Ugashik Traditional Village
Targeted Brownfields Assessment
Draft Report
TDD: 01-07-0008

EPA Contract: 68-S0-01-02

April 30, 2003

EPA Region X

START

Superfund Technical Assessment and Response Team

Weston Solutions, Inc. · 190 Queen Anne Avenue North · Seattle, WA 98109-4926

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April 30, 2003

Joanne LaBaw, Task Monitor
United States Environmental Protection Agency
1200 Sixth Avenue, M/S ECL-115
Seattle, WA 98101

RE: Ugashik Traditional Village Targeted Brownfields Assessment Report
Contract No. 68-S0-01-02
TDD: 01-07-0008
Document Control Number: 12644.001.003.AABS

Dear Ms. LaBaw:

Enclosed please find 2 copies of the revised Ugashik Traditional Village Targeted Brownfields Assessment report for the Ugashik Traditional Village site, located in Ugashik, Alaska.

If you have any questions or comments, please contact me at (206) 521-7638 or by e-mail at sonia.fernandez@westonsolutions.com.

Sincerely,

Weston Solutions, Inc.

Sonia Fernández, P.G.
START Site Leader

Enclosures

cc: Greg Stuesse, Weston, START Project Manager, Seattle, WA (letter only)

UGASHIK TRADITIONAL VILLAGE
TARGETED BROWNFIELDS ASSESSMENT REPORT
UGASHIK, ALASKA

TDD: 01-07-0008

Submitted To:

Joanne LaBaw, Task Monitor
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

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April 30, 2003

Contract No.: 68-S0-01-02
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LIST OF ACRONYMS

Acronym	Definition
ACM	asbestos containing materials
ADEC	Alaska Department of Environmental Conservation
AET	Apparent Effects Threshold
APA	Alaska Packers Association
AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, ethylbenzene, toluene, xylene
CLP	Contract Laboratory Program
CLPAS	Contract Laboratory Program Analytical Service
CSL	cleanup screening levels
DRO	diesel range organics
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
GPS	Global Positioning System
GRO	gasoline range organics
HCID	Hydrocarbon Identification Analyses
IDW	investigation-derived wastes
LAET	Lowest Apparent Effects Threshold
MEL	Manchester Environmental Laboratory
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls

LIST OF ACRONYMS (continued)

Acronym	Definition
pesticides	chlorinated pesticides
PRG	Preliminary Remediation Goal
QA	Quality Assurance
QC	Quality Control
RRO	residual range organics
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
SQAP	Sampling and Quality Assurance Plan
START	Superfund Technical Assessment and Response Team
SVOCs	semivolatile organic compounds
TAL	Target Analyte List
TBA	Targeted Brownfields Assessment
TDD	Technical Direction Document
TM	Task Monitor
TOC	Total Organic Carbon
TPH	total petroleum hydrocarbon
USFWS	United States Department of Fish and Wildlife Service
UTVC	Ugashik Traditional Village Council
VOCs	volatile organic compounds
Weston	Weston Solutions, Inc.

1. INTRODUCTION

SECTION 1

INTRODUCTION

Pursuant to U.S. Environmental Protection Agency (EPA) Superfund Technical Assessment and Response Team (START) Contract No. 68-S0-01-02 and Technical Direction Document (TDD) No. 01-07-0008, Weston Solutions, Inc. (Weston) conducted a Targeted Brownfields Assessment (TBA) at the Ugashik Traditional Village located in Ugashik, Alaska. The site consists of one building located in an abandoned cannery and a nearby former boat repair area. In addition, several buildings located also in the abandoned cannery, several of the village garbage pits, and several groundwater supply wells were also included for study in the TBA.

Brownfields sites are vacant or otherwise under-utilized properties, largely of industrial usage, with known or perceived contamination which precludes the sale and/or redevelopment of the site. EPA's Brownfields Economic Redevelopment Initiative is designed to empower states, cities, tribes, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields.

The building and former boat repair area that comprise the site are owned by the Ugashik Traditional Village Council (UTVC), a non-profit, community-based development organization. The garbage pits and groundwater wells are owned by independent village members or UTVC and the abandoned cannery is owned by a private individual. UTVC is interested in determining whether any potential contamination exists at the site and will use the results of the TBA to assist them in the assessment of future uses of the property. The TBA consisted of limited sampling at potential contaminant source and target areas for site characterization purposes. This document outlines the technical and analytical approaches that were employed by Weston during the TBA fieldwork and characterizes actual contaminants detected.

This document is organized to present study results separately for each area sampled. The following represent the sections of the report and associated topics presented within each section:

- Section 1 contains general information and study methods applicable to all of the areas included for study.
- Section 2 provides background information regarding the site.
- Section 3 provides study results for the areas sampled.
- Section 4 presents a summary and the conclusions of the study findings for all areas studied under the TBA.
- Section 5 lists references used during the investigation.
- Appendix A presents photographs documenting site conditions and the field investigation.
- Appendix B contains the Sample Plan Alteration Forms that document changes to the Sampling and Quality Assurance Plan.

- Appendix C contains a quality assurance/quality control (QA/QC) summary for the TBA and the data validation memoranda for sample analytical results.
- Appendix D presents the complete listing of sample analytical results.

1.1 GENERAL SITE LOCATION AND DESCRIPTION

The Ugashik Traditional Village brownfields site (hereinafter referred to as "the site") is located within Ugashik, Alaska, a small traditional Yupik Eskimo and Aleut village located near the northwest coast of the Alaska Peninsula (Figure 1-1). Ugashik is located on the east bank of the Ugashik River, approximately 10 miles east-southeast of Bristol Bay, 80 miles south of the village of King Salmon, and 440 miles southwest of Anchorage (Figure 1-1).

The site consists of approximately 6 acres of vacant mixed commercial/industrial areas and residential properties. Four areas within the village are the main focus of the TBA (Figure 1-2): the abandoned Alaska Packer's Association (APA) north cannery building, the former boat repair area hereinafter referred to as the upland area, an abandoned ferry (*Winray*) grounded along the Ugashik River's eastern shoreline adjacent to the upland area, and individual garbage pits throughout the village (Figure 1-2).

The terrain of the site and vicinity consists of rolling tundra with areas of thick willow shrubs surrounding the village. Surface water runoff from the site drains west towards the tidally-influenced Ugashik River. Groundwater occurs between 20 to 40 feet below ground surface (bgs) and is the village source for drinking water and other domestic water uses. Nineteen drinking water wells are located on several residential properties throughout the village.

The village population consists of 11 year-round residents and increases to approximately 90 residents during the summer fishing season. Most of Ugashik's residents depend on subsistence hunting and on subsistence and commercial fishing from 11 set net sites along the Ugashik River (ADCRA 1982). The river is a major sockeye (red) salmon spawning and rearing habitat and is one of the main fisheries in the area. King (chinook), coho, chum, and humpback (pink) salmon are also present in the river near Ugashik (ADCRA 1982). The river is also used as habitat by several sensitive species such as the endangered short tailed albatross *(Phoebastria albatrus)*, the threatened steller's eider *(Polysticta stelleri)*, and the northern sea otter *(Enhydra lutris kenyoni)* a candidate species for listing under the Endangered Species Act (ESA; USFWS 2002).

1.2 POTENTIAL FUTURE USES

Redevelopment plans at the site are currently underway. The UTVC started the redevelopment of the north cannery building as a flash-freezer plant and salmon smoker facility for the village fishermen. This building is already being used as storage facility for commercial fishermen in the village. Plans for the boat repair area consist of redeveloping the upland property near the abandoned *Winray* into a passive recreational shoreline community park and picnic area.

In addition to these areas, the UTVC requested the assessment of the garbage pits and water supply wells to determine if the disposed wastes in the pits have contaminated their land and their drinking water source. The UTVC would like to remove the garbage from the individual pits into the proposed central landfill that was planned for construction in 2002.

The information obtained during the TBA regarding environmental impacts in the remaining areas of the cannery and village will be used by UTVC to obtain funds for the cleanup of the cannery and garbage pits and the removal of the *Winray*.

1.3 REGULATORY CRITERIA

The goals of Targeted Brownfields Assessments are to empower states, cities, tribes, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields. In order to interpret analytical results, conservative screening levels and background concentrations are used for comparison. Both the Alaska Department of Environmental Conservation (ADEC) cleanup levels (ADEC 2000) and EPA Region 9 Preliminary Remediation Goals (PRGs; EPA 1999) are used in this TBA as conservative screening levels to assess whether contaminant concentrations at the site and vicinity pose a potential threat to human health under a variety of exposure conditions. The following sections present information (organized by media) regarding the screening levels used to evaluate the site. Soil and groundwater screening levels are presented in Table 1-1.

Since no screening levels for butyltins have been established, only the results will be discussed.

For the majority of samples collected, detection levels for the analytical methods used during this TBA typically met or exceeded the standards used. However, analytical methodology was unable to meet a limited number of the risk-based contaminant concentration levels listed in Table 1-1. Weston will report the lowest concentration level that was detected in the appropriate sections of this report.

1.3.1 Soil

Alaska regulations provide four different methods to determine soil cleanup levels at petroleum-contaminated sites. Method One provides cleanup levels only for petroleum hydrocarbons and involves a table to calculate a matrix score, which is then used to select a cleanup level. Method Two uses two different tables, one for selected individual contaminants and one for petroleum hydrocarbon ranges. Method Three allows for substitution of site-specific data parameters used in the method two equations. Method Four involves the development of risk-based screening levels under ADEC approval. Based on the conditions of the site and the proposed developments, Method Two is most appropriate to determine soil cleanup levels at the site.

Method Two was designed to protect human health from three different potential soil exposure pathways:

- Direct ingestion
- Inhalation of volatile organic compounds (VOCs)
- Migration of contaminants from soil to groundwater and subsequent ingestion of contaminated groundwater

For carcinogenic substances, the Method Two human health risk-based cleanup levels were developed to correspond to an excess lifetime cancer risk of 1-in-100,000 and a hazard quotient of 1 for non-carcinogenic substances. A hazard quotient is the ratio of the exposure point value to the reference dose for the hazardous substance.

Method Two uses two tables: Table B1 for petroleum related chemicals in soil and Table B2 for petroleum hydrocarbons in soil. Both tables are arranged in three categories: the artic zone, the under 40-inch zone, and the over 40-inch zone; and by pathways within each category. Based on the total mean annual precipitation for the site (approximately 66 inches [WRCC 2002]), the site is categorized in the over 40-inch zone applying to those sites receiving more than 40-inches of mean annual total precipitation. Table 1-1 presents soil cleanup levels for ingestion, inhalation, and migration from soil to groundwater pathways in the over 40-inch zone category. The most conservative levels from the three pathways (typically the migration from soil to groundwater pathway) were selected as the site screening levels. Soil metal results will also be compared to background metal concentrations established from a background sample collected from the site vicinity.

1.3.2 Groundwater

For groundwater, two ADEC rules may be applied to develop groundwater cleanup levels at a site with groundwater contamination (18 AAC 75.350): Table C cleanup levels and the 10X rule. In Alaska, contaminated groundwater must meet the Table C cleanup levels if the current or reasonably expected future groundwater use is as a drinking water source. If ADEC determines that under 18 AAC 75.350 groundwater is not a current or reasonably expected future drinking water source, a cleanup level equal to 10 times Table C levels may be used for a site (i.e., 10X rule). In Ugashik, since groundwater is currently used as a drinking water source, Table C cleanup levels are most appropriate for use.

1.3.3 Sediments

Alaska regulations do not provide guidelines for selecting cleanup levels for contaminated sediments. Therefore, Washington State Sediment Management Standards (SMS) Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSL) were used as guidelines for sediment samples collected at the site. The SQS are long-term cleanup goals that correspond to sediment quality that will not result in adverse effects to biological resources for samples with total organic carbon (TOC) concentrations between 0.5 to 4 percent. The CSL are less stringent standards that correspond to minor adverse effects to biological resources and are typically used to determine if remediation is required in a specific area. The SMS include TOC normalized

criteria for non-ionic/non-polar organic compounds that are effective at predicting adverse effects in sediments with TOC content greater than 0.5 percent (Michelsen 1997).

In cases where high TOC (greater than three to four percent) may be due to some anthropogenic contribution (e.g., oils or wood debris), TOC normalization may not be appropriate. In these cases, samples with TOC concentrations outside the range from 0.5-4 percent can be compared to the Washington State Apparent Effects Threshold values (AET; EPA 1988). The AET is defined as the concentration of a given chemical above which a significant biological effect (i.e., mortality) is always expected to occur. Therefore, AET values define the upper boundary of a chemical concentration that may be tolerated by an organism. The Lowest AET (LAET) is used as the equivalent of the SQS corresponding to sediment quality that will not result in adverse effects to biological resources for samples with TOC concentrations outside the 0.5-4 percent range. The second Lowest AET (2LAET) is used in place of the CSL and correspond to minor adverse effects to biological resources for samples with TOC concentrations outside the 0.5-4 percent range (Table 1-2).

TOC normalization was not conducted for this assessment since the preparation of a transport model was not anticipated. Since TOC analyses were not conducted in the sediment samples collected around the *Winray*, and the LAET are equally stringent as the SQS, they were used for comparison purposes during the TBA. A summary of the Washington State Sediment Quality guidelines is presented in Table 1-2.

1.3.4 Asbestos

Asbestos containing materials (ACM) are defined as any material containing more than 1 percent of total asbestos (EPA 2002). EPA has not established a reference concentration or a reference dose for asbestos; however, EPA has classified it as a Group A human carcinogen based primarily on inhalation studies (EPA 2002). EPA has calculated an inhalation unit risk of 2.3×10^{-1} fibers per milliliter (fibers/mL) and a cancer risk level of 1-in-1,000,000 excess lifetime risk equal to four fibers/mL. The Occupational Safety and Health Administration provides a permissible occupational exposure limit of 0.2 fiber per cubic centimeter (fibers/cm$^{3)}$ for fibers less than five micrometers(µm) for a normal eight hour workday, 40 hour workweek. The most conservative regulatory advisory level is provided by the National Institute of Occupational Safety and Health, which recommends an exposure limit of 0.1 fiber/cm^3 for fibers less than 5 µm. Analytical results indicating the presence of asbestos in the samples collected from the north and the main cannery buildings can be used for future risk evaluations at the site.

1.3.5 Region 9 PRGs

Where a soil screening value for a substance was not available in Alaska regulations (Method Two or Table C), the most recent Region 9 PRG was selected as the soil screening level. EPA Region 9 PRGs are risk-based levels that are useful as screening values to determine whether levels of contaminants pose a potential threat to human health. PRGs are based on an excess lifetime cancer risk of 1-in-1,000,000 for carcinogens and a hazard quotient of 1 for non-carcinogens. Soil PRGs are available for residential exposure scenarios (including children) and industrial exposure scenarios (adults only); the residential values will be used for screening at the Ugashik TBA. Tap water PRGs can be used for comparison to groundwater, assuming the

groundwater is used for domestic purposes in a residential exposure setting (i.e., drinking, washing clothes and dishes, bathing, etc.).

1.4 ANALYTICAL PROTOCOL AND SAMPLING METHODS

Field sampling for this TBA was conducted from September 24 to October 3, 2002. Sampling and analysis were conducted in accordance with the EPA-approved Sampling and Quality Assurance Plan (SQAP; Weston 2002). A total of 71 samples were collected during the sampling event consisting of 28 surface soil samples, 18 subsurface soil samples, four surface sediment samples, six groundwater samples, three asbestos samples, one investigation derived waste (IDW) sample and 11 quality assurance/quality control (QA/QC) samples.

Sample locations are presented in Figures 1-3 to 1-5. A summary of sample locations and analyses is provided in Table 1-3.

1.4.1 Sample Analysis

All sediment and surface and subsurface soil samples were submitted for off-site fixed laboratory analysis for total petroleum hydrocarbons (TPH) hydrocarbon identification analyses (HCID; Ecology Method NWTPH-HCID) and semivolatile organic compounds (SVOCs; Contract Laboratory Program Analytical Service [CLPAS] OLM04.2 and/or EPA SW-846 Method 8270). Based on the results of the NWTPH-HCID analyses, all samples were analyzed for the range of hydrocarbons identified using Alaska State methods for gasoline/benzene-ethylbenzene-toluene-xylene, diesel, and/or residual range organics (GRO-ADEC AK-101/BTEX, DRO-ADEC AK-102, and RRO-ADEC AK-103, respectively). In addition to these analyses, samples from selected areas were also submitted for:

- Butyltins (EPA Manchester Environmental Laboratory [MEL] methods)
- Target Analyte List (TAL) metals (Contract Laboratory Program Analytical Service [CLPAS] ILM04.1)
- Pesticides/polychlorinated biphenyls (pest/PCBs; CLPAS OLM04.2 as presented below)

Groundwater samples were analyzed for TPH and hydrocarbon identification (Ecology Method NWTPH-HCID), SVOC (CLPAS OLM04.2 and/or EPA SW-846 Method 8270), volatile organic compounds (VOC; CLPAS OLC03.2), polycyclic aromatic hydrocarbons (PAH [EPA SW-846 Method 8270/SIM]), and pesticides/PCB (CLPAS OLC03.2 and/or EPA SW-846 Methods 8081/8082). Based on the results of the NWTPH-HCID analyses, samples were also analyzed for the range of hydrocarbons identified using Alaska methods for gasoline, diesel, or residual range organics (GRO-ADEC AK-101/BTEX, DRO-ADEC AK-102, and RRO-ADEC AK-103, respectively).

Microvacuum (Microvac) dust samples from the north cannery building were submitted for asbestos analyses using methods ASTM D-5755-95. One bulk asbestos sample was collected from the main cannery building and was submitted for asbestos analyses by method EPA 600/R-93/116 or EPA 540/2-90/005.

1.4.2 Sampling Methodologies

Surface soil (0 to 6 inches bgs) and subsurface soil samples were collected using a decontaminated trowel (surface soil) or hand auger (subsurface soil) and dedicated stainless steel bowls and spoons. Collected material was placed in the decontaminated stainless steel bowls, homogenized thoroughly, and placed into pre-cleaned, pre-labeled sample containers.

To minimize disturbance of the sample and potential volatilization of the volatile fraction of the contaminants, samples for VOCs and Alaska GRO analyses were collected prior to homogenization using a dedicated plastic medical syringe modified to allow its use for sample collection. The syringe and a field scale were used to obtain approximately 40 grams of material (as specified by the analysis). After collection, the sample was transferred directly from the syringe into the appropriate pre-cleaned, pre-weighed sample containers. For GRO samples, the soil was placed in a laboratory- provided pre-weighed container and a pre-measured amount of preservative (also provided by the laboratory) was added to the sample. Samples were transferred to an iced cooler for temporary storage prior to shipment to the analytical laboratory.

Sediment samples (0 to 10 cm bgs) were collected using a decontaminated stainless steel spoon. The samples were placed into a decontaminated stainless steel bowl, homogenized thoroughly, placed into pre-cleaned, pre-labeled sample containers, and transferred to an iced cooler for temporary storage prior to shipment to the analytical laboratory.

Domestic water supply well samples were collected from spigots located closest to the wellhead and prior to any treatment. Water from the spigots was allowed to flow freely for 20 minutes prior to sample collection. On occasion, a garden hose was used to discharge the water out of the home or well housing and for sample collection.

The microvacuum asbestos dust samples were collected using a high flow vacuum pump dedicated polyethylene tubing, and a sealed and dedicated microvacuum sample cassette. The vacuum pump was calibrated to a flow of 2 liters/minute as per the American Society for Testing and Materials ASTM method D-5755-95. The cassette and the tubing were connected to the pump and the dust particles from a 100 square centimeter surface were vacuumed for a minimum of two minutes and two passes of the cassette assembly over the entire surface. The sample collection and handling was conducted in accordance with the ASTM standard and the site-specific SQAP.

The bulk asbestos sample was collected by cutting a square of the insulation layers approximately three square inches in size with a razor knife. After collection, the sample was placed inside a pre-labeled and re-sealable plastic bag, was double bagged, and stored in a cooler prior to transportation to the analytical laboratory.

A outlined in the site-specific SQAP, a global positioning system (GPS) coordinate was documented in field forms and logged in the GPS unit at every sample location. Field sample location coordinates are presented in Appendix B.

Table 1-1—Screening Levels for Soil and Groundwater Analyses
Ugashik Traditional Village Targeted Brownfields Assessment
Ugashik, Alaska

Analyte	Groundwater				Soils				
					ADEC Method Two Cleanup Levels (Over 40 inch Zone)				
	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
VOCs									
Acetone	3650	36500	610	**3650**	8300		9	1600	**9**
Benzene	5	50	0.35	**5**	230	6.4	0.02	0.65	**0.02**
Bromodichloromethane	100	1000	0.18	**100**	110		0.3	1.0	**0.3**
Bromoform	100	1000	8.5	**100**	860	370	0.34	62	**0.34**
Bromomethane			8.7	**8.7**				3.9	**3.9**
Carbon disulfide	3650	36500	1000	**3650**	8300	453	16	360	**16**
Carbon tetrachloride	5	50	0.17	**5**	52	2.6	0.03	0.24	**0.03**
Chlorobenzene	100	1000	110	**100**	1700	81	0.5	150	**0.5**
Chloroethane (ethyl chloride)			4.6	**4.6**				3	**3**
Chloroform	100	1000	0.16	**100**	830	2.4	0.3	0.24	**0.3**
Chloromethane			1.5	**1.5**				1.2	**1.2**
Cumene (isopropylbenzene)	3650	36500	660	**3650**	8300	450	200	160	**200**
Cyclohexane			35000	**35000**				140	**140**
Dibromo-3-chloropropane;1,2-			0.048	**0.048**				0.45	**0.45**
Dibromochloromethane			0.13	**0.13**				1.1	**1.1**
Dibromoethane;1,2-	0.05	0.5	0.00076	**0.05**	0.08	1	0.00014	0.0069	**0.00014**
Dichlorobenzene;1,2-	600	6000	370	**600**	7500	110	6	370	**6**
Dichlorobenzene;1,3-	30	300	5.5	**30**	75		0.23	13	**0.23**
Dichlorobenzene;1,4-	75	750	0.5	**75**	280	6000	0.7	3.4	**0.7**
Dichlorodifluoromethane	7300	73000	390	**7300**	16600	210	53.3	94	**53.3**

Table 1-1—Screening Levels for Soil and Groundwater Analyses
Ugashik Traditional Village Targeted Brownfields Assessment
Ugashik, Alaska

Analyte	Groundwater				Soils				
					ADEC Method Two Cleanup Levels (Over 40 inch Zone)				
	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
Dichloroethane;1,1-	3650	36500	810	**3650**	8300	890	11	590	**11**
Dichloroethane;1,2-	5	50	0.12	**5**	75	3.5	0.01	0.35	**0.01**
Dichloroethylene;1,1-	7	70	0.046	**7**	11	0.65	0.03	0.054	**0.03**
Dichloroethylene;1,2-,cis	70	700	61	**70**	830		0.2	43	**0.2**
Dichloroethylene;1,2-,trans	100	1000	120	**100**	1700		0.34	63	**0.34**
Dichloromethane (methylene chloride)	5	50	4.3	**5**	900	135	0.01	8.9	**0.01**
Dichloropropane;1,2-	5	50	0.16	**5**	100	12	0.015	0.35	**0.015**
Dichloropropene;1,3-,trans			0.4	**0.4**				0.7	**0.7**
Dichloropropene;1,3-,cis			0.4	**0.4**				0.7	**0.7**
Dichloropropene;1,3-,(total)	5	50		**5**	25	1	0.02		**0.02**
Ethylbenzene	700	7000	1300	**700**	8300	89	5	230	**5**
Hexanone;2- (Methyl butyl ketone)									
Methyl acetate			6100	**6100**				22000	**22000**
Methyl ethyl ketone (Butanone,2-)	22000	220000	1900	**22000**	49800	23300	53.2	7300	**53.2**
Methyl isobutyl ketone (4-Methyl-2-pentanone)			160	**160**				790	**790**
Methyl tert-butyl ether (MTBE)			20	**20**					
Methylcyclohexane			5200	**5200**				2600	**2600**
Styrene	100	1000	1600	**100**	17000	280	1.2	1700	**1.2**
Tetrachloroethane;1,1,2,2-	4	40	0.055	**4**	34	4	0.01	0.38	**0.01**
Tetrachloroethylene (tetrachloroethene)	5	50	1.1	**5**	130	79	0.025	5.7	**0.025**
Toluene	1000	10000	720	**1000**	17000	180	4.8	520	**4.8**

Table 1-1—Screening Levels for Soil and Groundwater Analyses
Ugashik Traditional Village Targeted Brownfields Assessment
Ugashik, Alaska

Analyte	Groundwater				Soils				
					ADEC Method Two Cleanup Levels (Over 40 inch Zone)				
	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
Trichloro-1,2,2-trifluoroethane;1,1,2-(Freon-113)	1095000	10950000	59000	**1095000**	1000000	4660	28400	5600	**28400**
Trichlorobenzene;1,2,4-	70	700	190	**70**	830	570	1.7	650	**1.7**
Trichloroethane;1,1,1-	200	2000	540	**200**		460	0.9	630	**0.9**
Trichloroethane;1,1,2-	5	50	0.2	**5**	120	8	0.015	0.84	**0.015**
Trichloroethylene (trichloroethene)	5	50	1.6	**5**	620	32	0.02	2.8	**0.02**
Trichlorofluoromethane			1300	**1300**				390	**390**
Vinyl chloride	2	20	2	**0.041**	4	0.3	0.008	0.15	**0.008**
Xylenes (total)	10000	100000	1400	**10000**	166000	81	69	210	**69**
Pesticides/PCBs									
Aldrin	0.05	0.5	0.004	**0.05**	0.40	18	1.5	0.029	**1.5**
Aroclor 1254			0.034	**0.034**				0.22	**0.22**
Aroclor-1016			0.96	**0.96**				3.9	**3.9**
Aroclor-1221			0.034	**0.034**				0.22	**0.22**
Aroclor-1232			0.034	**0.034**				0.22	**0.22**
Aroclor-1242			0.034	**0.034**				0.22	**0.22**
Aroclor-1248			0.034	**0.034**				0.22	**0.22**
Aroclor-1260			0.034	**0.034**				0.22	**0.22**
Chlordane; alpha- (chlordane)	2	20	0.19	**2**	5	100	3	1.6	**3**
Chlordane; gamma- (chlordane)	2	20	0.19	**2**	5	100	3	1.6	**3**
DDD;4,4'-	3.6	36	0.28	**3.6**	28		42	2.4	**28**
DDE;4,4'-	2.5	25	0.2	**2.5**	20		130	1.7	**20**

Table 1-1—Screening Levels for Soil and Groundwater Analyses
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Ugashik, Alaska

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	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
DDT;4,4'-	2.5	25	0.2	**2.5**	20	3900	80	1.7	**20**
Dieldrin	0.05	0.5	0.0042	**0.05**	0.4	6	0.014	0.03	**0.014**
Endosulfan I (endosulfan)	200	2000	220	**200**	500		6	370	**6**
Endosulfan II (endosulfan)	200	2000	220	**200**	500		6	370	**6**
Endosulfan sulfate (endosulfan)	200	2000	220	**200**	500		6	370	**6**
Endrin	2	20	11	**2**	25		0.3	18	**0.3**
Endrin aldehyde									
Endrin ketone									
Heptachlor	0.4	4	0.015	**0.4**	1.5	0.6	7	0.11	**0.6**
Heptachlor epoxide	0.2	2	0.0074	**0.2**	0.75	25	0.2	0.053	**0.2**
HCH; beta- (hexachlorocyclohexane;beta)	0.47	4.7	0.037	**0.47**	4	32	0.008	0.32	**0.008**
Lindane (gamma-HCH)	0.2	2	0.052	**0.2**	5		0.003	0.44	**0.003**
Methoxychlor	40	400	180	**40**	420		47	310	**47**
Polychlorinated biphenyl mixtures	0.5	5	0.034	**0.5**	10	10	10	0.22	**10**
Toxaphene	3	30	0.061	**3**	6	460	9	0.44	**6**
Inorganics									
Aluminum			36000	**36000**				76000	**76000**
Antimony	6	60	15	**6**	33		3	31	**3**
Arsenic, inorganic	50	500	0.045	**50**	4.5		1.8	0.39	**1.8**
Barium	2000	20000	2600	**2000**	5800		982	5400	**982**
Beryllium	4	40	73	**4**	1.6		38	150	**38**

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Ugashik, Alaska

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	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
Cadmium	5	50	18	**5**	83		4.5	37	**4.5**
Calcium									
Chromium (total)	100	1000		**100**	420		23	210	**23**
Cobalt			2200	**2200**				4700	**4700**
Copper	1300	13000	1400	**1300**	3320		6260	2900	**3320**
Iron			11000	**11000**				23000	**23000**
Lead	15	150		**15**				400	**400**
Magnesium									
Manganese			880	**880**				1800	**1800**
Mercury	2	20	11	**2**		13	1.24	23	**1.24**
Nickel	100	1000	730	**100**	1700		78	1600	**78**
Potassium									
Selenium	50	500	180	**50**	420		3	390	**3**
Silver	180	1800	180	**180**	420		19	390	**19**
Sodium									
Thallium	2	20	2.4	**2**				5.2	**5.2**
Vanadium	260	2600	260	**260**	580		3050	550	**580**
Zinc	11000	110000	11000	**11000**	25000		8100	23000	**8100**
SVOCs									
Acenaphthene	2200	22000	370	**2200**	5000		190	3700	**190**
Acenaphthylene	2200	22000		**2200**	5000		190		**190**

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	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
Acetophenone			0.042	**0.042**				0.49	**0.49**
Anthracene	11000	110000	1800	**11000**	24900		3900	22000	**3900**
Atrazine			0.3	**0.3**				2.2	**2.2**
Benzaldehyde			3600	**3600**				6100	**6100**
Benzo(a)anthracene	1	10	0.092	**1**	9		5.5	0.62	**5.5**
Benzo(a)pyrene	0.2	2	0.0092	**0.2**	0.9		2.4	0.062	**0.9**
Benzo(b)fluoranthene	1	10	0.092	**1**	9		17	0.62	**17**
Benzo(g,h,i)perylene	1100	11000		**1100**	2500		1400		**1400**
Benzo(k)fluoranthene	10	100	0.92	**10**	93		170	6.2	**93**
Biphenyl; 1,1'-			300	**300**				350	**350**
Bis-(2-chloroethoxy)methane									
Bis-(2-chloroethyl)ether	0.77	7.7	0.0098	**0.77**	6	2.4	0.002	0.21	**0.002**
Bis-(2-ethylhexyl)phthalate (DEHP)	6	60	4.8	**6**	490		1100	35	**490**
Bromophenyl-phenylether; 4-									
Butylbenzylphthalate	7300	73000	7300	**7300**	16600		5000	12000	**5000**
Caprolactam			18000	**18000**				31000	**31000**
Carbazole	40	400	3.4	**40**	340		2	24	**2**
Chloro-3-methylphenol; 4-									
Chloroaniline; 4- (chloroaniline;p-)	150	1500	150	**150**	330		0.46	240	**0.46**
Chloronaphthalene; 2- (beta-chloronaphthalene)	1500	15000	490	**1500**	3300		38	3900	**38**
Chlorophenol; 2-	200	2000	30	**200**	415		1.3	63	**1.3**

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Ugashik, Alaska

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	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
Chlorophenyl-phenylether; 4-									
Chrysene	100	1000	9.2	**100**	930		550	62	**550**
Dibenzo(a,h)anthracene	0.1	1	0.0092	**0.1**	0.9		5	0.062	**0.9**
Dibenzofuran			24	**24**	330		13.9	290	**13.9**
Dichlorobenzidine; 3,3'-	2	20	0.15	**2**	15		0.02	1.1	**0.02**
Dichlorophenol; 2,4-	100	1000	110	**100**	250		0.45	180	**0.45**
Diethylphthalate	29000	290000	29000	**29000**	66000		170	49000	**170**
Dimethylphenol; 2,4-	700	7000	730	**700**	1700		3.6	1200	**3.6**
Dimethylphthalate			360000	**360000**	830000		1200	100000	**1200**
Di-n-butylphthalate			3600	**3600**	8300		1500	6100	**1500**
Dinitro-2-methylphenol; 4,6-									
Dinitrophenol; 2,4-	70	700	73	**70**	170		0.17	120	**0.17**
Dinitrotoluene; 2,4- (Dinitrotoluene mixture)	1.25	12.5	0.099	**1.25**	10		0.0044	0.72	**0.0044**
Dinitrotoluene; 2,6- (Dinitrotoluene mixture)	1.25	12.5	0.099	**1.25**	10		0.004	0.72	**0.004**
Di-n-octyphthalate	700	7000	730	**700**	1700		720000	1200	**1700**
Fluoranthene	1460	14600	1500	**1460**	3300		1900	2300	**1900**
Fluorene	1460	14600	240	**1460**	3300		240	2600	**240**
Hexachlorobenzene	1	10	0.042	**1**	4	5	0.7	0.3	**0.7**
Hexachlorobutadiene	10	100	0.86	**10**	17	41	7	6.2	**7**
Hexachlorocyclopentadiene	50	500	260	**50**	580	5	120	420	**5**
Hexachloroethane	60	600	4.8	**60**	83	290	1.4	35	**1.4**

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Ugashik, Alaska

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	ADEC Table C Cleanup Levels (µg/L)	ADEC 10X Rule Cleanup Levels (µg/L)	Region 9 EPA PRGs for Tap Water (µg/L)	Screening Level Proposed For Use (µg/L)	Ingestion Pathway (mg/kg)	Inhalation Pathway (mg/kg)	Migration to Groundwater Pathway (mg/kg)	Region 9 EPA PRGs (mg/kg)	Screening Level Proposed for Use (mg/kg)
Indeno(1,2,3-cd)pyrene	1	10	0.092	**1**	9		50	0.62	**9**
Isophorone	900	9000	71	**900**	7200		2.6	510	**2.6**
Methylnaphthalene; 2-	1500	15000		**1500**	3300		38		**38**
Methylphenol; 2- (cresol; o-)	1800	18000	1800	**1800**	4200		6	3100	**6**
Methylphenol; 4- (cresol; p-)			180	**180**				310	
Naphthalene	1460	14600	6.2	**1460**	3300		38	56	**38**
Nitroaniline; 2-			2.1	**2.1**				3.5	**3.5**
Nitroaniline; 3-									
Nitroaniline; 4-									
Nitrobenzene	18	180	3.4	**18**	42	67	0.06	20	**0.06**
Nitrophenol; 2-									
Nitrophenol; 4-			290	**290**				490	**490**
N-Nitroso-di-n-propylamine	0.1	1	0.0096	**0.1**	1		0.0003	0.069	**0.0003**
N-Nitrosodiphenylamine	170	1700	14	**170**	1400		3	99	**3**
oxybis(1-chloropropane); 2,2'- (bis[2-chloro-1-methyl ethyl]ether)			0.27	**0.27**				2.9	**2.9**
Pentachlorophenol	1	10	0.56	**1**	28		0.009	3.0	**0.009**
Phenanthrene	11000	110000		**11000**	24900		3900		**3900**
Phenol	22000	220000	22000	**22000**	50000		60	37000	**60**
Pyrene	1100	11000	180	**1100**	2500		1400	2300	**1400**
Trichlorophenol; 2,4,5-	3650	36500	3600	**3650**	8300		78	6100	**78**
Trichlorophenol; 2,4,6-	77	770	6.1	**77**	620	1100	0.5	44	**0.5**

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Ugashik, Alaska

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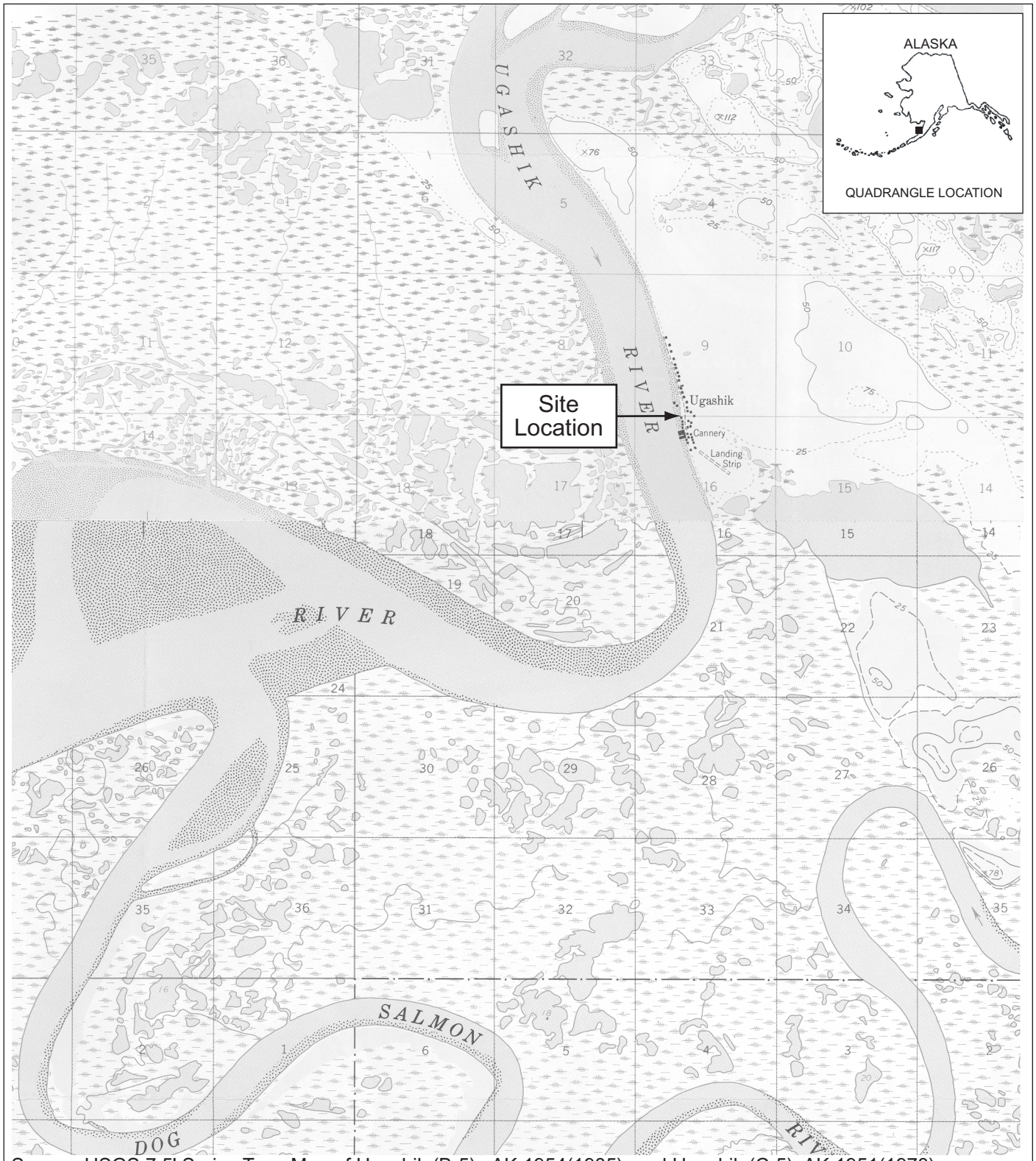
Total Petroleum Hydrocarbons									
Gasoline Range Organics (without benzene and [for soil] the total of ethyl benzene, toluene, and xylene are less than 1% of the gasoline mixture)	1300	13000		**1300**	1400	1400	260		**260**
Gasoline Range Organics (all other gasoline mixtures)	1300	13000		**1300**	1400	1400	260		**260**
Diesel Range Organics	1500	15000		**1500**	8250	12500	230		**230**
Heavy Oils	1100	11000		**1100**	8300	22000	9700		**8300**
Mineral Oils	1100	11000		**1100**	8300	22000	9700		**8300**



Source: USGS 7.5' Series Topo Map of Ugashik (B-5) , AK 1954(1985), and Ugashik (C-5), AK 1951(1973).

Site Location Map
Ugashik Traditional Village TBA
Ugashik, Alaska

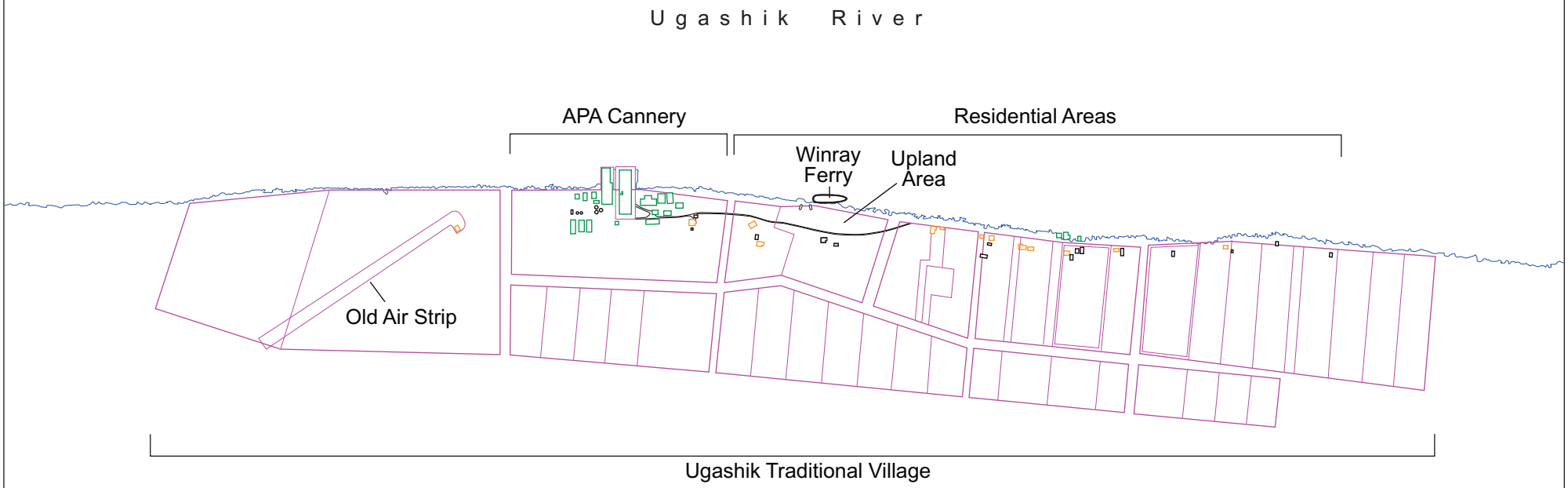
0 1000 2000

Scale in Feet

Figure

1-1

03-0118 Fig1-1.ai



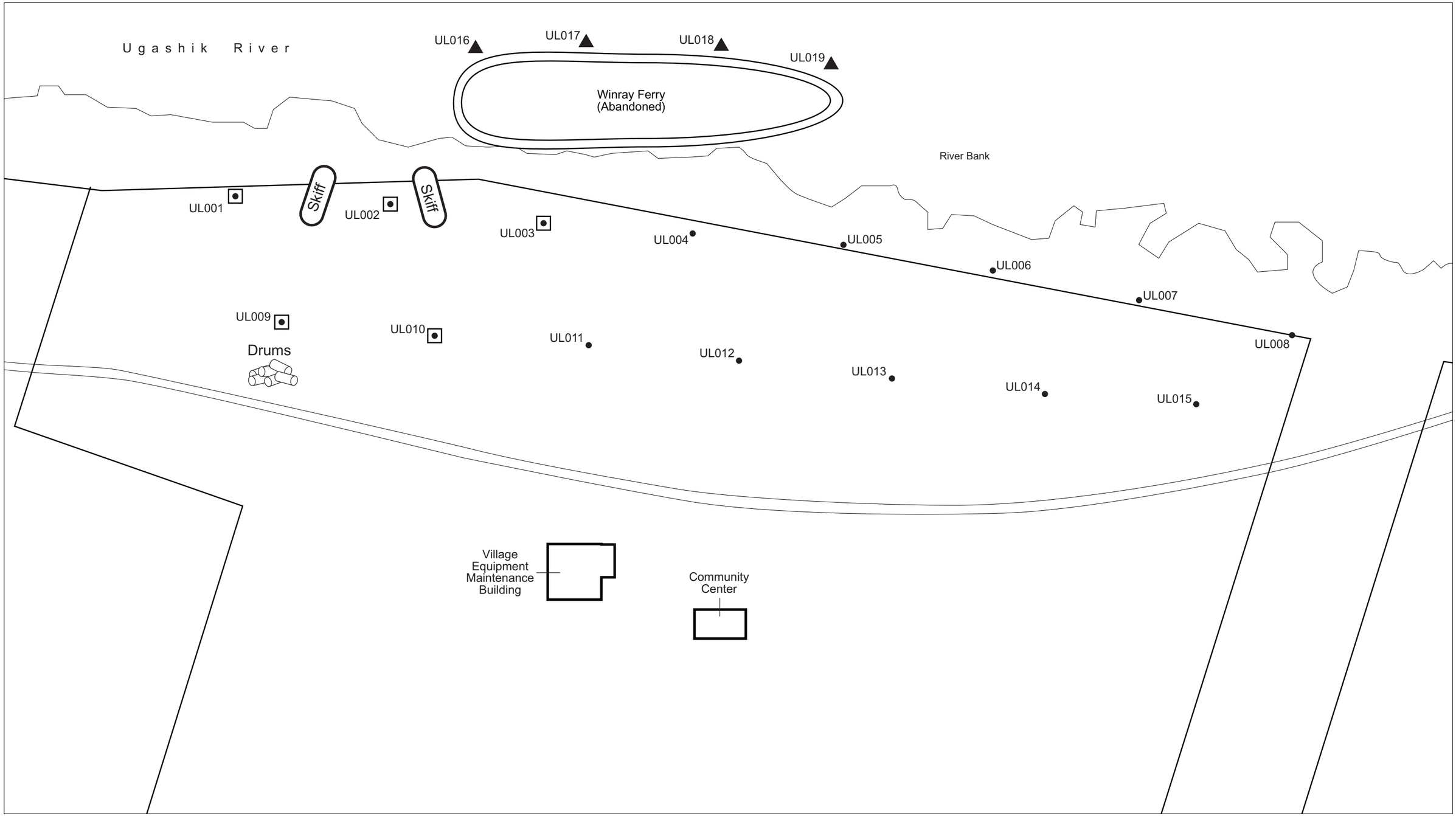
0 400 800

Scale in Feet

Site Vicinity Map
Ugashik Traditional Village TBA
Ugashik, Alaska

Figure
1-2

03-0118 Fig1-2.ai



0 15 30

Scale in Feet

▲ Sediment Sample

● Surface Soil Sample

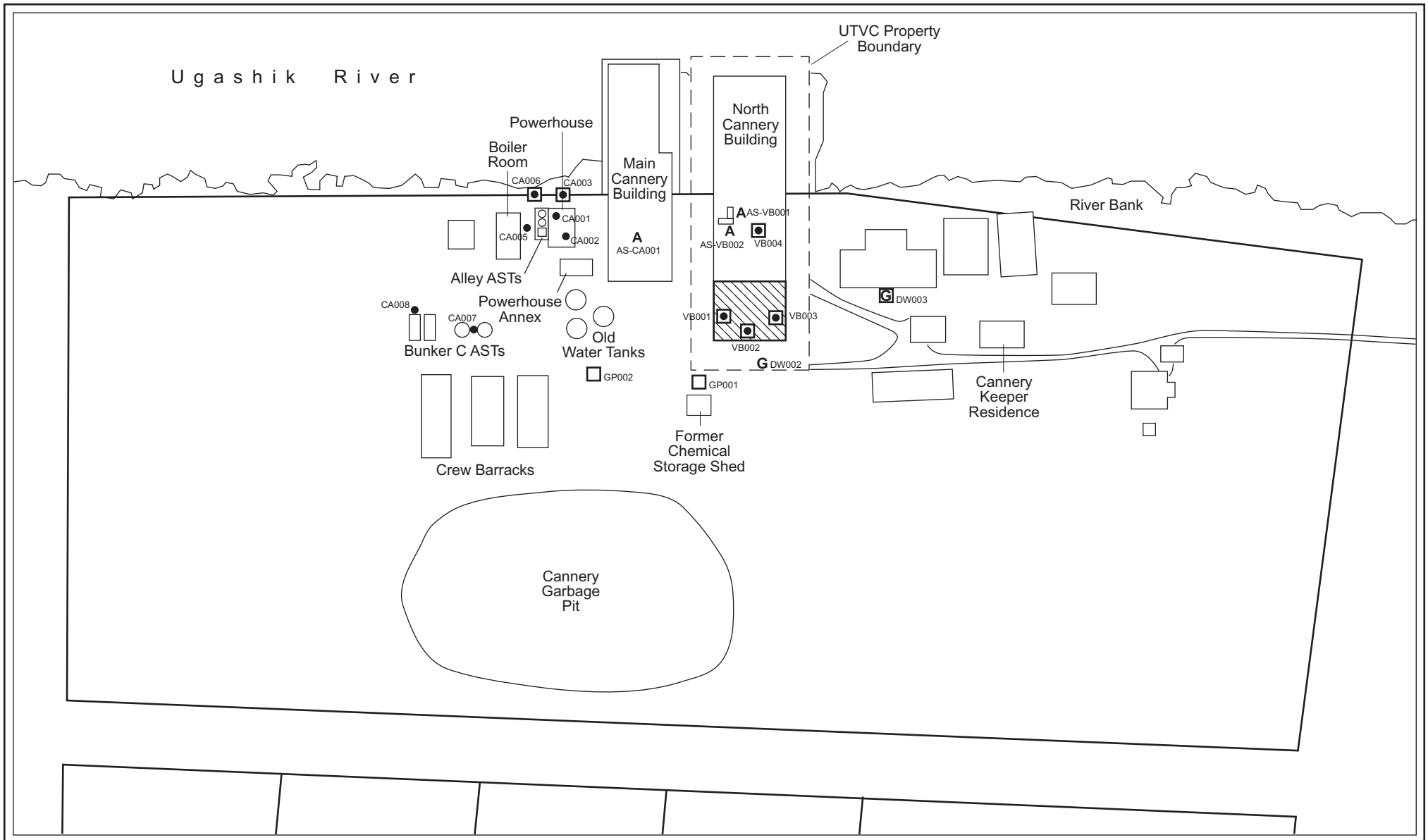
□ Subsurface Soil Sample

Upland Area Sampling Locations
Ugashik Traditional Village TBA
Ugashik, Alaska

Figure

1-3

03-0118 Fig1-3.ai



0 60 120

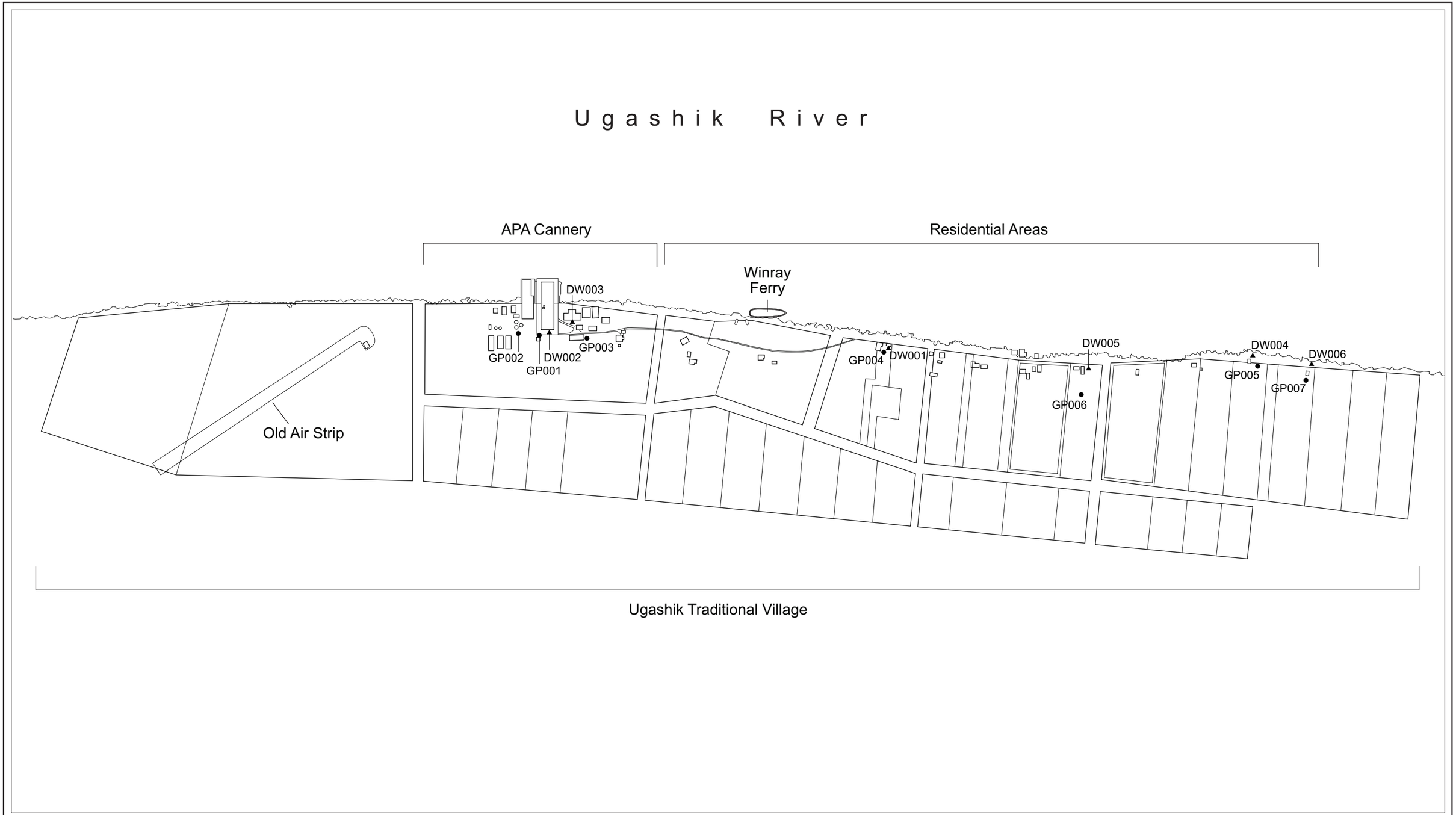
Scale in Feet

G	Groundwater Sample
A	Asbestos Sample
●	Surface Soil Sample
□	Subsurface Soil Sample
▨	Former Maintenance Shop
UTVC	Ugashik Traditional Village Council

Cannery Sampling Locations
Ugashik Traditional Village TBA
Ugashik, Alaska

Figure
1-4

03-0118 Fig1-4.ai



N

0 225 450

Scale in Feet

● Garbage Pit Sample Location

▲ Drinking Water Sampling Location

WESTON SOLUTIONS

Garbage Pit and Groundwater Sampling Locations
Ugashik Traditional Village TBA
Ugashik, Alaska

Figure

1-5

03-0118 Fig1-5.ai

2. TARGETED BROWNFIELDS ASSESSMENT BACKGROUND AND SOURCE CHARACTERISTICS

SECTION 2

TARGETED BROWNFIELDS ASSESSMENT BACKGROUND AND SOURCE CHARACTERISTICS

2.1 SITE BACKGROUND

Weston conducted a site visit on September 19 to 20, 2002 to assess the site and identify potential sampling locations. The information presented in the following sections is based on the observations made during the site visit and the sampling event conducted from September 24 to October 3, 2002.

2.1.1 Site Location and Description

The site is located along the eastern shore of the Ugashik River at Sections 9 & 16, Township 31 South, Range 50 West, Seward Meridian. The site is approximately 6 acres in size and consists of the North Cannery Building, the upland area above the abandoned ferry, and garbage pits and domestic groundwater supply wells throughout the village.

2.1.2 Site Ownership History

The cannery was developed in the 1920s by the Red Salmon Company (part of the APA) to support local fisheries within the area. In 1940, Lem Wingard purchased the Red Salmon Company and operated the cannery until 1957. APA operated the cannery for one additional year until 1958. Currently abandoned, the APA cannery has since been owned by two private individuals. The UTVC bought the north dock and north cannery building from the current cannery owner in 2000.

The upland area above the abandoned ferry has been owned by UTVC since 2000. It was originally owned by the APA and later by private individuals.

Village residents own the various individual garbage pits and five of the six groundwater supply wells sampled during the TBA. One well, the ice plant well, is owned by UTVC.

2.1.3 Site Operations and Source Characteristics

2.1.3.1 APA Cannery

The cannery, built to process and pack locally caught salmon, operated from several buildings at the facility. These buildings include the north cannery building, the main cannery building, the powerhouse, the boiler room, two ice plants, a chemical storage shed, and the crew barracks (Figure 1-4). Other features at the cannery include four Bunker C fuel oil aboveground storage tanks (ASTs) of approximately 24,000-gallon capacity (still partially to completely full), three water storage towers, and what was previously believed to be several small ASTs (2,000-gallon capacity or less) of unknown contents located near the riverbank on the south end of the cannery

property. Upon closer inspection during the field activities these turned out to be old boilers and not ASTs.

When the cannery was in operation, the north cannery building was used mainly for product storage, with a mechanics shop located along the east end of the building. It is suspected that petroleum products, oils, solvents, cleaners, degreasers, waste oils, and other similar materials were handled and/or stored in this area of the north building as evidenced by heavy staining of the wood floor surface observed by Weston during the site visit. A dock (north dock) is present along the exterior west and south walls of the north cannery building. The north dock joins with the main cannery building dock along the south side of the north cannery building. The north dock was used to receive cannery supplies and for product shipment.. The building construction consists of a wood frame and wood beam floors, with corrugated metal siding and roof, and glass windows. The building is in generally good condition; however, the north end of the dock is starting to buckle and some doors and windows are missing. Several old trucks, cars, snow machines, small boats, numerous mechanical parts, and a lathe are stored within the building. In addition, the village currently uses the building to store construction materials and fishing equipment (e.g., nets, buoys). UTVC bought the north dock and north cannery building to re-develop it into a flash freeze and a fish smoking plant which is currently under construction.

The main cannery building and the dock have not been used since the 1950s. Both the building and dock are collapsing due to the destructive action of the river ice along the front of the cannery during spring breakup, and most of the building windows and doors are broken or missing. All fish processing operations (cooking and canning) were conducted on the main cannery building. The building still houses six retorts (commercial cookers for the salmon industry), which are covered with suspect asbestos-containing insulation. Suspect asbestos-containing cloth pipe insulation was also observed throughout this building. The suspect ACM are in friable condition and exposed directly to the environment where wind can suspend asbestos fibers into the air and transport them through the broken windows and missing doors. Boilers, small containers, pipes, and fragments of the building and dock litter the shoreline where the river ice has deposited them after each spring breakup.

Additional suspect ACM, Bunker C fuel oil, ASTs, old transformers, and stained soils were observed in and around the powerhouse and the boiler room. Friable ACM observed in these buildings consist of insulation around the boilers (boiler room) and warehouse heaters (powerhouse). Heavily-stained soil was observed around aboveground piping and three small Bunker C ASTs (approximately 500 to 600 gallon capacity) located in an alley between the boiler room and the powerhouse. Several rusted 55-gallon drums were also observed in the alley and in an annex building to the powerhouse. The drums in the alley were bulged, on their side, and empty. The drums inside the annex were accumulated in an organized fashion and appeared to be partially full. According to the cannery keeper, the drums inside the annex are full of TPH impacted top soil removed from the alley approximately 10 years ago in an attempt by the owner to clean up the area. Large amounts of Bunker C fuel oil remain in the ASTs located southeast of the main cannery building.

2.1.3.2 Abandoned Ferry

The vessel "*Winray*" is a former 130-foot Washington State ferry once used as a fish processing facility upriver from Ugashik. A windstorm caused the *Winray* to break from its moorings and drift downriver where it grounded at Ugashik. The grounded ferry was set on fire in the early 1940s, and remains in Ugashik partially collapsed. The steel hull and support beams remain at the high tide line and the bottom of the vessel is heavily rusted and pitted. Attempts were made to move the ferry over a period of four years but proved unsuccessful. The ferry's Bunker C fuel tanks were emptied in 1996 by ADEC after leaks were discovered along the riverbank (ADEC 2001). Additional evidence of leaks from the ferry in 2001 prompted additional intervention by ADEC, which collected and disposed of the remaining sludge and steam-cleaned the tanks (ADEC 2001).

2.1.3.3 Upland Property

The upland area above the *Winray* was historically used by the cannery and later by the villagers as a boat repair yard and winter storage area until approximately 10 years ago. Maintenance-related activities reportedly conducted in this area include boat painting and weather-proofing, engine repairs/maintenance, coal tarring, fueling, and winter storage. Several old skiffs as well as rusted 55-gallon drums, engine remains, boat parts, old crab pots, and chemical containers are scattered throughout this property. It is very likely that the abandoned skiffs may still contain fuel and lubricating oils in their tanks and engines.

2.1.3.4 Individual Garbage Pits

Historically, domestic garbage has been collected and burned in pits at each villager's property. The pits were consequently covered/abandoned when full. Several pits, generally 10 feet long by 10 feet wide by 10-15 feet deep, exist at each property. Some of the garbage pits in the village date back to the 1940s and are owned by private individuals with the exception of the cannery garbage pit located east of the north cannery building. In addition to general household wastes, other materials disposed of in these pits include batteries, insecticides, paint thinners, paints, household and electronic appliances, and engine parts.

According to the villagers, the cannery garbage pit was not really a typical garbage pit but rather an area where the APA had dumped equipment and debris after a large fire that destroyed many cannery buildings. The area was also used as the cannery fuel yard where 55-gallon drums of diesel and gasoline were stored for use in their daily operations.

2.1.4 Previous Site Investigations

The only studies conducted in Ugashik consist of a 1983 ADEC field investigation into potential landfill locations (ADEC 1983), a waste management plan prepared by ADEC for the village in 1992 (ADEC 1992), and a 2001 situation report regarding cleanup of Bunker C fuel leaking from the *Winray* (ADEC 2001). The only information provided by the ADEC Situation Report indicates that globules of Bunker C had been spotted in the tide flat in 1996, at which point ADEC emptied the *Winray* fuel tanks and disposed of the fuel off-site. The report also indicates

that more releases were spotted in 2001 surrounding the ferry, which prompted ADEC to remove the remaining sludge and steam clean the ferry fuel tanks in 2001 (ADEC 2001).

No environmental studies have been identified regarding the cannery or its vicinity.

2.1.5 Areas of Potential Contamination

Sampling for the Ugashik Traditional Village TBA was conducted in areas considered to be potential contamination sources, and in areas that may have been contaminated through the migration of hazardous substances from off-site sources. Based on a review of background information and discussions with site representatives, the following areas or features were identified for inspection during the Ugashik Traditional Village TBA.

2.1.5.1 TBA Areas of Concern

- **Upland Area**—The cannery and villagers have historically used the upland area near the *Winray* as a boat repair, maintenance, and winter storage area. Numerous 55-gallon drums, smaller chemical containers, small skiffs, crab pots, engine and boat parts, and other materials are embedded in the soil and grasses covering this area. Contaminated soils from leaks, spills, poor housekeeping, and waste management practices within this property can be a source of contaminants to soil, sediment, the river, and groundwater. Based on this information, contaminants of concern in this area include TPH, TAL metals, butyltins, VOCs, pesticides, and SVOCs.
- ***Winray***—Sediments surrounding the *Winray* and along the Ugashik River riverbank may have been contaminated by historical leaks from the *Winray's* fuel tanks and by historical practices in the adjacent upland area. Impacts on the sediments may in turn impact fish and fish habitat along the river. Based on this information, contaminants of concern in this area include TPH, TAL metals, pesticides, PCBs, butyltins, and SVOCs.
- **North Cannery Building**—Historically poor housekeeping and chemical management practices at the cannery maintenance shop may have contaminated soils underneath the north cannery building. ACM may be present in building materials and on wall and floor surfaces due to windblown fibers released from surrounding buildings. Based on this information, contaminants of concern in this area include total petroleum hydrocarbons TPH, TAL metals, VOCs, SVOCs, and asbestos dust.
- **Garbage Pits and Domestic Water Supply Wells—**Numerous garbage pits throughout the village (up to several per residence) are used to dispose of wastes. Due to the lack of a public landfill facility, a variety of wastes, including hazardous substances and petroleum products, have been historically disposed of in these pits. Leachate from the pits can potentially contaminate surrounding soils and may also reach groundwater. Contaminants of concern include TPH, TAL metals, pesticides, PCBs, and SVOCs.

  Leachate from the garbage pits can potentially contaminate groundwater, which is the only drinking water source available. Based on the types of wastes disposed of at the garbage pits, groundwater contaminants of concern include TPH, PAH, TAL metals, Pest/PCBs, VOCs, and SVOCs.

- **Main Cannery Building**—Large quantities of friable suspect ACM in the form of cloth pipe insulation and retort insulation were observed within the collapsing main cannery building during Weston's site visit in September 2001. The main contaminant of concern in these areas is bulk ACM and windblown asbestos fibers.
- **Powerhouse—**Soils underneath the powerhouse building may have been contaminated by leaks or releases from the powerhouse generators, engines, transformers, and numerous abandoned batteries observed in the building. Stained soils were observed through numerous missing floorboards during Weston's site visit. Based on this information, contaminants of concern within the powerhouse include TPH, TAL metals, PCBs, SVOCs, and asbestos.
- **Powerhouse Annex**—Soils underneath the powerhouse annex building may have been contaminated by leaks or spills from the numerous 55-gallon drums accumulated in the annex. With the exception of one drum labeled as leaded gasoline, the content of most of these drums is reportedly TPH impacted soil from the adjacent alley. Based on this information, contaminants of concern within the powerhouse annex include TPH, solvents, TAL metals, pesticides/PCBs, SVOCs, PAHs, and asbestos.
- **Alley between the Powerhouse and the Boiler Room**—Weston observed heavily stained soils in an alley between the powerhouse and the boiler room during the site visit. The stained soils were a result of leaks and spills from piping connecting the ASTs to the powerhouse, from active leaks from the small ASTs in the alley, and from leaking drums. Based on this information, contaminants of concern in this area include TPH, TAL metals, and SVOCs.
- **Cannery Fuel ASTs**—According to the Ugashik tribal administrator and environmental coordinator, the cannery ASTs still contain thousands of gallons of Bunker C fuel oil. With an estimated capacity of 24,000 gallons each, leaks and/or spills from the four abandoned and deteriorating ASTs or associated piping may have contaminated soils surrounding them and could potentially result in a future catastrophic release. Based on this information, contaminants of concern near the ASTs include TPH, TAL metals, and SVOCs.

3. TARGETED BROWNFIELDS ASSESSMENT ACTIVITIES AND RESULTS

SECTION 3

TARGETED BROWNFIELDS ASSESSMENT ACTIVITIES AND RESULTS

The field effort for the Ugashik Traditional Village TBA was conducted from September 24 to October 3, 2002. The following sections present the field activities conducted and the analytical results of samples collected at the Ugashik Traditional Village site. Sampling locations are presented in Figures 1-3 through 1-5 and sample exceedances of screening levels for specific areas are presented in Figures 3-1 to 3-5. Table 1-3 presents a detailed summary of the sample locations, sampling information, and analyses conducted for each sample collected during the TBA. Summaries of detected constituents (compared to screening levels) per area are presented in Tables 3-1- to 3-14. Full data listings of analytical results for samples collected during the TBA are included in Appendix D.

Since highly mineralized deposits are common in areas of volcanic deposits such as those surrounding Ugashik, a surface soil background sample was collected. The background sample was collected to document natural background metal concentrations for the site and to use the results to compare to metals concentrations detected in the site samples collected. Results of the surface soil background sample are included in Appendix D.

3.1 UPLAND AREA AND THE *WINRAY*

3.1.1 Field Activities

Sampling activities at the upland area were conducted over three days from September 25 to September 28, 2002. In accordance with the SQAP (Weston 2002), the sampling locations were arranged in a modified 50-foot hexagonal grid (Figure 1-3). The grid was constructed by clearing two paths within parallel to the shoreline the upland area that were approximately 44 feet apart. Sampling locations were spaced approximately 50 feet apart along each path. Eight locations were marked along the path closest to the shoreline (shoreline path) and seven locations (offset by 50 feet) along the path farthest from the shoreline (inland path, Figure 1-3).

3.1.2 Sampling Locations and Analytical Results

3.1.2.1 Surface Soil

Fifteen surface soil samples (SS-UL001 to SS-UL015) were collected from 0 to 6 inches bgs as presented in Figure 3-1. The surface soil samples were analyzed for those parameters listed in Table 1-3. Surface soils consisted of a highly organic medium to dark brown silty sand to sandy silt with minor amounts of gravel and clay.

Analytical results from the upland area surface soil samples indicate that 22 SVOCs, four chlorinated pesticides, one organotin compound, 21 TAL metals, and TPH in the diesel and motor oil ranges were detected (Table 3-1). From these, benzo(a)pyrene (3,900 µg/kg), antimony (3.2-4.8 mg/kg), arsenic (2.1-14.4 mg/kg), chromium (37.5 mg/kg), lead

(1,040-2,700 mg/kg), and selenium (3.6 mg/kg) exceeded the site-specific screening levels in some of the samples collected (Figure 3-1). Arsenic (2.5 mg/kg) and lead (2.9 mg/kg) concentrations in the upland surface soil samples exceeded the concentrations of these two metals detected in the background sample.

Based on a study conducted by the USGS in 1988 regarding element concentrations present in surficial materials in Alaska, arsenic concentrations detected in the upland surface soil samples collected during this study are within reported arsenic levels for surface soils in this area of Alaska (Gough et. al. 1988). Since highly mineralized deposits are common in areas of volcanic deposits such as those surrounding Ugashik, it is likely that arsenic levels found in these samples represent naturally occurring levels within the area.

During this investigation, lead concentrations exceeded the site-specific screening levels and background sample concentrations only at the upland area. Furthermore, the range of detected lead concentrations in the upland area not only exceeded the lead concentration detected in the background surface soil sample collected during the TBA by several orders of magnitude but also exceeded the naturally occurring levels for lead reported in the USGS study (Gough et. al. 1988). Lead exceedances at the upland appear to be scattered throughout the area and do not appear be related to any of the potential sources observed during the field effort such as the abandoned skiffs or the drums.

3.1.2.2 Subsurface Soil

Five collocated subsurface soil samples (SB-UL001 to SB-UL003, SB-UL009, and SB-UL010) were collected at the water table encountered between 6-8-feet bgs (Table 1-3). Subsurface soil samples consisted of dark to medium grayish brown gravelly sand with silt.

One VOC, two organotin compounds, and 17 TAL metals were detected in the five subsurface soil samples (Table 3-2). From these, only arsenic, at concentrations ranging from 2.1-6.8 mg/kg, exceeded the site-specific screening levels in four of the five subsurface soil samples collected (Table 3-2). As presented in the previous section, the arsenic levels observed in these samples likely represent naturally occurring arsenic concentrations in the area. Although the background soil sample and the USGS study only relate to metal concentrations for surficial soils, these concentrations may be used as an indication of arsenic concentrations at shallow depths such as the samples collected during this study.

3.1.2.3 Sediment

Sediment samples from 0-10 cm were collected from four locations surrounding the abandoned *Winray*. The sediment samples were analyzed for those parameters listed in Table 1-3, and consisted of very fine olive gray to medium gray sand with silt and clay. Small fragments of corroded metal and organic fragments were also observed in these samples.

Two SVOCs, one chlorinated pesticide, one organotin compound, and 21 TAL metals were detected in the four sediment samples collected around the *Winray* (Table 3-3). None of these samples exceed the Washington State LAET standards used as guidance screening levels in the TBA (Table 3-3).

3.2 NORTH CANNERY BUILDING

3.2.1 Field Activities

Field activities in the North Cannery building were conducted on September 28 and 29, 2002. Based on information regarding the historical uses of the North Cannery building, four locations inside the building were selected for sampling (Figure 1-4). Sampling efforts were concentrated in the eastern section of the building historically used as a repair shop. Using a hand auger, collocated surface and subsurface soil samples were collected from areas under the building by removing a section of the floorboards between the floor joists. The sample locations were selected from those areas of the building where heavy oil-like staining was observed on the floorboards.

In addition to the surface and subsurface soil samples, two microvac samples of suspect ACM dust were collected from two locations inside the north cannery building on October 1, 2002 (Figure 1-4). The two locations chosen for the sampling, a truck fender and the deck of a stored skiff, due to their location in front of an open door and directly downwind from the broken doors, windows, and friable retort insulation materials in the main cannery building.

3.2.2 Sampling Locations and Analytical Results

3.2.2.1 Surface Soil

Four surface soil samples (SS-VB001 to SS-VB004) were collected from 0 to 6 inches bgs as presented in Figure 3-2. The surface soil samples were analyzed for those parameters listed in Table 1-3, and consisted of dark brown, fine to medium grained silty sand with gravel and trace amounts of clay.

Twenty-seven SVOCs, 22 TAL metals, and TPH in the diesel and motor oil ranges were detected in the four surface soil samples collected from the north cannery building (Table 3-4). From these, benzo(a)pyrene (1,200 µg/kg), diesel (280 mg/kg), and arsenic (2.5-4.1 mg/kg) exceeded the site-specific screening levels as presented in Figure 3-2. Arsenic screening levels were exceeded in all four samples, while benzo(a)pyrene, and diesel screening levels were exceeded only in SS-VB004.

Arsenic concentrations in three of the north cannery building surface soil samples (SS-VB001 through SS-VB003) slightly exceed the arsenic concentration detected in the surface soil background sample (2.5 mg/kg) collected during this TBA. As presented in Section 3.1.2.1, highly mineralized deposits are common in volcanic regions such as those surrounding Ugashik and the arsenic concentrations detected in these samples are within established levels in surficial soils in the area (Gough et. al. 1988). Based on this information, the arsenic levels observed in the north cannery building samples likely represent naturally occurring arsenic concentrations in the area.

3.2.2.2 Subsurface Soil

Four collocated subsurface soil samples were collected at the water table, which was observed between 6.5 feet to 8.5 feet bgs (Figure 3-2). The subsurface soil samples were analyzed for those parameters listed in Table 1-3. The subsurface soil samples consisted of orange to reddish dark brown, fine to medium grained sandy gravel to gravelly sand.

TAL were the only constituents detected in the four subsurface soil samples collected from the north cannery building (Table 3-5). From the 20 TAL metals detected, only arsenic exceeded the site-specific screening level, at concentrations ranging from 2.9-4.9 mg/kg (Table 3-5).

Based on the information presented in Section 3.1.2.1, the arsenic levels observed in the subsurface soil samples collected from the north cannery building likely represent naturally occurring arsenic concentrations in the area. Although the background soil sample and the USGS study only relate to metal concentrations for surficial soils, these concentrations may be used as an indication of arsenic concentrations at shallow depths such as the samples collected during this study.

3.2.2.3 Asbestos

Analytical results of the two microvac samples (AS-VB001 [truck] and AS-VB002 [boat]) indicated that asbestos fibers in the form of chrysotile and tremolite were present in both dust samples collected. Analytical results of the microvac dust samples are presented in Table 3-6. Because there was no ACM in the north cannery building, the presence of asbestos fibers in each sample (58,600 structures/cm^2 in both AS-VB001 and AS-VB002) may indicate that asbestos fibers are being transported through the air from a source outside the north cannery building. The presence of asbestos fibers in dust in the building may create a hazard for the villagers and future employees of the flash freeze plant and smoker facility.

3.3 MAIN CANNERY BUILDING

3.3.1 Field Activities

As presented in Section 2.1.5, production and canning operations took place in the main cannery building. During the site visit conducted in September 2001, friable suspect ACM insulation was observed in piping and around the cannery retorts. Sampling in the main cannery building consisted of collecting one bulk suspect asbestos sample from insulation materials covering one of the six retorts located inside the building (retort No. 5). The sample was collected by cutting a square of the insulation layers approximately three square inches in size with a razor knife. The sample consisted of ten layers: a layer of gray paint, an off-white woven fabric-like material, a pale grayish white fibrous papery layer, a golden yellow resinous mastic layer, a layer of a pale grayish white fibrous wavy (corrugated) papery material, a pale grayish white fibrous flat papery layer, another layer of pale grayish white corrugated papery material, and three additional layers of a pale grayish white fibrous flat papery material.

After collection, the sample was placed inside a pre-labeled and resealable plastic bag, was double bagged, and stored in a cooler prior to transportation to the analytical laboratory. The sample was analyzed for bulk asbestos as listed in Table 1-3.

3.3.2 Sampling Locations and Analytical Results

Table 3-7 presents the results of the bulk suspect ACM insulation. Analytical results for this sample indicated that seven of the ten insulation layers contained 35 percent asbestos, each in the form of the mineral chrysotile.

3.4 POWERHOUSE AND POWERHOUSE ANNEX

3.4.1 Field Activities

Field activities at the powerhouse and annex were conducted on September 28 and 29, 2002 and consisted of colleting surface and subsurface soil samples from three locations at the powerhouse (Figure 1-4). The sample locations were selected based on the historical uses of the building and Weston's observations during the site visit in 2001. Two locations were selected for sampling where heavy oil-like stains were observed next to a generator and a concrete pad inside the building. Another location was selected for sampling outside and downgradient (west) of the building to determine whether contaminant migration through soil from sources inside the building has occurred (Figure 1-4).

One additional location was proposed for sampling in the SQAP; however, upon arrival at the site, the location was found to be beneath the collapsing dock of the main cannery building. Due to unsafe conditions, sampling at this location was not conducted. The EPA task monitor (TM) was notified of the situation and a Sample Plan Alteration Form was prepared. A copy of this form is included in Appendix B.

The powerhouse annex was inspected on September 28, 2002. The 55-gallon drums inside the building were in poor condition, unlabeled, rusted, and some of them were dented. No apparent leaks were observed from any of the drums. As mentioned in Section 1.2.5, the drums contents were reportedly TPH impacted soil from the alley and they all appeared to be full. The drums were on a concrete slab; however the slab was heavily cracked and subsiding, and portions were missing exposing the soil underneath. No stained soils or evidence of leakage or spills from the drums was observed on the concrete slab surrounding the drums or on the areas of exposed soil observed beneath the concrete slab.

3.4.2 Sampling Locations and Analytical Results

3.4.2.1 Surface Soil

Three surface soil samples (SS-CA001 through SS-CA003) from 0 to 6 inches bgs were collected at the powerhouse, as presented in Figure 3-3 and were analyzed for the parameters listed in Table 1-3. The surface soil samples consisted of black brown, fine grained gravelly to dark grayish brown to black fine-grained crusty sand with silt and trace clay. Corroded metal

fragments and an oily stain were observed on all samples collected. A petroleum hydrocarbon odor was noticed in the surface soil sample collected downgradient from the building.

Six SVOCs, nine chlorinated pesticides, 21 TAL metals, and TPH in the diesel and motor oil range were detected in the three surface soil samples collected at the powerhouse (Table 3-8). From these, diesel (2,300-14,000 mg/kg), motor oil (37,000-50,000 mg/kg), and arsenic (2-3 mg/kg) exceeded the site-specific screening levels in samples SS-CA001 and SS-CA002 and diesel and arsenic screening levels were exceeded in sample SS-CA003 (Figure 3-3).

As presented in Section 3.1.2.1, highly mineralized deposits are common in volcanic regions such as those surrounding Ugashik. In addition, the arsenic concentrations detected in the surface soil samples collected from the powerhouse are within established levels in surficial soils in the area (Gough et. al. 1988). Based on this information, the arsenic levels observed in these samples likely represent naturally occurring arsenic concentrations in the area.

3.4.2.2 Subsurface Soil

One collocated subsurface soil sample (SB-CA003) was collected at the water table (encountered at approximately 6.5 feet bgs) from the location downgradient from the powerhouse (Figure 1-4). This sample, analyzed for the parameters listed in Table 1-3, consisted of highly discolored (gray) brownish gray fine- to medium-grained silty sand with trace gravel with a very strong diesel odor.

Three SVOCs, one chlorinated pesticide, 19 TAL metals, and TPH in the diesel and gasoline ranges were detected in the subsurface soil sample collected downgradient from the powerhouse (Table 3-9). From these detections, diesel (6,000 mg/kg) and arsenic (2.9 mg/kg) were the only constituents that exceeded the site-specific screening levels (Table 3-9).

Based on the information presented in Section 3.1.2.1, the arsenic levels observed in the subsurface soil samples collected from the powerhouse likely represent naturally occurring arsenic concentrations in the area. Although the background soil sample and the USGS study only relate to metal concentrations for surficial soils, these concentrations may be used as an indication of arsenic concentrations at shallow depths such as the samples collected during this study.

3.5 ALLEY

3.5.1 Field Activities

Field activities in the alley between the Powerhouse and the Boiler Room were conducted on September 28 and 29, 2002, and consisted of the collection of surface and subsurface soil samples from two locations (Figure 1-4). The locations in the alley were selected based on historical use of Bunker C fuel oil in both the boiler room and powerhouse and the observations made by Weston during the site visit in September 2001. One of the selected locations was next to the ASTs and the active leak where extremely heavy stained soils impregnated with a tar-like substance (presumably Bunker C fuel oil) were observed. The other location downgradient

(west) from the ASTs and leaking pipe was selected to assess the extent of impacted soil towards the beach (Figure 1-4).

3.5.2 Sampling Locations and Analytical Results

3.5.2.1 Surface Soil

Two surface soil samples (SS-CA005 and SS-CA006) from 0 to 6 inches bgs were collected in the alley as presented in Figure 3-4, and were analyzed for those parameters listed in Table 1-3. The samples consisted of black brown, fine- to coarse-grained gravelly sand with silt impregnated with a tar-like substance (presumably Bunker C fuel oil), and with a strong petroleum hydrocarbon odor.

Thirteen SVOCs, three chlorinated pesticides, and TPH in the diesel and motor oil ranges were detected in both surface soil samples collected from the alley (Table 3-10). From these, diesel (13,000-61,000 mg/kg) and motor oil (24,000-44,000 mg/kg) exceeded the site specific screening levels in both samples (Figure 3-4). Benzo(a)anthracene (9,100 µg/kg) and benzo(a)pyrene (2,900 µg/kg) exceeded the site-specific screening levels in sample SS-CA006.

3.5.2.2 Subsurface Soil

One collocated subsurface soil sample (SB-CA006) was collected at the water table (encountered at approximately 6 feet bgs) from the location downgradient from the ASTs and leak (Figure 3-4). This sample, analyzed for the parameters listed in Table 1-3, consisted of highly discolored dark gray fine- to medium-grained gravelly sand with silt with a very strong diesel odor.

One VOC, five SVOCs, six chlorinated pesticides, and TPH in the diesel, gasoline, and motor oil ranges were detected in the subsurface sample collected downgradient from the alley (Table 3-11). Only diesel-range hydrocarbons, at a concentration of 9,200 mg/kg, exceeded the site-specific screening level of 230 mg/kg (Figure 3-4).

3.6 CANNERY ASTS

3.6.1 Field Activities

Field activities around the cannery ASTs were conducted on September 29, 2002 and consisted of collecting two surface soil samples around the ASTs to assess if any releases had occurred around the tanks (Figure 1-4). In addition to collecting the samples, Weston conducted a visual inspection of the ASTs and attempted to find the location of the fuel supply lines leading to the boiler room and the powerhouse. Upon inspection, the ASTs appeared to be partially to almost completely full, were in poor condition and, although not pitted, showed signs of corrosion. Bunker C fuel oil was observed seeping through several of the riveted seams throughout the AST's surface. The ASTs were secured over a wood beam base and were surrounded by an earthen berm serving as secondary containment. The wood beam supports, although very thick, were rotted and buckled under the weight of the ASTs. No liners were observed inside the berm

and the floor of the containment, and although heavily vegetated with long grasses, appeared to consist of bare soil. Pools of a thick tar-like substance (presumably Bunker C fuel oil) three to six inches thick were observed beneath and around the ASTs and wooden base. Fuel supply lines around the ASTs were observed to extend through the earthen berm and appeared to remain below ground until resurfacing around the boiler room and the alley. On the north side of the berm, the supply lines appeared to have been cut near joints and manifolds. Patches of soil impregnated with a tar-like substance, presumably Bunker C fuel oil, were observed in several areas beneath the fuel supply lines.

3.6.2 Sampling Locations and Analytical Results

Two surface soil samples (SS-CA 007 and SS-CA008) were collected from 0 to 6 inches bgs (Figure 3-5) and were analyzed for the parameters listed in Table 1-3. One sample was collected from an area between the two northernmost ASTs (SS-CA007), and one was collected underneath the fill port of the southernmost AST (SS-CA008). The samples consisted of dark brown to black medium to coarse-grained gravelly sand with silt impregnated with a tar-like substance (presumably Bunker C fuel oil) and organic matter.

Fourteen SVOCs and TPH in the diesel and motor oil ranges were detected in both of the surface soil samples colleted from the cannery ASTs (Table 3-12). From these, benzo(a)anthracene (12,000 µg/kg) and benzo(a)pyrene (5,700 µg/kg) exceeded the site-specific screening levels in sample SS-CA008 collected from the southernmost AST. Diesel (33,000-120,000 mg/kg) and motor oil (22,000-210,000 mg/kg) exceeded the site-specific screening levels in both samples (Figure 3-5).

3.7 GARBAGE PITS

3.7.1 Field Activities

Field activities at the garbage pits were conducted from September 30 to October 1, 2002. The work consisted of collecting one subsurface soil sample downgradient from each of six garbage pits located throughout the village. Due to its large size, two samples were collected from the cannery garbage pit and the remaining five samples were collected from the garbage pits of five private residences. The purpose of these samples was to address the villagers concerns that waste materials buried in their garbage pits could impact groundwater.

In the SQAP, the sample depth proposed for collection of these samples was at the permafrost, which was believed to be located at approximately 5 feet bgs. Upon arrival to the site it was noted there was no layer of permafrost beneath the site. Therefore, an attempt was made to reach the maximum depth of each particular pit by advancing the hand augers to that depth or to refusal. The maximum depth of the pits sampled ranged from 10- to 15-feet bgs. In all the sample locations, refusal occurred before the maximum depth of the pits was achieved.

In addition, upon conversation with the villagers, Weston discovered that the former chemical storage shed was a location where lead weights (sinkers) and other lead parts were manufactured for the cannery's nets. Also, the area between the garbage pit and the shed was historically used

the well (a result of the installation process) would artificially alter the analytical results of the sample. Based on this information, a new well that had just been installed and was being developed a few days earlier was sampled in place of the community center well. This new well, the ice plant well, would be used by the village in the upcoming months to supply water to the ice plant for the flash-freeze plant and smoker facility to be located in the north cannery building. The EPA TM was notified of the situation and a Sample Plan Alteration Form was prepared. A copy of this form is included in Appendix B.

3.8.2 Sampling Locations and Analytical Results

Six groundwater samples (GW-DW001 to GW-DW006) were collected from six village groundwater supply wells on October 1 and 2, 2002 (Figure 1-5). One of the wells sampled was the future ice plant well for the flash freeze plant and smoker facility. The remaining six samples were collected from the groundwater wells at the same private residences where the garbage pit samples were collected.

One VOC and 18 TAL metals were detected in the six groundwater samples collected form the groundwater supply wells (Table 3-14). There were no exceedances to the site-specific screening levels in any of the groundwater samples collected during this investigation.

by the cannery as their fuel storage yard. Based on this information, one sample location was placed downgradient of the garbage pit, the fuel yard, and the former chemical storage shed/lead sinker production shed (GP001; Figures 1-4 and 1-5).

3.7.2 Sampling Locations and Analytical Results

Seven subsurface soil samples (SB-GP001 to SB-GP007) were collected downgradient from the garbage pits as presented in Figure 1-5. Two of the samples, SB-GP001 and SB-GP002 were collected downgradient from the cannery garbage pit the former was also located downgradient of the former chemical storage shed and fuel storage. Sample depths ranged from 6.5 feet to 9 feet bgs. The subsurface soil samples were analyzed for those parameters listed in Table 1-3, and consisted of dark reddish brown, medium- to coarse-grained gravelly sand with occasional trace silt.

Twenty TAL metals and TPH in the diesel and motor oil ranges were detected in the subsurface soil samples collected from the garbage pits (Table 3-13). Total petroleum hydrocarbons in the diesel range (56 mg/kg) and motor oil range (11 mg/kg) were detected only in SB-GP007 (at a residential garbage pit), and metals were detected in all of the samples collected. Arsenic, at concentrations ranging from 2.6-4 mg/kg, was the only analyte that exceeded the site-specific screening levels in all the samples collected from the garbage pits (Table 3-13).

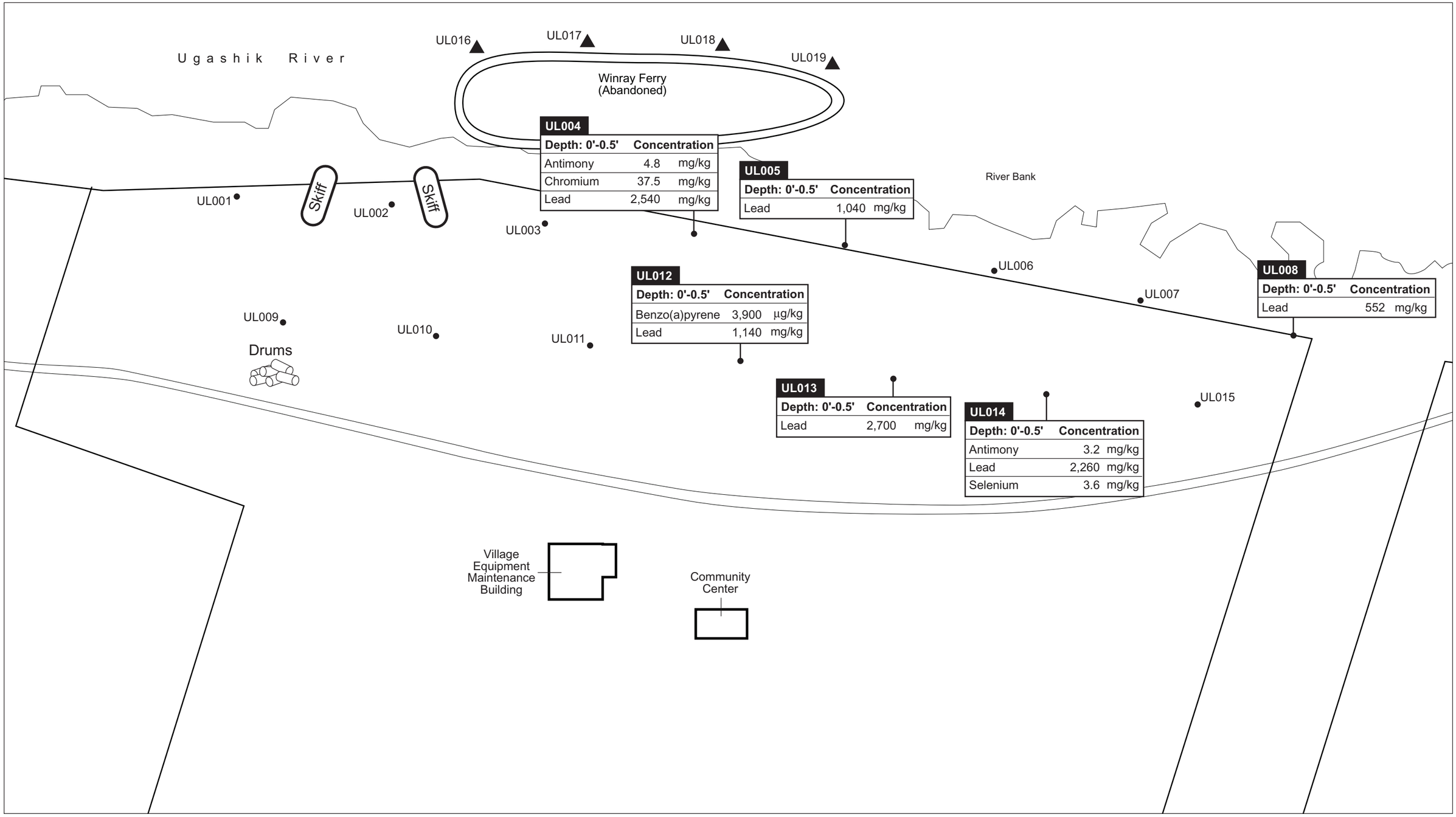
As presented in Section 3.1.2.1, highly mineralized deposits are common in volcanic regions such as those surrounding Ugashik. In addition, the arsenic concentrations detected in these samples are within established levels in surficial soils in the area (Gough et. al. 1988). Although the background soil sample and the USGS study only relate to metal concentrations for surficial soils, these concentrations may be used as an indication of arsenic concentrations at shallow depths such as the samples collected during this study. Based on this information, the arsenic levels observed in these samples likely represent naturally occurring arsenic concentrations in the area.

3.8 DOMESTIC GROUNDWATER SUPPLY WELLS

3.8.1 Field Activities

Field activities regarding the groundwater supply wells were conducted on October 1 and 2, 2002 and consisted of collecting groundwater samples from six wells that are either used as domestic water supply or are used by the entire community or a large section of it. The samples were collected to address the villagers concerns that wastes from the garbage pits may be affecting their groundwater supply.

In the SQAP, one of the proposed groundwater wells to be sampled was the community center well ,which was going to be used by the entire community. Upon arrival to the site, the villagers informed Weston that the well had been installed two years ago but had not been developed (a procedure to clean fine and extraneous material left by the drilling process around the well screen) and had not likely been used since its installation. Due to these conditions, a sample from this well would not have been representative of the site since high amounts of sediment in



N

0 15 30

Scale in Feet

▲ Sediment Sample

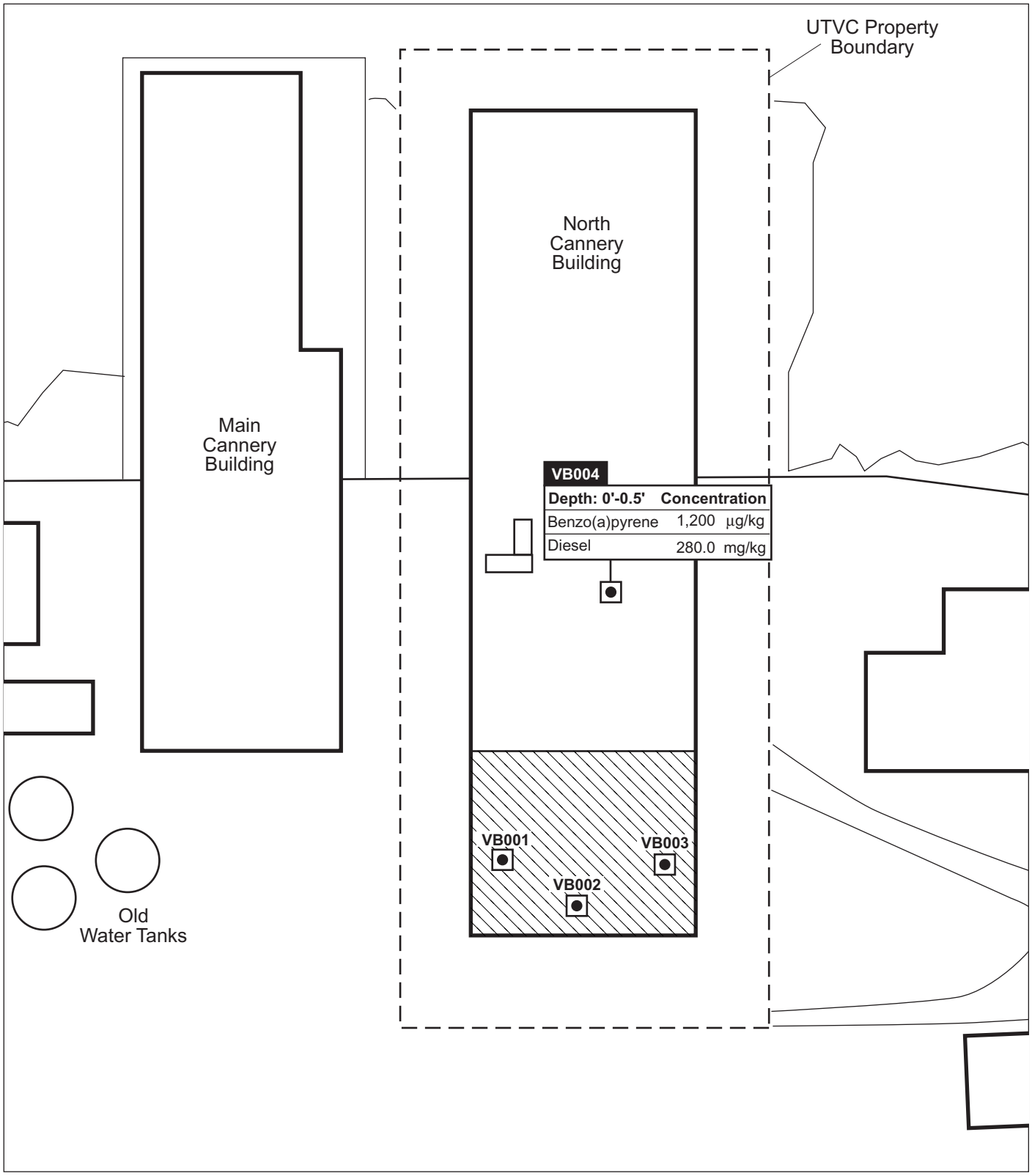
● Surface Soil Sample

WESTON SOLUTIONS

Upland Area Surface Soil Samples Screening Level Exceedances Map
Ugashik Traditional Village TBA
Ugashik, Alaska

Figure
3-1

03-0118 Fig3-1.ai



North Cannery Building Soil Sample Screening Level Exceedances Map
Ugashik Traditional Village TBA
Ugashik, Alaska

N

0 20 40

Scale in Feet

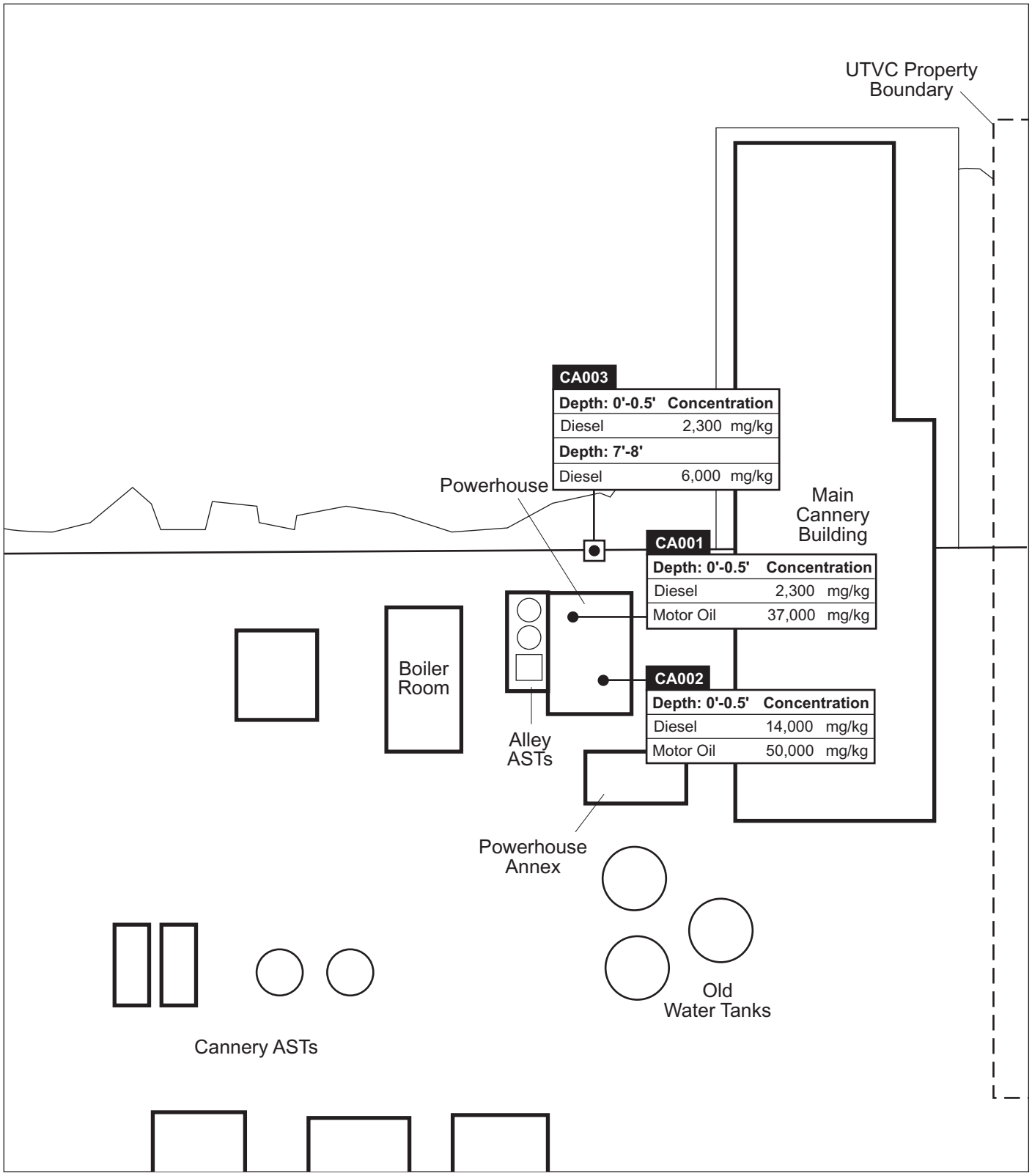
WESTON SOLUTIONS

- Surface Soil Sample
- Subsurface Soil Sample
- Former Maintenance Shop
- UTVC Ugashik Traditional Village Council

Figure **3-2**

03-0118 Fig3-2.ai

4. SUMMARY AND CONCLUSIONS



Powerhouse Soil Sample Screening Level Exceedances Map
Ugashik Traditional Village TBA
Ugashik, Alaska

N

0 20 40

Scale in Feet

WESTON SOLUTIONS

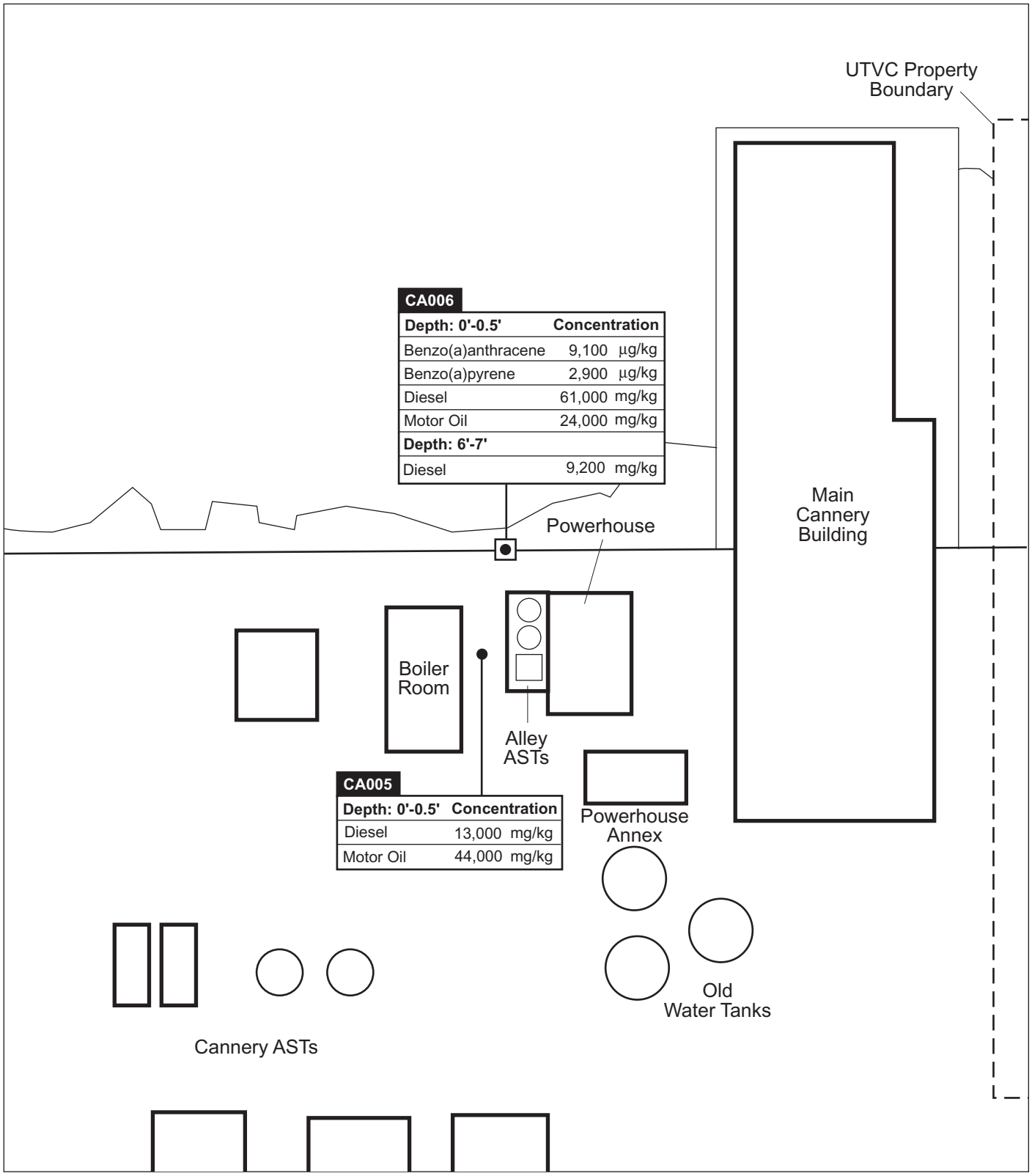
• Surface Soil Sample

□ Subsurface Soil Sample

UTVC Ugashik Traditional Village Council

Figure **3-3**

03-0118 Fig3-3.ai



Alley Soil Sample Screening Level Exceedances Map
Ugashik Traditional Village TBA
Ugashik, Alaska

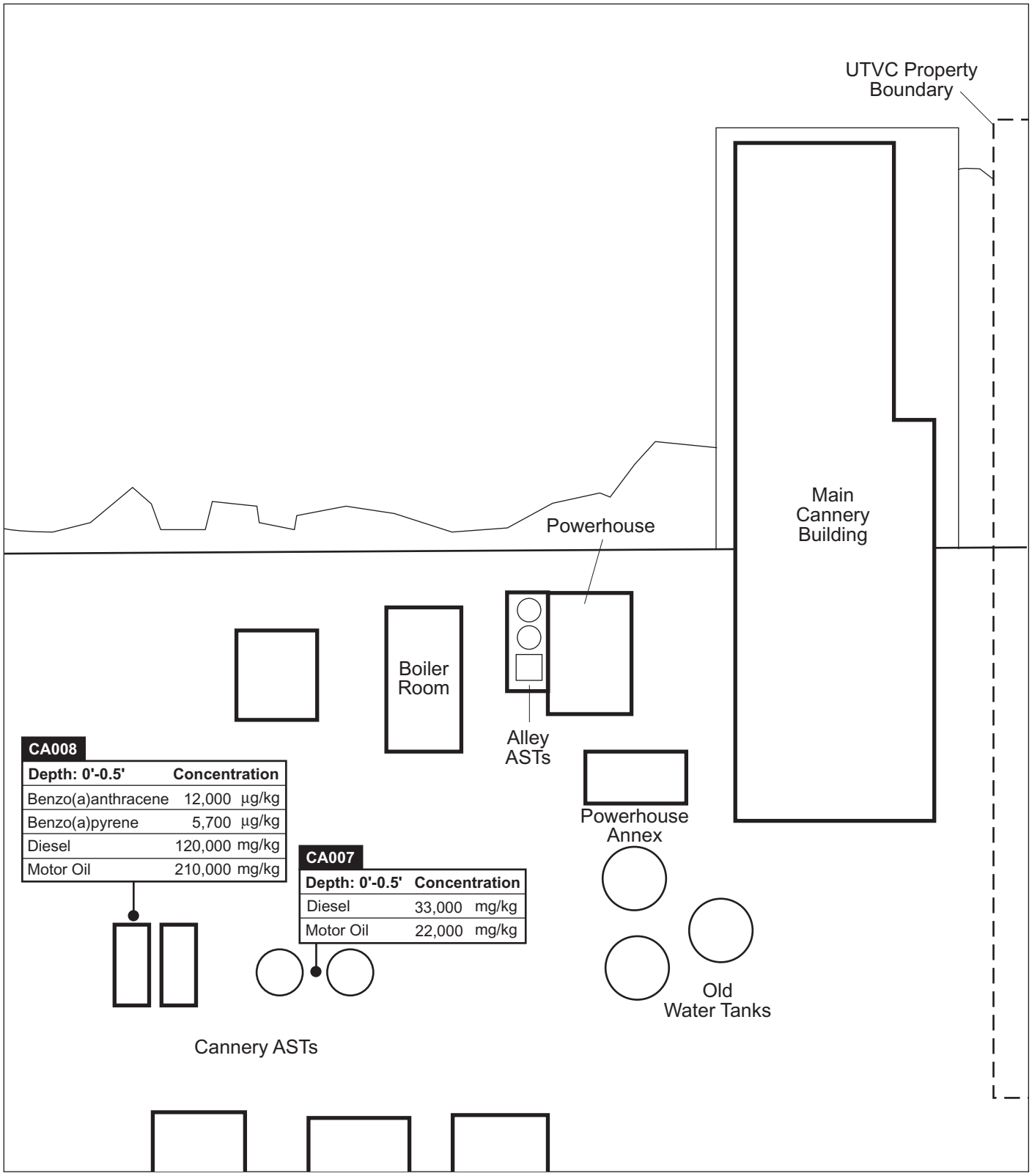
0 20 40
Scale in Feet

WESTON SOLUTIONS

• Surface Soil Sample
□ Subsurface Soil Sample
UTVC Ugashik Traditional Village Council

Figure
3-4

03-0118 Fig3-4.ai



Cannery ASTs Surface Soil Sample Screening Level Exceedances Map
Ugashik Traditional Village TBA
Ugashik, Alaska

N

0 20 40

Scale in Feet

WESTON SOLUTIONS

Surface Soil Sample

Subsurface Soil Sample

UTVC Ugashik Traditional Village Council

Figure **3-5**

03-0118 Fig3-5.ai

SECTION 4

SUMMARY AND CONCLUSIONS

The four areas of the Ugashik Traditional Village site that were the main focus of the TBA consist of the APA north cannery building, the upland area, the abandoned *Winray* ferry adjacent to the upland area, and individual garbage pits throughout the village (Figure 1-2). Other areas of the village were also evaluated due to their suspected impacts to human health and the environment. Surface and subsurface soil samples were collected from these areas and selected areas of the APA cannery in order to assess if there is contamination at the site that may preclude its redevelopment. The north cannery building is expected to be redeveloped as a flash freeze plant and salmon smoking facility for the village and the upland area is to be redeveloped as a community park. Based on the results of this TBA, the UTVC hopes to obtain funds to dismantle the abandoned *Winray,* to excavated the village garbage pits, and to construct a landfill for the community.

Analytical results of surface and subsurface soil samples collected during this TBA indicate that elevated concentrations of TAL metals, (particularly arsenic and lead) are present throughout the site, and exceed the site-specific screening levels in many areas. Since highly mineralized deposits are common in areas of volcanic deposits such as those surrounding Ugashik, a surface soil background sample was collected to document natural background metal concentrations for the site, and to compare to metals concentrations detected in site samples. Analytical results from the background surface soil sample collected during the investigation indicate an estimated arsenic concentration of 2.5 mg/kg. Most of the arsenic concentrations detected in surface and subsurface soil samples collected from the site were at or slightly above the background concentration.

Three samples from the upland area (SS-UL004, SS-UL013 and SS-UL014) contained arsenic concentrations more than three times the background level. In addition, lead levels, which only exceeded screening levels in samples from the upland area, were higher than background levels by up to several orders of magnitude in most of the samples where metal concentrations exceeded the screening levels (Figure 3-1). The scattered nature of the exceedances found in the upland area may be the result of the buried materials in the area and historical practices. There were no exceedances of the site-specific screening levels in the four sediment samples collected around the *Winray* during this TBA.

Most of the surface and subsurface soil samples collected within the APA cannery exceeded the site-specific screening levels for arsenic and TPH. The origin of the arsenic exceedances is believed to be a result of natural arsenic concentrations in the area soils while the origin of the TPH exceedances is believed to be a result of the hydrocarbon releases from the ASTs, leaking pipes, and the powerhouse operations.

Analytical results of the bulk retort insulation sample collected from retort No. 5 at the main cannery building indicated that asbestos in the form of the mineral chrysotile is present in the

retort insulation. Chrysotile was present in seven of the 10 layers in the sample, consisting of 35 percent chrysotile on each layer.

At the north cannery building, other than arsenic, only one soil sample, SS-VB004, had concentrations of other contaminants consisting of TPH, and benzo(a)pyrene at concentrations exceeding the site-specific screening levels. The exceedances in this sample may indicate that these compounds may be leaching from a source that remains unidentified beneath the building and is located between the other sampling locations in the building (SS-VB001 through SS-VB003) and SS-VB004. Because these compounds were detected only in the surface soil sample, the source may be located at or close to the surface and contaminants might be moving by surface runoff or tidal influences. Analytical results for the two microvacuum dust samples collected in the north cannery building indicated that asbestos in the form of the minerals chrysotile and tremolite was present in dust settled inside the building.

Analytical results from surface and subsurface soil samples in the powerhouse, alley, and cannery ASTs indicate that significant releases of petroleum hydrocarbons, mostly diesel and motor oil, had occurred. The analytical results from the subsurface soil samples collected from the sampling locations downgradient of the powerhouse and the alley further indicate that diesel impacted soil is present at the soil and groundwater interface at approximately 6 feet bgs. Although two SVOCs (benzo(a)anthracene and benzo(a)pyrene were also detected in three surface soil samples collected in the area (SS-CA006 and SS-CA008), it appears that petroleum hydrocarbons from releases from the various ASTs and fuel supply lines are the major contaminants of concern in the area.

Analytical results for the garbage pits indicated that arsenic is the only constituent detected at concentrations exceeding the site-specific screening levels. The range of concentrations of arsenic in these samples (2.6-4 mg/kg) are only slightly above the background concentrations and may reflect natural conditions in the area.

There are no exceedances of the site-specific screening levels in any of the domestic groundwater supply samples collected during this TBA.

5. REFERENCES

SECTION 5

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APPENDIX A

PHOTOLOG

photo 1

View of the upland area and the Winray, looking south.

photo 2

View of one of the paths cleared at the upland area for sampling. Looking north.

Photolog

WESTON SOLUTIONS

Photoplate
A-1

03-0118 Photolog.ai

photo 3

View of the Winray and the upland area. Note the APA cannery buildings in the background. Looking south.

photo 4

View of the sediment sampling collection area beside the Winray. Looking north-northwest.

Photolog

WESTON SOLUTIONS

Photoplate
A-2

photo 5

View of sampling location VB001 inside the north cannery building. Note stained floorboards in the foreground.

photo 6

View of the collapsing main cannery building. Looking southwest.

Photolog

WESTON SOLUTIONS

Photoplate
A-3

photo 7

View of cannery retorts inside the main cannery building. Note the retort insulation fallen from retort No. 5.

photo 8

View of truck and skiff inside the north cannery building where microvac samples were collected.

Photolog

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photo 9

View inside of the powerhouse towards sample location CA002.

photo 10

View of the powerhouse and alley. Looking west.

Photolog

WESTON SOLUTIONS

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A-5

photo 11

View of sample location CA003 located down-gradient from the powerhouse. Looking south.

photo 12

View of sample location CA001 inside the powehouse.

Photolog

WESTON SOLUTIONS

Photoplate
A-6

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photo 13

View of the powerhouse annex. Looking northwest.

photo 14

View of sampling location CA006 downgradient from the alley. Looking west.

Photolog

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A-7

photo 15

View of the cannery ASTs. Looking southwest.

photo 16

View of the sampling location CA008 under fill port of one of the cannery ASTs.

Photolog

Photoplate
A-8

03-0118 Photolog.ai

photo 17

View of the collapsing wooden base supporting the cannery ASTs. Looking east.

photo 18

View of the cannery garbage pit located east-northeast of the crew barracks. Looking south.

Photolog

WESTON SOLUTIONS

Photoplate
A-9

photo 19

View of the former chemical storage/lead sinker production shed and sampling location GP001. Looking southeast.

photo 20

View of the ice plant well during development. Looking south.

Photolog

WESTON SOLUTIONS

Photoplate
A-10

APPENDIX B

GLOBAL POSITIONING SYSTEM SAMPLE COORDINATES

APPENDIX B

Global Positioning System Sampling Location Coordinates
Ugashik Traditional Village Targeted Bronfields Assessment

Station ID	Latitude	Longitude
BK001	57.52272733	-157.4044739
CA005	57.50795797	-157.3995776
CA006	57.50794226	-157.399621
CA007	57.50762269	-157.3987577
CA008	57.50752427	-157.3986675
DW001	57.51326258	-157.4014289
DW002	57.50863117	-157.3992372
DW003	57.50905588	-157.3998885
DW004	57.51869105	-157.4040211
DW005	57.51559836	-157.4021644
DW006	57.52051874	-157.405168
GP001	57.50824305	-157.3984743
GP002	57.50835034	-157.398946
GP003	57.5092305	-157.3990097
GP004	57.51338806	-157.4013286
GP005	57.51910499	-157.4042064
GP006	57.51566677	-157.4008123
GP007	57.5204475	-157.4045828
UL001	57.51057258	-157.4005582
UL002	57.51069567	-157.4005973
UL003	57.51082536	-157.4006235
UL004	57.5109742	-157.4006796
UL005	57.51140755	-157.4011058
UL006	57.51154491	-157.4011408
UL007	57.51164589	-157.4012142
UL008	57.51178333	-157.4012405
UL009	57.51100536	-157.4007323
UL010	57.51114577	-157.4007636
UL011	57.51125603	-157.4008534
UL012	57.51137051	-157.4008914
UL013	57.51152381	-157.4008765
UL014	57.51169081	-157.400908
UL015	57.51183114	-157.4009407
UL016	57.51109283	-157.401426
UL017	57.51130008	-157.4016364
UL018	57.51146833	-157.4017274
UL019	57.51156065	-157.4017452

Notes:
Horizontal Datum used for GPS measurements is the North American Datum (NAD) 83 with a geographical projection.

APPENDIX C

SAMPLE PLAN ALTERATION FORMS

APPENDIX D

QUALITY ASSURANCE/QUALITY CONTROL SUMMARY AND DATA VALIDATION MEMORANDA

APPENDIX D

QUALITY ASSURANCE/QUALITY CONTROL SUMMARY
Ugashik Traditional Village Targeted Brownfields Assessment

In order to ensure data quality objectives are met, data quality indicators are evaluated to determine sample and laboratory performance. These data, known as QA/QC data, are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware, and reagents due to sample collection, preparation, and analysis activities. Specific QC requirements for laboratory analyses are incorporated in the *USEPA Contract Laboratory Program Statement of Work for Organic Analysis, OLM04.2* (EPA1999), *USEPA Contract Laboratory Program Statement or Work for Inorganic Analyses, ILM04.1* (EPA 2000), *Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods* (USEPA SW-846, 3rd edition), Appendix L of Ecology's *Guidance for Remediation of Releases from Underground Storage Tanks,* and *Analytical Methods for Petroleum Hydrocarbons* (Ecology 97-602), *Alaska Department of Environmental Conservation* petroleum analysis methods, and contracted-laboratory standard operating procedures.

These QC requirements or equivalent requirements were followed for analytical work on the *Ugashik Traditional Village Targeted Brownfields Assessment (TBA).* This section describes the QA/QC measures taken for work associated with the TBA and provides evaluation for the end user regarding usability of the data presented in this report.

All samples were collected following procedures outlined in the Sampling and Quality Assurance Plan (SQAP; Weston 2002). Soil and water analyses for metals were performed by Liberty Analytical, following *USEPA Contract Laboratory Program Statement or Work for Inorganic Analyses, Multi-Media, Multi Concentration ILM04.1 (EPA 2000)* for metals and *USEPA Contract Laboratory Program Statement or Work for Organic Analyses, Multi-Media, Multi Concentration OLM04.2 (EPA 1996)* for organochlorine pesticides/PCBs, VOCs, and PAHs. Soil/sediment and water analyses for polynuclear aromatic hydrocarbons (PAH), butyltins, and petroleum products were performed by Laucks Testing Laboratories of Seattle, Washington, and the EPA Region 10 Laboratory in Manchester, Washington.

All data from analyses performed at the CLP Laboratory were validated using the CADRE software application. Data collected by the commercial laboratory were validated by Weston. Data collected by the EPA Region 10 laboratory were validated by EPA. Data qualifiers were applied as required by *Contract Laboratory Program National Functional Guidelines for Organic Data Review (1999),* modified to include specific criteria of the individual analytical methods. Data qualifiers for inorganics data were applied by the CADRE software.

D.1 SATISFACTION OF DATA QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The project data quality objectives for the field effort were designed to produce data of known and documented quality in order to characterize sources, determine off-site migration of

contaminants, determine whether the site is eligible for placement on the NPL, and to document threat(s) or potential threat(s) to public health or the environment posed by the site. The Data Quality Objective (DQO) process applied to this project followed that described in the EPA document, *Guidance for the Data Quality Objectives Process* (EPA 1994).

All samples collected during the TBA investigation were analyzed using definitive analytical methods, and all analytical methods employed for this project were accepted by EPA. The data generated for this project met or exceeded requirements for the definitive data category as defined in *Data Quality Objective Process for Superfund* (EPA 540/G-93/71). A detailed discussion of the objectives achieved during the TBA is presented in the following sections.

D.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Quality control checks for sample collection were evaluated by a combination of Chain-of-Custody protocols and laboratory quality assurance as prescribed in the sampling or analytical methods. Quality control samples (i.e., matrix spike/duplicate samples, rinsate samples) at a frequency of one per 20 samples per media were collected during the TBA field effort. Results from these samples were compared to each method's criteria.

All of the analyses conducted during this project produced definitive data. Data quality indicator targets for this project are specified below—data quality objectives (DQOs) are summarized in the SQAP. Bias on estimated, flagged data was determined through the validation process. The laboratories' DQOs for completeness and the field team's ability to meet the DQO for representativeness were set at 90%. Precision and accuracy requirements are outlined also in the SQAP.

D.3 PROJECT-SPECIFIC DATA QUALITY OBJECTIVES

Data quality indicator (DQI) goals—precision, accuracy, representativeness, comparability, and completeness (PARCC)—for this project were developed following guidelines presented in EPA *Guidance for Quality Assurance Project Plans*, EPA QA/G-5 Final, Appendix D. The basis for assessing each of the elements of data quality is discussed in the following subsections. QA objectives for measurement of analytical data and QC guidelines for precision and accuracy are presented in the SQAP. Other DQI goals are included in the individual Standard Operating Procedures (SOPs), the CLP Statement of Work (SOW) for Inorganics Analysis, ILM04.1, and the CLP Statement of Work for Organics Analysis, OLM04.2.

The laboratory and field team were able to meet project DQOs.

D.3.1 Precision

Precision measures the reproducibility of measurements. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar conditions.

Analytical precision is the measurement of the variability associated with duplicate (two) or replicate (more than two) analyses. When recovery results between different analytical batches

are compared, the laboratory control sample (LCS) may be used to determine the precision of the analytical method. In this case, the comparison is not between a sample and a duplicate sample analyzed in the same batch. Rather, the comparison is between the sample and samples analyzed in previous batches. A LCS may be prepared and analyzed within a given batch; in this case, the analytical precision is associated with a particular preparation and analysis sequence.

Total precision is the measurement of the variability associated with the entire sampling and analysis process for one sampling event. It is determined by analysis of duplicate or replicate field samples and measures variability introduced by both the laboratory and field operations. Field duplicate samples and matrix duplicate spiked samples shall be analyzed to assess field and analytical precision, and the precision measurement is determined using the relative percent difference (RPD) between the duplicate sample results. The laboratory was able to meet project DQOs, with the exceptions listed below.

D.3.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systemic error. It reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. Analytical accuracy is measured by comparing the percent recovery of analytes spiked into an LCS or into a field sample (to prepare a matrix-spiked sample or matrix-spiked duplicate sample) to a control limit. The laboratory was able to meet project DQOs, with the exceptions listed below.

D.3.3 Representativeness

Representativeness is a measure of the degree to which data accurately and precisely represent a population, including a sampling point, a process condition, or an environmental condition. Representativeness is the qualitative term that should be evaluated to determine that measurements are made and physical samples collected at locations and in a manner resulting in characterizing a matrix or media. Subsequently, representativeness is used to ensure that a sampled population represents the target population and an aliquot represents a sampling unit. The field team was able to meet project DQOs.

D.3.4 Comparability

Comparability is the qualitative term that expresses the measure of confidence that two data sets or batches can contribute to a common analysis and evaluation. Comparability with respect to laboratory analyses pertains to method type comparison, holding times, stability issues, and aspects of overall analytical quantitation. The following items are evaluated when assessing data comparability:

- Determining if two data sets or batches contain the same set of parameters
- Determining if the units used for each data set are convertible to a common metric
- Determining if similar analytical procedures and quality assurance were used to collect data for both data sets

- Determining if the analytical instruments used for both data sets have approximately similar detection levels
- Determining if samples within data sets were selected and collected in a similar manner

To ensure comparability of data collected during this investigation to other data that may have been or may be collected for the site, standard collection and measurement techniques were used. The field team was able to meet project DQOs.

D.3.5 Completeness

Completeness is calculated for the aggregation of data for each analyte measured for any particular sampling event or other defined set of samples. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not rejected through data validation. The requirement for completeness for this project is 90% for aqueous samples and 90% for soil samples.

The following formula is used to calculate completeness:

$$\%\ \text{completeness} = \frac{\text{number of valid results}}{\text{number of possible results}}$$

For this investigation, all samples are considered critical. Therefore, standard collection and measurement methods will be used to achieve the completeness goal. The project DQO of 90% for completeness was met..

D.4 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PARAMETERS

The laboratory data also were reviewed for technical holding time compliance, blank samples contamination, laboratory control sample recovery, duplicate sample analysis, and matrix spike sample analysis. These parameters are described below in more detail, and sample-specific detail is provided in the data validation memoranda (Appendix D).

This section details performance of the commercial laboratory only—comprehensive data validation was not performed on the CLP-generated data.

D.4.1 Holding Times

All analyses were completed with the technical holding times with the exception of 4 petroleums analyses in soil extraction. The associated data were not flagged.

D.4.2 Laboratory Blanks

All laboratory blanks met the frequency criteria. The following contaminants of concern were detected in the laboratory blanks:

- Traces of phthalates and VOC target compounds were detected in method blanks associated with CLP organics analyses. Because the associated compounds are common laboratory contaminants, all detected sample results less ten-times the blank values are reported as non-detected (U) at the measured concentration.

Any other associated sample result less than five-times the blank level (ten-times for common laboratory contaminants) was qualified as non-detected (U).

D.4.3 Laboratory Control Samples

All laboratory control samples analyzed met frequency and recovery criteria, with the exception of low blank spike/blank spike duplicate recoveries associated with AK102/103 analyses for SDG UTV02. Because the samples were highly contaminated, no data were qualified.

D.4.4 Duplicate Sample Analysis

Duplicate sample precision and frequency criteria were met.

D.4.5 Matrix Spike Sample Analysis

Matrix spike analysis met precision and accuracy requirements, with the exception of thallium for SDG MJ0MZ7. Thallium results were rejected for use due to zero percent matrix spike recovery.

D.4.6 Other Data Assessment

For data quantitation the GC/MS threshold level is equivalent to approximately 67 µg/kg on a sample basis. This threshold level assumes a sample size of 15 g, 100% total solids and no dilutions, although these are nominal parameters which vary on a sample per sample basis. For relatively uncontaminated samples, levels below the Region 9 PRG lowest action levels of 100 ppb or 137 ppb for several PAH compounds were achieved.

For these GC/MS analyses, various technical considerations (including the difficulty of mass spectral confirmation for analytes at very low concentrations) may preclude the reporting of concentrations at the MDL. Consequently, for each instrument used in the GC/MS analyses, the laboratory established an instrument-specific threshold value. Analyte concentrations greater than this threshold value but less than the reporting limit were reported as positive and assigned estimated (J) qualifiers to signify that such concentrations should be considered estimates. Analyte concentrations less than this threshold value were reported as non-detected at the CRQL reporting limit.

Because the laboratory's GC/MS forms-generating software constraints prevented the listing of these threshold values on the Forms I (these forms are generated based on CLP organic SOW

requirements), the equivalent values were not reported based on the above specifications for each sample/analyte.

Non-detected values represent the nominal 67 µg/kg detection limit, scaled by the sample size and percent solids content. Furthermore, reported non-detected concentration values may divided by a factor of five (5) to calculate the estimated sample detection limit.

APPENDIX E

SUMMARY OF SAMPLE ANALYTICAL RESULTS

APPENDIX E

SUMMARY OF SAMPLE ANALYTICAL RESULTS
Data Qualifier Definitions

The following is a list of the data qualifiers used in data validation packages for analytical results of samples collected during the Ugashik Traditional Village Targeted Brownfield Assessment. Analytical results from samples analyzed through CLP and EPA laboratories were validated using the EPA's Computer-Aided Data Review and Evaluation (CADRE) software package. Samples analyzed by commercial laboratories under subcontract with Weston were validated by Weston.

U — The compound was analyzed for, but not detected.

UJ — The compound was analyzed for, but was not detected; the associated quantitation limit is an estimate because quality control criteria were not met.

J — The analyte was positively identified, but the associated numerical values is an estimate quantity because quality control criteria were not met or because concentrations reported are less than the quantitation limit or lowest calibration standard.

R — Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.

B — Detected concentration is below the method reporting limit/Contract Required Detection Limit (CRDL) but is above the instrument detection limit (inorganics only).

BJ — Detected concentration is below the method reporting limit/Contract Required Detection Limit (CRDL) but is above the instrument detection limit (inorganics only). The associate result is an estimate.

BJK Detected concentration is below the method reporting limit/Contract Required Detection Limit (CRDL) but is above the instrument detection limit (inorganics only). The associate result is an estimate with and unknown bias.

H — High bias.

K — Unknown bias.

L — Low bias.

Q — Detected concentration is below the method reporting limit/Contract Required Quantitation Limit (CRQL) but is above the method detection limit (organics only).

Table 1-2—Summary of Sediment Quality Guidelines
Ugashik Traditional Village Targeted Brownfields Assessment
Ugashik, Alaska

Compound	WA State Sediment Management Standards (SMS)		Washington State Apparent Effects Threshold (AETs) Sediment Quality Values (SQS)		Screening Level Proposed for Use
	SQS[1]	CSL[2]	LAET[3]	2LAET[4]	
Inorganics (mg/kg DW)					
Antimony			150	200	150
Arsenic	57	93	57	93	57
Cadmium	5.1	6.7	5.1	6.7	5.1
Chromium	260	270	260	270	260
Copper	390	390	390	390	390
Lead	450	530	450	530	450
Mercury	0.41	0.59	0.41	0.59	0.41
Nickel			>140	>140	>140
Silver	6.1	6.1	6.1	6.1	6.1
Zinc	410	960	410	960	410
BNAs (µg/kg DW)					
2-Methylnaphthalene			670	1400	670
Naphthalene			2100	2400	2100
Acenaphthylene			1300	1300	1300
Acenaphthene			500	730	500
Fluorene			540	1000	540
Phenanthrene			1500	5400	1500
Anthracene			960	4400	960
Total LPAH			5200	13000	5200
Fluoranthene			1700	2500	1700
Pyrene			2600	3300	2600
Benzo(a)anthracene			1300	1600	1300
Chrysene			1400	2800	1400
Total Benzofluoranthenes			3200	3600	3200
Benzo(a)pyrene			1600	3000	1600
Dibenz(a,h)anthracene			230	540	230
Benzo(g,h,i)perylene			670	720	670
Total HPAH			12000	17000	12000
Phenol	420	1200	420	1200	420
2-Methylphenol	63	63	63	72	63
4-Methylphenol	670	670	670	1800	670
2,4-Dimethylphenol	29	29	29	72	29
Pentachlorophenol	360	690	360	690	360
1,2-Dichlorobenzene			35	50	35
1,3-Dichlorobenzene			170	170	170
1,4-Dichlorobenzene			110	120	110
1,2,4-Trichlorobenzene			31	51	31
Hexachlorobenzene			22	70	22

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Ugashik Traditional Village Targeted Brownfields Assessment
Ugashik, Alaska

Compound	WA State Sediment Management Standards (SMS)		Washington State Apparent Effects Threshold (AETs) Sediment Quality Values (SQS)		Screening Level Proposed for Use
	SQS[1]	CSL[2]	LAET[3]	2LAET[4]	
Dimethylphthalate			71	160	71
Diethylphthalate			200	200	200
Di-n-butylphthalate			1400	1400	1400
Butylbenzylphthalate			63	900	63
Bis(2-ethylhexyl)phthalate			1300	1900	1300
Di-n-octylphthalate			6200	6200	6200
Dibenzofuran			540	700	540
Hexachlorobutadiene			11	120	11
Hexachloroethane					
n-Nitrosodiphenylamine			28	40	28
BNAs (µg/kg TOCN)[5]					
2-Methylnaphthalene	38000	64000			
Naphthalene	99000	170000			
Acenaphthylene	66000	66000			
Acenaphthene	16000	57000			
Fluorene	23000	79000			
Phenanthrene	100000	480000			
Anthracene	220000	1200000			
Total LPAH	370000	780000			
Fluoranthene	960000	1200000			
Pyrene	1000000	1400000			
Benzo(a)anthracene	110000	270000			
Chrysene	110000	460000			
Total Benzofluoranthenes	230000	450000			
Benzo(a)pyrene	99000	210000			
Indeno(1,2,3-cd)pyrene	34000	88000			
Dibenz(a,h)anthracene	12000	33000			
Benzo(g,h,i)perylene	31000	78000			
Total HPAH	960000	5300000			
1,2-Dichlorobenzene	2300	2300			
1,4-Dichlorobenzene	3100	9000			
1,2,4-Trichlorobenzene	810	1800			
Hexachlorobenzene	380	2300			
Dimethylphthalate	53000	53000			
Diethylphthalate	61000	110000			
Di-n-butylphthalate	220000	1700000			
Butylbenzylphthalate	4900	64000			
Bis(2-ethylhexyl)phthalate	47000	78000			
Di-n-octylphthalate	58000	4500000			

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Ugashik Traditional Village Targeted Brownfields Assessment
Ugashik, Alaska

Compound	WA State Sediment Management Standards (SMS)		Washington State Apparent Effects Threshold (AETs) Sediment Quality Values (SQS)		Screening Level Proposed for Use
	SQS[1]	CSL[2]	LAET[3]	2LAET[4]	
Dibenzofuran	15000	58000			
Hexachlorobutadiene	3900	6200			
n-Nitrosodiphenylamine	11000	11000			
VOCs (µg/kg DW)					
Ethylbenzene			10	33	10
Tetrachloroethene			57	140	57
Trichloroethene					
Xylene (Total)			40	100	40
PCBs (µg/kg DW)					
Total PCB			130	1000	130
PCBs (µg/kg TOCN)					
Total PCB	12000	65000			

Notes:
[1] SQS: Sediment quality standard.
[2] CSL: Cleanup screening level.
[3] LAET: Lowest AET.
[4] 2LAET: Second-lowest AET.
[5] TOCN: Normalized to total organic carbon content.
DW: Dry-weight.
Blank cell indicates criterion not available.

Table 1-3—Ugashik Traditional Village Targeted Brownsfield Assessment—Sampling Locations & Analyses

Sample Number	Depth Interval (ft bgs)	EPA Number	Organic CLP #	Inorganic CLP #	Sample Date	Sample Time	HCID	AK TPH	PAHs	SVOCs	VOCs	TAL Metals	Pest/ PCBs	TBT	Asbestos		Notes
															Microvac	Bulk Suspect ACM	
Ugashik Traditional Village North Cannery Building—Surface Soil																	
UTV-SS-VB001 - 0000	0-0.5	02394031	JOD92	MJ0MY4	9/28/02	1320	X	X		X		X					SE corner of Bldg
UTV-SS-VB002 - 0000	0-0.5	02394033	JOD94	MJ0MY6	9/28/02	1525	X	X		X		X					Center east—laithe
UTV-SS-VB003 - 0000	0-0.5	02394035	JOD96	MJ0MY8	9/28/02	1545	X	X		X		X					NE corner of Bldg.
UTV-SS-VB004 - 0000	0-0.5	02394037	JODW0	MJ0MZ0	9/29/02	1110	X	X		X		X					Downgradient by north door
Ugashik Traditional Village North Cannery Building—Subsurface Soil																	
UTV-SB-VB001 - 0070	7-8	02394032	JOD93	MJ0MY5	9/28/02	1430	X	X		X	X	X					SE corner of Bldg
UTV-SB-VB002 - 0075	7.5-8.5	02394034	JOD95	MJ0MY7	9/28/02	1730	X	X		X	X	X					Center east—laithe
UTV-SB-VB003 - 0075	7.5-8.5	02394036	JOD97	MJ0MY9	9/28/02	1650	X	X		X	X	X					NE corner of Bldg.
UTV-SB-VB004 - 0065	6.5-7.5	02394038	JODW1	MJ0MZ1	9/29/02	1215	X	X		X	X	X					Downgradient by north door
Ugashik Traditional Village North Cannery Building—ACM																	
UTV-AS-VB001 - 0000	NA	02404114	NA	NA	10/01/02	1630									X		Microvac Truck
UTV-AS-VB002 - 0000	NA	02404115	NA	NA	10/01/02	1636									X		Microvac Boat
Main Cannery Building—ACM																	
UTV-AS-CA001 - 0000	NA	02394041	NA	NA	9/28/02	1130										X	Bulk sample from Retort #5
Cannery Powerhouse—Surface Soil																	
UTV-SS-CA001 - 0000	0-0.5	02394025	JOD86	MJ0MX8	9/28/02	1125	X	X		X		X	X				Inside by generator
UTV-SS-CA002 - 0000	0-0.5	02394026	JOD87	MJ0MX9	9/28/02	1145	X	X		X		X	X				Inside to the east center
UTV-SS-CA003 - 0000	0-0.5	02394027	JOD88	MJ0MY0	9/28/02	1400	X	X		X		X	X				Outside—downgradient ctr west
UTV-SS-CA004 - 0000	0-0.5	NA	NA	NA	NA	NA	X	X		X		X	X				Not collected-blocked by pier
Cannery Powerhouse—Subsurface Soil																	
UTV-SB-CA003 - 0065	6.5-7.5	02394028	JOD89	MJ0MY1	9/28/02	1335	X	X		X		X	X				Outside—downgradient ctr west
Alley Between The Powehouse and The Boiler Room—Surface Soil																	
UTV-SS-CA005 - 0000	0-0.5	02394042	JODW4	NA	9/28/02	1300	X	X		X			X				By leaking pipes
UTV-SS-CA006 - 0000	0-0.5	02394043	JODW5	NA	9/28/02	1425	X	X		X			X				downgradient—east of berm
Alley Between The Powehouse and The Boiler Room—Subsurface Soil																	
UTV-SB-CA006 - 0060	6-7	02394044	JODW6	NA	9/28/02	1435	X	X		X			X				downgradient—east of berm
Cannery ASTs—Surface Soil																	
UTV-SS-CA007 - 0000	0-0.5	02394045	JODW7	NA	9/29/02	1315	X	X		X							Tall ASTs-Sample collected between both ASTs
UTV-SS-CA008 - 0000	0-0.5	02394046	JODW8	NA	3/29/02	1350	X	X		X							Long AST-under fill port of southernmost
Area Upland From the Winray—Surface Soil																	
UTV-SS-UL001 - 0000	0-0.5	02394000	JOD14	MJ0M13	9/26/02	1142	X	X		X		X	X	X			
UTV-SS-UL002 - 0000	0-0.5	02394002	JOD16	MJ0M15	9/26/02	1130	X	X		X		X	X	X			
UTV-SS-UL003 - 0000	0-0.5	02394004	JOD18	MJ0MT8	9/26/02	1300	X	X		X		X	X	X			
UTV-SS-UL004 - 0000	0-0.5	02394006	JOD20	MJ0MW0	9/26/02	1345	X	X		X		X	X	X			
UTV-SS-UL005 - 0000	0-0.5	02394011	JOD73	MJ0MW5	9/26/02	1515	X	X		X		X	X	X			
UTV-SS-UL006 - 0000	0-0.5	02394012	JOD74	MJ0MW6	9/26/02	1545	X	X		X		X	X	X			
UTV-SS-UL007 - 0000	0-0.5	02394019	JOD81	MJ0MX3	9/27/02	1225	X	X		X		X	X	X			

Table 1-3—Ugashik Traditional Village Targeted Brownsfield Assessment—Sampling Locations & Analyses

Sample Number	Depth Interval (ft bgs)	EPA Number	Organic CLP #	Inorganic CLP #	Sample Date	Sample Time	HCID	AK TPH	PAHs	SVOCs	VOCs	TAL Metals	Pest/ PCBs	TBT	Asbestos		Notes
															Microvac	Bulk Suspect ACM	
UTV-SS-UL008 - 0000	0-0.5	02394018	JOD80	MJ0MX2	9/27/02	1215	X	X		X		X	X	X			
UTV-SS-UL009 - 0000	0-0.5	02394007	JOD21	MJ0MW1	9/26/02	1450	X	X		X		X	X	X			
UTV-SS-UL010 - 0000	0-0.5	02394009	JOD23	MJ0MW3	9/26/02	1530	X	X		X		X	X	X			
UTV-SS-UL011 - 0000	0-0.5	02394013	JOD75	MJ0MW7	9/27/02	1115	X	X		X		X	X	X			
UTV-SS-UL012 - 0000	0-0.5	02394014	JOD76	MJ0MW8	9/27/02	1125	X	X		X		X	X	X			
UTV-SS-UL013 - 0000	0-0.5	02394015	JOD77	MJ0MW9	9/27/02	1135	X	X		X		X	X	X			
UTV-SS-UL014 - 0000	0-0.5	02394016	JOD78	MJ0MX0	9/27/02	1150	X	X		X		X	X	X			
UTV-SS-UL015 - 0000	0-0.5	02394017	JOD79	MJ0MX1	9/27/02	1155	X	X		X		X	X	X			
Area Upland From The Winray—Subsurface Soil																	
UTV-SB-UL001 - 0080	8-9	02394001	JOD15	MJ0M14	9/26/02	1325	X	X		X	X	X	X	X			
UTV-SB-UL002 - 0070	7-8	02394003	JOD17	MJ0MT7	9/26/02	1220	X	X		X	X	X	X	X			
UTV-SB-UL003 - 0070	7-8	02394005	JOD19	MJ0MT9	9/26/02	1430	X	X		X	X	X	X	X			
UTV-SB-UL009 - 0060	6-7	02394008	JOD22	MJ0MW2	9/26/02	1608	X	X		X	X	X	X	X			
UTV-SB-UL010 - 0070	7-8	02394010	JOD24	MJ0MW4	9/26/02	1700	X	X		X	X	X	X	X			
***Winray* —Sediment**																	
UTV-SD-UL016 - 0000	0-10 cm	02394020	JOD82	MJ0MX4	9/27/02	1315	X	X		X		X	X	X			Southwest corner
UTV-SD-UL017 - 0000	0-10 cm	02394021	JOD83	MJ0MX5	9/27/02	1325	X	X		X		X	X	X			Southwest center
UTV-SD-UL018 - 0000	0-10 cm	02394022	JOD84	MJ0MX6	9/27/02	1345	X	X		X		X	X	X			Northwest center
UTV-SD-UL019 - 0000	0-10 cm	02394023	JOD85	MJ0MX7	9/27/02	1350	X	X		X		X	X	X			Northwest corner
Garbage Pits—Subsurface Soil																	
UTV-SB-GP001 - 0070	7-8	02404100	JODX2	MJ0MZ8	9/30/02	1530	X	X		X		X	X				Cannery Pit 1—Lead shack
UTV-SB-GP002 - 0065	6.5-7.5	02404101	JODX3	MJ0MZ9	9/30/02	1745	X	X		X		X	X				Cannery Pit 2—Water Towers
UTV-SB-GP003 - 0070	7-8	02404102	JODX4	MJ0N00	10/01/02	1110	X	X		X		X	X				Art's Pit
UTV-SB-GP004 - 0080	8-9	02404103	JODX5	MJ0N01	10/01/02	1215	X	X		X		X	X				Hattie's Pit
UTV-SB-GP005 - 0075	7.5-8.5	02404104	JODX6	MJ0N02	10/1/02	1655	X	X		X		X	X				Mark and Nancy's Pit
UTV-SB-GP006 - 0070	7-8	02404105	JODX7	MJ0N03	10/01/02	1920	X	X		X		X	X				Paul and Lacy's Pit
UTV-SB-GP007 - 0090	9-10	02404106	JODX8	MJ0N04	10/01/02	1110	X	X		X		X	X				Roy's pit
Domestic Water Supply Wells																	
UTV-GW-DW001 - 0000	NA	02404108	JODY0	MJ0N05	10/01/02	1230	X	X	X	X	X	X	X				Hattie's Well
UTV-GW-DW002 - 0000	NA	02404109	JODY1	MJ0N06	10/01/02	1010	X	X	X	X	X	X	X				Ice Plant Well
UTV-GW-DW003 - 0000	NA	02404110	JODY2	MJ0N07	10/01/02	1120	X	X	X	X	X	X	X				Art's Well
UTV-GW-DW004 - 0000	NA	02404111	JODY3	MJ0N08	10/01/02	1555	X	X	X	X	X	X	X				Mark and Nancy's Well
UTV-GW-DW005 - 0000	NA	02404112	JODY4	MJ0N09	10/01/02	1750	X	X	X	X	X	X	X				Paul and Lacy's Well
UTV-GW-DW006 - 0000	NA	02404113	JODY5	MJ0N10	10/02/02	1035	X	X	X	X	X	X	X				Roy's Well
Rinsate Blanks																	
UTV-SS-CA007 - 4000	NA	02394047	JODW9	MJ0MZ4	9/29/02	0900	X	X		X		X	X	X			
UTV-SS-VB004 - 4000	NA	02394048	JODX0	MJ0MZ5	9/29/02	0915	X	X		X		X	X				
UTV-SB-VB004 - 4000	NA	02394049	JODX1	MJ0MZ6	9/29/02	0930	X	X		X		X	X				
UTV-SB-CA002 - 4000	NA	02394040	JODW3	MJ0MZ3	09/28/02	0900	X	X		X		X	X	X			
UTV-SD-UL001 - 4000	NA	02394039	JODW2	MJ0MZ2	9/27/02	1845	X	X		X		X	X	X			

Table 1-3—Ugashik Traditional Village Targeted Brownsfield Assessment—Sampling Locations & Analyses

Sample Number	Depth Interval (ft bgs)	EPA Number	Organic CLP #	Inorganic CLP #	Sample Date	Sample Time	HCID	AK TPH	PAHs	SVOCs	VOCs	TAL Metals	Pest/ PCBs	TBT	Asbestos		Notes
															Microvac	Bulk Suspect ACM	
Background Sample																	
UTV-SS-BK001_ - 0000	0-0.5	02404116	NA	MJOMZ7	10/02/02	1045						X					
Trip Blanks																	
UTV-SB-UL002 - 2070	NA	02394024	NA	NA	9/26/02	2000		X									AK101 trip blank
UTV-SS-UL008 - 2000	NA	02404107	NA	NA	9/30/02	0935		X									AK101 trip blank
UTV-SB-VB004 - 2065	NA	02394051	JODX2	NA	9/29/02	0830					X						VOC trip blank
UTV-SS-CA008 - 2000	NA	02394052	NA	NA	9/29/02	1700		X									AK101 trip blank
UTV-SB-GP-001 - 2070	NA	02404117	NA	NA	10/03/02	0800		X									AK101 GW trip blank
UTV-GW-DW001 - 2000	NA	02404118	JODY7	NA	10/01/02	0815					X						VOC GW trip blank
IDW																	
UTV-WA-IDW1 - 0000	NA	02404119	JODY8	MJON11	10/02/02	2000	X	X	X	X	X	X	X	X			

Table 3-1—Upland Area Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Semi-Volatile Organic Compounds (µg/kg)					
1,1'-Biphenyl	28	1/15	0/15	Region 9 EPA PRGs	350,000
2-Methylnaphthalene	28-56	4/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Acenaphthene	20	1/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	190,000
Acenaphthylene	17-530	10/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	190,000
Anthracene	12-1,200	12/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Benzaldehyde	16	1/15	0/15	Region 9 EPA PRGs	6,100,000
Benzo(a)anthracene	19-4,400	12/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	5,500
Benzo(a)pyrene	18-3,900	12/15	**1/15**	ADEC Method Two Cleanup Levels-Ingestion Pathway	900
Benzo(b)fluoranthene	22-3,100	12/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	17,000
Benzo(g,h,i)perylene	48-2,100	8/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Benzo(k)fluoranthene	29-3,200	12/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	93,000
Carbazole	13-110	5/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	2,000
Chrysene	32-4,400	12/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	550,000
Di-n-octylphthalate	38	1/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	1,700,000
Dibenzo(a,h)anthracene	28-650	7/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	900
Dibenzofuran	14-43	2/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	13,900
Fluoranthene	23-7,300	13/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,900,000

Table 3-1—Upland Area Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Fluorene	20-160	5/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	240,000
Indeno(1,2,3-cd)pyrene	37-2,100	10/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	9,000
Naphthalene	14-150	6/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Phenanthrene	30-2,300	12/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Pyrene	25-7,000	13/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Pesticides/PCBs (µg/kg)					
4,4'-DDE	4.8	1/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	20,000
delta-BHC	4.3	1/15	N/A	N/A	N/A
Endrin aldehyde	3.5-7.2	2/15	N/A	N/A	N/A
Endrin ketone	5.7	1/15	N/A	N/A	N/A
Organotins (µg/kg)					
Butyltin trichloride	7-25	13/15	N/A	N/A	N/A
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	31	1/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230
Motor Oil (C25-C36)	74	1/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	8,300
Inorganics (Total) (mg/kg)					
Antimony	3.2-4.8	2/15	**2/15**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Arsenic	1.7-14.4	15/15	**13/15**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.8
Barium	19.7-58.8	15/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	982
Beryllium	0.12-0.26	15/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38

Table 3-1—Upland Area Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Chromium	4.2-37.5	15/15	**1/15**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	23
Cobalt	2-6.5	15/15	0/15	Region 9 EPA PRGs	4,700
Copper	40.5-140	2/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	3,320
Lead	3.6-2,700	15/15	**6-15**	Region 9 EPA PRGs	400
Manganese	120-1,020	15/15	0/15	Region 9 EPA PRGs	1,800
Mercury	0.084-0.38	9/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.24
Nickel	2-14.3	15/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	78
Selenium	0.89-3.6	10/15	**1-15**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Silver	0.45-0.48	2/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	19
Vanadium	27.4-61.7	15/15	0/15	ADEC Method Two Cleanup Levels-Ingestion Pathway	580
Zinc	27-359	15/15	0/15	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	8,100

Notes:
Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-2—Upland Area Subsurface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Volatile Organic Compounds (µg/kg)					
Methyl Acetate	84	1/5	0/5	Region 9 EPA PRGs	22,000,000
Organotins (µg/kg)					
Butyltin trichloride	5.8-13.2	5/5	0/5	N/A	N/A
Dibutyltin dichloride	7.8	1/5	0/5	N/A	N/A
Inorganics (Total) (mg/kg)					
Arsenic	1.6-6.8	5/5	**4/5**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.8
Barium	34.8-97.1	5/5	0/5	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	982
Beryllium	0.1-0.24	5/5	0/5	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38
Chromium	6.5-17	5/5		ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	23
Cobalt	3.3-5.9	5/5	0/5	Region 9 EPA PRGs	4,700
Lead	2.2-3.5	5/5		Region 9 EPA PRGs	400
Manganese	166-388	5/5	0/5	Region 9 EPA PRGs	1,800
Nickel	5.3-8.3	5/5	0/5	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	78
Selenium	0.79-1.1	2/5		ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Vanadium	27.2-63.1	5/5	0/5	ADEC Method Two Cleanup Levels-Ingestion Pathway	580
Zinc	19-39.9	5/5	0/5	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	8,100

Notes:
Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-3—Upland Area Sediment Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Levels
Semi-Volatile Organic Compounds (µg/kg)					
Fluoranthene	17	1/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	1,700
Pyrene	22	1/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	2,600
Pesticides/PCBs (µg/kg)					
delta-BHC	5.4	1/4	N/A	N/A	N/A
Organotins (µg/kg)					
Butyltin trichloride	11.7-42.9	3/4	N/A	N/A	N/A
Inorganics (Total) (mg/kg)					
Antimony	0.69	1/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	150
Arsenic	5.9-10.5	4/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	57
Barium	31.9-38.3	4/4	N/A	N/A	N/A
Beryllium	0.19-0.28	4/4	N/A	N/A	N/A
Cadmium	0.1	1/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	5.1
Chromium	11.9-16.5	4/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	260
Cobalt	4.9-7.3	4/4	N/A	N/A	N/A
Copper	17.1-20.3	4/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	390
Lead	3.6-159	4/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	450
Manganese	348-690	4/4	N/A	N/A	N/A
Nickel	8-9.7	4/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	>140
Selenium	1.1-1.8	3/4	N/A	N/A	N/A
Thallium	0.76-1.2	4/4	N/A	N/A	N/A

Table 3-3—Upland Area Sediment Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Levels
Vanadium	50.1-79.6	4/4	N/A	N/A	N/A
Zinc	47.3-193	4/4	0/4	Washington State Sediment Quality Standards (SQS/LAET)1	410

Notes:

1: Since the State of Alaska does not have cleanup standards for contaminated sediment, the Washington State SQS are used for comparison purposes only. The SQS standards listed in this table are not normalize for total organic carbon.

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-4—North Cannery Building Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Semi-Volatile Organic Compounds (µg/kg)					
1,1'-Biphenyl	13	1/4	0/4	Region 9 EPA PRGs	350,000
2,4-Dimethylphenol	54	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,600
2-Methylnaphthalene	44	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
2-Methylphenol	26	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	6,000
4-Methylphenol	51	1/4	0/4	N/A	N/A
Acenaphthene	26	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	190,000
Acenaphthylene	170	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	190,000
Acetophenone	20	1/4	0/4	Region 9 EPA PRGs	490
Anthracene	500	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Benzaldehyde	110	1/4	0/4	Region 9 EPA PRGs	6,100,000
Benzo(a)anthracene	1,100	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	5,500
Benzo(a)pyrene	12-1,200	2/4	**1/4**	ADEC Method Two Cleanup Levels-Ingestion Pathway	900
Benzo(b)fluoranthene	830	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	17,000
Benzo(g,h,I)perylene	500	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Benzo(k)fluoranthene	1,000	1/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	93,000
Caprolactam	32-90	2/4	0/4	Region 9 EPA PRGs	31,000,000
Carbazole	41	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	2,000
Chrysene	1,400	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	550,000

Table 3-4—North Cannery Building Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Di-n-octylphthalate	260	1/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	1,700,000
Dibenzo(a,h)anthracene	210	1/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	900
Dibenzofuran	28	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	13,900
Fluoranthene	14-1,900	2/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,900,000
Fluorene	160	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	240,000
Indeno(1,2,3-cd)pyrene	690	1/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	9,000
Naphthalene	52	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Phenanthrene	1,100	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Pyrene	30-2,200	2/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	19-280	3/4	**1/4**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230
Motor Oil (C25-C36)	110-550	3/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	8,300
Inorganics (Total) (mg/kg)					
Antimony	0.69-0.88	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Arsenic	2.5-4.1	4/4	**4/4**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.8
Barium	83.6-150	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	982

Table 3-4—North Cannery Building Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Beryllium	0.13-0.37	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38
Cadmium	0.1-0.58	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	4.5
Chromium	5-11	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	23
Cobalt	5.1-7.3	4/4	0/4	Region 9 EPA PRGs	4,700
Copper	18-25	4/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	3,320
Lead	37.3-216	4/4	0/4	Region 9 EPA PRGs	400
Manganese	342-450	4/4	0/4	Region 9 EPA PRGs	1,800
Mercury	0.77	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.24
Nickel	3.6-8.9	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	78
Selenium	0.99-1.5	3/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Thallium	0.56-0.82	4/4	0/4	Region 9 EPA PRGs	5.2
Vanadium	43.9-53.9	4/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	580
Zinc	167-579	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	8,100

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-5—North Cannery Building Subsurface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site Specific Screening Level
Inorganics (Total) (mg/kg)					
Antimony	0.32-0.5	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Arsenic	2.5-4.9	4/4	**4/4**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.8
Barium	48.1-52.2	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	982
Beryllium	0.12-0.17	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38
Chromium	6.3-11.6	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	23
Cobalt	4.2-7.7	4/4	0/4	Region 9 EPA PRGs	4,700
Copper	9.9-14.4	4/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	3,320
Lead	1.5-3.2	4/4	0/4	Region 9 EPA PRGs	400
Manganese	168-377	4/4	0/4	Region 9 EPA PRGs	1,800
Mercury	0.059	1/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.24
Nickel	5.4-9.7	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	78
Thallium	0.53-0.56	4/4	0/4	Region 9 EPA PRGs	5.2
Vanadium	33.2-51	4/4	0/4	ADEC Method Two Cleanup Levels-Ingestion Pathway	580
Zinc	21.8-37.1	4/4	0/4	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	8,100

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-6—Analytical Result of Suspect Asbestos Dust (Microvac) Samples
North Cannery Building
Ugashik Traditional Village Targeted Brownfield Assessment

Sample ID	Fiber type	Concentration (str/cm2)	Number of structures counted	Type of Asbestos mineral identifed/Number of fibers
Dust Microvac Samples				
Truck	Total Asbestos	5.86×10^4	22	Chrysotile/15; Tremolite/7
	Asbestos >= 5μm	2.66×10^3	1	Tremolite/1
	Non-Asbestos	2.66×10^3	1	1
Boat	Total Asbestos	5.86×10^4	11	Chrysotile/9; Tremolite/2
	Asbestos >= 5μm	5.33×10^3	1	Chysotile/1
	Non-Asbestos	3.73×10^4	7	7

Notes:
str: structures (fibers)

Table 3-7—Analytical Results of Suspect Bulk Asbestos Retort Insulation Sample
Main Cannery Building
Ugashik Traditional Village Targeted Brownfield Assessment

Sample Layer ID	Layer Description	Asbestos Components Concentration (%)	Non-asbestos Components Concentration (%)	Type of Asbestos mineral identifed
1	Gray Paint	0	100	NA
2	Off-white woven fabric-like material	0	100	NA
3	Pale grayish white fibrous papery material	35	65	Chrysotile
4	Golden yellow resinous mastic	0	100	NA
5	Pale grayish white fibrous wavy papery material	35	65	Chrysotile
6	Pale grayish white fibrous flat papery material	35	65	Chrysotile
7	Pale grayish white fibrous wavy papery material	35	65	Chrysotile
8	Pale grayish white fibrous flat papery material	35	65	Chrysotile
9	Pale grayish white fibrous flat papery material	35	65	Chrysotile
10	Pale grayish white fibrous flat papery material	35	65	Chrysotile

Table 3-8—Powerhouse Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Semi-Volatile Organic Compounds (µg/kg)					
Benzo(a)pyrene	480	1/3	0/3	ADEC Method Two Cleanup Levels-Ingestion Pathway	900
Benzo(b)fluoranthene	220	1/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	17,000
Chrysene	910-1,700	2/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	550,000
Indeno(1,2,3-cd)pyrene	240	1/3	0/3	ADEC Method Two Cleanup Levels-Ingestion Pathway	9,000
Phenanthrene	120-460	2/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Pyrene	430-1,100	2/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Pesticides/PCBs (µg/kg)					
4,4'-DDD	2.7	2/3	0/3	ADEC Method Two Cleanup Levels-Ingestion Pathway	28,000
4,4'-DDE	3.8-15	2/3	0/3	ADEC Method Two Cleanup Levels-Ingestion Pathway	20,000
4,4'-DDT	110	1/3	0/3	ADEC Method Two Cleanup Levels-Ingestion Pathway	20,000
alpha-Chlordane	2.6	1/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,000
Endosulfan sulfate	6.7	2/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	6,000
Endrin	7.7	1/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	300
Endrin aldehyde	8.3	1/3	N/A	N/A	N/A
Endrin ketone	7.6	1/3	N/A	N/A	N/A
Methoxychlor	4,700	1/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	47,000
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	2300-14,000	3/3	**3/3**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230

Table 3-8—Powerhouse Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Motor Oil (C25-C36)	4,100-50,000	3/3	**2/3**	ADEC Method Two Cleanup Levels-Ingestion Pathway	8,300
Inorganics (Total) (mg/kg)					
Antimony	0.64-0.92	3/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Arsenic	2-3	3/3	**3/3**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.8
Barium	44.1-126	3/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	982
Beryllium	0.96-0.12	3/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38
Cadmium	0.34-0.49	3/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	4.5
Chromium	7.6-12.8	3/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	23
Cobalt	3.5-4.3	3/3	0/3	Region 9 EPA PRGs	4,700
Copper	12.9-59.4	3/3	0/3	ADEC Method Two Cleanup Levels-Ingestion Pathway	3,320
Lead	55.1-222	3/3	0/3	Region 9 EPA PRGs	400
Manganese	196-232	3/3	0/3	Region 9 EPA PRGs	1,800
Nickel	5-8.8	3/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	78
Selenium	1-1.1	2/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Thallium	0.48-0.50	3/3	0/3	Region 9 EPA PRGs	5.2
Vanadium	36.9-53	3/3	0/3	ADEC Method Two Cleanup Levels-Ingestion Pathway	580
Zinc	122-426	3/3	0/3	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	8,100

Notes:
Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-9—Powerhouse Subsurface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Semi-Volatile Organic Compounds (µg/kg)					
2-Methylnaphthalene	580	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Naphthalene	110	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Pyrene	110	2/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Pesticides/PCBs (µg/kg)					
Endrin aldehyde	5.8	1/1	N/A	N/A	N/A
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	6,000	1/1	**1/1**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230
Gasoline (C6-C10)	22	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	260
Inorganics (Total) (mg/kg)					
Antimony	0.42	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Arsenic	2.9	1/1	**1/1**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.8
Barium	41	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	982
Beryllium	0.12	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38
Chromium	9.7	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	23
Cobalt	4.8	1/1	0/1	Region 9 EPA PRGs	4,700
Copper	12.9	1/1	0/1	ADEC Method Two Cleanup Levels-Ingestion Pathway	3,320
Lead	3	1/1	0/1	Region 9 EPA PRGs	400
Manganese	293	1/1	0/1	Region 9 EPA PRGs	1,800

Table 3-9—Powerhouse Subsurface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Nickel	6.8	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	78
Thallium	0.55	1/1	0/1	Region 9 EPA PRGs	5.2
Vanadium	39.4	1/1	0/1	ADEC Method Two Cleanup Levels-Ingestion Pathway	580
Zinc	36.7	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	8,100

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-10—Alley Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Semi-Volatile Organic Compounds (µg/kg)					
2-Methylnaphthalene	3,000	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Acenaphthene	3400-4500	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	190,000
Anthracene	1,800	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Benzo(a)anthracene	2200-9100	2/2	**1/2**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	5,500
Benzo(a)pyrene	700-2900	2/2	**1/2**	ADEC Method Two Cleanup Levels-Ingestion Pathway	900
Benzo(b)fluoranthene	2,700	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	17,000
Benzo(k)fluoranthene	3,400	1/2	0/2	ADEC Method Two Cleanup Levels-Ingestion Pathway	93,000
Caprolactam	410	1/2	0/2	Region 9 EPA PRGs	3,100,000
Chrysene	4600-20000	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	550,000
Fluorene	3,800	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	240,000
Naphthalene	200	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Phenanthrene	8,400	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Pyrene	5800-26000	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Pesticides/PCBs (µg/kg)					
4,4'-DDE	210	1/2	0/2	ADEC Method Two Cleanup Levels-Ingestion Pathway	20,000

Table 3-10—Alley Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Dieldrin	3.8	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	14
Endrin	290	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	300
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	13,000-61,000	2/2	**2/2**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230
Motor Oil (C25-C36)	24,000-44,000	2/2	**2/2**	ADEC Method Two Cleanup Levels-Ingestion Pathway	8,300

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-11—Alley Subsurface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Volatile Organic Compounds (µg/kg)					
m,p-Xylene	240	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	69,000
Semi-Volatile Organic Compounds (µg/kg)					
2-Methylnaphthalene	770	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Benzo(a)anthracene	120	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	5,500
Chrysene	260	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	550,000
Naphthalene	270	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Pyrene	530	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Pesticides/PCBs (µg/kg)					
4,4'-DDT	13	1/1	0/1	ADEC Method Two Cleanup Levels-Ingestion Pathway	20,000
Aldrin	2	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,500
Endosulfan sulfate	12	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	6,000
Endrin	5.8	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	300
Endrin aldehyde	19	1/1	0/1	N/A	N/A
gamma-BHC (Lindane)	1	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	9,200	1/1	**1/1**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230
Gasoline (C6-C10)	37	1/1	0/1	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	260
Motor Oil (C25-C36)	2,400	1/1	0/1	ADEC Method Two Cleanup Levels-Ingestion Pathway	8,300

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-12—Cannery ASTs Surface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Semi-Volatile Organic Compounds (µg/kg)					
1,1'-Biphenyl	590	1/2	0/2	Region 9 EPA PRGs	350,000
2-Methylnaphthalene	23,000-24,000	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Acenaphthene	4,800-10,000	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	190,000
Anthracene	2,700-3,800	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Benzo(a)anthracene	1,900-12,000	2/2	**1/2**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	5,500
Benzo(a)pyrene	750-5,700	2/2	**1/2**	ADEC Method Two Cleanup Levels-Ingestion Pathway	900
Benzo(b)fluoranthene	540-5,200	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	17,000
Benzo(k)fluoranthene	690-6,800	2/2	0/2	ADEC Method Two Cleanup Levels-Ingestion Pathway	93,000
Chrysene	4,100-36,000	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	550,000
Fluoranthene	5,500	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,900,000
Fluorene	5,300-13,000	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	240,000
Naphthalene	1,100	1/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38,000
Phenanthrene	14,000-40,000	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3,900,000
Pyrene	4,500-39,000	2/2	0/2	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1,400,000
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	33,000-120,000	2/2	**2/2**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230
Motor Oil (C25-C36)	22,000-210,000	2/2	**2/2**	ADEC Method Two Cleanup Levels-Ingestion Pathway	8,300

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-13—Garbage Pit Subsurface Soil Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Total Petroleum Hydrocarbons (mg/kg)					
Diesel (C10-C25)	56	1/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	230
Motor Oil (C25-C36)	11	1/7	0/7	ADEC Method Two Cleanup Levels-Ingestion Pathway	8,300
Inorganics (Total) (mg/kg)					
Antimony	0.33-0.54	4/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Arsenic	2.6-4	7/7	**7/7**	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	1.8
Barium	57.3-75.8	7/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	982
Beryllium	0.13-0.19	7/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	38
Chromium	8.1-15.2	7/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	23
Cobalt	5.3-8.8	7/7	0/7	Region 9 EPA PRGs	4,700
Copper	10.4-19.8	7/7	0/7	ADEC Method Two Cleanup Levels-Ingestion Pathway	3,320
Lead	1.6-2.4	7/7	0/7	Region 9 EPA PRGs	400
Manganese	303-489	7/7	0/7	Region 9 EPA PRGs	1,800
Nickel	6.8-11.2	7/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	78
Selenium	0.65-1.2	7/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	3
Thallium	0.48-0.57	7/7	0/7	Region 9 EPA PRGs	5.2
Vanadium	33.8-46.1	7/7	0/7	ADEC Method Two Cleanup Levels-Ingestion Pathway	580
Zinc	21.8-30.6	7/7	0/7	ADEC Method Two Cleanup Levels-Migration to Groundwater Pathway	8,100

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.

Table 3-14—Domestic Groundwater Supply Wells Sample Screening Level Summary
Ugashik Traditional Village Targeted Brownfields Assessment

Analyte	Range of Detected Concentrations	Frequency of Detections	Frequency of Exceedance of Screening Level	Screening Level Source	Site-Specific Screening Level
Volatile Organic Compounds (µg/L)					
Acetone	10	1/6	0/6	ADEC Table C Cleanup Levels	3,650
Inorganics (Total) (µg/L)					
Antimony	1.2-2.3	2/6	0/6	ADEC Table C Cleanup Levels	6
Barium	0.73-5.8	6/6	0/6	ADEC Table C Cleanup Levels	2,000
Beryllium	0.28	1/6	0/6	ADEC Table C Cleanup Levels	4
Cadmium	0.45	1/6	0/6	ADEC Table C Cleanup Levels	5
Chromium	0.86-1	3/6	0/6	ADEC Table C Cleanup Levels	100
Cobalt	1.1	1/6	0/6	Region 9 EPA PRGs for Tap Water	2,200
Copper	2-132	4/6	0/6	ADEC Table C Cleanup Levels	1,300
Lead	5.2	1/6	0/6	ADEC Table C Cleanup Levels	15
Manganese	0.27-367	6/6	0/6	Region 9 EPA PRGs for Tap Water	880
Nickel	1-1.2	3/6	0/6	ADEC Table C Cleanup Levels	100
Vandium	1-3.8	6/6	0/6	ADEC Table C Cleanup Levels	260
Zinc	1.5-312	6/6	0/6	ADEC Table C Cleanup Levels	11,000

Notes:

Bold: Bold values present those analytes exceeding the site-specific screening levels.