FIGURES

SLR

SCALE: 1" = 700'
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE
0 700 1400' 2100'

N

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Report PROPERTY ASSESSMENT AND CLEANUP PLAN
OLD AVEC TANK FARM
ELIM, ALASKA

Drawing SITE LOCATION MAP

Date November 10, 2009	Scale 1" = 700'	Fig. No. 1
File Name ELIM_F1	Project No. 005.0065.09003	

SLR

SCALE: 1" = 100'
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE
0 100 200 300'

N

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Report PROPERTY ASSESSMENT AND CLEANUP PLAN
OLD AVEC TANK FARM
ELIM, ALASKA

Drawing SITE DETAIL

Date November 10, 2009	Scale 1" 100'	Fig. No. 2
File Name ELIM_F2	Project No. 005.0065.09043	April 2025

NOTES

BACKGROUND PHOTOGRAPH REFERENCED FROM AEROMETRIC 2004 AERIAL PHOTOGRAPH

2001 SOIL SAMPLE LOCATIONS ESTIMATED FROM THE 2001 BRISTOL ENVIRONMENTAL & ENGINEERING SERVICES CORPORATION SITE RECONNAISSANCE REPORT

LEGEND

ELM-S-002 — APPROXIMATE 2001 SOIL SAMPLE LOCATION

ABREVIATIONS

BGS	BELOW GROUND SURFACE
DRO	DIESEL RANGE ORGANICS
MG/KG	MILLIGRAMS PER KILOGRAM
N/R	NOT RECORDED
PETROFLAG	TOTAL PETROLEUM HYDROCARBONS
PID	HEADSPACE VAPOR LEVEL
PPM	PARTS PER MILLION

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Report: PROPERTY ASSESSMENT AND CLEANUP PLAN
OLD AVEC TANK FARM
ELIM, ALASKA

Drawing: 2001 SOIL SAMPLE LOCATION MAP

SLR

SCALE: 1" = 25'
WHEN PLOTTED AT 8.5 x 11 PAGE SIZE
0 25 50 75'

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Date: November 10, 2009	Scale: 1" 25'	Fig. No. 3
File Name: ELIM_F3	Project No. 005.0065.09003	April 2025

TABLE

Table 1
Evaluation of Remedial Alternatives for Soil

ALTERNATIVE	ENVIRONMENTAL PROTECTION	REGULATORY COMPLIANCE	EFFECTIVENESS	IMPLEMENT-ABILITY	COST	OVERALL RATING
No Action	Poor	Fair	Poor	Excellent	Good; site ground water monitoring required	Fair
Passive Biopile Construction	Good	Good	Fair	Fair	Good	Fair
Road Base Encapsulation	Good	Good	Good	Poor; no known road construction	Good	Fair
Daily Landfill Cover	Fair	Fair	Fair	Good; there is a Class III landfill in Elim	Good	Fair
Landfarming	Fair	Fair	Fair	Good	Good	Good
Landfarming followed by Daily Landfill Cover	Good	Good	Good	Good; there is a Class III landfill in Elim	Good	Good
Thermal Remediation	Good	Good	Good	Good	Poor; extremely high cost for small projects	Fair
Offsite Shipment and Disposal	Good	Good	Good	Fair; only practical if non-petroleum hydrocarbon-impacted soils are present	Poor; extremely high cost for small projects	Fair

APPENDIX A

DEC BROWNFIELD ASSESSMENT REQUEST FORM – 2009

Alaska Department of Environmental Conservation
Contaminated Sites Program

Old AVEC Tank Farm - Elim
600.57.001

DEC BROWNFIELDS ASSESSMENT REQUEST FORM – 2009

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 March 3, 2009.

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 How did AVEC come into Elim?

Is the site federally owned?

☐ Yes ☒ No

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

☐ Yes ☒ No ☐ Unknown

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

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

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

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

☐ Hazardous Substances ☒ Petroleum Only ☐ Hazardous Substances and Petroleum

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

☐ Yes ☐ No ☒ Unknown

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

---

1. Applicant/Owner

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

Robert A. Keith, President
Native Village of Elim
P.O. Box 39070
Elim Alaska 99739

angelrag@gci.net
(907) 890-3737
(907) 890-3738

If Applicant is IGAP staff, please provide name of EPA project officer:

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.)

~~O~~ IGAP Staff

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

See faxed letter, attached

Elim Native Corp. (Remember we are not affiliated with any other Regional corporation

196 - surface & subsurface

City has keys to the fenced area

DEC Brownfield Assessment Request Form FY2010

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.

US Survey #25218
Norton Bay Reservation
Old AVEC Powerplant
Diesel

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.

See map included

Has AVEC done any

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.

(?)

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.

- Health Hazard
- New AVEC plant moved a number of years ago. No one has pursued the cleanup.
- The land can be used for a private home or commercial property

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.).

Old AVEC powerplant cleaned up and the land available for use for the community

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.

Community meeting will need to be held with all organizations + membership with AVEC.

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.

Reuse or Re Development Plans should be done with a community meeting.

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.)

Community meeting

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.)

If you see into City of Elim minutes and # of times Utility Board bring up how to clean up this old site

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?

only if a community meeting is held and every one is there & understands "in-kind" services

DEC Brownfield Assessment Request Form FY2010

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 March 3, 2009, to:

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

Or by regular mail:

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

If you have questions, call Sonja Benson at (907) 451-2156, Deborah Williams at (907) 451-5174, or John Carnahan at (907) 451-2166.

CITY OF ELIM
ELIM CITY COUNCIL
P.O.BOX 39009
ELIM, ALASKA 99739
PH: (907)890-3441
FAX: (907)890-3811

ELIM · NATIVE · CORP.

DT: April 15, 2009

TO: Sonja Benson, ADEC DBA

FR: City of Elim, Elim IRA Council and Elim Native Corporation

RE: DEC Brownfields Assessment Support

On behalf of Elim City residents, Elim IRA Council membership and Elim Native Corporation shareholders we respectfully request that your office do a Brownfields assessment on the former AVEC power plant farm. The land was in Reservation Status prior the creation of the Elim Native Corporation. The Bureau of Indian Affairs issued a Site use permit (attached) in 1970 to AVEC for the purpose of building and operating a power plant to provide Electricity for Elim. The above named organizations support and grant Alaska Department of Environmental Conservation (ADEC) or any contractor of ADEC ingress or aggress to the former AVEC power plant farm for the purpose doing a Brownfields Assessment on said property. All three parties have some legal jurisdiction regarding this old AVEC power plant farm but the land on which this plant occupies will be Elim Native Corporation land once the clean up issues have been dealt with in a manner consistent with current environmental regulations.

Enclosed are 5 pages taken from a BIA report in the mid 1970's that provide excellent historical background. If you have any questions please call Robert or Carol at 890-3737 or Christine Amaktoolik, City Manager at 890-3441 and Darla Jemewouk at 890-3741 wk 890-2001.

Edwin Kotongan	Robert A. Keith	Julius Pleasent VP for
City of Elim Mayor	Elim IRA Council President	Elim Native President

Elim June 1974

Spring 2008

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

By authority of the Department of the Interior, the Area Director, Bureau of Indian Affairs, Juneau Area Office, hereinafter called the Permittor, hereby grants permission to Alaska Village Electric Cooperative, Inc., in Anchorage, Alaska, hereinafter called the Permittee to enter upon and occupy the following described lands at Elim, Alaska, to wit:

Beginning at the Northwest Corner of BIA school property marked with a white 2" x 4", thence East 200 feet to the True point of beginning on the North boundary line of BIA property, thence 100 feet North; thence 200 feet East; thence 100 feet South to the BIA property line; thence 200 feet West to the True point of beginning, containing 20,000 square feet, and the associated areas required for the distribution of the electrical energy produced for consumption in the Village of Elim, Alaska.

This permit shall take effect and begin on April 1, 1970, and be in effect until April 1, 2005. The Permittee shall pay on or before the effective date of this permit the sum of one dollar ($1.00) and other valuable consideration for the full period this permit remains in force and effect.

In consideration of this permission, the Permittee agrees to use the lands for the following purposes and upon the following conditions, to wit:

To construct facilities for installing electrical generation equipment, primary and secondary distribution facilities, and operate and maintain the same for the purpose of furnishing electric utility service in the Village of Elim, Alaska, as shown on the attached drawing, which is a part of this permit.

The Alaska Village Electric Cooperative, Inc., will use Elim workmen in every capacity possible in connection with this utility operation. Subject to the preferential right of employment provided above in connection with the performance of work under this agreement, the Permittee agrees to comply with all of the provisions of Section 202 (1) to (7) inclusive of Executive Order 11246, as amended, (30 FR 12319), which is hereby incorporated by reference in this agreement.

It is further understood and agreed that this instrument is not a lease and is not to be taken or construed as granting any leasehold interest or right in or to the land described herein but is a Use Permit for the term before stated.

The Permittee plans to construct certain facilities located on the permit area. The Permittor grants permission to the Permittee to use these facilities on said land for the purposes stated in this

permit. The Permittee may remove such improvements from the land within one year after termination of this permit or any renewal thereof; provided that upon failure of the Permittee to remove such constructed improvements within the period fixed, they shall become the property of the Permittor.

The Permittee shall commit no waste on the premises, and he shall not permit violation of any State or Federal law thereon; and that at the termination of the permit he shall leave the premises in a clean and sanitary condition.

No member of or delegate to Congress or Resident Commissioner shall be admitted to any share of this permit or to any benefit that may arise herefrom, but this restriction shall not be considered to extend to this permit if made with a corporation or company for its general benefit.

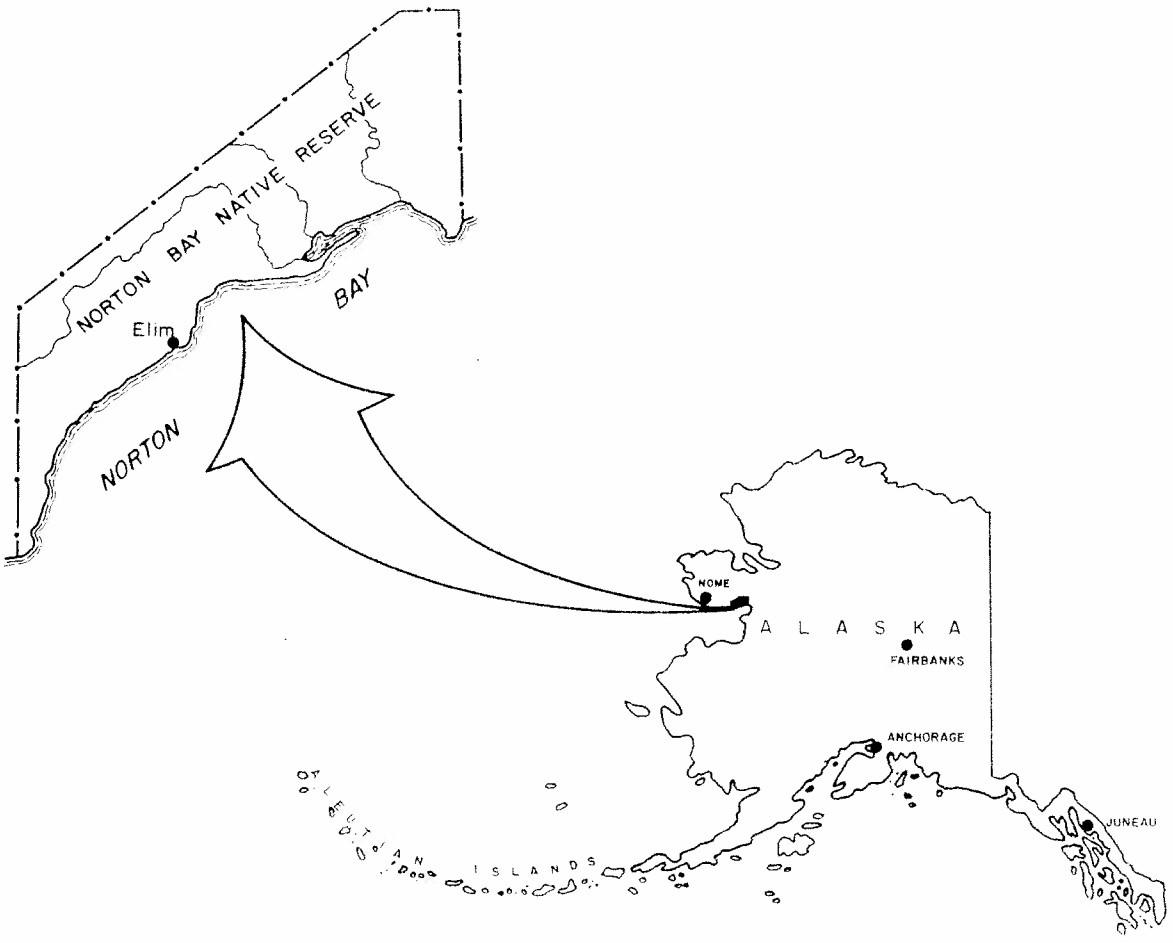
Acting Area Director
Bureau of Indian Affairs
Permittor

Alaska Village Electric Cooperative, Inc.
Permittee

REPORT NO. 231

ELIM ALASKA

ITS RESOURCES AND DEVELOPMENT POTENTIAL



PREPARED BY
THE PLANNING SUPPORT GROUP
BUREAU OF INDIAN AFFAIRS
DEPARTMENT OF THE INTERIOR

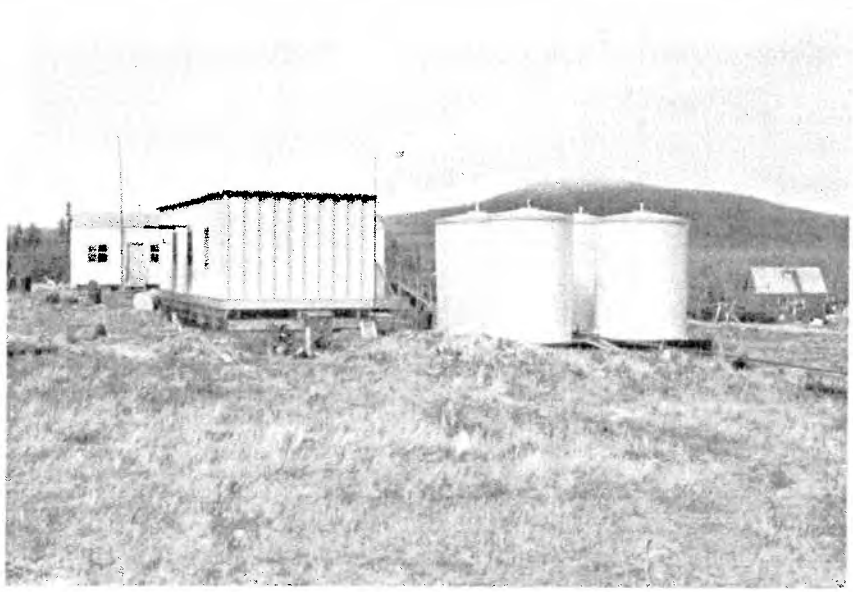
ELECTRICITY

Electricity Source

Elim is one of 48 villages in Alaska that is electrified by the Alaska Village Electric Co-operative, Inc. (A.V.E.C.). A.V.E.C. was organized in 1968 to provide electrical services to small rural villages throughout Alaska and all villages which are members of A.V.E.C. have populations of less than 500 persons. A.V.E.C. borrows their capital funds from the Rural Electrification Administration (R.E.A.) to install the system and therefore must conform to R.E.A.'s regulations. The original installation, additional service hook-up installation, operations and repairs of the electrical system is handled by a contractual agreement between the incorporated village of Elim and A.V.E.C. Because of R.E.A.'s regulations, A.V.E.C. cannot pay over $200 per meter on installation or pay over $260 for the village to operate the system. The village plant operating expenses are paid from local sales. When A.V.E.C. was formed in Alaska, an agreement was made between R.E.A., O.E.O., B.I.A., and the Alaska State Department of Education where operating funds for management and technical staff of A.V.E.C. would be paid by an O.E.O. grant. B.I.A. and the state operated schools agreed to pay the largest share of the operating and loan repayment expenses by purchasing electricity from A.V.E.C. for operation of their schools. In the 48 villages with A.V.E.C. the Alaska State and B.I.A. schools pay an established monthly rate, year-round, regardless of size of school, village, or seasonal consumption.

Electricity is produced in Elim by a diesel engine-driven 50 kilowatt (K.W.) generator with an additional 50 K.W. generator as an alter-

nate or back-up. A.V.E.C. is proposing to replace the two 50 K.W. generators with two 100 K.W. generators since Elim's consumption of electricity has increased. A.V.E.C. periodically sends a service man to Elim to check and repair the diesel engines and the generators. Fuel oil for the diesel engines is hauled into Elim once a year when the Bureau of Indian Affairs' ship, the NORTH STAR III, makes its annual voyage delivering supplies. A relatively large amount of fuel oil is consumed by the diesel engines, as the NORTH STAR III hauled 25,300 gallons to A.V.E.C. at Elim in 1972 and 15,000 gallons in 1973.[1/] This amounts to 733 barrels of fuel oil shipped to Elim in two years for use in generating electricity.



A.V.E.C.'s building for electrical generators and four fuel storage tanks to operate the engine-driven generators.

1/ Bureau of Indian Affairs' NORTH STAR III Trip Reports for Voyages 98 and 100.

July with $15.83 and the highest month was December with $23.96. Converting the average Elim residential FY 1974 bill to kilowatts consumed the average FY 1974 monthly residential household consumed 110.6 K.W. per month. During July the lowest average monthly consumption per household was 80.5 K.W. and the highest consumption was during December with 134.7 K.W. During the winter month of December, the average Elim residential consumer of electricity used 67.3 percent more than during the summer month of July. 1/

Although the average residential Elim electricity consumer was billed $244.08 during fiscal year 1974, for a total village residential consumer bill of $8,908.41, the residential consumer bill was only 24.1 percent of the total A.V.E.C. Elim bill. Non-residential electricity consumers were billed $28,073.29 during fiscal year 1974, which is 75.9 percent of Elim's total electrical bill. 2/ During most of the year there were six non-residential electricity consumers with the Bureau of Indian Affairs School the largest user of electricity. The high non-residential bill for fiscal year 1974 may not be completely indicative of a typical year since the Public Health Service conducted a fairly large construction project building the water-sewer system during this period. Now that the water-sewer project is pumping water through a complete circulator system by an electric motor-driven pump, an additional non-residential consumer is added to the consumptive use of the electrical system.

1/ Calculated from information furnished by the Alaska Village Electric Co-operative Inc. - Anchorage, Alaska - see Appendix Table 9.

2/ Ibid

APPENDIX B

STAKEHOLDER MEETING MINUTES

Meeting Summary

Date: September 24, 2009, 10:00 A.M. to 11:15 A.M.

Re: Elim Property Assessment and Cleanup Plan Stakeholder Meeting

Attendees: Carol Nagaruk, Environmental Coordinator (IGAP) for Native Village of Elim
Edward Kotongan, Mayor, City of Elim
Christine Amaktoolik, City Clerk, City of Elim
Leigh Takak, Watershed Project Assistant, Native Village of Elim
Mark Teitzel, Vice President of Engineering, Alaska Village Electric Cooperative (AVEC)
Deborah Williams, Brownfield Project Manager, Alaska Department of Environmental Conservation (DEC)
Sonja Benson, Brownfield Project Manager, DEC
Michael Rieser, Program Director, SLR
Carl Benson, Project Manager, SLR
Christina Bentz, Field Geologist, SLR

Meeting Opening:

The planning meeting was opened with brief introductions from each of the meeting attendees. Ms. Benson then spoke briefly about the EPA-funded Brownfield, reuse and development, program and how the focus of the Brownfield program is safe for reuse of properties with environmental concerns. Ms. Benson spoke to how the program looks at assessments of sites with potential hazards to human health and the environment, and evaluates options for funding and community resources to achieve cleanup for safe reuse. Ms. Benson added that based on the reconnaissance report from 2001, one sample was collected from outside the fence of the Elim AVEC tank farm and indicated fuel concentrations below cleanup levels, but it would be good to have more assessment at the site. Ms. Benson spoke of the grant funds available for private site assessment through the State Tribal Response Program (STRP) through the EPA and that this would be the mechanism for funding this project. Ms. Benson stated that the team approach was effective and should include all interested parties: the City of Elim, The Native Village Elim, and the Village Corporation. It was pointed out that only the City of Elim and the Village Corporation would be eligible for a cleanup grant if cleanup was necessary. Mr. Teitzel said that AVEC was interested in the land use permit issued by BIA back in 1970 and that the land ownership status was not completely clear to AVEC at this time. Ms. Benson closed her introduction to the project by stating that the objective of this project is to prepare a Property Assessment and Cleanup Plan (PACP) for the safe reuse of the property.

Mr. Teitzel said the site photograph was a good view of the current state of the old AVEC facility, but wanted to know who owned the truck in the tank farm area. Ms. Nagaruk said the truck belonged to the city and was there because it was the safest place to store it when not in use.

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

SLR Project Summary:

Mr. Benson explained SLR's objectives to accomplish the project and the PACP process. The project includes a review of available documentation from ADEC, ownership records for the property, aerial photographs, a site visit, and interviews with key persons involved with the property/project area. Mr. Benson continued and said soil disposal options would be evaluated based on labor and equipment availability, and exposure considerations. Mr. Benson said that the site visit would include inspection of the facility to assess the need for future site characterization work and that the PACP would recommend sampling and assessment required to characterize contamination potentially at the site. The PACP would also summarize local resources, qualified labor and village equipment available for managing contaminated soil if necessary, and would include options available to the Village of Elim for treating the soil and removing the old AVEC infrastructure from the site.

Mr. Rieser continued the introduction of the project by summarizing other information that would be needed to fulfill the project objectives. These include interviews with the tank farm and AVEC generator operator to better understand the past use practices at site. This information would allow a future characterization to be prepared to assess for contaminants specific to those activities which may have involved the use of solvents, lubricating oils, transformers, or fuels. Mr. Rieser added that this PACP won't develop volumes of contaminated soil, but would scope assessment activities based on past practices. Examples of disposal options would be included in the PACP which could include shipping off site or daily use as landfill cover.

Ms. Amaktoolik asked whether the plan would include treatment options for soils contaminated by fuels that leaked below the tanks. Mr. Rieser said a conceptual site model (CSM) would be developed as part of the plan to determine how contaminants could be transported to receptors off site using transport mechanisms specific to the site. Cleanup levels would be developed for contaminants at the site, using the transport mechanisms identified in the CSM, and would be used to identify appropriate cleanup actions. Ms. Amaktoolik asked whether this would include soils outside the fence. Mr. Rieser said yes, but a site characterization involving sampling would have to be performed to quantify this if it exists. Ms. Williams said that to perform a complete assessment, the tanks would have to be removed first and asked whether a community plan existed for this land. Ms. Amaktoolik said a community meeting would have to be held to develop reuse options.

Mr. Rieser said that community resources available for performing the cleanup work would be evaluated in the PACP. Ms. Nagaruk said a 40-hour class and an 8-hour class were being conducted this week in Elim, and that twelve people have Hazmat training now.

Ms. Benson asked if there were currently plans for the property. Ms. Nagaruk said there would be plans because the property is centrally located within the village.

There was a discussion of the history of AVEC in Elim. Mr. Teitzel said the plant was energized in 1971 on requests from community leaders to provide power and locate land on which to build the facility. Ms. Nagaruk said AVEC paid the operators of the tank farm and generator facilities. Mr. Teitzel said the power was paid for by grants, loans, and from payments from utility users. Mr. Teitzel continued by saying in the early 2000s AVEC partnered with the Denali Commission to build new facilities, but not remove the old ones, and now cities and villages have old tanks, but no funds are available to cleanup old community tank farms and generator facilities.

Ms. Benson asked what the planned project schedule would be. Mr. Rieser said the site visit should be conducted as soon as possible, and it was decided the week of October 5 would be a good time for the community. Ms. Nagaruk said that the city would have lodging available during this week and food would be available at the school (breakfast and lunch).

A discussion was started regarding the best key dates for historical aerial photographs representing the improvements at the generator facility. It was decided that a photo depicting the date of system startup (March 1971) and other photos indicating upgrades would be the best. Mr. Teitzel said he could review work orders at AVEC that would indicate the dates of significant upgrades at the power plant through time.

Mr. Rieser asked about transportation for Ms. Bentz during the site visit and Mr. Nagaruk said that it wouldn’t be a problem to arrange for a 4-wheeler to be available during the week of October 5.

Meeting Closing:

Ms. Williams concluded the meeting by thanking the attendees, and requested to SLR prepare the meeting notes. Ms. Williams said that she would start preparation of a list of the meeting attendees for distribution with the minutes.

APPENDIX C

PHOTOGRAPHIC LOG

PHOTOGRAPHIC LOG

Photograph 1:
Vertical ASTs on the east side of the property (photograph taken looking south).

Photograph 2:
Central portion of the property; the floor of the former generator building found can be seen (beneath the arrow) and the white generator building is present on the right (photograph taken looking south).

Photograph 3:
Western portion of the property. Both the white generator building (left) and the CONEX building (right) are visible as is the City of Elim's truck (photograph taken looking south).

Photograph 4:
Piping headers associated with the Old AVEC Tank Farm fuel lines. A total of approximately 178 feet of buried piping is still present extending from the southeast corner of the tank farm.

Photograph 5:
An old generator was present on the site.
No stained soil was observed next to this generator.

Photograph 6:
Drums located on the northeast corner of the Old AVEC Tank Farm.

Photograph 7:
Old electrical boxes. The wood and generator in the foreground will be removed by Mr. Gary Nakarak who owns the former AVEC building.

Photograph 8:
Stressed vegetation was noted in several locations on the site. It was unable to be determined if stressed vegetation is a result of site-related activities or due to runoff at the site.

Photograph 9:
Stained soil southwest of the white generator building; this was the only area where stained soil was observed.

Photograph 10:
Piping and paint and paint thinner cans inside of white generator building.

Photograph 11:
Equipment remaining inside the white generator building.

Photograph 12:
Paint found inside the white generator building.

Photograph 13:
Equipment inside the CONEX building.

Photograph 14:
Old generator base and electrical equipment present inside the CONEX building.

Photograph 15:
Potential soil landfarming area (left half of photograph) at Iron Creek Pit.

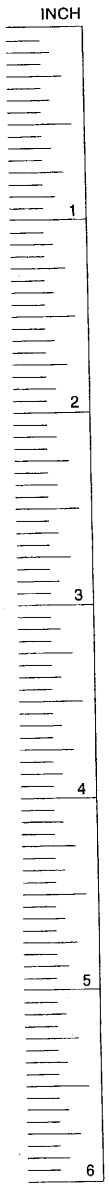
APPENDIX D

FIELD NOTES

Elim Old AVEC Tank Farm

"Rite in the Rain"®
ALL-WEATHER
JOURNAL
No. 391

005.0065.09013



"Rite in the Rain®"
ALL-WEATHER WRITING PAPER

Name SLR International Corp
Christina Bentz

Address 4601 Business Park Blvd., Suite K42, Anchorage, AK 99503

Phone 907-222-1112

Project Elim Old AVEC Tank Farm Property Assessment and Cleanup Plan
005.0065.09013

Clear Vinyl Protective Slipcovers (Item No. 30) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

PAGE	REFERENCE	DATE

2

Tuesday Oct. 6, 2009 C. Bentz

0915 depart office for airport

0945 checked in and waiting for scheduled departure to Nome (1100); review site background information

1140 depart Anchorage via Alaska Airlines; delay due to mechanical issues

1310 arrive in Nome

1330 checked in at Bering Air; waiting for scheduled departure (1500)

1457 depart Nome for Elim

1539 arrive in Elim; meet Carol and Paul Nagaruk (Carol = IGAP Coordinator) go on driving tour of Elim - Carol has lived her whole life in Elim and Paul has lived in Elim for the past 15 years and is a former mayor.

- City water supply is a seep and an dug out area in the creek bed that utilizes pumps; they did not believe the old well (~~1960~~ 1960s for old school) was used
- Elim has barge service all through the summer months; unaware of backhaul program

C. Bentz 10/6/09

3

Oct. 6, 2009 C. Bentz

- drove by site; Carol + Paul indicated that AVEC was accepting bids on the old building - sold to a local home owner who is now responsible for its removal from the site; work to remove the building is in progress; also looked at piping associated with the old AVEC Tank Farm which lies outside the fence; Paul indicated the fence surrounding the tank farm could be beneficially re-used within the community at the courts by the school or at the community playground
- talked about old school tanks which were located where courts are currently - leaked at some point and contaminated soil was removed from the site and taken to aerating area
- two aerating areas exist; 1 - behind the landfill in a cleared area (approximately 2 1/4 miles from town) 2 - at the Iron Creek Pit which is

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4 1/2 to 5 miles from town - the pit is used for active gravel mining and is on corporation land
- landfill uses cover material → not current on cover but lots of turnover at the city recently; they have an ash burner and accept waste (~$100/load)
- Carol indicated that getting tanks out of town is a priority school tanks, city tank, store tanks, and AVEC tanks are all outside of main town area
- Carol stated one of the concerns with the site is proximity to the school
- nearest SW is either Elim Creek or Norton Sound

After driving tour stop briefly at Native Village of Elim offices brief discussion with Robert Keith (president) - he indicated that last year they dug up sewer pipes and buried them deeper in

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the vicinity of Old AVEC Tank Farm - stated he did not believe any soil was removed from east of site but area to the north had contaminated soil

1730 break for dinner / relax before IRA council + city council meeting

1930 at Village office for IRA council and City Council Meeting

2100 depart meeting - see notes on pages 6-

End of day.

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1930 Attend IRA Council / City Council Meeting; attendees included

IRA Council - Robert Keith
Sheldon Robert
Fred Murray
Janelle Murray
Tyler Ivanoff
Charles Saccheus

City Council - Edwin Kotongan
Marlin Paul Sr.
Betty Segock
Christine Amaktoolik
Ida Murray

Discussed Old AVEC Tank Farm and related issues

- Past activity @ site included
  - transformers
  - generators
  - stove oil
  - diesel fuel
  - radiator fluid (glycol)
  - paint - lead based?
- Early days @ AVEC had PCB-containing transformers - on the ground through 1980 - no one

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Knows if they ever leaked

- No use for old AVEC tanks in the community
- New AVEC plant built around 2000
- Talked about building that was auctioned off by AVEC - wondering if there are any concerns
- Community does not want to pay for AVEC Tank Farm-cleanup through higher consumer rates
- Concern for the Corporation - land supposidly reverts to corporation → they don't want to assume ownership due to potential environmental liability
- No liners at first underneath the AVEC tanks; liners may have been installed in the 1980s
- One person had observed overfilling of AVEC tanks - one time
- Potential use for the site:
  1- Housing - they are limited on good land to build plus it is cheaper to build closer to water + sewer currently limited to building east

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2 - Picnic Area for community
3 - 5-Plex for elders w/ community center
- Feed line from AVEC tank farm still present - may encounter contaminated soil during removal although 2009 activities to deepen sewer line - didn't hear anything about contaminated soil encountered
- Community is worried about potential impacts to water supply; study ongoing for possible re-location of surface water supply
- looked @ 1973 photo of Elim AVEC Tank Farm only had 4 tanks located North of Old School Tank Farm
- Historically had 3 to 4 ditches to route water away from town - may be visible in old photos
- Other contaminated sites identified in Elim discussed
  - Old School Tank Farm

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located where courts are now; indicated that it had leaks through time
- New school construction had to remove a lot of cont. soil associated with it
- Old Armory Tanks - encountered cont. soil north of AVEC Tank Farm in 2008 - indicated strong smelling soil
- Old store tank farm had a 10,000 gallon gasoline spill that was reported and cleaned up → this spill is the driving force for Elim to re-locate all tanks outside of main city area → AVEC tank farm is last remaining one. When cleanup of spill occured a bedrock rise was observed between town and the ocean - trapping cont. against it
- noted that some spills have been reported - check DEC database

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0830 Call Carl Benson with update on site visit

0900 Head to Village office - review documents and gather additional information

- barge service through Crowley + Northland
- water/sewer pipes buried along roadways
- community would like to see contaminated sites cleaned up - have been getting locals trained for 40-hr. HAZWOPER and doing annual 8-hr. refresher
- potential future construction plans include -
  - building houses
  - potential 5-plex (elder housing)
  - new water supply
- community getting new loader and 410 - equipment they have is capable of digging frozen ground

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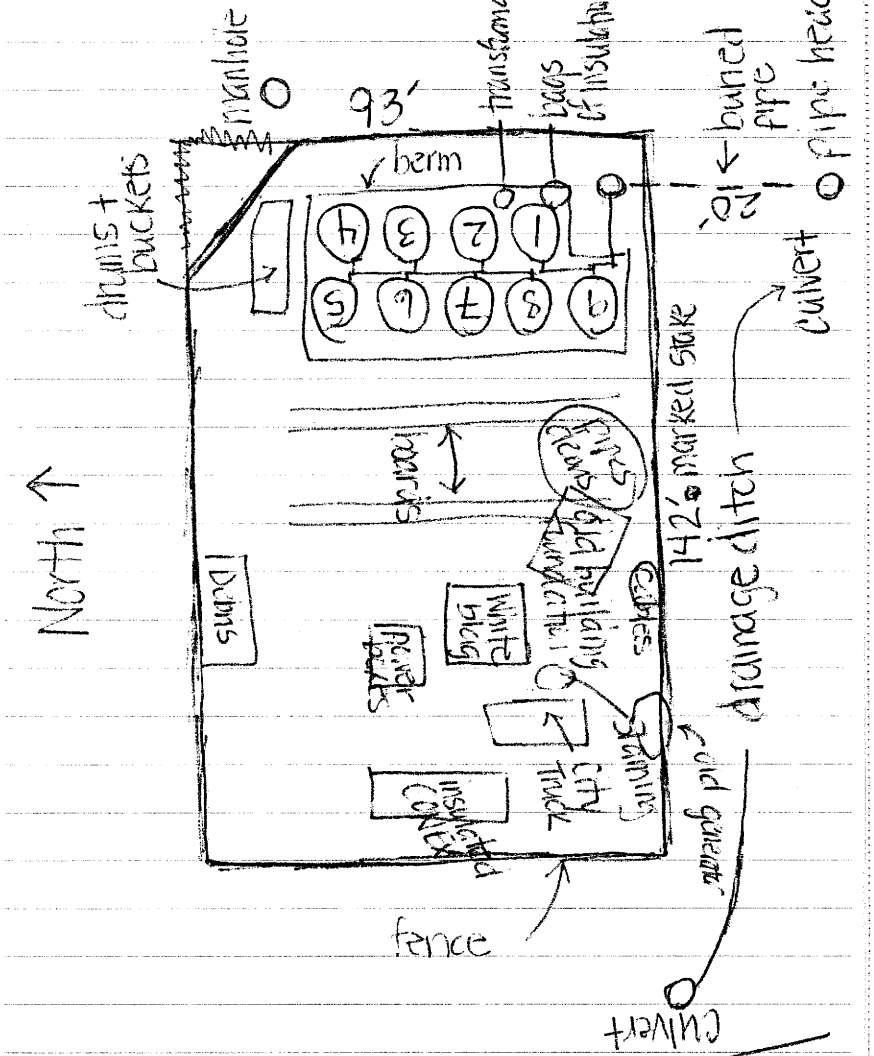
1100 Head to Old AVEC Tank Farm



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from center of pipe headers = 158' to above ground pipes south of site - line is buried

tanks: 1 - #1 Diesel Fuel
Tank #8
12' 11.01"
9,118 gallons

2 - #1 Diesel Fuel
Tank #6
13' 5.38"
8,659 gallons

3 - #1 Diesel Fuel
Tank #4
13' 0.83"
9,184 gallons

4 - #1 Diesel Fuel
Tank #2
13' 0.63"
6,809 gallons

5 - #1 Diesel Fuel
Tank #1
13' 0.63"
8,327 gallons

6 - #1 Diesel Fuel
Tank #3
13' 1.13"
7,565 gallons

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7 - #1 Diesel Fuel
Tank #5
13' 6.63"
9,572 gallons

8 - #1 Diesel Fuel
Tank #7
12' 10.51"
8,293 gallons

9 - 6,690 gallons

Tanks on 2x12 over timbers with liner beneath; sand bags holding liner in place; where visible liner appears in good condition; vegetation growing inside bermed area; liner holds water; tanks appear empty

7 drums on North side of berm on pallets
labels indicate
Diesel #1
Delvac 1300 Super (Main)
Used Antifreeze
Used oil

3 buckets De-Solv-It

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1230 depart Old AVEC Tank Farm → head to village office to write-up photographs & Darla Jemewouk 890-2001

1313 meet ~~Darlene~~ on Corporation board = $5/cubic yard for backfill
no current fee for placing soil in aerating area
Corporation had written letter to AVEC about responsibility to clean it up maybe about a year ago - have never responded
land will belong to corporation, so ultimately corporations decision on future land use - corporation hasn't talked about re-use

1450 talk to Gary Nakarak - new owner of building - still has stuff to move offside → building foundation, debris north of white building, and wood/metal debris near drums

☆ Call AVEC - determine what they want from the site - community thinks they may want CONEX or at least generator in it

1500 go to city office, check out + wait

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Old AVEC Tank Farm Photo Log

100-0001 Soil ~~Air~~ Aerating Area at Iron Creek CB Pit

100-0002 + 100-0003 Same as 100-0001

100-0004 Iron Creek Pit Gravel Mining Area

100-0005 - 100-0011 Elim / Norton Sound Photos

100-0012 - 100-0015 View of property from the North

100-0016 North of site (area where Contaminated soil was discovered in 2008)

100-0017 - 100-0018 drum + debris area just north of tanks

100-0019 - 100-0021 site from the east

100-0022 - east of site

100-0023 - pipe headers

100-0024 above ground piping that connects tank farm to pipe headers

100-0025 - 100-0026 pipe headers

100-0027 View of drainage ditch + South side of property

100-0028 Shows location of courts + new school relative to site

100-0029 visible piping associated with old AVEC tank farm

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Photo Log Cont.'d

100-0030 close up of piping associated w/ AVEC old Tank Farm
100-0031 view in between tanks
100-0032 shows standing water near tank 9 (no sheen visible)
100-0033 - 100-0036 view of property from the south
100-0037 above ground piping and stressed (?) vegetation
100-0038 - 100-0041 drum, bucket, and debris area
100-0042 bags of insulation
100-0043 wood + metal debris on west side of tanks
100-0044 - 100-0045 motor oil/diesel fuel blending system
100-0046 fan in diked area
100-0047 debris ~~east~~ west of tanks CB
100-0048 stained parts of wood
100-0049 old foundation and nuts in property from building removal
100-0050 disturbed soil from building removal
100-0051 white building onsite

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Photo Log Cont.'d

100-0052 - 100-0053 electrical boxes
100-0054 debris area north of white building
100-0055 small patches of soil staining
100-0056 electrical + fencing materials near power pole
100-0057 CONEX (insulated)
100-0058 - 100-0059 vegetation outside CONEX - stressed?
100-0060 - 100-0064 inside CONEX
100-0065 poles on ground
100-0066 - old generator
100-0067 debris
100-0068 - 100-0070 old generator
100-0071 rolls of wires
100-0072 area of stained soil ~~NW~~ CB - east of truck, SW of white building
100-0073 White building
100-0074 - 100-0082 inside white building

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for flight. Scheduled to be here around 1550.

1635 arrive in Nome

1650 Check in at Alaska Airlines flight departs at 2055

2230 arrive in Anchorage

2257 have luggage and car; depart for home. End of day

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APPENDIX E

CITY DRINKING WATER ANALYTICAL RESULTS

Division of Environmental Health

Drinking Water Program

You are here:

Water System

Water System No.:	AK2340345	**Federal Type**	C
Water System Name:	ELIM WATER SUPPLY	**State Type:**	C
Principal County Served:	NOME	**Primary Source:**	SW
Status:	A	**Activity Date:**	1997-01-01 00:00:00.0

Non-Coliform Sample Results

Lab Sample No. :	VO*F0812255-01A	Collection Date	12-16-2008

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

	Alaska Department of Environmental Conservation Contaminated Sites Program				UG/L		Elim Old AVEC Tank Farm APA		MG/L
2991	TOLUENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	1.000000000 MG/L
2992	ETHYLBENZENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.700000000 MG/L
2996	STYRENE	524.2	Y	MRL	0.500000000 UG/L		01-01-2008	12-31-2008	0.100000000 MG/L

Total Number of Records Fetched = 21

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APPENDIX F

CONCEPTUAL SITE MODEL

OLD AVEC TANK FARM
CONCEPTUAL SITE MODEL

This Conceptual Site Model (CSM) was developed to qualitatively assess the ways in which potential human receptors may be exposed to contaminants associated with the Old AVEC Tank Farm site (the Site). This CSM is based on information from the 2001 site visit (BEESC, 2001) and information gathered during the 2009 site visit.

This CSM was prepared in accordance with the Alaska Department of Environmental Conservation (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 scoping form. All cleanup levels referenced in this CSM are DEC Method Two cleanup levels for either the Under-40 Inch Zone or migration to ground water, whichever is less.

1.1 Impacted Media

Impacted media at the Site are the environmental substances to which a contaminant is directly released (DEC, 2005). All media are discussed in the subsequent sections with respect to whether the media are impacted or not.

1.1.1 Surface Soil

Surface soil is defined as the interval from 0 feet to 2 feet below ground surface (bgs) (DEC, 2005). Previous activities at the Site would likely have resulted in impacts in the immediate vicinity of above ground storage tanks (ASTs), drums, and equipment; a release or discharge associated with the activities at this Site would therefore directly affect surface soil. For this CSM, surface soil is considered an impacted medium.

Two samples were collected from the surface soil interval in 2001. The samples were collected from outside the Site boundaries, and results may not be attributable to previous activities at the Site. Field screening using a photoionization detector was performed on one of these samples with a result of 0.8 parts per million (ppm). Both samples were field screened using U.S. Environmental Protection Agency (EPA) Method 9074, which is a turbidometric field testing method for qualitative analysis of total petroleum hydrocarbons (TPH). TPH results ranged from 0 ppm to 330 ppm. Both samples were also submitted to an analytical laboratory for analysis of diesel range organics (DRO); no other analysis was requested. DRO concentrations ranged from non-detect to 212 milligrams per kilogram (mg/kg), which is slightly below the DEC Method Two soil cleanup level of 250 mg/kg (BEESC, 2001).

One area (approximately 3 feet by 4 feet) of stained soil was observed southwest of the white building during the 2009 site visit. No other stained soil was observed.

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 receptors. Previous activities at the Site would likely have resulted in impacts in the immediate vicinity of ASTs, drums, and equipment, and thus surface soil rather than subsurface soil would have been the receiving medium. Thus, for this CSM, subsurface soil is not considered an impacted medium.

One field screening sample was collected from this interval in 2001 (from an offsite location). Field screening via EPA Method 9074 resulted in a value of 0 ppm. No analytical samples have been collected from this interval.

1.1.3 Ground Water

Previous activities at the Site would likely have resulted in impacts in the immediate vicinity of ASTs, drums, and equipment, and thus soil rather than ground water would have been the receiving medium. As such, for this CSM, ground water is not considered an impacted medium, but will be considered as an exposure medium; exposure media are described in further detail in Section 1.2.

One ground water well is registered in the village of Elim. The well was drilled in 1964 at the U.S. Bureau of Indian Affairs school to a depth of 78 feet bgs (screened from 72 to 78 feet bgs). Bedrock was encountered at approximately 8 feet bgs and was frozen to a depth of 29 feet bgs. Water was encountered at a depth of 66 feet bgs. The static water level was observed at 63 feet bgs and a pumping test observed 3 feet of drawdown. Testing of the water in 1964 indicated a high concentration (1,100 ppm) of dissolved solids which exceeds the current regulatory criterion for drinking water of 500 ppm. In addition, both sodium (at 270 ppm) and chloride (at 479 ppm) exceed the regulatory limit of 250 ppm.

1.1.4 Surface Water

Previous activities at the Site would likely have resulted in impacts in the immediate vicinity of ASTs, drums, and equipment, and thus soil rather than surface water would have been the receiving media. As such, for this CSM, surface water is not considered an impacted media, but will be considered as an exposure media.

The nearest surface water body to the Site is Norton Sound, which is located approximately 0.08 miles south of the Site. The area is subject to storm surges which may occur in the fall months when Norton Sound is open and ice free. The rate of coastal flood hazards in Elim is low and no residential units are located within the 100-year flood plain; severe coastal floods were recorded in 1917, 1946, and 1974 (Dorava et. al., 1994). Norton Sound is an inlet of the Bering Sea and although used for subsistence activities, is not anticipated as a drinking water source due to its saltwater nature.

The community drinking water supply is located approximately ¼ mile from the Site. The community drinking water supply consists of an infiltration gallery along Elim Creek, which is upgradient of the Site (Figure 1).

No known surface water samples have been collected from near the Site. The most recent volatile organic compound sample collected on December 16, 2008 from the community

drinking water supply did not contain any analytes at concentrations above laboratory method reporting limits.

1.1.5 Sediment

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

No known sediment samples have been collected from the Site.

1.2 Transport Mechanisms and Exposure Media

Transport mechanisms are the pathways through which contaminants may move from impacted media to other exposure media. Exposure media are the media to which contaminants are released or transported, both of which may result in exposure of human receptors to the contaminants. Six transport mechanisms were identified at the Site including direct release to surface soil, migration or leaching to subsurface soil, 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, ground water, air, surface water, and biota) were identified.

Possible transport mechanisms and exposure media are depicted on the DEC Draft Human Health CSM Diagram included at the end of this CSM (as Appendix F-3).

1.3 Exposure Pathways

Each potential exposure pathway was evaluated using the DEC Draft Human Health CSM Scoping Form. Based on this evaluation, six potentially complete exposure pathways were identified. These pathways include incidental soil ingestion, dermal absorption of contaminants from soil, ingestion of ground water, inhalation of outdoor air, inhalation of indoor air, and ingestion of wild foods. A description of complete and incomplete exposure pathways is provided 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 feet and 15 feet bgs and the property may be used by human receptors.

The dermal absorption of contaminants from soil exposure pathway is potentially complete because polynuclear aromatic hydrocarbons (PAHs) and polychlorinated biphenols (PCBs), which may permeate the skin, may be present at the Site based on historical use information. Collection of soil samples for PAH and PCB analysis would allow for a definitive determination of whether or not this pathway is complete and/or significant.

The ingestion of ground water exposure pathway is considered potentially complete because there is the potential for contaminants to migrate to ground water and use of ground water as a future drinking water source cannot be excluded. Exposure via this pathway is considered to be low because the availability of another drinking water source and the poor quality of ground water limit its potential usage as a future drinking water source. In addition, the depth to water and the presence of permafrost in the area limit the ability of contaminants to migrate to ground water.

The inhalation of outdoor air exposure pathway is considered complete because of the presence of volatile contaminants (DRO) in soil between 0 feet and 15 feet bgs and the potential use of the property by human receptors. This pathway is relevant for receptors near the Site in addition to onsite receptors, since outdoor air is not constrained by Site boundaries.

The inhalation of indoor air exposure pathway is considered potentially complete because of the presence of DRO and the potential presence of additional volatile contaminants in soil (based on historical use information) between 0 feet and 15 feet bgs, and the presence of occupied buildings (both residential and commercial) within 100 feet of the Site. DEC generally does not require an evaluation for vapor intrusion if the only contaminants present at a site are DRO, GRO, and RRO. If no other volatile components are identified at the Site, this pathway may therefore not require further evaluation.

The ingestion of wild foods exposure pathway is considered potentially complete because of the potential presence of contaminants in the top 6 feet of soil, where they are available for uptake, and the proximity of the Site to subsistence hunting and gathering areas. Based on historical site usage, PAHs and PCBs, which have the potential to bioaccumulate, may be present at the Site. Collection of soil samples for PAH and PCB analysis would allow for a definitive determination of whether or not this pathway is complete and/or significant. This pathway is relevant for receptors near the Site in addition to onsite receptors, since animals could accumulate contaminants at the Site and then move offsite to nearby subsistence hunting and gathering areas.

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 CSM Scoping Form. These incomplete pathways are discussed briefly here.

The ingestion of surface water exposure pathway is not considered complete because the community drinking water source is upgradient of the Site. Any transport of contaminants would be to Norton Sound (an inlet of the Bering Sea), which is used for subsistence activities; exposure via subsistence activities is already accounted for in the ingestion of wild foods pathway (discussed in Section 1.3.1).

The dermal exposure to contaminants in ground water and surface water pathways and the inhalation of volatile compounds in household water pathway are not considered to require further evaluation (and are thus considered incomplete) because DEC water quality standards are being applied as cleanup levels at the Site.

The inhalation of fugitive dust exposure pathway is not considered complete because DEC soil ingestion cleanup levels, which are being applied at the Site, are protective of this pathway for all analytes except chromium. Based on historical site use information, chromium is not considered a contaminant of potential concern at the Site.

The direct contact with sediment pathway is not considered complete because DEC soil ingestion cleanup levels, which are being applied at this site, are protective of this pathway. In addition, sediment is not considered an exposure media, and no known activities that result in direct contact with sediment are undertaken at the Site.

1.4 Current and Future Receptors

The AVEC power plant moved in approximately 2000 and the Site has remained unused since that time; the structures, tanks, and other items that remain onsite are located within a fenced area that has a lock. Access to the Site by trespassers, visitors, and recreational users is therefore currently prevented but could occur in the future. Due to the Site's location close to the city offices, school, and residences, and the proposed future reuse objectives for the Site, the following human receptors are considered to be potentially exposed to site contaminants:

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

1.5 References

Alaska Department of Environmental Conservation (DEC), 2005. *Draft Guidance on Developing Conceptual Site Models*. Alaska Department of Environmental Conservation, Division of Spill Prevention and Response. November 30.

Bristol Environmental & Engineering Services Corporation (BEESC), 2001. *Draft Site Reconnaissance Report, Elim, Alaska*, December.

Dorava, Joseph M., Robert P. Ayres, and William C. Sisco, 1994. *Overview of Environmental and Hydrogeologic Conditions at Moses Point*, Alaska, U.S. Geological Survey Open-File Report 94-310.

HDR Alaska, Inc. (HDR), 1999. *City of Elim Solid Waste Permit Application for a Class III Solid Waste Landfill*, September.

Human Health Conceptual Site Model Scoping Form

Site Name: Old AVEC Tank Farm, Elim, Alaska

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: Generators

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:

No further evaluation is necessary since DEC water-quality standards are being applied as cleanup levels.

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:

No further evaluation is necessary since DEC water-quality standards are being applied as cleanup levels.

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:

No further evaluation is necessary because DEC soil ingestion cleanup levels, which are being applied at this Site, are assumed to be protective of this pathway and chromium is not considered a contaminant of concern at this Site.

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:

No further evaluation of this pathway is necessary as there is no known activities that would result in exposure to sediment, nor is sediment an exposure media at this Site.

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: Old AVEC Tank Farm
Elim, Alaska

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

Completed By: SLR International Corp
Date Completed: November 2009

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

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

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

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

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

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

APPENDIX G

COST ESTIMATE SPREADSHEETS

Cost Estimate for FY 2010 Work April 6, 2010 - Interim Removal Action, Old AVEC Tank Farm, Elim, Alaska

	Clerical	Drafting	Environmental Scientist	Project Manager	Project Director	Total		Comments / Backup
1. Direct Labor	$55.00	$90.00	$90.00	$100.00	$130.00	Hours	Cost	
Task 1 - Remedial Work Plan Preparation	6	24	76	16	4	126	$11,450.00	40 hours for plan prep plus one site visit of two 12-hour days (including coordination with Village representatives) and 12 hours travel (round trip)
Task 2 - Debris Removal, Tank Decommissioning		8	138	16	4	166	$15,260.00	Assumes 16 hours for consultant to mobilize for field work and coordinate with certified tank removal subcontractor for decommissioning of 9 AST's and 178' of fuel pipeline, and removal of AST's. Consultant will perform field screening to estimate contamination limits during tank decommissioning, building demolition, and waste removal. Assumes one week (12-hour days) for consultant and laborer's to be on site during tanks and pipe decommissioning (the tank decommissioning subcontractor will be on site approximately 14 days) and tank removal and two 12-hour days for building demolition and disposal of non-hazardous debris on-site. This task includes 12 hours for round trip travel from Anchorage to Elim.
Task 3A - Construction Landfarm area.			24	8	2	34	$3,220.00	Will require one day on site for cell construction (avg. 12-hour days). This time is needed to prep the roughly 52'x52' square area for the landfarm. This task includes 12 hours for round trip travel from Anchorage to Elim. It is assumed all scope items for Task 3A-3D will be performed in a single site visit.
Task 3B - Excavation of Contaminated Soils, Spreading Landfarm Soils			24	4	2	30	$2,820.00	Assumes a 10-yard capacity dump truck. One hour turn time for each 10-yard load from excavation of contaminated soil will be the rate-limiting step. Assumes the trucks will travel for 30 minutes round trip with 15 minutes on each end for loading and dumping. Total 12-hour operating day of hauling and 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 landfarm area and the loader will require one day to spread after initial spreading by trucks is complete.
Task 3C - Backfilling Excavations (100 cubic yards)			24	4	2	30	$2,820.00	Assume one hour turn time for each 10-yard load from backfill source area. One day required to load and haul material to excavation site and compact site in 1-foot lifts. One contingency day added for equipment maintenance.
Task 3D - Tilling and Fertilizing landfarm			72	16	8		$9,120.00	Set up equipment and start tilling and fertilizing process to be performed by local labor and travel time (one way). This task also assumes time to purchase and ship the rototiller, fertilizer spreader, and fertilizer to Elim. Project report for excavation and backfill, and landfarm construction
Task 4 - Landfarm Maintenance 2011		6	48	8	2	64	$5,920.00	Assume one trip for sample collection (one 12 hour day and 12-hours travel time) and 24 hours for environmental scientist to prepare letter interim report. Assumes village labor to do two rounds of tilling and fertilizing
Task 5 - Landfarm Maintenance 2012		6	48	8	2	64	$5,920.00	Assume one trip for sample collection (one 12 hour day and 12-hours travel time) and 24 hours for environmental scientist to prepare letter interim report. Assumes village labor to do two rounds of tilling and fertilizing
Task 6 - Decommission landfarm 2013		4	36	18	4	62	$5,920.00	Will require up to one 12 hour day for cell confirmation sampling, one 12 hou
Task 7 - Reporting	12	24	72	24	8	140	$12,740.00	day for creating landfill cover stockpile and 12 hours of travel Final report of landfarm sampling and decommissioning.
Total Hours	18	72	562	122	38	812		
Labor Cost	$990	$6,480	$50,580	$12,200	$4,940	**Labor Cost Total**	**$75,190**	

Task 1 - Remedial Work Plan Preparation	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Phone/FAX	1	estimate	$50	$50	
Reproduction	1	estimate	$250	$250	
Per Diem	3	estimate	$65	$195	
Lodging	2	estimate	$100	$200	
ATV Rental	2	12-hr days	$75	$150	
ATV Fuel	4	gallons	$10	$40	Assumes 4 gallons per day of ATV use
Consultant RT Airfare, Anchorage to Elim	1	each	$968	$968	Alaska Airlines from Anchorage to Nome, Bering Air from Nome to Elim

Subtotal Task 1 (ODC)	**$1,853**
Subtotal Task 1 (Labor)	**$11,450**
Task 1 - Total Costs	**$13,303**

Cost Estimate for FY 2010 Work April 6, 2010 - Interim Removal Action, Old AVEC Tank Farm, Elim, Alaska

Task 2 - Debris Removal, Tank Decommissioning	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Consultant and Tank Contractors RT Airfare, Anchorage to Elim	4	each	$968	$3,872	Alaska Airlines from Anchorage to Nome, Bering Air from Nome to Elim
ATV Rental	9	12-hr days	$75	$675	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
ATV Fuel	36	gallons	$10	$360	Assumes 4 gallons per day of ATV use
Dump Truck	9	12-hr days	$338	$3,042	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
950 F Loader	11	12-hr days	$450	$4,950	
Equipment Fuel	264	gallons	$10	$2,640	Assumes 3 gallons per hour of equipment use
Equipment Operator #1	132	Hour	$52	$6,882	Assume one week for tank decommissioning and disposal, 2 days for building demolition and disposal of non-hazardous debris, and 2 days for test pitting Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Equipment Operator #2	108	Hour	$52	$5,631	Assume one week for tank decommissioning and disposal, and 2 days for building demolition and disposal of non-hazardous debris. Davis Bacon wag rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #1	108	Hour	$43	$4,692	Assume one week for tank decommissioning and disposal, and 2 days for building demolition and disposal of non-hazardous debris. Davis Bacon wag rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #2	108	Hour	$43	$4,692	Assume one week for tank decommissioning and disposal, and 2 days for building demolition and disposal of non-hazardous debris. Davis Bacon wag rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Debris disposal	16	truckload	$900	$14,400	Assumes Connex, generators, paints, and solvents will be reused and NOT disposed of. Assumes 5 truckloads for the ASTs, 10 truckloads for building debris, and 1 truckload for miscellaneous equipment and debris. Does not account for disposal of drums, that will be characterized in this project task. It is assumed characterization will reveal waste oil and drum contents will be reused in a waste oil burner in Elim.
Drum Sample Analysis - Method 1311 TCLP for SW-846 Method 8260 for Volatiles	8	samples	$265	$2,120	One sample per drum plus one duplicate sample.
Drum Sample Analysis - Method 1311 TCLP for SW-846 Method 8270 for Semi volatiles	8	sample	$305	$2,440	One sample per drum plus one duplicate sample.
Drum Sample Analysis - Method 1311 TCLP for SW-846 Method 6020 for Metals	8	sample	$245	$1,960	One sample per drum plus one duplicate sample.
Soil Sample Analysis - GRO/BTEX AK101/EPA 8021B	18	samples	$85	$1,530	Samples and one duplicate needed to characterize soil under each AST and along fuel pipeline.
Soil Sample Analysis - DRO/RRO AK101/AK102	18	samples	$85	$1,530	Samples and one duplicate needed to characterize soil under each AST and along fuel pipeline.
Soil Sample Analysis - PCBs	9	samples	$85	$765	Confirm of deny presence of contaminant onsite during targeted investigation.
Soil Sample Analysis - RCRA Metals	9	samples	$155	$1,395	Confirm of deny presence of contaminant onsite during targeted investigation.
Soil Sample Analysis - Chlorinated Solvents	9	samples	$185	$1,665	Confirm of deny presence of contaminant onsite during targeted investigation.
Transportation of Consultant Equip/Materials to Elim	1	estimate	$2,000	$2,000	
Lodging	9	man-day	$100	$900	
Meals	9	man-day	$65	$585	Estimated daily cost for food and meals.
PID Rental	9	days	$50	$450	
Tank Decommissioning Contractor	1	each	$35,000	$35,000	Includes general estimate from Rockwell Engineering for decommissioning of 9 ASTS and 178' of fuel pipeline. It is assumed the pipeline will be abandoned in place.
Digital Camera	9	days	$15	$135	
PPE	45	days	$20	$900	

Subtotal Task 2 (ODC)	**$105,211**
Subtotal Task 2 (Labor)	**$15,260**
Task 2 - Total Costs	**$120,471**

Task 3A - Construction Landfarm area.	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Consultant RT Airfare, Anchorage to Elim	1	each	$968	$968	Alaska Airlines from Anchorage to Nome, Bering Air from Nome to Elim
ATV Rental	1	12-hr days	$75	$75	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
ATV Fuel	4	gallons	$10	$40	Assumes 4 gallons per day of ATV use
950 F Loader	1	12-hr days	$450	$450	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
Dump Truck	1	12 -hr days	$338	$338	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
Equipment Fuel	24	gallons	$10	$240	Assumes 3 gallons per hour of equipment use
Operator #1	12	Hour	$52	$626	Assume one day for preparation of landfarm area. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Operator #2	12	Hour	$52	$626	Assume one day for preparation of landfarm area. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #1	12	Hour	$43	$521	Assume one day for preparation of landfarm area. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #2	12	Hour	$43	$521	Assume one day for preparation of landfarm area. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
20-mil HDPE Liner Material	3600	sq ft	$0.35	$1,260	Polar Supply quote 10/12/2009 assumes 52'x52' landfarm area with 4' on each side for the berm.
20-mil HDPE Liner Material cut fee	1	each	$31.50	$32	Polar Supply quote 10/12/2009.
Felt Liner	3364	sq ft	$0.10	$336	Assumes 52'x52' landfarm area with 4' on each side for the berm.
Calgon carbon water treatment unit	1	each	$900	$900	
Water Pump	1	each	$200	$200	
Lodging	1	man-day	$100	$100	
Meals	1	man-day	$65	$65	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	1	days	$15	$15	
PID Rental	1	days	$50	$50	
PPE / Consumables	5	days	$20	$100	Based upon costs of Level D PPE during the effort.

Subtotal Task 3A (ODC)	**$7,762**
Subtotal Task 3A (Labor)	**$3,220**
Task 3A - Total Costs	**$10,982**

Cost Estimate for FY 2010 Work April 6, 2010 - Interim Removal Action, Old AVEC Tank Farm, Elim, Alaska

Task 3B - Excavation of Contaminated Soils, Spreading Landfarm Soils	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Hitachi Excavator	2	12-hr days	$450	$900	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
Dump Truck	2	12-hr days	$338	$676	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
Equipment Fuel	48	gallons	$10	$480	Assumes 3 gallons per hour of equipment use
ATV Rental	2	12-hr days	$75	$150	
ATV Fuel	8	gallons	$10	$80	Assumes 4 gallons per day of ATV use
Equipment Operator #1	24	Hour	$52	$1,251	Assume two days for excavation. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Equipment Operator #2	24	Hour	$52	$1,251	Assume two days for excavation. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #1	24	Hour	$43	$1,043	Assume two days for excavation. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #2	24	Hour	$43	$1,043	Assume two days for excavation. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Soil Sample Analysis (Floor Characterization) - GRO/BTEX AK101/EPA 8021B	7	samples	$85	$595	Needed to characterize excavation floor levels, assumes one excavation planned to be 2500 square feet. This will require six samples (two for first 25(square feet and one additional for next 250). Total samples is 6, plus 1 for QC. Thus, per UST procedures manual, sample requirements will be 7 basec
Soil Sample Analysis (Floor Characterization) - DRO/RRO AK101/AK102	7	sample	$85	$595	As above for excavation floor.
Soil Sample Analysis (Sidewall Characterization) - GRO/BTEX AK101/SW 8021B	9	samples	$85	$765	Sidewall characterization based on one sample per 20 linear feet with 10% QC duplicate frequency.
Soil Sample Analysis (Sidewall Characterization) - DRO/RRO AK101/AK102	9	sample	$85	$765	As above for excavation sidewall.
Soil Sample Analysis (Sidewall and Floor) PAH SIM SW 8270	3	sample	$185	$555	PAH analysis on selected sidewall and floor samples exhibiting highest screening results.
Soil sample analysis (Sidewall and Floor) VOC 8260B	3	sample	$185	$555	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	1	trip blank	$43	$43	Trip blanks for GRO/BTEX analyses.
Soil sample analysis (Sidewall and Floor) VOC Travel Blanks	1	trip blank	$92	$92	Trip blanks for VOC analyses.
Soil Sample Analysis (Landfarm Characterization) - GRO/BTEX	4	samples	$85	$340	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Soil Sample Analysis (Landfarm Characterization) - DRO/RRO	4	sample	$95	$380	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Lodging	2	days	$100	$200	
Meals	2	days	$65	$130	
PPE	10	days	$20	$200	
Digital Camera	3	days	$10	$30	
PID Rental	3	days	$50	$150	
Consultant RT Airfare, Anchorage to Elim	1	each	$968	$968	Alaska Airlines from Anchorage to Nome, Bering Air from Nome to Elim

Subtotal Task 3B (ODC)	**$13,236**
Subtotal Task 3B (Labor)	**$2,820**
Task 3B - Total Costs	**$16,056**

Task 3C - Backfilling Excavations (100 cubic yards)	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Hitachi Excavator	2	12-hr days	$450	$900	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
Dump Truck	2	12-hr days	$338	$676	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
Equipment Fuel	48	gallons	$10	$480	Assumes 3 gallons per hour of equipment use
ATV Rental	2	12-hr days	$75	$150	
ATV Fuel	8	gallons	$10	$80	Assumes 4 gallons per day of ATV use
Equipment Operator #1	24	Hour	$52	$1,251	Assume two days to backfill and compact excavation areas. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Equipment Operator #2	24	Hour	$52	$1,251	Assume two days to backfill and compact excavation areas. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #1	24	Hour	$43	$1,043	Assume two days to backfill and compact excavation areas. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
Laborer #2	24	Hour	$43	$1,043	Assume two days to backfill and compact excavation areas. Davis Bacon wage rates for Group I Operator and Group I Laborer. Rate includes Fringe Costs.
20-mil HDPE Liner Material	2500	sq ft	$0.35	$875	Polar Supply quote 10/12/2009 with 1000 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	2	day	$100	$200	
Meals	2	day	$65	$130	
PPE	10	day	$20	$200	
Digital Camera	5	day	$10	$50	
Backfill gravel for Excavations	100	cubic yards	$1.40	$140	

Subtotal Task 3C (ODC)	**$10,969**
Subtotal Task 3C (Labor)	**$2,820**
Task 3C - Total Costs	**$13,789**

Cost Estimate for FY 2010 Work April 6, 2010 - Interim Removal Action, Old AVEC Tank Farm, Elim, Alaska

Task 3D - Tilling and Fertilizing landfarm	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Rototiller	1	estimate	$3,000	$3,000	
Laborer #1	48	hours	$43	$2,064	Assume one day to spread fertilizer and till soil using local labor. This will be performed twice annually. Also assumes 24 hours annually to dewater th landfarm, performed as needed.
Transportation of Equip/Materials to Elim	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	$200	$200	35 pounds of 8-32-16 fertilizer for approximate 10-12 pounds per 1,000 square feet. Two applications per summer season.
ATV Rental	4	vehicle-day	$75	$300	Vehicle rental for laborer to drive to and from landfill landfarm area.
ATV Fuel	16	gallons	$10	$160	Assumes 4 gallons per day of ATV use
Rototiller Fuel	30	gallons	$10	$300	
Lodging	1	man-day	$100	$100	
Meals	4	man-day	$65	$260	Based upon worker for four days in the field.
PID	1	instr-day	$50	$50	
PPE	4	day	$20	$80	
Digital Camera	1	day	$15	$15	Based upon one Digital Camera
Miscellaneous	1	estimate	$1,000	$1,000	Confirmation sampling: frequency based upon one sample per 50 cubic yards, plus 6 samples for screening.

Subtotal Task 2E (ODC)	**$8,679**
Subtotal Task 2E (Labor)	**$9,120**
Task 2E - Total Costs	**$17,799**

Task 4 - Landfarm Maintenance 2011	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Consultant RT Airfare, Anchorage to Elim	1	each	$968	$968	Alaska Airlines from Anchorage to Nome, Bering Air from Nome to Elim
Laborer #1	48	hours	$43	$2,064	Assume one day to spread fertilizer and till soil using local labor. This will be performed twice annually. Also assumes 24 hours annually to dewater th landfarm, performed as needed.
Transportation of Equip/Materials to Elim	1	estimate	$200	$200	Ship fertilizer and rototiller from Anchorage
Fertilizer	1	estimate	$200	$200	35 pounds of 8-32-16 fertilizer for approximate 10-12 pounds per 1,000 square feet. Two applications per summer season.
ATV	5	vehicle-day	$75	$375	Vehicle rental for laborer to drive to and from landfill landfarm area.
ATV Fuel	20	gallons	$10	$200	Assumes 4 gallons per day of ATV use
Rototiller Fuel	30	gallons	$8	$240	Rototiller fuel
Lodging	1	man-day	$100	$100	
Calgon Carbon Canister	1	each	$450	$450	
Soil Sample Analysis (Landfarm Characterization) - GRO/BTEX	4	samples	$85	$340	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Soil Sample Analysis (Landfarm Characterization) - DRO/RRO	4	sample	$95.00	$380	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Water Sample Analysis (Landfarm Discharge) - DRO/RRO AK101/AK102	6	samples	$85.00	$510	Landfarm water discharge water sample. Assumes two samples and one duplicate sample will be collected two times per year.
Meals	5	man-day	$65	$325	Based upon worker for 5 days in the field.
PID	1	instr-day	$50	$50	
PPE	5	day	$20	$100	
Digital Camera	1	day	$15	$15	Based upon one Digital Camera.
Miscellaneous	1	estimate	$1,000	$1,000	

Subtotal Task 3 (ODC)	**$7,517**
Subtotal Task 3 (Labor)	**$5,920**
Task 3 - Total Costs	**$13,437**

Task 5 - Landfarm Maintenance 2012	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Consultant RT Airfare, Anchorage to Elim	1	each	$968	$968	Alaska Airlines from Anchorage to Nome, Bering Air from Nome to Elim
Laborer #1	48	hours	$43	$2,064	Assume one day to spread fertilizer and till soil using local labor. This will be performed twice annually. Also assumes 24 hours annually to dewater th landfarm, performed as needed.
Transportation of Equip/Materials to Elim	1	estimate	$200	$200	Ship fertilizer and rototiller from Anchorage.
Fertilizer	1	estimate	$200	$200	35 pounds of 8-32-16 fertilizer for approximate 10-12 pounds per 1,000 square feet. Two applications per summer season.
ATV	5	vehicle-day	$75	$375	Vehicle rental for laborer to drive to and from landfill landfarm area.
ATV Fuel	20	gallons	$10	$200	Assumes 4 gallons per day of ATV use
Rototiller Fuel	30	gallons	$8	$240	Rototiller fuel
Lodging	1	man-day	$100	$100	
Calgon Carbon Canister	1	each	$450	$450	
Soil Sample Analysis (Landfarm Characterization) - GRO/BTEX	4	samples	$85	$340	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Soil Sample Analysis (Landfarm Characterization) - DRO/RRO	4	sample	$95.00	$380	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Water Sample Analysis (Landfarm Discharge) - DRO/RRO AK101/AK102	6	samples	$85.00	$510	Landfarm water discharge water sample. Assumes two samples and one duplicate sample will be collected two times per year.
Meals	5	man-day	$65	$325	Based upon worker for 5 days in the field.
PID	1	instr-day	$50	$50	
PPE	5	day	$20	$100	
Digital Camera	1	day	$15	$15	Based upon one Digital Camera.
Miscellaneous	1	estimate	$1,000	$1,000	

Subtotal Task 4 (ODC)	**$7,517**
Subtotal Task 4 (Labor)	**$5,920**
Task 4 - Total Costs	**$13,437**

Cost Estimate for FY 2010 Work April 6, 2010 - Interim Removal Action, Old AVEC Tank Farm, Elim, Alaska

Task 6 - Decommission landfarm 2013	No. of Units	Unit	Cost Per Unit	Subtotal	Comments
Consultant RT Airfare, Anchorage to Elim	1	each	$968	$968	Alaska Airlines from Anchorage to Nome, Bering Air from Nome to Elim
Hitachi Excavator	2	12-hr days	$450	$900	Based on City of Elim Equipment Rates, Effective June 27, 2001. Daily Rate (8 Hours) Plus 4 Hours Prorated Daily Rate
Dump Truck	2	12-hr days	$338	$675	Assumes two days of dump truck time to move soils closer to landfill.
Equipment Fuel	48	gallons	$10	$480	Assumes 3 gallons per hour of equipment use
ATV	2	12-hr days	$75	$150	Vehicle rental for laborer to drive to and from landfill landfarm area.
ATV Fuel	8	gallons	$10	$80	Assumes 4 gallons per day of ATV use
Operator #1	24	hour	$52	1251.36	
Operator #2	24	hour	$52	1251.36	
Laborer	24	hour	$43	$1,043	
Transportation of Equip/Materials to Elim	2	estimate	$200	$400	
Lodging	2	man-day	$100	$200	
Meals	2	man-day	$65	$130	Based upon worker for two days in the field.
PID	2	instr-day	$50	$100	
Digital Camera	2	day	$15	$30	Based upon one Digital Camera.
Soil Sample Analysis (Landfarm Characterization) - GRO/BTEX	4	samples	$85	$340	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
Soil Sample Analysis (Landfarm Characterization) - DRO/RRO	4	sample	$95.00	$380	Four samples, includes one duplicate, for 100 cubic yards (ex situ volume) per Table C of 18 AAC 78.605(b).
PPE	8	days	$20.00	$160	
Phone/FAX	1	estimate	$50	$50	
Reproduction - B&W	1000	each	$0.10	$100	
Reproduction - Color	100	each	$1	$100	

Subtotal Task 5 (ODC)	**$8,788**
Subtotal Task 5 (Labor)	**$5,920**
Task 5 - Total Costs	**$14,708**

Total, Labor	**$75,190**
Total, Other Direct Costs	**$171,532**
10% Contingency	**$24,672**
TOTAL PROJECT COST (Elim Remediation)	***$271,395***

APPENDIX H

HEAVY EQUIPMENT RENTAL RATES

CITY OF ELIM
ELIM, ALASKA 99739
Effective June 27, 2001

Equipment Rental Rates:

Equipment	Hr Rate (Short term) (With fluids w/o fuel	Wet Rate (With Fluids and Fuel)	Wet w/op (With fluids fuel and operator)		
1. Dump Truck	75.00	82.04	107.04	225/day	1,000/week
2. Hitachi ex-200	150.00	157.04	182.04	300/day	1,200/week
3. 950F Loader	150.00	158.44	183.44	300/day	1,200/week
4. 140G	150.00	158.44	183.44	300/day	1,200/week
5. 450JD	75.00	77.81	102.81	225/day	1,000/week
6. 410E	100.00	104.23	129.23	250/day	1,100/week
7. D4	100.00	104.00	127.00	250/day	1,100/week
8. Flat Bed/Geo	50.00	175.00/day			
9. Freight Trailer	25.00/day				

Note:

***1. For Daily and Weekly dry rates renters shall be responsible for operator's wages, maintenance, fueling repair, and replacement of parts while equipment is under their control. (CHAPTER 39, SECTION 3)**
2. Day rate is based on an 8 hour day, then prorated.
3. Weekly rate is based on a 40 hour week, then prorated.
4. Rates are subject to change at any time.
5. Deposit on estimated rental will be required unless credit has been established.
6. City approved operators only or CLD certified.
7. The City reserves the right to refuse to rent equipment.
8. Must use City Equipment Logs and submit figures daily.

APPENDIX I

AERIAL PHOTOGRAPHS

Appendix D – 2018 Site Visit Report

ADEC Site Visit Report

Elim Old AVEC Tank Farm
Hazard ID: 25432
ADEC File No. 600.38.006
October 2018

Lisa Griswold
Environmental Program Specialist
Contaminated Sites Program

Introduction

On September 18, 2018 a site visit was conducted at the Old AVEC Tank Farm located in Elim, AK by Lisa Griswold (ADEC) and Kit Persson (Kawerak, Inc.). Heavy equipment used was generously donated by Sean McKnight with Kawerak, Inc.

Community Description

Elim is an Inupiat Eskimo community located on the northwest shore of Norton Bay on the Seward Peninsula (64.6160, -162.2648; Section 15, Township 10 South, Range 18 West, Kateel River Meridian). It is 460 miles northwest of Anchorage, and 96 miles east of Nome. Elim has a subarctic climate with maritime influences. Norton Sound is ice-free between approximately mid-June to mid-November. The area is characterized by tundra interspersed with boreal forests and weather patterns of shorter warm summers with longer cold winters. It is located within ADEC's under 40 inch precipitation zone.

Site Background

The Old AVEC Tank Farm is located in the city of Elim at the intersection of 2nd street and Main Street (64.616541, -162.263164). The property is owned by the Elim Native Corporation who received the property in 1979 via ANCSA transfer. Prior to ANCSA, the property was owned by the US Bureau of Indian Affairs who issued a permit to AVEC from 1970-2005 to use the property in order to construct facilities; install electrical generation equipment; and install distribution facilities in order to provide electricity to the Village. AVEC operated the power plant with up to nine aboveground diesel storage tanks whose number and configuration changed through time. When the new tank farm was constructed in the early 2000s, the old tank farm was abandoned. Over time, structures on the property were removed, with the tanks being decommissioned and removed in 2012. The property currently sits vacant with a chain link fence around the perimeter. Review of the ADEC spills database yielded no information regarding spills on site.

Previous investigations

2001

In September 2001 a Site Reconnaissance was completed on Elim Tank Farms through ADEC's AST program. Three samples were taken from outside the fence surrounding the AVEC tank farm. One sample was taken from 30 feet north of the northeast corner of the tank farm at 2 feet bgs; the other two samples were taken in a ditch on the east side of the road on the east side of the tank farm (30 feet directly east of the tank farm) at 2 feet bgs, and 4 ft bgs. Only the samples taken at 2 feet bgs were sent to a lab for DRO analysis. The sample from the ditch returned a non-detect result, while the sample from north of the tank farm returned a DRO concentration of 212 mg/Kg (below cleanup level). The report recommended that the soil beneath the tank farm be investigated once the tank farm was decommissioned.

2009

In 2009 the property received a Property Assessment and Cleanup Plan under ADEC's Reuse and Redevelopment program. This report did not include any sample collection. The report notes that there were six areas of potential contamination on the property including:

- Debris pile
- Drum area
- Tank farm area
- Electrical boxes
- One electrical transformer (located within the tank farm)
- Stained soil

The 2009 PACP had the following recommendations:

- Remove the solid waste
- Conduct a targeted surface and subsurface soil investigation
- Excavate the contaminated soil
- Manage the contaminated soil

The 2009 PACP did not recommend an investigation of the groundwater as data indicated the groundwater is located below permafrost and possibly as deep as 66 ft bgs. Additionally the groundwater quality is poor. The community drinking water source is surface water upslope from the site. The potential for suprapermafrost groundwater exposure was indicated to be evaluated based upon findings during a soil investigation.

Contaminants of Potential Concern

Although the site is known to have permafrost, the site is located within the "Under 40 inch" precipitation zone, and the permafrost likely discontinuous. For this reason the below table references ADEC's Under 40 inch Table B1 and Table B2 cleanup levels for the site. Groundwater cleanup levels are not referenced as groundwater is thought to be ~60 ft bgs and will not likely be encountered as part of this effort. If suprapermafrost groundwater is encountered, it will be noted and described in the field notes for further assessment at a later date. Based upon the site use as a diesel tank farm, and the items identified in the 2009 PACP report, the contaminants of potential Concern (COPCs) are:

Analyte	Ingestion (mg/kg)	Inhalation (mg/kg)	ADEC Human Health Cleanup level (mg/kg)	Migration to Groundwater Cleanup level (mg/kg)	Analysis Method
GRO	1400	1400	N/A	300	AK 101
DRO	10250	12500	N/A	250	AK 102
RRO	10000	220000	N/A	11000	AK 103
VOCs	N/A	N/A	See table B1	See table B1	EPA 8260D
PAH	N/A	N/A	See table B1	See table B1	EPA 8270E
PCBs	N/A	N/A	1.0	N/A	EPA 8082A
RCRA Metals	N/A	N/A	See table B1	See table B1	EPA 6020B

Field Interviews

Griswold and Persson interviewed members of the Native Corporation (Office Manager Judy and President John Jemewouk) at their office. The former tank farm property is of great interest to the community for reuse. It is located slightly northwest of the new school and is next to the school playground, west of the Native Corporation office and north and east of homes. There are multiple requests every year to reuse the property, but the Native Corporation will not grant use due to the perceived contamination. They want a thorough evaluation of the site conducted so they can reuse the property.

Site Visit

At 1400, Griswold and Persson visited the site. It was overcast with a temperature of 48 degrees with light rain falling off and on. Griswold and Persson walked the perimeter of the site, and walked the interior of the fenced area. The entire area was overgrown with vegetation in a fall state (i.e. dying, yellow, or brown; see photos 1-2) including willows in most areas disallowing for thorough investigation of areas of stained soil or distressed vegetation. One area was noted in the central area of the property that had no vegetation and appeared stained. The fence is collapsing in the southwest corner (see photo 3). The tank farm footprint is filled with vegetation (see photo 4) surrounded by an approximately 24 inch berm in poor condition (see photos 5-6) made of sandbags set into a dug out area. The most southern portion of the tank farm foot print contained appx. 3 inches of standing water (see photo 8). No sheen on the standing water was noted.

At 1430 Kawerak, Inc. DOT staff arrived with a backhoe. The first task was determined to be how deep the liner was beneath soil to ascertain the difficulty in removing the liner. It was quickly determined that the liner does not actually cover the entire tank farm foot print, but rather was only used to cover the berm made of sand bags. The fabric extends into the tank farm footprint by approximately 18 inches.

Test pit 1 (see photo 7) was dug along the northern edge of the tank farm; test pit 2 was dug in the center of the tank farm; test pit 3 was dug along the southern part of the tank farm, but stayed out of the area covered with standing water; and test pit 4 was dug outside of the tank farm footprint on the western edge.

Test pits 1 and 2 exhibited a strong petroleum odor as the test pits were dug (Samples TF1-TF6). All four test pits were dug to approximately 4 feet deep where large rocks began to be encountered. Three samples were taken from each test pit and labeled with a unique identifier (TF1-12).

Field screening protocol

Soil Samples were screened for petroleum using the heated headspace method with a photoionization detector (PID). This procedure included:

- Filling a re-sealable polyethylene bag one-third to one-half full with the sample to be analyzed.
- Collecting the sample from freshly uncovered soil.
- Sealing the bag quickly.
- Allowing headspace vapors to develop in the container for at least 10 minutes but no longer than one hour in ambient conditions or in a warm area to facilitate the temperatures of the headspace warming to at least 40°F.
- Shaking or agitating the bags for 15 seconds at the beginning and end of the headspace development period to assist volatilization.
- After headspace development, the sample probe was inserted about one-half the headspace depth with minimal opening of the bag.
- After probe insertion, the highest meter reading was recorded.
- All field screening results were recorded in the log book along with location.
- Note: the PID was not calibrated directly before utilization due to issues traveling with isobutylene gas. The PID was calibrated in the office prior to travel.

Samples from test pit 1 and 2 showed elevated PID readings (up to 401 ppm in test pit 1, up to 240 in test pit 2). The PID gave a filter error message while reading TF7, and the filter was replaced to end the error for the remaining samples.

Sample ID	Depth	PID	Notes	Sample ID	Depth	PID	Notes
TF1	12 inches	136	has strong odor	TF7	0 inches	1.7*	no odor
TF2	2 ft	329	has strong odor	TF8	2 ft	3	no odor
TF3	4 ft	401	has strong odor	TF9	4 ft	0.6	no odor
TF4	0 inches	143	has odor	TF10	0 inches	0.5	no odor
TF5	2 ft	36	has odor	TF11	2 ft	1.1	no odor
TF6	4 ft	240	has odor	TF12	4 ft	2.1	no odor

Samples were returned to the test pit location they came from. Due to limited time and dense vegetative cover, the XRF was not utilized for screening.

Updated Conceptual Site Model

The complete pathways for the site include: direct contact with surface soil, dermal absorption of contaminants from soil, ingestion of wild foods, and inhalation of outdoor air. Groundwater is suspected to be at ~60 ft bgs, and the community's water intake is a surface water intake located 1,483 feet northeast of the site (upslope from site). The site is currently surrounded by a 6 ft chain link fence, however it is collapsing in one area, and the gates are kept unlocked and were open at the time of the site visit. Please see Appendix G for more information.

Field QA/QC

As noted in the screening section, the PID was not calibrated in the field. A field notebook was kept to describe all activities. The log book described the following items:

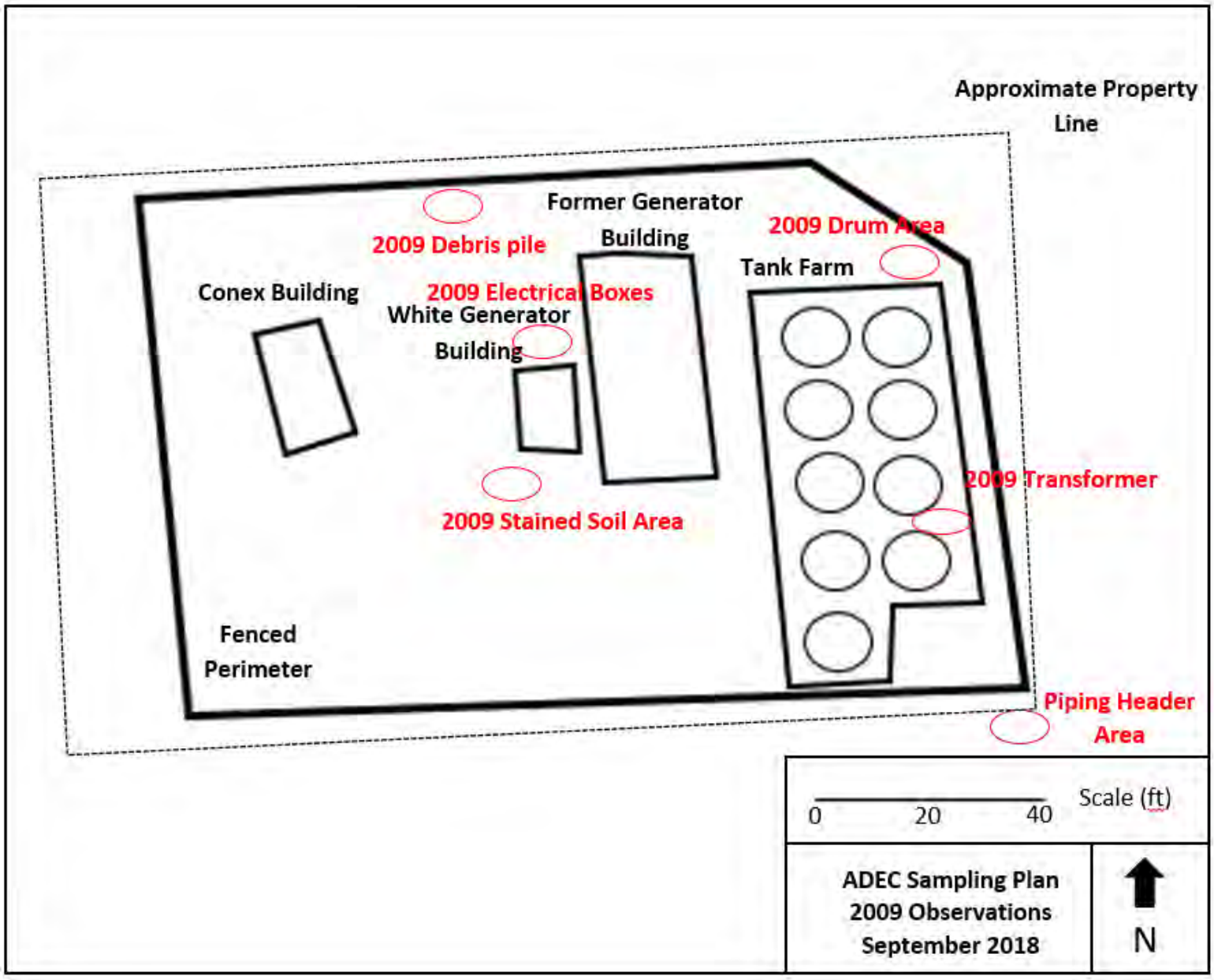
- Date
- Weather
- Site conditions
- Sampling team members
- Site sketches
- Field observations
- Location, unique ID and results of field screening

Please see Appendix H for copies of the log book

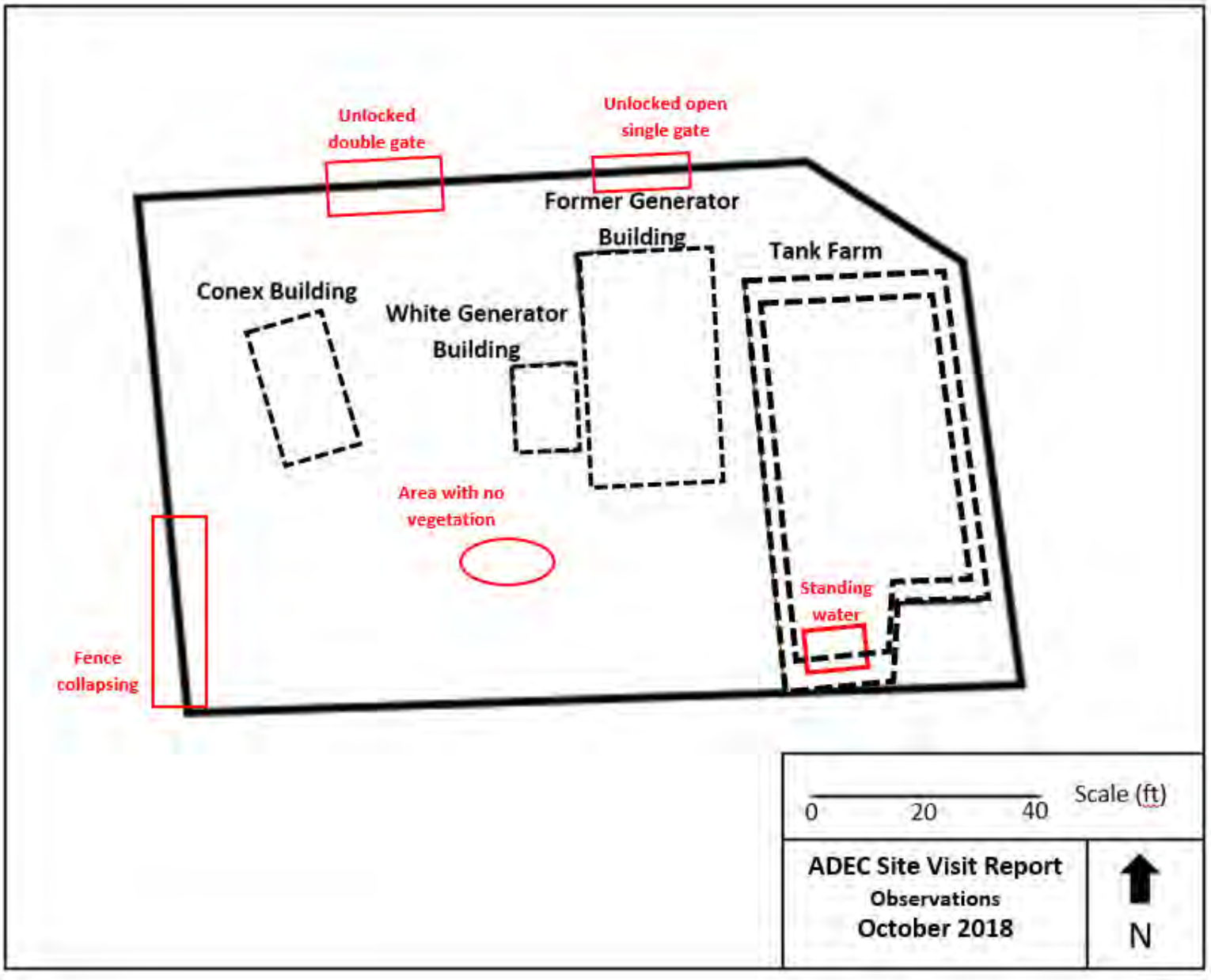
Appendix A: Community Location

Appendix B: Site Location

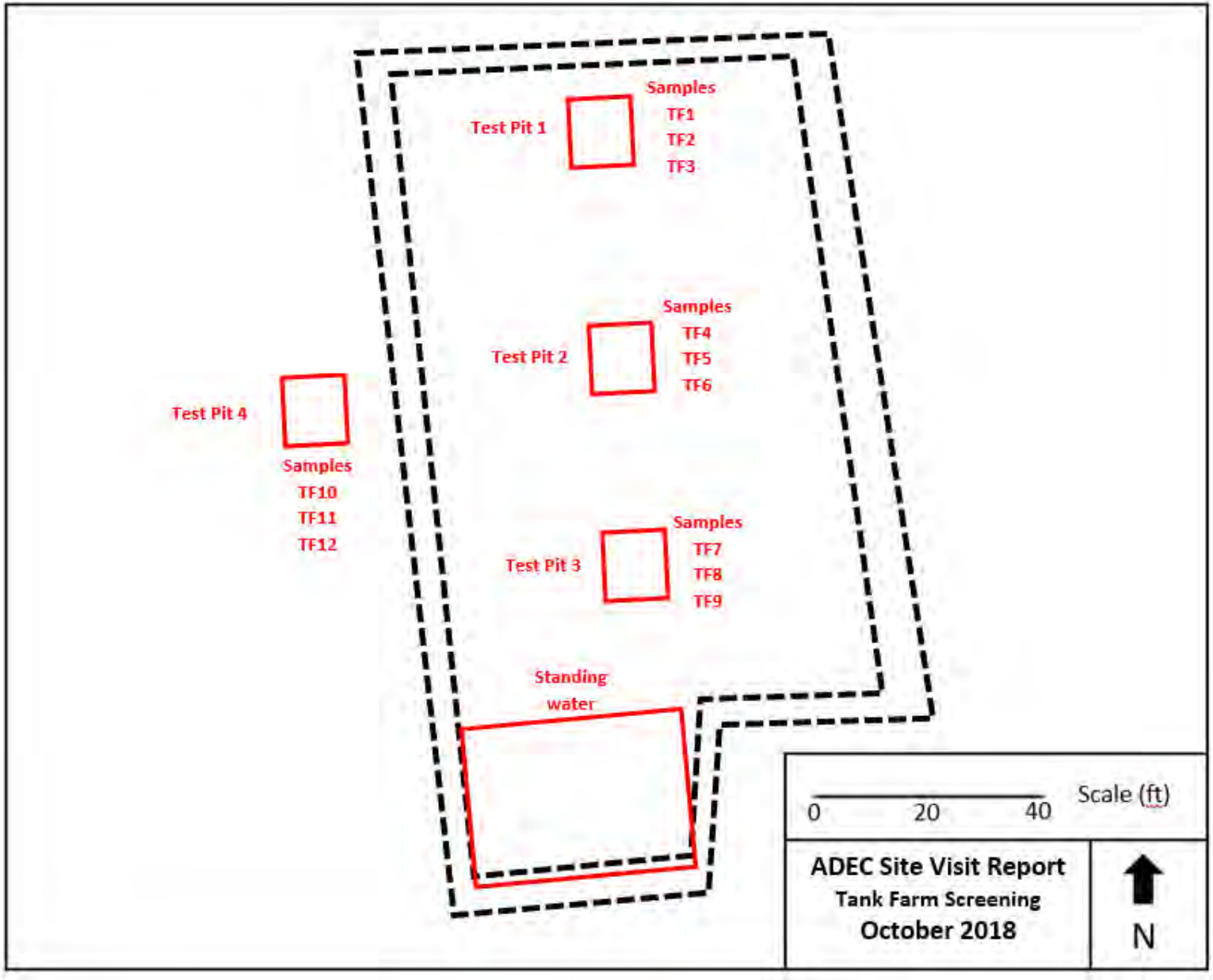
Appendix C: 2009 Observations



Appendix D: 2018 Site Visit



Appendix E: Tank Farm Screening locations



Appendix F: Photographic Log

Photo 1: Overhead view of tank farm from west looking east

Photo 2: Southwest corner of tank farm looking west

Photo 3: southwest fence collapsing into tank farm

Photo 4: vegetation within tank farm footprint

Photo 5: Tank farm berm condition

Photo 6: Tank farm berm condition

Photo 7: Test pit 1 – typical presentation

Photo 8: Standing water in southern portion of tank farm footprint

Print Form

Appendix G - Human Health Conceptual Site Model Scoping Form and Standardized Graphic

Site Name: Elim Old AVEC Tank Farm

File Number: 600.38.006

Completed by: Lisa Griswold

Introduction

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

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

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☒ ASTs
- ☐ Dispensers/fuel loading racks
- ☒ Drums
- ☐ Vehicles
- ☐ Landfills
- ☒ Transformers
- ☒ Other: Debris pile, electrical boxes

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
- ☐ Sediment
- ☒ Groundwater
- ☒ Surface water
- ☒ Biota
- ☐ 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

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

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

Comments:

Contaminants are currently unknown

2. Dermal Absorption of Contaminants from Soil

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

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

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

Comments:

Contaminants are currently unknown

b) Ingestion -

1. Ingestion of Groundwater

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

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

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

Comments:

Contaminants are not expected to be in groundwater. Groundwater is thought to be ~60 ft bgs. However suprapermafrost goundwater may be present.

2. Ingestion of Surface Water

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

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

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

Comments:

Contaminants are not expected in surface water; community water is taken from a surface water intake 1,483 feet northeast of the site.

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

Contaminants at site are unknown.

c) Inhalation-

1. Inhalation of Outdoor Air

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

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

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

Comments:

Contaminants are unknown at site

2. Inhalation of Indoor Air

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

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

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

Comments:

Contaminants are unknown. The parcel is currently vacant, but a building could be built if considered "cleaned up".

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

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

Comments:

Inhalation of Volatile Compounds in Tap Water

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

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

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

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

Comments:

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

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

Comments:

Direct Contact with Sediment

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

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

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

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

Comments:

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

Print Form

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Elim Old AVEC Tank farm

Completed By: Lisa Griswold

Date Completed: 9/4/2018

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/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. Check additional media under (1) if the media acts as a secondary source.*

Media	Transport Mechanisms
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil — check soil ☑ Migration to subsurface — check soil ☑ Migration to groundwater — check groundwater ☑ Volatilization — check air ☑ Runoff or erosion — check surface water ☑ Uptake by plants or animals — check biota ☐ Other (list):
☐ Subsurface Soil (2-15 ft bgs)	☐ Direct release to subsurface soil — check soil ☐ Migration to groundwater — check groundwater ☐ Volatilization — check air ☐ Uptake by plants or animals — check biota ☐ Other (list):
☐ Ground-water	☐ Direct release to groundwater — check groundwater ☐ Volatilization — check air ☐ Flow to surface water body — check surface water ☐ Flow to sediment — check sediment ☐ 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):

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

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

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

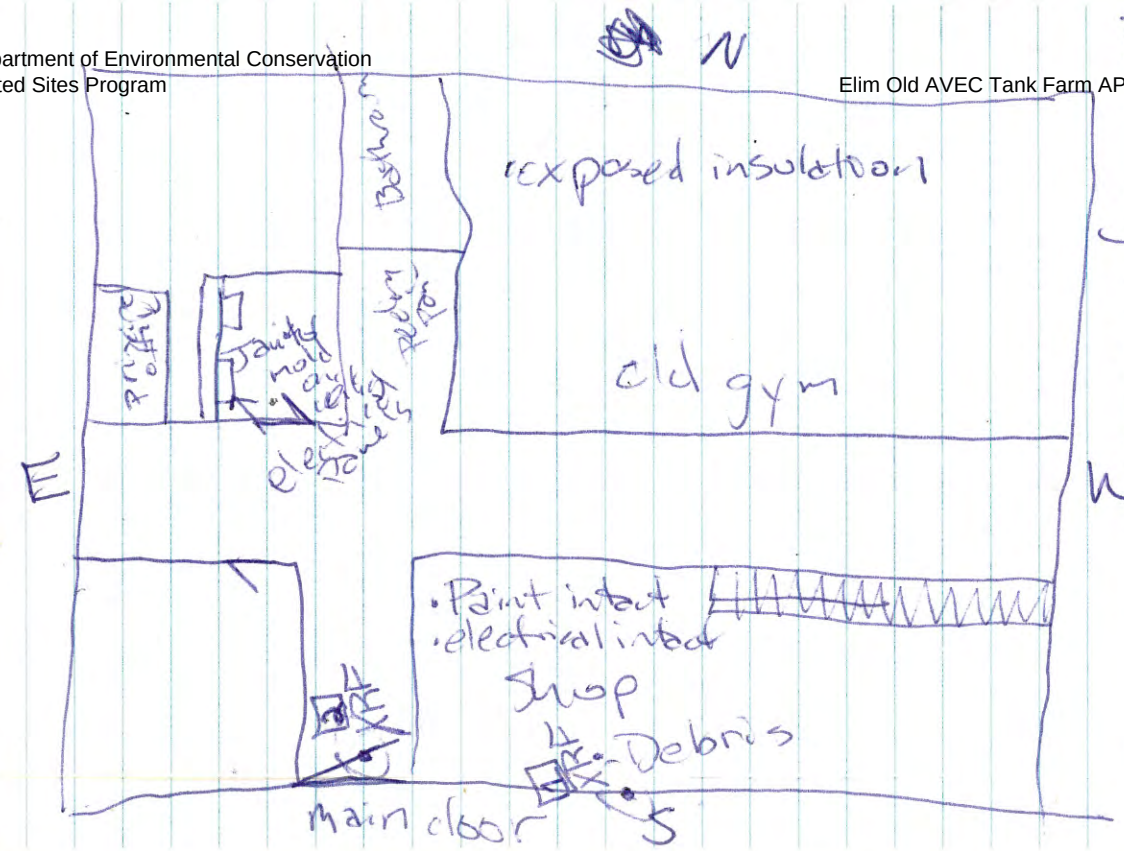
Current & Future Receptors

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

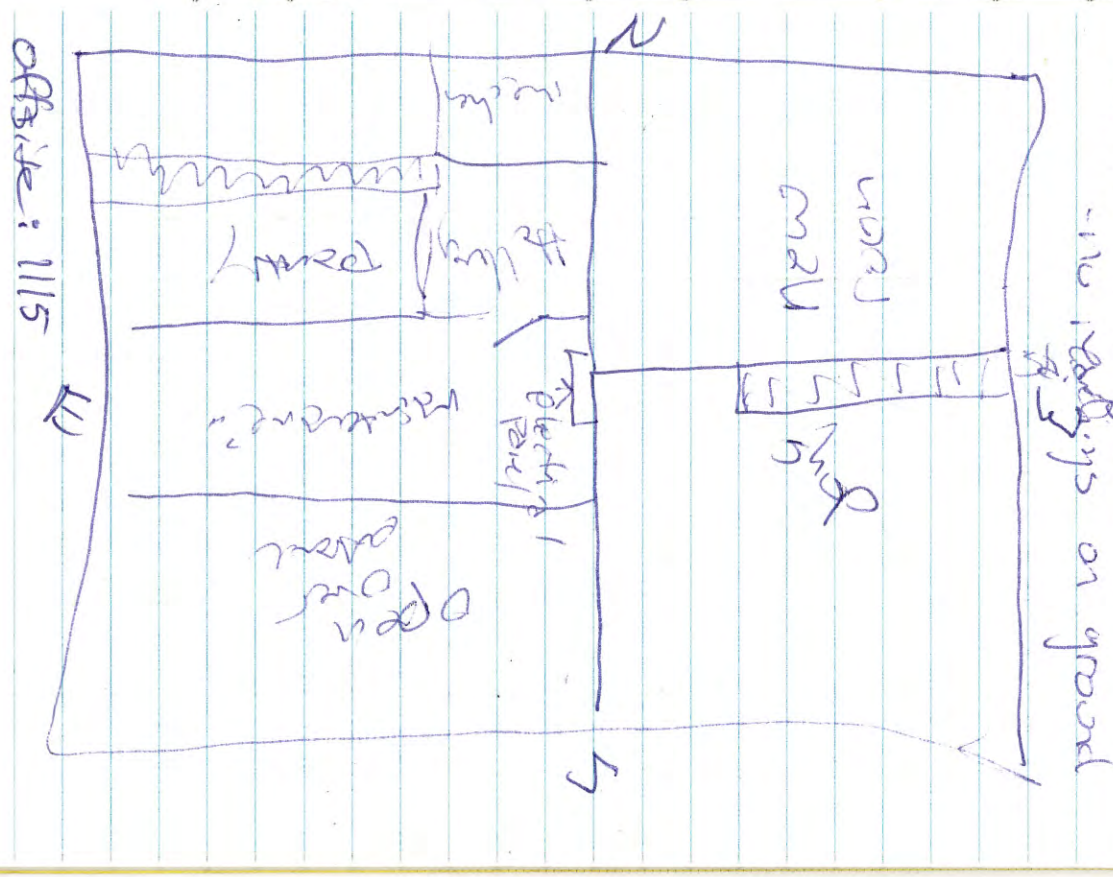
Revised, 10/01/2010

10

1/18/18
0915 Tn elim
1000 High school



11



• Built late 70's early 80's?
- Exterior paint peeling
flaking with ground
- No signs on ground

1120 Native Corp office
- Judy
- John J.

Interview results:
- AVEC TF site - multiple requests to use land → can't due to contamination.
- want to reuse - Prime spot on hill, on bedrock
- want thorough evaluation of site
- next to playground, locally (corner from school
- old school
  - moved from site of current school
  - ran out of grant $ for remodel
  - soil from school TF land spread 3 miles out of town - landspread?

1145 Head towards Moses Point
1200 at Rock quarry
- No soil found - stained stone

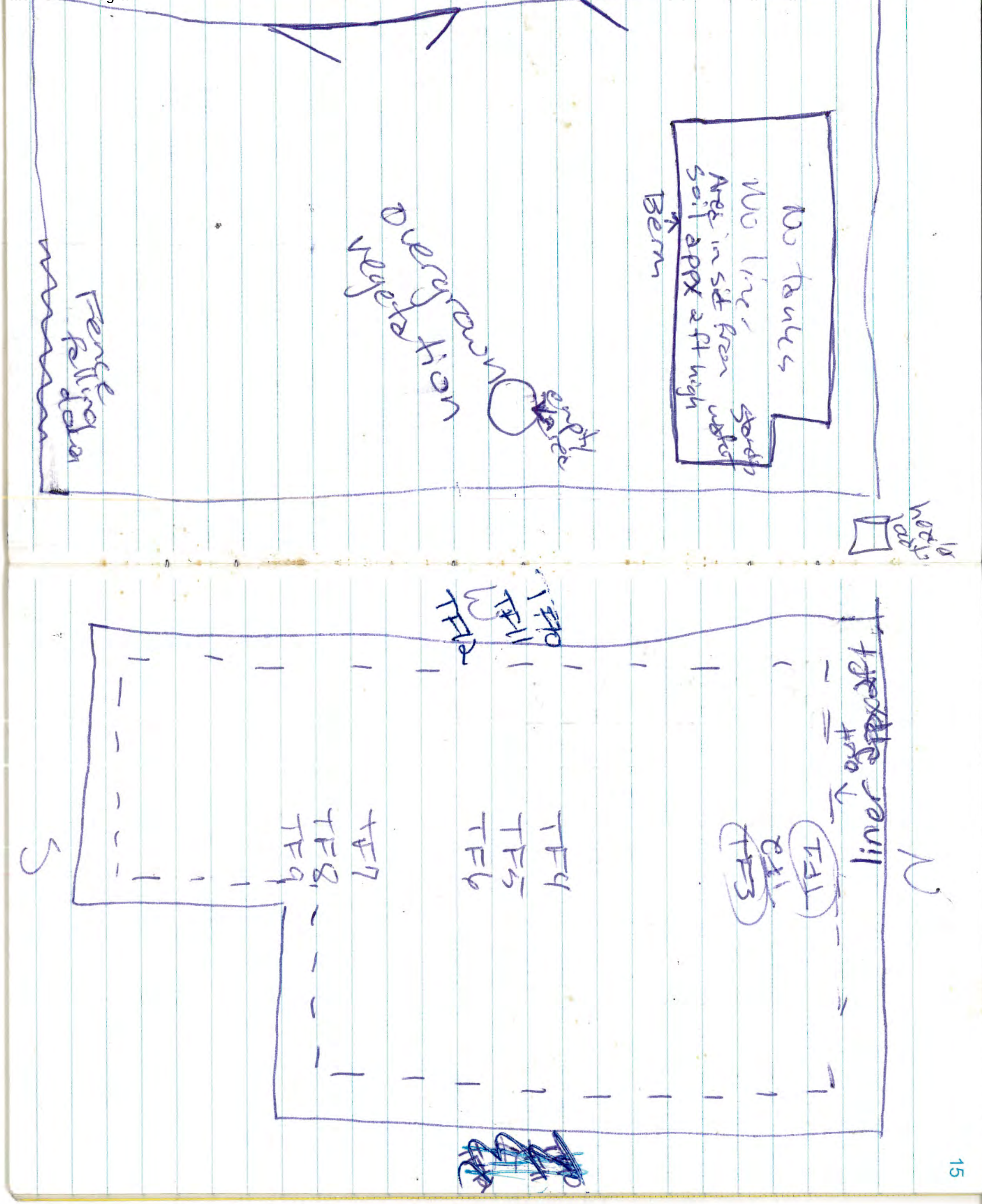
1230 Moses Point
- cleared area → FAA

1400 AVEC TF
- overcast
- 48°
- light rain
- staff
  - Grishwold ADEC - sampling
  - Persson, Kawerak - sampling
  - McKnight, Kawerak - supervisor
  - Sean ", Kawerak - operator

1430 Kawerak arrive w/ Backhoe
- test for liner
- no liner in TF footprint
- Berm liner extends appx 18-24 inches in from berm edge

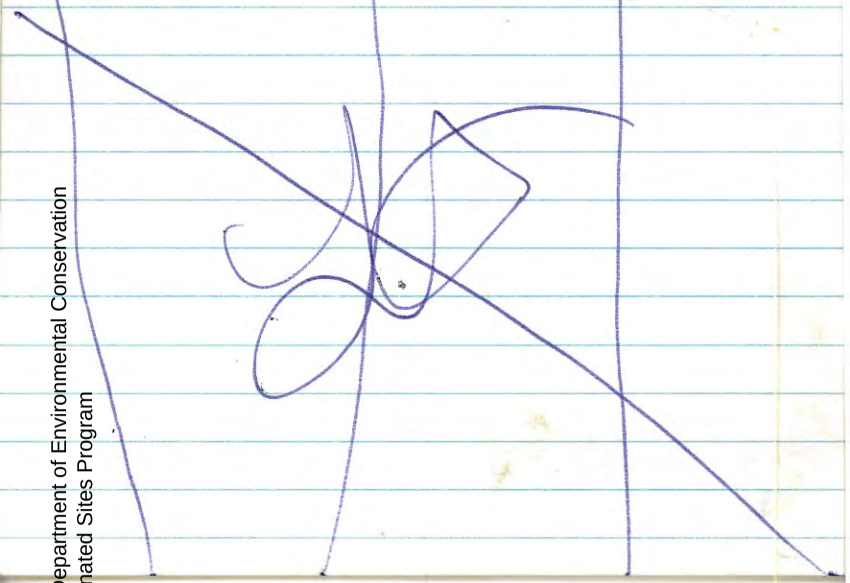
1500 TP1 - N edge of TF
1520 TP2 - center of TF
1530 TP3 - S edge of TF
1540 TP4 - outside TF W side
1600 screen headspace bags chronologically
- dump bags @ respective test pit sites

1640 off site
1650 on plane


14
No tanks
No liner
Berm
Overgrown vegetation
Fence falling down
TF1
TF3
TF4
TF5
TF6
TF7
TF8
TF9
TF10
TF11
TF12
liner
15

1610

Time	Sample ID		Depth	PID
1500	TF1	stinky	12 inch	136 PPM
1510	TF2	stinky	2ft	329
1555	TF3	nonestinky	4ft	401
1527	TF4	stinky	0 inch	143
1524	TF5	stinky	2 ft	36
1532	TF6	stinky	4 ft	240
1534	TF7	"clean"	0 inch	1.7 FAIL
1540	TF8	"clean"	2 ft	3.0
1542	TF9	"clean"	4ft	0.6
544	TF10	"clean"	0 in	0.5
546	TF11	"clean"	2ft	1.1
550	TF12	"clean"	4ft	2.1



Appendix E – XRF Log

Reading No	Time	Type	Duration	Units	Sequence	Flags	SAMPLE	LOCATION
31	6/1/2007 0:02	System Check	53.98	cps	Final			
32	6/1/2007 0:03	System Check	50.83	cps	Final			
33	6/1/2007 0:06	Soil	30.37	ppm	Final		sio2	
34	6/1/2007 0:08	Soil	30.32	ppm	Final		rcra	
35	6/1/2007 0:10	Soil	30.32	ppm	Final		usgs	
36	6/1/2007 0:12	Soil	30.34	ppm	Final		qc standard	
37	6/1/2007 0:15	Soil	0.17	ppm	Final		qc standard	
38	6/1/2007 0:00	Soil	30.8	ppm	Final		met-backg	
39	6/1/2007 0:02	Soil	30.61	ppm	Final		met-01	
40	6/1/2007 0:03	Soil	30.64	ppm	Final		met-02	
41	6/1/2007 0:16	Soil	30.52	ppm	Final		xrf01elim	
42	6/1/2007 0:17	Soil	0.15	ppm	Final		xrf01elim	
43	6/1/2007 0:19	Soil	30.72	ppm	Final		xrf01elim	
44	6/1/2007 0:20	Soil	30.69	ppm	Final		xrf03elim	
45	6/1/2007 0:00	System Check	53.8	cps	Final			
46	6/1/2007 0:02	System Check	53.34	cps	Final			
47	6/1/2007 0:04	Mining	30.71	%	Final		sio2	
48	6/1/2007 0:06	Mining	30.26	%	Final		rcra	
49	6/1/2007 0:07	Mining	30.33	%	Final		usgs	
50	6/1/2007 0:08	Mining	30.62	%	Final		qc standard	

INSPECTOR	COR 1	COR 2	MISC	NOTE	Res	EScale	Shape Time	Mo	Mo Error	Zr
					156.27	7.54	1			
					146.18	7.55	4			
								<LOD	3.63	<LOD
								<LOD	5.15	358.21
								14.38	3.54	283.21
								11.07	4.03	686.17
								<LOD	1038.71	<LOD
								<LOD	5.12	72.16
								<LOD	4.23	47.93
								<LOD	4.53	68.38
								<LOD	4.43	41.58
								<LOD	5709.89	<LOD
								<LOD	4	42.56
								<LOD	3.88	35.75
					159.08	7.54	1			
					144.97	7.55	4			
								<LOD	0.002	<LOD
								<LOD	0.002	0.027
								<LOD	0.002	0.021
								<LOD	0.002	0.053

Zr Error	Sr	Sr Error	U	U Error	Rb	Rb Error	Th	Th Error	Pb	Pb Error	Au
2.71	<LOD	1.85	<LOD	4.38	<LOD	1.89	<LOD	3.54	<LOD	4.48	<LOD
7.41	81.57	3.78	<LOD	7.92	60.14	3.93	16.13	5.82	494.3	20.8	22.32
6.8	149.55	4.92	<LOD	9.96	139.35	5.56	20.88	6.87	816.18	24.1	<LOD
10.05	158.6	5.09	<LOD	9.45	119.61	5.2	23.02	5.17	178.33	11.93	<LOD
456.66	<LOD	264.36	<LOD	830.04	<LOD	245.03	<LOD	256.57	<LOD	308.81	<LOD
6.36	712.44	11.94	<LOD	11.85	134.97	6.32	<LOD	6	24.88	6.51	<LOD
4.78	567.6	9.05	<LOD	9.63	125.88	5.17	<LOD	5.47	42.17	6.52	<LOD
5.39	645.74	9.96	<LOD	10.78	147.85	5.78	<LOD	5.85	65.75	7.91	<LOD
4.33	317.76	7.31	<LOD	9.23	98.17	4.92	<LOD	5.18	<LOD	6.65	<LOD
6399.99	<LOD	425.94	<LOD	1551.46	<LOD	251.03	<LOD	63.89	<LOD	436.14	<LOD
3.41	151.2	4.58	<LOD	6.46	46.95	3.17	<LOD	4.2	9.12	4.09	<LOD
3.23	146.46	4.45	<LOD	7.22	73.67	3.79	<LOD	4.36	10.4	4.13	<LOD
0.002	<LOD	0.002			<LOD	0.002					<LOD
0.001	0.007	0.001			0.005	0.001					<LOD
0.001	0.013	0.001			0.011	0.001					<LOD
0.001	0.014	0.001			0.009	0.001					<LOD

Au Error	Se	Se Error	As	As Error	Hg	Hg Error	Zn	Zn Error	W	W Error
6.08	<LOD	3.52	<LOD	3.56	<LOD	8.56	<LOD	8.22	<LOD	38.37
13.06	505.89	14.22	447.37	20.3	<LOD	11.57	57.34	9.37	<LOD	45.85
9.26	6.13	3.69	72.13	19.21	14.04	7.57	727.72	25.49	<LOD	47.27
7.95	6.99	3.42	26.45	9.69	<LOD	11.14	197.06	14.42	<LOD	48.32
322.82	<LOD	769.55	<LOD	652.31	<LOD	7737.9	<LOD	3118.63	<LOD	59748.76
8.01	<LOD	4.84	<LOD	7.8	<LOD	11.75	15.59	8.09	<LOD	51.95
6.91	<LOD	4.39	<LOD	7.83	<LOD	10.13	33.71	7.84	<LOD	44.18
7.47	<LOD	4.43	11.59	6.43	<LOD	10.67	233.11	15.47	<LOD	48.19
6.49	<LOD	4.1	6.75	3.85	<LOD	10.37	143.61	13.03	<LOD	45.35
492.36	<LOD	1679.32	<LOD	262.7	<LOD	16987.1	<LOD	6431.45	<LOD	130595.66
6.05	<LOD	3.93	7.18	3.56	<LOD	9.57	45.56	8.07	<LOD	43.13
6.26	<LOD	3.88	<LOD	5.15	<LOD	9.08	54.85	8.21	<LOD	39.76
0.002	<LOD	0.002	<LOD	0.002					<LOD	0.006
0.002	0.046	0.001	0.076	0.002					<LOD	0.009
0.002	<LOD	0.002	0.054	0.001					0.044	0.005
0.002	<LOD	0.002	0.012	0.001					0.007	0.004

Cu	Cu Error	Ni	Ni Error	Co	Co Error	Fe	Fe Error	Mn	Mn Error
<LOD	16.24	39.56	20.17	<LOD	29.37	62.83	28.18	71.63	37.68
22.55	13.87	60.77	25.34	137.09	83.54	14675.35	211.47	165.13	53.34
220.16	20.77	120.14	26.75	<LOD	122.74	14385.51	208.76	871.42	75.12
60.78	15.8	90.8	26.5	<LOD	142.59	19647.07	244.91	683.27	70.59
<LOD	15007.57	<LOD	266222.75	<LOD	2391.29	<LOD	7655.74	<LOD	56753.38
26.73	15.82	61.97	28.06	<LOD	107.89	8187.12	182.97	307.32	63.72
28.3	13.44	87.74	24.74	<LOD	143.69	21731.99	249.58	455.42	62.51
37.35	14.88	73.14	26.32	<LOD	187	35292.64	327.79	641.8	71.69
35.52	14.77	<LOD	37.15	<LOD	107.86	10027.82	182.94	300.83	57.38
<LOD	2623.78	<LOD	4673.36	<LOD	1421.65	<LOD	6786.98	<LOD	1103.28
48.08	13.67	55.41	22.54	<LOD	94.45	9673.45	160.27	236.51	49.13
23.46	12.43	63.46	22.12	<LOD	82.38	7686.74	141.21	222.76	47.15
		<LOD	0.003	<LOD	0.002	<LOD	0.005	<LOD	0.008
		<LOD	0.004	<LOD	0.009	1.941	0.024	<LOD	0.01
		<LOD	0.004	<LOD	0.009	1.845	0.023	0.098	0.009
		<LOD	0.004	<LOD	0.01	2.454	0.026	0.066	0.008

Cr	Cr Error	V	V Error	Ti	Ti Error	Sc	Sc Error	Ca	Ca Error	K
<LOD	13.7	<LOD	20.97	<LOD	42.52	<LOD	8.58	<LOD	22.97	91.3
494.25	27.47	127.36	52.43	3896.82	154.53	<LOD	64.86	6846.49	222.12	13275.04
83.34	17.88	122.45	43.04	1764.26	116.82	<LOD	55.39	5198.96	226.43	45392.92
42.84	17.18	76	49.57	3212.8	146.17	<LOD	64	6696.27	242.36	36836.83
48.33	15.16	54.77	32.8	1175.01	89.03	73.71	40.37	8784.57	210.25	15552.79
62.17	19.88	<LOD	68.19	883.7	120.44	<LOD	73.21	8967.04	264.51	23689.64
71.86	21.08	<LOD	66.71	1321.49	122.26	<LOD	63.42	5483.16	221.22	14902.6
64.99	15.96	<LOD	49.13	899.96	91.47	290.65	105.9	56382.14	550.64	18228.72
51.53	16.04	82.26	30.8	879.15	85.23	519.22	133.77	81584.99	686.37	6831.69
52.04	15.32	62.91	27.06	826.1	73.64	311.98	98.19	49668.74	504.41	6926.41
<LOD	0.015	<LOD	0.051	<LOD	0.089					
<LOD	0.019	<LOD	0.057	0.219	0.068					
<LOD	0.016	<LOD	0.056	0.178	0.066					
<LOD	0.015	<LOD	0.056	0.293	0.067					

K Error	S	S Error	Sb	Sb Error	Sn	Sn Error	Cd	Cd Error	Pd	Pd Error	Ag
59.7	<LOD	234.51									
419.81	<LOD	537.03									
741.24	1274.66	448.68									
683.07	<LOD	554.88									
383.67	<LOD	367.26									
567.28	<LOD	614.2									
479.76	<LOD	573.63									
466.42	<LOD	472.19									
334.19	<LOD	549.94									
301.87	<LOD	441.16									
			<LOD	0.002	<LOD	0.002	<LOD	0.002	<LOD	0.002	<LOD
			<LOD	0.002	<LOD	0.002	0.036	0.001	<LOD	0.002	<LOD
			<LOD	0.002	<LOD	0.002	<LOD	0.002	<LOD	0.002	<LOD
			<LOD	0.002	<LOD	0.002	<LOD	0.002	<LOD	0.002	<LOD

Ag Error	Bal	Bal Error	Nb	Nb Error	Bi	Bi Error	Re	Re Error	Ta	Ta Error	Hf
0.002	100	0.001	<LOD	0.002	<LOD	0.002	<LOD	0.002	<LOD	0.003	<LOD
0.031	97.596	0.015	<LOD	0.002	0.005	0.001	<LOD	0.005	<LOD	0.004	0.008
0.002	97.642	0.015	0.003	0.001	0.01	0.001	<LOD	0.006	<LOD	0.005	0.079
0.002	97.059	0.018	0.007	0.001	0.004	0.001	<LOD	0.004	<LOD	0.004	0.02

Hf Error
0.003
0.003
0.005
0.003