

RZA AGRA, Inc.

Engineering & Environmental Services

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9 June 1994

Unocal Corporation

P. O. Box 76

Seattle, Washington 98111

DEPARTMENT OF ECOLOGY	
NWRO/TCP TANK UNIT	
#1995	
INTERIM CLEANUP REPORT	☒
SITE CHARACTERIZATION	☐
FINAL CLEANUP REPORT	☐
OTHER	☐
ACTION	☐
MEDIA: SOIL	☒
GW	☒
INSPECTOR (INIT.) <i>WMM</i>	DATE <i>3-3-97</i>

11-06799-15

Attention: Mr. V. L. Carlson

RECEIVED

JUN 15 1994

ENVIRONMENTAL ENG.

Subject: Summary of Work Completed to Date

Unocal Station No. 4165

2nd Street and Avenue D

Snohomish, Washington

Dear Mr. Carlson:

This letter presents a summary of work completed to date at Unocal Station No. 4165, located in Snohomish, Washington. For more detailed discussions of environmental assessment and remediation work completed at the site, please refer to reports and letters previously submitted by RZA AGRA, Inc. (RZA AGRA) to Unocal Corporation. The location of the site is shown on the Vicinity Map, Figure 1.

INTRODUCTION

The station was built in the mid 1950's. The original station configuration included two 6,000 gallon gasoline underground storage tanks (USTs), one 280 gallon used oil tank, and one 550 gallon heating oil tank. The station was remodelled to its most recent configuration in 1968. Between the 1968 remodel and station demolition in March of 1991 USTs in use at the site included two 10,000 gallon gasoline tanks, one 550 gallon used oil tank, and one 550 gallon heating oil tank. A plan of the most recent station configuration including USTs, pump islands, service building, and other major site features is shown on the Pre-Closure Site Plan, Figure 2.

Subsurface exploration conducted at the site has indicated that soils underlying the property generally consist of interbedded well graded sand, silty fine sand, sandy silt, and clayey silt to the full depths explored (approximately 19 to 24 feet). Detailed descriptions of the soil types encountered during advancement of soil borings at the site are included on the attached boring logs. Static groundwater levels measured in site



AGRA
Earth & Environmental Group

monitoring wells have been observed to range from approximately 6.5 to 8.5 feet below ground surface. A summary of groundwater levels measured at the site to date is shown in Table 1. Groundwater flow based on monitoring measurements conducted on 26 May 1994 is toward the southwest. This is in general agreement with previous groundwater level measurements. Groundwater contours and monitoring well locations are shown on Figure 3.

PROJECT HISTORY

The following is a brief history of environmental assessment and remediation conducted at the site to date. Summaries of soil and groundwater testing results are shown in Tables 2 and 3. Monitoring well and soil sampling locations are shown on the Sample Location Plan, Figure 4. It should be noted that sample locations for areas overexcavated subsequent to sample collection have not been included in Figure 4.

Class A Environmental Site Assessment, July 1990

This phase of work included installation of five, 2-inch monitoring wells to depths ranging from approximately 19 to 24 feet. Analytical testing of soil and groundwater samples collected from the explorations indicated petroleum hydrocarbon concentrations in excess of the Model Toxics Control Act (MTCA) Method A cleanup levels in soil at the location of wells MW-2 and MW-5 and in groundwater at the locations of wells MW-1 and MW-4. Additionally, a concentration of 1,1,2,2 tetrachloroethane in excess of the MTCA cleanup level was measured in groundwater from MW-5.

Supplemental Groundwater Sampling Results, August 1990

Laboratory testing was conducted on groundwater samples collected from monitoring wells MW-1 through MW-5. The testing results indicated concentrations of petroleum hydrocarbon constituents in excess of the MTCA cleanup levels in monitoring wells MW-1, MW-2, and MW-4. Additionally, concentrations of perchloroethylene (PCE) and methylene chloride in excess of the MTCA Method A cleanup levels were measured in wells MW-1 and MW-2, respectively.

Underground Storage Tank Removal Summary Report, March 1992

This phase of work involved subsurface environmental assessment and excavation of petroleum hydrocarbon impacted soils during UST removal and station demolition. In addition to the USTs in use during the most recent station configuration, two relic 6,000 gallon gasoline USTs from the previous station configuration were also removed at this time. Approximately 800 cubic yards of petroleum hydrocarbon impacted soil was excavated from the vicinity of the former USTs and stockpiled on site. Monitoring wells MW-4 and MW-



5 were destroyed during UST removal. Analysis of soil samples collected at the site after overexcavation of petroleum impacted soils indicated that concentrations of petroleum constituents remained in excess of the MTCA Method A cleanup level at the bottom, north, and west perimeter of the gasoline, used oil, and heating oil UST field excavation (EX-1); at the north and west sidewalls of the relic UST field excavation (EX-2); at the location of the two service bay hoists; and at the locations of test pits excavated near the southeast and southwest corners of the site (samples S-31, S-101A, and S-101B). Excavation and sampling locations are shown on the Sample Location Plan, Figure 4. It should be noted that sample locations for areas overexcavated subsequent to sample collection have not been included in Figure 4.

Level I Environmental Site Assessment, May 1991

A Level I environmental site assessment conducted on the site indicated that at one time a service station was located on the east side of Avenue D opposite the Unocal site.

Assessment of Soils Surrounding Drywell, April 1992

A drywell located in the northwest portion of the site was demolished in March of 1992. The drywell was approximately four feet in diameter and six feet deep. At the time of demolition, the drywell contained oily, sheen covered water with some oily sludge covering the bottom and sidewalls. Samples collected from the perimeter of the drywell excavation subsequent to demolition indicated that concentrations of petroleum hydrocarbons in the soil exceeded the MTCA Method A cleanup level. Approximately 60 cubic yards of debris and soil from the drywell was hauled to RDC's Seattle transfer station for disposal.

Remediation of Petroleum Impacted Soils/Overexcavation of Drywell Area, October 1992

Approximately 200 cubic yards of clean soil was segregated from the 800 cubic yards of soil stockpiled on the site. The remaining 600 cubic yards of soil was bioremediated on site. Approximately 350 cubic yards of petroleum hydrocarbon impacted soil was excavated from the former drywell area. Analytical testing of soil samples collected from the limits of the drywell excavation (Excavation EX-3 on Figure 4) indicated that petroleum hydrocarbon concentrations were below the MTCA Method A cleanup level in all areas tested. The lower portion of the drywell excavation was backfilled using imported rock. The remainder of the excavation was backfilled with the segregated clean soil and with some of the bioremediated soil. Following completion of this phase of work approximately 350 cubic yards of petroleum hydrocarbon impacted soil and approximately 165 cubic yards of clean soil was stockpiled on site.

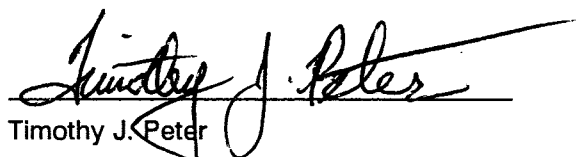


Summary of Recently Completed Work

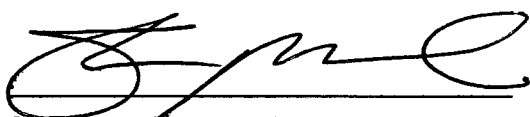
Analytical testing of soil stockpiled on site conducted in October of 1993 indicated that approximately 225 cubic yards of the material still contained concentrations of petroleum hydrocarbons in excess of the MTCA Method A cleanup level. All stockpiled soils, as well as other construction debris remaining on site such as asphalt and visquine, was removed from the site in May of 1994. The stockpiled petroleum hydrocarbon impacted soil was hauled to RDC's Seattle transfer station for disposal. Analytical testing of groundwater samples collected from on-site monitoring wells in May of 1994 indicate that concentrations of petroleum hydrocarbon constituents remain in excess of the MTCA cleanup levels in wells MW-1 and MW-2.

We appreciate this opportunity to be of service to Unocal Corporation. Should you have any questions or comments regarding this letter or other aspects of this project, please do not hesitate to call.

Respectfully submitted,
RZA AGRA, Inc.



Timothy J. Peter
Environmental Geologist



Steven M. Marczewski, P.E.
Associate Environmental Engineer

TJP/SMM/lad

Enclosures: Table 1. Summary of Fluid Level Measurements
 Table 2. Summary of Analytical Data: Soil
 Table 3. Summary of Analytical Data: Groundwater
 Figure 1. Vicinity Map
 Figure 2. Preclosure Site Plan
 Figure 3. Groundwater Surface Elevation Contour Map For 26 May 1994
 Figure 4. Sample Location Plan



**Table 1: Summary of Fluid Level Measurements
Unocal Service Station No. 4165
Snohomish, Washington
RZA AGRA, Inc. Project No. 11-06799-15**

Well Number/ Top of Casing Elevation (ft)	Date Collected	Product Thickness (ft)	Depth to Water (ft)	Groundwater Elevation (ft)
MW-1/ 98.11	20-Jun-90	0	8.11	90.00
	26-May-94	0	8.8	89.3
MW-2/ 99.39	20-Jun-90	0	6.29	93.10
	26-May-94	0	7.0	92.4
MW-3/ 99.87	20-Jun-90	0	6.81	93.06
	26-May-94	0	7.5	92.4
MW-4/ 98.90	20-Jun-90	0	8.21	90.69
	Well destroyed during UST removal in February 1991			
MW-5/ 98.99	20-Jun-90	0	8.11	90.88
	Well destroyed during UST removal in February 1991			

Notes:

Groundwater elevation established relative to an arbitrary datum of 100.00 feet.

Table 2: Summary of Analytical Data: Soil
Unocal Service Station No. 4165
Snohomish, Washington
RZA AGRA, Inc. Project No. 11-06799-15

page (1 of 3)

Sample I.D.	Sample Location	Depth Collected (ft)	Total Petroleum Hydrocarbons			Benzene (ppm)	Toluene (ppm)	Ethyl-benzene (ppm)	Total Xylenes (ppm)	Total Pb EPA 7420 (ppm)	Hal. Vol. Orgs. (ppm)
			418.1 (ppm)	8015 (ppm)	WTPH-G (ppm)						
B1-S2	MW-1	7.5 - 9	39.2	NT	NT	0.22	0.84	0.33	1.09	NT	NT
B2-S2	MW-2	7.5 - 9	525	NT	NT	<0.05	<0.05	<0.05	0.13	NT	NT
B3-S2	MW-3	7.5 - 9	13.8	NT	NT	<0.05	<0.05	<0.05	<0.05	NT	NT
B4-S2	MW-4	7.5 - 9	12.5	NT	NT	<0.05	0.11	0.18	0.28	NT	NT
B5-S2	MW-5	7.5 - 9	291	NT	NT	0.41	0.12	1.21	3.75	NT	NT
S-1	W. Sidewall EX-1	8	NT	113.0 as gas	NT	0.34	1.67	1.41	9.96	NT	NT
S-2	W. Sidewall EX-1	7	NT	57.4 as gas	NT	0.29	1.00	1.26	9.91	<1.3	NT
S-4	E. Sidewall EX-1	4	91.3	NT	NT	NT	NT	NT	NT	NT	NT
S-5	S. Sidewall EX-1	5	NT	<10	NT	0.47	0.46	0.08	0.47	NT	NT
S-6	S. Sidewall EX-1	7	NT	5.1 as gas	NT	<0.05	0.07	<0.05	0.21	<1.3	NT
S-10	Product Line Exc.	2.5	NT	<1	NT	<0.05	<0.05	<0.05	0.1	22.2	NT
S-11	Product Line Exc.	2.5	NT	<1	NT	<0.05	<0.05	<0.05	<0.05	12.1	NT
S-12	E. Sidewall EX-1	7.5	NT	<1	NT	<0.05	<0.05	<0.05	<0.05	5.9	NT
S-13	NE. Sidewall EX-1	4	39	NT	NT	NT	NT	NT	NT	NT	NT

Table 2: Summary of Analytical Data: Soil
Unocal Service Station No. 4165
Snohomish, Washington
RZA AGRA, Inc. Project No. 11-06799-15

page (2 of 3)

Sample I.D.	Sample Location	Depth Collected (ft)	Total Petroleum Hydrocarbons			Benzene (ppm)	Toluene (ppm)	Ethyl-benzene (ppm)	Total Xylenes (ppm)	Total Pb EPA 7420 (ppm)	Hal. Vol. Orgs. (ppm)
			418.1 (ppm)	8015 (ppm)	WTPH-G (ppm)						
S-15	Below S. Hoist	7.5	3,920	NT	NT	NT	NT	NT	NT	NT	NT
S-17	Below Sump	4	8,680	6,515 as gas & hvy. oil	NT	<0.05	0.31	2.79	2.06	NT	ND
S-20	Below Cen. Hoist	8	43.1	NT	NT	NT	NT	NT	NT	NT	NT
S-23	S. Sidewall EX-2	7	NT	<10	NT	<0.05	<0.05	<0.05	0.79	11.1	NT
S-24	W. Sidewall EX-2	7	NT	<10	NT	<0.05	<0.05	<0.05	<0.05	31.2	NT
S-28	Bottom EX-1	11	1,520	807 as gas & hvy. oil	NT	NT	NT	NT	NT	NT	NT
S-29	S. Sidewall EX-2	7	27.5	<10	NT	<0.05	0.25	1.35	3.06	NT	NT
S-31	SE corner of site	3	273	23 as gas	NT	<0.05	0.88	0.56	1.86	NT	NT
S-32	SE corner of site	8	47.4	34 as aged gas	NT	<0.05	3.73	6.01	12.1	NT	NT
S-33	NE. Sidewall EX-2	6	5,850	440 as aged gas	NT	0.85	18.2	12	64.3	NT	NT
S-35	W. Sidewall EX-2	5	4,490	32 as aged gas	NT	<0.05	<0.05	0.34	1.82	NT	NT

Table 2: Summary of Analytical Data: Soil
Unocal Service Station No. 4165
Snohomish, Washington
RZA AGRA, Inc. Project No. 11-06799-15

page (3 of 3)

Sample I.D.	Sample Location	Depth Collected (ft)	Total Petroleum Hydrocarbons			Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Total Xylenes (ppm)	Total Pb EPA 7420 (ppm)	Hal. Vol. Orgs. (ppm)
			418.1 (ppm)	8015 (ppm)	WTPH-G (ppm)						
S-101A	SW corner of site	11	368	NT	NT	NT	NT	NT	NT	NT	NT
S-101B	SW corner of site	11.5	676	602 as gas	NT	0.16	3.70	2.69	4.09	NT	NT
EX-3/B-1	Bottom EX-3	10	<25	NT	<6	<0.032	<0.032	<0.032	<0.032	<6.6	NT
EX-3/B-4	Bottom EX-3	11	<26	NT	<6	<0.032	<0.032	<0.032	<0.032	<6.1	NT
NSW-1	N. Sidewall EX-3	6	<27	NT	<7	<0.033	<0.033	<0.033	<0.033	<6.9	NT
WSW-2	W. Sidewall EX-3	9	<22	NT	<6	<0.028	<0.028	<0.028	<0.028	<5.8	NT
ESW-4	E. Sidewall EX-3	9	<22	NT	<6	<0.028	<0.028	<0.028	<0.028	<5.7	NT
SSW-1	S. Sidewall EX-3	8.5	<21	NT	5.5	<0.027	<0.027	<0.027	<0.027	<5.3	NT
MTCA Method "A" Cleanup Levels			200	100 gas\ 200 other	100	0.5	40	20	20	250	*

Notes:

MTCA = Model Toxics Control Act, Method A cleanup level (WAC 173-340-740).

Shaded values represent analyte concentrations in excess of the MTCA cleanup level.

ppm = Parts per million.

418.1 = Total petroleum hydrocarbons by EPA Method 418.1.

8015 = Total petroleum hydrocarbons by EPA Method 8015 modified.

WTPH-G = Purgeable range total petroleum hydrocarbons by State Method WTPH-G (C7-C12).

Hal. Vol. Orgs. = Halogenated Volatile Organics by EPA Method 8010.

ND = Not detected.

NT = Not tested.

Benzene, Toluene, Ethylbenzene and Total Xylenes analyses conducted by EPA Method 8020.

Values preceded by "<" represent analyte concentration below the method detection limit indicated.

* = MTCA cleanup level varies with analyte. All analytes non-detectable for testing performed.

Table 3: Summary of Analytical Data: Groundwater
Unocal Service Station No. 4165
Snohomish, Washington
RZA AGRA, Inc. Project No. 11-06799-15

Well Number	Date Collected	Total Petroleum Hydrocarbons			Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Total Xylenes (ppb)	Dissolved Pb EPA 7421 (ppb)	Hal. Vol. Orgs. (ppb)
		8015 (ppb)	WTPH-D (ppb)	WTPH-G (ppb)						
MW-1	14-Jun-90	26,000 as gasoline	NT	NT	345	179	266	2,260	NT	NT
	13-Aug-90	<10,000	NT	NT	630	180	120	1,390	NT	12 ppb PCE 7 ppb 1,2 Dichlorobenzene
	26-May-94	NT	1,600*	23,000	<2.5	35	410	3,700	3.3	1.2 ppb 1,2 Dichlorobenzene
MW-2	14-Jun-90	<10,000	NT	NT	<1	<1	<2	5	NT	NT
	13-Aug-90	<10,000	NT	NT	3	3	21	241	NT	106 ppb Methylene Chloride
	26-May-94	NT	580	4,500	<2.5	<2.5	4.5	10	4.7	NA
MW-3	14-Jun-90	<10,000	NT	NT	<1	<1	<1	<1	NT	ND
	13-Aug-90	<10,000	NT	NT	<1	<1	<1	<1	NT	ND
	26-May-94	NT	<250	<100	<0.5	<0.5	<0.5	2.9	3.0	NT
MW-4	14-Jun-90	<10,000	NT	NT	144	279	187	422	NT	ND
	13-Aug-90	<10,000	NT	NT	545	382	636	3,540	NT	ND
Well destroyed during UST removal in February 1991.										
MW-5	14-Jun-90	<10,000	NT	NT	<1	<1	<1	<1	NT	5 ppb 1,1,2,2 Tetra-chloroethane
	13-Aug-90	<10,000	NT	NT	10	<1	3	11	NT	ND
Well destroyed during UST removal in February 1991.										
MTCA Method "A" Cleanup Levels		1,000	1,000	1,000	5	40	30	20	5	**

Notes:

MTCA = Model Toxics Control Act, Method A cleanup level (WAC 173-340-720).

Shaded values represent analyte concentrations in excess of the MTCA cleanup level.

ppb = Parts per billion.

8015 = Total petroleum hydrocarbons by EPA Method 8015 modified.

WTPH-D = Extractable range total petroleum hydrocarbons by State Method WTPH-D (C12-C24).

WTPH-G = Purgeable range total petroleum hydrocarbons by State Method WTPH-G (C7-C12).

Benzene, Toluene, Ethylbenzene and Total Xylenes analyses conducted by EPA Method 602.

Hal. Vol. Orgs. = Halogenated Volatile Organics by EPA Method 601.

NT = Not tested.

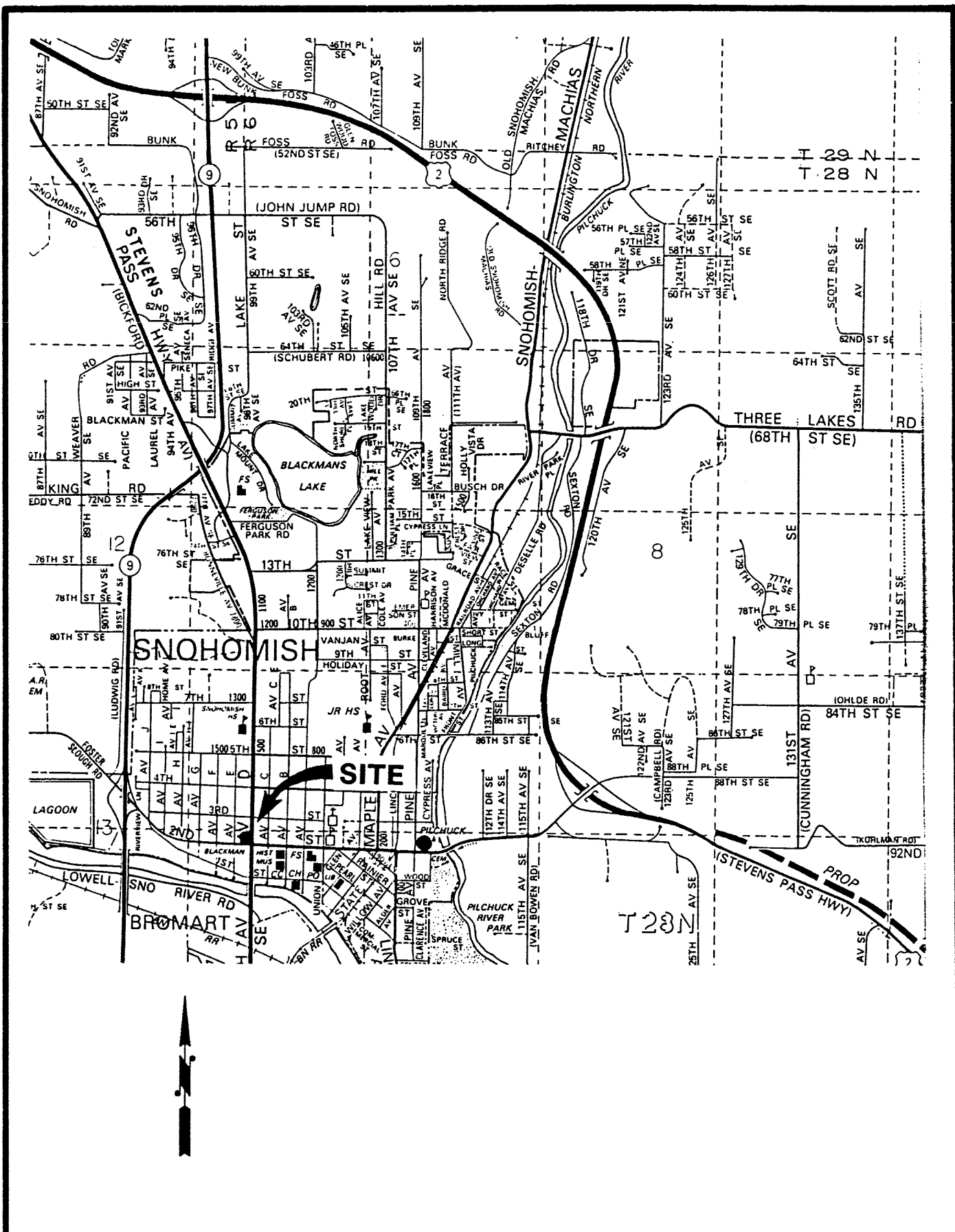
ND = Not detectable.

NA = Not available; analysis pending at the time of report preparation

* = Analysis extended to include both diesel (C12-C24) and motor oil (C24-C34) range hydrocarbons. Hydrocarbons detected in sample were all within the diesel range.

** = MTCA cleanup level varies with analyte: PCE=5 ppb, 1,2 Dichlorobenzene=60 ppb, Methylene Chloride=5 ppb; no MTCA Method A cleanup level has been established for 1,1,2,2 Tetrachloroethane, however the MTCA Method B cleanup level for 1,1,2,2 Tetrachloroethane=0.219 ppb.

Values preceded by "<" represent analyte concentrations below the method detection limit indicated.



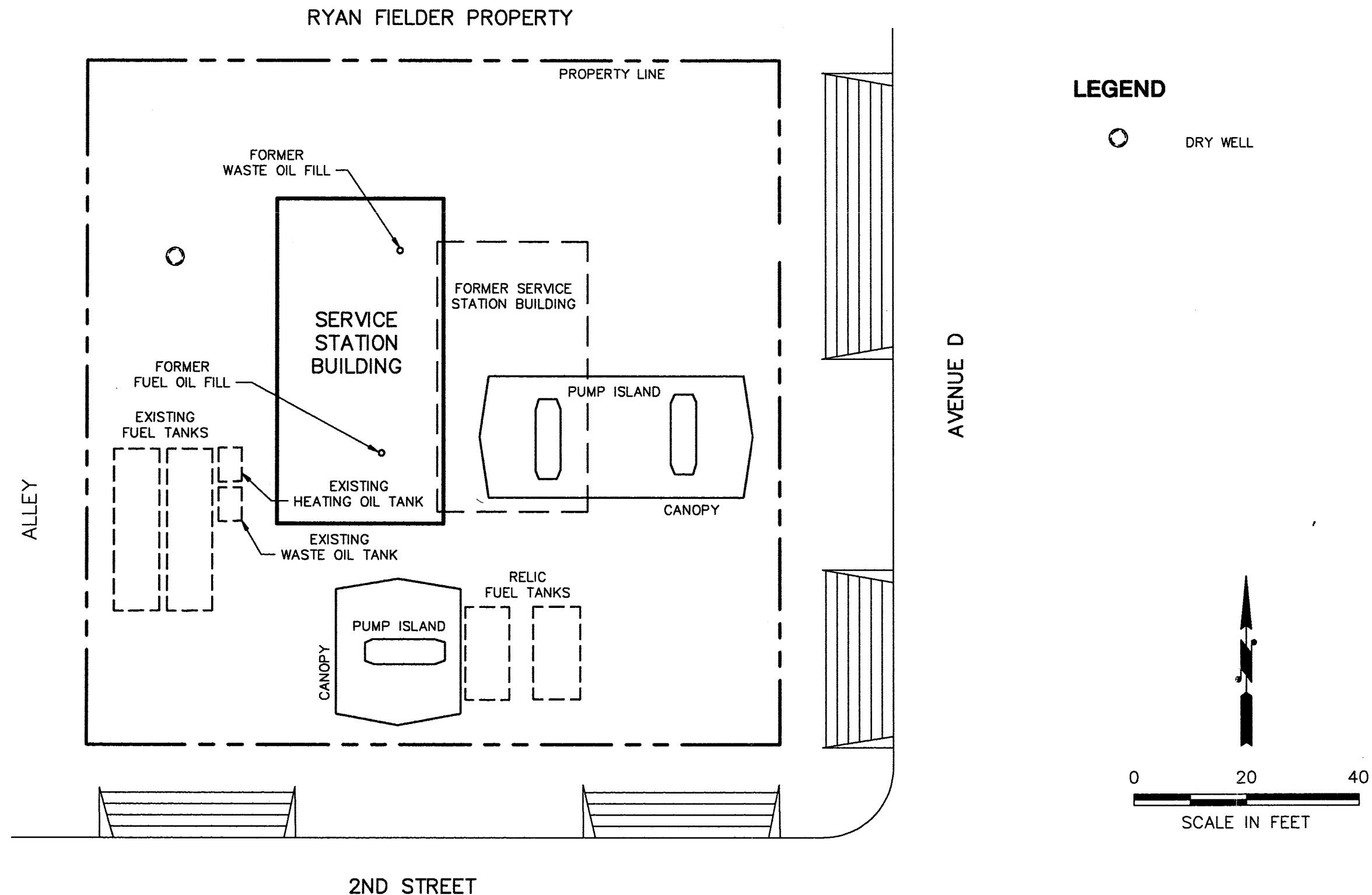
RZA-AGRA
ENGINEERING & ENVIRONMENTAL SERVICES

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Suite 100
Kirkland, Washington
98034-6918

W.O. 11-06799-15
DESIGN TJP
DRAWN MJF
DATE JUN 1994
SCALE N.T.S.

**UNOCAL SERVICE STATION No. 4165
SNOHOMISH, WASHINGTON**

**VICINITY MAP
FIGURE 1**



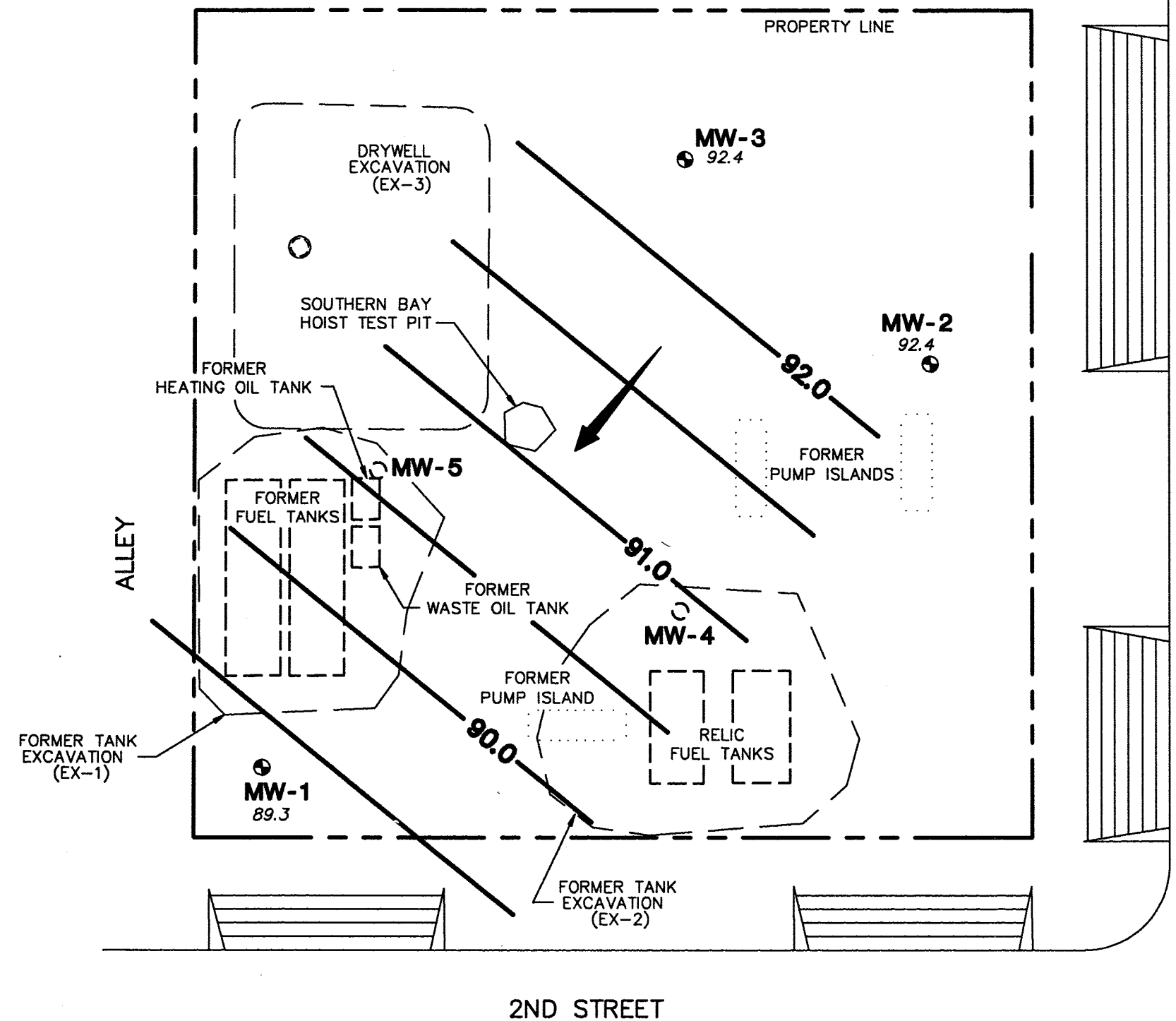
RZA AGRA, INC.
 Engineering & Environmental Services
 11335 N.E. 122nd Way
 Suite 100
 Kirkland, Washington 98034-6918

W.O. 11-06799-15
 DESIGN TJP
 DRAWN MJF
 DATE JUN 1994
 SCALE 1"=20'

UNOCAL SERVICE STATION No. 4165
 SNOHOMISH, WASHINGTON
 PRE CLOSURE SITE PLAN

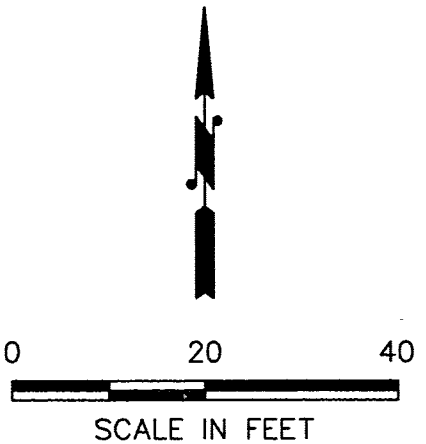
FIGURE 2

RYAN FIELDER PROPERTY



LEGEND

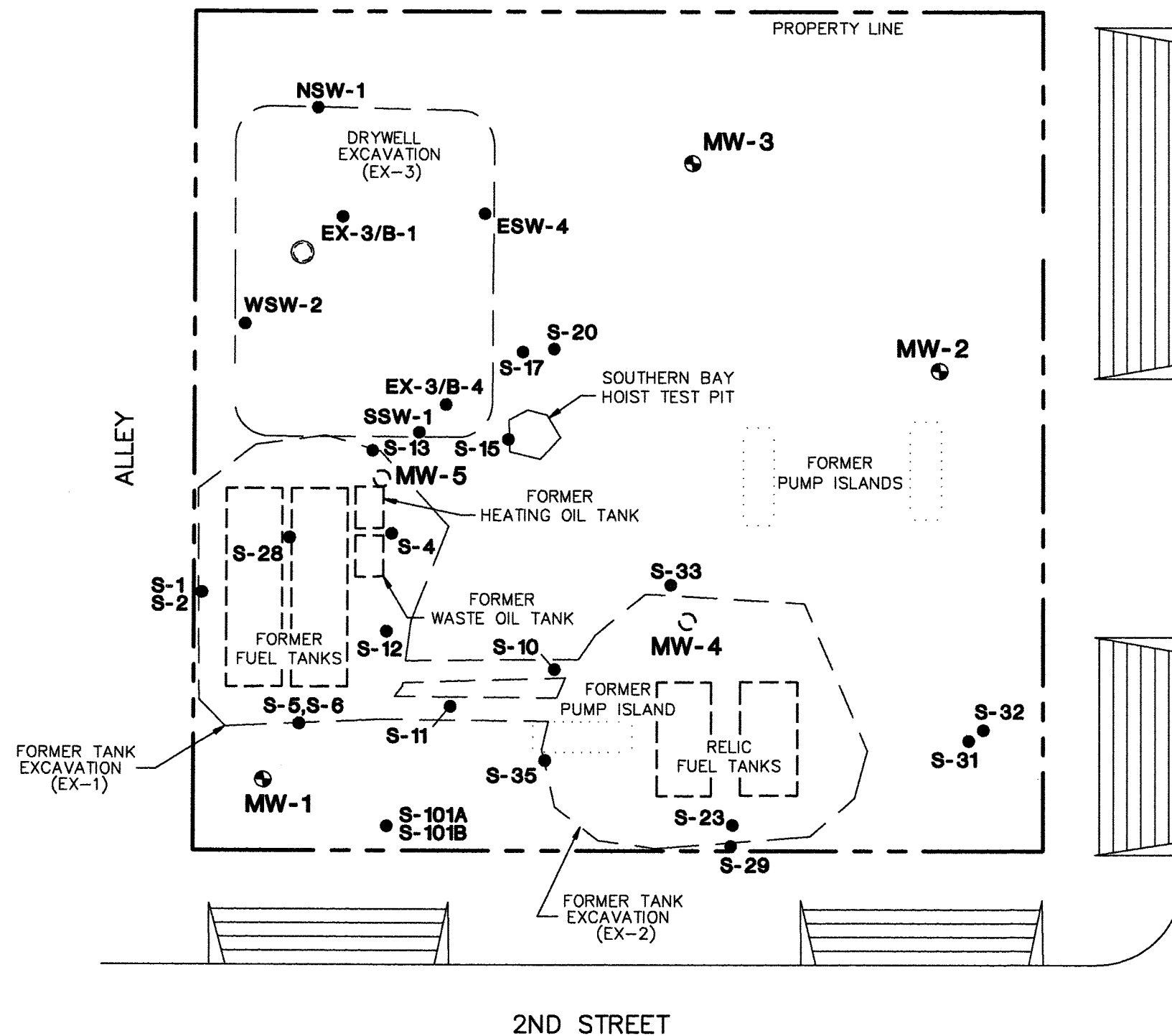
- DRY WELL
- MW-3 MONITORING WELL NUMBER AND LOCATION
- MW-5 MONITORING WELL DESTROYED DURING PREVIOUS EXCAVATION WORK
- LIMITS OF FORMER EXCAVATIONS
- 92.0- INFERRED GROUNDWATER SURFACE ELEVATION CONTOUR IN FEET
- 92.4 SPOT GROUNDWATER SURFACE ELEVATION IN FEET
- INFERRED DIRECTION OF GROUNDWATER MIGRATION



NOTE: ELEVATIONS ARE RELATIVE AND BASED UPON AN ARBITRARY DATUM OF 100.00 FEET.

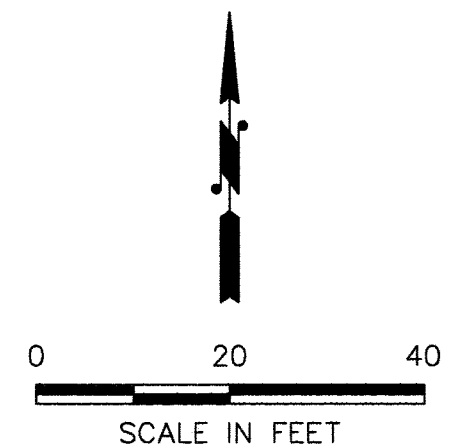
RZA AGRA, INC. <i>Engineering & Environmental Services</i> 11335 N.E. 122nd Way Suite 100 Kirkland, Washington 98034-6918	W.O.	11-06799-15	UNOCAL SERVICE STATION No. 4165 SNOHOMISH, WASHINGTON GROUNDWATER SURFACE ELEVATION CONTOUR MAP FOR 26 MAY 1994 FIGURE 3
	DESIGN	TJP	
	DRAWN	MJF	
	DATE	JUN 1994	
	SCALE	1"=20'	

RYAN FIELDER PROPERTY



LEGEND

- DRY WELL
- MW-3 MONITORING WELL NUMBER AND LOCATION
- MW-5 MONITORING WELL DESTROYED DURING PREVIOUS EXCAVATION WORK
- NSW-1 STOCKPILE SOIL SAMPLE NUMBER AND LOCATION (SAMPLE LOCATIONS PRINTED IN RED INDICATE MEASURED CONCENTRATIONS OF PETROLEUM CONSTITUENTS EXCEED MTCA METHOD A CLEANUP LEVEL)
- LIMITS OF FORMER EXCAVATIONS



NOTE: ELEVATIONS ARE RELATIVE AND BASED UPON AN ARBITRARY DATUM OF 100.00 FEET.

RZA AGRA, INC.
 Engineering & Environmental Services
 11335 N.E. 122nd Way
 Suite 100
 Kirkland, Washington 98034-6918

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 DESIGN TJP
 DRAWN MJF
 DATE JUN 1994
 SCALE 1"=20'

UNOCAL SERVICE STATION No. 4165
 SNOHOMISH, WASHINGTON
 SAMPLE LOCATION PLAN

FIGURE 4

Independent Action Report Update

Site Name: UNOCAL #4165

Inc. #: 1995

Date of Report: 8/9/94,
9/30/94

County: *Sanh*

Date Report Rec'd: 9/28/94,
10/19/94

Reviewed by: Wally Moon

Comments: (please include: free prod., tank info., media,
contaminant migration, GW conc. trends, PCS treated/fate?)

GW monitoring. Downgradient well adjacent of
property line cont. with 8 ppm TPH. Site not
characterized. PCE detected in past events.