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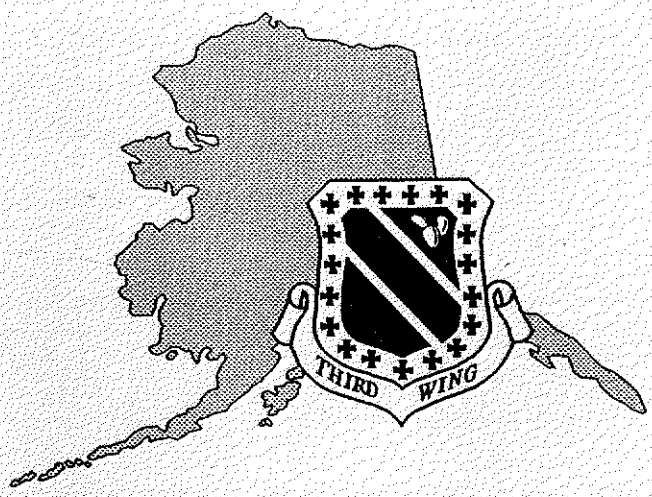

UNITED STATES AIR FORCE
ELMENDORF AIR FORCE BASE, ALASKA

FINAL REPORT
PHASE IV - ENVIRONMENTAL AND GEOTECHNICAL MONITORING IN SUPPORT OF PIPELINE REPLACEMENT
PORT OF ANCHORAGE FUEL SPILL

JANUARY 1996

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January 10, 1996

Ms. Sandra J. Davidson
Contracting Officer
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P.O. Box 875
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Final Report
Phase IV - Environmental and Geotechnical
Monitoring in Support of
Pipeline Replacement
Port of Anchorage Fuel Spill
Contract No. F65501-93-D0007 (D.O. 7018)
D&M Job No. 01016-474-160

Dear Ms. Davidson:

We are pleased to submit fifteen (15) copies of the Final Report titled *Phase IV Environmental and Geotechnical Monitoring in Support of Pipeline Replacement*. This Final Report was prepared per our Revised Proposal dated 4 October 1995, and incorporates the comments made on the Draft Report. Our work was performed in general accordance to Delivery Order 7018 under Contract No. F65501-93-D0007.

If you have any comments or questions, or require additional information, please do not hesitate to contact us.

Sincerely,

DAMES & MOORE

Paul R. Dworian
Project Geologist

Gary L. Hayward
Delivery Order Manager

GLH/PRD
PHASEIV.fnl

PHASE IV - ENVIRONMENTAL AND GEOTECHNICAL MONITORING IN SUPPORT OF PIPELINE REPLACEMENT PORT OF ANCHORAGE FUEL SPILL

FINAL

ELMENDORF AIR FORCE BASE
ANCHORAGE, ALASKA

January 10, 1996

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1.0 INTRODUCTION

This report presents the results of the investigation of the U.S. Air Force (Air Force) pipeline replacement at the Port of Anchorage (Figure 1). Fuel was reported by Municipality of Anchorage workers to be accumulating in a storm drain manhole near the intersection of Tidewater Road and Gull Avenue on August 25, 1994. Several fuel pipelines were located adjacent to this manhole, and it was suspected that a leak in one or more of these pipelines was the source of the observed fuel. The Defense Fuel Supply Center (DFSC), through their contractor Enterprise Engineering, Inc. (EEI), introduced a tracer compound into the 12-inch diameter Air Force JP-8 pipeline, and found detectable amounts of the tracer in the soil vapor near the manhole. This appeared to indicate that the source of the fuel was the Air Force pipeline.

In October, 1994, the Air Force contracted the excavation and repair of the pipeline at the leak location. The excavation and repair activities were monitored and soil and groundwater samples were analyzed to determine the level of hydrocarbon contamination within the initial excavation. The results and observations of this field work are documented in the report titled *Final Report, Phase I - Environmental and Geotechnical Monitoring in Support of Emergency Pipeline Repair, Port of Anchorage Fuel Spill*, dated 22 February 22 1995, which has been previously submitted to the Air Force.

After repair of the detected leak, it was determined by the Air Force that the remainder of the pipeline should be checked for leaks and overall operational integrity. Additional excavation activities and smart pigging operations along the Air Force pipeline was performed to further evaluate the extent of potential hydrocarbon contamination within the soil and groundwater. The results of environmental sampling and backfilling of the excavations was summarized in Dames & Moore's *Final Report, Phase II - Environmental and Geotechnical Monitoring in Support of Smart Pigging Operations* dated February 22, 1995. The pigging discovered two anomalies in the pipeline, one on the northwest corner of the intersection between Tidewater Road and Gull Avenue (Figure 2), and one near the entrance of the Tote Warehouse, approximately 1/2-mile north of Segment 4 (Figure 8).

After completion of the smart pigging operations, it was decided that the 500 feet of pipeline between the "Spaghetti Works" and the intersection of Gull Avenue and Tidewater Road should be abandoned in place, and that a new pipeline would be installed at a depth of approximately eight (8) feet below ground surface (bgs). Borings would be installed to document the

environmental conditions below the portion of the pipeline abandoned in place. In addition, the two anomalies in the pipeline would be excavated, examined, and the pipeline replaced, if necessary. This report presents the environmental conditions encountered during this pipeline abandonment.

2.0 SCOPE OF SERVICES

Dames & Moore's scope of services for this investigation included the following elements:

- Installation of seven soil borings along the portion of the JP-8 pipeline to be abandoned in place (Figure 2). These borings were placed approximately 50 feet apart, and were drilled to depths between 16 and 18 feet bgs.

- Collection and analysis of soil and groundwater samples from the borings. The samples were analyzed for diesel range organics (DRO) by EPA Method 8100m, gasoline range organics (GRO) by EPA Method 8015m, lead by EPA Method 7421, and benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8010.

- Screening the soil excavated from along the pipeline using a photoionization detector (PID) to evaluate the possible presence of volatile organic compounds (VOCs).

- Collection of soil and groundwater samples from along the pipeline. The samples were analyzed for DRO, GRO, BTEX, and lead, as appropriate.

- Observation and documentation of subsurface conditions and significant events encountered during work on the pipeline.

- Sampling excavated soil for disposal purposes.

- Monitoring the backfill and soil compaction performed on the excavation.

- Preparation of this report summarizing the investigative methods and findings.

All monitoring and sampling activities performed for this project were conducted in general

accordance with the procedures and protocols outlined in the Quality Assurance Project Plan (QAPP), dated October 14, 1994, previously submitted to the Air Force for this Phase IV investigation. The results of the geotechnical testing of the backfill compaction above the pipeline have been provided to the Air Force in a separate transmittal.

3.0 INVESTIGATIVE METHODS

3.1 UTILITY CLEARANCE

Prior to the start of work at the site, Dames & Moore met with Air Force personnel to locate the existing pipeline at the site. The pipeline was located by Air Force personnel using geophysical (magnetic) locators. Dames & Moore met with various utilities at the site, including the City of Anchorage Wastewater Utility, the Port of Anchorage, Chugach Electric, Alaska Telephone Utility, Signature Flight Support, and Texaco to locate the utilities in the area. The utilities were marked with spray paint and stakes, and the proposed drilling locations adjusted to accommodate the utilities.

3.2 SOIL BORINGS

A total of seven soil borings were installed at the site, at approximately 50-foot intervals along the pipeline (Figure 2). The borings were drilled to depths just below the Air Force JP-8 pipeline, which ranged from 8 feet bgs near the manhole to 16 feet bgs near the Spaghetti Works (Figures 3 & 4). The borings were drilled using a truck-mounted drill rig equipped with a six-inch diameter hollow stem auger. Samples were not collected in the first eight feet of the borings, since this soil would be excavated and sampled when the new pipeline was installed. Relatively undisturbed soil samples were collected at approximately two foot intervals from 8 feet bgs to the bottom of each boring using a split-spoon sampler. Following retrieval, the soil within the sampler was placed in the appropriate glass jars with teflon-lined caps. Sample labels with the following information were affixed to each sample jar: sample location, sample depth, date, time, sampler name, and project identification.

During drilling, a Microtip PID was used to monitor for the presence of volatile organic vapors in the soil samples. A small amount of the soil sample was sealed in a ziplock bag, disaggregated, and placed in a warm place. Volatile vapor readings were obtained by inserting the PID probe into the end of the sealed bag. The PID was calibrated to the appropriate gas standards before use each day.

After reaching the final depth for each boring, the augers were left in the ground for approximately 15 minutes to allow groundwater to enter the augers. Groundwater was not observed in the augers in all cases. The augers were removed, and the boreholes partially collapsed. Generally, the borings were observed to collapse within 4 feet of the surface. After collapse, Borings B-4, B-5, B-6, and B-7 were observed to have groundwater in the remaining portion of the borehole. The depth at which this water was entering the borehole was unknown. Where possible, groundwater samples were collected using a disposable bailor and rope. The groundwater samples were placed in the appropriate bottles and labeled with the sample location, sample depth, date, time, sampler name, and project identification.

Boring logs were maintained by the field geologist, and included PID readings, a description of the materials encountered in accordance with the United Soil Classification System (USCS), and sampling information. Copies of the boring logs are presented in Appendix A.

The soil and groundwater samples were stored in an ice chest cooled with blue ice for delivery to an Alaska Department of Environmental Conservation (ADEC) certified analytical laboratory (CT&E) for analyses. Selected soil and groundwater samples were analyzed for DRO by EPA Method 8100m, GRO by EPA Method 8015m, BTEX by EPA Method 8010, and lead by EPA Method 7421. The results of these analyses are summarized in Tables 1 & 2, and are discussed in Section 5.0. Proper chain-of-custody procedures were maintained for all samples collected, and copies of the chain-of-custodies and analytical results are presented in Appendix B (bound separately).

All sampling equipment was thoroughly cleaned between sampling events using a dilute Alconox solution followed by double rinsing by fresh and distilled water. The sampler was then air-dried. The augers were steam cleaned between borings. Following completion of soil sampling, the borings were backfilled with the soil cuttings.

3.3 TRENCH SAMPLING

Dames & Moore maintained field notes on the staining, odors, and soil types encountered during excavation of the trench. During the excavation, Dames & Moore collected soil samples at regular intervals from the walls and floor of the trench (Figures 5 to 8). The samples were collected using a stainless steel trowel. The soil samples were packed in pre-cleaned glass jars with teflon-lined lids. Each sample was labeled with the sample location, sample depth, date, time, sampler name, and project identification. The samples were then placed in a cooler with blue ice. A small portion of the soil from each of these samples was placed in a plastic bag for

screening with the PID. The results of the field screening are presented on Table 3.

During the excavation, water was observed to be accumulating within the trench at several locations. Samples of these fluids were collected directly into the appropriate glass jars. The samples were with the sample location, sample depth, date, time, sampler name, and project identification and placed in coolers with blue ice.

After collection, the samples were delivered to CT&E of Anchorage, Alaska under standard chain-of-custody procedures. Selected soil and water samples were analyzed for DRO by EPA Method 8100m, GRO by EPA Method 8015m, BTEX by EPA Method 8010, and lead by EPA Method 7421. The results of these analyses are summarized in Tables 2 & 4, and are discussed in Section 5.0. Proper chain-of-custody procedures were maintained for all samples collected, and copies of the chain-of-custodies and analytical results are presented in Appendix B (bound separately).

All sampling equipment was thoroughly cleaned between sampling events using a dilute Alconox solution, double rinsed with fresh water, and finally rinsed with distilled water. The sampling equipment was then air-dried.

3.4 WASTE CHARACTERIZATION SAMPLING

Contaminated soil encountered during the excavation was stockpiled at the site. Samples of this contaminated soil were collected to characterize this soil for disposal. Approximately one composite soil sample was collected for every 100 cubic yards of stockpiled soil. The samples were collected from various parts of the excavated soil pile, and hand tools were used to dig down at least one foot to obtain a fresh sample. The soil collected was placed in glass jars with teflon-lined lids, labeled, and placed in a cooler with blue ice. The samples were delivered to the analytical laboratory (CT&E) and analyzed for DRO by EPA Method 8100m, GRO by EPA Method 8015m, and BTEX by EPA Method 8010. Selected samples were also analyzed for volatile organic compounds (VOCs) by EPA Method 8240. The results of these analyzes are summarized on Table 5, and are discussed in Section 5.0. Proper chain-of-custody procedures were maintained for all samples collected, and copies of the chain-of-custodies and analytical results are presented in Appendix B.

During excavation, groundwater collecting in the trench was pumped into a tanker truck, and hauled to Elmendorf Air Force Base (EAFB). At EAFB, the water was placed in one 200 gallon tank and three railroad tanker cars. Samples of this water were collected to characterize the

water for disposal. The samples were collected using disposable bailors, placed in the proper sample jars, labeled, and sent to CT&E for analyses. The results of these analyses are presented on Table 6.

4.0 FIELD OBSERVATIONS

4.1 SOILS

The surface soil at the site was observed to consist of sandy/silty/gravelly fill, with occasional boulders, railroad ties, wood pilings, and other debris. In general, this fill appeared to consist of homogenous sand to the west (near B-1), and appeared more silty to the east (near B-5). At a depth of approximately 16 feet bgs in the west and 8 feet bgs in the east, the soil appeared to be a dark gray silty clay with a strong organic odor and occasional roots. This clay is believed to be the Bootlegger Cove Clay Formation.

4.2 GROUNDWATER

Groundwater at the site appears to occur in several perched lenses within the fill, and well as above the Bootlegger Cove Clay. The overall groundwater flow direction at the site is probably toward the west; however, localized groundwater flow directions at the site may vary significantly due to the heterogeneous nature of the soils.

The depth to groundwater at the site is difficult to estimate. The soil samples collected from the three western borings (B-1, B-2, and B-3) were not observed to be wet, and groundwater was not observed in the open borehole. In Borings B-4 and B-5 the shallow soil was observed to be wet, but appeared only moist in samples collected from below 12 feet bgs. Water was observed in these boreholes after removal of the auger. In Borings B-6 and B-7 the samples and cuttings did not appear to be wet, but water was observed in the boreholes after removal of the auger.

During excavation of the pipeline, the flow of groundwater into the 8-foot deep trench was observed to be minimal. The western portion of the trench was observed to be largely dry, while the eastern portion of the trench appeared to accumulate water slowly. Occasional seeps in the sidewall were observed, particularly in the vicinity of B-4, B-5 and B-7. Over time, the flow of water from these seeps appeared to diminish significantly. The northern portion of Segment 4, as well as the Segment 4 Extension and the Tote Anomaly excavation were observed to be dry (Figure 8).

The occurrence of groundwater in the soil borings and the trench would appear to be consistent with the heterogenous nature of the soils observed. Groundwater appears to flow along the coarser fill and debris, and collect on silt and clay lenses. The amount of groundwater collecting above the lenses appears to be limited, based on the limited flow of water from the seeps within the trenches. The overall water table for the site is probably located just above the contact between the fill and the underlying Bootlegger Cove Clay.

4.3 OTHER OBSERVATIONS AND EVENTS

During excavation of the trench in the vicinity of Boring B-7, a water main was broken. This caused large amounts of water to enter the trench, filling Segment 4 almost to the top. Approximately 20,000 gallons of water were removed from this trench to alleviate this problem. A smaller amount of water also entered the trench when a 60-inch diameter storm drain was broken in Segment 4. Water entered the trench periodically from this source, apparently under a tidal influence. Both the water main and the storm drain breaks caused significant delays in the project. It should be noted that filling Segment 4 with water may have caused contaminants to be spread both laterally and vertically through the trench, affecting the soil results. Groundwater samples were not collected from Segments 3 and 4 of the excavation, since the dilution effect of the water releases into the trench were unknown.

5.0 ANALYTICAL RESULTS

5.1 SOIL BORINGS

The results of the analyses of the soil samples from the borings are summarized on Table 1, and a complete copy of the analytical results are presented in Appendix B. Many of the soil samples collected from the soil borings were found to contain significant concentrations of hydrocarbons. The hydrocarbons appeared to consist of jet fuel or possibly mixed gasoline and diesel. The hydrocarbons appeared to be concentrated at two locations, at the known JP-8 release near the manhole in Segment 4 (Figures 9 & 10) and in the vicinity of Boring B-4 (Figures 11 & 12).

The contamination in the vicinity of Boring B-7 appears to be concentrated in the vicinity of the original release near the manhole. The hydrocarbon contamination appears to extend to a depth of approximately 12 feet bgs (Figures 9 & 10). The lateral spread of the hydrocarbons from the original release location may have been due to flow along the pipeline corridor.

Based on the occurrence and concentration of contamination, the hydrocarbon contamination in

the soil at Boring B-4 appears to have originated from above the Air Force JP-8 pipeline (Figures 11 & 12). The lateral spread of the contamination at depth may be due to the differences in permeability between the overlying fill and the underlying Bootlegger Clay.

Lead was not reported to be present above background concentration in the soil boring samples analyzed. This would appear to indicate that leaded gasoline is not a contributor to the hydrocarbon contamination found at the site.

5.2 TRENCH SOIL SAMPLES

The analytical results for the soil samples collected from the trenches are summarized on Table 4, and the complete analytical results are presented in Appendix B. The results confirm and further define the results of the soil borings, showing the hydrocarbon contamination to be concentrated in two main areas. These areas are the original release near the manhole (Figures 9 & 10) and in the vicinity of Boring B-4 (Figures 11 & 12).

One of the samples from the Segment 4 extension (Sample T555E12) was found to contain elevated concentrations of hydrocarbons (2,100 mg/kg DRO). The remaining samples from the extension did not appear to be significantly contaminated by hydrocarbons. This contamination appears to occur below the pipeline, and the depth to which it extends is unknown. Although an anomaly was found in the JP-8 pipeline at this location, no obvious breaks in the pipeline were observed. The pipeline away from the anomaly was not investigated.
Soil samples collected from the Tote Anomaly excavation did not appear to be contaminated with significant concentrations of hydrocarbons. Low concentrations of DRO (16.9 to 39.2 mg/kg) and GRO (<1.2 to 12.5 mg/kg) were reported in the samples, however, these concentrations are believed to be typical of background conditions at the Port. BTEX compounds were not reported in the samples.

Lead was not reported to be present above background concentration in any of the soil samples from the trenches. This would appear to indicate that leaded gasoline is not a contributor to the hydrocarbon contamination found at the site.

5.3 WATER

Four groundwater samples were collected from Borings B-4, B-5, B-6, and B-7, and three water samples were collected from the trench. A sample of the water in the 10-inch abandoned pipeline was also collected. All the water samples were analyzed for DRO, GRO, lead, and BTEX, and the results are summarized on Table 2. In summary, DRO GRO and BTEX

compounds were found in all the samples analyzed. The concentrations were highest in the groundwater samples from Borings B-4, B-5, and B-7. This is consistent with the results of the soil sampling. Samples collected from the trench (TWS1, TWS2, and TWS3) appeared to have lower concentrations of contaminants than the samples from the borings. This may be due to dilution by uncontaminated groundwater or seawater entering the trench, or volatilization of the hydrocarbons after excavation of the trench. The water sample collected from the 10-inch pipeline appears to have lower hydrocarbon concentration than water from the trench.

5.4 WASTE CHARACTERIZATION

The results of the waste characterization sampling for the excavated soil indicate that VOCs (other then methylene chloride, a laboratory contaminant) were not present in the samples analyzed (Table 5). Significant concentrations of hydrocarbons were found in most of the samples analyzed. These results were forwarded to the Air Force in order to characterize the soil for proper disposal.

Water samples collected from Tanks 1 through 4 were found to have varying degrees of hydrocarbon contamination (Table 6). The highest concentrations were found in the water samples collected from Tanks 1 and 3. Dames & Moore was contracted by the Air Force to treat and dispose of this water. This work is discussed in Dames & Moore's report titled *Draft Report - Railroad Car Water Treatment in Support of Emergency Pipeline Repair, Port of Anchorage Fuel Spill* dated 4 January 1996.

5.5 DUPLICATE SAMPLES

In accordance with our ADEC approved Quality Assurance Plan, Dames & Moore collected duplicate samples of the soil and water at the site for analyses (Tables 1, 2 and 4). The results of these analyses are consist with the results of the original samples in all cases.

6.0 RECOMMENDATIONS

Based on the results of this investigation, there appears to be two significant spill of hydrocarbons along the pipeline corridor. The first spill is near is located near the manhole. The second spill appears to be in the vicinity of B-4. The concentrations of contaminants in the soil and groundwater near these two spills significantly exceed ADEC cleanup levels. It should be noted, however, that the current threat to human or wildlife health from this contamination

would appear to be minimal, and much of the contaminated soil may have already been removed or remediated from the spill locations during replacement of the pipeline.

A course of action which may need to be considered at the site is the installation of additional soil borings and/or groundwater monitoring wells. However, on-going groundwater monitoring at the site is expected to present some difficulty. Groundwater appears to occur in isolated lenses within the fill, and probably as a layer above the Bootlegger Cove Clay. While groundwater is expected to flow primarily towards the west, the flow is probably strongly influenced by irregularities in the underlying Bootlegger Cove Clay and the nonhomogeneous nature of the fill. Preferential flow may occur along debris or old pipes in the fill. An additional problem is the likely tidal influences on the direction of groundwater flow in this area. In short, groundwater wells placed "down gradient" of the releases may not intercept the most contaminated groundwater, may be unintentionally screened across the wrong aquifer, or screened across more than one aquifer. If groundwater wells are to be installed in the spill vicinity, it is recommended that the wells be installed in fairly close proximity to the release locations.

7.0 LIMITATIONS

The conclusions presented in this report are professional opinions based solely on our interpretation of the available analytical data and observations at the site. The conclusions are intended exclusively for the purpose outlined herein and at the site location and project indicated. This report is for the sole use of the Air Force. The scope of services performed in the execution of this investigation may not be appropriate to satisfy the needs of other users, and any re-use of this document or the findings, conclusions, or recommendations presented herein is at the sole risk of said user(s).

It should be recognized that this study is not intended to be a definitive investigation of contamination at the subject property. Given that the scope of services for this project was limited, that exploratory excavations were limited in number and depth, and that sampling of deeper soils and groundwater was not undertaken, it is possible that currently unrecognized contamination may exist at the site.

Opinions and recommendations presented in this report apply to the site conditions existing at the time of the site visit. They cannot necessarily apply to site changes of which Dames & Moore is unaware and has not had the opportunity to evaluate. This report is intended to be

used in its entirety; no excerpts may be taken to be representative of the findings of this investigation.

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TABLES

TABLE 1
ANALYTICAL RESULTS
SOIL SAMPLES FROM SOIL BORINGS
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
B-1	8-10	66.5	57.7	1.44	4.4	<0.055	<0.055	<0.055	<0.055
	10-12	38.6	119	36.0	4.4	<0.055	<0.055	0.156	0.440
	12-14	56.7	36.1	435	3.6	0.220	0.185	0.863	1.792
	14-16	24.2	16.8	2.20	3.5	<0.050	<0.050	<0.050	<0.050
	16-18	21.8	18.2	1.20	9.0	<0.060	<0.060	<0.060	<0.060
QC (B-1 Dup.)	8-10	-	624	62.0	4.6	<0.050	<0.050	0.251	0.511
	10-12	-	175	36.8	8.7	<0.055	<0.055	0.139	0.420
	12-14	-	27.2	349	4.0	<0.050	0.179	0.490	1.432
	14-16	-	16.0	2.79	3.8	0.104	<0.055	<0.055	<0.055
	16-18	-	16.4	<1.20	9.0	<0.060	<0.060	<0.060	<0.060

<:	Not reported above analytical detection limit.
ft. bgs:	Feet below ground surface.
mg/kg:	Milligrams per kilogram.
ppm:	Parts per million.
DRO:	Diesel range organics.
GRO:	Gasoline range organics.
BTEX:	Benzene, toluene, ethylbenzene, xylenes.
PID:	Photoionization detector.
QC:	Quality control duplicate.
-:	Not analyzed.

TABLE 1 (cont.)
ANALYTICAL RESULTS
SOIL SAMPLES FROM SOIL BORINGS
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
B-2	8-10	1,601	4,130	9,321	4.2	9.40	171	116	308
	10-12	1,350	2,030	2,185	4.0	0.722	23.1	34.8	112.4
	12-14	129	22.8	40.9	5.0	<0.050	<0.050	0.156	0.293
	14-16	217	22.2	2.61	9.0	<0.060	<0.060	<0.060	0.065
	16-18	22.5	12.3	1.20	8.0	<0.060	<0.060	<0.060	<0.060
B-3	10-12	61.1	30.5	3.15	9.0	<0.055	<0.055	<0.055	0.077
	12-14	20.2	21.4	<1.20	10	<0.060	<0.060	<0.060	<0.060
	14-16	22.2	21.4	<1.10	9.9	<0.055	<0.055	<0.055	<0.055
	16-18	25.8	41.7	<1.10	8.8	<0.055	<0.055	<0.055	<0.055
B-4	8-10	555	1,550	258	12	0.350	0.532	2.32	7.999
	10-12	743	482	642	8.8	0.807	5.26	7.42	32.94
	12-14	683	54.5	110	10	0.097	0.807	1.00	2.497
	14-16	947	262	138	11	<0.055	0.417	1.04	2.487
	16-18	56.8	56.1	<1.20	11	<0.060	<0.060	<0.060	<0.060

<: Not reported above analytical detection limit.
ft. bgs: Feet below ground surface.
mg/kg: Milligrams per kilogram.
ppm: Parts per million.
BTEX: Benzene, toluene, ethylbenzene, xylenes.
GRO: Gasoline range organics.
PID: Photoionization detector.
DRO: Diesel range organics.

TABLE 1 (cont.)
ANALYTICAL RESULTS
SOIL SAMPLES FROM SOIL BORINGS
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
B-5	8-10	16.0	58.1	2.29	9.4	<0.055	<0.055	<0.055	<0.055
	10-12	21.2	14.8	<1.10	12	0.138	<0.055	<0.055	<0.055
	12-14	17.6	16.1	<1.10	8.8	<0.055	<0.055	<0.055	<0.055
	15-17	22.1	22.8	<1.20	12	<0.060	<0.060	<0.060	<0.060
B-6	8-10	15.8	125	<2.63	21	<0.055	<0.055	<0.055	<0.055
	10-12	10.4	9.48	<1.10	13	<0.055	<0.055	<0.055	<0.055
	12-14	10.4	9.13	<1.20	15	<0.060	<0.060	<0.060	<0.060
	15-17	17.2	10.1	<1.20	18	<0.060	<0.060	<0.060	<0.060
B-7	8-10	1,370	5,570	866	17	3.04	32.8	10.1	51.7
	10-12	878	201	194	15	0.221	4.30	1.99	10.07
	12-14	264	1,030	1,300	53	1.19	26.0	5.63	22.22
	15-17	10.5	7.07	<1.10	12	<0.060	<0.060	<0.060	<0.060

<: Not reported above analytical detection limit.
ft. bgs: Feet below ground surface.
mg/kg: Milligrams per kilogram.
ppm: Parts per million.
DRO: Diesel range organics.
GRO: Gasoline range organics.
BTEX: Benzene, toluene, ethylbenzene, xylenes.
PID: Photoionization detector.

TABLE 2
ANALYTICAL RESULTS
WATER SAMPLES FROM TRENCHES, SOIL BORINGS, AND PIPELINES
PORT OF ANCHORAGE

Sample Location	DRO (mg/L)	GRO (mg/L)	Lead (mg/L)	BTEX Compounds (mg/L)			
				Benzene	Toluene	Ethylbenzene	Xylenes
TWS1	22.9	8.63	0.057	0.792	0.984	0.368	1.449
TWS2	18.2	87.4	0.49	11.8	20.6	1.88	8.32
QC	106	132	0.29	12.1	21.7	2.41	10.19
TWS3	18.9	9.26	0.46	0.024	0.0043	0.090	0.122
B-4	311	208	0.20	16.0	29.9	2.90	11.6
B-5	560	4.71	3.2	0.035	0.0018	0.099	0.1674
B-6	11.2	0.056	1.2	0.0070	0.011	0.014	0.0043
B-7	158	12.5	2.1	0.359	1.21	0.266	1.545
AP1	3.27	6.89	<0.0050	0.023	0.076	0.151	1.347

<: Not reported above analytical detection limit.
mg/L: Milligrams per liter.
DRO: Disel range organics.
GRO: Gasoline range organics.
VOCs: Volatile organic compounds.
BTEX: Benzene, toluene, ethylbenzene, xylenes.

TABLE 3
PID READINGS FROM TRENCH SAMPLES
PORT OF ANCHORAGE

LOCATION	DEPTH (ft. bgs)	PID READING (ppm)
T24N2	2	0.0
T24N5	5	0.0
T24B8	8	711
T50N2	2	34.3
T50N5	5	96.7
T60S2	2	31.2
T60S5	5	28.5
T60B8	8	1,649
T70N2	2	40.4
T70N5	5	154.5
T100N2	2	29
T100N5	5	38.2
T100B8	8	1,889
T116N2	2	11.2
T116N5	5	285
T116B8	8	1,638
T120S2	2	122
T120S5	5	730

PID: Photoionization detector.
ppm: Parts per million.
ft. bgs: Feet below ground surface.

TABLE 3 (cont.)
PID READINGS FROM TRENCH SAMPLES
PORT OF ANCHORAGE

LOCATION	DEPTH (ft. bgs)	PID READING (ppm)
T134N2	2	29.3
T134N5	5	35.0
T134B8	8	1,552
T140S2	2	90.3
T140S5	5	781
T150N2	2	2,841
T150N5	5	757
T160S2	2	60.1
T164N2	2	1,191
T164N5	5	1,371
T164B8	8	1,250
T170S2	2	2,417
T170S5	5	1,744
T170B8	8	788
T180N2	2	36.5
T180N5	5	1,147
T180B8	8	1,757
T190S2	2	1,183
T190S5	5	1,188
T190B8	8	1,132

ppm: Parts per million.
ft. bgs: Feet below ground surface.
PID: Photoionization detector.

TABLE 3 (cont.)
PID READINGS FROM TRENCH SAMPLES
PORT OF ANCHORAGE

LOCATION	DEPTH (ft. bgs)	PID READING (ppm)
T500W2	2	4.1
T500W5	5	3.1
T500B11	11	4.9
T515E2	2	22.5
T515E7	7	7.2
T515B11	11	5.1
T535S5	5	0.0
T538W5	5	17.2
T538W12	12	18.6
T548E12	12	1162
T555E12	12	1420
T556E5	5	114
T556W12	12	1,586
T558E12	12	264
T562W5	5	1,663
T565N5	5	264
DMTOTE-1	9	16.7
DMTOTE-2	8	7.7
DMTOTE-3	9	6.2
DMTOTE-4	7	5.6

ppm: Parts per million.
ft. bgs: Feet below ground surface.
PID: Photoionization detector.

TABLE 3 (cont.)
PID READINGS FROM TRENCH SAMPLES
PORT OF ANCHORAGE

LOCATION	DEPTH (ft. bgs)	PID READING (ppm)
T410W2	2	39.2
T410W5	5	32.0
T410B9	9	10.9
T425E2	2	25.7
T425E5	5	419
T425B10	10	58.6
T445W2	2	133
T445W5	5	244
T445B10	10	93.2
T450B8	8	56.6
T455E2	2	4.3
T455E5	5	7.4
T455B10	10	56.8
T455B8	8	701
T470W2	2	3.9
T470W5	5	9.2
T470B11	11	109
T485E2	2	3.4
T485E7	7	7.1
T485B11	11	13.9

ppm: Parts per million.
ft. bgs: Feet below ground surface.
PID: Photoionization detector.

TABLE 3 (cont.)
PID READINGS FROM TRENCH SAMPLES
PORT OF ANCHORAGE

LOCATION	DEPTH (ft. bgs)	PID READING (ppm)
T305E2	2	10.7
T305E5	5	7.6
T305B9	9	34
T320W2	2	18.5
T320W5	5	71.2
T320B9	9	6.3
T335E2	2	18.1
T335E5	5	50.1
T335B9	9	64.2
T350W2	2	464
T350W5	5	773
T350B9	9	50.8
T365E2	2	20.8
T365E5	5	1,019
T365B9	9	7.5
T380W2	2	13.3
T380W5	5	45.5
T380B9	9	407
T395E2	2	8.3
T395E5	5	43.1
T395B9	9	14.7

ppm: Parts per million.
ft. bgs: Feet below ground surface.
PID: Photoionization detector.

TABLE 3 (cont.)
PID READINGS FROM TRENCH SAMPLES
PORT OF ANCHORAGE

LOCATION	DEPTH (ft. bgs)	PID READING (ppm)
T200S2	2	900
T200S5	5	823
T200B8	8	567
T215N2	2	13.6
T215N5	5	15.9
T215B8	8	211
T230S2	2	28
T230S5	5	813
T230B8	8	25.2
T245N2	2	9.3
T245N5	5	1,258
T245B8	8	105
T260S2	2	9.1
T260S5	5	133
T260B8	8	62.3
T275N2	2	7.4
T275N5	5	10.2
T275B8	8	11.1
T280S2	2	17.9
T280S5	5	8.5

ppm: Parts per million.
ft. bgs: Feet below ground surface.
PID: Photoionization detector.

TABLE 4
ANALYTICAL RESULTS
SOIL SAMPLES FROM TRENCHES
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
T24B8	8	711	1,010	394	7.0	<0.500	0.690	1.82	7.52
T60S2	2	31.2	29.7	2.90	7.0	<0.050	<0.050	<0.050	0.097
T60S5	5	28.5	24.0	<1.00	5.2	<0.050	<0.050	<0.050	<0.050
T100N2	2	29	23.6	2.06	7.8	<0.050	0.055	<0.050	0.061
T100N5	5	38.2	31.2	2.71	4.8	<0.055	0.058	0.066	0.226
T100B8	8	1,889	2,360	1,830	5.2	10.1	73.8	25.9	1.108
T134N2	2	29.3	1,710	2.10	21	<0.055	0.077	<0.055	0.066
T134N5	5	35.0	45.8	4.05	5.8	<0.050	0.119	0.063	0.073
T134B8	8	1,552	312	1,178	7.1	1.02	33.8	20.1	71.9
T170S2	2	2,417	2,650	4,696	10	12.0	86.0	49.9	171.8
T170S5	5	1,744	4,890	5,047	9.0	13.1	197	72.5	260.2
T230S2	2	28	225	4.99	26	<0.050	<0.050	<0.050	0.054
T230S5	5	813	45.9	<1.10	4.7	<0.060	<0.060	<0.060	<0.060

<: Not reported above analytical detection limit.
ft. bgs: Feet below ground surface.
mg/kg: Milligrams per kilogram.
ppm: Parts per million.
PID: Photoionization detector.
DRO: Diesel range organics.
GRO: Gasoline range organics.
BTEX: Benzene, toluene, ethylbenzene, xylenes.

TABLE 4 (cont.)
ANALYTICAL RESULTS
SOIL SAMPLES FROM TRENCHES
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
T538W12	12	18.6	18.0	6.14	5.3	0.119	<0.055	0.112	0.430
T555E12	12	1,420	2,150	799	9.2	<0.55	6.64	7.64	28.03
T556E5	5	114	207	<1.10	5.9	<0.055	<0.055	<0.055	<0.055
T565N5	5	264	21.4	29.6	4.9	<0.050	0.066	0.383	0.363

<: Not reported above analytical detection limit.
ft. bgs: Feet below ground surface.
mg/kg: Milligrams per kilogram.
ppm: Parts per million.
DRO: Diesel range organics.
GRO: Gasoline range organics.
BTEX: Benzene, toluene, ethylbenzene, xylenes.
PID: Photoionization detector.

TABLE 4 (cont.)
ANALYTICAL RESULTS
SOIL SAMPLES FROM TRENCHES
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
T455B10	10	56.8	188	-	-	-	-	-	-
T455E2	2	4.3	109	<1.00	11	<0.050	<0.050	<0.050	<0.050
T455E5	5	7.4	14.6	<1.00	4.3	<0.050	<0.050	<0.050	<0.050
T455B8	8	701	5,840	842	8.9	<0.050	2.05	2.45	20.63
T470B11	11	109	3,990	-	-	-	-	-	-
T485B11	11	13.9	56.1	-	-	-	-	-	-
T500W2	2	4.1	14.2	-	-	-	-	-	-
T500W5	5	3.1	14.6	-	-	-	-	-	-
T500B11	11	4.9	47.4	-	-	-	-	-	-
T515E2	2	22.5	123	-	-	-	-	-	-
T515E7	7	7.2	69.3	-	-	-	-	-	-
T515B11	11	5.1	95.0	-	-	-	-	-	-

<: Not reported above analytical detection limit.
ft. bgs: Feet below ground surface.
mg/kg: Milligrams per kilogram.
ppm: Parts per million.
DRO: Diesel range organics.
GRO: Gasoline range organics.
BTEX: Benzene, toluene, ethylbenzene, xylenes.
PID: Photoionization detector.
-: Not analyzed.

TABLE 4 (cont.)
ANALYTICAL RESULTS
SOIL SAMPLES FROM TRENCHES
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
T275N2	2	7.4	51.0	<1.00	16	<0.050	<0.050	<0.050	<0.050
T275N5	5	10.2	136	20.6	17	<0.060	0.090	0.120	0.225
T305B9	9	34	152	-	-	-	-	-	-
T320B9	9	6.3	101	-	-	-	-	-	-
T335B8	9	64.2	3,150	-	-	-	-	-	-
T350W2	2	464	755	55.4	25	<0.060	0.092	0.155	0.708
T350W5	5	773	836	206	32	<0.055	0.263	0.692	1.472
T350B9	9	50.8	2,130	-	-	-	-	-	-
T365B9	9	7.5	851	-	-	-	-	-	-
T380B9	9	407	1,640	-	-	-	-	-	-
T395B9	9	14.7	76.4	-	-	-	-	-	-
T410B9	9	10.9	429	-	-	-	-	-	-
T425B10	10	58.6	441	-	-	-	-	-	-
T445B10	10	93.2	4,360	-	-	-	-	-	-

<: Not reported above analytical detection limit.
ft. bgs: Feet below ground surface.
mg/kg: Milligrams per kilogram.
ppm: Parts per million.
DRO: Diesel range organics.
GRO: Gasoline range organics.
BTEX: Benzene, toluene, ethylbenzene, xylenes.
PID: Photoionization detector.
-: Not analyzed.

TABLE 4 (cont.)
ANALYTICAL RESULTS
SOIL SAMPLES FROM TRENCHES
PORT OF ANCHORAGE

Sample Location	Depth (ft. bgs)	PID (ppm)	DRO (mg/kg)	GRO (mg/kg)	Lead (mg/kg)	BTEX Compounds (mg/kg)			
						Benzene	Toluene	Ethylbenzene	Xylenes
DM-TOTE1	9	16.7	24.5	<1.20	9,3	<0.060	<0.060	<0.060	<0.060
DM-TOTE2	8	7.7	16.9	<1.20	8.7	<0.060	<0.060	<0.060	<0.060
DM-TOTE3	9	6.2	17.5	1.33	6.3	<0.050	<0.050	<0.050	<0.050
DM-TOTE4	7	5.6	39.2	12.5	10	<0.060	<0.060	<0.060	0.076

<:	Not reported above analytical detection limit.
ft. bgs:	Feet below ground surface.
mg/kg:	Milligrams per kilogram.
ppm:	Parts per million.
DRO:	Diesel range organics.
GRO:	Gasoline range organics.
BTEX:	Benzene, toluene, ethylbenzene, xylenes.
PID:	Photoionization detector.

TABLE 5
ANALYTICAL RESULTS
SOIL PILE SAMPLES
PORT OF ANCHORAGE

Sample Location	DRO (mg/kg)	GRO (mg/kg)	VOCs (mg/kg)	BTEX Compounds (mg/kg)			
				Benzene	Toluene	Ethylbenzene	Xylenes
SP2S1	4,620	2,716	ND	<5.5	73.8	29.6	1,151
SP1S2	1,030	365	ND	<0.505	8.07	4.39	20.32
SP1S3	606	173	0.133 Methylene Chloride	0.066	1.58	1.26	6.62
SP1S4	400	0.153	0.118 Methylene Chloride	0.153	3.71	2.68	12.56
SP3S1	637	427	-	<0.055	0.678	2.46	7.87
SP3S2	368	186	-	0.097	1.50	1.80	5.87
SP3S3	1,150	122	-	<0.050	0.871	1.48	7.85
SP3S4	526	6.71	-	<0.050	<0.050	<0.050	<0.050
SP4S1	1,330	241	-	0.067	2.65	2.16	10.89
SP4S2	1,240	595	-	1.70	17.3	6.40	34.25
SP4S3	755	1.51	-	0.185	3.28	2.42	8.49

-	Not analyzed.
ND:	Not reported above various analytical detction limits.
<:	Not reported above analytical detection limit.
mg/kg:	Milligrams per kilogram.
BTEX:	Benzene, toluene, ethylbenzene, xylenes.
DRO:	Disel range organics.
GRO:	Gasoline range organics.
VOCs:	Volatile organic compounds.

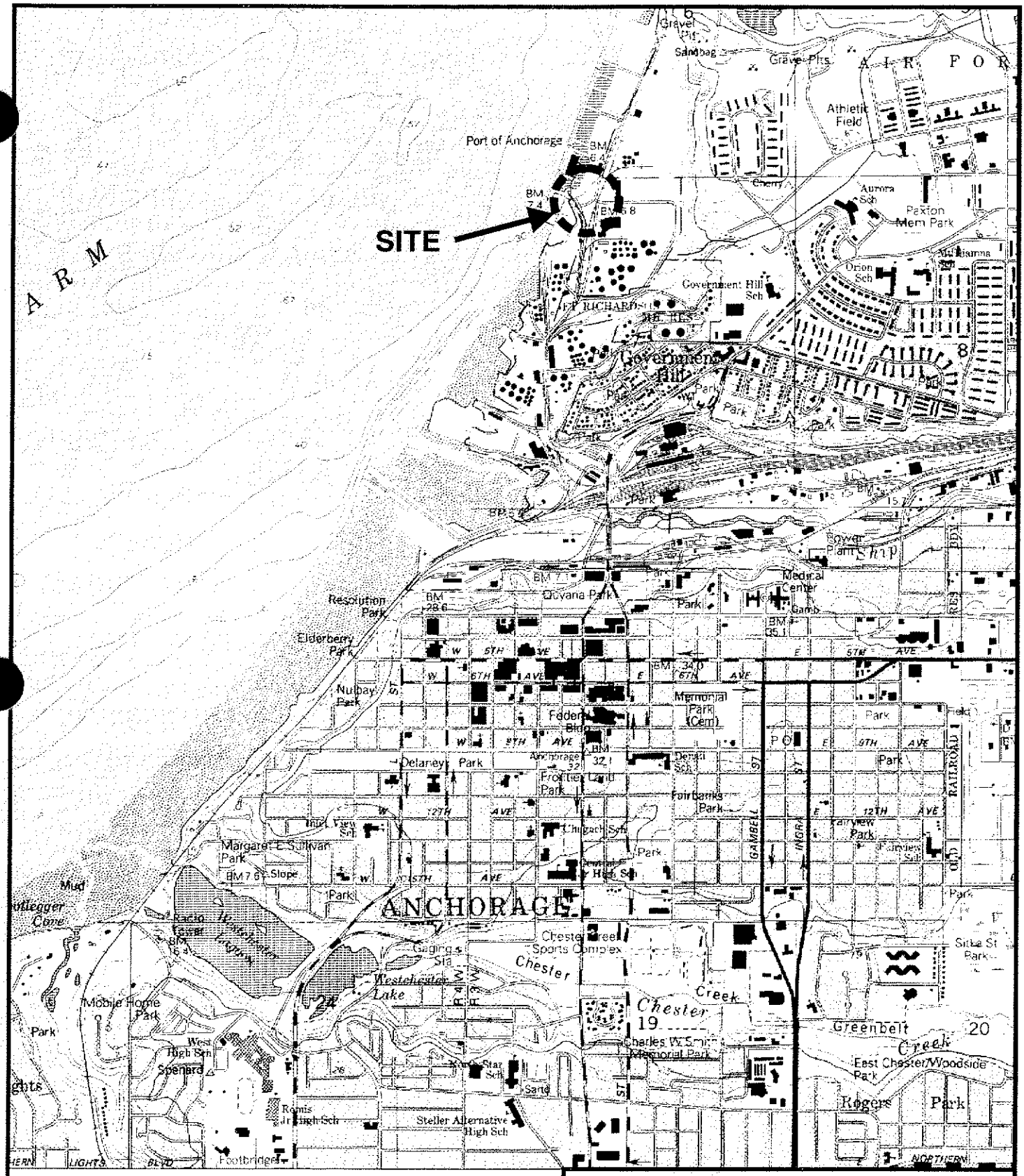
TABLE 6
ANALYTICAL RESULTS
WATER TANK SAMPLES
PORT OF ANCHORAGE

Sample Location	DRO (mg/L)	GRO (mg/L)	BTEX Compounds (mg/L)			
			Benzene	Toluene	Ethylbenzene	Xylenes
Tank 1	81,200	2,564	10.2	24.8	19.4	74.4
Tank 2	13.4	5.74	0.595	0.466	<0.100	1.219
Tank 3	3,460	16.3	1.47	0.905	0.094	0.829
Tank 4	862	16.6	0.211	0.144	0.057	0.448

<: Not reported above analytical detection limit.
mg/L: Milligrams per liter.
ft. bgs: Feet below ground surface.
DRO: Disel range organics.
GRO: Gasoline range organics.
VOCs: Volatile organic compounds.
BTEX: Benzene, toluene, ethylbenzene, xylenes.

FIGURES

FIGURES



N
W — E

0 1/4 1/2 1

APPROXIMATE SCALE IN MILES

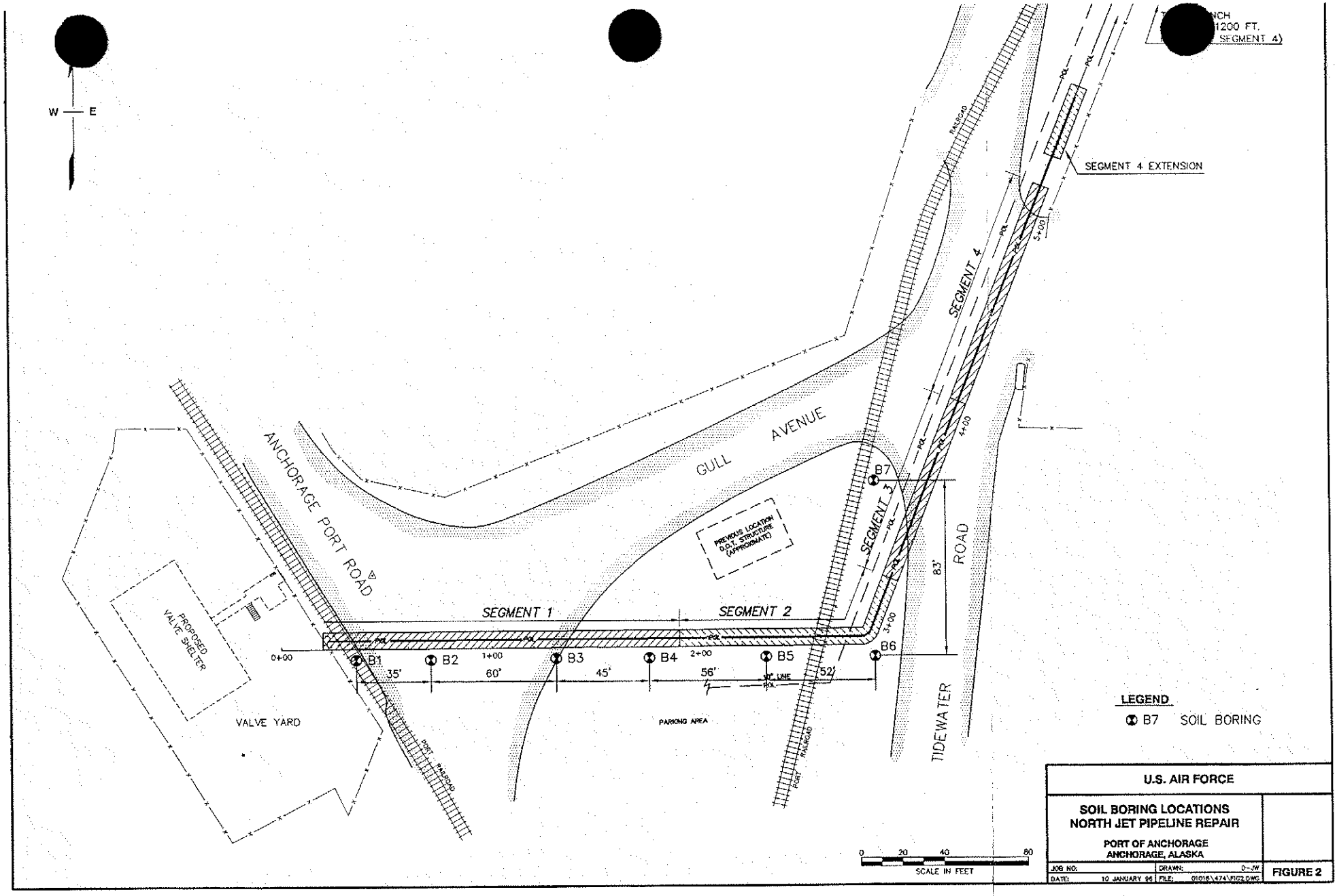
Reference: Anchorage (A-8) NW Map, USGS 1:25,000 Topographic Series, 1994

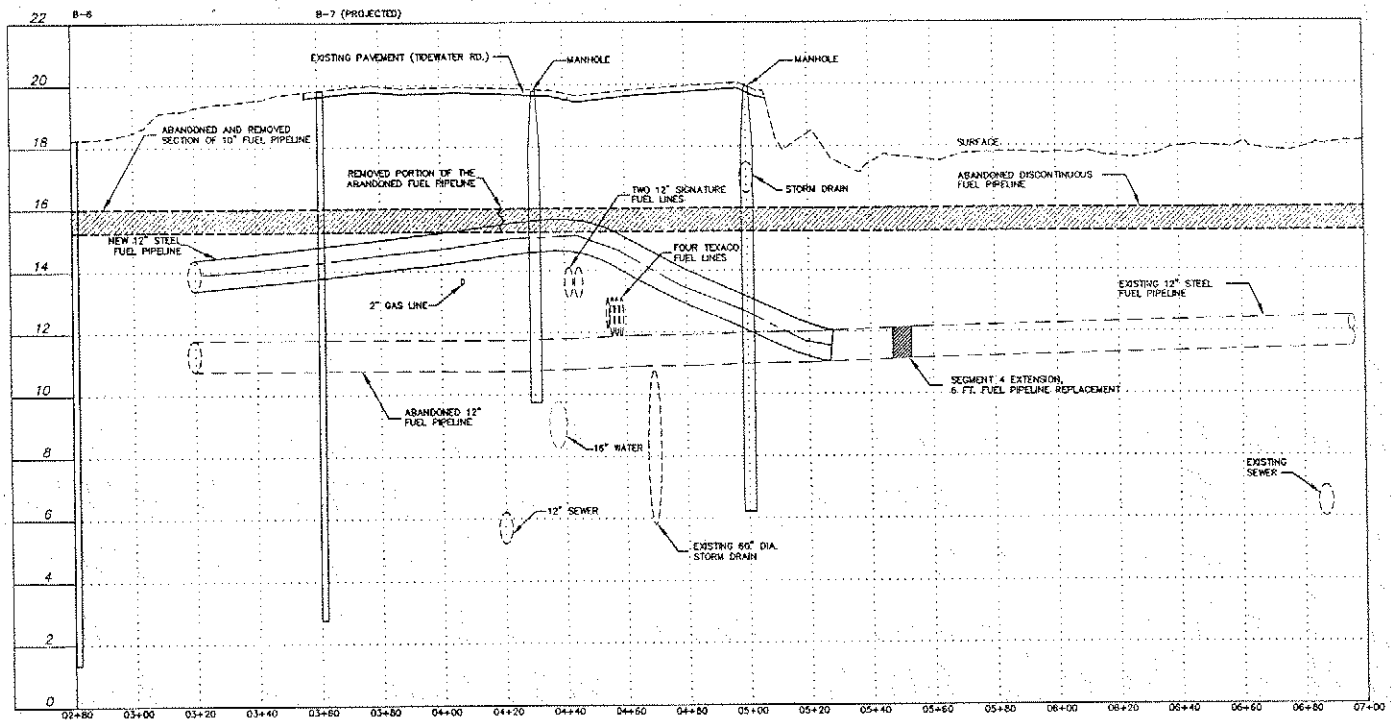
DEPARTMENT OF THE AIR FORCE

REPAIR NORTH JET PIPELINE
SITE VICINITY MAP

PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO:		DRAWN:	ELK	FIGURE 1
DATE:	8 DECEMBER 1995	FILE:	01016\474\FIG1.CDR	


W — E
SEGMENT 4 EXTENSION
SEGMENT 4
SEGMENT 3
SEGMENT 1
SEGMENT 2
GULL AVENUE
ANCHORAGE PORT ROAD
PREVIOUS LOCATION D.O.T. STRUCTURE (APPROXIMATE)
PROPOSED VALVE SHELTER
VALVE YARD
PORT RAILROAD
PARKING AREA
TIDEWATER ROAD
83'
B1
B2
B3
B4
B5
B6
B7
0+00
1+00
2+00
3+00
4+00
5+00
35'
60'
45'
56'
52'
90° LINE
POL
LEGEND
B7 SOIL BORING
0 20 40 80
SCALE IN FEET
U.S. AIR FORCE
SOIL BORING LOCATIONS
NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE
ANCHORAGE, ALASKA
JOB NO:
DRAWN: D-JW
DATE: 10 JANUARY 96
FILE: 01016\474\FIG2.DWG
FIGURE 2



0 20 40 80
HORIZONTAL SCALE IN FEET

0 2 4 8
VERTICAL SCALE IN FEET

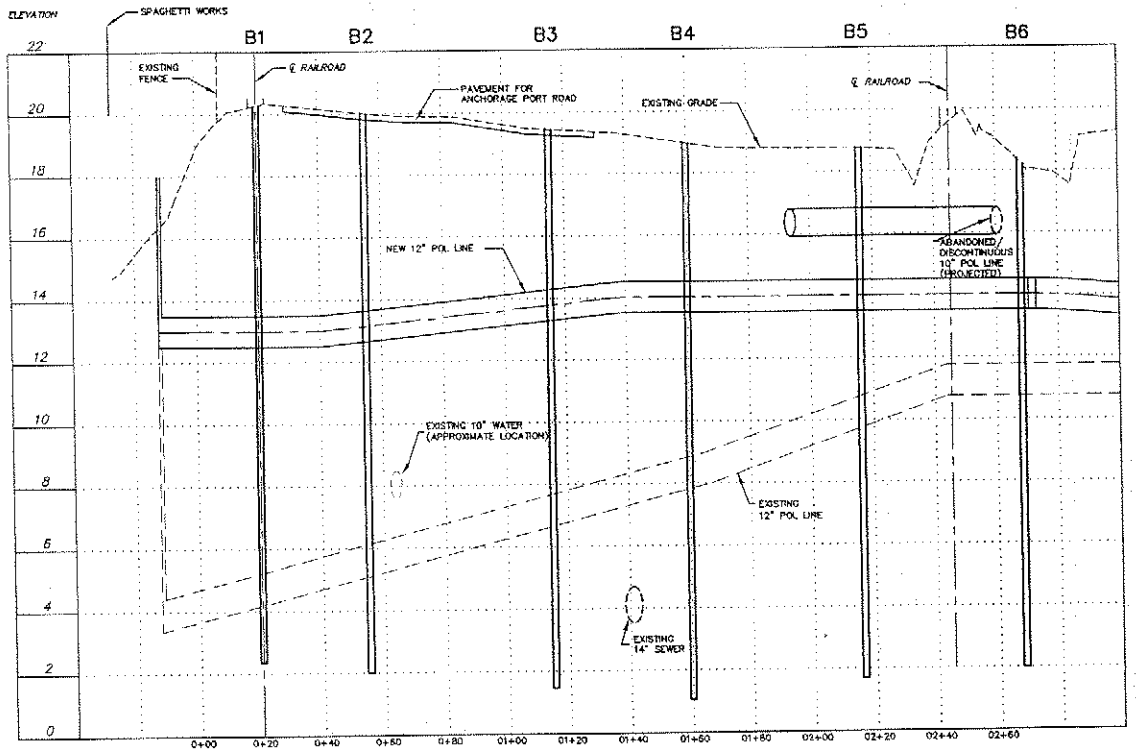
VERTICAL EXAGGERATION = 10x

U.S. AIR FORCE

CROSS SECTION FROM BORING B-6 TO SEGMENT 4 EXTENSION
NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO:	0	DRAWN:	LAS
DATE:	10 JANUARY 96	FILE: 01016\474\B6-SEG4.DWG	

FIGURE 3



0 20 40 80
HORIZONTAL SCALE IN FEET

0 2 4 8
VERTICAL SCALE IN FEET

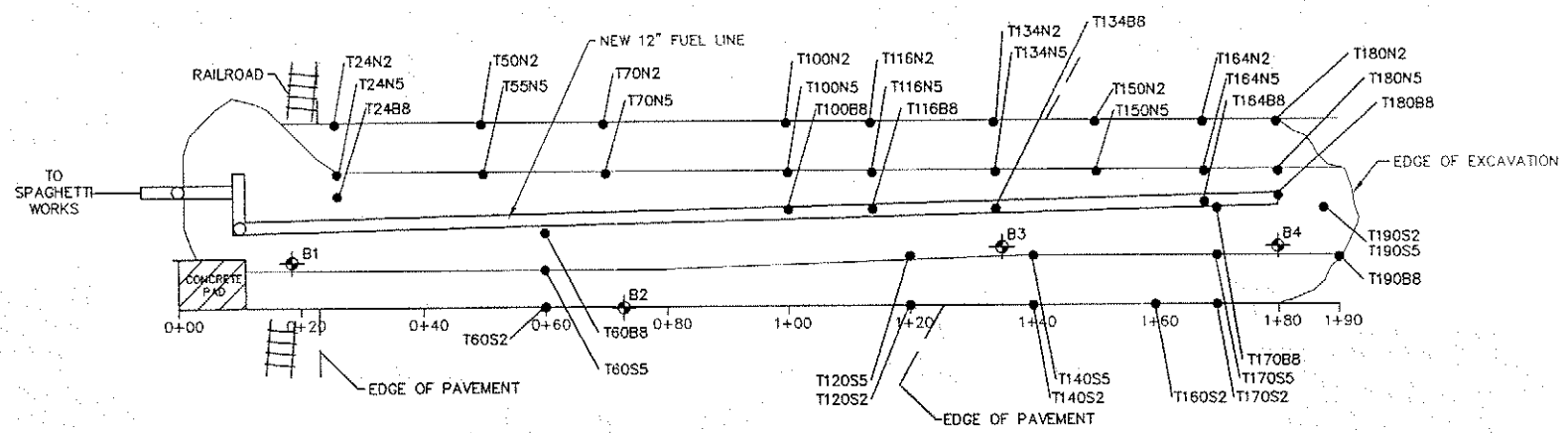
VERTICAL EXAGGERATION = 10x

U.S. AIR FORCE

CROSS SECTION FROM SPAGHETTI WORKS TO BORING B-6
NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO: DRAWN: LAS
DATE: 10 JANUARY 96 FILE: 01016\474\SPA-B6.DWG

FIGURE 4



SEGMENT 1

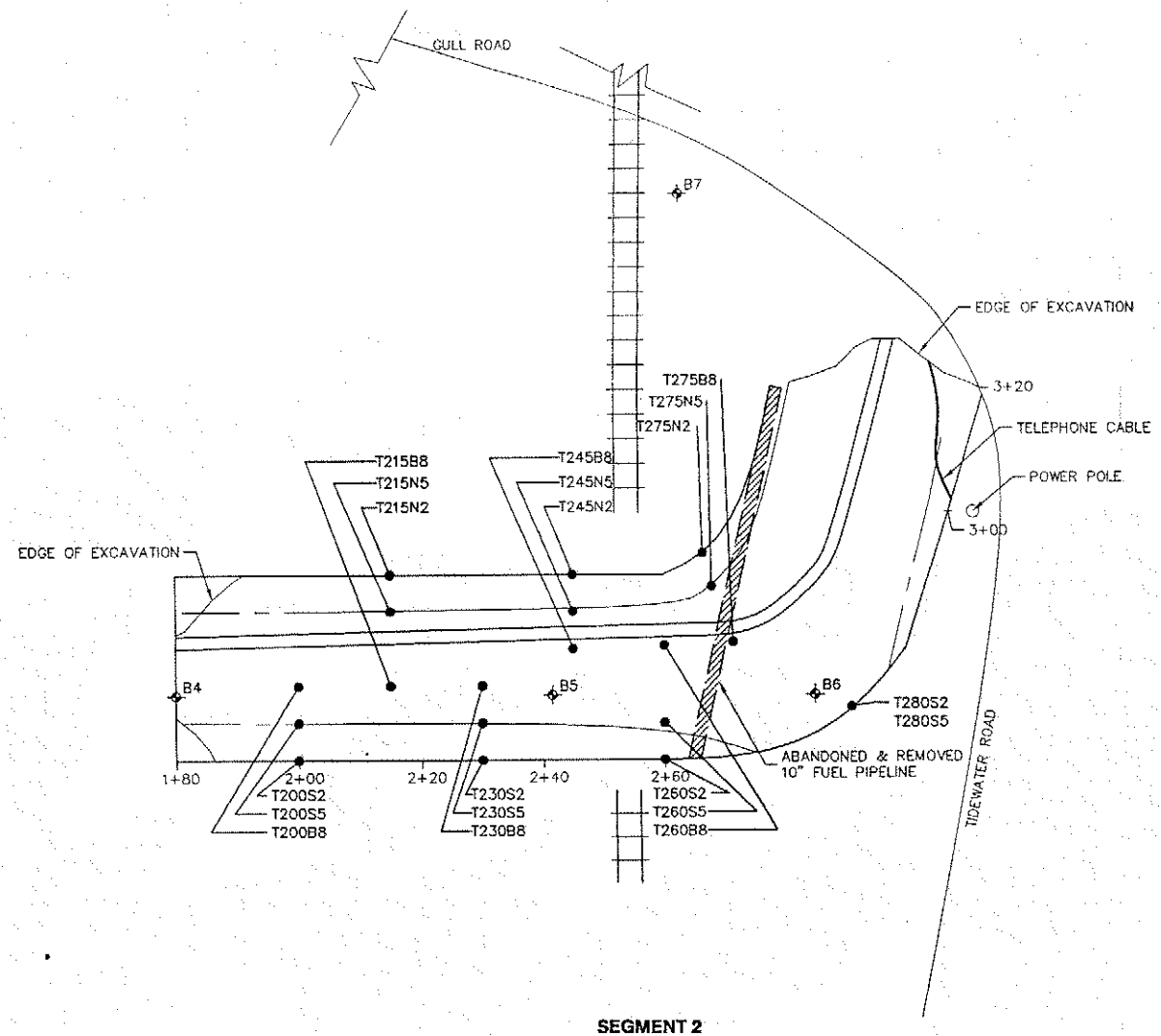
LEGEND:

⊕ SOIL BORING LOCATIONS

NOTES:
SOIL SAMPLE RESULTS CAN BE FOUND IN TABLES 1–4.

0 10 20 40
SCALE IN FEET

U.S. AIR FORCE		
SEGMENT 1 SAMPLE LOCATIONS NORTH JET PIPELINE REPAIR PORT OF ANCHORAGE ANCHORAGE, ALASKA		
JOB NO: 0	DRAWN: LAS	FIGURE 5
DATE: 10 JANUARY 96	FILE: 01016\474\FIG5.dwg	



LEGEND:

⊕ SOIL BORING LOCATIONS

NOTES:
SOIL SAMPLE RESULTS CAN BE FOUND IN TABLES 1–4.

SEGMENT 2

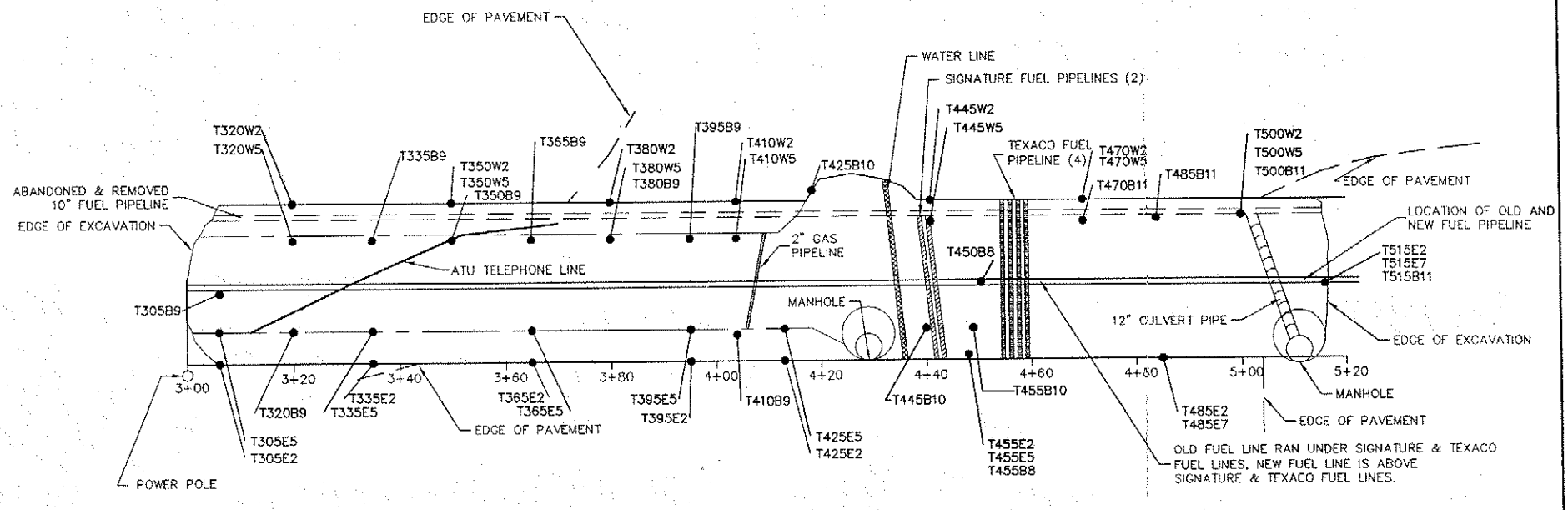
U.S. AIR FORCE

SEGMENT 2 SAMPLE LOCATIONS
NORTH JET PIPELINE REPAIR

PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO:	0	DRAWN:	LAS
DATE:	10 JANUARY 96	FILE:	01016\474\FIG6.dwg

FIGURE 6



SEGMENTS 3 & 4

0 10 20 40
SCALE IN FEET

LEGEND:

● SOIL SAMPLE LOCATIONS

NOTES:
SOIL SAMPLE RESULTS CAN BE FOUND ON TABLES 1–4.

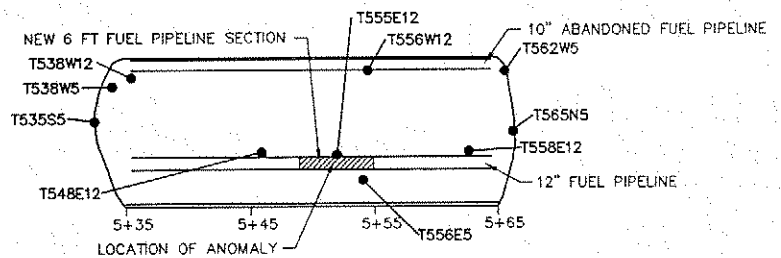
U.S. AIR FORCE

SEGMENTS 3 & 4 SAMPLE LOCATIONS
NORTH JET PIPELINE REPAIR

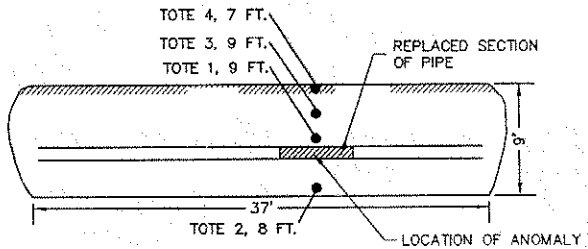
PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO:	0	DRAWN:	LAS
DATE:	10 JANUARY 96	FILE:	01016\474\FIG7.dwg

FIGURE 7



SEGMENT 4 EXTENSION



TOTE ANOMALY

0 5 10 20
SCALE IN FEET

LEGEND:

● SOIL SAMPLE LOCATIONS

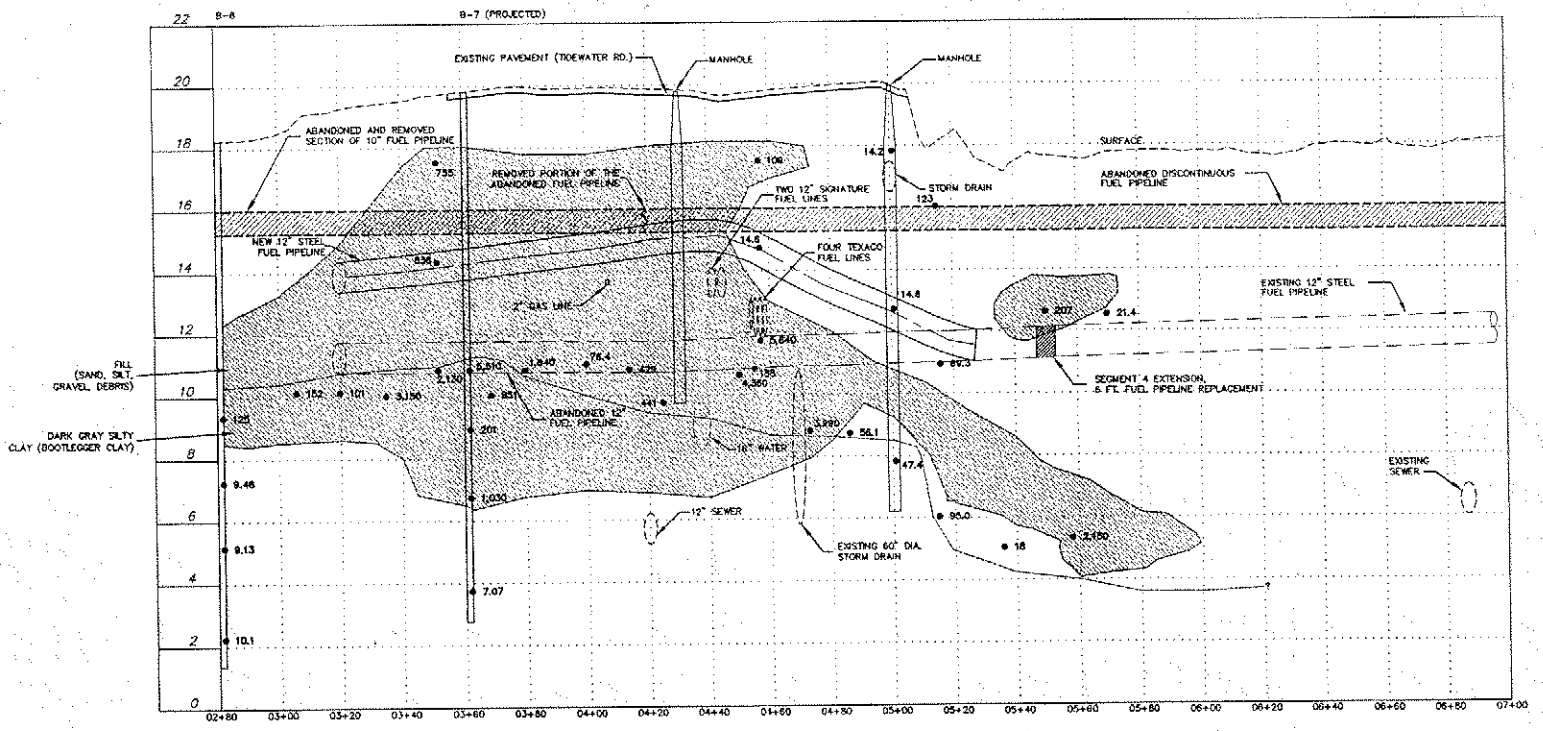
NOTES:
SOIL SAMPLE RESULTS CAN BE FOUND ON TABLES 1–4.

U.S. AIR FORCE

SEGMENT 4 EXTENSION AND TOTE ANOMALY SAMPLE LOCATIONS NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE ANCHORAGE, ALASKA

JOB NO: 0 | DRAWN: LAS
DATE: 10 JANUARY 96 | FILE: 01018\474\FIG8.dwg

FIGURE 8



LEGEND:

- ● SAMPLE LOCATION WITH DRO CONCENTRATION IN MG/KG
- NS DRO >100 MG/KG

0 20 40 80
HORIZONTAL SCALE IN FEET

0 2 4 8
VERTICAL SCALE IN FEET

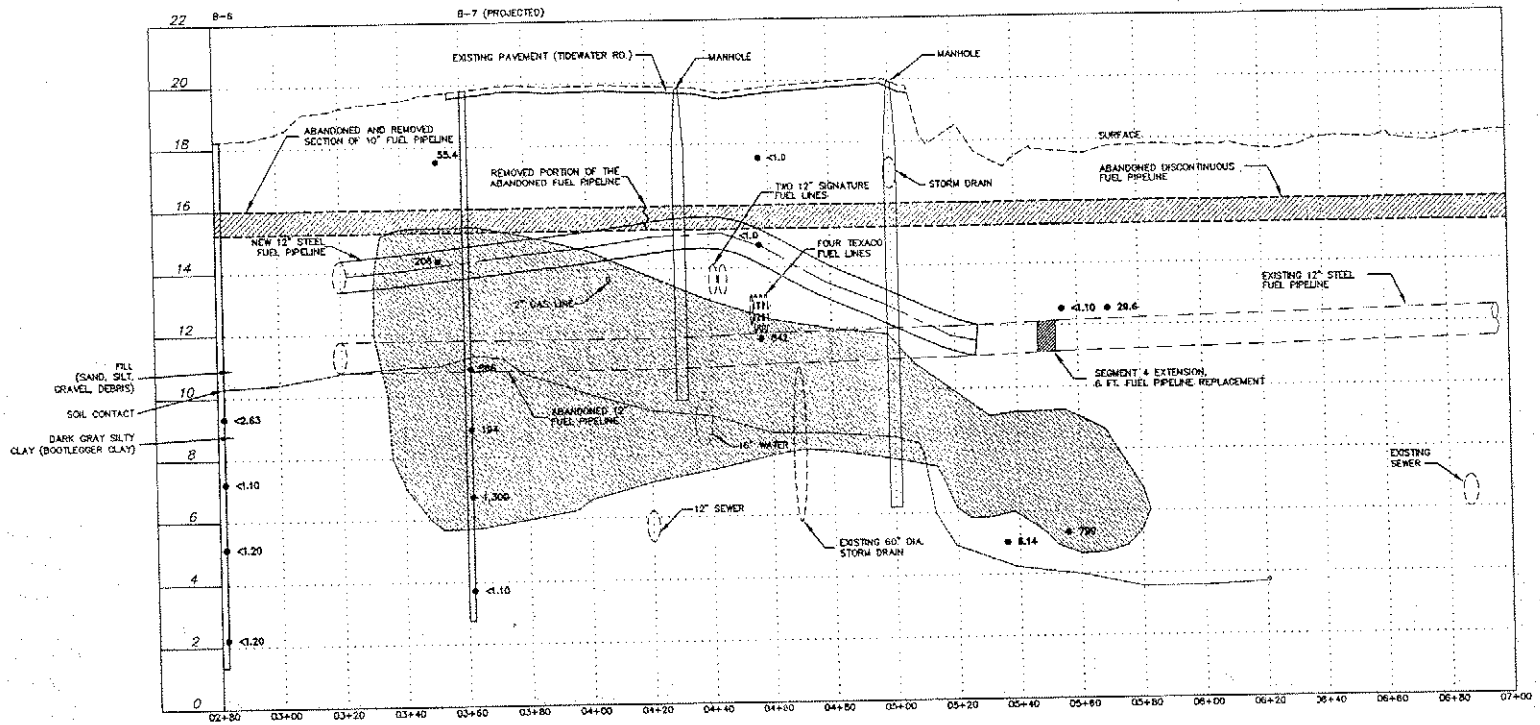
VERTICAL EXAGGERATION = 10x

U.S. AIR FORCE

CROSS-SECTION FROM BORING B-6 TO SEGMENT 4 EXTENSION, SHOWING DRO RESULTS NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO:	0	DRAWN:	LAS
DATE:	10 JANUARY 96	FILE: 01016\474\05-SEG4.DWG	

FIGURE 9



LEGEND:

- ● SAMPLE LOCATION WITH GRO CONCENTRATION IN MG/KG
- ▨ GRO >100 MG/KG

0 20 40 80
HORIZONTAL SCALE IN FEET

0 2 4 8
VERTICAL SCALE IN FEET

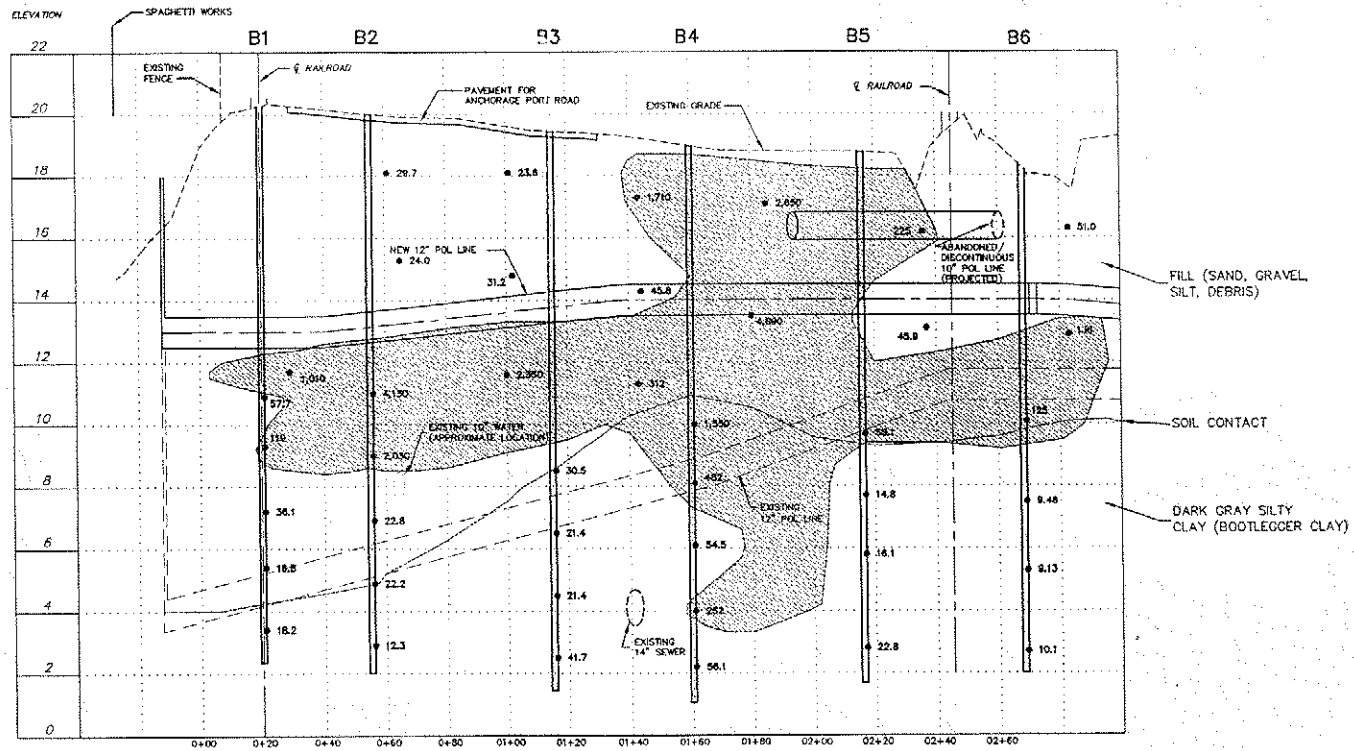
VERTICAL EXAGGERATION = 10x

U.S. AIR FORCE

CROSS-SECTION FROM BORING B-6 TO SEGMENT 4 EXTENSION, SHOWING GRO RESULTS
NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO: 0 | DRAWN: LAS
DATE: 10 JANUARY, 98 | FILE: 01016\474\B6-SEG4.DWG

FIGURE 10



LEGEND:

- ● DRO CONCENTRATION (MG/KG)
- ▨ DRO >100 MG/KG

0 20 40 80
HORIZONTAL SCALE IN FEET

0 2 4 8
VERTICAL SCALE IN FEET

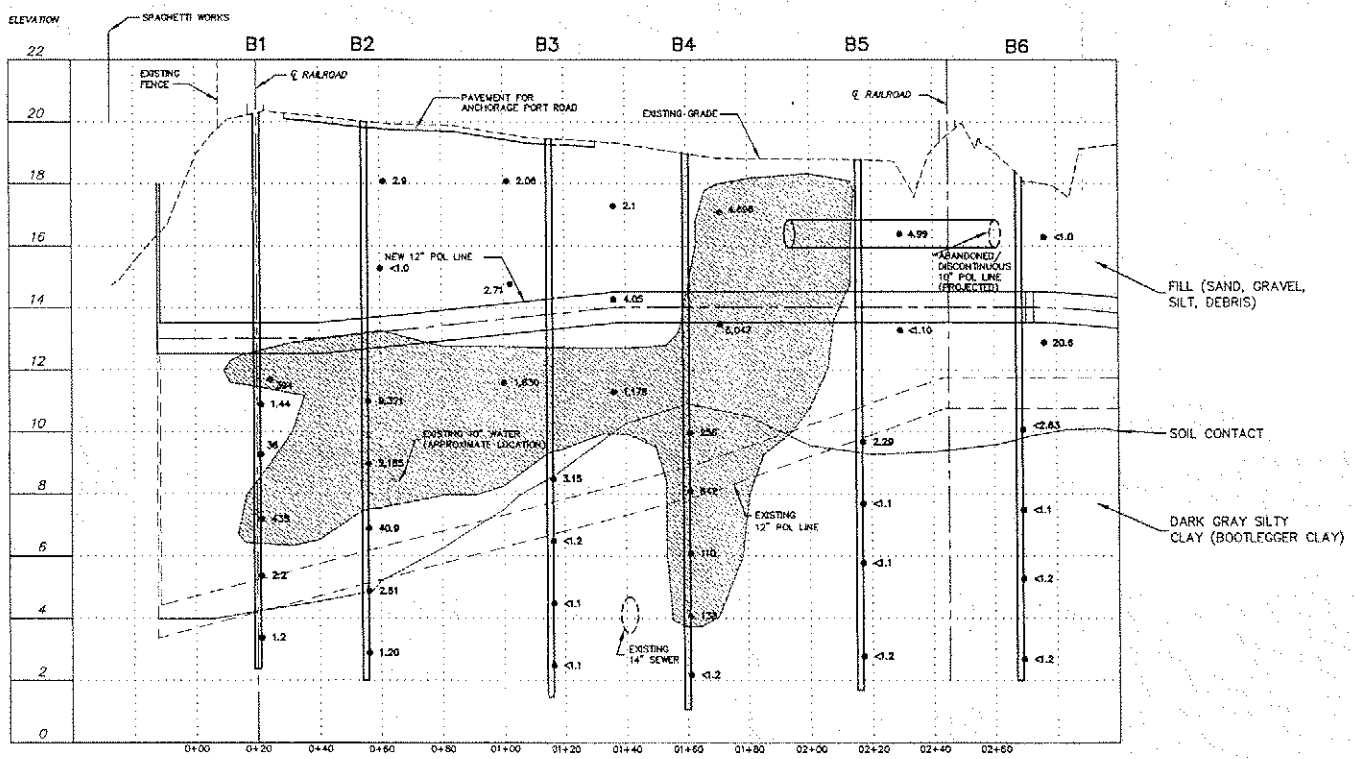
VERTICAL EXAGGERATION = 10x

U.S. AIR FORCE

CROSS-SECTION FROM SPAGHETTI WORKS TO BORING B-6, SHOWING DRO RESULTS
NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO: | DRAWN: LAS
DATE: 10 JANUARY 96 | FILE: 01016\474\SPA-B6.DWG

FIGURE 11



LEGEND:

- ● GRO CONCENTRATION (MG/KG)
- ▨ GRO >100 MG/KG

0 20 40 80
HORIZONTAL SCALE IN FEET

0 2 4 8
VERTICAL SCALE IN FEET

VERTICAL EXAGGERATION = 10x

U.S. AIR FORCE

CROSS-SECTION FROM SPAGHETTI WORKS TO BORING B-6, SHOWING GRO RESULTS
NORTH JET PIPELINE REPAIR
PORT OF ANCHORAGE
ANCHORAGE, ALASKA

JOB NO: | DRAWN: LAS
DATE: 10 JANUARY 96 | FILE: 01016\474\SPA-B6.DWG

FIGURE 12