentially complete because of the presence of soil contamination that has the potential to migrate to ground water.

The inhalation of outdoor air exposure pathway is considered complete because of the presence of volatile contaminants in soil between 0 foot and 15 feet bgs and the future use of the Site by human receptors.

The inhalation of indoor air exposure pathway is considered complete because of the presence of volatile contaminants in the soil and the future presence of an occupied building (i.e. clinic) on the Site. The former generator building is not currently occupied.

The ingestion of surface water pathway is considered potentially complete because the Site has the potential to flood resulting in overland migration of contaminants. In addition, nearby surface water, the Yukon River, which is used for subsistence fishing and recreational activities.

1.3.2 Incomplete Exposure Pathways

The remaining exposure pathways were determined to be incomplete based on site data, features, or other pertinent information in accordance with the DEC Draft Human Health Conceptual Site Model Scoping Form. These incomplete pathways of note are discussed briefly here.

The ingestion of wild foods exposure pathway is not complete because contaminants that bioaccumulate have not been detected at the Site.

1.4 Current and Future Receptors

The Site is reported as unused, however, the Site is in the center of town and current use from visitors, trespassers, recreational users, or subsistence harvesters and consumers cannot be ruled out. The Site is also the proposed location of a new clinic and is expected to have on site workers, but no permanent residences. Any future work at the Site (environmental or construction) will require construction workers. Based on current development plans, the following human receptors are considered to be potentially exposed to site contaminants:

- Commercial or industrial workers (future);
- Construction workers (future);
- Site visitors, trespassers, or recreational users (current and future); and,
- Subsistence harvesters and consumers (current and future).

Human Health Conceptual Site Model
Scoping Form

Site Name: Koyukuk Former Generator Building

File Number: 830.38.002

Completed by: SLR International Corp

Introduction

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

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

1. *General Information:*

Sources *(check potential sources at the site)*

- ☐ USTs
- ☑ ASTs
- ☑ Dispensers/fuel loading racks
- ☑ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☑ Other: Used Oil, Batteries

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

- ☑ Spills
- ☑ Leaks
- ☑ Direct discharge
- ☐ Burning
- ☐ Other: _____

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

- ☑ Surface soil (0-2 feet bgs*)
- ☑ Subsurface Soil (>2 feet bgs)
- ☐ Air
- ☐ Groundwater
- ☐ Surface water
- ☐ Other: _____

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

- ☐ Residents (adult or child)
- ☑ Commercial or industrial worker
- ☑ Construction worker
- ☑ Subsistence harvester (i.e., gathers wild foods)
- ☑ Subsistence consumer (i.e., eats wild foods)
- ☑ Site visitor
- ☑ Trespasser
- ☑ Recreational user
- ☐ Farmer
- ☐ Other: _____

* bgs – below ground surface

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

a) Direct Contact –

1 Incidental Soil Ingestion

Is soil contaminated anywhere between 0 and 15 feet bgs? ☑

Do people use the site or is there a chance they will use the site in the future? ☑

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

2 Dermal Absorption of Contaminants from Soil

Is soil contaminated anywhere between 0 and 15 feet bgs? ☑

Do people use the site or is there a chance they will use the site in the future? ☑

Can the soil contaminants permeate the skin? (Contaminants listed below, or within the groups listed below, should be evaluated for dermal absorption). ☑

Arsenic	Lindane
Cadmium	PAHs
Chlordane	Pentachlorophenol
2,4-dichlorophenoxyacetic acid	PCBs
Dioxins	SVOCs
DDT	

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

b) Ingestion –

1 Ingestion of Groundwater

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

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

If both the boxes are checked, label this pathway complete: Complete

2 Ingestion of Surface Water

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

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

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

3 Ingestion of Wild Foods

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

Do the site contaminants have the potential to bioaccumulate (*see* Appendix A)? ☐

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. the top 6 feet of soil, in groundwater that **could be** connected to surface water, etc.) ☑

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

c) Inhalation

1 Inhalation of Outdoor Air

Is soil contaminated anywhere between 0 and 15 feet bgs? ☑

Do people use the site or is there a chance they will use the site in the future? ☑

Are the contaminants in soil volatile (*See Appendix B*)? ☑

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

2 Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be placed on the site in an area that could be affected by contaminant vapors? (i.e., within 100 feet, horizontally or vertically, of the contaminated soil or groundwater, <u>or</u> subject to "preferential pathways" that promote easy airflow, like utility conduits or rock fractures) ☑

Are volatile compounds present in soil or groundwater (*See Appendix C*)? ☑

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

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

Exposure from this pathway may need to be assessed only in cases where DEC water-quality or drinking-water standards are not being applied as cleanup levels. Examples of conditions that may warrant further investigation include:

- Climate permits recreational use of waters for swimming,
- Climate permits exposure to groundwater during activities, such as construction, without protective clothing, or
- Groundwater or surface water is used for household purposes.

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

Comments:

Inhalation of Volatile Compounds in Household Water

Exposure from this pathway may need to be assessed only in cases where DEC water-quality or drinking-water standards are not being applied as cleanup levels. Examples of conditions that may warrant further investigation include:

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

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

Comments:

Inhalation of Fugitive Dust

Generally DEC soil ingestion cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway, although this is not true in the case of chromium. Examples of conditions that may warrant further investigation include:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers. This size can be inhaled and would be of concern for determining if this pathway is complete.

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

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during recreational or some types of subsistence activities. People then incidentally **ingest** sediment from normal hand-to-mouth activities. In addition, **dermal absorption of contaminants** may be of concern if people come in contact with sediment and the contaminants are able to permeate the skin (see dermal exposure to soil section). This type of exposure is rare but it should be investigated if:

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

ADEC soil ingestion cleanup levels are protective of direct contact with sediment. If they are determined to be over-protective for sediment exposure at a particular site, other screening levels could be adopted or developed.

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

Comments:

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

APPENDIX A

BIOACCUMULATIVE COMPOUNDS

Table A-1: List of Compounds of Potential Concern for Bioaccumulation

Organic compounds are identified as bioaccumulative if they have a BCF equal to or greater than 1,000 or a log K_{ow} greater than 3.5. Inorganic compounds are identified as bioaccumulative if they are listed as such by EPA (2000). Those compounds in Table X of 18 AAC 75.345 that are bioaccumulative, based on the definition above, are listed below.

Aldrin	DDT	Lead
Arsenic	Dibenzo(a,h)anthracene	Mercury
Benzo(a)anthracene	Dieldrin	Methoxychlor
Benzo(a)pyrene	Dioxin	Nickel
Benzo(b)fluoranthene	Endrin	PCBs
Benzo(k)fluoranthene	Fluoranthene	
Cadmium	Heptachlor	Pyrene
Chlordane	Heptachlor epoxide	Selenium
Chrysene	Hexachlorobenzene	Silver
Copper	Hexachlorocyclopentadiene	Toxaphene
DDD	Indeno(1,2,3-c,d)pyrene	Zinc
DDE		

Because BCF values can relatively easily be measured or estimated, the BCF is frequently used to determine the potential for a chemical to bioaccumulate. A compound with a BCF greater than 1,000 is considered to bioaccumulate in tissue (EPA 2004b).

For inorganic compounds, the BCF approach has not been shown to be effective in estimating the compound's ability to bioaccumulate. Information available, either through scientific literature or site-specific data, regarding the bioaccumulative potential of an inorganic site contaminant should be used to determine if the pathway is complete.

The list was developed by including organic compounds that either have a BCF equal to or greater than 1,000 or a log K_{ow} greater than 3.5 and inorganic compounds that are listed by the United States Environmental Protection Agency (EPA) as being bioaccumulative (EPA 2000). The BCF can also be estimated from a chemical's physical and chemical properties. A chemical's octanol-water partitioning coefficient (K_{ow}) along with defined regression equations can be used to estimate the BCF. EPA's Persistent, Bioaccumulative, and Toxic (PBT) Profiler (EPA 2004) can be used to estimate the BCF using the K_{ow} and linear regressions presented by Meylan et al. (1996). The PBT Profiler is located at http://www.pbtprofiler.net/. For compounds not found in the PBT Profiler, DEC recommends using a log K_{ow} greater than 3.5 to determine if a compound is bioaccumulative.

APPENDIX B

VOLATILE COMPOUNDS

Table B-1: List of Volatile Compounds of Potential Concern
Common volatile contaminants of concern at contaminated sites. A chemical is defined as volatile if the Henry's Law constant is 1 x 10^{-5} atm-m^3/mol or greater and the molecular weight less than 200 g/mole (g/mole; EPA 2004a). Those compounds in Table X of 18 AAC 75.345 that are volatile, based on the definition above, are listed below.

Acenaphthene	1,4-dichlorobenzene	Pyrene
Acetone	1,1-dichloroethane	Styrene
Anthracene	1,2-dichloroethane	1,1,2,2-tetrachloroethane
Benzene	1,1-dichloroethylene	Tetrachloroethylene
Bis(2-chlorethyl)ether	Cis-1,2-dichloroethylene	Toluene
Bromodichloromethane	Trans-1,2-dichloroethylene	1,2,4-trichlorobenzene
Carbon disulfide	1,2-dichloropropane	1,1,1-trichloroethane
Carbon tetrachloride	1,3-dichloropropane	1,1,2-trichloroethane
Chlorobenzene	Ethylbenzene	Trichloroethylene
Chlorodibromomethane	Fluorene	Vinyl acetate
Chloroform	Methyl bromide	Vinyl chloride
2-chlorophenol	Methylene chloride	Xylenes
Cyanide	Naphthalene	GRO
1,2-dichlorobenzene	Nitrobenzene	DRO

APPENDIX C

COMPOUNDS OF CONCERN FOR VAPOR MIGRATION

Table C-1: List of Compounds of Potential Concern for the Vapor Migration

A chemical is considered sufficiently toxic if the vapor concentration of the pure component poses an incremental lifetime cancer risk greater than 10-6 or a non-cancer hazard index greater than 1. A chemical is considered sufficiently volatile if it's Henry's Law constant is 1 x 10^{-5} atm-m^3/mol or greater.

Acenaphthene	Dibenzofuran	Hexachlorobenzene
Acetaldehyde	1,2-Dibromo-3-chloropropane	Hexachlorocyclopentadiene
Acetone	1,2-Dibromoethane (EDB)	Hexachloroethane
Acetonitrile	1,3-Dichlorobenzene	Hexane
Acetophenone	1,2-Dichlorobenzene	Hydrogen cyanide
Acrolein	1,4-Dichlorobenzene	Isobutanol
Acrylonitrile	2-Nitropropane	Mercury (elemental)
Aldrin	N-Nitroso-di-n-butylamine	Methacrylonitrile
alpha-HCH (alpha-BHC)	n-Propylbenzene	Methoxychlor
Benzaldehyde	o-Nitrotoluene	Methyl acetate
Benzene	o-Xylene	Methyl acrylate
Benzo(b)fluoranthene	p-Xylene	Methyl bromide
Benzylchloride	Pyrene	Methyl chloride chloromethane)
beta-Chloronaphthalene	sec-Butylbenzene	Methylcyclohexane
Biphenyl	Styrene	Methylene bromide
Bis(2-chloroethyl)ether	tert-Butylbenzene	Methylene chloride
Bis(2-chloroisopropyl)ether	1,1,1,2-Tetrachloroethane	Methylethylketone (2-butanone)
Bis(chloromethyl)ether	1,1,2,2-Tetrachloroethane	Methylisobutylketone
Bromodichloromethane	Tetrachloroethylene	Methylmethacrylate
Bromoform	Dichlorodifluoromethane	2-Methylnaphthalene
1,3-Butadiene	1,1-Dichloroethane	MTBE
Carbon disulfide	1,2-Dichloroethane	m-Xylene
Carbon tetrachloride	1,1-Dichloroethylene	Naphthalene
Chlordane	1,2-Dichloropropane	n-Butylbenzene
2-Chloro-1,3-butadiene (chloroprene)	1,3-Dichloropropene	Nitrobenzene
Chlorobenzene	Dieldrin	Toluene
1-Chlorobutane	Endosulfan	trans-1,2-Dichloroethylene
Chlorodibromomethane	Epichlorohydrin	1,1,2-Trichloro-1,2,2-trifluoroethane
Chlorodifluoromethane	Ethyl ether	1,2,4-Trichlorobenzene
Chloroethane (ethyl chloride)	Ethylacetate	1,1,2-Trichloroethane
Chloroform	Ethylbenzene	1,1,1-Trichloroethane
2-Chlorophenol	Ethylene oxide	Trichloroethylene
2-Chloropropane	Ethylmethacrylate	Trichlorofluoromethane
Chrysene	Fluorene	1,2,3-Trichloropropane
cis-1,2-Dichloroethylene	Furan	1,2,4-Trimethylbenzene
Crotonaldehyde (2-butenal)	Gamma-HCH (Lindane)	1,3,5-Trimethylbenzene
Cumene	Heptachlor	Vinyl acetate
DDE	Hexachloro-1,3-butadiene	Vinyl chloride (chloroethene)

Source: EPA 2002.

HUMAN HEALTH CONCEPTUAL SITE MODEL

Site: Koyukuk Former Generator Building
Koyukuk, Alaska

Completed By: SLR International Corp
Date Completed: Mav 2009

Follow the directions below. Do not consider engineering or land use controls when describing pathways.

(1)
Check the media that could be directly affected by the release.

(2)
For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Briefly list other mechanisms or reference the report for details.

(3)
Check exposure media identified in (2).

(4)
Check exposure pathways that are complete or need further evaluation. The pathways identified must agree with Sections 2 and 3 of the CSM Scoping Form.

(5)
Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, or "C/F" for both current and future receptors.

Media	Transport Mechanisms	Exposure Media	Exposure Pathways	Current & Future Receptors: Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil — *check soil*	☑ soil	☑ Incidental Soil Ingestion		F	C/F	F	C/F	C/F	
	☑ Migration or leaching to subsurface — *check soil*		☑ Dermal Absorption of Contaminants from Soil		F	C/F	F	C/F	C/F	
	☑ Migration or leaching to groundwater — *check groundwater*									
	☑ Volatilization — *check air*									
	☑ Runoff or erosion — *check surface water*									
	☑ Uptake by plants or animals — *check biota*									
	☐ Other (*list*):									
☑ Subsurface Soil (2-15 ft bgs)	☑ Direct release to subsurface soil — *check soil*	☑ groundwater	☑ Ingestion of Groundwater		F		F			
	☑ *Migration to groundwater* — *check groundwater*		☐ Dermal Absorption of Contaminants in Groundwater							
	☑ *Volatilization* — *check air*		☐ Inhalation of Volatile Compounds in Tap Water							
	☐ *Other (list):*									
☐ Ground-water	☐ Direct release to groundwater — *check groundwater*	☑ air	☑ Inhalation of Outdoor Air		F	C/F	F	C/F	C/F	
	☐ *Volatilization* — *check air*		☑ Inhalation of Indoor Air		F	C/F	F			
	☐ *Flow to surface water body* — *check surface water*		☐ Inhalation of Fugitive Dust							
	☐ *Flow to sediment* — *check sediment*									
	☐ *Uptake by plants or animals* — *check biota*									
	☐ *Other (list):*									
☐ Surface Water	☐ Direct release to surface water — *check surface water*	☑ surface water	☑ Ingestion of Surface Water			C/F		C/F	C/F	
	☐ *Volatilization* — *check air*		☐ Dermal Absorption of Contaminants in Surface Water							
	☐ *Sedimentation* — *check sediment*		☐ Inhalation of Volatile Compounds in Tap Water							
	☐ *Uptake by plants or animals* — *check biota*									
	☐ *Other (list):*									
☐ Sediment	☐ Direct release to sediment — *check sediment*	☐ sediment	☐ Direct Contact with Sediment							
	☐ *Resuspension, runoff, or erosion* — *check surface water*									
	☐ *Uptake by plants or animals* — *check biota*	☑ biota	☐ Ingestion of Wild Foods							
	☐ *Other (list):*									

Revised 3/21/06

APPENDIX F

DEC EXPOSURE TRACKING MODEL

Exposure Tracking Model - Evaluation Summary

Navigation

Site Information:

Site: City of Koyukuk Generator Day Tank
Source: Generator day tank
Evaluation Date: 11/1/2007 2:37:13 PM
Initial/Updated: Initial

Results Summary:

Human Health Exposure Category: High Potential Exposure
Controlling Pathway(s): Surface Soil, Subsurface Soil, Outdoor Inhalation
Score: 1

Ecological Site Exposure Category: High Potential Exposure

Potentially-Contaminated Media: Surface Soil, Subsurface Soil, Groundwater, Surface Water
Other Site Concerns: Odors in Building, Public Concern

Exposure Assessment:

Pathway	Exposure Categories Initial Ranking 11/1/2007 3:51:53 PM	Updated Ranking
Direct Contact with Surface Soil:	High Potential Exposure	
Direct Contact with Subsurface Soil:	High Potential Exposure	
Outdoor Air Inhalation:	High Potential Exposure	
Groundwater Ingestion:	Low Potential Exposure	
Surface Water Ingestion:	Pathway Incomplete	
Wild or Farmed Foods Ingestion:	Pathway Incomplete	
Indoor Air Inhalation (Vapor Intrusion):	Pathway Incomplete	
Other Human Health:	Pathway Incomplete	
Ecological:	High Potential Exposure	

Initial Ranking Comments

Direct Contact With Surface Soil: (comments - page)
Spills occurred at the generator building, which is in the middle of the village, across the street from the school and washeteria, approximately 100 yards from the village drinking water well. No cleanup has occurred to date and fuel contamination remains in soil.

Direct Contact With Subsurface Soil: (comments - page)
This site was featured in the Yukon River Inter-Tribal Watershed Council's Brownfield DVD as a potential future playground area. If redevelopment were to occur, excavation may be part of the project. At one time a worker tried to dig up some of the contaminated soil but stopped, saying it smelled too bad and made him feel ill.

Outdoor Air Inhalation: (comments - page)
One attempt to dig up some of the contaminated soil resulted in the worker stopping because he said it smelled too bad and made him feel ill.

Groundwater Ingestion: (comments - page)
Public drinking water supply well, PWS AK 2360214, DEC DW file no. 830.07.001, is located less than 100 yards from the site. DEC is requiring annual monitoring of VOCs. No VOCs have been detected in the drinking water well since the spills occurred.

Surface Water Ingestion: (comments - page)
Sheen was noted on pond near generator building. Surface not used for drinking water. However, entire village may be within 1/4 mile of the Koyukuk and Yukon Rivers.

Wild or Farmed Foods Ingestion: (comments - page)
Berry picking nearby a possibility, but not likely.

Indoor Air Inhalation (Vapor Intrusion): (comments - page)
Generator building not a residence, only limited time likely to be spent in building at various intervals.

Aquatic and Terrestrial: (comments - page)
Uncertain proximity to the Koyukuk and Yukon Rivers.

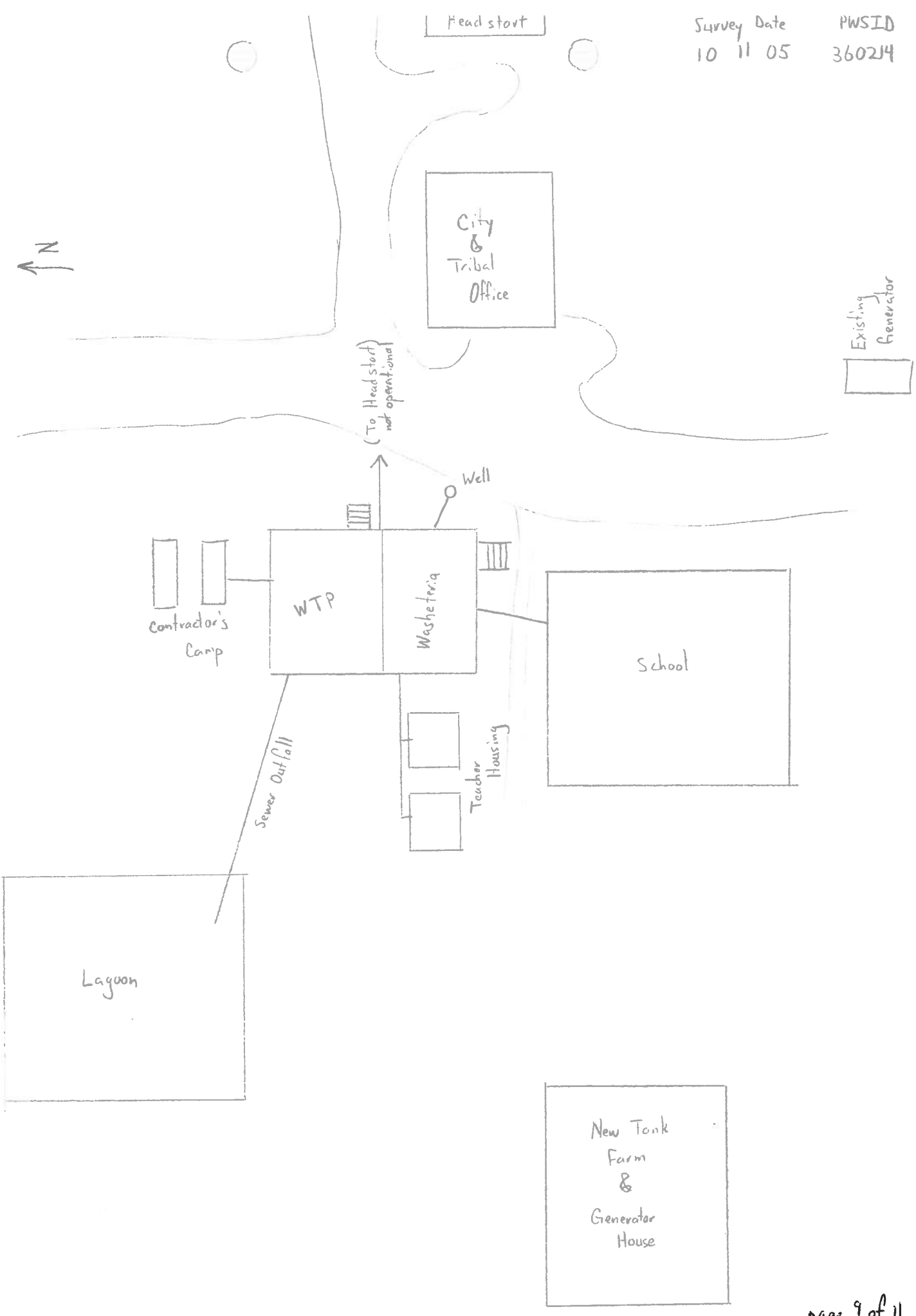
Updated Ranking Comments

APPENDIX G

COMMUNITY WATER SYSTEM PIPING LAYOUT

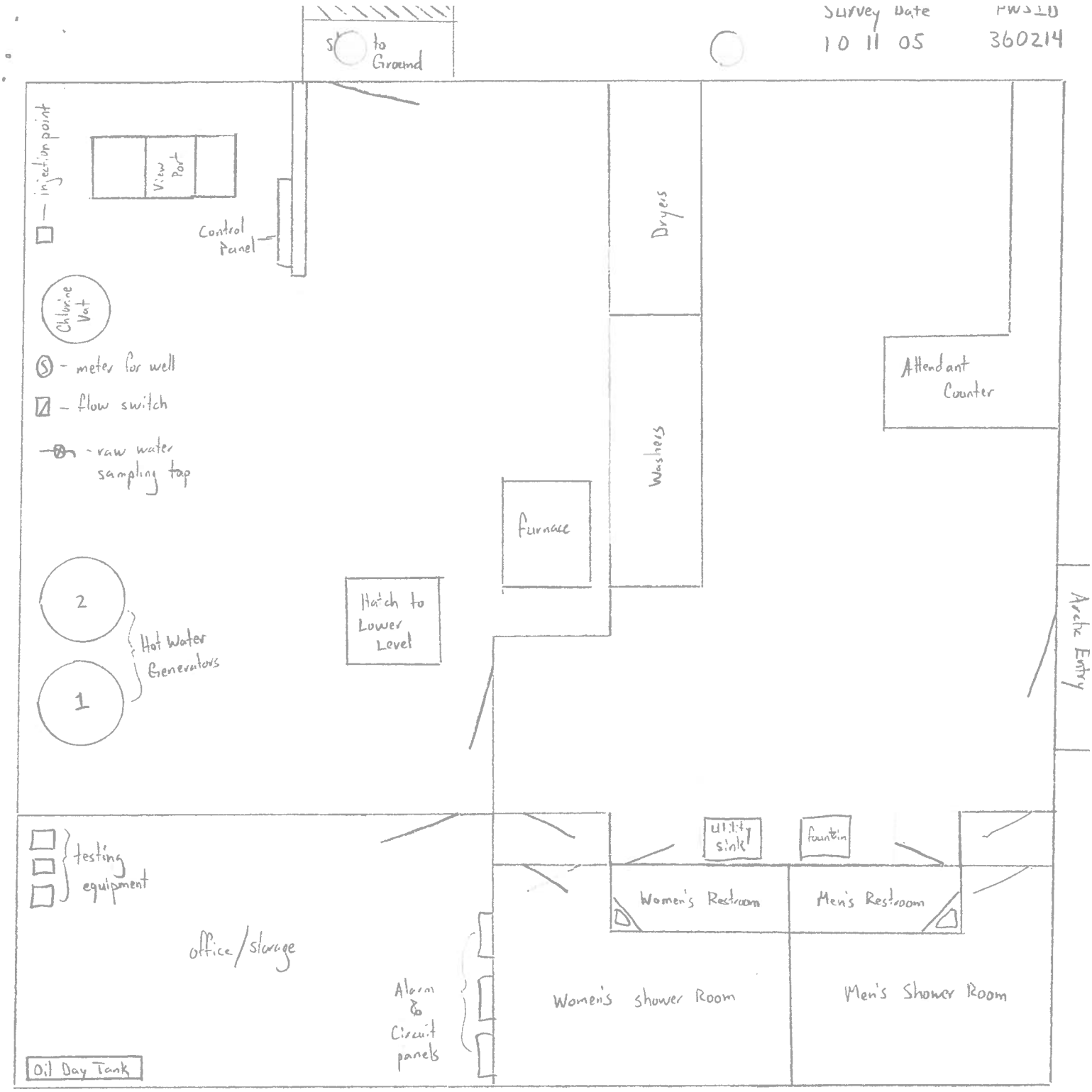
Survey Date 10 11 05

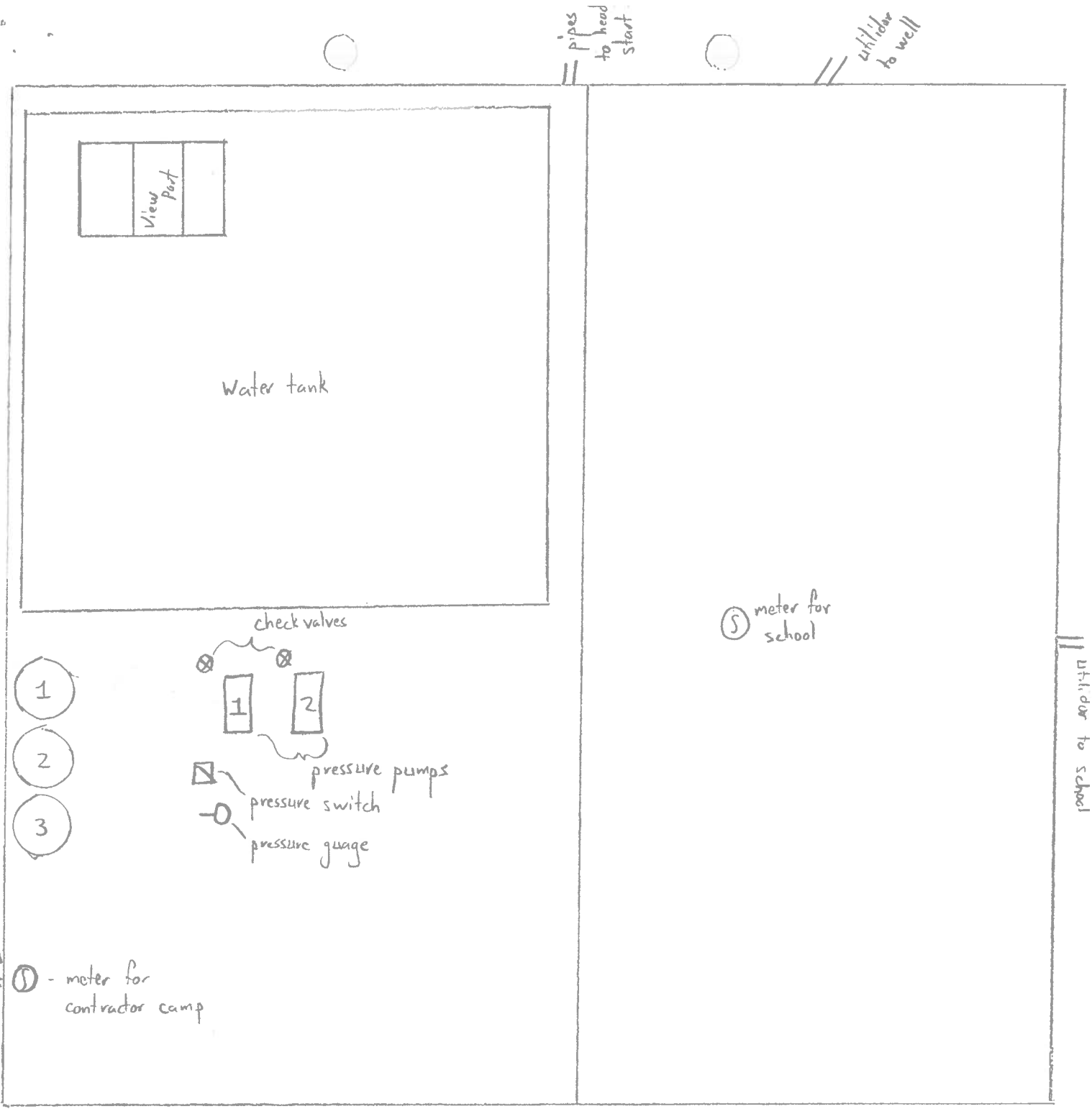
PWSID 360214



Survey Date 10 11 05

PWSID 360214





pressure pumps: 1 - Paco Smart Pump
Cat # 10-10705-130001-P0
Ser # RRD89A00609
IMP DIA 5.6
US Electric Motors
- 3 HP PH3 HZ 60 RPM 3490

2 - Paco Smart Pump
Cat # 10-10705-130001-2621
Ser # RRD89A00609
IMP DIA 5.6
US Electric Motors
-3 HP PH3 HZ 60 RPM 3490

Survey Date
10 11 05

PWSID
360214

APPENDIX H

COST ESTIMATE SPREADSHEETS

Cost Estimate for FY 2010 Work (6/25/2009) - Remediaion, Village of Koyukuk Former Generator Building Soils, Alaska

	Clerical	Drafting	Environmental Scientist	Project Manager	Project Director	Total		Comments / Backup
1. Direct Labor	$55.00	$90.00	$90.00	$100.00	$130.00	Hours	Cost	
Task 1 - Remedial Workplan Preparation		24	56	40	16	136	$13,280.00	Forty hours for plan prep plus one-day site visit of two 12-hour days including coordination with Village representatives.
Task 2A - Construction Landfarm area and haul debris to landfill		8	72	16	8	104	$9,840.00	Will require up to five days on site for cell construction (avg. 12-hour days), + 12 hrs mob. This time is needed to prep the roughly 180-foot square area for the landfarm. In addition, all solid waste debris will be hauled to the land fill in dump trucks. All liquid wastes will be managed through the Village Solid Waste Coordinator.
Task 2B - Excavation of Contaminated Soils, Spreading Landfarm Soils		12	48	16	8	84	$8,040.00	Assumes total 10-hour operating daily rate of hauling is 450 cubic yards (assume 10 hour production in 12-hour day due to refueling, etc.) Three days needed for Excavation. One contingency day added for equipment maintenance. Excavation floor sampling/mapping will take place during excavation. Dump Trucks will dump soils in an area next to the landfill and the loader will require two days to spread after initial spreading by trucks is complete.
Task 2C - Backfilling Excavations (850 cubic yards)		8	72	16	8	104	$9,840.00	Assume six days required to load and haul material to excavation site. One contingency day added for equipment maintenance. Loader needed on both sides of process results in two extra days of loader time for this task. Compaction will require one additional day. Purchase of compactor to compact backfill gravel in one-foot lifts.
Task 2D - Tilling and Fertilizing Land Farm	6	24	120	24	8		$16,730.00	Set up equipment and start tilling and fertilizing process to be performed by local labor. This task also assumes time to purchase and ship the rototiller, fertilizer spreader, and fertilizer to Koyukuk. Project report for excavation and backfill, and landfarm construction
Task 3 - Land Farm Maintenance 2011		8	60	8	2	78	$7,180.00	Assume one trip for sample collection and village labor to do three rounds of tilling and fertlilizing (assumes one 12-hour day and 12-hours travel time) 24 hours for environmental scientist to prepare letter interim report.
Task 4 - Land Farm Maintenance 2012		4	60	8	2	74	$6,820.00	Assume one trip for sample collection and village labor to do three rounds of tilling and fertlilizing (assumes one 12 hour day and 12-hours travel time for consultant). 24 hours for environmental scientist to prepare letter interim report.
Task 5 - Decommission Land Farm 2013		4	72	40	4	120	$11,360.00	Will require up to 1 day for cell confirmation sampling, 4 days for creating landfill cover stockpile (October 2013), and 10 hours of travel.
Task 6 - Reporting	4	24	80	60	8	176	$16,620.00	Final report of landfarm sampling and decommissioning.
Total Hours	10	116	640	228	64	1,058		
Labor Cost	$550	$10,440	$57,600	$22,800	$8,320	**Labor Cost Total**	**$99,710**	

Task 1 - Remedial Workplan Preparation	No. of Units	Unit	Cost Per Unit	Subtotal	
Phone/FAX	1	estimate	$50	$50	
Reproduction	1	estimate	$250.00	$250	
Meals	2	estimate	$65.00	$130	Estimate
Lodging	1	estimate	$30.00	$30	Based on cost quoted from City of Koyukuk.
Consultant RT Airfare, Fairbanks to Koyukuk	1	each	400	$400	Based on cost quoted from Frontier Flying Services.

SubTotal Task 1 (ODC)	**$860**
SubTotal Task 1 (Labor)	**$13,280**
Task 1 - Total Costs	**$14,140**

Cost Estimate for FY 2010 Work (6/25/2009) - Remediaion, Village of Koyukuk Former Generator Building Soils, Alaska

Task 2A - Construction Landfarm area and haul debris to landfill

	No. of Units	Unit	Cost Per Unit	Subtotal	
Consultant RT Airfare, Fairbanks to Koyukuk	1	each	$400	$400	Based on cost quoted from Frontier Flying Services.
Pickup Truck Rental (with fuel)	60	hour	$30	$1,800	Based on cost quoted from City of Koyukuk.
Caterpillar Loader/Backhoe (with fuel)	5	12-hr days	$564	$2,820	Based on rate from Hughes; will be update once Koyukuk rate is available.
Dump Truck (with fuel)	120	Hour	$30	$3,600	Based on cost quoted from City of Koyukuk.
Operator #1	60	Hour	$52	$3,128	Assume five days for preparation of landfarm area and hauling debris to landfill. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Operator #2	120	Hour	$52	$6,257	
Laborer #1	60	Hour	$43	$2,606	Assume five days for preparation of landfarm area and hauling debris to landfill. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #2	60	Hour	$43	$2,606	
Transportation of Consultant Equip/Materials to Koyu	1	estimate	$2,000	$2,000	Includes seed, fertilizer, instruments, etc. (may ship fertilizer w/liners).
Lodging	5	man-day	$30	$150	
Meals	5	man-day	$65	$325	Estimated daily cost for food and meals.
Surveying equipment	1	weeks	$300	$300	Surveyor's Exchange: laser level that can be operated by one person.
Digital Camera	5	days	$15	$75	
PPE / Consumables	30	days	$20	$600	Based upon costs of Level D PPE during the effort.

SubTotal Task 2A (ODC)	**$26,668**
SubTotal Task 2A (Labor)	**$9,840**
Task 2A - Total Costs	**$36,508**

Cost Estimate for FY 2010 Work (6/25/2009) - Remediaion, Village of Koyukuk Former Generator Building Soils, Alaska

Task 2B - Excavation of Contaminated Soils, Spreading Landfarm Soils					
Caterpillar Excavator/Loader *(with fuel)	6	12-hr days	$564.00	$3,384	Based on rate from Hughes; will be update once Koyukuk rate is available.
Dump Truck (with fuel)	120	Hour	$30.00	$3,600	Based on cost quoted from City of Koyukuk.
Pickup Truck (with fuel)	72	Hour	$30.00	$2,160	Based on cost quoted from City of Koyukuk.
Equipment Operator #1	72	Hour	$52	$3,754	Excavator/Loader operator
Equipment Operator #2	120	Hour	$52	$6,257	"" (10-yard dumptruck)
Laborer #1	72	Hour	$43	$3,128	
Laborer #2	72	Hour	$43	$3,128	
Soil Sample Analysis (Floor Characterization) - GRO/BTEX AK101/EPA 8021B	24	samples	$85	$2,040	Needed to characterize excavation floor levels, assumes a 5-foot excavation depth and 850 cubic yards excavated. Two separate excavations are planned at approximately 625 and 4,000 square feet. The first excavation will require four samples (two for first 250 square feet and two additional for next 375). The second excavation, will require 17 samples (two for first 250 square feet and 15 additional for next 3,750). Total samples is 21, plus 3 for QC. Thus, per UST procedures manual, floor sample requirements will be 24 based on estimated excavation limits.
Soil Sample Analysis (Floor Characterization) - DRO/RRO AK101/AK102	24	sample	$85.00	$2,040	As above for excavation floor.
Soil Sample Analysis (Sidewall Characterization) - GRO/BTEX AK101/SW 8021B	20	samples	$85	$1,700	Sidewall characterization based on one sample per 20 linear feet with 10% QC duplicate frequency.
Soil Sample Analysis (Sidewall Characterization) - DRO/RRO AK101/AK102	20	sample	$85.00	$1,700	As above for excavation sidewall.
Soil Sample Analysis (Sidewall and Floor) PAH SIM SW 8270	5	sample	$185.00	$925	PAH analysis on selected sidewall and floor samples exhibiting highest screening results.
Soil sample analysis (Sidewall and Floor) VOC 8260B	5	sample	$185.00	$925	VOC analysis on selected sidewall and floor samples exhibiting highest screening results or areas indicative of solvent or gasoline use.
Soil Sample Analysis (Sidewall Characterization) - GRO/BTEX Travel Blanks	4	trip blank	$42.50	$170	Trip blans for GRO/BTEX analyses.
Soil sample analysis (Sidewall and Floor) VOC Travel Blanks	2	trip blank	$92.00	$184	Trip blanks for VOC analyses.
Water Sample Analysis (Public Well Sample) - DRO/RRO AK102/AK103	1	sample	$85.00	$85	Well Water Sample.
Water Sample Analysis (Public Well Sample) - GRO/BTEX AK101/SW 8021B	1	samples	$85.00	$85	Well Water Sample.
Water Sample Analysis (Public Well Sample) - VOC SW 8260B	1	sample	$185.00	$185	Well Water Sample.
Water Sample Analysis (Public Well Sample) - VOC EPA 524.2	1	sample	$200.00	$200	Well Water Sample.
Water Trip Blank Analysis (Public Well Sample) - GRO/BTEX	1	trip blank	$42.50	$43	Well Water Sample Travel Blank.
Water Trip Blank Analysis (Public Well Sample) - VOC SW 8260B	1	trip blank	$92.50	$93	Well Water Sample Travel Blank.
Water Trip Blank Analysis (Public Well Sample) - EPA 524.2	1	trip blank	$100.00	$100	Well Water Sample Travel Blank.
Lodging	6	days	$30	$180	
Meals	6	days	$65	$390	
PPE	36	days	$20	$720	
Digital Camera	6	days	$15	$90	
PID Rental	6	days	$50	$300	
Consultant RT Airfare, Fairbanks to Koyukuk	2	each	$400	$800	Based on cost quoted from Frontier Flying Services.

SubTotal Task 2B (ODC)	**$38,364**
SubTotal Task 2B (Labor)	**$8,040**
Task 2B - Total Costs	**$46,404**

Task 2C - Backfilling Excavations (850 cubic yards)					
Caterpillar Excavator/Loader *(with fuel)	8	12-hr days	$564.00	$4,512	Based on rate from Hughes; will be update once Koyukuk rate is available.
Dump Truck (with fuel)	96	Hour	$30.00	$2,880	
Pickup Truck (with fuel)	48	Hour	$30.00	$1,440	Based on cost quoted from City of Koyukuk.

Equipment Operator #1	72	Hour	$52	$3,754	
Equipment Operator #2	96	Hour	$52	$5,005	
Laborer #1	60	Hour	$43	$2,606	Assume a total of five days to complete compaction of excavation areas.
Laborer #2	60	Hour	$43	$2,606	
20-mil HDPE Liner Material (5,000 square feet)	6000	sq ft	$0.35	$2,100	Polar Supply quote 5/19/2009 with 1,500 square feet as contingency to cutting losses and excavation expansion
Purchase of small plate compactor and shipping with liner material	1	estimate	$2,500	$2,500	16" by 21" plate compactor is $1,995 at CMI in Fairbanks May 2009.
Lodging	5	day	$30	$150	Assuming 10-days on site to backfill (again, limited by truck turn time) and additional day to demob at village (coordinate equipment removal, etc.).
Meals	5	day	$65	$325	
PPE	30	day	$20	$600	
Digital Camera	5	day	$10	$50	
Backfill gravel for Excavations	850	yards	$2	$1,275	$1.5/yard to ADNR for gravel permit.

SubTotal Task 2C (ODC)	**$29,804**
SubTotal Task 2C (Labor)	**$9,840**
Task 2B - Total Costs	**$39,644**

Task 2D - Tilling and Fertilizing Land Farm

Rototiller	1	estimate	$3,000	$3,000	
Laborer #1	168	hours	$43	$7,224	Assume seven days to spread fertilizer and till soil using local labor. This will be performed twice annually
Transportation of Equip/Materials to Koyukuk	1	estimate	$1,000	$1,000	Ship fertilizer and rototiller from Anchorage.
Fertilizer Spreader	1	estimate	$150	$150	Purchase of broadcast spreader.
Fertilizer	1	estimate	$800	$800	350 pounds of 8-32-16 fertilizer for approximate 10 - 12 pounds per 1,000 square feet. Two applications per summer season.
Vehicle Rental	168	hours	$30	$5,040	Based on cost quoted from City of Koyukuk.
Rototiller Fuel	30	gallons	$8	$240	Vehicle - ATV fuel.
Lodging	1	man-day	$30	$30	
Meals	2	man-day	$65	$130	Based upon worker for three days in the field.
PID	1	instr-day	$50	$50	
PPE	15	day	$20	$300	
Digital Camera	1	day	$15	$15	Based upon one Digital Camera.
Miscellaneous	1	estimate	$1,000.00	$1,000	

SubTotal Task 2C (ODC)	**$18,979**
SubTotal Task 2C (Labor)	**$16,730**
Task 2B - Total Costs	**$35,709**

Cost Estimate for FY 2010 Work (6/25/2009) - Remediaion, Village of Koyukuk Former Generator Building Soils, Alaska

Task 3 - Land Farm Maintenance 2011					
Consultant RT Airfare, Fairbanks to Koyukuk	1	each	$400	$400	Based on cost quoted from Frontier Flying Services.
Laborer #1	168	hours	$43	$7,224	Assume seven days to spread fertilizer and till soil using local labor. This will be performed twice annually.
Transportation of Equip/Materials to Koyukuk	1	estimate	$200	$200	Ship fertilizer and rototiller from Anchorage.
Fertilizer	1	estimate	$800	$800	350 pounds of 8-32-16 fertilizer for approximate 10 - 12 pounds per 1,000 square feet. Two applications per summer season.
Vehicle Rental	168	hours	$30	$5,040	Based on cost quoted from City of Koyukuk.
Rototiller Fuel	30	gallons	$8	$240	Rototiller fuel.
Lodging	1	man-day	$30	$30	
Soil Sample Analysis (Landfarm Characterization) - GRO/BTEX	11	samples	$85	$935	Eleven samples, includes one duplicate, for 1,230 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Soil Sample Analysis (Landfarm Characterization) - DRO/RRO	11	sample	$95.00	$1,045	Eleven samples, includes one duplicate, for 1,230 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Meals	2	man-day	$65	$130	Based upon worker for 3 days in the field.
PID	1	instr-day	$50	$50	
PPE	15	day	$20	$300	
Digital Camera	1	day	$15	$15	Based upon one Digital Camera
Miscellaneous	1	estimate	$1,000.00	$1,000	

SubTotal Task 3 (ODC)	**$17,409**
SubTotal Task 3 (Labor)	**$7,180**
Task 3 - Total Costs	**$24,589**

Cost Estimate for FY 2010 Work (6/25/2009) - Remediaion, Village of Koyukuk Former Generator Building Soils, Alaska

Task 4 - Land Farm Maintenance 2012					
Consultant RT Airfare, Fairbanks to Koyukuk	1	each	$400	$400	Based on cost quoted from Frontier Flying Services.
Laborer #1	168	hours	$43	$7,224	Assume seven days to spread fertilizer and till soil using local labor. This will be performed twice annually
Transportation of Equip/Materials to Koyukuk	1	estimate	$200	$200	Ship fertilizer and rototiller from Anchorage.
Fertilizer	1	estimate	$800	$800	350 pounds of 8-32-16 fertilizer for approximate 10 - 12 pounds per 1,000 square feet. Two applications per summer season.
Vehicle Rental	168	hours	$30	$5,040	Based on cost quoted from City of Koyukuk.
Rototiller Fuel	30	gallons	$8	$240	Rototiller fuel.
Lodging	1	man-day	$30	$30	
Soil Sample Analysis (Landfarm Characterization) - GRO/BTEX	11	samples	$85	$935	Eleven samples, includes one duplicate, for 1,230 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Soil Sample Analysis (Landfarm Characterization) - DRO/RRO	11	sample	$95.00	$1,045	Eleven samples, includes one duplicate, for 1,230 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Meals	2	man-day	$65	$130	Based upon worker for three days in the field.
PID	1	instr-day	$50	$50	
PPE	15	day	$20	$300	
Digital Camera	1	day	$15	$15	Based upon one Digital Camera
Miscellaneous	1	estimate	$1,000.00	$1,000	

SubTotal Task 4 (ODC)	**$17,409**
SubTotal Task 4 (Labor)	**$6,820**
Task 4 - Total Costs	**$24,229**

Task 5 - Decommission Land Farm 2013					
Consultant RT Airfare, Fairbanks to Koyukuk	1	each	$400	$400	Based on cost quoted from Frontier Flying Services.
Caterpillar Excavator/Loader *(with fuel)	6	12-hr days	$564	$3,384	Based on rate from Hughes; will be update once Koyukuk rate is available.
Dump Truck (with fuel)	48	hour	$30	$1,440	Asssumes four days of dump truck time to move soils closer to landfill.
Pickup Truck (with fuel)	72	hour	$30	$2,160	Based on cost quoted from City of Koyukuk.
Operator #1 (Loader/Backhoe)	72	hour	$52	3754.08	
Operator #2	48	hour	$52	2502.72	
Laborer	72	hour	$43	$3,128	
Transportation of Equip/Materials to Koyukuk	2	estimate	$200	$400	
Lodging	4	man-day	$30	$120	
Meals	6	man-day	$65	$390	Based upon worker for three days in the field.
PID	6	instr-day	$50	$300	
Digital Camera	5	day	$15	$75	Based upon one Digital Camera
Soil Sample Analysis (Landfarm Characterization) - GRO/BTEX	11	samples	$85	$935	Eleven samples, includes one duplicate, for 1,220 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Soil Sample Analysis (Landfarm Characterization) - DRO/RRO	11	sample	$95.00	$1,045	Eleven samples, includes one duplicate, for 1,220 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
PPE	21	days	$20.00	$420	
Phone/FAX	1	estimate	$50	$50	
Reproduction - B&W	1000	each	$0.10	$100	
Reproduction - Color	100	each	$1.00	$100	

SubTotal Task 5 (ODC)	**$20,703**
SubTotal Task 5 (Labor)	**$16,620**
Task 5 - Total Costs	**$37,323**

Total, Labor	**$88,350**
Total, Other Direct Costs	**$170,197**
10% Contingency	**$25,855**
TOTAL PROJECT COST (Koyukuk Remediation)	***$284,402***