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SUPPLEMENTAL CONTAMINATION ASSESSMENT

0302

UNOCAL SERVICE STATION No. 4652

**15th. Avenue & C Street
Anchorage, Alaska**

Prepared For

UNOCAL

A-1204-8

April, 1989

4-6-89

RITTENHOUSE-ZEMAN & ASSOCIATES
Geotechnical & Hydrogeological Consultants





RZA, INC.
Geotechnical & Hydrogeological Consultants
711 'H' Street, Suite 450
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10303

31 March 1989

A-1204-8

UNOCAL
3131 Elliott Avenue
Seattle, Washington 98121

Attention: Mr. Gary Gunderson

Subject: Supplemental Contamination Assessment Report
UNOCAL Service Station No. 4652
15th Avenue and C Street
Anchorage, Alaska

Gentlemen:

In accordance with your authorization, RZA, Inc. has completed a supplemental contamination assessment at the above referenced facility. This report addresses the additional work requested by the Alaska Department of Environmental Conservation (ADEC) in their letter dated 7 February 1989, reviewing the RZA Contamination Assessment Report dated 30 December 1988.

RZA has been pleased to be of assistance to you on this project. If you have any questions regarding the submitted information or if we may be of any further assistance please feel free to contact us.

Respectfully submitted,

RZA, Inc.

Daniel S. Whitman
Senior Hydrogeologist

Supplemental Contamination Assessment Report
UNOCAL Service Station No. 4652
15th Avenue and C Street
Anchorage, Alaska

Prepared for

UNOCAL
3131 Elliott Avenue
Seattle, Washington 98121

Prepared by

RZA, Inc.
711 'H' Street, Suite 450
Anchorage, Alaska 99501-3442
March 1989
A-1204-8

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Supplemental Contamination Assessment Report
UNOCAL Service Station No. 4652
15th Avenue and C Street
Anchorage, Alaska

A-1204-8

1.0 SUMMARY

This supplemental contamination assessment report has been prepared to assist UNOCAL in meeting the requirements of the Alaska Department of Environmental Conservation (ADEC). RZA, Inc. prepared a contamination assessment report, dated 30 December 1988 which summarized previous activities at the site. ADEC review of the document requested additional information regarding conditions in the surrounding areas. This report summarizes the findings of our supplemental investigations and presents the results of our recently completed field studies. Our investigations disclosed:

- o The municipal right-of-ways of 15th Avenue and C Street contain utility easements for city water, sewer and storm drains. The potential for preferential flow of groundwater in the utility backfill material has been evaluated and these utilities do not appear to be a significant preferential flow path.
- o Groundwater monitoring wells recently installed within utility corridors south of the UNOCAL property do not indicate evidence of petroleum impacts.
- o Two shallow soil probes located on the Rader property were drilled to obtain soil samples for laboratory analysis. No evidence of petroleum impacts were encountered at the locations drilled.
- o Quarterly sampling of the groundwater monitoring wells indicates a magnitude and distribution of dissolved petroleum compounds similar to those noted during previous quarters. Three newly installed monitoring wells in the utility corridors did not indicate evidence of impacts.

These conclusions are discussed in detail in the text of this report. This summary is presented for introductory purposes only and should be used in conjunction with the full text of this supplement and the 30 December 1988 Contamination Assessment Report. This report has been prepared for the exclusive use of UNOCAL and their agents for specific application to this project.

2.0 PROJECT DESCRIPTION

This phase of work was performed to provide a more current and comprehensive understanding of the conditions surrounding the UNOCAL site to delineate the full extent of soil and groundwater impacts which have occurred due to petroleum releases on the subject property. The scope of work was planned to address the request for additional characterization from ADEC in their letter dated 7 February 1989.

Studies in this phase of work include reviewing municipal records of utility installations in the area; drilling, soil sampling and installation of three additional monitoring wells in the utility corridors south of the subject property; quarterly groundwater monitoring and sampling; and laboratory analyses of soil and groundwater samples. The procedures used, and the findings of each portion of this field study are addressed in the report.

2.1 Utility Corridor Documentation

Utility corridors were suspected of providing preferential migration pathways for groundwater flow in the area of the site. Backfill materials surrounding buried pipelines, particularly coarse, gravel bedding materials which are commonly used in utility construction, could provide a means for groundwater migration in otherwise silty, low permeability native soils. The utilities which are most commonly constructed with granular bedding materials are water lines, sewer lines, and storm drains; gas, telephone and buried electrical are usually installed in narrow, shallow trenches without the use of bedding material and would not be considered viable pathways of migration. Gas, telephone and buried electric lines, if any, were not researched in detail.

Information regarding the as-built conditions of utilities in the area of the site was obtained through the Anchorage Public Works Department. Portions of the as-built construction diagrams of water, sewer and storm drain lines adjacent to the subject site are included in Appendix A of this report.

The most significant utility system in the area of the site is a series of 42-inch diameter reinforced concrete pipe (RCP) storm drain lines. A storm drain trunk line is located in the right-of-way of C Street, adjacent to the site and proceeding downhill to the south, to an outlet in Chester Creek, approximately 1,500 feet south of the site.

A utility corridor which includes a petroleum pipeline, sanitary sewer and storm drain trends north-south along B Street, approximately 200 feet east of the UNOCAL property. On the Rader property south of 15th Avenue, the B Street utilities turn west, cross the property and join the utilities in C Street approximately 150 feet south of the intersection of 15th Avenue.

A branch of the sanitary sewer and storm drain extends south from 15th Avenue, near the southeast corner of the UNOCAL property. These drain lines intersect the main drainage system near the center of the Rader property, and also drain towards the C Street corridor.

In conversations with representatives of the Public Works Department and Department of Transportation, an RZA representative was informed that the storm drain lines in this area were laid directly on the natural, clayey subgrade material, without the use of a granular bedding. The trenches were backfilled using the original excavated material. This suggests that although some preferential flow may occur in these utility corridors due to disturbance of the natural materials, no significantly bedding material is present within the largest utility trench to allow a major or continuous preferential flow path.

A water main traverses the length of 15th Avenue immediately south of the site. This water main, being pressurized, does not require a consistent slope for drainage as a sewer or storm drain would. Therefore, the water main generally follows the ground surface contour, buried at a depth of approximately 8 feet. The point of lowest elevation is close to the location where the water main crosses the storm drain line, approximately 50 feet east of the southeast corner of the site. If the water main trench served as a preferential flow path, shallow groundwater would collect in this low lying area and would likely migrate from the water main trench to the deeper storm drain trench at this intersection.

An abandoned 4 inch diameter sanitary sewer line trends to the southeast from the southeast corner of the UNOCAL property, crosses 15th Avenue and intersects the sanitary sewer corridor, as documented in the previous Contamination Assessment Report. This line and the water main trench conducting water to the area of the north-

south utility corridor 50 feet east of the site, suggests that if preferential flow paths do occur this corridor would serve as a significant drainage feature.

The information developed from the research of utility corridors surrounding the site was used to plan monitoring well locations on the utility corridors.

2.2 Drilling and Monitoring Well Installation

Three monitoring wells were installed in the area south of the site between 20 and 22 February 1989 to: 1) obtain soil samples; 2) assist in defining the site hydrogeology; and 3) determine if volatile aromatic hydrocarbons or other petroleum impacts have migrated via utility trenches. The monitoring well locations drilled during this phase of site investigation are shown on the Site and Exploration Plan, Figure 1.

The borings were drilled by Ambler Exploration under subcontract to RZA using a Pac-Trac drill rig equipped with 2.5 inch I.D. hollow-stem auger. All drill rods, augers and samplers were steam cleaned or otherwise decontaminated prior to each use. Soil samples were obtained at approximately 5 foot depth intervals using split-spoon sampling in general accordance with the procedures of ASTM:D-1586, the Standard Penetration Test Method.

Upon retrieval of the driven sampler, portions of the soil samples were immediately sealed in laboratory prepared bottles, which were then placed in a chilled ice chest and held under chain-of-custody. An additional portion of the sample was sealed in a one pint jar for soil classification and field screening to qualitatively assess contamination by volatile organic hydrocarbons.

All field operations were performed or observed by an experienced RZA geologist who selected boring locations, logged the borings, collected soil samples and performed field qualitative screening for evidence of petroleum impacts. After completion of the sampling to the total depth of the borings, 2 inch diameter PVC monitoring wells were installed. Boring logs, including as-built construction diagrams and monitoring wells are included in Appendix B.

2.3 Soil Probe Sampling

Two soil probes were drilled on the Rader property south of the site on 20 and 22 February 1989 to obtain soil samples for laboratory analytical testing. The probes consisted of a 5 foot section of steam cleaned, 3.5 inch O.D. solid flight auger which was advanced with a Pac-Trac drill rig. The auger was drilled to a depth of approximately 4 feet then removed and all cuttings were cleaned off the auger flights. The auger was then reinserted into the boring and advanced to the depth of approximately 5 feet. Upon retrieval of the auger the outer layer of soil was removed from the bottom flights and discarded, and a sample of the soil near the tip of the auger was placed in laboratory jars for analytical testing. An additional sample was placed in a one pint glass jar for headspace screening at RZA's Anchorage laboratory. Approximate locations of the soil probes are shown on the Site and Exploration Plan, Figure 1.

2.4 Groundwater Monitoring and Sampling

After installation, water levels were measured in the three new monitoring wells. The elevation of the top of each monitoring well was surveyed relative to the existing on site wells in order to measure relative groundwater elevations. MW-15 was dry at the time of drilling and generally has not shown evidence of a shallow groundwater condition as of the date of this report. This well could receive groundwater flow in the future, due to seasonal changes in groundwater levels or very slow seepage in the upper silty sand units on the site. Monitoring wells MW-14 and MW-16 contained some groundwater but indicated relatively slow recharge, requiring approximately one hour to return to static conditions after purging. These two wells were developed by surging and bailing in order to increase the hydrogeologic communication with the surrounding formation.

On 13 and 14 March 1989 all of the currently accessible monitoring wells, including the new wells MW-14 and MW-16 were purged and sampled using properly decontaminated equipment in accordance with the procedures in the RZA Field Quality Assurance/Quality Control Manual. Groundwater samples were sealed in laboratory prepared bottles and vials, chilled and held under chain-of-custody until delivered to the laboratory for analytical testing.

2.5 Laboratory Analyses

2.5.1 Soil Samples

Soil samples obtained from the monitoring well installations and soil probes were packaged for shipping and sent by overnight courier to Sound Analytical Services, Inc., of Tacoma, Washington. Soil samples were analyzed for benzene, ethyl benzene, toluene and xylenes (BTEX) using EPA Method 8020, and total petroleum hydrocarbons (TPH) by EPA Method 418.1.

2.5.2 Groundwater Samples

Groundwater samples from 11 monitoring wells were submitted to Northern Testing Laboratories, Inc. of Anchorage, Alaska, immediately after sampling. Groundwater samples from all of the sampled monitoring wells were analyzed for purgeable aromatics by EPA Method 602 and total petroleum hydrocarbons (TPH) by EPA Method 418.1. Samples from monitoring wells MW-3, MW-4, MW-6, MW-7, MW-8, MW-9 and MW-14 were analyzed for purgeable halocarbons by EPA Method 601.

3.0 CONTAMINATION ASSESSMENT

The previous studies combined with the current scope of work allows an assessment of the subject site and surrounding properties. This contamination assessment integrates the current findings with previously existing data where possible.

3.1 Subsurface Conditions

Subsurface soil conditions were evaluated in an expanded area on the property south of the UNOCAL site by a series of soil borings and monitoring well installations during this supplemental contamination assessment. These borings were generally within or near the utility corridors at locations which were potentially susceptible to petroleum contamination from the UNOCAL site.

3.1.1 Drilling and Monitoring Well Installation Results

The three borings drilled within the utility corridors were logged by an experienced geologist during drilling. Generally MW-14, MW-15, and MW-16 encountered approximately 4 to 8 inches of organic topsoil overlying a silty, sandy, gravel layer which extended to depths of approximately 3 to 4.5 feet below the ground surface. Below the

gravel layer, borings MW-14 and MW-16 encountered sandy silt FILL, similar to the silty outwash deposits noted in other borings in the project area.

In MW-14 a silty sand layer containing some gravel was encountered at a depth of approximately 10.5 feet below ground surface, a depth which most likely represents the base of the sanitary sewer trench. This gravelly sand zone was wet, but no evidence of petroleum impacts were noted. Underlying this sandy zone the boring encountered the gray silty clay of the Bootlegger Cove Formation.

MW-16 encountered sandy silts and gray silty clay to a depth of approximately 14 feet where auger refusal occurred. This depth correlates with the depth of the 42 inch diameter storm drain at this location. The boring was offset and redrilled through trench backfill materials into the underlying silty clay unit.

MW-15 encountered gray silty clay from a depth of 3 feet to the full depth of the boring at 16.5 feet. No clear change could be determined between the trench backfill material and the underlying silty clay. No wet zones were encountered during the drilling and the installed monitoring well has not indicated the presence of groundwater.

Monitoring wells were installed with 10 foot screened intervals ranging from approximately 5 to 15 feet below ground surface. A sand filter pack was installed in the bore hole, surrounding the screen and extending to a level above the top of the screened interval. Above the filter pack a bentonite seal was installed and a security casing was placed over the top of the well at the ground surface for protection. The as-built construction of each monitoring well is indicated on the boring logs included in Appendix B of this report.

MW-14 and MW-16 were installed at depths which intersected the base elevation of the utility trenches. MW-14 contained groundwater at the time of drilling. MW-16 did not contain free groundwater. However, wet zones were noted in the soils and after the well had been installed some groundwater seepage accumulated within the well casing.

3.2 Hydrogeologic Conditions

Figure 2 indicates the groundwater piezometric surface contouring inferred from groundwater level measurements on 13 March 1989. The groundwater contours indicate a relatively steep gradient to the south southeast across the site and surrounding areas, similar to previous interpretations of groundwater conditions. Groundwater levels are generally lower than during the summer and fall 1988 quarterly monitoring measurements, consistent with the seasonal variation in water levels noted during previous quarterly monitoring. Tabulated summaries of groundwater level measurements taken since 1986 are included in Appendix C.

The groundwater levels and conditions noted in the newly installed monitoring wells indicate similar hydrogeologic restraints on groundwater flow occur south of the site, indicating a relatively low flow situation.

3.3 Soil Analytical Results

The laboratory analytical reports for soil samples are included in Appendix D. The volatile aromatic hydrocarbons (BTEX) results are presented in units of milligrams/kilograms (mg/kg), which are equivalent to parts per million (ppm) concentrations. EPA Method 8020 analytical results indicated no detectable concentrations of BTEX in any of the soil samples within the detection limits of 0.05 mg/kg.

Total petroleum hydrocarbon analyses indicated concentrations ranging from below detectable (>5.0 mg/kg) to 40.0 mg/kg. It should be noted that the total petroleum hydrocarbons as determined by laboratory method EPA 418.1 is a quantitative measure of the non-polar hydrocarbons remaining in the extracted sample after a silica gel cleanup, intended to remove most animal or vegetable fats. However, in the presence of organic soils such as topsoil or peat, the silica gel cleanup does not remove all traces of naturally occurring organic material. The remaining organics are quantified as part of the total petroleum hydrocarbons, giving a somewhat unrepresentative result. The sample which indicates the highest concentration of total petroleum hydrocarbons (MW-14, S-1) included traces of organic material unrelated to petroleum impacts.

Generally, the soil samples from the monitoring wells and soil probes indicate little or no evidence of petroleum impacts at the locations drilled. Apparently, these borings defined

outer extent of petroleum impacts from the UNOCAL site and indicate that the utility corridors do not act as a significant preferential flow path for contaminants from the site.

3.4 Groundwater Analytical Results

Representative groundwater samples were obtained from 11 monitoring wells on and off the project site. This sampling round represents the first quarter sampling event for 1989. Laboratory analytical reports and tabulated summaries of groundwater analytical results of samples taken since 1986 are included in Appendix D.

Groundwater analyses for total petroleum hydrocarbons indicate impacts to be greatest in monitoring wells MW-6 and MW-7, on the south boundary of the UNOCAL property, with concentrations of 12.8 and 8.8 mg/l (ppm), respectively. Of the offsite wells only monitoring wells MW-8 and MW-9 indicate impacts, with concentrations of 3.8 and 3.1 ppm respectively. This finding is consistent with previous quarterly monitoring rounds in distribution and magnitude.

Volatile aromatic hydrocarbon analyses by EPA Method 602 indicates petroleum based compounds in a distribution similar to that noticed in previous quarterly sampling rounds with the greatest concentrations found in monitoring wells MW-6, MW-7, MW-8 and MW-9. The monitoring wells constructed further offsite (MW-12, MW-13, MW-14 and MW-16) show little or no detectable impact. Of these wells only the sample from MW-16 contained detectable volatile organic hydrocarbons (xylenes at the detection limit of 0.6 ug/l, equivalent to parts per billion (ppb)).

During the May and July 1988 sampling events MW-8 had not been indicating volatile aromatics, although earlier analyses had shown some evidence of impacts, particularly in March 1987. Variations in groundwater level also occur over time, and appear to correlate with variations in chemistry; lower water concentrations at times of relatively high water levels, indicating dilution occurs. Apparently some seasonal variations in groundwater level and chemistry result due to variations in the seasonal recharge of groundwater.

Samples tested for purgeable halocarbons by EPA Method 601 generally did not encounter evidence of chlorinated solvents. The sample from MW-4 indicated 1, 2-

dichloroethane at a concentration of 4.5 ug/l (ppb). The sample from MW-14 was apparently placed in a bottle which had undergone a Freon rinse, rather than the standard cleaning procedure for laboratory volatile aromatic septum seal vials. A portion of this chromatogram was obscured by a spike of Freon which may have obscured the detection of low concentrations (less than 5 ppb) of 7 compounds of the normal EPA Method 601 analysis. Of the 7 compounds only 1, 2-dichloroethane has previously been encountered in any of the groundwater analyses on site.

Based on the groundwater analytical testing, the distribution of petroleum impacts appears similar to previous quarterly sampling rounds and the newly installed monitoring wells indicate little evidence of petroleum impacts at the locations drilled in the utility corridors.

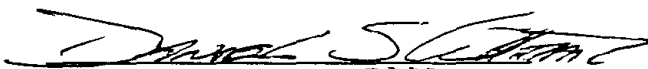
4.0 CONCLUSIONS

Based on the findings of our studies it is apparent that petroleum hydrocarbon impacts have occurred to the south southeast and south of the UNOCAL site within a limited area. Additional monitoring wells installed during this supplemental scope of work have defined groundwater conditions beyond the extent of petroleum impacts and determine that preferential flow is not a significant factor in petroleum contaminant migration.

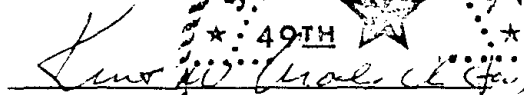
RZA has been pleased to be of service to you on this project. If you have any questions regarding the enclosed information or if we may be of any further assistance to you please feel free to contact us.

Respectfully submitted,

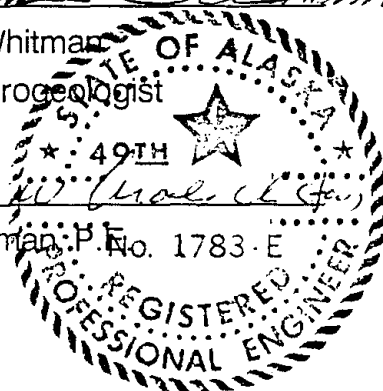
RZA, Inc.

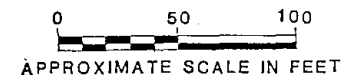


Daniel S. Whitman
Senior Hydrogeologist



Alvin R. Zeman, P.E. No. 1783-E





LEGEND

- EXISTING MONITORING WELLS (1986)
- CONTAMINATION ASSESSMENT WELLS (1988-1989)
- SOIL PROBES
- ▣ TEST PITS

NOTE: GROUND SURFACE ELEVATIONS ARE RELATIVE TO AN ASSIGNED DATUM.

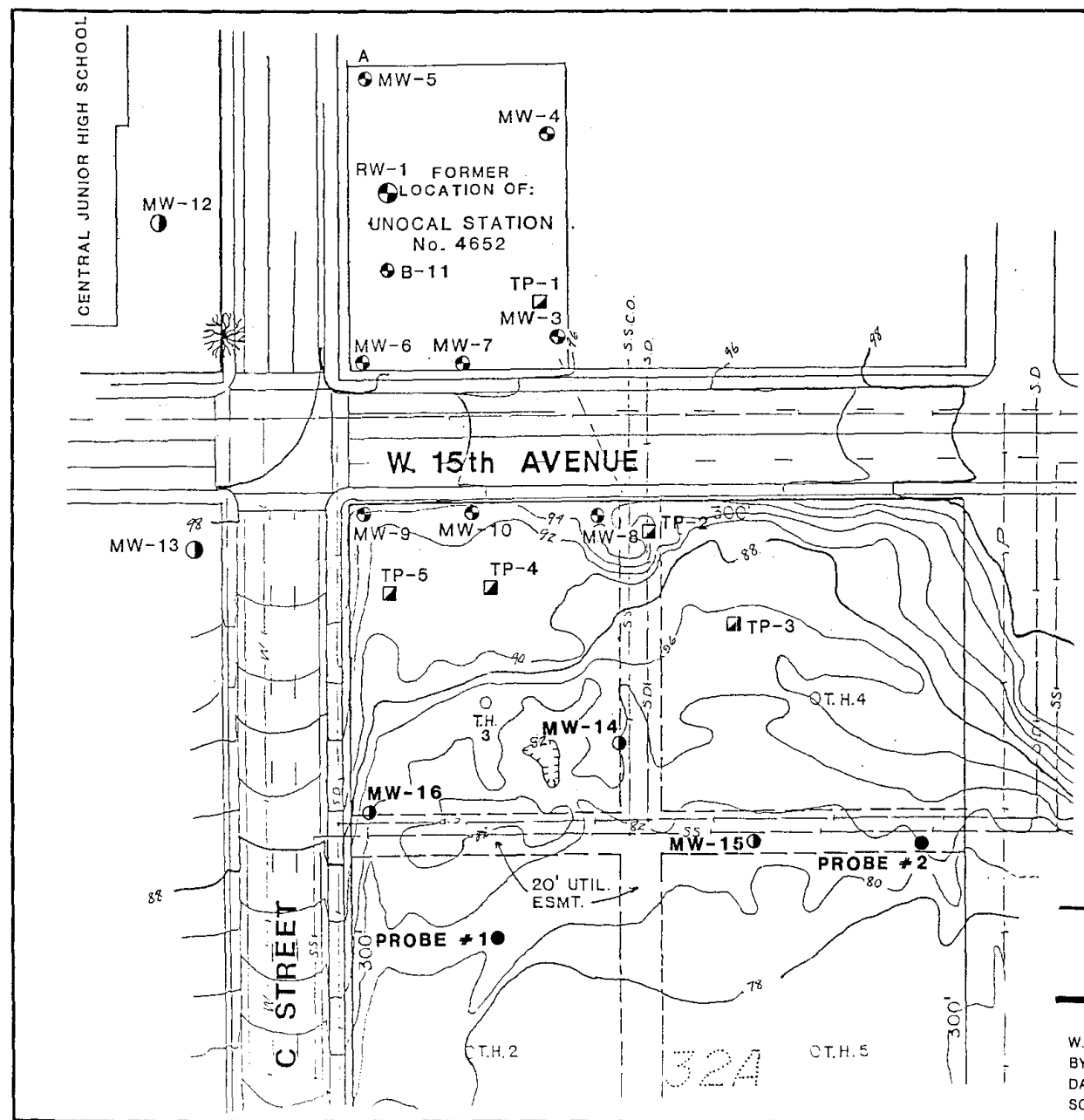
UNOCAL SERVICE STATION No. 4652
ANCHORAGE, ALASKA

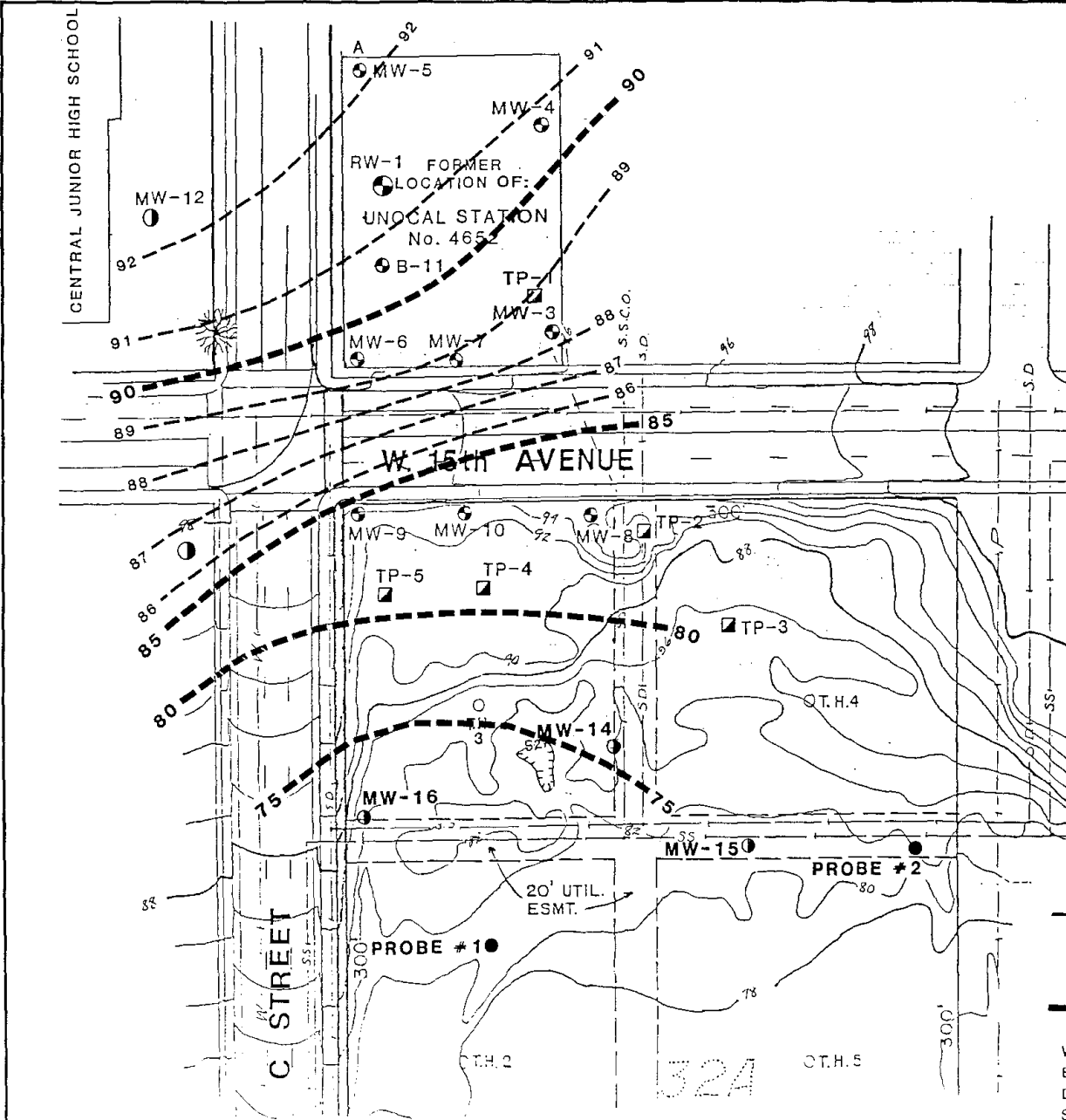
CONTAMINATION ASSESSMENT SUPPLEMENT
ADDITIONAL MONITORING WELL LOCATIONS

FIGURE 1

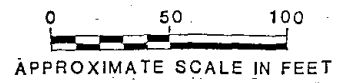
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 DATE APR 1989
 SCALE NOTED

RZA, INC.
 Geotechnical & Environmental Consultants
 711 'H' Street, Suite 450
 Anchorage, Alaska 99501





0318



LEGEND

- EXISTING MONITORING WELLS (1986)
- CONTAMINATION ASSESSMENT WELLS (1988-1989)
- SOIL PROBES
- ▣ TEST PITS

NOTE: GROUND SURFACE ELEVATIONS ARE RELATIVE TO AN ASSIGNED DATUM.

PIEZOMETRIC SURFACE CONTOURS
BASED ON WATER LEVEL MEASUREMENTS
OF 3-13-89

UNOCAL SERVICE STATION No. 4652
ANCHORAGE, ALASKA

CONTAMINATION ASSESSMENT SUPPLEMENT
PIEZOMETRIC SURFACE CONTOURS

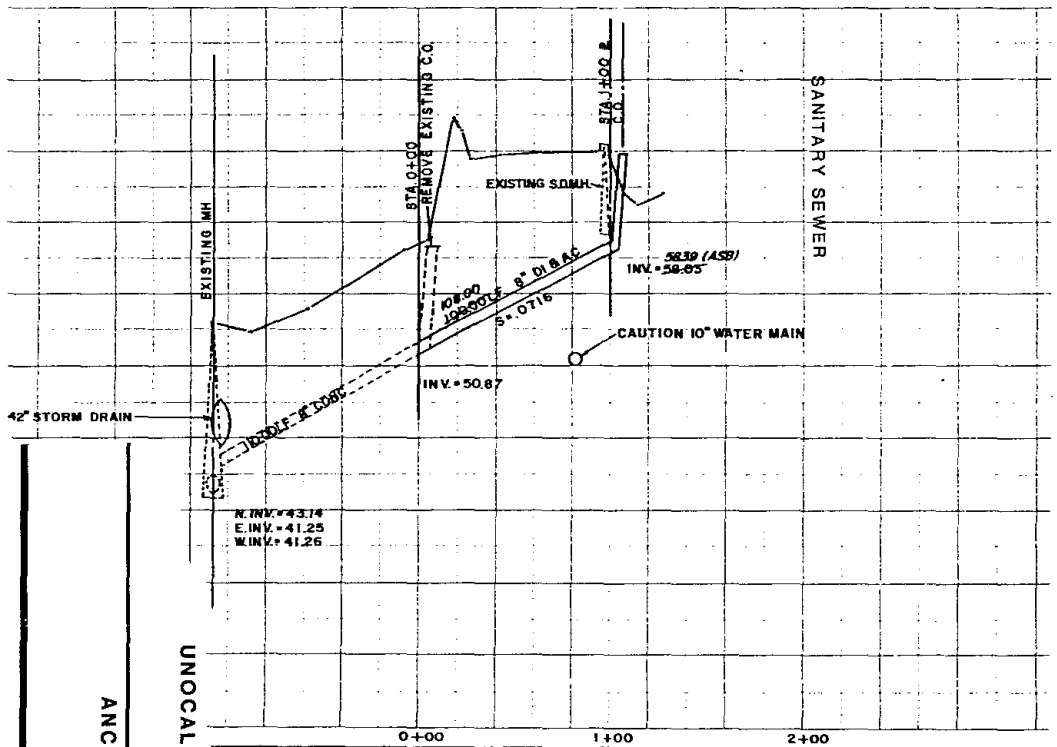
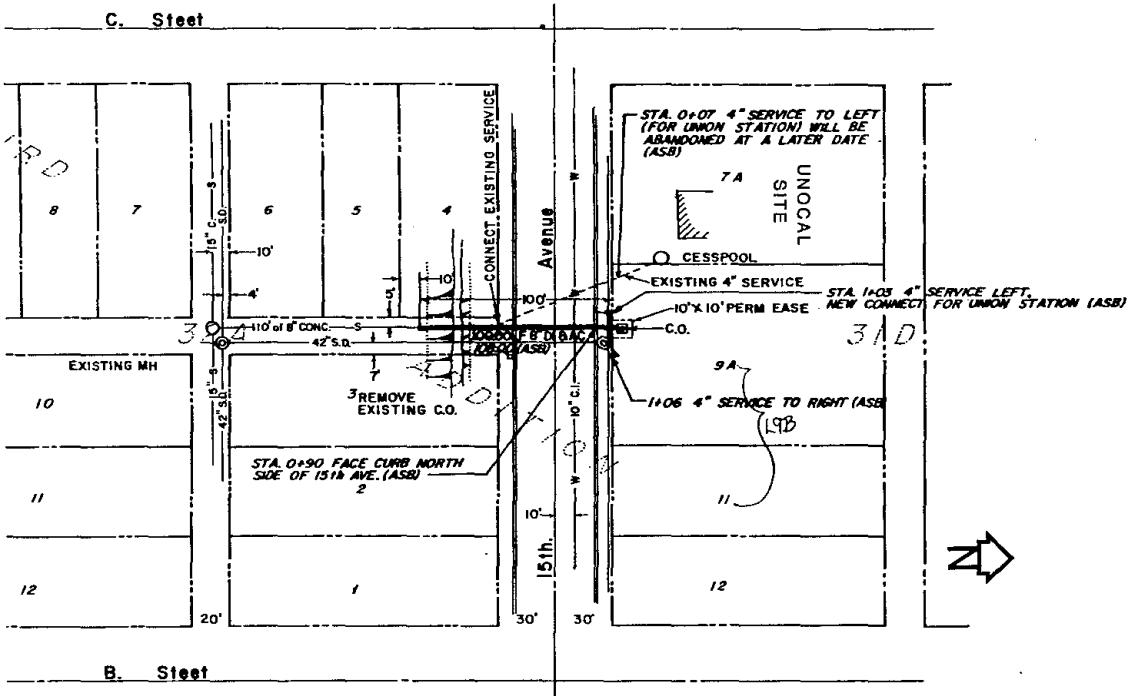
FIGURE 2

W.O. A-1204-8
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RZA, INC.
 Geotechnical & Environmental Consultants
 711 'H' Street, Suite 450
 Anchorage, Alaska 99501



Appendix A
Utility As-Built Construction Plans
A-1204-8



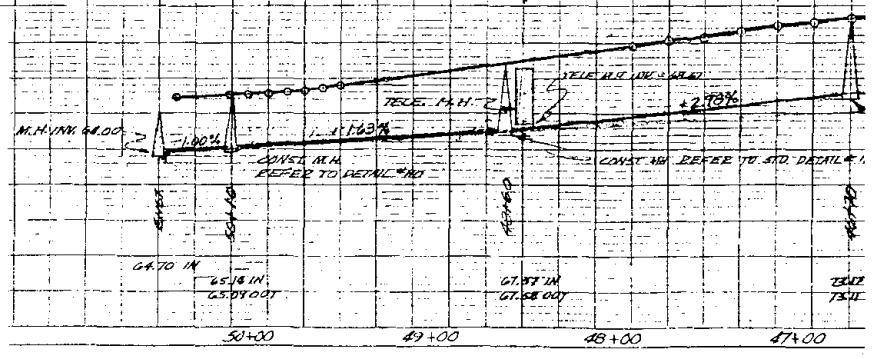
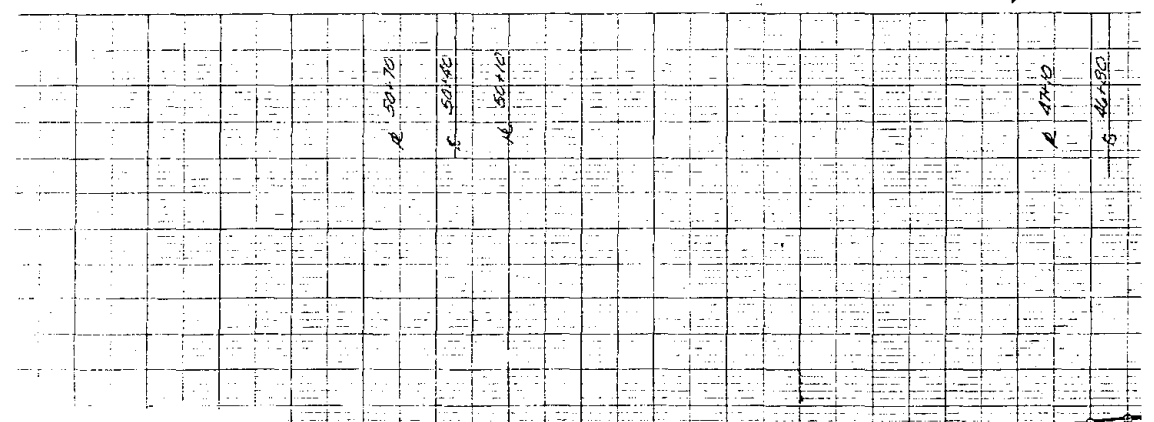
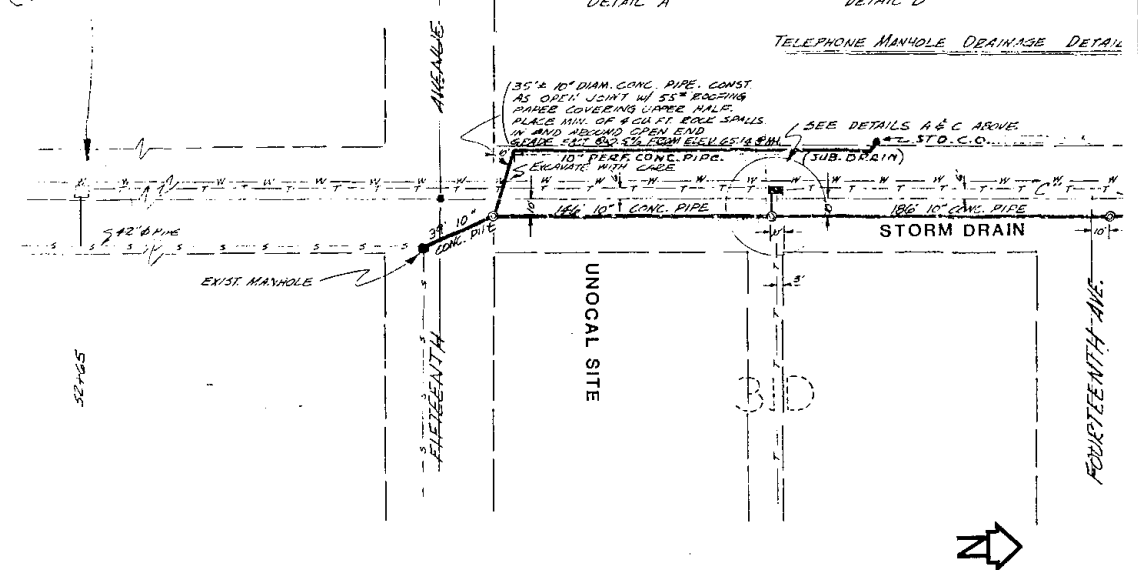
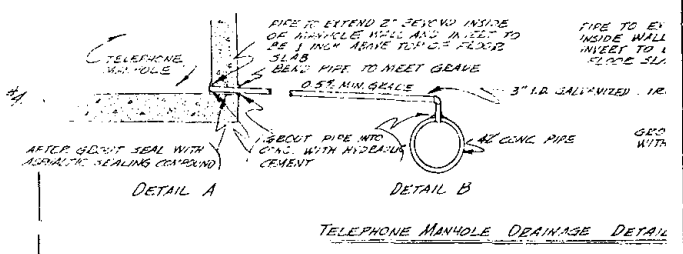
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RZA, INC.
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 Anchorage, Alaska 99501



UNOCAL SERVICE STATION No. 4652
15th AVENUE & C STREET
ANCHORAGE MUNICIPAL UTILITIES
AS - BUILT DIAGRAMS
SHEET 1

Note:
 Open End of Manhole at Sta 4652
 with 42" dia. pipe 3' x 4' in pipe frame
 1.5' below ground. Refer to drainage plan.



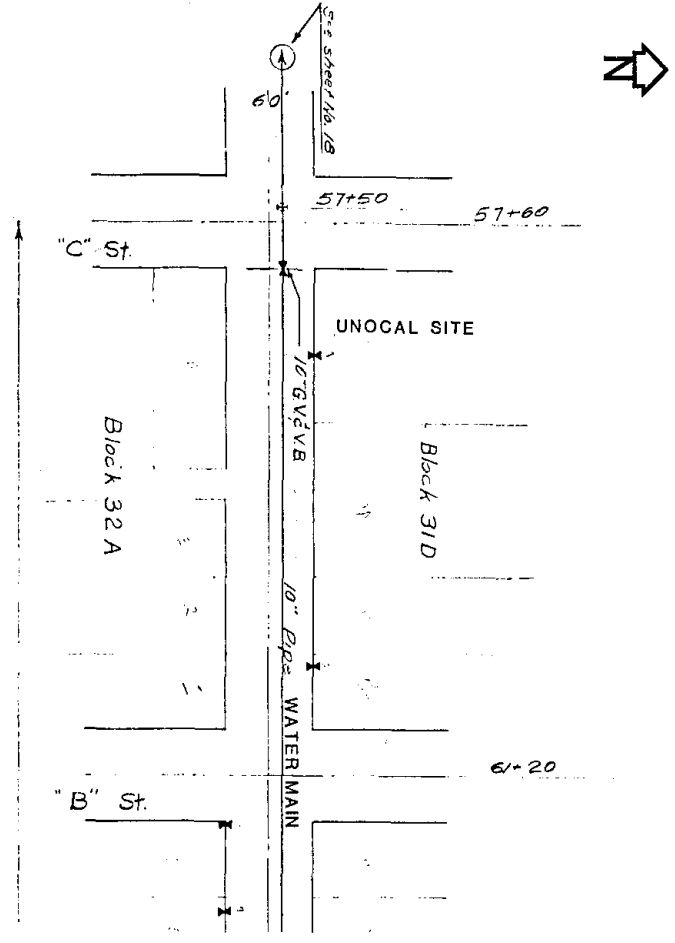
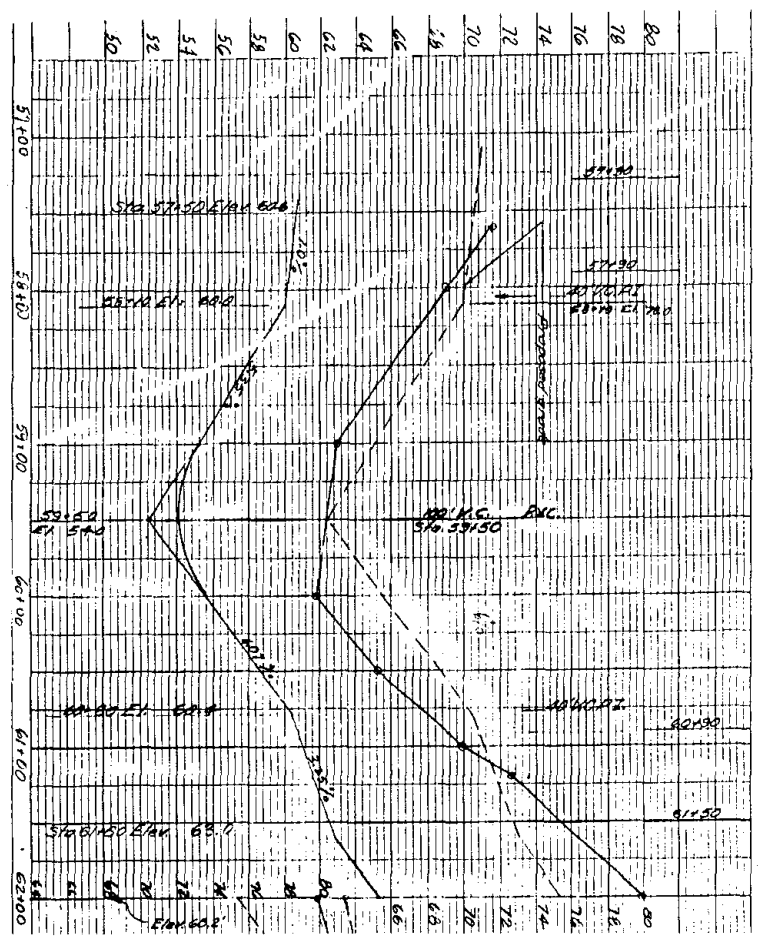
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UNOCAL SERVICE STATION No. 4652
 15th AVENUE & C STREET
 ANCHORAGE, ALASKA
 ANCHORAGE MUNICIPAL UTILITIES
 AS - BUILT DIAGRAMS
 SHEET 2

0321



UNOCAL SERVICE STATION No. 4652
 15th AVENUE & C STREET
 ANCHORAGE, ALASKA

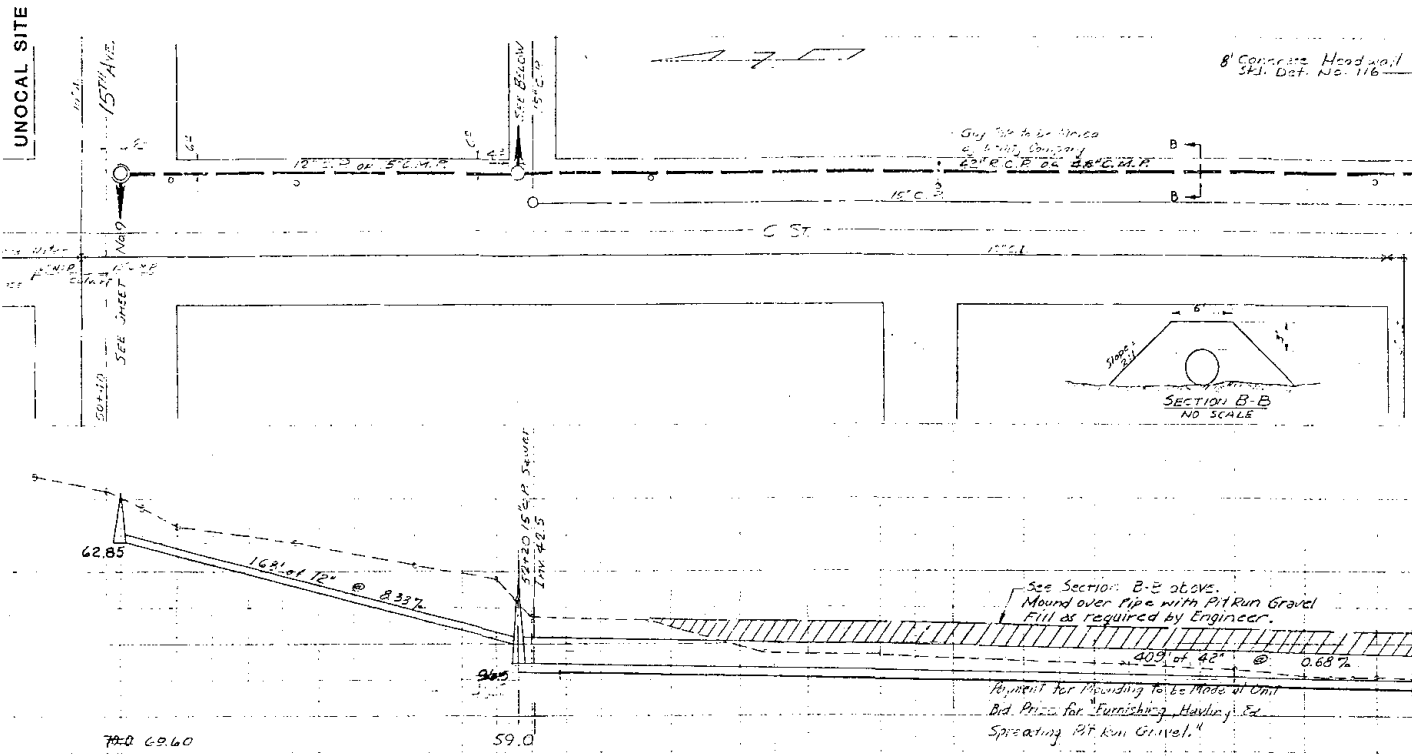
ANCHORAGE MUNICIPAL UTILITIES
 AS - BUILT DIAGRAMS

SHEET 3

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UNOCAL SERVICE STATION No. 4652
15th AVENUE & C STREET
ANCHORAGE, ALASKA

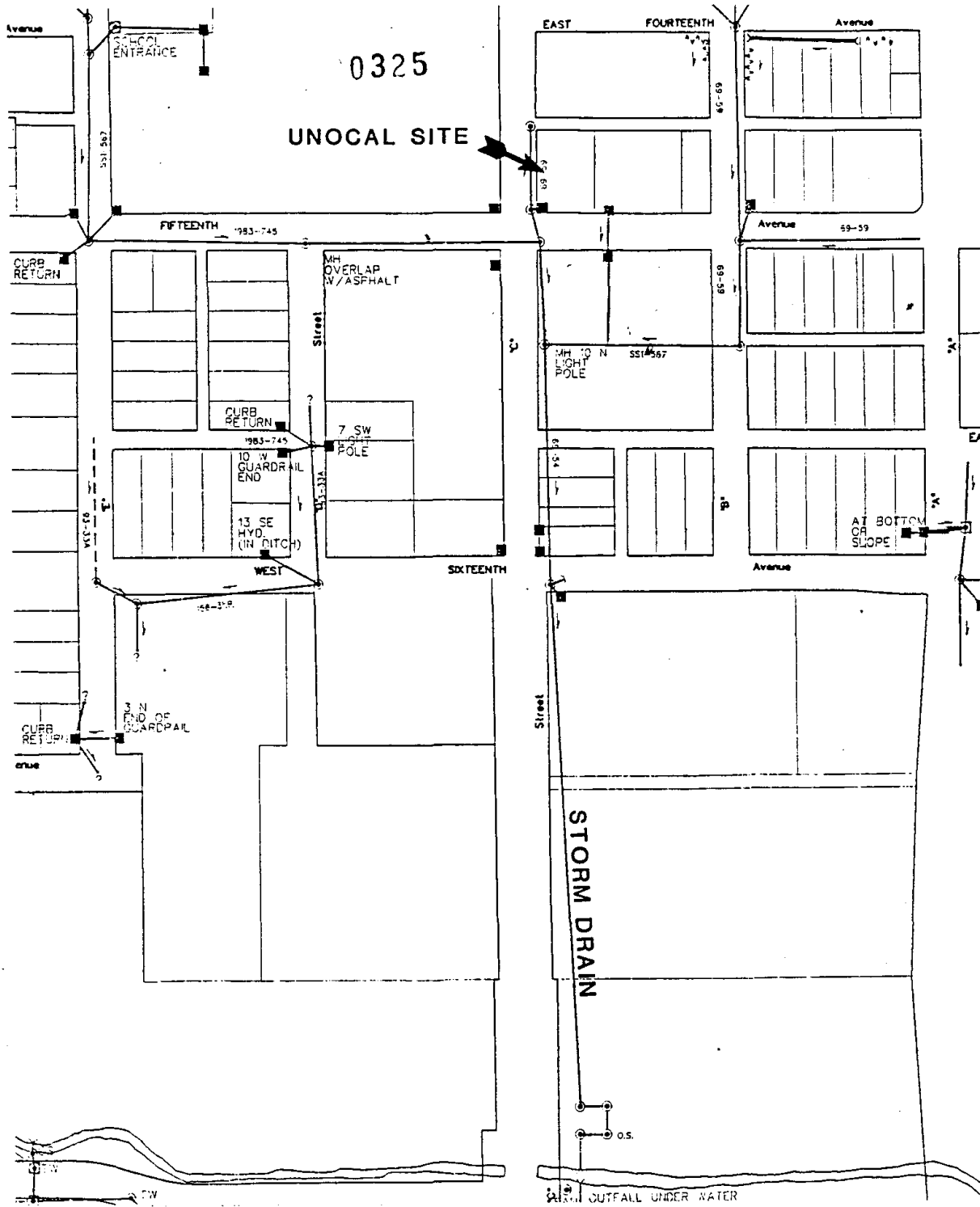
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DATE APR 1989
SCALE N.T.S.

RZA, INC.
Geotechnical & Environmental Consultants
711 'H' Street, Suite 450
Anchorage, Alaska 99501





**UNOCAL SERVICE STATION No. 4652
15th AVENUE & C STREET
ANCHORAGE, ALASKA**

**ANCHORAGE MUNICIPAL UTILITIES
AS - BUILT DIAGRAMS
SHEET 4**

W.O. A-1204-8
 By DSW
 Date APR 1989
 Scale N.T.S.

RZA, Inc.
Geotechnical Consultants

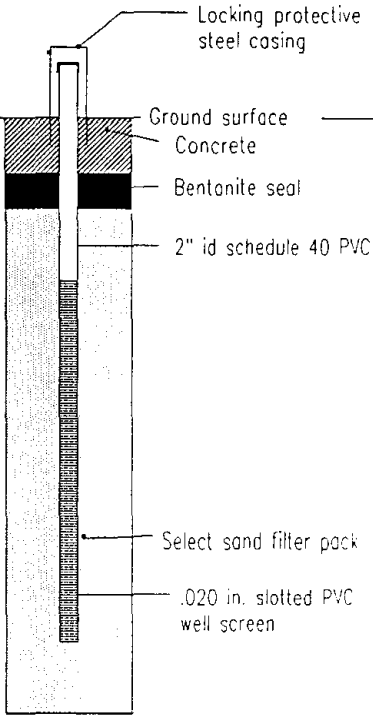


Appendix B
Soil Boring Logs
A-1204-8



SOIL OR ROCK DESCRIPTION	HN READING	WATER LEVEL	DEPTH (IN FEET)	SOIL SAMPLES	SAMPLE INTERVAL	AS-BUILT
DRILLED BY: Ambler Exploration DRILLING METHOD: HSA/SPT REFERENCE ELEVATION: 100.00 Assigned CASING: 83.30 GROUND: 81.1 +/-						
Topsoil						Ground surface
Loose, moist, brown, silty GRAVEL some sand (Fill)						Concrete Native sand backfill
Loose, moist to wet, brown, sandy SILT and silty fine SAND, with occasional gravel, trace organic material (Fill)	2.5		5	S-1		Bentonite seal 2" id schedule 40 PVC
Medium dense, wet, gray, silty SAND, interlayered with sandy GRAVEL (Fill)	0		10	S-2		Select sand filter pack
Very soft to stiff, moist to wet, gray, SILT/CLAY	0		15	S-3		.020 in. slotted PVC well screen
Bottom of borehole @ 16.5 ft.						
No product odors or sheens noted.						
Note: Water level shown was observed in well on 3-14-89.			20			
			25			
			30			
			35			



SOIL OR ROCK DESCRIPTION	HN U R E A D I N G	W A T E R L E V E L	D E P T H (I N F E E T)	S O I L S A M P L E S	S A M P L E I N T E R V A L	AS-BUILT
DRILLED BY: Ambler Exploration DRILLING METHOD: HSA/SPT REFERENCE ELEVATION: 100.00 Assigned CASING: 79.63 GROUND: 77.5 +/-						
Topsoil Loose, moist, brown, silty GRAVEL some sand (Fill)						
Very soft to stiff, moist, gray, SILT/CLAY, trace sand.	0		5	S-1	I	
	1		10	S-2	I	
	0		15	S-3	I	
Bottom of borehole @ 16.5 ft. No product odors or sheens noted. Note: Groundwater not encountered during drilling or in monitoring well at later dates.			20 25 30 35			



RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants

WELL NUMBER MW-16 PAGE 1 OF 1
PROJECT NAME UNOCAL 15th & C St. W.O. A-1204-8
DATE DRILLED 2-22-89

SOIL OR ROCK DESCRIPTION	HN READING	WATER LEVEL	DEPTH (IN FEET)	SOIL SAMPLES	SAMPLE INTERVAL	AS-BUILT
DRILLED BY: Ambler Exploration DRILLING METHOD: HSA/SPT REFERENCE ELEVATION: 100.00 Assigned CASING: 85.11 GROUND: 83.0 +/-						
Topsoil Loose, moist, brown, silty GRAVEL some sand (Fill)						
Stiff, moist to wet, dark brown, sandy SILT, occasional gravel	1		5	S-1		
Very soft to stiff, moist to wet, gray, SILT/CLAY, trace sand, with fine sand lenses	0		10	S-2		
No product odors or sheens noted. Auger refusal at 14 ft, suspected to be storm drain line. Abandoned boring and redrilled 5 ft north of original boring to a depth of 16.5 ft. Note: Groundwater not encountered during drilling. Water level indicated was observed in monitoring well 3-14-89.	0		15	S-3		
			20			
			25			
			30			
			35			

Appendix C
Tabulated Groundwater Level Measurements
A-1204-8

FILE NAME: B3-1204-8

0331

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
07/31/86	1738	95.05	5.09	--	0.00	89.96	
08/01/86	0855	95.05	5.12	--	0.00	89.93	
08/01/86	1655	95.05	5.15	--	0.00	89.90	
08/02/86	0935	95.05	5.17	--	0.00	89.88	
08/02/86	1757	95.05	5.17	--	0.00	89.88	
08/03/86	1126	95.05	5.19	--	0.00	89.86	
08/04/86	1111	95.05	5.21	--	0.00	89.84	
08/05/86	0704	95.05	5.23	--	0.00	89.82	
08/05/86	1825	95.05	5.29	--	0.00	89.76	
08/06/86	0713	95.05	5.26	--	0.00	89.79	
08/07/86	1043	95.05	5.29	--	0.00	89.76	
08/08/86	1114	95.05	5.25	--	0.00	89.80	
08/15/86	1936	95.05	5.21	--	0.00	89.84	
08/21/86	2000	95.05	5.20	--	0.00	89.85	
09/06/86	1557	95.05	5.29	--	0.00	89.76	
09/22/87	1120	95.05	5.23	--	0.00	89.82	
03/17/87	1100	95.05	6.79	--	0.00	88.26	
10/08/87	1100	95.05	5.33	--	0.00	89.72	
01/15/88	1508	95.05	6.45	--	0.00	88.60	
05/03/88	0914	95.05	3.89	--	0.00	91.16	
07/26/88	0854	95.05	5.21	--	0.00	89.84	
11/17/88	1531	95.05	5.45	--	0.00	89.60	
03/13/89	1035	95.05	6.89	--	0.00	88.16	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B4-1204-8

0332

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER-LEVEL ELEVATION	REMARKS
08/02/86	0939	97.15	5.11	--	0.00	92.04	
08/02/86	1735	97.15	5.08	--	0.00	92.07	
08/03/86	1123	97.15	5.09	--	0.00	92.06	
08/04/86	1040	97.15	5.16	--	0.00	91.99	
08/05/86	0712	97.15	5.16	--	0.00	91.99	
08/06/86	0722	97.15	5.18	--	0.00	91.97	
08/07/86	1050	97.15	5.21	--	0.00	91.94	
08/08/87	1121	97.15	5.11	--	0.00	92.04	
09/22/86	1105	97.15	4.77	--	0.00	92.38	
03/17/87		97.15		NOT ACCESSIBLE			
10/08/87	1114	97.15	5.34	--	0.00	91.81	
01/15/88	1504	97.15	5.96	--	0.00	91.19	
05/03/88	0912	97.15	4.29	--	0.00	92.86	
07/26/88	1843	97.15	5.10	--	0.00	92.05	
11/17/88	1405	97.15	5.38	--	0.00	91.77	
03/13/89	1009	97.15	6.30	--	0.00	90.85	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: 85-1204-8

0333

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
08/02/86	0938	100.36	7.14	--	0.00	93.22	
08/02/86	1745	100.36	7.14	--	0.00	93.22	
08/03/86	1124	100.36	7.13	--	0.00	93.23	
08/04/86	1056	100.36	7.18	--	0.00	93.18	
08/05/86	1828	100.36	7.17	--	0.00	93.19	
08/07/86	1049	100.36	7.20	--	0.00	93.16	
08/08/86	1119	100.36	7.16	--	0.00	93.20	
08/15/86	2017	100.36	7.10	--	0.00	93.26	
08/18/86	1814	100.36	7.14	--	0.00	93.22	
09/06/87	1552	100.36	7.12	--	0.00	93.24	
09/22/86	1105	100.36	7.98	--	0.00	92.38	
03/17/87	1000	100.36	8.04	--	0.00	92.32	
10/08/87	1111	100.36	7.21	--	0.00	93.15	
01/15/88	1458	100.36	7.78	--	0.00	92.58	
05/03/88	0916	100.36	6.03	--	0.00	94.33	
07/26/88	2044	100.36	6.99	--	0.00	93.37	
11/17/88	1324	100.36	7.13	--	0.00	93.23	
03/13/89	0935	100.36	8.25	--	0.00	92.11	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B6-1204-8

0334

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
08/03/86	1133	96.54	5.57	--	0.00	90.97	
08/04/86	1059	96.54	5.29	--	0.00	91.25	
08/05/86	0710	96.54	5.63	--	0.00	90.91	
08/05/86	1830	96.54	5.64	--	0.00	90.90	
08/06/86	0718	96.54	5.62	--	0.00	90.92	
08/07/86	1047	96.54	5.66	--	0.00	90.88	
08/08/86	1117	96.54	5.55	--	0.00	90.99	
08/15/86	1954	96.54	5.54	--	0.00	91.00	
08/18/86	1808	96.54	5.70	--	0.00	90.84	
08/21/86	2007	96.54	5.64	--	0.00	90.90	
09/06/86	1609	96.54	5.68	--	0.00	90.86	
09/22/86	1142	96.54	5.44	--	0.00	91.10	
03/17/87	1505	96.54	7.27	--	0.00	89.27	
10/08/87	1127	96.54	6.01	--	0.00	90.53	
01/15/88	1650	96.54	6.75	--	0.00	89.79	
05/03/88	0932	96.54	4.46	--	0.00	92.08	
07/26/88	2049	96.54	5.60	--	0.00	90.94	
11/17/88	1536	96.54	5.99	--	0.00	90.55	
03/13/89	1440	96.54	6.46	--	0.00	90.08	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B7-1204-8

0335

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
08/03/86	1136	95.38	4.77	--	0.00	90.61	
08/04/86	1107	95.38	4.83	--	0.00	90.55	
08/05/86	0707	95.38	4.74	--	0.00	90.64	
08/05/86	1833	95.38	4.73	--	0.00	90.65	
08/06/86	0715	95.38	4.71	--	0.00	90.67	
08/07/86	1045	95.38	4.79	--	0.00	90.59	
08/08/86	1116	95.38	4.56	--	0.00	90.82	
08/15/86	1945	95.38	4.72	--	0.00	90.66	
08/18/86	1805	95.38	4.88	--	0.00	90.50	
08/21/86	2002	95.38	4.75	--	0.00	90.63	
09/06/86	1604	95.38	4.79	--	0.00	90.59	
09/22/86	1130	95.38	4.59	--	0.00	90.79	
03/17/87	1510	95.38	4.59	--	0.00	90.79	
10/08/87	1125	95.38	5.00	--	0.00	90.38	
01/15/88	1634	95.38	5.72	--	0.00	89.66	
05/03/88	0930	95.38	3.33	--	0.00	92.05	
07/26/88	2053	95.38	4.68	--	0.00	90.70	
11/17/88	1545	95.38	5.02	--	0.00	90.36	
03/13/89	1130	95.38	6.35	--	0.00	89.03	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B8-1204-8

0336

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
09/06/86	1637	91.78	6.31	--	0.00	85.47	
09/22/86	1212	91.78	6.09	--	0.00	85.69	
03/17/87	1420	91.78	7.84	--	0.00	83.94	
10/08/87	1120	91.78	6.50	--	0.00	85.28	
01/18/88	1620	91.78	7.28	--	0.00	84.50	
05/03/88	0919	91.78	5.40	--	0.00	86.38	
07/26/88	2055	91.78	6.17	--	0.00	85.61	
11/17/88	1553	91.78	6.57	--	0.00	85.21	
03/13/89	1705	91.78	8.43	--	0.00	83.35	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B9-1204-8

0337

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
09/06/86	1655	94.98	9.05	--	0.00	85.93	
09/22/86	1155	94.98	8.75	--	0.00	86.23	
03/17/87	1001	94.98	10.03	--	0.00	84.86	
10/08/87	1122	94.98	9.54	--	0.00	85.44	
01/15/88	1634	94.98	9.60	--	0.00	85.38	
05/03/88	0925	94.98	8.02	--	0.00	86.96	
07/26/88	2057	94.98	6.30	--	0.00	88.68	
11/17/88	1600	94.98	9.20	--	0.00	85.78	
03/13/89	1650	94.98	10.86	--	0.00	84.12	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER-LEVEL ELEVATION	REMARKS
09/06/86	1642	91.79	--	--	0.00	NONE OBSERVED	DRY WELL
09/22/86	1206	91.79	--	--	0.00	NONE OBSERVED	DRY WELL
03/17/87			NOT LOCATED				
10/08/87	1121	91.79	--	--	0.00	NONE OBSERVED	DRY WELL
05/03/88	0927	91.79	4.72	--	0.00	87.07	
07/26/88	2055	91.79	--	--	0.00	NONE OBSERVED	DRY WELL
11/17/88	1610	91.79	--	--	0.00	NONE OBSERVED	DRY WELL
03/13/89	1511	91.79	--	--	0.00	NONE OBSERVED	DRY WELL

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B12-1204-8

0339

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
11/17/88	1215	102.97	9.88	--	0.00	93.09	
03/13/89	1610	102.97	10.53	--	0.00	92.44	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B13-1204-8

0340

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
11/17/88	1222	96.99	8.68	--	0.00	88.31	
03/13/89	1546	96.99	10.33	--	0.00	86.66	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B14-1204-8

0341

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
03/13/89	0955	83.30	7.78	--	0.00	75.52	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B15-1204-8

0342

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
03/13/89	1021	79.63	--	--	0.00	NONE OBSERVED	DRY WELL

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

FILE NAME: B16-1204-8

0343

DATE	CLOCK TIME	MEASURING POINT ELEVATION	MEASURED DEPTH TO WATER	MEASURED DEPTH TO PRODUCT	MEASURED PRODUCT THICKNESS	WATER- LEVEL ELEVATION	REMARKS
03/13/89	1100	85.11	13.88	--	0.00	71.23	

NOTES:

1) ALL MEASUREMENTS ARE IN FEET. ELEVATIONS ARE BASED ON ARBITRARY DATUM.

Appendix D
Laboratory Analytical Reports
Soil Samples
Groundwater Samples
Tabulated Groundwater Analytical Results
A-1204-8

Soil Samples
A-1204-8

SOUND ANALYTICAL SERVICES, INC.

0346

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4630 PACIFIC HIGHWAY EAST, SUITE B-14, TACOMA, WASHINGTON 98424 - TELEPHONE (206) 922-2310 - FAX (206) 922-5047

Report To: Rittenhouse-Zeman

Date: February 24, 1989

Report On: Analysis of Soil

Lab No.: A 5317

Page 1 of 2

IDENTIFICATION:

Samples Received on 2-23-89

Project No: A-1204-8

ANALYSIS:

Laboratory Sample No.	<u>Concentration, mg/kg</u>		
	1	2	3
Client Identification	MW-14 SPT-1	MW-14 SPT-2	MW-14 SPT-3
Benzene	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05	< 0.05
Total Petroleum Hydrocarbons	40.0	9.7	< 5.0

Laboratory Sample No.	<u>Concentration, mg/kg</u>		
	4	5	6
Client Identification	MW-15 SPT-1	MW-15 SPT-2	MW-15 SPT-3
Benzene	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05	< 0.05
Total Petroleum Hydrocarbons	5.7	< 5.0	< 5.0

Continued

SOUND ANALYTICAL SERVICES, INC.

0347

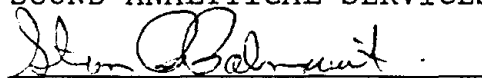
Rittenhouse-Zeman
 Page 2 of 2
 Lab No. A 5317
 February 24, 1989

Laboratory Sample No.	<u>Concentration, mg/kg</u>		
	7	8	9
Client Identification	MW-16 SPT-1	MW-16 SPT-2	MW-16 SPT-3
Benzene	< 0.05	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05	< 0.05
Toluene	< 0.05	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05	< 0.05
Total Petroleum Hydrocarbons	8.4	32.0	< 5.0

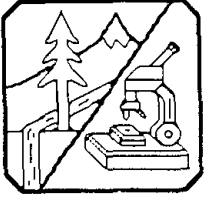
Laboratory Sample No.	<u>Concentration, mg/kg</u>	
	10	11
Client Identification	Soil Probe 1	Soil Probe 2
Benzene	< 0.05	< 0.05
Ethyl Benzene	< 0.05	< 0.05
Toluene	< 0.05	< 0.05
Xylenes	< 0.05	< 0.05
Total Petroleum Hydrocarbons	14.0	15.0

Analysis Procedures: BETX by SW-846 Method 8020
 TPH by EPA Method 418.1

SOUND ANALYTICAL SERVICES


 STAN P. PALMQUIST

Groundwater Samples
A-1204-8



NORTHERN TESTING LABORATORIES, INC. ⁰³⁴⁹

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-6378

Rittenhouse-Zeman & Associates
1400-140th Avenue, N.E.
Bellevue, WA 98005

Attn: Dan Whitman

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/23/89

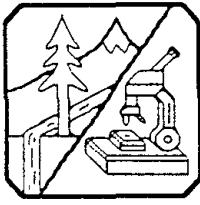
Source: Monitoring Wells, 15th & C Street
Sample ID#: A031489-4 through 16

NTL ID #	Client ID #	Total Petroleum Hydrocarbons mg/l
A031489-4	MW-3	1.5
A031489-5	MW-4	0.45
A031489-6	MW-5	<0.61
A031489-7	MW-6	12.8
A031489-8	MW-7	8.8/8.9
A031489-9	MW-8	3.8
A031489-10	MW-9	3.1
A031489-11	MW-12	0.60
A031089-12	MW-13	1.1
A031489-13	MW-14	0.77
A031089-14	MW-16	0.80

Reported By:

Date: 03/24/89

Francois Rodigari, Anchorage Operations Manager



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/15/89

Attn: Cliff Morrison

Source: 15th & C Street
Sample ID#: A031489-4,5,6,7

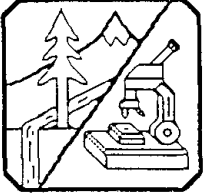
Parameter	Units	A031489-4 MW-3	A031489-5 MW-4	A031489-6 MW-5	A031489-7 MW-6	Standard Detection Limit
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Purgeable Aromatics: EPA Method 602

Benzene	ug/l	370	<DL	<DL	8500/10000	0.2
Chlorobenzene	ug/l	<DL	<DL	<DL	140	0.2
1,2-Dichlorobenzene	ug/l	<DL	<DL	<DL	140	0.2
1,3-Dichlorobenzene	ug/l	<DL	<DL	<DL	140	0.2
1,4-Dichlorobenzene	ug/l	<DL	<DL	<DL	140	0.2
Ethylbenzene	ug/l	33	<DL	<DL	560/760	0.2
Toluene	ug/l	6.8	0.3	0.3	7300/9700	0.2
Xylenes	ug/l	280	0.9	0.9	4400/5900	0.2

Reported by:

Date: 03-14-89



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2535 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 15:45
Date Sampled: 03/15/89
Time Sampled: Various
Date Completed: 03/15/89

Attn: Cliff Morrison

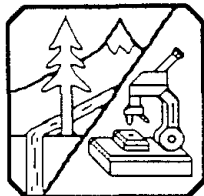
Source: 15th & C Street
Sample ID#: A031489-0,9,10,11

Parameter	Units	A031489-0 MW-7	A031489-9 MW-9	A031489-10 MW-9	A031489-11 MW-12	Standard Detection Limit
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Regulable Aromatics: EPA Method 802

Benzene	ug/l	0100	1400	0400	NDL	0.2
Chlorobenzene	ug/l	1100	120	110	NDL	0.2
1,2-Dichlorobenzene	ug/l	1100	120	110	NDL	0.2
1,3-Dichlorobenzene	ug/l	1100	120	110	NDL	0.2
1,4-Dichlorobenzene	ug/l	1100	20	110	NDL	0.2
Ethylbenzene	ug/l	630	970	120	NDL	0.2
Toluene	ug/l	770	1	110	NDL	0.2
Xylenes	ug/l	120	1900	2000	NDL	0.2

AKL



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Rittenhouse-Leman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/15/89

Attn: Cliff Morrison

Source: 15th & C Street
Sample ID#: A031489-12,13,14,15

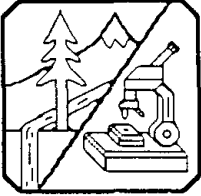
Parameter	Units	A031489-12 MW-13	A031489-13 MW-14	A031489-14 MW-16	A031489-15 Travel Blank	Standard Detection Limit
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Purgeable Aromatics: EPA Method 602

Benzene	ug/l	<DL	<DL	<DL	<DL	0.2
Chlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
1,2-Dichlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
1,3-Dichlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
1,4-Dichlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
Ethylbenzene	ug/l	<DL	<DL	<DL	<DL	0.2
Toluene	ug/l	<DL	<DL	<DL	<DL	0.2
Xylenes	ug/l	<DL	<DL	0.2	<DL	0.2

Reported by: *ML*

Date: 2/2/89



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Rittenhouse-Leman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/16/89

Attn: Cliff Morrison

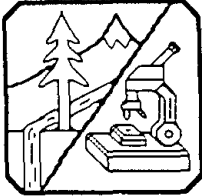
Source: 15th & C Street
Sample ID#: A031489-4,5,7,8

Parameter	Unit	A031489-4				Standard Detection Limits
		MW-3	MW-4	MW-5	MW-7	
Durable Halocarbons - EPA Method 801:						
Bromodichloromethane	ug/l	17.0	DL	10	1000	1.0
Bromoform	ug/l	100	DL	10	1000	1.0
Bromomethane	ug/l	10	DL	100	1000	1.0
Carbon tetrachloride	ug/l	5.0	DL	10	100	0.1
Chlorobenzene	ug/l	5.0	DL	10	100	1.0
Chloroethane	ug/l	50	DL	10	1000	1.0
2-Chloroethylvinyl ether	ug/l	1.50	DL	100	1000	1.0
Chloroform	ug/l	15.0	DL	10	1000	0.2
Chloroethane	ug/l	50	DL	100	1000	1.0
Dibromodichloromethane	ug/l	10	DL	100	1000	1.0
1,3-Dichlorobutane	ug/l	5.0	DL	10	100	1.0
1,3-Dichlorobenzene	ug/l	15.0	DL	10	1000	0.2
1,4-Dichlorobenzene	ug/l	5.0	DL	10	100	1.0
Dichlorodifluoroethane	ug/l	15.0	DL	10	1000	0.2
1,1-Dichloroethane	ug/l	15.0	DL	10	1000	0.2
1,2-Dichloroethane	ug/l	15.0	DL	10	1000	0.2
1,1-Dichloroethene	ug/l	1.25	DL	200	1500	1.0
trans-1,2-Dichloroethene	ug/l	1.25	DL	100	1500	1.0
1,2-Dichloropropane	ug/l	10	DL	100	1000	0.5
cis-1,3-Dichloropropene	ug/l	15.0	DL	10	1000	0.2
trans-1,3-Dichloropropene	ug/l	5.0	DL	10	100	0.2
Methylene chloride	ug/l	10	DL	100	1000	1.0
1,1,1,2-Tetrachloroethane	ug/l	10	DL	100	1000	0.5
Tetrachloroethene	ug/l	15.0	DL	10	100	0.2
1,1,1-Trichloroethane	ug/l	10	DL	100	1000	1.0
1,1,2-Trichloroethane	ug/l	10	DL	100	1000	0.5
Trichloroethene	ug/l	10	DL	100	1000	0.5
Trichlorofluoroethane	ug/l	10	DL	100	1000	1.0
Trichloroethylene	ug/l	10	DL	100	1000	1.0

Printed on 03/16/89
10:00 AM

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Printed on 03/16/89
10:00 AM



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/23/89

Attn: Cliff Morrison

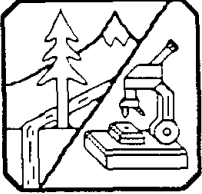
Source: 15th & C Street
Sample ID#: A031489-9,10,13,16

Parameter	Unit	A031489-9 MW-8	A031489-10 MW-9	A031489-13 MW-14	A031489-16 Travel Blank	Standard Detection Limits
Purgeable Halocarbons - EPA Method 601:						
Bromodichloromethane	ug/l	<30	<60	<DL	<DL	0.3
Bromoform	ug/l	<100	<200	<DL	<DL	1.0
Bromomethane	ug/l	<200	<400	<DL	<DL	2.0
Carbon tetrachloride	ug/l	<20	<40	*	<DL	0.2
Chlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
Chloroethane	ug/l	<200	<400	<DL	<DL	2.0
2-Chloroethylvinyl ether	ug/l	<200	<400	<DL	<DL	2.0
Chloroform	ug/l	<20	<40	*	<DL	0.2
Chloromethane	ug/l	<200	<400	<DL	<DL	2.0
Dibromochloromethane	ug/l	<50	<100	<DL	<DL	0.5
1,2-Dichlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
1,3-Dichlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
1,4-Dichlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
Dichlorodifluoromethane	ug/l	<20	<40	*	<DL	0.2
1,1-Dichloroethane	ug/l	<20	<40	<DL	<DL	0.2
1,2-Dichloroethane	ug/l	<20	<40	*	<DL	0.2
1,1-Dichloroethene	ug/l	<100	<200	*	<DL	1.0
trans-1,2-Dichloroethene	ug/l	<100	<200	<DL	<DL	1.0
1,2-Dichloropropane	ug/l	<50	<100	<DL	<DL	0.5
cis-1,3-Dichloropropene	ug/l	<20	<40	<DL	<DL	0.2
trans-1,3-Dichloropropene	ug/l	<20	<40	<DL	<DL	0.2
Methylene chloride	ug/l	<200	<400	*	<DL	2.0
1,1,2,2-Tetrachloroethane	ug/l	<40	<80	<DL	<DL	0.4
Tetrachloroethene	ug/l	<20	<40	<DL	<DL	0.2
1,1,1-Trichloroethane	ug/l	<40	<80	*	<DL	0.4
1,1,2-Trichloroethane	ug/l	<40	<80	<DL	<DL	0.4
Trichloroethene	ug/l	<20	<40	<DL	<DL	0.2
Trichlorofluoromethane	ug/l	<200	<400	*	<DL	2.0
Vinyl chloride	ug/l	<200	<400	<DL	<DL	2.0

*: Small amounts (less than 5 ug/l) of these parameters could be present, but this portion of chromatogram was obscured by freon leaks in sampling bottle.

Reported By: *KLH*

Date: 03/24/89



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Quality Control Report

=====

Client: RZA
A031489-4 through 16

Listed below are quality control assurance reference samples with a known concentration prior to analysis. The acceptable limits represent a 95% confidence interval established by the Environmental Protection Agency or by our laboratory through repetitive analyses of the reference sample. The reference samples indicated below were analyzed at the same time as your sample, ensuring the accuracy of your results.

Sample #	Parameter	Unit	Result	Acceptable Limit
NTL CCC5	Benzene	ug/l	7.4	6.5 - 9.8
	Toluene	ug/l	7.3	6.2 - 9.3
	Ethylbenzene	ug/l	7.9	6.3 - 9.5
	Chlorobenzene	ug/l	9.0	7.2 - 10.9
	p,m-Xylene	ug/l	11.4	8.9 - 13.8
	o-Xylene	ug/l	6.3	5.4 - 8.1
	1,4-Dichlorobenzene	ug/l	10.4	8.4 - 12.6
	1,3-Dichlorobenzene	ug/l	9.5	7.7 - 11.7
	1,2-Dichlorobenzene	ug/l	10.8	8.5 - 12.9
	1,2-Dichloroethane	ug/l	8.1	7.3 - 11.0
	Trichloroethene	ug/l	11.6	9.3 - 14.0
EPA 379-1	Tetrachloroethene	ug/l	7.2	6.3 - 9.6
	Oil & Grease	mg/l	20.5	16.6 - 23.4

Reported By: *FR*

Date: 03/24/89

Francis Rodigari, Anchorage Operations Manager

Tabulated Groundwater Analytical Results
A-1204-8

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652
 Address: 15TH & C ST.
 ANCHORAGE, ALASKA

Job Number: A-1204-8
 Monitoring Well MW-3

DATE	SEP 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
CONTAMINANT								
BENZENE (ppb)	ND(1)	694.00	230.00	653.00	2.00	560.00	1,100.00	870.00
TOLUENE (ppb)	ND(1)	12.00	28.00	7.00	ND(0.2)	ND(1)	7.50	6.80
ETHYLBENZENE (ppb)	ND(1)	68.00	17.50	60.00	ND(0.2)	9.80	400.00	34.00
CHLOROBENZENE (ppb)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(1)	ND(0.2)	ND(5.0)
XYLENES, TOTAL (ppb)	ND(1)				1.90		2,400.00	290.00
p & m		172.00	172.00	130.00				
o		103.00	103.00	85.00				
DICHLOROBENZENE (ppb)								
1,4	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(1)	ND(0.2)	ND(5.0)
1,3	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(1)	ND(0.2)	ND(5.0)
1,2	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(1)	ND(0.2)	ND(5.0)
OIL & GREASE (mg/L)	--	1.70	--	0.31	7.70	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/L)	--	0.70	0.26	0.12	0.24	1.10	1.30	1.50

0357

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. Monitoring Well MW-4
 ANCHORAGE, ALASKA

DATE	SEP 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
BENZENE (ppb)	NOT	NOT	ND(1)	ND(1)	ND(0.2)	0.20	0.20	ND(0.2)
TOLUENE (ppb)	SAMPLED	SAMPLED	ND(1)	3.30	ND(0.2)	ND(0.2)	0.50	0.30
ETHYLBENZENE (ppb)			ND(1)	ND(1)	ND(0.2)	ND(0.2)	0.30	ND(0.2)
CHLOROBENZENE (ppb)			ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
XYLENES, TOTAL (ppb) p & m			ND(1)	ND(1)	ND(0.2)	ND(0.2)	1.40	0.90
o			ND(1)	ND(1)				
DICHLOROBENZENE (ppb) 1,4			ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
1,3			ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
1,2			ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
OIL & GREASE (mg/l)			--	0.17	7.40	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)			0.15	0.15	0.80	ND(0.5)	ND(0.4)	0.45

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST Monitoring Well MW-5
 ANCHORAGE, ALASKA

DATE	SEPT 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
CONTAMINANT								
BENZENE (ppb)	NOT	3.30	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
TOLENE (ppb)	SAMPLED	7.40	ND(1)	13,000.00	ND(0.2)	0.40	0.80	0.30
ETHYLBENZENE (ppb)		4.70	ND(1)	25.00	ND(0.2)	ND(0.2)	0.30	ND(0.2)
CHLOROBENZENE (ppb)		ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
XYLENES, TOTAL (ppb)					ND(0.2)	ND(0.2)	1.50	0.60
p & m		11.00	ND(1)	40.00				
o		4.40	ND(1)	14.00				
DICHLOROBENZENE (ppb)								
1,4		ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
1,3		ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
1,2		ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
OIL & GREASE (mg/l)		0.19	--	2.70	5.80	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)		0.60	0.16	0.60	1.30	ND(0.5)	ND(0.4)	ND(0.61)

0359

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652
 Address: 15TH & C ST.
 ANCHORAGE, ALASKA

Job Number: A-1204-8
 Monitoring Well MW-6

DATE	SEP 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
CONTAMINANT								
BENZENE (ppb)	14,000.00	14,300.00	18,700.00	23,900.00	1,400.00	15,000.00	16,000.00	8,500.00
TOLUENE (ppb)	17,000.00	19,000.00	31,200.00	28,400.00	3,600.00	27,000.00	24,000.00	7,300.00
ETHYLBENZENE (ppb)	2,100.00	2,390.00	2,710.00	1,850.00	590.00	1,400.00	2,800.00	560.00
CHLOROBENZENE (ppb)	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(100)	ND(100)	ND(40)
XYLENES, TOTAL (ppb) p & m	14,000.00	10,100.00	13,700.00	13,300.00	5,800.00	13,000.00	16,000.00	4,400.00
o		4,400.00	5,040.00	4,600.00				
DICHLOROBENZENE (ppb)								
1,4	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(100)	ND(100)	ND(40)
1,3	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(100)	ND(100)	ND(40)
1,2	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(100)	ND(100)	ND(40)
OIL & GREASE (mg/l)	--	24.00	--	9.40	7.60	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	--	12.00	11.30	6.60	6.80	10.10	6.90	12.80

0360

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652
 Address: 15TH & C ST.
 ANCHORAGE, ALASKA

Job Number: A-1204-8
 Monitoring Well MW-7

DATE	SEPT 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
CONTAMINANT								
BENZENE (ppb)	2,400.00	6,030.00	8,400.00	8,200.00	6,300.00	6,400.00	7,800.00	8,100.00
TOLUENE (ppb)	4,900.00	12,300.00	19,800.00	3,900.00	17,000.00	15,000.00	12,000.00	8,500.00
ETHYLBENZENE (ppb)	390.00	2,660.00	2,070.00	2,400.00	1,100.00	1,500.00	2,700.00	630.00
CHLOROBENZENE (ppb)	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(200)	ND(400)	ND(100)
XYLENES, TOTAL (ppb) p & m	5,600.00	9,440.00	12,700.00	12,400.00	9,900.00	11,000.00	14,000.00	4,200.00
o		4,460.00	5,300.00	5,100.00				
DICHLOROBENZENE (ppb)								
1,4	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(200)	ND(200)	ND(100)
1,3	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(200)	ND(200)	ND(100)
1,2	ND(1)	ND(1)	ND(1)	ND(1)	ND(200)	ND(200)	ND(200)	ND(100)
OIL & GREASE (mg/l)	--	27.00		7.10	7.50	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	--	18.00	9.28	3.20	7.30	10.60	8.00	8.80

0361

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. Monitoring Well MW-8
 ANCHORAGE, ALASKA

DATE	SEP 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
CONTAMINANT								
BENZENE (ppb)	200.00	1,340.00	116.00	278.00	ND(0.2)	0.20	97.00	1,400.00
TOLUENE (ppb)	31.00	875.00	608.00	39.40	ND(0.2)	ND(0.2)	4.70	61.00
ETHYLBENZENE (ppb)	ND(1)	1,040.00	17.70	46.00	ND(0.2)	ND(0.2)	65.00	970.00
CHLOROBENZENE (ppb)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(20)
XYLENES, TOTAL (ppb) p & m	790.00	3,200.00	40.20	238.00	0.60	ND(0.2)	270.00	4,900.00
o		1,440.00	15.50	66.00				
DICHLOROBENZENE (ppb)								
1,4	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(20)
1,3	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(20)
1,2	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.2)	ND(0.2)	ND(0.2)	ND(20)
OIL & GREASE (mg/l)	--	6.60	--	4.50	6.80	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	--	3.40	0.26	0.57	1.50	0.80	0.60	3.80

0362

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. MONITORING WELL MW-9
 ANCHORAGE, ALASKA

DATE	SEP 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
CONTAMINANT								
BENZENE (ppb)	3,300.00	4,710.00	5,430.00	4,800.00	5,300.00	6,700.00	4,400.00	8,400.00
TOLUENE (ppb)	34.00	71.00	607.00	58.30	62.00	850.00	42.00	60.00
ETHYLBENZENE (ppb)	150.00	73.00	98.50	492.00	ND(40)	220.00	520.00	520.00
CHLOROBENZENE (ppb)	ND(1)	ND(1)	ND(1)	ND(1)	ND(40)	ND(100)	ND(20)	ND(40)
XYLENES, TOTAL (ppb) p & m	560.00	2,390.00	2,520.00	1,560.00	960.00	2,600.00	1,300.00	2,000.00
o		506.00	669.00	334.00				
DICHLOROBENZENE (ppb)								
1,4	ND(1)	ND(1)	ND(1)	ND(1)	ND(40)	ND(100)	ND(20)	ND(40)
1,3	ND(1)	ND(1)	ND(1)	ND(1)	ND(40)	ND(100)	ND(20)	ND(40)
1,2	ND(1)	ND(1)	ND(1)	ND(1)	ND(40)	ND(100)	ND(20)	ND(40)
OIL & GREASE (mg/l)	--	5.10	--	0.96	6.90	--	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	--	3.10	2.24	0.44	4.90	2.70	1.70	3.10

0363

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. Monitoring Well B-10
 ANCHORAGE, ALASKA

DATE	SEP 86	MAR 87	OCT 87	JAN 88	MAY 88	JUL 88	NOV 88	MAR 89
CONTAMINANT								
BENZENE (ppb)	DRY	DRY	DRY	DRY	ND(0.4)	DRY	DRY	DRY
TOLUENE (ppb)	WELL	WELL	WELL	WELL	ND(0.4)	WELL	WELL	WELL
ETHYLBENZENE (ppb)					ND(0.4)			
CHLOROBENZENE (ppb)					ND(0.4)			
XYLENES, TOTAL (ppb) p & m o					ND(1.2)			
DICHLOROBENZENE (ppb)								
1,4					ND(0.4)			
1,3					ND(0.4)			
1,2					ND(0.4)			
OIL & GREASE (mg/l)					--			
TOTAL PETROLEUM HYDROCARBONS (mg/l)					--			

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. Monitoring Well MW-12
 ANCHORAGE, ALASKA

DATE	NOV 88	MAR 89
CONTAMINANT		
BENZENE (ppb)	1.90	ND(0.2)
TOLUENE (ppb)	6.10	ND(0.2)
ETHYLBENZENE (ppb)	2.30	ND(0.2)
CHLOROBENZENE (ppb)	ND(0.2)	ND(0.2)
XYLENES, TOTAL (ppb) p & m o	12.00	ND(0.2)
DICHLOROBENZENE (ppb)		
1,4	ND(0.2)	ND(0.2)
1,3	ND(0.2)	ND(0.2)
1,2	ND(0.2)	ND(0.2)
OIL & GREASE (mg/l)	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	0.50	0.60

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. Monitoring Well MW-13
 ANCHORAGE, ALASKA

DATE	NOV 88	MAR 89
CONTAMINANT		
BENZENE (ppb)	0.30	ND(0.2)
TOLUENE (ppb)	0.90	ND(0.2)
ETHYLBENZENE (ppb)	1.30	ND(0.2)
CHLOROBENZENE (ppb)	ND(0.2)	ND(0.2)
XYLENES, TOTAL (ppb) p & m o	4.90	ND(0.2)
DICHLOROBENZENE (ppb)		
1,4	ND(0.2)	ND(0.2)
1,3	ND(0.2)	ND(0.2)
1,2	ND(0.2)	ND(0.2)
OIL & GREASE (mg/l)	--	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	ND(0.4)	1.10

0366

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. Monitoring Well MW-14
 ANCHORAGE, ALASKA

DATE	MAR 89
CONTAMINANT	
BENZENE (ppb)	ND(0.2)
TOLUENE (ppb)	ND(0.2)
ETHYLBENZENE (ppb)	ND(0.2)
CHLOROBENZENE (ppb)	ND(0.2)
XYLENES, TOTAL (ppb) p & m o	ND(0.2)
DICHLOROBENZENE (ppb)	
1,4	ND(0.2)
1,3	ND(0.2)
1,2	ND(0.2)
OIL & GREASE (mg/l)	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	0.77

0367

GROUNDWATER SAMPLING RESULTS

Job Name: UNOCAL STA. NO. 4652 Job Number: A-1204-8
 Address: 15TH & C ST. Monitoring Well MW-16
 ANCHORAGE, ALASKA

DATE	MAR 89
CONTAMINANT	
BENZENE (ppb)	ND(0.2)
TOLUENE (ppb)	ND(0.2)
ETHYLBENZENE (ppb)	ND(0.2)
CHLOROBENZENE (ppb)	ND(0.2)
XYLENES, TOTAL (ppb) p & m o	0.60
DICHLOROBENZENE (ppb)	
1,4	ND(0.2)
1,3	ND(0.2)
1,2	ND(0.2)
OIL & GREASE (mg/l)	--
TOTAL PETROLEUM HYDROCARBONS (mg/l)	0.80



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

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MAR 31 1989

ZD HOZ

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99510

ANCHORAGE/WESTERN
DISTRICT OFFICE

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/23/89

Attn: Cliff Morrison

Source: Monitoring Wells, 15th & C Street
Sample ID#: A031489-4 through 16

NTL ID #	Client ID #	Total Petroleum Hydrocarbons mg/l
A031489-4	MW-3	1.5
A031489-5	MW-4	0.45
A031489-6	MW-5	<0.61
A031489-7	MW-6	12.8
A031489-8	MW-7	8.8/8.9
A031489-9	MW-8	3.8
A031489-10	MW-9	3.1
A031489-11	MW-12	0.60
A031089-12	MW-13	1.1
A031489-13	MW-14	0.77
A031089-14	MW-16	0.80

Reported By: *Ali*

Date: 03/24/89

Francois Rodigari, Anchorage Operations Manager



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/16/89

Attn: Cliff Morrison

Source: 15th & C Street
Sample ID#: A031489-4,5,7,8

Parameter	Unit	A031489-4 MW-3	A031489-5 MW-4	A031489-7 MW-6	A031489-8 MW-7	Standard Detection Limits
Purgeable Halocarbons - EPA Method 601:						
Bromodichloromethane	ug/l	<7.5	<DL	<60	<150	0.3
Bromoform	ug/l	<25	<DL	<200	<500	1.0
Bromomethane	ug/l	<50	<DL	<400	<1000	2.0
Carbon tetrachloride	ug/l	<5.0	<DL	<40	<100	0.2
Chlorobenzene	ug/l	<5.0	<DL	<40	<100	0.2
Chloroethane	ug/l	<50	<DL	<400	<1000	2.0
2-Chloroethylvinyl ether	ug/l	<50	<DL	<400	<1000	2.0
Chloroform	ug/l	<5.0	<DL	<40	<100	0.2
Chloromethane	ug/l	<50	<DL	<400	<1000	2.0
Dibromochloromethane	ug/l	<13	<DL	<100	<250	0.5
1,2-Dichlorobenzene	ug/l	<5.0	<DL	<40	<100	0.2
1,3-Dichlorobenzene	ug/l	<5.0	<DL	<40	<100	0.2
1,4-Dichlorobenzene	ug/l	<5.0	<DL	<40	<100	0.2
Dichlorodifluoromethane	ug/l	<5.0	<DL	<40	<100	0.2
1,1-Dichloroethane	ug/l	<5.0	<DL	<40	<100	0.2
1,2-Dichloroethane	ug/l	<5.0	4.5	<40	<100	0.2
1,1-Dichloroethene	ug/l	<25	<DL	<200	<500	1.0
trans-1,2-Dichloroethene	ug/l	<25	<DL	<200	<500	1.0
1,2-Dichloropropane	ug/l	<13	<DL	<100	<250	0.5
cis-1,3-Dichloropropene	ug/l	<5.0	<DL	<40	<100	0.2
trans-1,3-Dichloropropene	ug/l	<5.0	<DL	<40	<100	0.2
Methylene chloride	ug/l	<50	<DL	<400	<1000	2.0
1,1,2,2-Tetrachloroethane	ug/l	<10	<DL	<80	<200	0.4
Tetrachloroethene	ug/l	<5.0	<DL	<40	<100	0.2
1,1,1-Trichloroethane	ug/l	<10	<DL	<80	<200	0.4
1,1,2-Trichloroethane	ug/l	<10	<DL	<80	<200	0.4
Trichloroethene	ug/l	<5.0	<DL	<40	<100	0.2
Trichlorofluoromethane	ug/l	<50	<DL	<400	<1000	2.0
Vinyl chloride	ug/l	<50	<DL	<400	<1000	2.0

Reported By: *FR*

Date: 03/24/89

Francois Rodigari, Anchorage Operations Manager



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

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ANCHORAGE, ALASKA 99503

907-479-3115
907-277-8378

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/23/89

Attn: Cliff Morrison

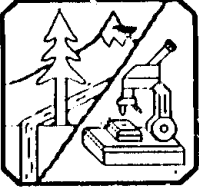
Source: 15th & C Street
Sample ID#: A031489-9,10,13,16

Parameter	Unit	A031489-9 MW-8	A031489-10 MW-9	A031489-13 MW-14	A031489-16 Travel Blank	Standard Detection Limits
Purgeable Halocarbons - EPA Method 601:						
Bromodichloromethane	ug/l	<30	<60	<DL	<DL	0.3
Bromoform	ug/l	<100	<200	<DL	<DL	1.0
Bromomethane	ug/l	<200	<400	<DL	<DL	2.0
Carbon tetrachloride	ug/l	<20	<40	*	<DL	0.2
Chlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
Chloroethane	ug/l	<200	<400	<DL	<DL	2.0
2-Chloroethylvinyl ether	ug/l	<200	<400	<DL	<DL	2.0
Chloroform	ug/l	<20	<40	*	<DL	0.2
Chloromethane	ug/l	<200	<400	<DL	<DL	2.0
Dibromochloromethane	ug/l	<50	<100	<DL	<DL	0.5
1,2-Dichlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
1,3-Dichlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
1,4-Dichlorobenzene	ug/l	<20	<40	<DL	<DL	0.2
Dichlorodifluoromethane	ug/l	<20	<40	*	<DL	0.2
1,1-Dichloroethane	ug/l	<20	<40	<DL	<DL	0.2
1,2-Dichloroethane	ug/l	<20	<40	*	<DL	0.2
1,1-Dichloroethene	ug/l	<100	<200	*	<DL	1.0
trans-1,2-Dichloroethene	ug/l	<100	<200	<DL	<DL	1.0
1,2-Dichloropropane	ug/l	<50	<100	<DL	<DL	0.5
cis-1,3-Dichloropropene	ug/l	<20	<40	<DL	<DL	0.2
trans-1,3-Dichloropropene	ug/l	<20	<40	<DL	<DL	0.2
Methylene chloride	ug/l	<200	<400	*	<DL	2.0
1,1,1,2-Tetrachloroethane	ug/l	<40	<80	<DL	<DL	0.4
Tetrachloroethene	ug/l	<20	<40	<DL	<DL	0.2
1,1,1-Trichloroethane	ug/l	<40	<80	*	<DL	0.4
1,1,2-Trichloroethane	ug/l	<40	<80	<DL	<DL	0.4
Trichloroethene	ug/l	<20	<40	<DL	<DL	0.2
Trichlorofluoromethane	ug/l	<200	<400	*	<DL	2.0
Vinyl chloride	ug/l	<200	<400	<DL	<DL	2.0

*: Small amounts (less than 5 ug/l) of these parameters could be present, but this portion of chromatogram was obscured by freon rinse of sampling bottle.

Reported By: *[Signature]*

Date: 03/24/89



NORTHERN TESTING LABORATORIES, INC.

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ANCHORAGE, ALASKA 99503

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907-277-8378

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/15/89

Attn: Cliff Morrison

Source: 15th & C Street
Sample ID#: A031489-4,5,6,7

Parameter	Units	A031489-4 MW-3	A031489-5 MW-4	A031489-6 MW-5	A031489-7 MW-6	Standard Detection Limit
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Purgeable Aromatics: EPA Method 602

Benzene	ug/l	870	<DL	<DL	8500/10000	0.2
Chlorobenzene	ug/l	<5.0	<DL	<DL	<40	0.2
1,2-Dichlorobenzene	ug/l	<5.0	<DL	<DL	<40	0.2
1,3-Dichlorobenzene	ug/l	<5.0	<DL	<DL	<40	0.2
1,4-Dichlorobenzene	ug/l	<5.0	<DL	<DL	<40	0.2
Ethylbenzene	ug/l	34	<DL	<DL	560/760	0.2
Toluene	ug/l	6.8	0.3	0.3	7300/8700	0.2
Xylenes	ug/l	290	0.9	0.6	4400/5900	0.6

Reported By: *FR*

Date: 03/24/89

Francois Rodigari, Anchorage Operations Manager

0373

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/15/89

Attn: Cliff Morrison

Source: 15th & C Street
Sample ID#: A031489-8,9,10,11

Parameter	Units	A031489-8 MW-7	A031489-9 MW-8	A031489-10 MW-9	A031489-11 MW-12	Standard Detection Limit
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Purgeable Aromatics: EPA Method 602

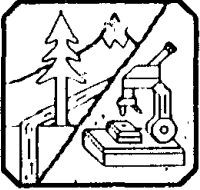
Benzene	ug/l	8100	1400	8400	<DL	0.2
Chlorobenzene	ug/l	<100	<20	<40	<DL	0.2
1,2-Dichlorobenzene	ug/l	<100	<20	<40	<DL	0.2
1,3-Dichlorobenzene	ug/l	<100	<20	<40	<DL	0.2
1,4-Dichlorobenzene	ug/l	<100	<20	<40	<DL	0.2
Ethylbenzene	ug/l	630	970	520	<DL	0.2
Toluene	ug/l	8500	61	60	<DL	0.2
Xylenes	ug/l	4200	4900	2000	<DL	0.6

Reported By:

frli

Date: 03/24/89

Francois Rodigari, Anchorage Operations Manager



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
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FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

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907-277-8378

Rittenhouse-Zeman & Associates
711 "H" Street, Suite 450
Anchorage, Alaska 99503

Date Arrived: 03/14/89
Time Arrived: 1345
Date Sampled: 03/13/89
Time Sampled: Various
Date Completed: 03/15/89

Attn: Cliff Morrison

Source: 15th & C Street
Sample ID#: A031489-12,13,14,15

Parameter	Units	A031489-12 MW-13	A031489-13 MW-14	A031489-14 MW-16	A031489-15 Travel Blank	Standard Detection Limit
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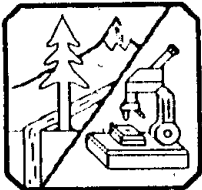
Purgeable Aromatics: EPA Method 602

Benzene	ug/l	<DL	<DL	<DL	<DL	0.2
Chlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
1,2-Dichlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
1,3-Dichlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
1,4-Dichlorobenzene	ug/l	<DL	<DL	<DL	<DL	0.2
Ethylbenzene	ug/l	<DL	<DL	<DL	<DL	0.2
Toluene	ug/l	<DL	<DL	<DL	<DL	0.2
Xylenes	ug/l	<DL	<DL	0.6	<DL	0.6

Reported By: *FR*

Date: 03/24/89

Francois Rodigari, Anchorage Operations Manager



NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A
2505 FAIRBANKS STREET

FAIRBANKS, ALASKA 99709
ANCHORAGE, ALASKA 99503

907-479-3115
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Quality Control Report

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Client: RZA
A031489-4 through 16

Listed below are quality control assurance reference samples with a known concentration prior to analysis. The acceptable limits represent a 95% confidence interval established by the Environmental Protection Agency or by our laboratory through repetitive analyses of the reference sample. The reference samples indicated below were analyzed at the same time as your sample, ensuring the accuracy of your results.

Sample #	Parameter	Unit	Result	Acceptable Limit
NTL CCC5	Benzene	ug/l	7.4	6.5 - 9.8
	Toluene	ug/l	7.3	6.2 - 9.3
	Ethylbenzene	ug/l	7.9	6.3 - 9.5
	Chlorobenzene	ug/l	9.0	7.2 - 10.9
	p,m-Xylene	ug/l	11.4	8.9 - 13.8
	o-Xylene	ug/l	6.3	5.4 - 8.1
	1,4-Dichlorobenzene	ug/l	10.4	8.4 - 12.6
	1,3-Dichlorobenzene	ug/l	9.5	7.7 - 11.7
	1,2-Dichlorobenzene	ug/l	10.8	8.5 - 12.9
	1,2-Dichloroethane	ug/l	8.1	7.3 - 11.0
	Trichloroethene	ug/l	11.6	9.3 - 14.0
	Tetrachloroethene	ug/l	7.2	6.3 - 9.6
	EPA 379-1	Oil & Grease	mg/l	20.5

Reported By: *FR*

Date: 03/24/89

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Francois Rodigari, Anchorage Operations Manager

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