Alaska Department of Environmental Conservation

Reuse & Redevelopment Initiative

Brownfield Assessment

ENVIRONMENTAL MANAGEMENT PLAN

Hughes Former Generator Building and Tank Farms

Hughes, Alaska

Submitted to:
Department of Environmental Conservation
Brownfield Program

By:
SLR International Corp
June 2009

ENVIRONMENTAL MANAGEMENT PLAN
HUGHES FORMER GENERATOR BUILDING
AND TANK FARMS
HUGHES, ALASKA

Prepared for

Alaska Department of Environmental Conservation
Contaminated Sites Program
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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.

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ACRONYMS

°F	degrees Fahrenheit
AAC	Alaska Administrative Code
DCCED	Alaska Department of Commerce, Community and Economic Development
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AHRM	Alaska Hazard Ranking Model
ANTHC	Alaska Native Tribal Health Consortium
AST	aboveground storage tank
BGES	Braunstein Geological & Environmental Services
bgs	below ground surface
BIA	Bureau of Indian Affairs
BTEX	benzene, toluene, ethylbenzene, and xylenes
CDL	commercial driver's license
CFR	code of federal regulations
CSM	conceptual site model
cy	cubic yards
DBA	DEC Brownfield Assessment
DCRA	Division of Community and Regional Affairs
DEC	Alaska Department of Environmental Conservation
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
OSHA	Occupational Safety and Health Administration

ACRONYMS (CONTINUED)

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
TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compound
YKSD	Yukon Koyukuk School District
YRITWC	Yukon River Intertribal Watershed Council

EXECUTIVE SUMMARY

SLR International Corp (SLR) is pleased to submit this Environmental Management Plan (EMP) to the Alaska Department of Environmental Conservation (DEC) for two properties in Hughes, Alaska. The sites on the two properties are the City of Hughes former generator building, abandoned generator building, and former City of Hughes tank farm, and the former school tank farm. The former generator building and abandoned generator building, and associated former tank farm are located on Lot 11 of U.S. Survey No. 3720, and are owned by the City of Hughes. The former school tank farm is located on Lot 13 of U.S. Survey No. 3720, and is owned by the State of Alaska. These properties are contiguous and are collectively referred to as the Site.

The objective of this EMP is to provide information aimed at advancing the site through the Brownfield process to beneficially reuse the Site. The two properties contain known petroleum contamination because of overfilling tanks, poor maintenance, aging facilities, and flooding events. A fuel line that connected the former school tank farm to the former generator buildings still exists on both properties. The community drinking water well that supplies the majority of the drinking water used by Hughes residents has historically been contaminated with benzene at concentrations less than, but near the maximum contaminant level. The well is suspected to be impacted by the contamination from the surrounding area, and is located within 20 feet of suspected petroleum hydrocarbon-contaminated soil identified at the Site.

Interested parties in this EMP are the City of Hughes, the Hughes Village Council, the Yukon Koyukuk School District, and the Yukon River Inter-Tribal Watershed Council (YRITWC). The City intends to reuse the Site as the location for an elder/youth center and a softball field.

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

1. INTRODUCTION

In the spring of 2008, the Hughes Village Council submitted a DEC Brownfield Assessment (DBA) request form to the Alaska Department of Environmental Conservation (DEC) to address contamination concerns at two properties in the community. The DBA request form is included as Appendix A. The properties in question contain the former generator building area, an abandoned generator building, a former city tank farm and associated pipeline to the abandoned generator building, and a former school tank farm. The former and abandoned generator buildings, city tank farm and associated pipeline, are located on land owned by the City of Hughes. This land is Lot 11 of U.S. Survey No. 3720. The former school tank farm is located on Lot 13 of U.S. Survey No. 3720 and is owned by the State of Alaska. The properties are contiguous and hereinafter are referred to as the Site. The DBA request form identified fuel contamination from the former activities at the Site as a health concern precluding reuse of the land. The Village Council's stated reuse objective for the Site is to provide an area for an Elder/Youth Center and open space for a softball field. Specific location information for either the elder/youth center or the softball field was not provided in the DBA Request Form.

This Environmental Management Plan (EMP) was written on behalf of DEC in response to the Hughes Village Council's DBA 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 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 the Brownfield cleanup and redevelopment process. The stated reuse objective at the Site, requiring Brownfield funding, is to provide reusable property for the construction of a community building that could serve as an elder/youth center, and a softball field.

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 Hughes Village Council, the City of Hughes, 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 community 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 these sites. 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 is a comprehensive summary based on the inventory of existing background documents, interviews with members of the Hughes community, and the community meeting summary. The intent of this EMP is to supply all interested stakeholders with a guideline document suitable for moving the Hughes sites through the Brownfield process.

1.3 OBJECTIVES

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

- Compile demographic information about the City of Hughes, current site ownership information, prior and current use, and reuse objectives for the land,
- Prepare a summary of contaminant history and assessment activities performed to date, and
- Develop a general execution plan and a cost estimate for a feasible remedial alternative permitting the community's reuse objective for the sites to be met.

2. COMMUNITY OVERVIEW

This section provides information about the community of Hughes, home of the Hut'odleekkaakk'et Tribe. It provides pertinent information on the stakeholders and summarizes the community involvement for the site.

2.1 COMMUNITY GENERAL INFORMATION

Hughes receives approximately 13 inches of precipitation per year and is subject to flooding of the Koyukuk River. Hughes experiences extreme temperature differences, with extended periods of minus 40 degrees Fahrenheit (°F) during winter months, and an average July temperature of 70°F. The Koyukuk River is ice free from June through October and fluctuates in elevation, hampering the transport of river cargo (BGES, 2008). Currently, supplies are delivered to Hughes by air since there is no regular barge service to the community (personal communication with Thelma Nicholai, May 15, 2009).

The highest flood on record (272 feet above mean sea level [AMSL]) occurred in 1965. In September 1994, a severe flood with an elevation of 270.5 feet destroyed nearly all of the community's buildings, homes, and food caches. Another major flooding event occurred in 2006; both events resulted in significant fuel releases. Since then, residents have rebuilt homes and facilities (BGES, 2008).

No homes have complete plumbing, most use honey buckets and outhouses. Eleven houses, as well as the school, the teacher's apartments, and the Tribal offices, are supplied with piped water from the community well (BGES, 2008). This is the only well registered in the community and no residents own or operate wells of their own (DEC, 2009). Most Hughes residents currently haul water from the central watering house, washeteria. The well has been impacted by known petroleum contamination (DEC, 2009). The source of impact to this well may be associated with fuel releases from the Site. The drill log and U.S. Geological Survey (USGS) site schedule prepared in 1986 for this well are provided in Appendix C. The well is currently being monitored under the Drinking Water Program of DEC's Division of Environmental Health. Laboratory results of the quarterly sampling of the community well done in March 2009 are provided in Appendix D.

The Alaska Department of Commerce, Community, and Economic Development (DCCED) provided information regarding the history of the community well and water distribution system. The community water well, for which a lithology and construction log exists, was drilled in 1973. The USGS site schedule prepared in 1986 indicated a 1963 installation date for the community well. It is not certain whether this is the same well or an abandoned well. In 1968 a water distribution system was completed for Hughes households, and was expanded in 1973. However, in 1983, the system froze, leaving only a few facilities operational. Today, 11 facilities are still supplied with piped water and most Hughes residents currently haul water from the community well. A feasibility study has been completed to identify needed sanitation improvements (DCCED, 2009).

2.1.1 LOCATION

The village is located on the east bank of the Koyukuk River (Figure 1), adjacent to a 500-foot bluff rising from the river bank. Hughes is about 115 air miles northeast of Galena and 210 air miles northwest of Fairbanks. The area is dominated by continuous permafrost and surficial features consist of isolated low hills intermixed with river valleys (BGES, 2008). Figure 1 shows the location of Hughes, located in the Fort Gibbons Recording District, The community center lies at approximately 66.048890° North Latitude and -154.255560° West Longitude using North American Datum 1983, (Section 33, Township 8 North, Range 22 East of the Kateel River Meridian). The village encompasses 3.1 square miles of land.

2.1.2 POLITICAL ORGANIZATIONAL STRUCTURE

In 1973, Hughes became one of 116 incorporated second class cities within Alaska. This incorporation indicates that the city has fewer than 400 residents and is governed by a seven-member council, known in Hughes as the Hughes Village Council (DCRA, 2009). The city council oversees the administration and operation of municipal services and infrastructure such as water, sewer, and electricity services.

A seven-member village council administers programs in the village. These programs are defined in compacts with the Bureau of Indian Affairs (BIA). Some examples of village programs under compact with the BIA are tribal family youth programs, the IGAP, and transportation. The Tanana Chiefs Conference is the holder of the compacts with BIA and administers some of the programs (personal communication with Thelma Nicholai, May 15, 2009).

2.1.3 STAKEHOLDERS

Stakeholders for this project include the City of Hughes, the Hughes Village Council, DEC, EPA, the YRITWC, and the Yukon Koyukuk School District (YKSD). A summary of the project stakeholders, and their involvement in the Brownfield process for this site, is provided below.

2.1.3.1 The City of Hughes

The Hughes Village Council is the governing body for administering municipal services in the City of Hughes. The City of Hughes owns Lot 11 upon which the former city tank farm, buried pipeline, abandoned generator building, and the location of the former generator building remain. Alaska city governments are considered eligible applicants for EPA Brownfield assessment and cleanup grants.

2.1.3.2 The Hughes Village Council

The Hughes Village 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 Hughes Village 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 Brownfield Program has partnered with 36 tribes, working with them to identify, prioritize and assess potential Brownfield sites. In the spring of 2008, the Hughes Village Council applied for an ESA through the YRITWC Brownfield Program. This project site was ranked as a high priority and the council selected the Hughes site to receive a site assessment. The YRITWC also completed an action plan for the site, with the purpose of providing the Hughes community with background information and proposed site control and cleanup options.

The YRITWC operates a backhaul program to several villages. Hughes is served by this backhaul program, but only using small carrier aircraft and, on occasion, by C-130 cargo aircraft. The Watershed Council coordinates the entire 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 (funded through the EPA). However, YRITWC is non-profit, so if the state, federal, or local stakeholders (land owners, etc.) of the contaminated sites provide additional funding for the removal of material, more could be accomplished.

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 Hughes responding to concerns regarding potentially contaminated sites. The two active contaminated sites in Hughes are now the subject of 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 are intended to establish and enhance environmental response programs, as well as to address the assessment, cleanup, and redevelopment of Brownfields (EPA, 2009).

EPA's Brownfield Program empowers tribes, states, and communities by providing money and technical assistance to prevent, assess, safely clean up, 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 (EPA, 2009).

2.1.3.6 Yukon Koyukuk School District

The YKSD owns Lot 13 upon which the former school tank farm and elevated pipeline remain. The YKSD has replaced the school tank farm with its own new tanks closer to the school, and has an interest in seeing the former tank farm removed. The Hughes school utilities are integrated with the community in that the school uses village water and power.

2.1.4 COMMUNITY DEMOGRAPHICS

Historically, several Native groups have lived in the Hughes area, including the Koyukon Athabascans and the Kobuk, Selawik, and Nunamiut Eskimos from the north and northwest. The Koyukon lived in several temporary seasonal fishing and gathering camps throughout the year and Hughes was used as a trade center between the Athabascans and the Eskimos. It also served as a supply port for the Indian River gold fields until 1915 when the local mining industry declined (DCRA, 2009).

The Hut'odleekkaakk'et Tribe, a federally recognized tribe, is a Koyukon Athabascan community and resides in Hughes. As of 2009, the population of Hughes consists of 79.5 percent Alaska Native or part Native (DCRA, 2009).

The 2000 U.S. Census data indicates that there are 78 people, 26 households, and 17 families residing in the city. The population density was 25.2 people per square mile. There were 39 housing units at an average density of 12.6 per square mile (U.S. Census, 2000).

U.S. Census data in 2000 showed 18 residents as employed. The unemployment rate at that time was 14.29 percent, although 64 percent of all adults were not in the workforce. The median household income was $24,375, per capita income was $10,194, and 28 percent of residents were living below the poverty level (U.S. Census, 2000).

2.2 COMMUNITY INVOLVEMENT

During the 2008 DBA application period, a project team was developed, identifying community involvement in the desired cleanup of the Hughes contaminated sites. Members of the Hughes Village Council and the City of Hughes are active participants (DEC, 2008c). The contact list for the project, as identified during the project stakeholder meeting, is included with the stakeholder meeting minutes as Appendix B of this plan. Within the 2008 DBA Request application, community concerns were identified, including the concern that fuel contamination in the soil is a health concern and preventing the city from reusing the land. The community's desire to reuse the land is based on the limited open space in the village. The application stated that tribal members believe it is important to provide recreational opportunities by reusing the property and building a community building for an elder/youth center and a softball field. The application states that the only space available for kids during funerals and other adult meetings or gatherings is the gym.

The City of Hughes has held meetings regarding the reuse of the land since 2006 (DEC, 2008c). 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. The YRITWC and the YKSD are also committed to helping with and contributing to the different phases of the project.

2.2.1 STAKEHOLDER MEETING SUMMARY

In February 2009, a stakeholder and planning teleconference was held and included attendees from the Hughes Village Council, the City of Hughes, DEC, EPA, SLR, the YRITWC, and the IGAP. The purpose of the meeting was to define the cleanup objectives and approaches to a solution regarding existing environmental impacts as identified through previous work. 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 land include the construction of a community center to be used by elders and youth. Plans also include the development of a softball field. Currently, the property is not used and is unoccupied by residents.

2.2.3 INTERVIEWS AND COMMUNITY INPUT

Interviews were conducted with individuals knowledgeable about current and historical conditions of the site. The following summaries of the interviews provide the pertinent gathered information.

2.2.3.1 The Yukon Koyukuk School District

Kerry Boyd, superintendent of the YKSD, was interviewed on April 29, 2009. She indicated that YKSD has an outstanding relationship with the City of Hughes, facilitated by the Community School Committee. Members from YKSD and the City of Hughes meet periodically to discuss the needs of the school. Although she was not overly familiar with the history or current status of the site, she recommended that David Pratt (facilities director of the school district) and Bob Hawkins (principal of the Hughes School) be contacted for this report.

David Pratt, facilities director of YKSD, was contacted on April 29, 2009. Mr. Pratt has been involved with the efforts to remediate the site since August of 2008. He indicated that the tanks in the old tank farm had not been cleaned after the damage from past flooding events. He also indicated that while he was aware of discussions regarding the drilling of a new community well, he believed it was still in the planning stage. Mr. Pratt stated that a fuel dispenser with active fuel handling connected to the new generator building supplies fuel to the school. Fuel from the new school tank farm is transferred to a day tank, which is then dispensed to the school.

Bob Hawkins, principal of the Hughes School, was contacted on April 29, 2009. Mr. Hawkins has provided current photographs of the school; these are included in the Photo Log of this report in Appendix E. He reported the locations of the new tank farm (consisting of two 6,000 gallon tanks), the 1,000 gallon day tank, and generator building, which can be seen Appendix E. Mr. Hawkins also indicated that a new septic and water supply system was installed in the school in 2008. The water is supplied from the community well which is then treated in the City's water treatment facility.

Mr. Hawkins also explained that there is currently a backhaul program available for the community's waste via aircraft that currently haul in community supplies. He stated that the supply planes often haul out empty tanks and other small, light waste material. He indicated this service would be available for the potential removal of the old tank farm debris.

2.2.3.2 City of Hughes

Thelma Nicholai, city administrator for City of Hughes, called in response to a request for an interview on May 14, 2009. Ms. Nicholai provided rates for labor and heavy equipment in the village, and a map indicating the location of the proposed road and landfill. Ms. Nicholai said the landfill road and landfill area were located on land owned by the City of Hughes. Regarding personnel training, Ms. Nicholai said that several people in the village had taken the 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training, but that they all would require refresher training to be able to work on this project. Ms. Nicholai said that the equipment in Hughes for the road and landfill construction project would not be in the village for the 2010 construction season. Therefore, she provided rates for city-owned equipment only. Ms. Nicholai also said that there is currently no barge service to Hughes. Ms. Nicholai spoke with Mr. Ralph Williams (tribal member) who said the pipe was installed in 1984 and was buried approximately 5 feet deep. Mr. Williams told Ms. Nicholai the pipeline reportedly leaked when last in use.

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

3.1.1 LOT 11 - CITY OF HUGHES

The lot, owned by the City of Hughes, contains the footprint of the former generator building located immediately south of the washeteria, a skid mounted abandoned generator building located west of the washeteria, one 10,000 gallon aboveground storage tank (AST) and associated fuel dispenser, and buried pipeline (Figure 2). The buried pipeline leads from the former City of Hughes tank farm to the abandoned generator building and washeteria building. This buried pipeline is still in place and is reported to have a burial depth of 5 feet (personal communication with Thelma Nicholai). The former generator building was fueled from drums and no buried or elevated pipeline ever connected it to the community or school tank farms. The former generator building was demolished in 2007.

In response to repeated flooding events, the City of Hughes built a new tank farm during the summer of 2005. The new generator building and tank farm are built on a raised gravel pad on the southeast corner of the airport apron (personal communication with Thelma Nicholai, May 15, 2009). The old city tank farm was abandoned in place.

3.1.2 LOT 13 – STATE OF ALASKA

The lot, owned by the State of Alaska, contains the abandoned school tank farm. An above-ground fuel line connects the former school tank farm to the former City of Hughes tank farm. The property lines and lot identifications for the two sites are shown on Figure 2.

According to the DEC contaminated sites database, a new tank farm for the school was constructed after the 2006 flooding event. The old tanks were not removed. Interview findings indicate that the tanks were stood upright but not cleaned. The new school tank farm is located approximately 200 feet south of the former tank farm in a location on higher ground closer to the school.

3.2 GEOLOGIC SETTING

According to the ESA (BGES, 2008), the geological features near Hughes are dominated by hills that form the foothills of the Brooks Mountain Range (BGES, 2008). Multiple glacial advances shaped this landscape. The surficial geology of the soil underlying the City of Hughes is described as fine-grained, silty alluvium. Hughes lies at the southern edge of an area of continuous permafrost. The vicinity of Hughes is described as containing hills and isolated low mountains intermixed with river and stream valleys. Hughes is reported to receive approximately 13 inches of precipitation per year.

The documentation for the community well was reviewed for lithological information. The community water well is the only registered water well located for the Hughes area. The well log for this well indicates frozen sand and gravel from ground surface to 6 feet below ground surface (bgs). Sand, silt, and gravel were logged from 6 feet bgs to 30 feet bgs. The material coarsened from 30 feet bgs to 35 feet into a sand and gravel mix. The log indicates a blue clay layer, likely a lake-bottom deposit, from 35 feet bgs to 39 feet bgs overlying fractured sandstone bedrock to 100 feet bgs which was the bottom of the logged borehole. Ground water was noted to have a static elevation in the completed well of 6 feet bgs. Water was first noted during drilling at 30 feet bgs; therefore, it is not known whether ground water in shallow sediments at the site is at 6 feet bgs, or if this level represents the head in the underlying sandstone. Because no obvious aquitard was noted from the surface to 30-feet bgs, it is likely that the static ground water depth is at 6-feet bgs.

Hughes is subject to flooding. According to the U.S. Army Corps of Engineers (USACE) Flood Hazard Data, the elevation of the highest flood of record, which occurred in 1965, was 272 feet above mean sea level (AMSL). The elevation of the best recorded and documented flood, in 1994, was 270.5 feet AMSL. The elevation of the 2006 flooding event was not available.

3.3 PROPERTY USE

The site plan, Braunstein Geological and Environmental Services (BGES) sampling locations, and the approximate property boundary between the two sites are shown on Figure 2. The two sites are centrally located in Hughes, close to the washeteria. The historical and current uses of the properties are discussed below.

3.3.1 HISTORICAL USE

During the ESA (BGES, 2008), a review of historical aerial photographs indicated that the Site was completely undeveloped and covered with vegetation in September, 1963 (BGES, 2008). A June 1971 photograph shows the presence of four large ASTs and drum storage areas; this coincides with the location of the city's bulk fuel storage areas. In a September 1984 photograph, construction of the school and the Hughes power generation plant is apparent, coinciding with development associated with the City's incorporation in 1973. This generator building was located immediately south of the washeteria building and was fueled from 55-gallon drums. Some time later, the power plant was upgraded to a skid mounted generator plant connected to the City tank farm via buried pipeline. The generator building was dismantled in 2007, and the area is now referred to as the "former" generator building.

The Site was used for fuel handling and storage until the City of Hughes moved its fuel storage and power generation facilities to the southeast airport apron in 2005, and the school built a new tank farm closer to the school in 2006.

3.3.2 CURRENT USE

Current use of the Site is minimal. However, the properties are in the center of town, in close proximity to the school, city offices, and the washeteria. The known dissolved hydrocarbon contamination found in water from the community well is suspected to originate from the Site (BGES, 2008). Apparently, no active fuel handling is taking place at either of the two former tank farms.

3.4 RECORDS REVIEW

Since the review of the DEC contaminated sites database (BGES, 2008), the Hughes School and Community Tank Farm 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 which yielded the 1973 well log and maps showing the piping layout for the water distribution system.

As a Class C public water system in Alaska, the water well at Hughes is sampled regularly by the community per the requirements of the Drinking Water Program in DEC's Division of Environmental Health. The Drinking Water Program maintains a database of well sampling results going back to 1993 for the community of Hughes. These data indicate concentrations of benzene ranging from non-detect, above a 0.5 micrograms per liter (µg/L) reporting limit, to 4.93 µg/L on May 14, 2003, using EPA Method 524.2. The most recent volatile organic compound (VOC) results for the Hughes community well are provided in Appendix D.

DEC currently has two active sites in this area; the Hughes Power Plant Pipeline (DEC Contaminated Site file number 810.38.002), and the Hughes School and Community Tank Farm (DEC Contaminated Site file number 810.38.003). The following bullets summarize this file information:

- In 1992, the community of Hughes called DEC and reported a suspected fuel leak in the underground portion of pipeline between the City of Hughes tank farm and the washeteria, village council, and generator buildings. It was noted that the community well is within 50 feet of the buried pipeline. The report suggested the line was tested by DEC and deemed not leaking, but records verifying this claim, were not located (BGES, 2008). The Hughes Power Plant Pipeline site remains active with file number 810.38.002.

- In 1994 and 2006, DEC responded to flood damage reported at the school tank farm. A summary of DEC file history for the site area indicated that DEC had documented petroleum hydrocarbon impact to soils near the former school tank farm at 39,500 milligrams per kilogram (mg/kg) at an unidentified location, and noted fuel floating in the lined impoundment. The Hughes School and Community tank farm site remains active under file number 810.38.003.

4. ENVIRONMENTAL REVIEW AND SUMMARY OF FINDINGS

This section summarizes previous environmental work conducted at the Site. It also provides the summary of the findings of this report.

4.1 PREVIOUS WORK AND EXISTING SITE DATA

Braunstein Geological & Environmental Services (BGES) was retained by the YRITWC in 2008 to conduct a Phase I and Limited Phase II ESA of the areas containing the abandoned generator building, the footprint of the former generator building, and the school tank farm and associated pipeline (BGES, 2008). Soil sampling results from the limited Phase II are presented on Figure 2. The sampling results indicated that contaminant releases associated with the following activities likely had occurred:

- Fuel handling activities associated with the former generator building previously located immediately south of the washeteria building. Fuel at this generator building had been managed manually in 55-gallon drums,
- Maintenance and fueling operations at the abandoned skid-mounted generator building west of the washeteria, and
- Fuel storage at the former school tank farm area. Based on the BGES 2008 site sampling results, fuel contamination in soils in this area appeared limited to beneath the liner of the tank farm. An assessment of berm material was not performed as part of the BGES site work.

On October 5, 1992, the City of Hughes contacted DEC regarding a suspected release of diesel fuel from the Hughes power plant fuel line. The community well is within 50 feet of this buried fuel line which is suspected to have leaked. DEC still recognizes the power plant pipeline contaminated site as active.

In September 1994, flood waters damaged both the school tank farm and the City of Hughes's fuel storage tank. The school tank farm was impacted by flooding of the Koyukuk River again on May 13, 2006. Two ASTs were found to be tipped over as a result of the flood and disconnected the piping of the remaining upright tanks. A DEC representative visited the city after the flooding in 1994. The DEC representative characterized and sampled the surface soil contamination resulting from flood damage and found diesel range organics (DRO) significantly greater than the DEC cleanup levels within the school tank farm area. The sample was collected from an unknown location.

Following the 2006 flood, DEC representatives re-visited the site to assess flood damage. During the site visit, two ASTs were found to have been overturned as a result of the flood and the representatives observed diesel fuel floating on ponded water in the tank farm. One of the tanks had been floated approximately 50 feet north of the tank farm containment, potentially causing a release of fuel. The DEC representatives worked with the community of Hughes to recover the free product in the tank farm area.

The school tank farm had been abandoned in-place since the construction of the new tank farm in the summer of 2006 after the spring flooding that occurred that year. The new tank farm, which uses new double-wall skid mounted steel tanks, was located closer to the school building on elevated terrain approximately 200 feet south of the former tank farm. The new City of Hughes generator and city tank farm are located immediately off the southeast end of the airport apron (personal communication with Thelma Nicholai, May 15, 2009).

The source associated with the Hughes school and community tank farm site was identified as either the bulk fuel storage tank farm or the former Hughes generator building, located south of the washeteria building (Figure 2). Samples taken in 1995 by a DEC representative indicated that the highest soil petroleum hydrocarbon contamination was near the school tank farm. Water samples collected from the community well in 2001 contained 2.14 µg/L benzene. Quarterly water monitoring is performed at this well due to benzene contamination. The most recent well water sample collected from this well, on March 31, 2009, contained benzene and ethylbenzene at concentrations of 0.69 µg/L and 0.93 µg/L, respectively.

4.2 POTENTIAL SOURCE AREAS

A map of estimated contaminant extent was prepared based on the BGES investigation, estimated release volumes, and community interview findings. This map is included as Figure 2. Estimates of contaminated soil requiring excavation from each of these source areas are presented in Section 5.2.

4.3 KNOWN OR PERCEIVED DATA GAPS

The primary data gaps existing for characterizing the fuel contamination at the Site is the magnitude of soil impact and the nature and distribution of ground water impact. Assumptions were used to develop estimated soil removal volumes in Section 5.2. An absence of ground water contaminant distribution information makes future wellhead protection difficult.

4.4 CONCEPTUAL SITE MODEL

SLR developed a Conceptual Site Model (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 in 2008 by BGES, and prior sampling conducted by DEC field representatives, and describes the potential exposure scenarios for current and future site receptors. The CSM is included as Appendix F.

The CSM identified the following completed exposure pathways:

- Direct contact exposure pathway via incidental soil ingestion,
- Direct contact via dermal absorption of contaminants from soil,

- Ingestion of ground water,
- Inhalation of outdoor air,
- Inhalation of indoor air, and
- Ingestion of wild foods.

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

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 the 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 report. The results summary of that model found six completed exposure pathways at the site. The completed exposure pathway representing the highest risk to receptors was from direct contact with surface soil. On April 24, 2009, on a scale of 1 to 10, with 10 representing the highest priority, the ETM ranked the Hughes site with a score of 6. The entire model is provided in Appendix G.

4.5 CLEANUP CRITERIA

Current contaminant distributions are compared to 18 Alaska Administrative Code (AAC) 75 (DEC, 2008a) soil and ground water cleanup levels. 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, 2008a) and are listed below:

- Benzene, 0.025 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)
- Gasoline range organics (GRO), 300 mg/kg (migration to ground water)
- DRO, 250 mg/kg (migration to ground water)

- Residual range organics (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 indicated 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, if encountered, should be collected and compared to 18 AAC 70 and 18 AAC 75 cleanup levels.

4.5.2.1 Ground Water

A ground water sample should be collected from the community well and results should be compared against prior monitoring results for that location using the drinking water methods EPA 524.2 (VOC).

Applicable 18 AAC 75 Table C ground water cleanup levels should be used for the contaminants listed for ground water. Table C ground water cleanup levels are shown 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 excavation area, should be compared to water quality criteria published in 18 AAC 70 (DEC, 2008). Analysis of surface water samples should include total aromatic hydrocarbons (TAH) using EPA 624, and PAH using EPA 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 must be collected in marine and fresh waters below the surface and away from any observable sheen as required by 18 AAC 70.020.

Interview findings indicate that the site was still frozen in May, but that ponded water existed in the warm season in the liner under the old school tank farm. Impounded water over a liner would not require sampling as part of the work scope under this plan.

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, a one-time asbestos containing waste disposal operation may be possible through the acquisition of a DEC Division of Environmental Health's Solid Waste Program (DEC Solid Waste Program) General Permit. General Permit No. SWG0301000 is issued for a one-time disposal of asbestos containing waste.

The 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 cubic yards (cy) of waste may be disposed of by obtaining DEC Solid Waste Program's General Permit No. 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 Hughes is permitted prior to this removal and excavation activity, this permit may not be available.

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 Program 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 a review of the CSM provided in Appendix F of this plan, the contaminant levels documented from limited sampling conducted at this site, and the planned land reuse objective, it is evident that completed exposure pathways to contaminants at this site currently preclude further development. Near-surface soil contamination represents incidental ingestion and dermal sorption exposure risks that should be addressed before any reuse of the sites is acted upon.

Because the site is centrally located within the community and stated reuse objectives of an elder/youth center and a softball field will involve the presence and congregation of children from the community, clean up activities planned in this EMP should reduce significant exposure potential to human health. The planned clean up activities should also reduce exposure to the environment by removing the former fuel handling and power generation facilities, and near-surface soil contamination from potential flood exposure.

5. RECOMMENDED ACTIONS

The following sections summarize actions necessary to reuse the land at Lots 11 and 13 for the purposes of a community center and softball field in Hughes.

Currently, DEC is working with the City of Hughes to identify sanitation improvements and the feasibility of installing a new well for the community washeteria (DCCED, 2009). 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. Discussions with the Alaska Native Tribal Health Consortium (ANTHC) project engineer for Hughes, Davan Currier, revealed that they plan to be able to get funding to relocate or reinstall the community well for Hughes sometime in 2011.

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 fuel line, the abandoned generator building, several steel tanks, and other material. Figure 2 shows 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, potentially a dry transformer, and a cylinder of halon fire retardant gas will 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 pre-fabricated structure may be skid mounted. This structure may be reused as a dry storage area if the contents can be removed without excessive damage. The disposal option for this structure is placement in the new landfill.
- Several **marked and unmarked abandoned drums** are located near the former generator building and near the former school tank farm. 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.
- Tanks at the former school tank farm. **Four 11,000 gallon ASTs**. One of the tanks was damaged and overturned by the 1994 flood. There are reports of standing water held within a liner with a visible sheen and hydrocarbon odor (YRITWC, 2008). There is also a horizontal AST of an unknown volume north of the tank farm. The tanks should be purged of fuel and removed. Cleaned tanks may be transported to Fairbanks using the YRITWC aircraft-based backhaul program, or reused as storage space once they are relocated and man-way doors are cut.

- **Lead-acid batteries** within YRITWC totes reportedly located north of the former city tank farm. It is recommended that these batteries be flown out using the YRITWC aircraft-based backhaul program.
- The **former fuel dispensing station** including a small AST, a pump house, a fuel dispenser and an assortment of abandoned gas cans. Piping and licensed storage tanks should be removed by a licensed tank worker. All other material should be removed off site by the contractor.
- There is an unused **abandoned fuel line** that is elevated between the former school tank farm to the fuel dispensing station. The fuel line is below ground between the fuel dispensing station, abandoned generator building, and the washeteria (Figure 2). The depth of the buried pipe is estimated to be 5 feet below grade (personal conversation with Thelma Nicholai). The elevated and buried portions of this pipeline should be purged of fuel. The elevated portion of the pipeline should be disposed in the new landfill if other reuse or recycling options are not identified.
- East of the former tank farm, there is a small fenced area reported to have included **propane cylinders and kerosene containers** (BGES, 2008). It is recommended these be removed off-site using the aircraft-supported back-haul program if they are not being re-filled on site.

All activities for the removal of materials off site should be conducted according to all applicable state, federal, and local regulations. Procedures for tank decommissioning should follow the DEC Underground Storage Tanks (USTs) 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 aircraft-based backhaul program or disposal in the new landfill. Scrap metal can be shipped off site for recycling without waste characterization since 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. The vertical 12,000 gallon tanks could also be reused as cold storage units once cleaned and relocated.

5.2 CONTAMINATED SOIL EXCAVATION

All treatment options begin with removing contaminated soils from the site designated for reuse. The limits of excavation should be driven by risk posed by contamination levels left on site.

Prior to excavation, utility clearances must be performed to avoid damaging buried utilities. The piping layout for the water system on Lots 11 and 13 is presented in Appendix H.

Preliminary limits of excavation are depicted in Figure 2. These limits are based on data summarized in Section 4.1. The total in-place volume of the proposed excavation area(s) is 860 cy based on a site-wide 5-foot excavation depth. 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 excavated, confirmation samples can be collected from the excavation sidewalls. Excavation screening sampling frequency and screening and analytical methods are discussed in Section 6.

Due to the absence of complete delineation data for the five presumed source areas, assumptions were used to develop the excavation limits presented on Figure 2. These assumptions are presented in Table 1, and listed below, for each of the presumed release areas:

- Former generator building site on Lot 11 – 10-foot radius of impact based on localized fuel drum handling activity and no day tank assumed to be in building for an in-place volume estimate of 58 cy.
- Abandoned generator building on Lot 11 – 10-foot radius of impact based on BGES discussion of impact at this location. Fuel leaking from the day tank is assumed to have been released from the module floor drain. Tracking or maintenance activities are assumed to have localized impact to a circular area 20 feet in diameter that extends beneath the abandoned generator building for an in-place volume estimate of 58 cy.
- Former fuel dispenser island at City tank farm on Lot 11 – 10-foot radius of impact based on experience assessing fuel island sites where the fuel handling activity is localized centrally to one dispenser for an in-place volume estimate of 58 cy.
- Elevated pipeline between Lot 11 and Lot 13 – 100-foot length and 4-foot width, based on visible corridor of this pipeline for an in-place volume estimate of 74 cy. The area of impact assumes a pipe with threaded joints and episodic spills and slow leaks along the line.
- Below the liner of the school tank farm on Lot 13 – 66-foot length and 50-foot width beneath existing liner for an in-place volume estimate of 611 cy. This area is based on sub-liner sampling performed by BGES at the tank farm. Surrounding samples did not indicate fuel impact and the area of impact is not assumed to have spread laterally beyond the interior limits of the tank farm. This assumes the berm soils surrounding the tank farm have not been significantly impacted by fuel during the flooding events. Berm soils may be a source of backfill material if screening indicates they are not impacted.

In all cases, a 5-foot excavation depth is assumed to avoid extending the excavation to the depth of ground water at the site. Excavation and transport of saturated media increases the potential for leaching of contaminants from the landfarm area. The excavation depth was chosen to eliminate, or reduce the significance of, the completed exposure pathways identified in Section 4.4. This excavation depth may not eliminate exposure pathways associated with outdoor or indoor air inhalation, or ground water ingestion.

Table 1
Calculation of Contaminated Soil Volumes – Hughes

Site Description	Length (ft)	Width (ft)	Thickness (ft)	Radius (ft)	Volume (ft^3)	Volume (CY)
Former Generator Building site - Lot 11			5	10	1,570	58
Abandoned Generator Building - Lot 11			5	10	1,570	58
Former Fuel Dispenser Island at City Tank Farm - Lot 11			5	10	1,570	58
Pipeline - aboveground (assuming the buried pipeline is left untouched) - Lots 11 and 13	100	4	5		2,000	74
School Tank Farm (below the liner) - Lot 13	66	50	5		16,500	611
					TOTAL (CY)	**860**

Swell Factor for Excavated Soils	Loose Volume of Excavated Soils. (CY)
1.3	**1,118**

TOTAL TREATMENT CELL SOIL VOLUME (Loose) **(Not including soil or gravel in tank farm berm above contaminated soil)**		**1,118**
Contingency:	**10% =**	**112**
Estimated Soil Remediation Cell Volume, w/Contingency		**1,230**

The buried portion of the pipeline, between the City of Hughes tank farm and the abandoned generator building and washeteria, is buried at or below the 5-foot depth (Communication with Thelma Nicholai May 18, 2009) and, therefore, is not targeted for soil removal. The entire pipeline should be purged of fuel and the elevated portion should be removed for disposal. Due to the reported depth of burial, subsurface releases from the pipe should not impede the property reuse objectives proposed in the DBA funding request. Given the burial depth, potential contamination from leaks from the buried pipe may be managed administratively with institutional controls. One such administrative control is a notice of environmental contamination (NEC). As an administrative control, NECs communicate the presence of contamination and measures to take if excavation activities are necessary. NECs are filed with the Alaska Department of Natural Resources (DNR) recorder's office for filing with a rural property record. Where there are recorded property deeds, notices may be placed on the deeds to notify future owners or residents of the presence of contamination. If excavation of the buried pipeline appears warranted, procedures for screening and stockpiling clean overburden are provided in Section 6.

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 1,118 cy. An additional 10 percent contingency for additional excavation beyond the preliminary limits of excavation would require the management of 1,230 cy of soil. Table 1 presents the development of the total soil volume for management under this plan.

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 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 should remain complete and should be managed through notices and construction practices, respectively. Administrative controls such as an NEC may 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 to go along with a rural property record. The indoor air pathway can be eliminated if future structures placed on the property use elevated foundations.

Before backfilling the excavation, an impermeable liner material should be placed along the base of the excavation. The purpose of this liner would be threefold; it would serve as a barrier to migration of soil gas to the surface, provide a marker for the location of contaminated soil and serve as a cautionary marker for future construction workers, and 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 2. The following alternatives were considered for the management of contaminated soil.

Table 2
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	Fair	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	If pavement is used – Good If not - 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

- **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 landspreading or beneficial reuse.
- **Road Base Encapsulation** – This method would only apply to Hughes 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, since the contaminated soil in Hughes is mostly a silt matrix, and since silt is not generally used as road base material, this option is most likely not feasible for Hughes because it would require blending with significant amounts of uncontaminated material to meet construction specifications.
- **Daily Landfill Cover** – Under this option, contaminated soils could be used for landfill cover. This option requires permission from DEC's 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 Hughes, 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 will 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 Hughes.
- **Shipment Off Site for Treatment or Disposal** – This option is used if soils cannot be reasonably treated on site and is most feasible when inexpensive transportation is available. If soil is 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 2. 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 Hughes is landfarming. Precedence exists for using contaminated soils as landfill cover in rural communities, but it requires approval by DEC's Solid Waste Program. The Solid Waste Program requires that contaminated soil be managed prior to use as landfill cover after landfarming has been implemented to reduce contaminant levels to acceptable thresholds. This process typically takes two to three years. Figure 3 shows the proposed locations of the landfill and landfill road scheduled for construction in 2009.

5.5 INSTITUTIONAL CONTROLS

Since this excavation and soil treatment alternative may not remove all contamination from the sites, additional controls could be required to be protective of future site workers or residents. These controls, institutional controls, may involve deed notices, 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, 2008b).

5.6 LONG-TERM SOIL TREATMENT LOCATIONS IN HUGHES

Landfarming is considered a long-term treatment option because it typically takes years to meet required cleanup objectives. Site conditions at Hughes make the new landfill location the ideal location for implementing this remedial alternative. This location is approximately 2 miles from the City of Hughes on higher ground, thus limiting contact with village residents and reducing potential for exposure of contaminants to surface water or ground water. The criteria for selection were based on the following:

- Elevation above Koyukuk River to prevent erosion during future flooding events;
- Distance from village to limit contact with residents during course of treatment;
- Soils beneath selected area may 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 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.

In summary, landfarming of soils prior to use as land fill cover should constitute long-term treatment for the soils managed under this plan. The location identified for this activity is near the community landfill.

5.7 SOURCE OF BACKFILL MATERIAL

Backfill sources for the excavations described in this plan have been identified as bluff material, the tank farm berms (if screened clean), or river gravels dredged from the Koyukuk River. The projects sponsored by ANTHC in 2009 are using gravels excavated from the dry river channels as construction material (Figure 3). This material may also serve as adequate backfill material for the excavations discussed in this EMP. Use of river bank gravels require a permit from DNR and this Material Sale Contract carries a cost of $1.50 per cubic yard taken from below the normal high water line of the Koyukuk River 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

There are also small stockpiles of clean gravel in the village, but these may not be available or sufficient in volume at the time this project is performed. Coordination with the Hughes Village Council regarding the availability 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 may proceed for a limited depth below the static water level in an excavation if above 5-feet bgs, and the excavation should be managed to have a limited footprint excavated below the water table at any given time. 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. This is another reason the 5-foot excavation depth was selected since static water was noted on the drilling log at 6 feet bgs. No excavation dewatering is proposed as part of this EMP.

Liquid wastes may be generated during final decommissioning and purging of tanks, 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 6 feet in depth, haul trucks capable of carrying up to 10 cubic yards 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 one-foot depth specification.

5.10 AVAILABLE RESOURCES IN HUGHES AREA

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

5.10.1 EQUIPMENT

Equipment identified in the City of Hughes that is operating and available for the work specified in this EMP includes a Caterpillar 416 loader and backhoe, and five-yard and 10-yard dump trucks. The excavation depth of the Caterpillar 416 backhoe is more than adequate to reach the 5-foot excavation depth needed to remove contaminated soils from the sites identified. The Caterpillar 416 loader has a 1-yard bucket that is sufficient to spread the soils at the landfarm site.

Other equipment available during the 2009 construction season is a 670 loader, and a Yanmar B5 excavator.

5.10.2 LABOR

Several village residents currently have 40-hour HAZWOPER training, but all require their 8-hour refresher class prior to being eligible to work on a contaminated site.

5.10.3 RESOURCE LEVERAGING OPPORTUNITIES

The 2009 construction season in Hughes includes the construction of a new clinic building, a new permitted landfill, and 2 miles of road leading to the new landfill location. During the community planning meeting for this EMP, the equipment specified as available during this construction timeframe would include the 670 loader and B5 excavator. Since this remediation project may not occur until the 2010 season, it may be in the interest of the community to either retain, or arrange for contracting in the future, a larger loader for use at the landfarming site. Personnel with 40-hour HAZWOPER training may also be available from nearby villages.

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 drivers license (CDL) 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 taken to document 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 by EPA 8270 at selected locations
- Benzene, toluene, ethylbenzene, and xylenes 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 document soil conditions along the excavation sidewalls and floor at the limits of excavation in the target areas.

6.2.1 SCREENING AND SAMPLING OF EXCAVATION

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

6.2.1.1 Excavation Screening

Screening of soils during removal should be performed to guide excavation activities. Screening should be performed 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. 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.

Excavation field screening should be conducted using headspace analysis, as well as analysis for TPH using EPA Method 9074. Photoionization detector (PID) heated headspace screening should be performed on all samples, consisting of placing a representative soil sample in a re-sealable 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

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 field testing. Soil samples with elevated PID levels or field testing concentrations, 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.

If conditions warrant removal of the buried fuel line, the following approach should be taken. In the event of a subsurface release along the fuel line, overlying clean soils should be screened every 10 cy, segregated and stockpiled on reinforced polyethylene for subsequent sampling at a frequency for sampling untreated stockpiles per 18 AAC 78.605(c). If results indicate clean material, below the migration to ground water cleanup levels listed in Section 4.5.1, the soils should be land spread near the village or used as backfill. If the analytical results for the segregated soils exceed the cleanup levels, the soils should be treated with other excavated soil.

6.2.1.2 Sampling at Limits of Excavation

After PID screening and field testing indicates contaminated soil has been removed to the site cleanup level, laboratory 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 landfarm characterization sampling should 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 shall 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 AND SURFACE WATER SAMPLING

Ground water should be sampled from the community well to document ground water impact. Surface water, if encountered outside areas scheduled for soil removal, should also be sampled to document this potential ecological receptor exposure pathway.

6.3.1 GROUND WATER

The City of Hughes water supply well should be sampled to characterize impact with target compounds identified in Section 4.5.2. The drinking water method EPA 524.2 should be used to compare current results against previous sampling. Currently, the City of Hughes water supply well is sampled on a quarterly basis for EPA 524.2 compounds.

In addition to the drinking water analytical methods, ground water analytical work should use methods used for soil analyses to track the migration of fuel hydrocarbons from past operations at the site. These methods include GRO using AK101, DRO using AK102, RRO using AK103, VOC using EPA 8260, and PAH using EPA 8270. The latest analytical results from ground water samples collected from the drinking water well are presented in Appendix D.

6.3.2 SURFACE WATER

Analytical data from samples collected from surface waters, if present within the immediate site area, not including water impounded within the tank farm dike, should be compared to water quality criteria published in 18 AAC 70. Surface water samples, if available, should be analyzed for TAH using EPA 624, and PAH using EPA 610. The sum of TAH and PAH results from these two methods yield TAqH that can be compared to water quality criteria in 18 AAC 70.

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 holes 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 inform all residents of upcoming activities and their duration.

Due to the depth of excavation (5-feet), the open holes should be considered confined space and must not be entered for sampling. All screening and characterization samples from excavations should be collected from the excavator bucket.

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 should be 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, 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 Hughes. 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 the soil management must be assessed using the DEC data quality control procedures. Each data deliverable package must be reviewed and have a completed data review checklist and quality control summary.

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

Construction debris may comprise a significant portion of project waste after contaminated soils. As noted in Section 5.1, the abandoned generator building, steel tanks, and pipeline may all require management as waste or be reused in the village. The liner material from the former tank farm impoundments may also require disposal in the new landfill or be used for other beneficial uses 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, and steel tanks from the former school tank farm is use as dry cold storage containers. If re-use options are not possible for large debris, the YRITWC aircraft-based backhaul program may coordinate transport using C-130 aircraft. This would permit recycling of the tanks or other large debris.

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

7.2 LIQUID WASTES

Liquid wastes expected to be generated during this project include emulsions in drain pans noted during the 2008 BGES investigation, abandoned drum contents, bulk storage tank heels, fuel from purging fuel distribution pipe and pipeline, and coolants and crank case fluids from the abandoned generator. Identification and consolidation of liquid wastes on site should be an element of fieldwork. It is expected that up to 55-gallons of liquid waste could require characterization and shipping to Fairbanks for thermal treatment. Because of its high value, all recovered fuel should be used by the village.

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

8. COST

Cost was developed using preferred alternative and estimated volume of contaminated soils.

8.1 SOIL EXCAVATION AND LANDFARMING

A preliminary cost estimate for soil and waste management is provided in Appendix I. Appendix I 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 Hughes is $329,993 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 recommended remedial actions presented in this EMP were developed based on Site information available from previous work, DEC records, and conversations with village residents. The purpose of the remedial work is to reuse the land as the location for an elder/youth center and softball field as stated in the 2008 DBA request form submitted by the Hughes Village Council. Exclusive of environmental consultant assistance, the City of Hughes has the equipment and qualified labor sufficient to complete the scope of work outlined in this EMP. The cost developed for executing this remedial alternative, including a 10 percent contingency for variable sub-surface conditions or previously unknown contamination, is $329,993. The remedial work outlined in this EMP could be completed in one construction season. Up to two additional field seasons of landfarm maintenance would be required, followed by collection of landfarm characterization samples during the fourth year. Landfarm characterization sampling should serve as the basis to request approval from the DEC Solid Waste Division to use the soils as landfill cover.

10. REFERENCES

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

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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 : ©2009 GOOGLE EARTH PRO

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SCALE: 1" = 2000'
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE

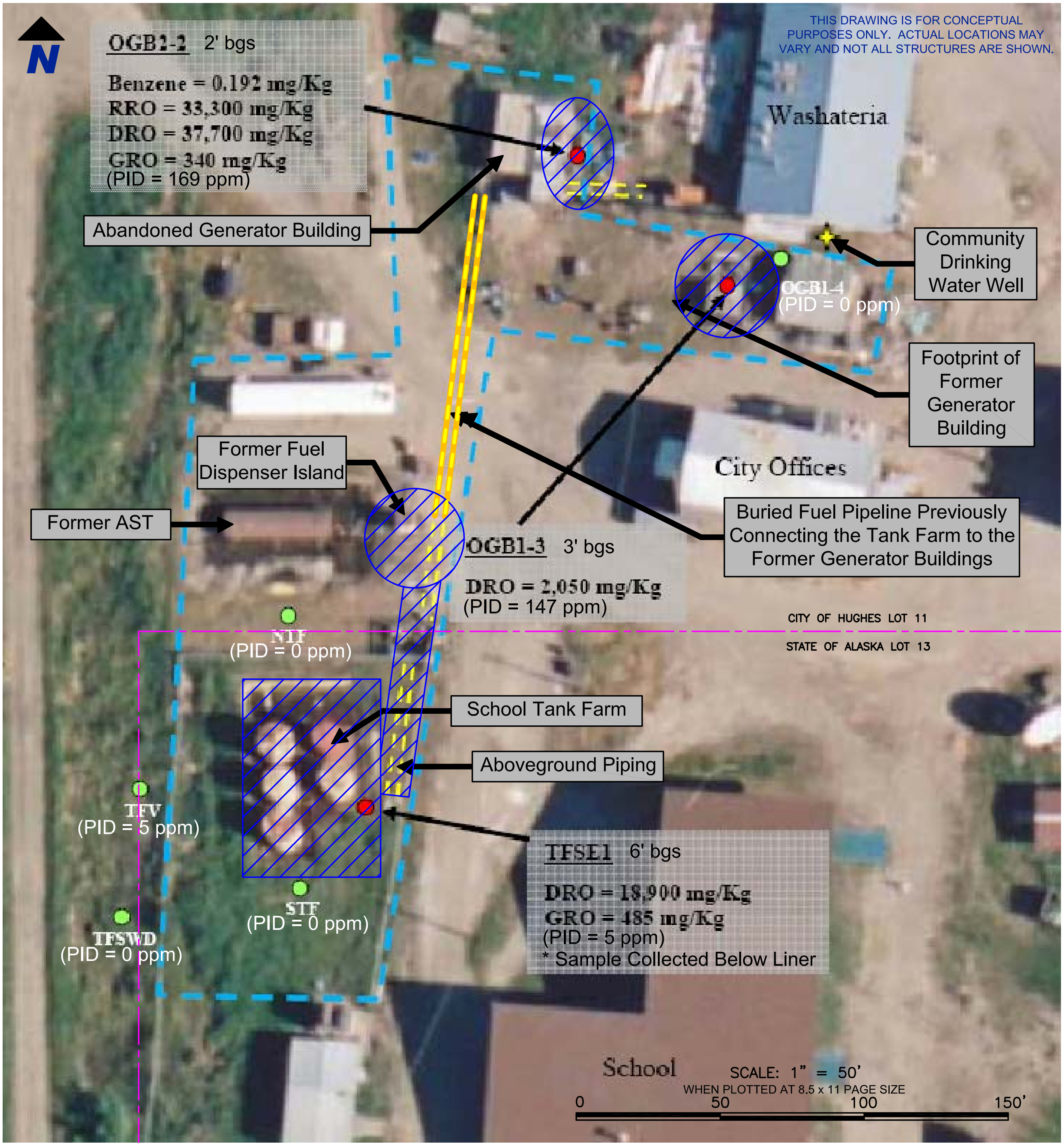
0 2000 4000' 6000'

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

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 Hughes Former Generator Building and Tank Farms
Drawing	Vicinity Map

Date April 14, 2009	Scale 1"=2000'	Fig. No. 1
File Name F1 HUGHES	Project No. 005.0065.09003	



LEGEND

- SOIL SAMPLE, RESULTS, EXCEEDING ADEC CLEANUP CRITERIA
- HAND BORING LOCATION, SCREENING SAMPLES COLLECTED
- WASHATERIA WELL HEAD LOCATION
- APPROXIMATE SITE BOUNDARY
- PROPOSED EXCAVATION AREAS
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE ROUTE OF PIPELINE, ABOVEGROUND
- APPROXIMATE ROUTE OF PIPELINE, BURIED

bgs	BELOW GROUND SURFACE
DRO	DIESEL RANGE ORGANICS
GRO	GASOLINE RANGE ORGANICS
RRO	RESIDUAL RANGE ORGANICS
PID	PHOTOIONIZATION DETECTOR
ppm	PARTS PER MILLION

SLR

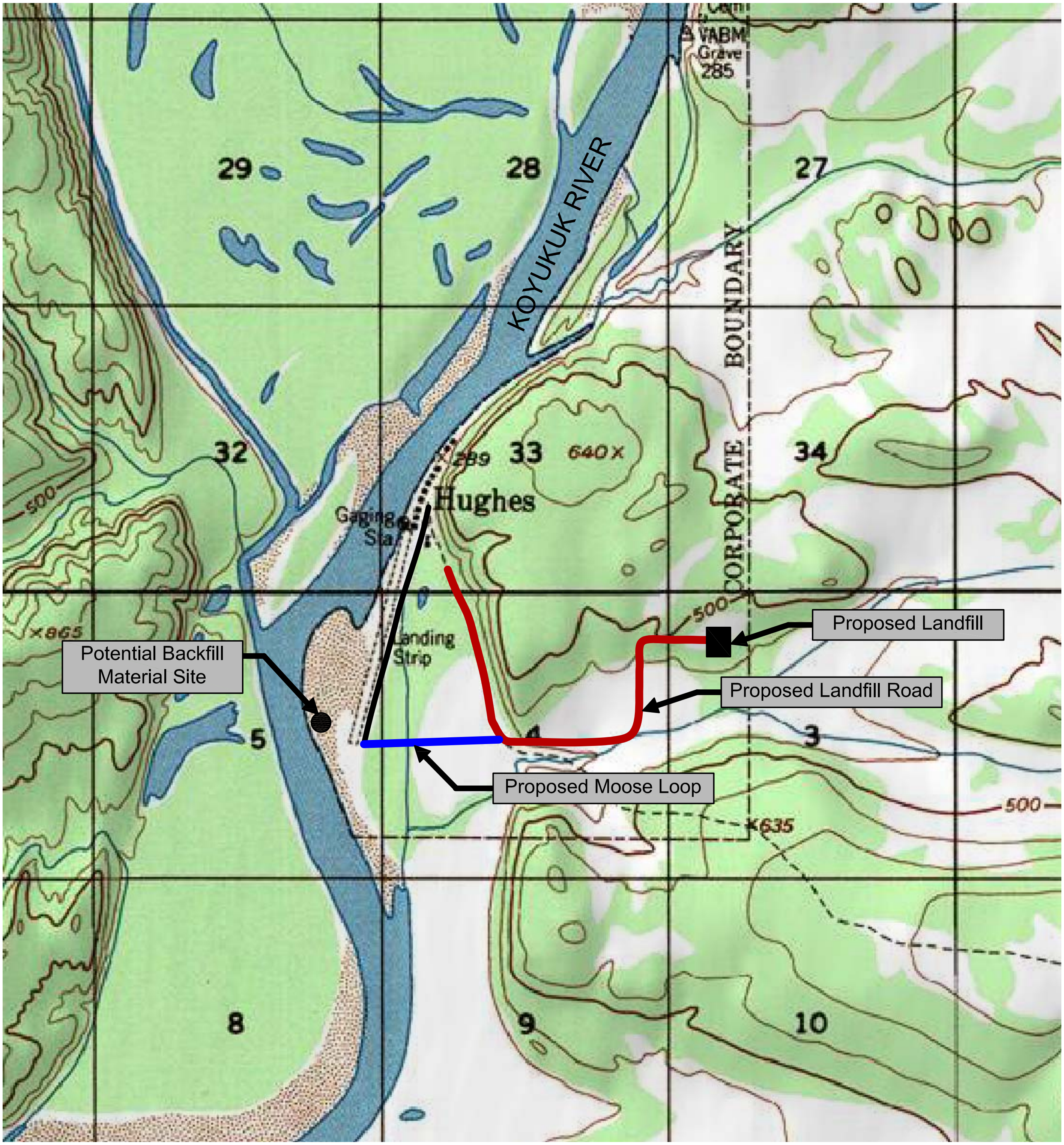
Alaska Department of Environmental Conservation
Contaminated Sites Program
Division of Spill Prevention and Response
611 University Avenue
Fairbanks, AK 99709-3643

Report: Environmental Management Plan
Hughes Former Generator Building
and Tank Farms

Drawing: Site Plan & Soil Sampling Locations

Date	May 19, 2009	Scale	1"=50'
File Name	F2 HUGHES	Project No.	005.0065.09003

Fig. No. 2



REFERENCED FROM : TOPO!® ©2003 NATIONAL GEOGRAPHIC

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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 Hughes Former Generator Building and Tank Farms
Drawing	Proposed Landfill and Road Locations

Date May 19, 2009	Scale 1"=0.5 miles	Fig. No. 3
File Name F3 HUGHES	Project No. 005.0065.09003	

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: Hughes School & Community Tank Farm 810.38.003

Hughes Power Plant Pipeline 810.38.002 (database printouts attached)

---

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.

Hughes Village Council, P.O. Box 45029, Hughes Alaska 99745 Contact Person: Janet Bifelt, janet.bifelt@tananachiefs.com Phone (907) 889-2239 Fax (907) 889-2252

Eileen Jackson, Environmental Coordinator (IGAP) for the Hughes Village Council.

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.)

Please see attachment, team sign-up sheet.

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.*)

Please see attachment, letter from City Administrator.

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.

As far as I know it was only used for the old generator house. And Hughes also had an Old Water house attached to the generator house. This was in the 70's. I will see if I can find any old maps or pictures. I really don't know what contaminates may be there.

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.

Smack in the middle of town. Between the city and water house. Latitude 66.0489679 Longitude-154.258329

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.

With Yukon River Inter-Tribal Water Shed Council was out here doing brownfield survey work (May 2007). DEC was out here doing a site visit in May 17, 2006 (trip report attached).

3. Environmental Concerns

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 fuel contamination in the soil here is a health concern and stopping us to reuse the land. We just want to reuse the land.

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.).

We would like to do this clean up this summer, while have a lot of heavy equipment here in Hughes right now. List of Heavy equipment that we have here in Hughes: **Cat pillar 416 Loader & Backhoe, Five yard Dump Truck and 10 yard dump truck.**

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.

Water & Sewer construction, Landfill road project, Clinic construction, One HUD home being built 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.

Community building for Elder/Youth Center. Soft Ball field.

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.)

Because there is limited space in the village, the reuse of this property is important for providing recreational opportunities for Tribal members. Presently the only space available for kids during funerals and other adult meetings or gatherings is the gym.

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.)

The City of Hughes held meetings since 2006. The latest was April 28, 2008. See attached meeting minutes. Numerous people have signed on to be project team members.

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?

List of Heavy equipment that we have here in Hughes: **Cat pillar 416 Loader & Backhoe, Five yard Dump Truck and 10 yard dump truck.** Project team members will be available to help with planning and logistics. The Yukon River Inter-Tribal Watershed Council and the Yukon-Koyukuk School District will also be able to help with different phases of the project.

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 25, 2009, 2:00 P.M. to 3:00 P.M.

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

Attendees: Eileen Jackson, Environmental Coordinator (IGAP) for Hughes Village Council
Janet Bifelt, Tribal Administrator, Hughes Village Council
Cara Ambrose, Solid Waste Director, Hughes Village Council
Wilmur Beetus, First Chief, Hughes Village Council
Ella Sam, Secretary, Hughes Village Council
Gerard Oldman, Second Chief, Hughes Village Council
Thelma Nicholia, City Administrator, Hughes Village Council
Ralph Williams, Hughes Tribal Member
John Carnahan, Brownfield Coordinator, ADEC
Deborah Williams, ADEC
Sonja Benson, ADEC
Mary Goolie, EPA Brownfield Program
Michael Rieser, Program Director, SLR
Carl Benson, Project Manager, SLR
Elizabeth Vickerman, Engineer, SLR
Rose Hewitt, YRITWC
Leah Anderson, YRITWC

Meeting Opening:

The planning meeting was opened with brief introductions from each of the meeting attendees. Mr. Carnahan then spoke briefly about the EPA-funded Brownfield, reuse and development, program and included a brief description of how the Brownfield program benefits the upcoming project. Mr. Carnahan added that the purpose of this work will be to define the cleanup objectives and approach to a solution within the context of existing environmental impacts. The ownership of the properties was summarized. The properties are located on two adjacent lots. The Yukon Kuskokwim School District (YKSD) owns the tank farm property located on Lot 11, while the former and abandoned generator facilities owned by the City of Hughes were/are located on Lot 13. Mr. Carnahan indicated that access to the State of Alaska capital budget may be possible to clean up the old tank farm site due to state ownership of the tank farm property.

At the end of Mr. Carnahan's introduction, one attendee in Hughes asked if the program was funded by the United States Environmental Protection Agency (USEPA). Mr. Carnahan answered that the funding was provided by the USEPA through the Alaska Department of Environmental Conservation (ADEC) using the State Tribal Response Program (STRP) grant program. Mr. Carnahan explained that the ADEC is using the STRP grant money to fund the preparation of the Environmental Management Plan (EMP) for Hughes and other locations in 2009.

Ms. Hewitt asked what would be completed in 2009 in Hughes and Mr. Carnahan said the EMP would be developed.

A participant in Hughes asked what testing had been done on site. Mr. Carnahan and Ms. Hewitt summarized the 2008 sampling work in which soil samples exceeded cleanup levels in three locations out of nine sampled around the tank farm, pipeline, and former and abandoned generator building facilities.

A participant in Hughes asked what would be done with the contaminated soils and Mr. Carnahan said the development of the EMP would evaluate the soil management options.

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

SLR Project Summary:

Mr. Rieser explained the objectives of SLR to accomplish the project. The project includes a review of the available documentation from the ADEC, the Yukon River Inter-Tribal Watershed Council (YRITWC), and interviews with key persons involved with the property/project area. Mr. Rieser continued and said soil disposal options would be evaluated based on future village projects, equipment availability, and exposure considerations. The construction of the existing washeteria well will be researched as well as the sampling history for that well. Community demographic information will be collected from state web sites and the city council members to support the federal Brownfield application process. Mr. Rieser said that the management of communications for site work would also be summarized in the EMP, and continued to summarize the general outline for the EMP.

Mr. Carnahan commented on state liability driving state funds used on projects in several communities, and mentioned that ADEC drinking water and solid waste programs may be involved in the work. Mr. Carnahan said that a trip out to Hughes was possible if deemed necessary to more fully define the project. Mr. Rieser asked who would be the main point of contact in Hughes. Ms. Jackson was determined to be the primary City of Hughes contact. Mr. Carnahan said that Kerry Boyd of the YKSD would be the primary contact for the school until a local contact could be identified.

Ms. Jackson identified Mr. Ralph Williams as the point of contact with knowledge about local equipment availability. Mr. Williams identified equipment currently in Hughes as that listed on the 2008 ADEC Brownfield Assessment Request Form: Caterpillar 416 loader & backhoe, five-yard and ten-yard dump trucks. Other equipment available is a 670 Loader, and a B5 Excavator.

Mr. Carnahan asked about large projects being performed in the village this year. Mr. Williams said that the contractor, the Alaska Native Tribal Health Consortium (ANTHC), would be busy in 2009 at the Village of Hughes resurfacing two miles of roadway, building a new, permitted, landfill, and building a new clinic. Mr. Williams said the projects would be kicking off in April, 2009.

Ms. Hewitt asked about a meeting with SLR on site to help the process with a face-to-face exchange of information? Mr. Carnahan said that it could be planned if it would benefit the process and help define the problem more productively.

Ms. Hewitt asked about contaminated soils stockpiled in Hughes. An attendee from Hughes said ANTHC obtains clean gravel from the river for use on projects in the village.

Ms. Williams asked if the landfill project was to move or rebuild the existing landfill. A participant from Hughes said that the landfill was currently not in compliance with FAA guidance and would be moved to a higher location approximately 10,000 feet away from the airport runway.

Ms. Jackson said that the location for contaminated soils would be brought up during the next community meeting.

Ms. Benson asked when the pre-construction meeting would take place. An attendee from Hughes said likely next month (March). Mr. Carnahan said that it may help the project to listen in on a call to that meeting.

Meeting Closing:

Mr. Carnahan concluded the meeting with requests for SLR to prepare the meeting notes and asked Ms. Jackson to provide a list of the meeting attendees in Hughes to Ms. Williams via e-mail.

2009 Hughes Environment Management Plan Contact List

Name	Affiliation	Title	e-mail	phone
Kevin Contree	ANTHC			
Kerry Boyd	YKSD	Superintendent	kboyd@ykds.com	(907) 374-9400
Eileen Jackson	Hughes Village Council	Environmental Coordinator	eileenjackson@hotmail.com	(907) 889-2261
Janet Bifelt	Hughes Village Council	Tribal Administrator	janetbifelt@tananachiefs.org	(907) 889-2239
Cara Ambrose	Hughes Village Council	Solid Waste Director	tsaahbaa@hotmail.com	(907) 889-2261
Ralph Williams	Hughes Village Council	Tribal Member		(907) 889-2239
Wilmer Beetus	Hughes Village Council	First Chief		(907) 889-2239
Ella Sam	Hughes Village Council	Secretary		(907) 889-2239
Gerald Oldman	Hughes Village Council	Second Chief		(907) 889-2239
Thelma Nicholai	City of Hughes	City Administrator	Thelma.nicholia@tananachiefs.org	(907) 889-2206
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
Elizabeth Vickerman	SLR	Project Engineer	evickerman@slrcorp.com	(907) 455-9005
Carl Benson	SLR	Project Manager	cbenson@slrcorp.com	(907) 455-9005

APPENDIX C

COMMUNITY WELL LOG AND USGS 1986 SITE SCHEDULE

WELL LOG

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

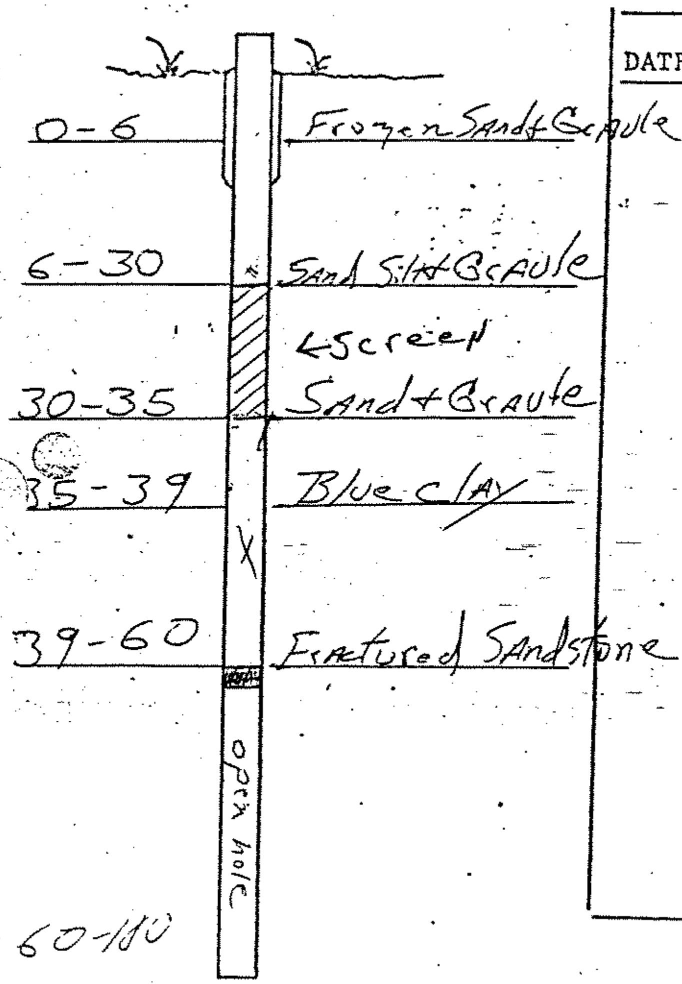
LOCATION Hughes DATE STARTED 5/15/73

DATE COMPLETED 5/22/73 DRILLER George Estabrook

TOTAL DEPTH OF WELL 100 FT. CASING INSTALLED 60 DIAMETER 6"

GROUT None SCREEN SIZE 30 MFG Johnson LENGTH 5 Ft

STATIC WATER LEVEL 6 HRS. PUMPED 16 @ 15 GPM. DRAWDOWN 36 FT



DATE	DEPTH FROM - TO	FORMATION	DRILLER
	0-6	Frozen Sand&Gravel	
	6-30	Sand Siltd Gravel	
	30-35	Sand+Gravel (Water)	
	35-39	Blue Clay	
	39-60	Fractered Rock	
	60-100	Rock sandstone	

SPECIAL NOTES:

Pump level ~~#~~ 9^{6} @ 15 gpm

Suggest Set pump @ 30 ft From present ground leve new schedule

11507

FORM NO. 9—1904—A
Revised September 1980

SITE NO. KA7-22-33 CCAC1-1

U.S. DEPT. OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
SITE SCHEDULE

Recorded by P. STRELAKOS

Date 1-15-86

Check One ✓ English ___ Metric Units

GENERAL SITE DATA (0)

Site Ident No 660295154152001 (5 … 19)

RG Number R=0 *

Transaction T= (A) D M V * — add, delete, modify, verified

Site-Type 2= C D E H I M Ø P S T (W) X * — collector, drain, excavation, sink-hole, connector well, multiple, outcrop, pond, spring, tunnel or shaft, well, test hole

Data Reliability 3= C (U) * — field checked, unchecked

Reporting Agency 4= USGS *

Project No. 5= *

District 6= 02 *

State 7= 02 *

County (or town) HUGHES 8= 290 *

Latitude 9= 660247 * — deg min sec

Longitude 10= 1541517 * — deg min sec

Lat-Long Accuracy 11= S F (T) M * — sec, 5 sec, 10 sec, Min

Local Number 12= KA007022 33CCAC1 001 *

Land Net Loc. 13= NESWSW S 33 T 007N R 022E K * — 1/4 1/4 1/4 section, township, range, merid

Location Map 14= HUGHES A-3 *

Scale 15= 63360 *

Altitude 16= 250. *

Method of Measurement 17= A L (M) * — altimeter, level, map

Accuracy 18= 50. *

Topo Setting 19= A B C D E F G H K L M Ø P S T (U) V W * — alluvial fan, playa, stream channel, depression, dunes, flat, flood plain, hilltop, sink, swamp, mangrove swamp, offshore, pediment, hillside, terrace, undulating, valley flat, upland draw

Hydrologic Unit (OWDC) 20= 19030005 *

Use of Site 23= A C D E G H M Ø P R S T U (W) X Z * — anode, standby, drain, geothermal, seismic, heat reservoir, mine, observation, oil or gas, recharge, repress, test, unused, withdrawal, waste, destroyed

Secondary Site Use 301= *

Tertiary Site Use 302= *

Use of Water 24= A B C D E F H I J K M N (P) Q R S T U Y Z * — air cond., bottling, commercial, dewater, power, fire, domestic, irrigation, industrial (cooling), mining, medicinal, industrial, public supply, aquaculture, recreation, stock, institution, unused, desal, other

Secondary Water Use 25= T *

Tertiary Use of Water 26= *

Depth of Hole 27= 92.6 *

Depth of Well 28= 56. *

Source of Depth Data ① 29= D *

Water Level 30= . *

Date Measured 31= / / * — month day year

Source ① 33= *

Method of Measurement 34= A B C E G H L M N R S T V Z * — airline, analog, calibrated airline, estimated, pressure gage, calibrated pressure gage, geophysical logs, manometer, non-rec. gage, reported, steel tape, electric tape, calibrated electric tape, other

Site Status 37= D E F G H I J N Ø P R S T V W X Z * — dry, recently flowing, flowing, nearby flowing, nearby recently flowing, injector site, inj-site monitor, meas. discon., obstruction, pumping, recently pumped, nearby pumping, nearby recently pumped, foreign substance, well destroyed, surface water effects, other

Source of Geohydrologic Data ① 36= D *

Pump Used 35= * — no

Date of First Construction/Completion 21= 07091963 * — month day year

OWNER IDENTIFICATION (1)

R=158 * T= (A) D M * — add, delete, modify

Date of Ownership 159 # 07091963 * — month day year

Name: Last 161 # AK STATE *

First 162= HUGHES *

Middle Initial 163= *

OTHER SITE IDENTIFICATION NUMBERS (1)

R=189 * T= (A) D M * — add, delete, modify

Ident 190 # 50050 * Assigner 191= AKRG *

New Card Same R & T

Ident 190 # BEDROCK * Assigner 191= UNKNØWN *

SITE VISIT DATA (1)

R=186 * T= A D M * — add, delete, modify

Date of Visit 187 # / / * — month day year

Name of Person 188= *

FIELD WATER QUALITY MEASUREMENTS (1)

R=192 * T= A D M * — add, delete, modify

Date 193 # / / * — month day year

Geohydrologic Unit 195 # *

New Card Same R thru 195

Temperature 196 # 00010 * Degrees C 197= . *

Conductance 196 # 00095 * μ Mhos 197= . *

Other (STORET) Parameter 196 # * Value 197= . *

Other (STORET) Parameter 196 # * Value 197= . *

FOOT NOTES:

① Source of Data Codes:

A	D	G	L	M	O	R	S	Z
other gov't	driller	geologist	logs	memory	owner	other reported	reporting agency	other

10.

KA 7-22-33 CCAC1-1

APPENDIX D

COMMUNITY WELL ANALYTICAL DATA

APPENDIX D
HUGHES COMMUNITY WELL
RECENT LABORATORY RESULTS

Non-Coliform Sample Results

Lab Sample No. :	VO*F0904020-01B	Collection Date	03-31-2009

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	0.500000000 UG/L		01-01-2009	12-31-2009	0.070000000 MG/L
2380	CIS-1,2-DICHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.070000000 MG/L
2955	XYLENES, TOTAL	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	10.000000000 MG/L
2964	DICHLOROMETHANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.005000000 MG/L
2968	O-DICHLOROBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.600000000 MG/L
2969	P-DICHLOROBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.075000000 MG/L
2976	VINYL CHLORIDE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.002000000 MG/L
2977	1,1-DICHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.007000000 MG/L
2979	TRANS-1,2-DICHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.100000000 MG/L
2980	1,2-DICHLOROETHANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.005000000 MG/L
2981	1,1,1-TRICHLOROETHANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.200000000 MG/L
2982	CARBON TETRACHLORIDE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.005000000 MG/L
2983	1,2-DICHLOROPROPANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.005000000 MG/L
2984	TRICHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.005000000 MG/L
2985	1,1,2-TRICHLOROETHANE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.005000000 MG/L
2987	TETRACHLOROETHYLENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.005000000 MG/L
2989	CHLOROBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.100000000 MG/L
2990	BENZENE	524.2			0E-9	0.69000 UG/L	01-01-2009	03-31-2009	0.005000000 MG/L
2991	TOLUENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	1.000000000 MG/L
2992	ETHYLBENZENE	524.2			0E-9	0.93000 UG/L	01-01-2009	12-31-2009	0.700000000 MG/L
2996	STYRENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2009	12-31-2009	0.100000000 MG/L

APPENDIX E

PHOTO LOG

PHOTO LOG

Photograph 1: Old Fuel Dispenser Station

Photograph 2: School with the old tank farm (in front) and the new 6,000 gallon tanks (in rear).

Photograph 3: Generator and old fuel supply at the School

Photograph 4: New day tank for the School

Photograph 5: Two new 6,000 gallon tanks for the school

Photograph 6: Old School Tank Farm

Photograph 7: Old School Tank Farm Containment

APPENDIX F

SLR'S CONCEPTUAL SITE MODEL

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 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 Hughes Former Generator Buildings and Tank Farm as well as DEC's water quality investigations (described in the EMP) were compiled and 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. Field screening and analytical data used to support this CSM are presented in Table 2, Table 3 of the 2008 Phase I and II report from BGES.

1.1.1 Surface Soil

Surface soil is defined as the interval from 0 foot to 2 feet 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.

Eight field screening and one analytical characterization samples were collected from the surface soil interval in 2008. Heated headspace field screening results ranged from 0 ppm to 169 ppm with 2 samples with PID results greater than 100 ppm. Analytical results for DRO, RRO and GRO were above soil cleanup levels at maximum detected concentrations of 37,700 mg/kg, 33,300 mg/kg and 340 mg/kg, respectively. Benzene, toluene, ethylbenzene, and total xylenes (BTEX) were also all detected at concentrations above soil cleanup levels at 0.193 mg/kg, 2.28 mg/kg, 1.7 mg/kg and 45.5 mg/kg, respectively (BGES, 2008).

Samples collected in 1995 by an DEC representative determined that the worst soil contamination was near the school tank farm (DEC, 2009). DEC reported one sample at an undetermined location contained 39,500 mg/kg DRO.

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.

Thirteen PID field screening and two analytical samples were collected from this interval in 2008 (BGES, 2008). PID field screening results ranged from 0.0 ppm to 375 ppm. Staining and a heavy hydrocarbon odor were reported near the southeast corner of the tank farm. Analytical results for DRO, RRO, and GRO were all above DEC Method Two soil cleanup levels. DRO concentrations ranged from 2,050 mg/kg to 18,900 mg/kg, RRO concentrations ranged from 740 mg/kg to 1,140 mg/kg, and GRO concentrations ranged from 262 mg/kg to 485 mg/kg. BTEX compounds were not detected in either analytical sample. Lead was detected in one sample in which it was analyzed, but at a concentration less than the Method Two soil cleanup level.

1.1.3 Ground Water

DEC currently monitors the community water well on a quarterly basis, due to detected benzene concentrations. The well was drilled to 92.6 feet bgs, and is screened from 30 feet to 35 feet. It is currently within 50 feet of the contaminated sites and is still currently used by most residents. Samples from the community well detected 1.95 µg/L benzene on April 28, 2000 and 2.140 µg/L on June 26, 2001. The most recent monitoring results from March 31, 2009 indicated a benzene concentration of 0.69 µg/L, and an ethylbenzene concentration of 0.93 µg/L. Based on the drill log of the community well, seasonally frozen soils exist in the area, but permafrost was not noted in deeper soils; therefore, permafrost is not assumed to limit migration of near surface contamination to underlying ground water. Drinking water in Hughes is supplied by the Hughes Washeteria which gets it water from this well drawing ground water from the 30-foot to 35-foot depth interval.

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 1994 and 2006, increasing the risk of overland migration of contaminants.

Two surface water samples, assumed to have been collected from ponded standing water near the tank farm, were collected from BGES in 2008. Analytical results for TAH in one sample, detected at 0.0827 mg/L, in excess of the DEC surface water quality criteria of 0.010 mg/L.

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 this 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 DEC 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, five potentially complete exposure pathways were identified. These pathways include incidental soil ingestion, dermal absorption of contaminants from soil, ingestion of groundwater, inhalation of outdoor air, and inhalation of indoor air. 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 softball field and/or an elder and youth facility, and is therefore expected to be used by human receptors in the future.

The dermal absorption of contaminants from soil pathway is complete because 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 complete because known contamination has been detected. The well located on the property is the current drinking water source.

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. Volatile contaminants that make this a complete exposure pathway include DRO, GRO, BTEX compounds, and volatile PAHs.

The inhalation of indoor air exposure pathway is considered complete because of the presence of volatile contaminants in the soil and the presence of the occupied buildings within 100 feet of the site.

The ingestion of wild foods exposure pathway is considered complete because of the presence of foliage at the site area that may include wild berries.

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 surface water exposure pathway is not considered complete based on the lack of evidence identifying affected surface water bodies used as a drinking water source.

None of the additional exposure pathways are considered completed based on site data, features, or other pertinent information as described in the preceding sections.

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 site residents, visitors or trespassers cannot be ruled out. For example, children are reported to play in the vicinity of the site during town gatherings. The site is also currently monitored by DEC and environmental site investigators, so the current use from commercial or industrial workers cannot be ruled out. The site is also the proposed location of a new elder/youth center and a softball field. Based on current development plans, the following human receptors are considered to be potentially exposed to site contaminants:

- Residents (future);
- Commercial or industrial workers (current and future);
- Construction workers (current and future);
- Site visitors or trespassers (current and future);
- Farmers or subsistence harvesters (future); and
- Subsistence consumers.

Human Health Conceptual Site Model
Scoping Form

Site Name: Hughes Former Generator Building/Tank Farm

File Number: N/A/

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: batteries, pipeline, generator system

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: ______________________

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: 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: Hughes Former Generator Building and Tank Farms
Hughes, Alaska

Completed By: SLR International Corp.
Date Completed: April 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

[x] Surface Soil (0-2 ft bgs)
- Direct release to surface soil — check soil
- [x] Migration or leaching to subsurface — check soil
- [x] Migration or leaching to groundwater — check groundwater
- [x] Volatilization — check air
- [x] Runoff or erosion — check surface water
- [x] Uptake by plants or animals — check biota
- [ ] Other (list):

[x] Subsurface Soil (2-15 ft bgs)
- Direct release to subsurface soil — check soil
- [x] *Migration to groundwater* — check groundwater
- [x] *Volatilization* — check air
- [ ] *Other (list):*

[x] Ground-water
- Direct release to groundwater — check groundwater
- [x] *Volatilization* — check air
- [x] *Flow to surface water body* — check surface water
- [ ] *Flow to sediment* — check sediment
- [x] *Uptake by plants or animals* — check biota
- [ ] *Other (list):*

[ ] Surface Water
- Direct release to surface water — check surface water
- [ ] *Volatilization* — check air
- [ ] *Sedimentation* — check sediment
- [ ] *Uptake by plants or animals* — check biota
- [ ] *Other (list):*

[ ] Sediment
- Direct release to sediment — check sediment
- [ ] *Resuspension, runoff, or erosion* — check surface water
- [ ] *Uptake by plants or animals* — check biota
- [ ] *Other (list):*

Exposure Media / Exposure Pathways / Current & Future Receptors

Exposure Media	Exposure Pathways	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
[x] soil	[x] Incidental Soil Ingestion	F	C/F	C/F	F	F	F	
	[x] Dermal Absorption of Contaminants from Soil	F	C/F	C/F	F	F	F	
[x] groundwater	[x] Ingestion of Groundwater	F	C/F	C/F	F	F	F	
	[ ] Dermal Absorption of Contaminants in Groundwater							
	[ ] Inhalation of Volatile Compounds in Tap Water							
[x] air	[x] Inhalation of Outdoor Air	F	C/F	C/F	F	F	F	
	[x] Inhalation of Indoor Air	F	C/F	C/F	F	F	F	
	[ ] Inhalation of Fugitive Dust							
[x] surface water	[ ] Ingestion of Surface Water							
	[ ] Dermal Absorption of Contaminants in Surface Water							
	[ ] Inhalation of Volatile Compounds in Tap Water							
[ ] sediment	[ ] Direct Contact with Sediment							
[x] biota	[x] Ingestion of Wild Foods	F		F	F	F		

Revised 3/21/06

APPENDIX G

DEC EXPOSURE TRACKING MODEL

Exposure Tracking Model - Evaluation Summary

Navigation | Save Results | Add CSP Action

Site Information:

Site: Hughes School & Community Tank Farm
Source: ASTs
Evaluation Date: 4/24/2009 3:59:30 PM
Initial/Updated: Updated

Results Summary:

Human Health Exposure Category: Current Exposure
Controlling Pathway(s): Surface Soil
Score: 6

Ecological Site Exposure Category: Low Potential Exposure

Potentially-Contaminated Media: Surface Soil, Subsurface Soil, Groundwater
Other Site Concerns: None

Exposure Assessment:

Pathway	Exposure Categories Initial Ranking 4/16/2008 8:46:23 AM	Exposure Categories Updated Ranking 4/27/2009 9:21:10 AM
Direct Contact with Surface Soil:	High Potential Exposure	Current Exposure
Direct Contact with Subsurface Soil:	High Potential Exposure	High Potential Exposure
Outdoor Air Inhalation:	Low Potential Exposure	High Potential Exposure
Groundwater Ingestion:	High Potential Exposure	High Potential Exposure
Surface Water Ingestion:	Pathway Incomplete	Pathway Incomplete
Wild or Farmed Foods Ingestion:	Pathway Incomplete	Pathway Incomplete
Indoor Air Inhalation (Vapor Intrusion):	High Potential Exposure	High Potential Exposure
Other Human Health:	Pathway Incomplete	Pathway Incomplete
Ecological:	Low Potential Exposure	Low Potential Exposure

Initial Ranking Comments

: (comments - source)
There is little current information on this site, which was impacted by flooding several times over the last decade. The community well has been impacted by fuel spills and there is no current DW information available. Assume petroleum impacted surface and subsurface soil and groundwater that is used as DW.

Updated Ranking Comments

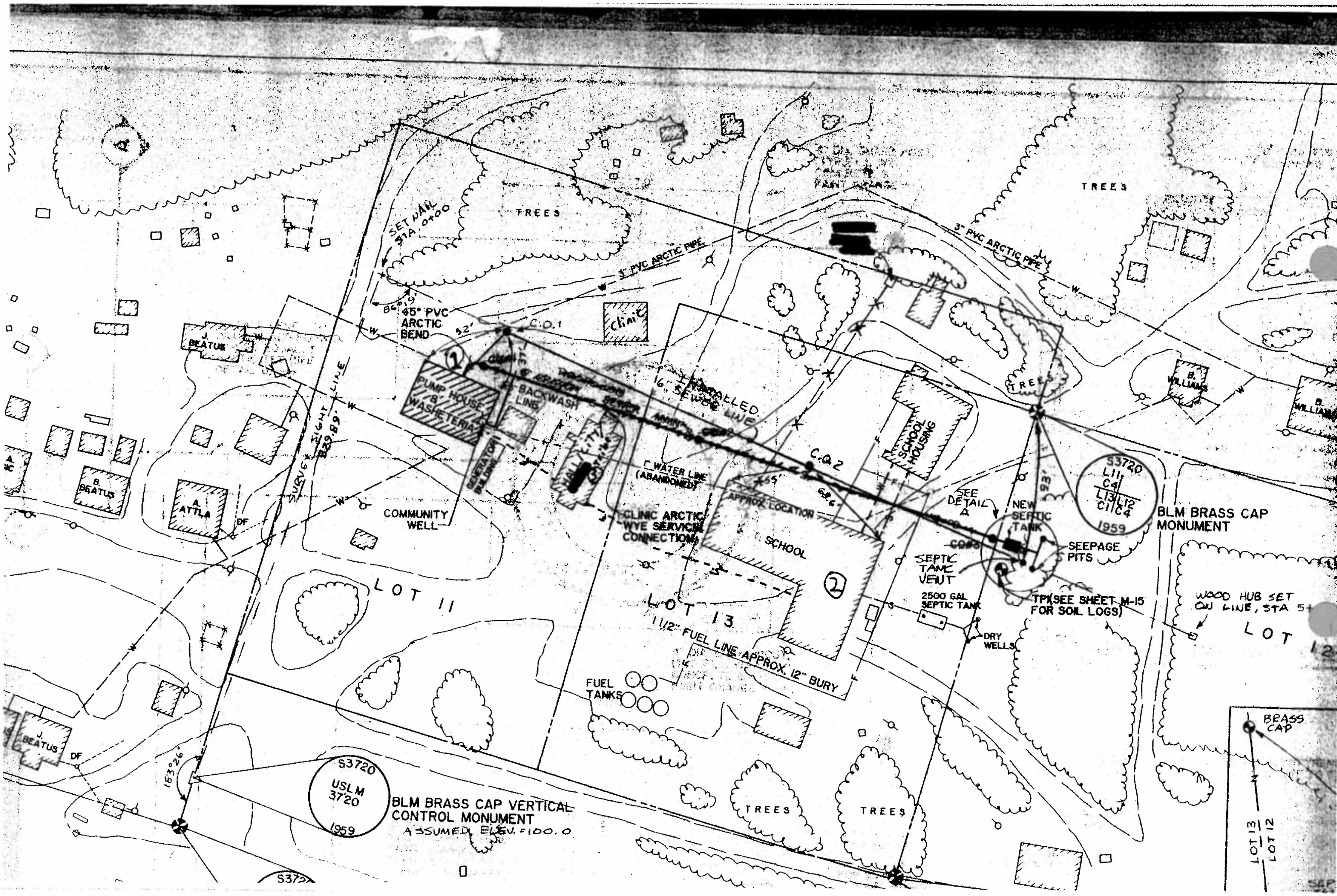
: (comments - source)
There is little current information on this site, which was impacted by flooding several times over the last decade. The community well has been impacted by fuel spills and there is no current DW information available. Assume petroleum impacted surface and subsurface soil and groundwater that is used as DW.

Direct Contact With Surface Soil: (comments - page)
The August 2008 BGES report on the Former Generator Buildings and Tank Farm indicated surface soil samples had DRO levels up to 37,700 mg/kg nera the former generator building and DRO up to 18,900 mg/kg at the former school tank farm.

Direct Contact With Subsurface Soil: (comments - page)
The 2008 Phase I/Limited Phase II report indicated DRO at levels up to 18,900 mg/kg at 6 feet bgs.

APPENDIX H

COMMUNITY WATER SYSTEM PIPING LAYOUT



TREES
TREES
TREES
SET NAIL STA. 0+00
3" PVC ARCTIC PIPE
3" PVC ARCTIC PIPE
[redacted]
clinic
45° PVC ARCTIC BEND
52'
C.O.1
J. BEATUS
PUMP HOUSE 8' WASHETERIA
BACKWASH LINE
GENERATOR BUILDING
16" INSTALLED SEWER LINE
SURVEY SIGHT LINE
839.89'
C.O.2
SCHOOL HOUSING
WATER LINE (ABANDONED)
APPROX LOCATION
SCHOOL
CLINIC ARCTIC WYE SERVICE CONNECTIONS
COMMUNITY WELL
A. ATTLA
B. BEATUS
B. WILLIAMS
B. WILLIAMS
SEE DETAIL A
NEW SEPTIC TANK
SEEPAGE PITS
SEPTIC TANK VENT
2500 GAL SEPTIC TANK
DRY WELLS
TP1 (SEE SHEET M-15 FOR SOIL LOGS)
193'
S3720 L11 C4 L13 L12 C1 C4 1959
BLM BRASS CAP MONUMENT
WOOD HUB SET ON LINE, STA 5+
LOT 11
LOT 13
LOT 12
1 1/2" FUEL LINE APPROX. 12" BURY
FUEL TANKS
J. BEATUS
DF
DF
153°26'
S3720 USLM 3720 1959
BLM BRASS CAP VERTICAL CONTROL MONUMENT
ASSUMED ELEV.=100.0
TREES
TREES
BRASS CAP
LOT 13
LOT 12

PHASE 1 OVERVIEW

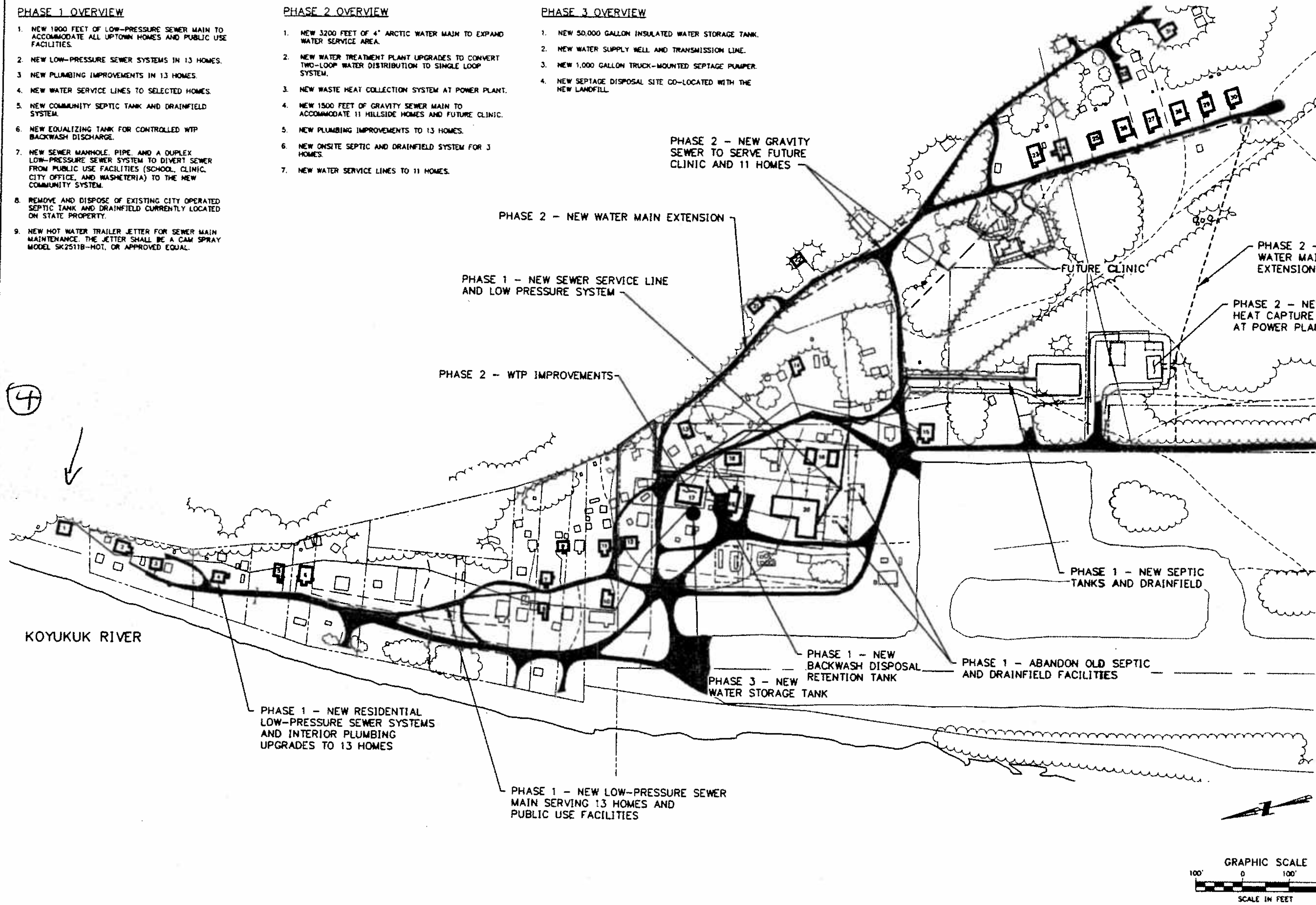
1. NEW 1900 FEET OF LOW-PRESSURE SEWER MAIN TO ACCOMMODATE ALL UPTOWN HOMES AND PUBLIC USE FACILITIES.
2. NEW LOW-PRESSURE SEWER SYSTEMS IN 13 HOMES.
3. NEW PLUMBING IMPROVEMENTS IN 13 HOMES.
4. NEW WATER SERVICE LINES TO SELECTED HOMES.
5. NEW COMMUNITY SEPTIC TANK AND DRAINFIELD SYSTEM.
6. NEW EQUALIZING TANK FOR CONTROLLED WTP BACKWASH DISCHARGE.
7. NEW SEWER MANHOLE, PIPE, AND A DUPLEX LOW-PRESSURE SEWER SYSTEM TO DIVERT SEWER FROM PUBLIC USE FACILITIES (SCHOOL, CLINIC, CITY OFFICE, AND WASHETERIA) TO THE NEW COMMUNITY SYSTEM.
8. REMOVE AND DISPOSE OF EXISTING CITY OPERATED SEPTIC TANK AND DRAINFIELD CURRENTLY LOCATED ON STATE PROPERTY.
9. NEW HOT WATER TRAILER JETTER FOR SEWER MAIN MAINTENANCE. THE JETTER SHALL BE A CAM SPRAY MODEL SK2511B-HOT, OR APPROVED EQUAL.

PHASE 2 OVERVIEW

1. NEW 3200 FEET OF 4" ARCTIC WATER MAIN TO EXPAND WATER SERVICE AREA.
2. NEW WATER TREATMENT PLANT UPGRADES TO CONVERT TWO-LOOP WATER DISTRIBUTION TO SINGLE LOOP SYSTEM.
3. NEW WASTE HEAT COLLECTION SYSTEM AT POWER PLANT.
4. NEW 1500 FEET OF GRAVITY SEWER MAIN TO ACCOMMODATE 11 HILLSIDE HOMES AND FUTURE CLINIC.
5. NEW PLUMBING IMPROVEMENTS TO 13 HOMES.
6. NEW ONSITE SEPTIC AND DRAINFIELD SYSTEM FOR 3 HOMES.
7. NEW WATER SERVICE LINES TO 11 HOMES.

PHASE 3 OVERVIEW

1. NEW 50,000 GALLON INSULATED WATER STORAGE TANK.
2. NEW WATER SUPPLY WELL AND TRANSMISSION LINE.
3. NEW 1,000 GALLON TRUCK-MOUNTED SEPTAGE PUMPER.
4. NEW SEPTAGE DISPOSAL SITE CO-LOCATED WITH THE NEW LANDFILL.



(4)

95% DESIGN

DATE	REVISIONS	INIT

STATE OF ALASKA · 49th · EDWARD L. HAKALA · CE 10580 · REGISTERED PROFESSIONAL ENGINEER

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM
DIVISION OF ENVIRONMENTAL HEALTH AND ENGINEERING
1901 Bragaw Street, Suite 200
ANCHORAGE, ALASKA 99508-3440
(907) 729-3600

ALASKA NATIVE TRIBAL HEALTH CONSORTIUM

HUGHES, ALASKA
SANITATION IMPROVEMENTS – PHASE ONE
OVERALL PHASE PLAN

AN-03-R54 / AN-02-N07 / AN-04-N61

DATE: 8/30/2007	PROJ MGR: GREG MCCONNELL, P.E.
DRAWN BY: AMBER MOBLEY	PROJ ENG: EDWARD HAKALA, P.E.
CHECKED BY: DALE WYCKOFF II	TUS ENG: PAUL GABBERT, P.E.
FILE: HUS-G-STPHAZ	LAYOUT: PH...

G-003
SHEET 3 OF 35

USER AMOBLEY FILE: I:\HUGHES\HUS-05-DRP\SUBDIVISION SEWER IMPROVEMENTS\DRAWINGS\GENERAL\HUS-G-STPHAZ.DWG PLOT DATE 8/

APPENDIX I

COST ESTIMATE SPREADSHEETS

Cost Estimate for FY 2010 Work (6/5/2009) - Interim Removal Action, Village of Hughes School Tank Farm and Former Generator Areas Soils, Alaska

1. Direct Labor	Clerical	Drafting	Environmental Scientist	Project Manager	Project Director	Total Hours	Total Cost	Comments / Backup
	$55.00	$90.00	$90.00	$100.00	$130.00	Hours	Cost	
Task 1 - Remedial Work Plan Preparation		24	56	40	16	136	$13,280.00	40 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. Contractor will inert and cut tanks to clean. Village labor will cut tanks small enough to haul to landfill or place on large cargo aircraft for backhaul for recycling.
Task 2B - Excavation of Contaminated Soils, Spreading Landfarm Soils		12	48	16	8	84	$8,040.00	Assumes both trucks are operational. Twenty minute turn time for each 5-yard and 10-yard load from excavation of contaminated soil will be the rate-limiting step. Assumes the truck will travel 4.5-mile round trip at 15 mph with one minute on each end for loading and dumping. 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 (1,000 cubic yards)		8	72	16	8	104	$9,840.00	Assume 20-minute turn time for each 5-yard and 10-yard load from backfill source area. Three 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 1-foot lifts.
Task 2D - Tilling and Fertilizing landfarm	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 Hughes. Project report for excavation and backfill, and landfarm construction.
Task 3 - landfarm 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 fertilizing (assumes one 12 hour day and 12-hours travel time) 24 hours for environmental scientist to prepare letter interim report.
Task 4 - landfarm 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 fertilizing (assumes one 12 hour day and 12-hours travel time for consultant). Twenty-four hours for environmental scientist to prepare letter interim report.
Task 5 - Decommission landfarm 2013		4	72	40	4	120	$11,360.00	Will require up to one day for cell confirmation sampling, four 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 Work Plan Preparation	No. of Units	Unit	Cost Per Unit	Subtotal	Comments / Backup
Phone/FAX	1	estimate	$50	$50	
lead soil using SW-846 Method 3050B/6020	6	estimate	$50	$300	Collection of soil and paint samples to characterize the paint and ground immediately surrounding the decommissioned ASTs at the Site
Reproduction	1	estimate	$250.00	$250	
Per Diem	2	estimate	$65.00	$130	
Lodging	1	estimate	$100.00	$100	
Consultant RT Airfare, Anchorage to Hughes	1	each	702	$702	

SubTotal Task 1 (ODC)	**$1,532**
SubTotal Task 1 (Labor)	**$13,280**
Task 1 - Total Costs	**$14,812**

Cost Estimate for FY 2010 Work (6/5/2009) - Interim Removal Action, Village of Hughes School Tank Farm and Former Generator Areas Soils, Alaska

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

	No. of Units	Unit	Cost Per Unit	Subtotal	
Consultant RT Airfare, Anchorage to Hughes	1	each	$702	$702	Warbelows and Alaska Airlines as of May 18, 2009
Pickup Truck Rental (with fuel)	5	12-hr days	$334	$1,670	Based on Hughes Equipment rates provided by City Administrator
Caterpillar 416 Loader/Backhoe (with fuel)	5	12-hr days	$564	$2,820	"" loader with fuel
5-yard dump truck (with fuel)	5	12 -hr days	$564	$2,820	"" 5- and 10-yard dump trucks with fuel
10-yard dump truck (with fuel)	5	12-hr days	$564	$2,820	"" 5- and 10-yard dump trucks with fuel
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	60	Hour	$52	$3,128	
Operator #2	60	Hour	$52	$3,128	
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	
Liquid Waste Management Backhaul to Fairbanks	2200	pounds	$1	$2,200	Estimated cost to fly drums to Fairbanks.
Liquid Waste Incineration at OIT, plus pickup at airport and haul to Moose Creek	6	drums	$260	$1,560	Quote from OIT for drummed POL liquids 5/20/2009 @$3/gallon plus $95 per drum from Arctic Fire and Safety in Fairbanks. Assume one drum per tank and buried pipeline. Recovered fuel will have high value in the village and this assumption is for tank sludges after evaporation of wash water.
Certified Tank Contractor	1	estimate	$30,000	$30,000	Contractor to cut and clean out tanks. Purge buried pipeline. Liquids will be profiled by local solid waste coordinator and shipped to OIT for treatment. Vertical fuel tanks may be reused as storage space after cleaning and cutting man way doors.
Transportation of Consultant Equip/Materials to Hugh	1	estimate	$2,000	$2,000	Includes seed, fertilizer, instruments, etc. (may ship fertilizer w/liners).
Lodging	5	man-day	$100	$500	
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)	**$62,990**
SubTotal Task 2A (Labor)	**$9,840**
Task 2A - Total Costs	**$72,830**

Cost Estimate for FY 2010 Work (6/5/2009) - Interim Removal Action, Village of Hughes School Tank Farm and Former Generator Areas Soils, Alaska

Task 2B - Excavation of Contaminated Soils, Spreading Landfarm Soils

Caterpillar 416 Excavator/Loader *(with fuel)	6	12-hr days	$564.00	$3,384	Village equipment rate for 8 hour day times 1.5.
5-yard dump truck (with fuel)	5	12-hr days	$564.00	$2,820	""
10-yard dump truck (with fuel)	5	12-hr days	$564.00	$2,820	""
Pickup Truck (with fuel)	6	12-hr days	$334.00	$2,004	""
Equipment Operator #1	72	Hour	$52	$3,754	Excavator/Loader operator
Equipment Operator #2	60	Hour	$52	$3,128	"" (10-yard dump truck)
Equipment Operator #3	60	Hour	$52	$3,128	"" (5-yard dump truck)
Laborer #1	72	Hour	$43	$3,128	
Laborer #2	72	Hour	$43	$3,128	
Soil Sample Analysis (Floor Characterization) - GRO/BTEX AK101/EPA 8021B	30	samples	$85	$2,550	Needed to characterize excavation floor levels, assumes a 5-foot excavation depth and 860 cubic yards excavated. Five separate excavations with four excavations planned to be between 315 and 400 square feet. Each of these will require three samples (two for first 250 square feet and one additional for next 250). The fifth excavation, at 3,300 square feet, will require 15 samples. Total samples is 27, plus 3 for QC. Thus, per UST procedures manual, sample requirements will be 30 based on estimated excavation limits.
Soil Sample Analysis (Floor Characterization) - DRO/RRO AK101/AK102	30	sample	$85.00	$2,550	As above for excavation floor.
Soil Sample Analysis (Sidewall Characterization) - GRO/BTEX AK101/SW 8021B	33	samples	$85	$2,805	Sidewall characterization based on one sample per 20 linear feet with 10% QC duplicate frequency.
Soil Sample Analysis (Sidewall Characterization) - DRO/RRO AK101/AK102	33	sample	$85.00	$2,805	As above for excavation sidewall.
Soil Sample Analysis (Sidewall and Floor) PAH SIM SW 8270	6	sample	$185.00	$1,110	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	5	trip blank	$42.50	$213	Trip blanks 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	$100	$600	
Meals	6	days	$65	$390	
PPE	36	days	$20	$720	
Digital Camera	6	days	$10	$60	
PID Rental	6	days	$50	$300	
Consultant RT Airfare, Anchorage to Hughes	2	each	$702	$1,404	

SubTotal Task 2B (ODC)	**$44,700**
SubTotal Task 2B (Labor)	**$8,040**
Task 2B - Total Costs	**$52,740**

Cost Estimate for FY 2010 Work (6/5/2009) - Interim Removal Action, Village of Hughes School Tank Farm and Former Generator Areas Soils, Alaska

Task 2C - Backfilling Excavations (1,000 cubic yards)

Caterpillar 416 Excavator/Loader *(with fuel)	6	12-hr days	$564.00	$3,384	Assumes four days to backfill and compact excavation areas.
5-yard dump truck (with fuel)	4	12-hr days	$564.00	$2,256	
10-yard dump truck (with fuel)	4	12-hr days	$564.00	$2,256	
Pickup Truck (with fuel)	4	12-hr days	$334.00	$1,336	
Equipment Operator #1	72	Hour	$52	$3,754	
Equipment Operator #2	48	Hour	$52	$2,503	
Equipment Operator #3	48	Hour	$52	$2,503	
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	$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	$100	$500	Assuming ten 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	1230	yards	$2	$1,845	$1.5/yard to DNR for gravel permit and no per yard rate paid to Hughes Tribal Council (conversation with Eileen Jackson of Village Council)

SubTotal Task 2C (ODC)	**$31,124**
SubTotal Task 2C (Labor)	**$9,840**
Task 2B - Total Costs	**$40,964**

Task 2D - Tilling and Fertilizing landfarm

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 Hughes	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	14	vehicle-day	$223	$3,122	Vehicle rental for laborer to drive to and from landfill landfarm area.
Rototiller Fuel	30	gallons	$8	$240	Vehicle - ATV fuel.
Lodging	1	man-day	$100	$100	
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	Confirmation sampling: frequency based upon one sample per 50 cubic yards, plus 6 samples for screening.

SubTotal Task 2C (ODC)	**$17,131**
SubTotal Task 2C (Labor)	**$16,730**
Task 2B - Total Costs	**$33,861**

Cost Estimate for FY 2010 Work (6/5/2009) - Interim Removal Action, Village of Hughes School Tank Farm and Former Generator Areas Soils, Alaska

Task 3 - landfarm Maintenance 2011

Consultant RT Airfare, Anchorage to Hughes	1	each	$867	$867	Warbelows and Alaska Airlines as of May 18, 2009.
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 Hughes	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	14	vehicle-day	$223	$3,122	Vehicle rental for laborer to drive to and from landfill landfarm area.
Rototiller Fuel	30	gallons	$8	$240	Rototiller fuel
Lodging	1	man-day	$100	$100	
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)	**$16,028**
SubTotal Task 3 (Labor)	**$7,180**
Task 3 - Total Costs	**$23,208**

Cost Estimate for FY 2010 Work (6/5/2009) - Interim Removal Action, Village of Hughes School Tank Farm and Former Generator Areas Soils, Alaska

Task 4 - landfarm Maintenance 2012					
Consultant RT Airfare, Anchorage to Hughes	1	each	$867	$867	Warbelows and Alaska Airlines as of May 18, 2009.
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 Hughes	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	14	vehicle-day	$223	$3,122	Vehicle rental for laborer to drive to and from landfill landfarm area.
Rototiller Fuel	30	gallons	$8	$240	Rototiller fuel
Lodging	1	man-day	$100	$100	
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)	$16,028
SubTotal Task 4 (Labor)	$6,820
Task 4 - Total Costs	$22,848

Task 5 - Decommission landfarm 2013					
Consultant RT Airfare, Anchorage to Hughes	1	each	$867	$867	Warbelows and Alaska Airlines as of May 18, 2009.
Caterpillar 416 Excavator/Loader *(with fuel)	6	12-hr days	$564	$3,384	Assumes six days of loader time to assemble use stockpile at landfill.
10-yard dump truck (with fuel)	4	12-hr days	$564	$2,256	Assumes four days of dump truck time to move soils closer to landfill.
Pickup Truck (with fuel)	6	12-hr days	$334	$2,004	Vehicle rental for laborer to drive to and from landfill landfarm area.
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 Hughes	2	estimate	$200	$400	
Lodging	4	man-day	$100	$400	
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 1,230 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).
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)	$22,110
SubTotal Task 5 (Labor)	$16,620
Task 5 - Total Costs	$38,730

Total, Labor	$88,350
Total, Other Direct Costs	$211,644
10% Contingency	$29,999
TOTAL PROJECT COST (Hughes Remediation)	*$329,993*