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Harding Lawson Associat

A Report Prepared for

Port Graham Corporation
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PORT GRAHAM BULK FUEL SYSTEM RELEASE INVESTIGATION PORT GRAHAM

HLA Project No. 24547

by

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1.0 INTRODUCTION

This report presents the results of a release investigation conducted by Harding Lawson Associates (HLA) for the Port Graham Corporation (PGC) at the Port Graham bulk fuel storage facility (Tank Farm) in Port Graham, Alaska. The release investigation was performed in accordance with HLA's Service Agreement with the PGC, signed by Mr. Patrick Norman, President of the PGC, on March 30, 1993. This report was prepared for the sole use of the PGC, the only intended beneficiary of HLA's work. No other party should rely on the information contained herein without the prior written consent of HLA. How about DEC can we rely on their work?

1.1 BACKGROUND

The community of Port Graham is located on the Kenai Peninsula, approximately 25 miles southwest of Homer (Plate 1). The Tank Farm site at Port Graham consists of 10 aboveground storage tanks (AGTs), a pump house, and associated product piping (Plate 2). The tanks store both gasoline and diesel fuel. The PGC reported fuel spills from the facility to the Alaska Department of Environmental Conservation (ADEC) in 1985. In 1991, the PGC began excavating visibly stained soil at three locations (Excavations A, B, and C as shown on Plate 2) in an attempt to clean up contamination from the spills. Approximately 3 cubic yards of soil was removed from the excavations, stockpiled in plastic bags, and placed inside three fish totes. In a letter dated

September 9, 1991, the ADEC recommended the PGC continue its cleanup of soil with "visible signs of contamination," and retain a third party to assess the extent and concentrations of the contamination.

In April 1992, PGC retained HLA to conduct a preliminary site assessment which HLA performed on April 20, 1992. The results of the preliminary assessment were presented in HLA's May 6, 1992, report titled "Site Visit, Fuel Storage Facility, Port Graham, Alaska." During the preliminary assessment, HLA observed stained soil in the Tank Farm area, along the product piping west of the pump house, and in Excavation A near the product piping west of the main cannery building (Plate 2). No stained soil was visible in Excavations B and C during the site visit.

Based on the findings of the preliminary site assessment, HLA recommended that the PGC perform a release investigation. In March 1993, PGC retained HLA to perform the release investigation.

1.2 SCOPE

HLA's scope of services for the release investigation are described in our proposal dated May 14, 1992. The objective of the release investigation was to evaluate the presence and extent of petroleum hydrocarbons in soil adjacent to the fuel tankage and piping as shown on Plate 2, and to gather information to support recommendations for site remediation and/or additional investigation. To complete this scope of services, HLA prepared a draft plan titled "Fuel Sampling Plan/Quality Assurance Project Plan, Release Investigation, Port Graham, Alaska," (FSP/QAPP). The draft FSP/QAPP was

approved by the ADEC on September 10, 1993, and the final version of the FSP/QAPP was completed on September 15, 1993. HLA conducted the field investigation from September 27 through September 29, 1993.

2.0 FIELD INVESTIGATION AND ANALYTICAL PROGRAM

HLA conducted the release investigation fieldwork at the Tank Farm site in accordance with the FSP/QAPP and the "Quality Assurance Program Plan for Underground Storage Tank Site Assessments Within Alaska" (QAPP) dated October 29, 1991, which is on file at the ADEC's Southcentral Regional Office. The release investigation was conducted under the supervision of an HLA engineer. The PGC provided a backhoe and backhoe operator; Commercial Testing & Engineering Co., Environmental Laboratory Services of Anchorage, Alaska, (CT&E) performed chemical analyses. The following sections summarize the field activities and analytical program performed to meet the project objectives.

2.1 TEST PIT EXCAVATION AND FIELD SCREENING

Thirteen test pits were excavated during the release investigation, using the PGC backhoe. Test pit locations are shown on Plate 2 and were selected to ascertain the presence of and assess the extent of contamination. Photographs from the release investigation are displayed on Plates 3 through 10.

Numerous obstacles impeded ideal selection of test pit locations, including building foundations, materials and debris from ongoing fuel storage tank construction work, and embankments. Test pits were sequentially numbered 1 through 13, in the order in which they were excavated.

The depths of the test pits were limited by the capacity of the backhoe, groundwater, and building foundations. Whenever possible, test pits were excavated to depths where the soil appeared to be unaffected by fuel contamination. Soil samples were collected from the bottoms of these excavations, and were field screened for organic vapors using a photoionization detector (PID) to further evaluate the presence of fuel contamination. Soil samples with organic vapor readings of less than 15 parts per million were also field screened with an Horiba OCMA-220 infrared oil content analyzer for total petroleum hydrocarbons (TPH). All test pits were backfilled with the original material. Results of the field screening are summarized in section 3.0.

2.2 LABORATORY ANALYTICAL PROGRAM

Sample collection, handling, documentation, custody, and shipment procedures were conducted in accordance with HLA's FSP/QAPP and QAPP. Seventeen samples, including at least one sample from each test pit and two duplicates, were analyzed for diesel-range organics (DRO), using Environmental Protection Agency (EPA) Method 8100 Modified (EPA 8100M). Six samples, including one duplicate, were also analyzed for gasoline-range organics (GRO) using EPA Method 8015M, and for purgeable aromatic volatiles using EPA Method 8020. At the request of ADEC, one sample from the area interpreted to have the maximum concentration of GRO was extracted using Toxicity Characteristic Leaching Procedure (TCLP) by EPA Method 1311, and was analyzed for aromatic volatiles

and metals using EPA Methods 8020, 7061, 6010, 7470, and 7741. Analytical results are summarized in section 3.0. Complete laboratory data reports are included in Appendix A.

3.0 INVESTIGATION RESULTS

Soil explored at the Tank Farm site consisted mainly of sand and gravel. The fuel storage tanks are located on a built-up ledge approximately 15 feet above the surrounding area and along the side of a hill. Soil in the immediate vicinity of the tanks had a higher percentage of fine sand. Groundwater, which is interpreted to be subject to tidal influences and non-potable, was encountered only in test pits excavated at the natural surface. Groundwater was encountered at approximately 5 feet below the surface at Test Pits 9, 11, and 13.

Based on the site characteristics described above, a soil cleanup level was calculated using the ADEC soil cleanup level matrix (ADEC Interim Guidance for Non-UST Contaminated Soil Cleanup Levels, 18 AAC 75.140, July 17, 1991). The calculated site cleanup level for the Tank Farm site is Level B: 200 milligrams per kilogram (mg/kg) DRO; 100 mg/kg GRO; 15 mg/kg total benzene, toluene, ethylbenzene, and xylenes (BTEX); and 0.5 mg/kg benzene. A completed ADEC Soil Matrix Score Sheet is included in Appendix B.

Sample field-screening and analytical results are presented in Table 1. Analytical results from the bottom of the test pits are summarized on Plate 11. CT&E laboratory data reports are presented in Appendix A. Soil contamination levels above site action levels were found in Test Pits 1, 4, 5, 6, 7, and 8. The highest concentrations of DRO were found in Test Pit 1 (13,400 mg/kg), Test Pit 5 (8,220 mg/kg), and Test Pit 6 (19,500 mg/kg). A petroleum hydrocarbon sheen was noted on the perched water observed seeping

Table 1. Field-Screening and Analytical Program Results

Sample Identification	Test Pit Number	Approximate Depth of Sample (feet)	Soil Type	Diesel-Range Organics (mg/kg)	Gasoline-Range Organics (mg/kg)	Benzene (mg/kg)	Total BTEX	Field-Screening OVM Readings (ppm)	Field-Screening TPH (mg/kg)	Odor
TP1	1	3	Sandy gravel	13,400	299	0.096	5.16	138	--	Septic diesel
TP1A (dup)	1	3	Sandy gravel	9,300	--	--	--	--	--	Septic diesel
TP21	2	2	Gravel	--	--	--	--	12	930	None
TP22	2	10	Gravel	22.0	--	--	--	6	--	None
TP3	3	4	Gravel	4.0	--	--	--	ND(5)	60	None
TP41	4	2	Sandy gravel	--	--	--	--	148	--	Gasoline
TP42	4	4	Sandy gravel	1,490	430	0.066	7.10	307	--	Gasoline
TP43 (dup)	4	4	Sandy gravel	--	479	0.051	10.08	--	--	Gasoline
TP51	5	6	Sandy gravel	--	--	--	--	33	--	Diesel
TP52	5	10	Sandy gravel	8,220	--	--	--	48	--	Diesel
TP6	6	1.5	Silty sand	19,500	75.8	0.040	2.14	133	--	Diesel
TP62 (dup)	6	1.5	Silty sand	19,000	--	--	--	--	--	Diesel
TP7	7	10	Sandy gravel	1,860	--	--	--	96	--	Diesel
TP81	8	6	Sandy gravel	1,690	328	0.0063[a]	1.01	435	--	Gasoline
TP82	8	9	Sandy gravel	7.84	4.39	0.248	2.04	24	--	Gasoline
TP9	9	5	Gravel	10.8	--	--	--	10	150	None
TP92 (dup)	9	5	Gravel	7.68	--	--	--	--	--	None
TP10	10	4.5	Sandy gravel	39.7	--	--	--	ND(5)	50	None
TP11	11	5	Gravel	17.0	--	--	--	ND(5)	60	None
TP12	12	6	Gravel	ND(4.0)	--	--	--	ND(5)	ND(25)	None
TP13	13	5	Gravel	ND(4.0)	--	--	--	ND(5)	--	None

a Sample was extracted using the Toxicity Characteristic Leaching Procedure; units are milligrams per liter.

-- = Not analyzed.
BTEX = Total concentration of benzene, toluene, ethylbenzene, and xylenes.
dup = Indicates sample is a duplicate of preceding sample.
mg/kg = Milligrams per kilogram.
ND = Not detected at practical quantification limit, which is in parenthesis.
OVM = Organic Vapor Meter.
ppm = Parts per million.
TPH = Total petroleum hydrocarbons.

Above Level A clean up Standards
100 ppm DRO
50 ppm GRO
0.1 ppm Benzene
10 ppm Total BTEX

from the sidewall of Test Pit 6. The highest concentrations of GRO were found in Test Pit 4 (479 mg/kg), and in Test Pit 8 at a depth of 6 feet (328 mg/kg). The detected concentrations of DRO and GRO in the bottom of Test Pit 8 (9 feet deep) were below site cleanup levels. Detected concentrations of benzene and total BTEX did not exceed the respective action levels in any of the test pits.

The zone of contamination with chemical concentrations above site action levels appears to be in three separate areas (Plate 11). The first area coincides with the location of Test Pits 1 and 2, and Excavation A, directly underneath the product piping along the west wall of the cannery. This site was identified by the PGC as the location of previously leaking pipeline. This area is partially bounded by Test Pits 2 and 13, which had soil contamination concentrations beneath action levels at depths of 10 and 5 feet, respectively. Field-screening (infrared spectrometer) results from soil in Test Pit 2 at a depth of 2 feet were 930 mg/kg. However, the detected concentration of DRO in the bottom of Test Pit 2 at a depth of 10 feet is 22 mg/kg, which is below the site cleanup level. The eastern limit of contamination could not be ascertained because of the obstacle posed by the location of the cannery building.

The second area of contamination extends from Test Pit 5 to the southern edge of the Tank Farm site. Releases adjacent to AGTs were probably caused by leaking tanks and piping. Test Pit 5 was located in an area identified by the PGC as the site of previously leaking pipeline. This contaminated area is partially bounded by the embankment to the west, and by Test Pits 9,

10, 11, and 12, which had soil contamination concentrations beneath action levels at depths of 5, 4.5, 5, and 6 feet, respectively.

The third area of contamination coincides with the location of Test Pit 4. This area may be contaminated due to a past pipeline leak in the vicinity, or may be an extension of the contamination detected at Test Pit 5. The area is partially bounded by Test Pits 3 and 12, which had soil contamination concentrations beneath action levels at depths of 4 and 6 feet, respectively.

The results of the release investigation suggest that the extent of petroleum hydrocarbon contaminated soil is limited to the immediate area surrounding the Tank Farm site and the associated pipeline. The results of the TCLP analyses suggest that the contaminated soil does not exhibit the characteristic of toxicity as defined by Title 40, Code of Federal Regulations, Part 261.23 (See Appendix A).

4.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this release investigation indicate the presence of contaminated soil with concentrations of diesel and gasoline that exceed the estimated ADEC soil cleanup levels. Because of the large volume and inaccessibility of contaminated soil, HLA recommends PGC consider an in situ treatment for the contaminated soil such as bioventing. As required in Appendix I of ADEC's Interim Guidance for Non-UST Contaminated Soil Cleanup Levels (July 17, 1991), for situations where the total volume of contaminated soil cannot be excavated and remediated, PGC, as the responsible party, must prepare a Remedial Action Plan (RAP). The purpose of the RAP is to describe the objectives of and the designs for subsequent remedial actions.

HLA recommends the RAP include institutional measures consisting of physical and administrative controls to limit exposure to the contaminated soil. These controls might include erecting a barrier or fence to restrict access to the Tank Farm site, and posting signs notifying Port Graham residents to avoid contact with soil beneath the pipeline.

Bioventing generally consists of inducing air flow in the ground to increase the available oxygen, and applying moisture and nutrients to the soil as needed, to enhance the biological breakdown of the petroleum products.

As part of the in situ treatment system design, site specific subsurface conditions would need to be evaluated. Specific conditions that should be evaluated include the following:

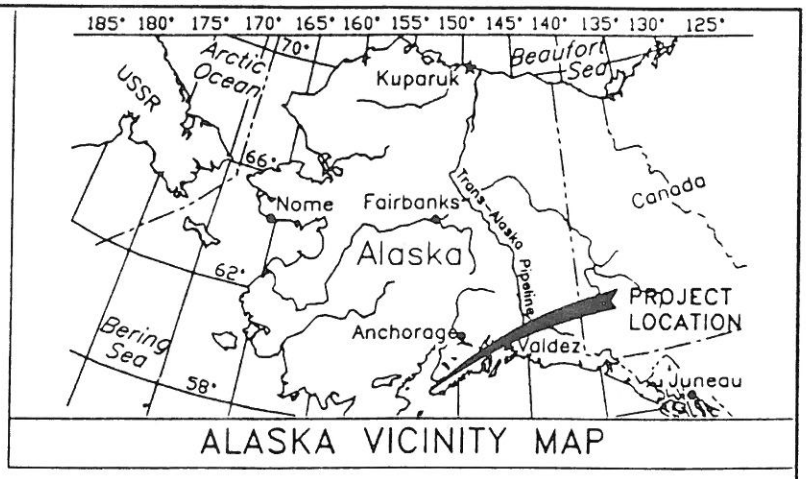
- Depth to the water table, and effects of tidal influence on water-table fluctuations;
- Possible presence of floating fuel product on the water table;
- Soil gas permeability and microbial activity at the site. Collecting site-specific data for designing an in situ remediation system would require mobilizing a small drill.

In addition to preparing a RAP, HLA recommends PGC implement measures to prevent future releases and bring the Tank Farm site into compliance with state and federal regulations, including:

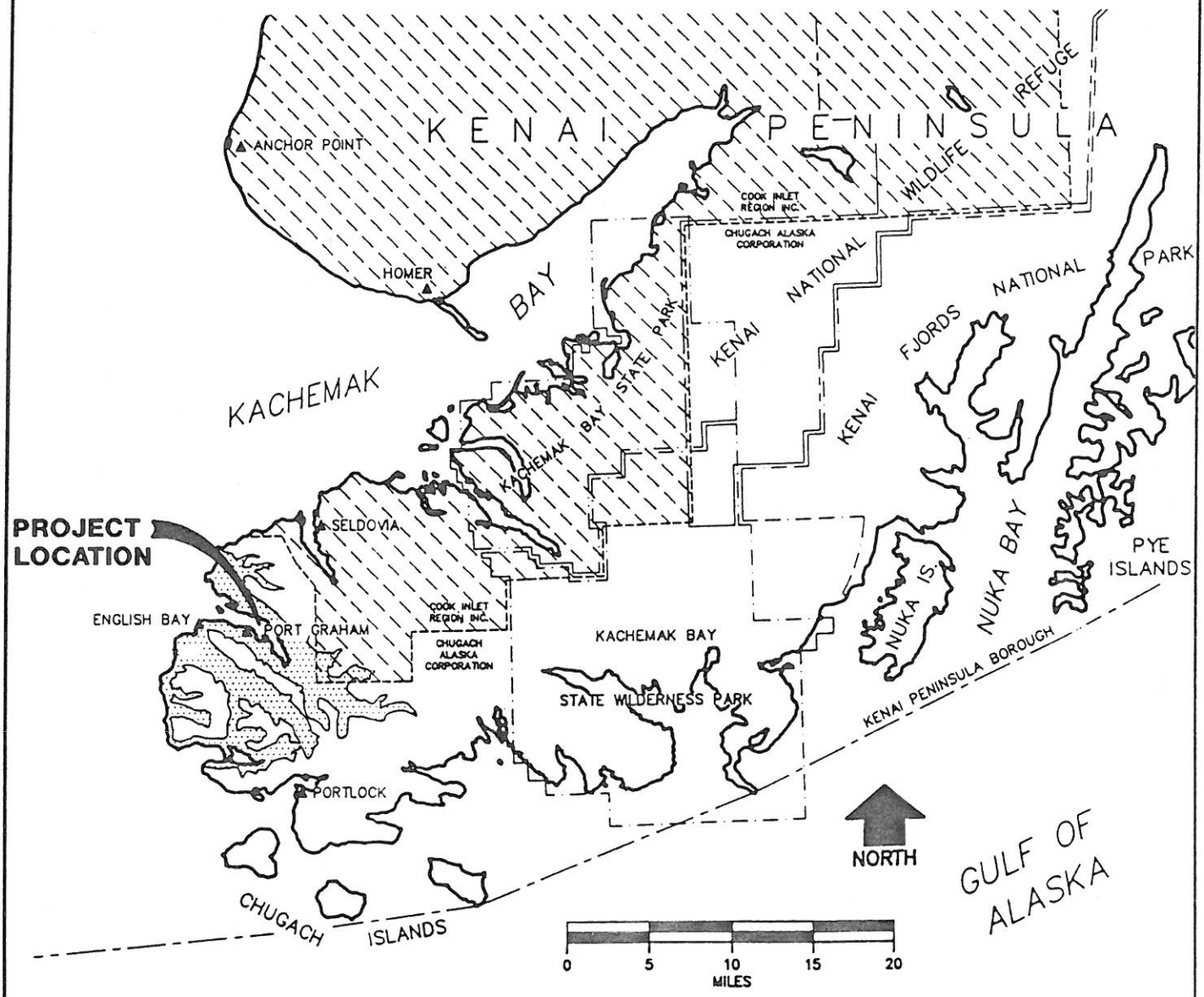
- Title 33, Code of Federal Regulations, Part 154 (33 CFR 154), U.S. Coast Guard (USCG) Regulations, Oil Pollution Prevention Regulations For Marine Oil Transfer Facilities;
- 33 CFR 156, USCG, Oil and Hazardous Transfer Operations;
- 40 CFR 60, EPA Regulations, Standards of Performance for New Stationary Sources;
- 40 CFR 112, EPA, Oil Pollution Prevention;
- Uniform Fire Code;
- National Electric Code.

These regulations specify the requirements for a Spill Prevention, Control, and Countermeasure Plan; secondary containment; equipment and operational requirements for facilities capable of transferring fuel in bulk to or from a vessel; and monitoring requirements for storage vessels of volatile organic compounds.

5.0 ILLUSTRATIONS



ALASKA VICINITY MAP



SOURCE: PORT GRAHAM COMMUNITY PROFILE, PREPARED BY MCCLINTOCK LAND SURVEY AND PLANNING COMPANY, DATED JUNE 1989.

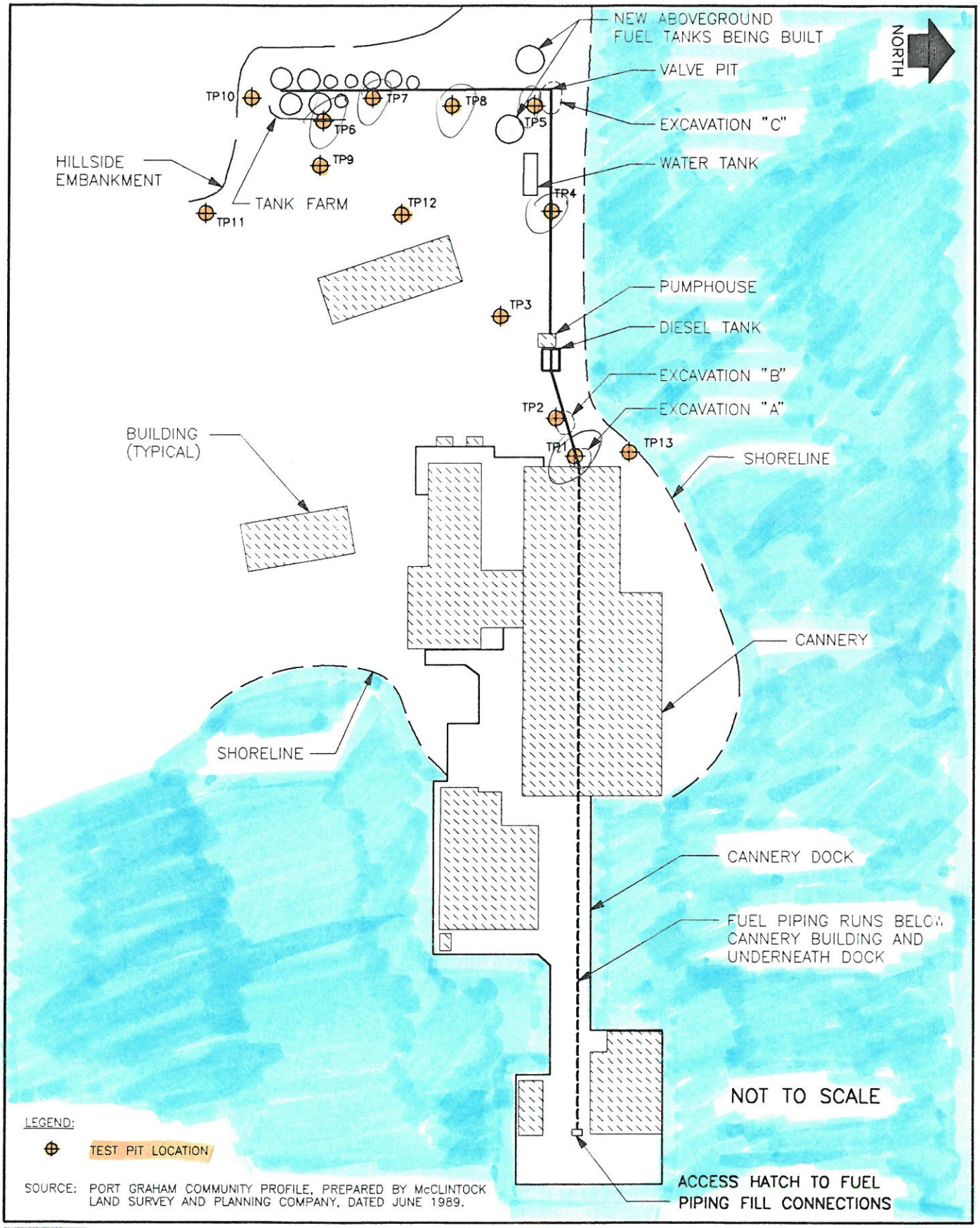
Harding Lawson Associates
Engineering and Environmental Services

Project Location

Release Investigation
Port Graham, Alaska

PLATE 1

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
PB	24547		11/93	hand



Harding Lawson Associates
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Environmental Services

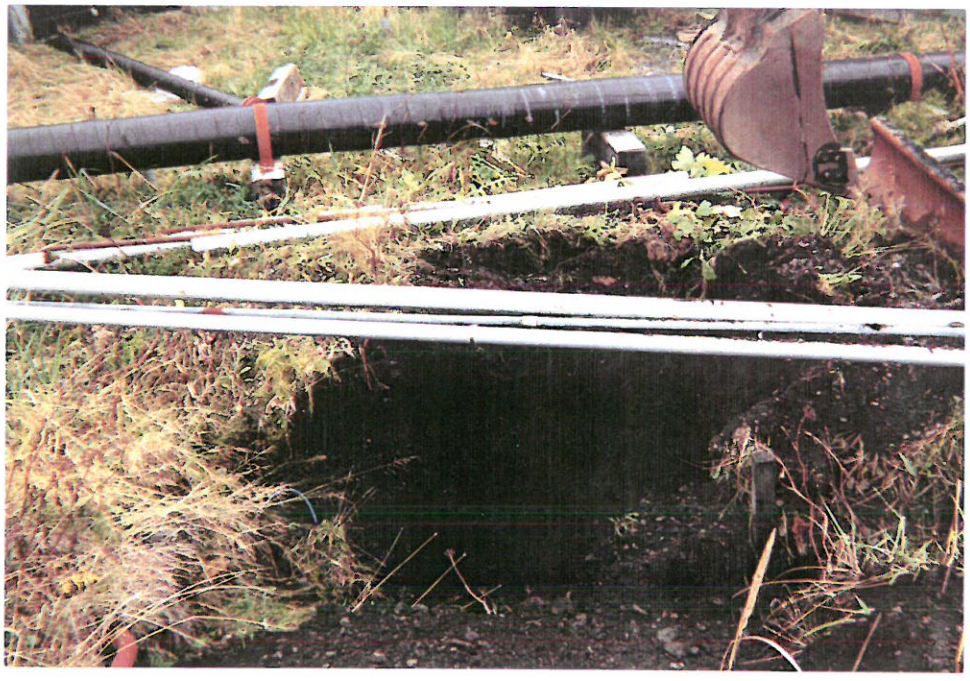
Site Plan

Release Investigation
Port Graham, Alaska

PLATE
2

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Test pit number one, western wall of cannery building, directly beneath product piping, adjacent to excavation "A". This was apparently the location of an abandoned septic tank leach field.



Test pit number two, adjacent to excavation "B".

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Engineering and Environmental Services

Photographic Log

Release Investigation
Port Graham, Alaska

PLATE 3

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Test pit number three

Test pit number four

Harding Lawson Associates
Engineering and
Environmental Services

Photographic Log

Release Investigation
Port Graham, Alaska

PLATE
4

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Vicinity of excavation "C"

Test pit number five, adjacent to excavation "C"

Harding Lawson Associates
Engineering and
Environmental Services

Photographic Log

Release Investigation
Port Graham, Alaska

PLATE
5

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Test pit number six, adjacent to embankment

Seep exposed during excavation of test pit number six

Harding Lawson Associates
Engineering and
Environmental Services

Photographic Log

Release Investigation
Port Graham, Alaska

PLATE
6

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Test pit number seven

Test pit number eight

Harding Lawson Associates
Engineering and
Environmental Services

Photographic Log

Release Investigation
Port Graham, Alaska

PLATE
7

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Test pit number nine

Test pit number ten

Harding Lawson Associates
Engineering and
Environmental Services

Photographic Log

Release Investigation
Port Graham, Alaska

PLATE 8

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Test pit
number eleven

Test pit number twelve

Harding Lawson Associates
Engineering and
Environmental Services

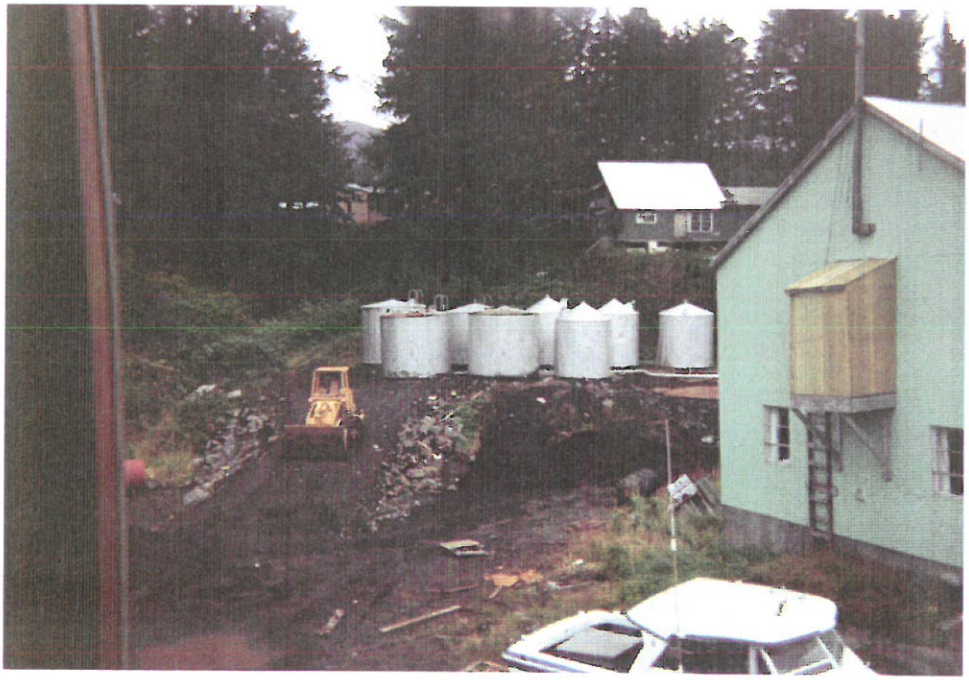
Photographic Log

Release Investigation
Port Graham, Alaska

PLATE
9

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d

Test pit
number thirteen



Port Graham tank farm,
viewed from window
of general store.

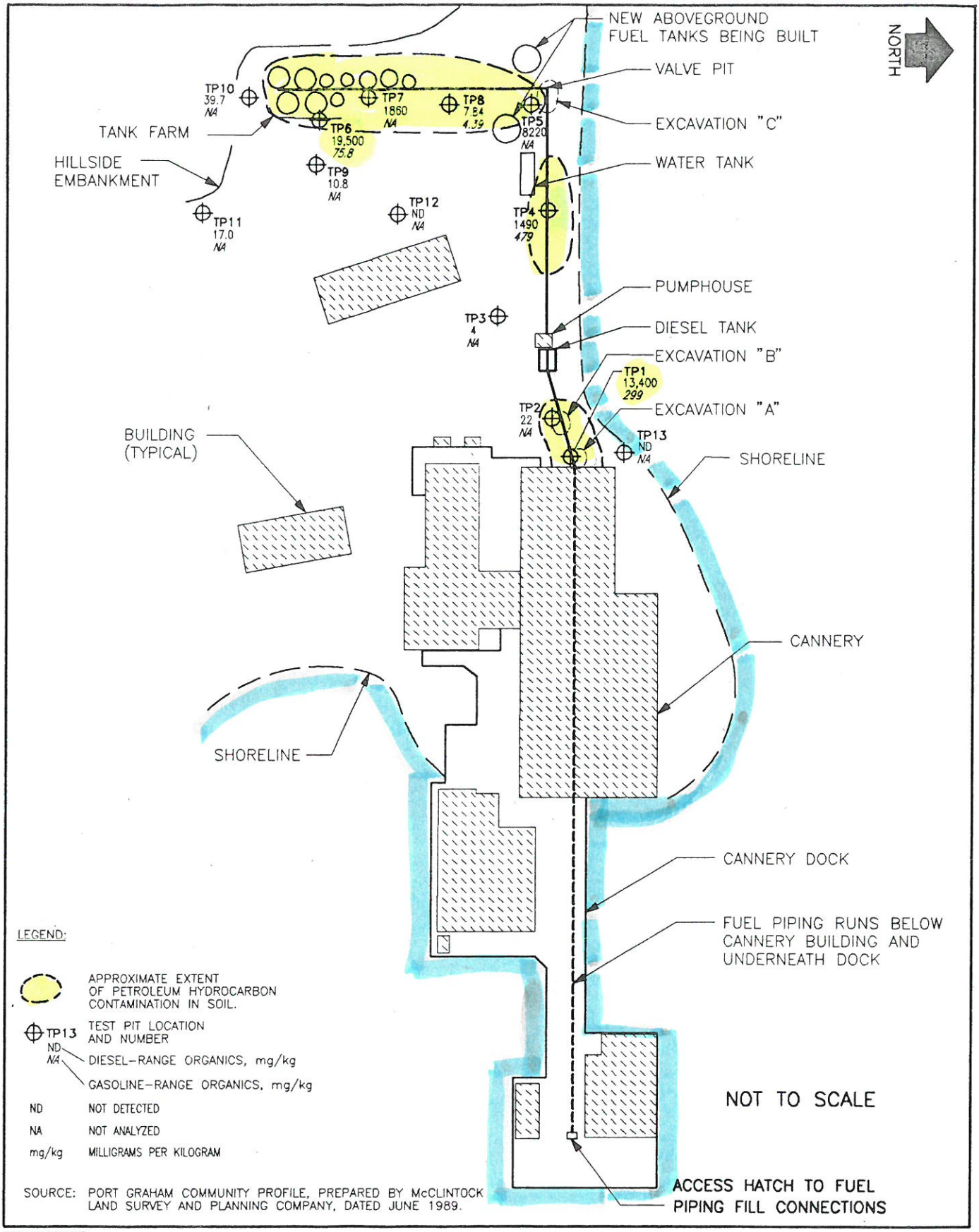
Harding Lawson Associates
Engineering and
Environmental Services

Photographic Log

Release Investigation
Port Graham, Alaska

PLATE
10

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d



Harding Lawson Associates
Engineering and Environmental Services

Detected Concentrations from Bottom of Test Pits

Release Investigation
Port Graham, Alaska

PLATE 11

DRAWN	PROJECT NUMBER	APPROVED	DATE	FILE NAME
DC	24547		11/93	122d