NORTH CREEK ANALYTICAL

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street		
11335 NE 122nd Way, #100	Sample Matrix:	Method Blank		
Kirkland, WA 98034	Analysis Method:	EPA 8020	Analyzed:	Aug 15, 1995
Attention: Bruce Williams	First Sample #:	BLK081595	Reported:	Aug 17, 1995

BTEX DISTINCTION

Sample Number	Sample Description	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
BLK081595	Method Blank	N.D.	N.D.	N.D.	N.D.	98
Reporting Limits:		**0.050**	**0.050**	**0.050**	**0.10**	

4-Bromofluorobenzene surrogate recovery control limits are 34 - 166 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

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Shannon Stowell
Project Manager

508227.AGR <7>

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AGRA Earth & Environmental 11335 NE 122nd Way, #100 Kirkland, WA 98034 Attention: Bruce Williams	Client Project ID: 1029 Market Street Sample Matrix: Soil Analysis Method: EPA 8020 Units: mg/kg (ppm) QC Sample #: B508231-01	Analyst: B. Christlieb F. Shino Analyzed: Aug 15, 1995 Reported: Aug 17, 1995

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Result:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.52	0.52	0.52	1.56
Spike Result:	0.38	0.37	0.38	1.16
Spike % Recovery:	73%	71%	73%	74%
Spike Dup. Result:	0.38	0.37	0.38	1.16
Spike Duplicate % Recovery:	73%	71%	73%	74%
Upper Control Limit %:	111	118	120	128
Lower Control Limit %:	59	55	61	55
Relative % Difference:	0.0%	0.0%	0.0%	0.0%
Maximum RPD:	17	16	17	17

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Shannon Stowell
Project Manager

% Recovery: $\frac{\text{Spike Result - Sample Result}}{\text{Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Spike Result - Spike Dup. Result}}{\text{(Spike Result + Spike Dup. Result) / 2}} \times 100$

508227.AGR <8>

AGRA
Earth & Environmental
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

CHAIN OF CUSTODY

PROJECT: 1029 Market Street
PROJECT No.: 12-1232-01
CLIENT: AEE
PHONE No.: (509) 482-0104
PROJECT MANAGER: Bruce Williams
PHONE No.: (509) 482-0104
SAMPLER'S NAME (please print): Jeffrey Kasper
PHONE No.: (206) 820-4669
SAMPLER'S SIGNATURE: [signature]

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP			
1. UST4K-BTSA-11	8/10/95		Soil	Chilled	1	8oz			X													8508227		-01
2. UST4K-BTW-11	8/10/95								X															-02
3. UST4K-SSWA-9	8/11/95								X															-03
4. UST4K-SSWB-9	8/11/95								X															-04
5. UST4K-WSWA-9	8/11/95								X															-05
6. UST4K-WSWB-8	8/11/95								X															-06
7. UST4K-NSWA-9	8/11/95								X															-07
8. UST4K-NSWB-9	8/11/95								X															-08
9. UST4K-ESWA-8	8/11/95								X															-09
10. UST4K-BTE-11	8/11/95				1				X															-10

SAMPLE RECEIPT	LABORATORY North Creek Analytical	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	Hold all samples for further analyses. samples containing the highest TPH-G/BTEX will be analyzed for WTPH-D and Total lead. We will inform you which samples upon receipt of WTPH-G/BTEX results
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
CONDITION OF SEALS	DOT DESIGNATION	☑ 1 WEEK	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. [signature] (Jeffrey Kasper) AEE	1:15 pm	8/11/95	1. Jeff Cathcart	8/11/95	1:15
2.			2.		
3.			3.		

PAGE 1 OF 1

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled:	Aug 11, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Relogged:	Aug 22, 1995
Kirkland, WA 98034	Analysis Method:	WTPH-D	Extracted:	Aug 28, 1995
Attention: Bruce Williams	First Sample #:	B508227-06	Analyzed:	Aug 29, 1995
			Reported:	Sep 1, 1995

TOTAL PETROLEUM HYDROCARBONS-DIESEL RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)	Surrogate Recovery %
B508227-06	UST4K-WSWB-8	13	65
BLK082895	Method Blank	N.D.	74

Reporting Limit:	10

2-Fluorobiphenyl surrogate recovery control limits are 50 - 150 %.
Extractable Total Petroleum Hydrocarbons are quantitated as Diesel Range Organics (C12 - C24).
Analytes reported as N.D. were not detected above the stated Reporting Limit. The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

508227.AGR <9>

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AGRA Earth & Environmental	Client Project ID: 1029 Market Street	Analyst: T. Fitzgibbon
11335 NE 122nd Way, #100	Sample Matrix: Soil	
Kirkland, WA 98034	Analysis Method: WTPH-D	Extracted: Aug 28, 1995
Attention: Bruce Williams	Units: mg/kg (ppm)	Analyzed: Aug 29, 1995
		Reported: Sep 1, 1995

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

	Diesel
Spike Conc. Added:	68
Spike Result:	50
% Recovery:	74
Upper Control Limit %:	125
Lower Control Limit %:	72

PRECISION ASSESSMENT
Sample Duplicate

	Diesel Range Hydrocarbons
Sample Number:	B508470-01
Original Result:	N.D.
Duplicate Result:	N.D.
Relative % Difference:	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Reporting Limit.
Maximum RPD:	42

NORTH CREEK ANALYTICAL Inc

Lauria Dutton

Shannon Stowell
Project Manager

% Recovery: $\frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

508227.AGR <10>

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled:	Aug 11, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Relogged:	Aug 22, 1995
Kirkland, WA 98034	Analysis Method:	EPA 7420	Digested:	Aug 25, 1995
Attention: Bruce Williams	First Sample #:	B508227-06	Analyzed:	Aug 28, 1995
			Reported:	Aug 29, 1995

METALS ANALYSIS FOR: TOTAL LEAD

Sample Number	Sample Description	Reporting Limit mg/kg (ppm)	Sample Result mg/kg (ppm)
B508227-06	UST4K-WSWB-8	10	12
BLK082595	Method Blank	10	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

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Shannon Stowell
Project Manager

508227.AGR <11>

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AGRA Earth & Environmental 11335 NE 122nd Way, #100 Kirkland, WA 98034 Attention: Bruce Williams	Client Project ID: 1029 Market Street Sample Matrix : Soil Units: mg/kg (ppm)	Analyst: K. Gendron S. Davis Digested: Aug 25, 1995 Reported: Aug 29, 1995

METALS QUALITY CONTROL DATA REPORT

ANALYTE	Lead

EPA Method: 7420
Date Analyzed: Aug 28, 1995

ACCURACY ASSESSMENT

LCS Spike Conc. Added:	50
LCS Spike Result:	52
LCS Spike % Recovery:	104
Upper Control Limit:	130
Lower Control Limit:	70
Matrix Spike Sample #:	B508487-01
Matrix Spike % Recovery:	91

PRECISION ASSESSMENT

Sample #:	B508487-01
Original:	11
Duplicate:	N.D.
Relative % Difference:	RPD values are not reported at sample concentration levels <10 X the Reporting Limit.

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Shannon Stowell
Project Manager

Lab Control Sample % Recovery: $\frac{\text{Conc. of L.C.S.}}{\text{L.C.S. Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

508227.AGR <12>

AGRA
Earth & Environmental
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-5918
Tel (206) 820-4669 Fax (206) 821-3914

CHAIN OF CUSTODY

PROJECT: 1029 Market Street
PROJECT No.: 12-1232-01
CLIENT: AEE
PHONE No.: (509) 582-0404
PROJECT MANAGER: Bruce Williams
PHONE No.: (509) 482-0404
SAMPLER'S NAME (please print): Jeff Kasper
PHONE No.: (206) 820-4669
SAMPLER'S SIGNATURE:

ANALYSIS REQUESTED (circle, check box or write on filled-in method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 HALOGEN	TPH by EPA 418.1	GC/MS EPA 624 / 8240 or EPA 8260 Volatiles	GC/MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	LEAD EPA 6010 EPA 7421 Total / Dissolved	TOTAL METALS	TCLP
* 1. DST4K-WSB-8	8/11/95		Soil		1	8oz					X							X		
2. (LAB ID = B508227-06)																				
3.																				
4.																				
5.																				
6.																				
7.																				
8.																				
9.																				
10.																				

Relog 5 day TAT from 8/22 as per @

SAMPLE RECEIPT
TOTAL # CONTAINERS:
CONDITION OF CONTAINERS:
CONDITION OF SEALS:

LABORATORY: North Creek Analytical
SHIPPING I.D. / AIRBILL #:
COURIER:
BOT DESIGNATION:

TURNAROUND TIME:
- ☐ 48 OUR
- ☐ 24 HOUR
- ☐ 48 HOUR
- ☐ 2 WEEK (standard)
- ☐ OTHER

SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS:
Supplemental Analyses requested by Jeff Kasper on 22 August 1995 via Phone

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. (Jeff Kasper)	8/22/95	10:10 Am	1. LAURA DUTTON	8/22/95	10:10 Am
2.			2.		
3.			3.		

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AGRA Earth & Environmental	Project Name:	1029 Market Street	
11335 NE 122nd Way, #100	Client Project :	#12-1232-01	
Kirkland, WA 98034			Received: Jul 21, 1995
Attention: Bruce Williams	NCA Project #:	B507366	Reported: Jul 24, 1995

PROJECT SUMMARY PAGE

Laboratory Sample Number	Sample Description	Sample Matrix	Date Sampled
B507366-01	PKX-SWSW-4	Soil	7/21/95
B507366-02	PKX-NWSW-5	Soil	7/21/95
B507366-03	PKX-SSW-6	Soil	7/21/95
B507366-04	PKX-ESW-8	Soil	7/21/95

The results in this report apply to the samples analyzed in accordance with the chain of custody document.
This analytical report must be reproduced in its entirety.

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Shannon Stowell
Project Manager

507366.AGR <1>

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	
11335 NE 122nd Way, #100	Sample Matrix:	Soil	
Kirkland, WA 98034			Received: Jul 21, 1995
Attention: Bruce Williams	First Sample #:	B507366-01	Reported: Jul 24, 1995

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
B507366-01	PKX-SWSW-4	90	10
B507366-02	PKX-NWSW-5	88	12
B507366-03	PKX-SSW-6	87	13
B507366-04	PKX-ESW-8	86	14

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

507366.AGR <2>

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9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled:	Jul 21, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Received:	Jul 21, 1995
Kirkland, WA 98034	Analysis Method:	WTPH-G	Analyzed:	Jul 21, 1995
Attention: Bruce Williams	First Sample #:	B507366-01	Reported:	Jul 24, 1995

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)	Surrogate Recovery %
B507366-01	PKX-SWSW-4	610	S-2
B507366-02	PKX-NWSW-5	720	S-2
B507366-03	PKX-SSW-6	1,300	S-2
B507366-04	PKX-ESW-8	470	S-2
BLK072195	Method Blank	N.D.	102

Reporting Limits	**1.0**

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %.
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane).
Analytes reported as N.D. were not detected above the stated Reporting Limit. The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

Please Note:
S-2 = The Surrogate Recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.

507366.AGR <3>

NORTH CREEK ANALYTICAL

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AGRA Earth & Environmental	Client Project ID: 1029 Market Street	Analyst: B. Christlieb
11335 NE 122nd Way, #100	Sample Matrix: Soil	F. Shino
Kirkland, WA 98034	Analysis Method: WTPH-G	
Attention: Bruce Williams	Units: mg/kg (ppm)	Analyzed: Jul 21, 1995
		Reported: Jul 24, 1995

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Gasoline	
Spike Conc. Added:	5.0
Spike Result:	3.2
% Recovery:	64
Upper Control Limit %:	115
Lower Control Limit %:	33

PRECISION ASSESSMENT
Sample Duplicate

Gasoline Range Hydrocarbons	
Sample Number:	B507305-12
Original Result:	8.7
Duplicate Result:	12
Relative % Difference:	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Detection Limit.
Maximum RPD:	67

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

% Recovery: $\frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

507366.AGR <4>

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled:	Jul 21, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Received:	Jul 21, 1995
Kirkland, WA 98034	Analysis Method:	EPA 8020	Analyzed:	Jul 21, 1995
Attention: Bruce Williams	First Sample #:	B507366-01	Reported:	Jul 24, 1995

BTEX DISTINCTION

Sample Number	Sample Description	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
B507366-01	PKX-SWSW-4	N.D. (R.L. = 0.080)	N.D. (R.L. = 0.080)	1.5	2.2	133
B507366-02	PKX-NWSW-5	0.34	N.D. (R.L. = 0.080)	3.0	4.8	123
B507366-03	PKX-SSW-6	0.73	N.D. (R.L. = 0.20)	4.6	6.0	150
B507366-04	PKX-ESW-8	0.42	0.94	2.1	3.4	110
BLK072195	Method Blank	N.D.	N.D.	N.D.	N.D.	79
Reporting Limits:		**0.050**	**0.050**	**0.050**	**0.10**	

4-Bromofluorobenzene surrogate recovery control limits are 34 - 166 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

Please Note:
S-2 = The Surrogate Recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.

507366.AGR <5>

NORTH CREEK ANALYTICAL

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AGRA Earth & Environmental 11335 NE 122nd Way, #100 Kirkland, WA 98034 Attention: Bruce Williams	Client Project ID: 1029 Market Street Sample Matrix: Soil Analysis Method: EPA 8020 Units: mg/kg (ppm) QC Sample #: B507305-10	Analyst: B. Christlieb F. Shino Analyzed: Jul 21, 1995 Reported: Jul 24, 1995

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Result:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	0.55	0.55	0.55	1.65
Spike Result:	0.42	0.46	0.43	1.43
Spike % Recovery:	76%	84%	78%	87%
Spike Dup. Result:	0.45	0.50	0.48	1.59
Spike Duplicate % Recovery:	82%	91%	87%	96%
Upper Control Limit %:	111	118	120	128
Lower Control Limit %:	59	55	61	55
Relative % Difference:	6.9%	8.7%	11%	11%
Maximum RPD:	17	16	17	17

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

% Recovery: $\frac{\text{Spike Result - Sample Result}}{\text{Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Spike Result - Spike Dup. Result}}{\text{(Spike Result + Spike Dup. Result) / 2}} \times 100$

507366.AGR <6>

AGRA
Earth & Environmental
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

CHAIN OF CUSTODY

PROJECT: 7029 Market Street	PROJECT No.: 12-1232-01
CLIENT: AEF	PHONE No.: (509) 482-0104
PROJECT MANAGER: Bruce Williams	PHONE No.: (509) 482-0104
SAMPLER'S NAME (please print): Jeff Kaspar	PHONE No.: (206) 820-4669
SAMPLER'S SIGNATURE:	

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP				
1. PKX-SWSW-4	7/21/95	11:00 Am	S	Chilled	1	80z			X													BS07366-			01
2. PKX-NWSW-5	7/21/95	↓	S	↓	1	80z			X																02
3. PKX-SSW-6	7/21/95	↓	S	↓	1	80z			X																03
4. PKX-ESW-8	7/21/95	11:15 Am	S	↓	1	80z			X																04
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

SAMPLE RECEIPT	LABORATORY: North Creek Analytical	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	
CONDITION OF CONTAINERS	CARRIER	☑ 24 HOUR BY 7/24/95 Am	
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. (Jeff Kaspar) AEF	7/21/95	12:30	1. Jeff Cannine / NCA	7/21/95	1230
2.			2.		
3.			3.		

PAGE 1 OF 1

AGRA Earth & Environmental, Inc. (7/94)

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	
11335 NE 122nd Way, #100	Sample Matrix:	Soil	
Kirkland, WA 98034			Received: Aug 18, 1995
Attention: Bruce Williams	First Sample #:	B508353-01	Reported: Aug 25, 1995

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
B508353-01	PKX-SSW-8W	87	13
B508353-02	PKX-WSW-7S	87	13
B508353-03	PKX-SSW-8E	88	12
B508353-04	PKX-ESW-9.5S	90	10
B508353-05	PKX-BTSE-10	90	10
B508353-06	PKX-NWS-8W	84	16
B508353-07	PKX-BTNW-10	84	16
B508353-08	PKX-BTNE-10	81	19
B508353-09	PKX-NSW-7E	86	14
B508353-10	PKX-ESW-8C	86	14
B508353-11	PKX-NSW-7WCR	87	13

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

508353.AGR <3>

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	
11335 NE 122nd Way, #100	Sample Matrix:	Soil	
Kirkland, WA 98034			Received: Aug 18, 1995
Attention: Bruce Williams	First Sample #:	B508353-12	Reported: Aug 25, 1995

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
B508353-12	PKX-WSW-8C	87	13
B508353-13	PKX-WSW-7N	86	14

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Shannon Stowell
Project Manager

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled: Aug 17, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Received: Aug 18, 1995
Kirkland, WA 98034	Analysis Method:	WTPH-G	Analyzed: Aug 22-24, 1995
Attention: Bruce Williams	First Sample #:	B508353-01	Reported: Aug 25, 1995

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)	Surrogate Recovery %
B508353-01	PKX-SSW-8W 8/16/95	370	S-2
B508353-02	PKX-WSW-7S 8/16/95	560	S-2
B508353-03	PKX-SSW-8E 8/16/95	2.1	87
B508353-04	PKX-ESW-9.5S 8/16/95	1.2	108
B508353-05	PKX-BTSE-10 8/16/95	2.4	109
B508353-06	PKX-NWS-8W	1.7	104
B508353-07	PKX-BTNW-10	2.4	105
B508353-08	PKX-BTNE-10	N.D.	108
B508353-09	PKX-NSW-7E	350	S-2
B508353-10	PKX-ESW-8C	N.D.	104
Reporting Limits		1.0	

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %.
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane).
Analytes reported as N.D. were not detected above the stated Reporting Limit. The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Please Note:
S-2 = The Surrogate Recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.

Shannon Stowell
Project Manager

508353.AGR <5>

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled: Aug 18, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Received: Aug 18, 1995
Kirkland, WA 98034	Analysis Method:	WTPH-G	Analyzed: Aug 23-24, 1995
Attention: Bruce Williams	First Sample #:	B508353-11	Reported: Aug 25, 1995

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)	Surrogate Recovery %
B508353-11	PKX-NSW-7WCR 8/17/95	410	S-2
B508353-12	PKX-WSW-8C	130	S-2
B508353-13	PKX-WSW-7N	520	S-2
BLK082395	Method Blank	N.D.	121

Reporting Limits	**1.0**

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %.
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane).
Analytes reported as N.D. were not detected above the stated Reporting Limit. The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Tawna Dutton

Shannon Stowell
Project Manager

Please Note:
S-2 = The Surrogate Recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.

508353.AGR <6>

NORTH CREEK ANALYTICAL

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled: Aug 17, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Received: Aug 18, 1995
Kirkland, WA 98034	Analysis Method:	EPA 8020	Analyzed: Aug 23-24, 1995
Attention: Bruce Williams	First Sample #:	B508353-01	Reported: Aug 25, 1995

BTEX DISTINCTION

Sample Number	Sample Description	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
B508353-01	PKX-SSW-8W 8/16/95	N.D (R.L. = 0.20)	0.58	1.0	N.D.	121
B508353-02	PKX-WSW-7S 8/16/95	0.67	0.98	1.4	1.3	122
B508353-03	PKX-SSW-8E 8/16/95	N.D.	N.D.	N.D.	N.D.	97
B508353-04	PKX-ESW-9.5S 8/16/95	N.D.	N.D.	N.D.	N.D.	104
B508353-05	PKX-BTSE-10 8/16/95	0.066	N.D.	N.D.	N.D.	110
B508353-06	PKX-NWS-8W	N.D.	N.D.	N.D.	N.D.	106
B508353-07	PKX-BTNW-10	N.D.	N.D.	N.D.	N.D.	99
B508353-08	PKX-BTNE-10	N.D.	N.D.	N.D.	N.D.	106
B508353-09	PKX-NSW-7E	N.D.	0.15	0.49	N.D.	129
B508353-10	PKX-ESW-8C	N.D.	N.D.	N.D.	N.D.	101
Reporting Limits:		**0.050**	**0.050**	**0.050**	**0.10**	

4-Bromofluorobenzene surrogate recovery control limits are 34 - 166 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Shannon Stowell
Project Manager

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled: Aug 18, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Received: Aug 18, 1995
Kirkland, WA 98034	Analysis Method:	EPA 8020	Analyzed: Aug 22-24, 1995
Attention: Bruce Williams	First Sample #:	B508353-11	Reported: Aug 25, 1995

BTEX DISTINCTION

Sample Number	Sample Description	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
B508353-11	PKX-NSW-7WCR 8/17/95	N.D. (R.L. = 0.20)	0.27	0.91	2.2	129
B508353-12	PKX-WSW-8C	0.059	0.17	0.31	0.50	110
B508353-13	PKX-WSW-7N	0.14	0.45	1.6	2.2	138
BLK082295	Method Blank	N.D.	N.D.	N.D.	N.D.	116
Reporting Limits:		**0.050**	**0.050**	**0.050**	**0.10**	

4-Bromofluorobenzene surrogate recovery control limits are 34 - 166 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

508353.AGR <9>

AGRA
Earth & Environmental
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

01235

CHAIN OF CUSTODY

PROJECT: 029 Market Street — PROJECT No.: 12-1232-01
CLIENT: AEE — PHONE No.: (509) 482-0104
PROJECT MANAGER: Bruce Williams — PHONE No.: (509) 482-0104
SAMPLER'S NAME (please print): Jeffrey Laspar — PHONE No.: (206) 820-4669
SAMPLER'S SIGNATURE: [signature]

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602/8020	WTPH-G	BTEX/WTPH-G	WTPH-HCID	WTPH-D/WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC/MS EPA 624/8240 or EPA 8260 Volatiles	GC/MS EPA 625/8270 Semi-volatiles	VOCs EPA 601/8010 or EPA 602/8020	PCBs EPA 608/8080	LEAD EPA 6010/EPA 7421 Total/Dissolved	TOTAL METALS	TCLP			
1. PKX-SSW-8W	8/16/95		Soil	Chill 4°C	1	80z			X												B5208353-01			
2. PKX-WSW-7S	8/16/95								X															02
3. PKX-SSW-8E	8/16/95								X															03
4. PKX-ESW-9SS	8/16/95								X															04
5. PKX-BTSE-10	8/16/95								X															05
6. PKX-NSW-8W	8/17/95								X															06
7. PKX-BTNW-10	8/17/95								X															07
8. PKX-BTNE-10	8/17/95								X															08
9. PKX-NSW-7E	8/17/95								X															09
10. PKX-ESW-8C	8/17/95		Soil		1	80z			X															10

SAMPLE RECEIPT	LABORATORY: North Creek Analytical	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	* Hold For Analysis (Additional). Highest WTPH-G/BTEX samples will be analyzed by WTPH-D and Total Lead. Will call to add these upon receipt of initial WTPH-G/BTEX results.
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
CONDITION OF SEALS	DOT DESIGNATION	☑ 1 WEEK	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Jeffrey Laspar (Jeff Laspar) AEE	8/18/95	1255	1. [signature] / NCA	8/18	1255
2.			2.		
3.			3.		

PAGE 1 OF 2

AGRA Earth & Environmental, Inc. (7/94)

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01236

CHAIN OF CUSTODY

PROJECT: 1029 Market Street
PROJECT No.: 12-1232-01
CLIENT: AEE
PHONE No.: (509) 482-0104
PROJECT MANAGER: Bruce Williams
PHONE No.: (509) 482-0104
SAMPLER'S NAME (please print): Jeffrey Kasper
PHONE No.: (206) 820-4669
SAMPLER'S SIGNATURE: [signature]

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP			
1. PKX-NSW-7WCR	8/17/95		Soil	Ice/4°C	1	4oz			X											B508358-11				
2. PKX-WSW-8C	8/18/95		↓		1	8oz			X															12
3. PKX-WSW-7N	8/18/95		Soil	↓	1	4oz			X															13
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								

SAMPLE RECEIPT	LABORATORY: North Creek Analytical	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	* See Page 1
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
CONDITION OF SEALS	DOT DESIGNATION	☑ 1 WEEK	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. [signature] (Jeff Kasper) AEE	8/18/95	1455	1. [signature] NCA	8/18	1955
2.			2.		
3.			3.		

PAGE 2 OF 2

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled:	Aug 16, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Relogged:	Aug 29, 1995
Kirkland, WA 98034	Analysis Method:	WTPH-D	Extracted:	Aug 29, 1995
Attention: Bruce Williams	First Sample #:	B508353-02	Analyzed:	Aug 30-31, 1995
			Reported:	Sep 7, 1995

TOTAL PETROLEUM HYDROCARBONS-DIESEL RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)	Surrogate Recovery %
B508353-02	PKX-WSW-7S	43	69
BLK082995	Method Blank	N.D.	100

Reporting Limit:	**10**

2-Fluorobiphenyl surrogate recovery control limits are 50 - 150 %.
Extractable Total Petroleum Hydrocarbons are quantitated as Diesel Range Organics (C12 - C24).
Analytes reported as N.D. were not detected above the stated Reporting Limit. The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Shannon Stowell
Project Manager

508353.AGR <11>

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AGRA Earth & Environmental 11335 NE 122nd Way, #100 Kirkland, WA 98034 Attention: Bruce Williams	Client Project ID: 1029 Market Street Sample Matrix: Soil Analysis Method: WTPH-D Units: mg/kg (ppm)	Analyst: T. Fitzgibbon Extracted: Aug 29, 1995 Analyzed: Aug 30-31, 1995 Reported: Sep 7, 1995

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

	Diesel
Spike Conc. Added:	68
Spike Result:	60
% Recovery:	88
Upper Control Limit %:	125
Lower Control Limit %:	72

PRECISION ASSESSMENT
Sample Duplicate

	Diesel Range Hydrocarbons
Sample Number:	B508497-15
Original Result:	N.D.
Duplicate Result:	N.D.
Relative % Difference:	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Reporting Limit.
Maximum RPD:	42

NORTH CREEK ANALYTICAL Inc

Shannon Stowell
Project Manager

% Recovery: $\frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

508353.AGR <12>

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AGRA Earth & Environmental	Client Project ID:	1029 Market Street	Sampled:	Aug 16, 1995
11335 NE 122nd Way, #100	Sample Matrix:	Soil	Relogged:	Aug 29, 1995
Kirkland, WA 98034	Analysis Method:	EPA 7420	Digested:	Aug 31, 1995
Attention: Bruce Williams	First Sample #:	B508353-02	Analyzed:	Aug 31, 1995
			Reported:	Sep 7, 1995

METALS ANALYSIS FOR: TOTAL LEAD

Sample Number	Sample Description	Reporting Limit mg/kg (ppm)	Sample Result mg/kg (ppm)
B508353-02	PKX-WSW-7S	10	N.D.
BLK083195	Method Blank	10	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.
The results reported above are on a dry weight basis.

NORTH CREEK ANALYTICAL Inc.

Tawna Dutton

Shannon Stowell
Project Manager

508353.AGR <13>

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AGRA Earth & Environmental 11335 NE 122nd Way, #100 Kirkland, WA 98034 Attention: Bruce Williams	Client Project ID: 1029 Market Street Sample Matrix : Soil Units: mg/kg (ppm)	Analyst: K. Gendron S. Davis Digested: Aug 31, 1995 Reported: Sep 7, 1995

METALS QUALITY CONTROL DATA REPORT

ANALYTE	Lead
EPA Method:	7420
Date Analyzed:	Aug 31, 1995

ACCURACY ASSESSMENT

LCS Spike Conc. Added:	50
LCS Spike Result:	46
LCS Spike % Recovery:	92
Upper Control Limit:	130
Lower Control Limit:	70
Matrix Spike Sample #:	B508353-02
Matrix Spike % Recovery:	94

PRECISION ASSESSMENT

Sample #:	B508353-02
Original:	N.D.
Duplicate:	N.D.
Relative % Difference:	RPD values are not reported at sample concentration levels <10 X the Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Shannon Stowell
Project Manager

Lab Control Sample % Recovery: $\frac{\text{Conc. of L.C.S.}}{\text{L.C.S. Spike Conc. Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

508353.AGR <14>

AGRA
Earth & Environmental
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918
Tel (206) 820-4669 Fax (206) 821-3914

CHAIN OF CUSTODY

PROJECT: 1029 Market Street	PROJECT No.: 12-1232-01
CLIENT: AEE	PHONE No.: (509) 482-0104
PROJECT MANAGER: Bruce Williams	PHONE No.: (509) 482-0104
SAMPLER'S NAME (please print): Jeffrey Kaspar	PHONE No.: (206) 820-4669
SAMPLER'S SIGNATURE: [signature]	

ANALYSIS REQUESTED (circle, check box or write preferred method in box)

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D (EXTENDED)	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 8010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP			
1. PKX-SSW-8W	8/16/95		Soil	Chill 4C	1	8oz			X												35208353-01			
2. PKX-WSW-7S	8/16/95								X		✓	—	—	—	—	—	—	—	✓					02
3. PKX-SSW-8E	8/16/95								X					8/29										03
4. PKX-ESW-9SS	8/16/95								X				as per J. Kaspar											04
5. PKX-BTSE-10	8/16/95								X															05
6. PKX-NSW-8W	8/17/95								X															06
7. PKX-BTNW-10	8/17/95								X															07
8. PKX-BTNE-10	8/17/95								X															08
9. PKX-NSW-7E	8/17/95								X															09
10. PKX-ESW-8C	8/17/95		Soil		1	8oz			X															10

SAMPLE RECEIPT	LABORATORY: North Creek Analytical	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	* Hold For Analysis (Additional), Highest WTPHG/BTEX samples will be analyzed by WTPH-D and Total Lead. Will call to add these upon receipt of initial WTPHG/BTEX results.
CONDITION OF CONTAINERS	CARRIER	~~☐ 24 HOUR~~	
CONDITION OF SEALS	DOT DESIGNATION	~~☐ 1 WEEK~~	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Jeffrey Kaspar / AEE	8/18/95	1255	1. [signature] / NCA	8/18	1255
2.			2.		
3.			3.		

PAGE 1 OF 2

AGRA Earth & Environmental, Inc. (7/94)

DISTRIBUTION: White, Yellow - Laboratory, Pink - Originator

ECOLOGY

UNDERGROUND STORAGE TANK
Site Check/Site Assessment Checklist

For Office Use Only
Owner # _____
Site # _____

INSTRUCTIONS:

When a release has not been confirmed and reported, this Site Check/Site Assessment Checklist must be completed and signed by a person registered with Ecology. **The results of the site check or site assessment must be included with this checklist.** This form must be submitted to Ecology at the address shown below within 30 days after completion of the site check/site assessment.

SITE INFORMATION: Include the Ecology site ID number if the tanks are registered with Ecology. This number may be found on the tank owner's invoice or tank permit.

TANK INFORMATION: Please list all tanks for which the site check or site assessment is being conducted. Use the owner's tank ID numbers if available, and indicate tank capacity and substance stored.

REASON FOR CONDUCTING SITE CHECK/SITE ASSESSMENT: Please check the appropriate item.

CHECKLIST: Please initial each item in the appropriate box.

SITE ASSESSOR INFORMATION: This form must be signed by the registered site assessor who is responsible for conducting the site check/site assessment.

Underground Storage Tank Section
Department of Ecology
P. O. Box 47655
Olympia, WA 98504-7655

SITE INFORMATION

Site ID Number (on invoice or available from Ecology if the tanks are registered): /

Site/Business Name: 1029 Market Street

Site Address: 1029 Market Street (Street) Telephone: (206) _____

Kirkland (City) WA (State) _____ (ZIP Code)

TANK INFORMATION

Tank ID No.	Tank Capacity	Substance Stored
/	4,000 gallons	Gasoline

REASON FOR CONDUCTING SITE CHECK/SITE ASSESSMENT

Check one:

- ____ Investigate suspected release due to on-site environmental contamination
- ____ Investigate suspected release due to off-site environmental contamination.
- ____ Extend temporary closure of UST system for more than 12 months.
- ____ UST system undergoing change-in-service.
- JK UST system permanently closed-in-place.
- ____ UST system permanently closed with tank removed.
- ____ Abandoned tank containing product.
- ____ Required by Ecology or delegated agency for UST system closed before 12/22/88.
- ____ Other (describe): _____

CHECKLIST

Each item of the following checklist shall be initialed by the person registered with the Department of Ecology whose signature appears below.

		YES	NO
1.	The location of the UST site is shown on a vicinity map.	JK	
2.	A brief summary of information obtained during the site inspection is provided. (see Section 3.2 in site assessment guidance)	JK	
3.	A summary of UST system data is provided. (see Section 3.1)	JK	
4.	The soils characteristics at the UST site are described. (see Section 5.2)	JK	
5.	Is there any apparent groundwater in the tank excavation?	JK	
6.	A brief description of the surrounding land use is provided. (see Section 3.1)	JK	
7.	Information has been provided indicating the number and types of samples collected, methods used to collect and analyze the samples, and the name and address of the laboratory used to perform the analyses.	JK	
8.	A sketch or sketches showing the following items is provided:		
	- location and ID number for all field samples collected	JK	
	- groundwater samples distinguished from soil samples (if applicable)	NA	JK
	- samples collected from stockpiled excavated soil		JK
	- tank and piping locations and limits of excavation pit	JK	
	- adjacent structures and streets	JK	
	- approximate locations of any on-site and nearby utilities	JK	
9.	If sampling procedures different from those specified in the guidance were used, has justification for using these alternative sampling procedures been provided? (see Section 3.4)	NA	
10.	A table is provided showing laboratory results for each sample collected including: sample ID number, constituents analyzed for and corresponding concentration, analytical method and detection limit for that method.	JK	
11.	Any factors that may have compromised the quality of the data or validity of the results are described.	JK	
12.	The results of this site check/site assessment indicate that a confirmed release of a regulated substance has not occurred.		JK

SITE ASSESSOR INFORMATION

Jeffrey Kaspar — Person registered with Ecology

AGRA Earth and Environmental — Firm Affiliated with

Business Address: 11335 NE 122nd Way, Suite 100 (Street)

Telephone: (206) 820-4669

Kirkland (City) WA (State) 98034-6918 (ZIP+Code)

I hereby certify that I have been in responsible charge of performing the site check/site assessment described above. Persons submitting false information are subject to penalties under Chapter 173.360 WAC.

9/13/95 — Date

Signature of Person Registered with Ecology

SUPPLEMENTAL SUBSURFACE PETROLEUM HYDROCARBON ASSESSMENT
1029 MARKET STREET
KIRKLAND, WASHINGTON

Submitted To:

The 1029 Market Street Participant Group

Submitted By:

AGRA Earth & Environmental, Inc.
11335 NE 122nd Way, Suite 100
Kirkland, Washington 98034-6918

September 1995

File #12-01232-01

AGRA
Earth & Environmental

AGRA
Earth & Environmental

AGRA Earth &
Environmental, Inc.
E 520 North Foothills Drive
Suite 600
Spokane, Washington
U.S.A. 99207
Tel (509) 482-0104
Fax (509) 482-0202

22 September 1995
12-01232-01

Attention: 1029 Market Street Participant Group

Subject: Supplemental Subsurface Petroleum Hydrocarbon Assessment
1029 Market Street
Kirkland, Washington

Dear 1029 Market Street Participant Group:

AGRA Earth & Environmental, Inc. (AEE) is pleased to present this draft version of the "Supplemental Subsurface Petroleum Hydrocarbon Assessment" report for the above referenced site. This assessment included the installation and sampling of three groundwater monitoring wells and one soil boring. The purpose of this assessment was to evaluate subsurface conditions in the vicinity of the former petroleum source areas with respect to the potential presence of petroleum hydrocarbons.

Based on AEE's field observations and analytical testing data collected during this investigation, petroleum impacted soils exceeding MTCA Method "A" cleanup criteria exist where the city sidewalk along Third Street meets the alley, southwest of the former UST excavation (boring B-3). This was the only exploration which contained detectable concentrations of petroleum hydrocarbons in soil.

Groundwater conditions encountered varied in the four explorations. Groundwater was encountered during drilling activities in all explorations but MW-5. When encountered, groundwater was located between 10 and 11 feet below grade. Subsequently water level measurements collected two days following drilling indicated groundwater existing between 4.60 (MW-3) to 13.12 (MW-5) feet below top of well casing. Based upon groundwater measurements collected on 8 September 1995, an inferred groundwater flow direction to the south was established. Presently, groundwater in MW-4 is the only location with concentrations of petroleum hydrocarbons exceeding MTCA Method "A" cleanup criteria. Concentrations of petroleum hydrocarbons below MTCA cleanup criteria have also been detected in groundwater samples collected from MW-2, MW-3, and MW-5.

All work performed during this assessment was conducted within the scope of work and budget established in the April 1995 Environmental Services Contract. Should you have any questions regarding the contents of this report, please feel free to contact our office at your convenience.

Respectfully submitted,
AGRA Earth & Environmental, Inc.

Jeffrey Kaspar
Project Environmental Geologist

Bruce D. Williams
Senior Project Scientist

REPORT DATED
SEPT. 1995

INDEPENDENT REMEDIAL ACTION PROGRAM REPORT
1029 MARKET STREET
KIRKLAND, WASHINGTON

Submitted To:

Washington State Department of Ecology
Northwest Regional Office

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7TH Report
29TH Sept 95

Tim Moriarty (206) 646-3356

File #12-01232-01

AGRA
Earth & Environmental

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12-01232-01

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Attachment F Supplemental Subsurface Petroleum Hydrocarbon Assessment

SECTION ONE - REQUIRED INFORMATION

1.0 Project Background/Site Description

1.0.1 Location and Description

The subject site is referred to as 1029 Market Street, which corresponds to the site address. The site is located on the southwest corner of 11th Avenue West and Market Street in Kirkland, Washington. Specifically, the site is located in the southeast quarter of Section 6, Township 26N, Range RE, 47.68 degrees North Latitude, and 122.21 Longitude. Figure 1 depicts the approximate location of the site.

Presently the site includes a one-story office building occupying approximately 3,867 square feet of the total 14,889 square feet comprising the property. The building is currently owned by several members of the former Kelly Trust who lease office space to several tenants. The tenants primarily consist of several counselors and vendors. Figure 2 depicts the current site features.

The utility services for the site consist of electric heating, a sanitary sewer system, City of Kirkland provided water, and U S WEST telephone service. Additional utilities including natural gas and storm sewer lines are also present either on the site itself, or within the right-of-ways bordering the site. Figure 6 depicts the approximate locations of the known utilities, based upon the former earthwork activities and utility location services.

Surrounding properties are residential, however several small businesses exist within ¼ to ½ mile of the site. The residences in the vicinity of the site were not observed to include basements, and no known drinking water wells were found. The nearest sensitive receptor to the subject site is a 30-foot deep domestic water well located at 405 Lake Avenue West, approximately ¼ to ½ mile southwest of the site (NW Regional Office of Ecology well log database).

1.0.2 Site Topography and Geology

The site was surveyed by Horton Dennis and Associates, Inc. of Kirkland, Washington in December 1994. Based upon an established benchmark of 170.55 feet of elevation, set at 3rd Street West and Market Street, and subsequent measurements of ground surface elevations at the exploration locations (test pits/borings/monitoring wells), the relief across the site from east to west decreases approximately 2 to 3 feet. The site slopes down from the west side of Market Street (benchmark elevation 170.6) to the alley, west of the building (elevation 167.1 feet).

Subsurface conditions were interpreted based upon the results of AEE's boring explorations and remedial excavation activities.

1.1 Release Information/Site Characterization

Prior to its use as an office building, the site was utilized as an automobile service station with retail gasoline sales from before 1946 through 1977 (Supplemental Phase I Assessment, 7 July 1995). Several underground storage tanks (USTs) were known to exist at the site including: one 285-gallon UST, one 550-gallon UST; one 1,000-gallon UST, three 3,000-gallon USTs; and one 4,000-gallon UST. The contents of these tanks is unknown due to the absence of any records pertaining to their use or location at the site. It is also known that at least one set of dispensers was present on the site, located somewhere in the vicinity of the current parking area.

Evidence of a petroleum release was first discovered in June 1994 during a Limited Phase II Environmental Site Assessment (3rd Party Site Assessments) performed in response to the prospective sale of the property. Results of the assessment indicated the presence of petroleum hydrocarbon concentrations in soil, exceeding Washington's Model Toxics Control Act (MTCA) Method A cleanup criteria in the vicinity of test pit exploration TP-3, located near the south corner of the building. Additionally, a steel, 4,000-gallon UST was encountered in this area. Portions of the UST were beneath the building and the building footing was found to have been formed around the UST itself. Detectable concentrations of petroleum hydrocarbons were also identified in soils associated with test pit explorations TP-1 and TP-2.

On 20 November 1994, AGRA Earth & Environmental, Inc. (AEE) was contracted to initiate a more detailed characterization investigation of the lateral and vertical extent of the petroleum affected media and develop a remedial action plan. During the initial Subsurface Petroleum Hydrocarbon Assessment:

- A Ground Penetrating Radar (GPR) survey was performed across the entire site and within the accessible areas of the interior of the building. Numerous small reflectors were identified in the vicinity of the front parking area, however no apparent evidence of additional USTs was indicated.

- Four groundwater monitoring wells were installed to depths of 20 to 24 feet below grade (MW-1 through MW-4). Additionally, two soil borings were drilled to depths of 20 feet (B-1) and 31 feet (B-2) below grade.

- Soils analyses indicated concentrations of petroleum hydrocarbons in excess of MTCA Method A cleanup criteria for soil were present in the vicinity of boring B-1, located in the front parking area (in the vicinity of the former test pit exploration TP-2). Detectable concentrations of petroleum hydrocarbons were also present in the samples obtained from explorations MW-2 and MW-4. Washington Department of Ecology Method WTPH-HCID analyses performed on soil samples containing the highest concentrations of petroleum hydrocarbons indicated the presence of gasoline and diesel range petroleum hydrocarbons (GRPH and DRPH) but no indications of oil range petroleum hydrocarbons. Complete details of the soil analyses are found in Table 1.

- Groundwater analyses indicated concentrations of petroleum hydrocarbons exceeding MTCA Method A cleanup criteria for groundwater were present in the sample obtained from MW-4 only (13 ppb benzene). Detectable concentrations of petroleum hydrocarbons were also present in samples from MW-1 and MW-3. At the time of this sampling event, TPH data from the soil analyses was not yet available. All samples were therefore analyzed for GRPH, volatile aromatic compounds (benzene, toluene, ethylbenzene, xylenes BTEX), and lead only. Groundwater analyses are summarized in Table 2.

The results of this initial assessment indicated the vertical extent of petroleum impact was less than 15 feet below grade for soils in the vicinity of the UST and the front parking area. The lateral extent of petroleum affected soils was not determined but was not anticipated to be extensive based upon the soil analytical results obtained from explorations MW-1, MW-2, MW-4, and B-1. Based upon the results of this investigation, a remedial action plan was proposed which included:

- An initial soil vapor survey along the utility corridors and perimeter of the property to estimate the lateral extent of petroleum impact;

- In-place-closure of the existing 4,000-gallon UST; and
- Remedial over excavation of accessible soils in the vicinity of both the UST and the front parking area.
- Supplemental subsurface investigation to include installation and sampling of groundwater monitoring wells, and performance of an aquifer test to determine of the aquifer could be considered a future drinking water source as defined in WAC 173-340-720(1)(a)(ii)(A).

The soil vapor survey was performed on 11 July 1995. Samples were collected from seven soil vapor points (SV-1 through SV-7) at depths of 3 feet and 5 to 8 feet. Figure 3 depicts the locations of these sampling points. The soil vapor survey indicated that the utility corridors, which were less than 4 feet in depth, were not acting as apparent conduits for petroleum migration. It was therefore hypothesized, based upon shallow groundwater levels existing in wells on the site, that groundwater was the major transportation agent for contaminant migration. The results of the investigation also indicated that the lateral extent of petroleum impacted soils in the vicinity of the UST area was likely to be restricted to the planter area. The lateral extent of petroleum impacted soils in the front parking area was concluded to be restricted to the area within the confines of MW-1, MW-2, and SV-1. Screening and analytical data from the soil vapor survey are summarized in Tables 3 and 4.

On 17 July 1995, the 4,000-gallon UST was closed-in-place by filling the UST with a grout mix following inerting, pumping, rinsing, and cleaning activities. No apparent holes or punctures were noted in the UST during the closure. This indicated that the source of the release was not likely to be the UST itself. Other possibilities therefore included: an overfilling event(s); a leak in the product lines; or was associated with one or more of the other UST systems which had been present at the site.

Following closure of the UST, over excavation of the accessible petroleum impacted soils surrounding the UST was performed. A significant portion of the planter area, including the sprinkler system, landscaping, trees, and building walkways were removed. The storm sewer system was the only utility which could be safely removed and temporarily repaired on a daily basis. Excavation was continued until the lateral limits of petroleum hydrocarbons impact exceeding MTCA Method A soil cleanup criteria was reached or the existing utilities which would require re-routing were approached (phone, electric, & sanitary sewer). Figure 4 depicts the approximate limits of excavation including sample locations. Areas where concentrations of petroleum hydrocarbons exceed MTCA cleanup criteria are shown on Figure 5. A total of 383 tons of petroleum impacted soils were removed from this excavation area.

Remedial excavation of petroleum affected soils was also performed in the front parking area. Soils were removed until either the extent of petroleum impact was reached or the risk to the building structure/existing storm sewer system warranted stopping excavation. Approximately 537 tons of petroleum affected soil was removed from the front parking area excavation. The excavation limits, sample locations, and areas where petroleum hydrocarbon concentrations exceed MTCA cleanup criteria area also depicted on Figure 4 and 5, respectively.

Results of the remedial excavation indicated the vertical extent of petroleum impact was predominantly between approximately 5 and 10 feet below grade, for both the areas. Soils in most of the front parking area were reworked within the upper 3 to 4 feet. This made the exact determination of the origin of the initial release difficult to ascertain. In both cases, the petroleum affected soils were within the glacial till, rather than the overlying fill materials. Additionally, the

petroleum impacted soils were observed to decrease significantly at an approximate depth of 10 to 11 feet below grade, corresponding with the perched groundwater occurrence noted in both excavations.

The lateral extent of petroleum impact was confirmed within the UST excavation area in all directions but the southwest corner and the northwest corner (Figure 5). The lateral extent of petroleum impact was confirmed within the front parking area in all directions but the west sidewall, and to a lesser extent on the east side of the catch basin. The vertical extent of petroleum impact was also confirmed with successful closure samples in both excavations. Summaries of the soil analytical results for the UST and front parking area excavations are located in Tables 5 and 6, respectively.

All soil generated during characterization and remediation activities was removed to TPS Technologies, Inc. of Tacoma, Washington. TPS Technologies, Inc. is a licensed remediation facility for petroleum affected soils. The soils are recycled into an asphalt matrix, after incineration.

Following completion of the remedial excavation activities, a second subsurface environmental assessment was performed at the subject site to fill in data gaps, primarily in respect to groundwater quality downgradient from the former source areas. The second assessment was initiated on 6 September 1995 and included the installation of three additional groundwater monitoring wells (MW-5, MW-6, MW-7) to depths ranging from 15 to 20 feet and one additional soil boring (B-3) to an approximate depth of 13 feet. Figure 7 depicts the locations of these explorations.

Soil analyses from the four explorations indicated petroleum hydrocarbon compounds in concentrations which exceeded MTCA Method A cleanup criteria for soil were present in the vicinity of exploration B-3 only. Boring B-3 was located approximately 10 feet southwest of the impacted portion of the west sidewall of the former UST remedial excavation. The vertical extent of petroleum impact was similar to that encountered within the excavation, extending from depths of approximately 5 feet to 10 feet below grade. Due to overhead and utility constraints, no additional borings were installed to estimate the lateral extent of petroleum impact in this area.

The installation of exploration MW-5 confirmed the soil vapor survey data from SV-1 which indicated no apparent petroleum hydrocarbon impact north of the catch basin/front parking area excavation. Soil analytical data from the supplemental subsurface assessment is summarized in Table 7.

Groundwater analyses continued to indicate samples from monitoring well MW-4 contained the only concentrations of petroleum hydrocarbons exceeding MTCA Method A criteria for groundwater. The benzene concentration was 64 ppb and the sum of the GRPH and DRPH concentrations was 1,060 ppb. Detectable concentrations of petroleum hydrocarbons were also contained in samples obtained from monitoring wells MW-2, MW-3, and MW-5. The groundwater analytical data is summarized in Table 2.

Based upon the site observations and analytical data collected throughout the site investigations, the origin of the release could not be determined based upon existing site conditions and the available historical site information. The existing 4,000-gallon UST does not appear to have been directly responsible for the release, based upon the condition of the tank and the lateral extent of petroleum impact. The origin(s) of the release can not be conclusively determined since the uppermost fill soils overlying the petroleum hydrocarbon impacted soils have been significantly reworked. Based upon the lateral extent of observed petroleum impacted soils, it is possible there may have been multiple sources of petroleum releases from the components of the former UST system; however, sufficient evidence does not exist to support this conclusion.

Based upon the analytical data from both soil and groundwater, the petroleum hydrocarbon source is primarily weathered gasoline. Minor concentrations of diesel range petroleum hydrocarbons have been detected in both soil and groundwater samples, however all concentrations have been below MTCA Method A cleanup levels for both soil and groundwater.

The remedial excavation action in both the UST area and front parking area has successfully removed the accessible petroleum impacted soils. The remaining petroleum impacted soils in the vicinity of the south corner of the site could not be removed without re-routing the existing utilities, including telephone, electric, sanitary sewer, and storm sewer systems. The cost of the removal in comparison to the remaining volume (<10% of original volume) was considered substantially disproportionate; therefore, continued excavation was halted. The petroleum impacted soils remaining beneath the building also could not be accessed without removal of the structure itself and were therefore left in place.

The primary areas of residual petroleum hydrocarbon concentrations remaining in the front parking area are located along the west sidewall of the excavation. The excavation was extended to within approximately 3 feet of the building footing. Further excavation was terminated due to the potential risk to the building structure. A second area of residual petroleum concentrations was adjacent to the east end of the catch basin. Further excavation on this side of the catch basin was terminated to avoid completely undermining the basin which extended from the surface to approximately 8 feet below grade. Based upon adjacent closure samples, the residual petroleum concentrations in this area are not considered to constitute a significant volume of material.

Results of both boring exploration programs indicated soils containing concentrations of petroleum hydrocarbons exceeding MTCA Method A criteria were found in borings B-1 and B-3 only. The soils associated with boring B-1 have been removed during the remedial excavation. The soils associated with B-3 are located approximately 10 feet southwest of the UST excavation's southwestern limit. These residual soils are also considered inaccessible due to the elevated cost of re-routing the existing utilities. Soils in all other boring/monitoring well explorations contained concentrations of petroleum hydrocarbons below MTCA Method A cleanup criteria.

Two groundwater sampling events have been performed, one in December 1994 and a second in September 1995. These two sampling events represent times of seasonal high and low fluctuations in water levels as is shown in Table 8. During both of these sampling events, samples obtained from MW-4 contained concentrations of benzene (13 ppb and 64 ppb, respectively) exceeding MTCA Method A criteria. Samples from all other monitoring wells have contained either no detectable petroleum compounds concentrations or low-level concentrations below regulatory criteria. Due to the removal of the primary source areas, groundwater quality should improve without the necessity for any remedial action. Section 2 should be referenced for additional information regarding groundwater conditions at the site.

The results of the Phase I Investigation(s) in combination with site observations have indicated no apparent sensitive receptors that are anticipated to be or which have been affected by the petroleum affected media at the site. Based upon the groundwater and soil analytical results of explorations/monitoring wells MW-1, MW-2, MW-6, and MW-7, it is unlikely that petroleum migration has exceeded the perimeters of the property boundaries or the adjacent right-of-ways. Additionally, no evidence of distressed vegetation was observed in either the planter areas or the adjacent properties, indicating that the underlying petroleum hydrocarbon concentrations had not affected the native flora. The adjacent properties were not observed to include basements. This therefore precludes any potential threat of vapor migration into a potentially sensitive area.

1.2 Previous Investigations

The following section includes a listing of the site investigations/assessments conducted to date:

- *Phase I Environmental Site Assessment and Limited Phase II Environmental Site Assessment*, (3rd Party Site Assessments, Inc.) dated June 1994;
- *Subsurface Petroleum Hydrocarbon Assessment*, dated 18 January 1995;
- *Supplemental Phase I Assessment*, dated 7 July 1995;
- *Soil Vapor Survey Status Letter*, dated 16 August 1995;
- *Underground Storage Tank Closure Assessment and Remediation Report*, dated 6 September 1995; and
- *Supplemental Subsurface Petroleum Hydrocarbon Assessment*, dated 29 September 1995.

The contents of each of these reports should be referred to for more specific details of each phase of this site investigation. The contents of this IRAP report are intended to meet the minimum requirements of Ecology's Guidance on preparing Independent Remedial Action Reports Under the Model Toxics Control Act Chapter 70.105 D RCW, dated 9 March 1994. Copies of each of the above referenced reports have been submitted to Ecology, as attachments to this report.

1.3 Selection of Cleanup Standards

For the purpose of this investigation, the MTCA Method A cleanup levels, as defined in WAC 173-340-700 through WAC 173-340-750 were selected. Method A cleanup levels were chosen on the basis that the site falls under the classification of a "routine cleanup action" as defined in WAC 173-340-130. Additionally, due to the relative simplicity of the number of contaminants of concern, which include GRPH, DRPH, and BTEX compounds only, the site meets the criteria for this selection under WAC 173-340-704.

For the purpose of this investigation, Points of Compliance for the soil remediation were selected based upon areas which were safely accessible and not capped with a relatively impermeable surface cover. This included all areas which would not be re-surfaced with asphalt such as the planter areas, and all areas which could be accessed without risk to either the existing building structure or utilities.

Groundwater quality in the vicinity of monitoring wells MW-1 through MW-3 and MW-5 through MW-7 are in compliance with the cleanup standards selected. Groundwater quality in the 4-inch diameter well (MW-4) exceeds compliance levels for total petroleum hydrocarbons (GRPH and DRPH) and benzene; however, groundwater quality is expected to improve now that the majority of the source area (soils) has been removed, provided leaching from the upgradient, residual petroleum concentrations beneath the building is minimal.

1.4 Explanation of Remedial Actions Taken and Rationale for Selection

In respect to remediation of the petroleum affected soils on site, removal of the soil from the subsurface and subsequent recycling of the soil at the TPS Technologies, Inc. facility in Tacoma, Washington was selected. This option was the most viable remedial option given the necessity for a rapid solution due to the potential sale of the property.

The primary areas of impacted soil were generally between 5 to 10 feet below grade in a hard, dense, glacial till horizon comprised mainly of silt with disjointed lenses and small horizons of fine to medium sand. The nature of these soils eliminated several in-situ remedial options due to cost, the time factors involved, and the technical feasibility of in-situ remediation. Removal of these materials was therefore the most viable remedial option which would result in both the remediation of the site soils and removal of the source area for potential groundwater impact.

As mentioned in the previous sections, petroleum impacted soils which could be removed without risk to the building structure or the critical utilities (power, phone, gas, and sanitary sewer) were overexcavated and removed to TPS Technologies, Inc. for incineration and subsequent recycling. Areas of residual petroleum hydrocarbon impacted soils remain beneath the building in the vicinity of the UST, along the south corner of the site, in the vicinity of the former UST remedial excavation and, along the west sidewall of the former front parking area excavation, and adjacent to the east side of the existing catch basin in the former front parking area excavation. These areas are depicted graphically on Figure 5.

The volume of soil removed from the UST area was approximately 383 tons. The volume of soil removed from the front parking area was approximately 537 tons. The remaining impacted soils, based upon the results of all site investigations conducted to date, is estimated to be less than 10 percent of the original volume and remains in areas which are not safely accessible or cost effective to warrant removal.

No groundwater remedial action is proposed due to the improvement to groundwater quality which is anticipated with the removal of the bulk of the source area. Groundwater quality data has also indicated that with the exception of monitoring well MW-4, concentrations of petroleum compounds in the remaining six wells do not exceed MTCA Method A groundwater cleanup levels. Monitoring well MW-4, located adjacent to the western sidewall of the former UST remedial excavation, has contained concentrations of benzene of 13 ppb and 64 ppb during the two sampling events (December 1994 and September 1995).

A brief aquifer yield test was performed on MW-4 on 8 September 1995 to determine whether the perched aquifer on site would fall under the classification of a potable drinking water aquifer. MW-4 was chosen based upon its design as a potential recovery well in the event that groundwater remediation was required and since it was the only groundwater monitoring well with concentrations of TPH and/or BTEX above the groundwater cleanup standards listed in Method A of MTCA. The results of the testing indicated that the 4-inch diameter recovery well could not sustain a yield of 0.5 gallons per minute, and the well casing and annular sand pack were purged dry in approximately 45 minutes. The water level in the well was observed to continuously fall with no measurable recharge occurring during the test after the groundwater from the annular sand pack and well casing was removed. The water level in the well only recharged within 73 percent of the original column height after 5 hours of termination of the test. The location of the site in an established residential area with an existing water utility service in combination with inability to maintain a 0.5 gpm yield over a reasonable time frame exempt the groundwater present at the site from being a potential drinking water source (WAC 173-340-720).

Overall, the groundwater quality at the site, including MW-4, is not anticipated to affect the environment or human health. The age of the release could have occurred from 18 to 50 years ago, and yet, the results of the investigation(s) have indicated minimal affect upon the existing groundwater system(s) as well as human health or the environment. Additionally, the absence of sensitive receptors which could be affected also support the decision for no groundwater

remediation. The boring exploration and excavation data indicate that the groundwater system(s) in the area are likely to be discontinuous with groundwater occurrence being dictated by the nature of glacial till in the area. Groundwater remediation could therefore affect a limited area of influence and thus, would not be a cost effective option. AEE therefore proposes to allow the existing compounds to naturally biodegrade over time.

1.5 Institutional Controls

Due to the remaining petroleum hydrocarbon impacted soils and groundwater at the site, institutional controls will be implemented as required under WAC 173-340-440. At this time, AEE proposes that restrictive covenant on the property be registered with the deed of the property. A copy of the restrictive covenant is presented in Appendix C.

1.6 Sampling and Analysis

A. Field Screening Techniques

The initial exploration locations (MW-1, MW-2, M W-3, MW-4, B-1 and B-2) were selected on the basis of the historical data available as well as upon the observations and analytical data obtained from reviewing the initial investigation conducted by 3rd Party Site Assessments. The configuration of the site itself also dictated the most accessible areas for AEE's initial explorations. The location of the potential recovery well, MW-4 was selected based upon the location of the existing UST corresponding to the most probable area of potential groundwater impact. Surface topography was also used to estimate an inferred groundwater migration direction to the west, towards Lake Washington. MW-1 was originally intended as the upgradient monitoring well, based upon topographic assumptions.

B. Sampling Procedures

B.1 Soil Sampling Procedures

During drilling activities, soil samples were obtained using a modification of the Standard Penetration Test Procedure as described in ASTM:D-1586. The testing and sampling consisted of driving a standard 3-inch outside diameter split barrel sampler a distance of 18 inches into the soil below the auger bit with a 140-pound hammer free falling a distance of 30 inches. The blow count, or "N" value consisting of the number of blows required to drive the sampler the final 12 inches, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils. The high gravel, cobble and boulder content of some fluvial and glacial soils often yields unrepresentatively high blow counts due to oversized material. The soil samples retrieved from the split-spoon sampler were classified in the field and a representative portion placed in laboratory prepared glass containers.

The soil samples were recovered at each interval using procedures designed to minimize the risk of cross contamination. Prior to the drilling of the boring, the drilling equipment and sample tools were cleaned using a steam cleaner. Between each sampling attempt, the sampling tools were scrubbed with a stiff brush and a detergent solution consisting of Liquinox and warm water, and then rinsed with potable water and liberal quantities of distilled water. The samples were classified in the field and immediately transferred to laboratory prepared containers, and tightly sealed with a teflon-lined threaded cap. Samples were screened in the field with an organic vapor meter (OVM). Samples were stored and transported in a chilled ice chest throughout the field investigation. Selected soil samples were subsequently transferred to the analytical laboratory in accordance with AEE chain-of-custody procedures.

Soil samples collected during the remedial excavation activities were collected using a backhoe due to the depth of the excavations. This involved removing only those soils which were not in direct contact with any surface of the backhoe bucket. AEE field personnel collected all samples from a minimum of 4 to 6 inches within each sidewall to ensure a fresh sample which was not exposed to the atmosphere would be obtained. Several areas at various depths and lateral locations in the desired sampling zone were screened using a PID and observations of the soils physical characteristics prior to deciding upon a final sampling location. Discrete samples were then obtained using the same procedure described above.

B.2 Well Installation Procedures

All monitoring wells were constructed in accordance with the minimum standards for construction and maintenance of wells (WAC 173-160). Monitoring wells construction details have been included with the boring logs in Appendix B.

B.3 Well Development and Purging Techniques

Following installation of the monitoring well, each well was developed in order to improve the hydraulic connection between the annular sand pack and the formation, which in turn enhances the well yield and decreases turbidity. Monitoring wells installed during this investigation were developed using a hand-operated surge block and a hand bailer. Development continued until the well was purged dry, the turbidity was observed to decrease significantly, or 6 to 10 well casing volumes of groundwater were removed. All wells were allowed a minimum of 24 to 48 hours to equilibrate prior conducting additional purging and sampling activities.

Prior to sampling, the existing column height of groundwater present in the well casing was measured and a well casing volume of water was calculated based upon the diameter of the well casing. Approximately 3 to 5 well casing volumes were removed using a hand bailer. Bailing is performed in a manner which minimized any surging of the well. All non-disposable bailers were decontaminated between each well by scrubbing with a stiff brush and solutions of isopropyl alcohol, Liquinox/potable water, and a deionized water rinse. Purging is performed in the order of least impacted to most impacted well when this data is available.

B.4 Groundwater Sampling Methods

Prior to sampling, depth to water measurements are taken in all wells to the nearest 0.01 foot, using an electronic well probe. The elevations of the tops of the well casings were established based upon survey data conducted by Horton Dennis and Associates, Inc. of Kirkland, Washington. A summary of the historical water level data, including depth to water and groundwater elevations is presented in Table 8. The required purge volumes are then calculated based upon the water level data collected.

Monitoring wells are purged of approximately three to five well casing volumes (see Section B.3) prior to performing sampling, or until the well is purged dry. Water levels are allowed to recharge to 80 to 90 percent of the original column height in the wells which are not purged dry prior to sampling. In the wells which are purged dry, sampling is performed once enough water is present to fill the sample containers. Groundwater samples are collected using dedicated, disposable plastic bailers (single check-valve). The bailer is slowly lowered into the water column to avoid surging and the groundwater sample is collected from the upper 2 to 3 feet of the water column. Groundwater samples are decanted into laboratory prepared containers in order of highest to lowest analyte volatility. All samples are labelled, placed into a chilled cooler (where applicable), and transported to the analytical laboratory under AEE chain-of-custody procedures.

C. Analytical Data

Summaries of both soil and groundwater analytical data performed throughout this study have been provided in Tables 1, 2, 4, 5, 6, and 7. Copies of all available laboratory test certificates have been provided with the reports listed in Section 1.2.

D. Sample Locations and Depths

The locations of samples obtained from the boring exploration program can be seen on Figures 2 and 7. Sample locations for the remedial over excavation and UST closure are depicted on Figure 4. Figure 5 depicts sample locations where residual petroleum concentrations exceeding MTCA Method A criteria exist for site soils. Figure 3 depicts the soil vapor survey sample points, including field screening data and laboratory analytical data. Figure 14 depicts the analytical data for both groundwater sampling events and the well locations.

Sample depths are indicated by the numerical suffix attached to each sample identification. The depths are also listed in each table containing the analytical data, as well as the corresponding boring logs.

E. Justification of Sample Selection

The sample locations which were selected for analysis from each boring exploration were based upon the depth to groundwater at the time of drilling; field headspace measurements utilizing a photoinization detector (PID), and observations of the physical characteristics of each sample. Based upon the contaminant type, at least one soil sample was selected which would correspond to the capillary fringe zone. Secondary samples were chosen to characterize the vertical extent of petroleum impact, where present.

Sample locations selected during the remedial over excavation of petroleum impacted soils in the vicinity of the existing UST and the front parking area were selected based upon several criteria. The sample locations in the UST area were chosen based the depth to groundwater, field headspace readings and the bottom depth of the UST itself. The Ecology guidance document for UST Site Checks and Site Assessments was followed where possible. All samples were discrete samples. Field headspace readings were used to select the depth from which the samples were obtained, which generally corresponded with the zone immediately above the groundwater occurrence of 10 to 11 feet below grade. A closure sample(s) could not be obtained immediately beneath the UST due to groundwater entering the UST once a hole was placed in the base of the UST. Several samples were collected from the base of the UST excavation to confirm successful containment removal at the vertical extent of the remedial action. Sample locations are shown on Figure 4. The numerical suffix following each sample identification corresponds to the approximate depth below grade at which each sample was obtained.

F. Soil Profile Information

The site soil profiles in the vicinity of each boring exploration are presented on the boring logs in Appendix B. A detailed discussion of the geology of the site was presented in Section 1.0.2. Geologic Cross Sections depicting general soil conditions across the site are presented on Figure 15 and 16.

G. Groundwater Data

Historically, depths to groundwater as measured in respect to the top of well casings have ranged from 2.91 feet to 7.65 feet below the top of casing in all wells but MW-5. The static water level in MW-5 was 13.12 feet prior to sampling in September 1995. The average depth to groundwater

based upon the historical data, presented in Table 8, is approximately 5.8 feet below top of well casing.

H. Residual Concentrations

The residual concentrations of petroleum hydrocarbons in soil are referenced in several sections of this report and are depicted along with the analytical data on Figure 5. The only area of groundwater containing residual petroleum hydrocarbons in excess of MTCA Method A cleanup criteria is in the vicinity of MW-4. MW-4 is depicted on Figure 14 along with the analytical results of the two sampling events.

SECTION TWO - ADDITIONAL INFORMATION

2.1 Groundwater Investigation

The first assessment of groundwater conditions and quality at the subject site was performed during AEE's Subsurface Petroleum Hydrocarbon Assessment in November 1994. During this assessment, three, 2-inch diameter groundwater monitoring wells (MW-1, MW-2, & MW-3) were installed to depths of approximately 20 feet below grade. One 4-inch diameter groundwater monitoring well (MW-4) was installed west of the existing UST, to an approximate depth of 24 feet below grade. Monitoring wells MW-2 through MW-4 were installed such that the well screen extended from 5 feet below grade to the bottom of each well. MW-1 was screened from 10 feet below grade to the bottom of the well. Well construction diagrams are presented in Appendix B.

Groundwater was encountered during the boring exploration program at depths ranging from 15 to 16.5 feet below grade within a saturated zone of silt in the glacial till underlying the site. Groundwater was not encountered during the installation of MW-3. This exploration program indicated that the occurrence of groundwater at the site was dictated by the geology of the glacial till.

Subsequent fluid level measurements indicated water levels ranged from 3.64 to 6.43 feet below the tops of the surveyed well casing elevations. At this time, it was uncertain as to whether groundwater was entering the wells at depths above that identified during drilling activities or whether some degree of confining pressure existed due to the overlying glacial till. Fluid level data is summarized in Table 8.

Based upon the groundwater data collected on 7 December 1994, and 11 January 1995, potentiometric surface maps (Figures 8 & 9) were constructed. An inferred groundwater flow direction to the east was interpreted.

During groundwater development and sampling activities, most of the monitoring wells could be purged dry following the removal of 3 to 6 well casing volumes of water. Groundwater quality data included testing for gasoline range petroleum hydrocarbons (GRPH), volatile aromatic compounds (BTEX), lead (total and dissolved), and turbidity. Diesel range petroleum hydrocarbons (DRPH) were not tested during the initial screening due to the absence of soil analytical data confirming its presence at the time of sampling. The laboratory analysis indicated that only the sample obtained from MW-4 contained concentrations of petroleum hydrocarbons in excess of MTCA Method A cleanup levels for groundwater. MW-4 contained a benzene concentration of 13 parts per billion (ppb). This was the only compound which exceeded MTCA criteria. Detectable concentrations of petroleum hydrocarbons were also present in samples obtained from MW-1 and MW-3. A complete summary of the analytical data is presented in Table 2.

Groundwater level measurements were collected on a monthly basis from May to September 1995. Potentiometric surface maps were constructed, and are included as Figures 10 through 13. The data presented in these figures indicates a general trend to the south for the inferred groundwater migration direction.

Observations of the groundwater conditions encountered during the excavation of the petroleum impacted soils associated with the UST area and front parking area indicated no apparent groundwater occurrence above a depth of 10 to 11 feet below grade. The groundwater encountered was observed to slowly seep into the excavations from a more permeable, sandier horizon within the glacial till. The groundwater encountered appeared to be perched upon a denser, less permeable silt layer underlying the water-bearing horizon above. This water bearing unit was less than 2 feet in thickness. No evidence of any groundwater above 10 feet was noted during the extent of the excavation activities.

The groundwater data collected through August 1995 indicated that the occurrence of groundwater at the site was dictated by the geology of the glacial till. The data also indicated that groundwater at the site was unlikely to occur above a depth of 10 feet below grade, and is likely to be perched. The depths to water within the wells are inferred to occur at shallower depths than what would be expected due to confining pressures of the overlying glacial till. This pressure was released during installation of the wells resulting in a rise of the water level.

In September 1995, AEE installed three additional 2-inch monitoring wells (MW-5, MW-6, & MW-7). MW-5 was installed as an upgradient well location in the front parking area. Monitoring wells MW-6 and MW-7 were installed as downgradient monitoring wells for the site in general. The location of these wells was based upon the potential age of the release and upon right-of-way constraints which prohibited installation of the wells in Market Street or 3rd Street West. Due to the potential age of the release, AEE installed these wells to confirm the absence of any dissolved petroleum hydrocarbon plume extending from the site.

Analytical data of groundwater samples from the 8 September 1995 sampling event indicated that the sample from MW-4 contained the only exceedance of the MTCA Method A groundwater cleanup levels for benzene (64 ppb) and total petroleum hydrocarbons (GRPH + DRPH = 1,060 ppb). Detectable concentrations of petroleum hydrocarbons were also present in samples obtained from MW-2, MW-3, and MW-5.

2.1.1 Hydrogeological Investigations (No Groundwater Contamination)

(Not applicable as groundwater contamination was detected.)

2.1.2 Hydrogeological Investigations (With Groundwater Contamination)

A. Potentiometric surface maps are presented in Figures 8 through 13; a summary of fluid level measurements is presented in Table 8.

B. Based upon the soil types observed during the drilling activities and the excavation program, the hydraulic conductivity (K) values were estimated at 10^{-6} cm/sec, which is an average for glacial till soils. Assuming an aquifer thickness of 10 feet (b), transmissivity (T) equals 3.049 x 10^{-4} cm^2/sec (T=Kb). Based upon the hydraulic conductivity value calculated for glacial tills, a known groundwater gradient (h) of 0.04 ft/ft, and an assumed effective soil porosity (n) of 15% , or 0.15, a groundwater velocity was calculated at 2.66 x 10^{-7} cm/sec or 0.275 feet/year, using the equation V = Kh/n.

C. Two geologic cross sections of the site are presented in Figures 15 and 16. See Figure 7 for locations of cross sections with respect to the site plan.

D. Historical groundwater sample concentrations (two sampling events) are presented on Figure 14.

E. Groundwater sample concentrations for the two sampling events are also presented in Table 2.

2.1.3 Groundwater Treatment

(No groundwater treatment is proposed for the site based upon the rationale presented in Section 1.4.).

2.2 Regulatory Records/Permits

(Not applicable; no permits were required for the remedial work conducted at the site.)

2.3 Hazardous Substance Management and Handling Practices

(Not applicable; no hazardous substances currently are managed nor handled. It is unknown if or what types of hazardous substances may have been managed or handled in the past.)

2.4 Corrective Action at Dangerous Waste Management Facilities

(Not applicable; dangerous wastes are not managed, stored, treated, or disposed at the site.)

3.0 CLOSURE

The following report has been prepared in accordance with Ecology's *Guidance on Preparing Independent Remedial Action Reports Under the Model Toxics Control Act, Chapter 70.105D RCW*, dated 9 March 1994. The data presented herein has been based upon all site investigations and assessments conducted up to the preparation of this report (presented as attachments). Should you have any additional questions or comments regarding the contents of this report, please feel free to contact our office at your earliest convenience.

Respectfully submitted,
AGRA Earth & Environmental, Inc.

Jeffrey Kaspar
Project Environmental Geologist

Bruce D. Williams
Senior Project Scientist

Jon N. Sondergaard, P.G., R.E.A.
Associate

JK/BDW/clt/aml

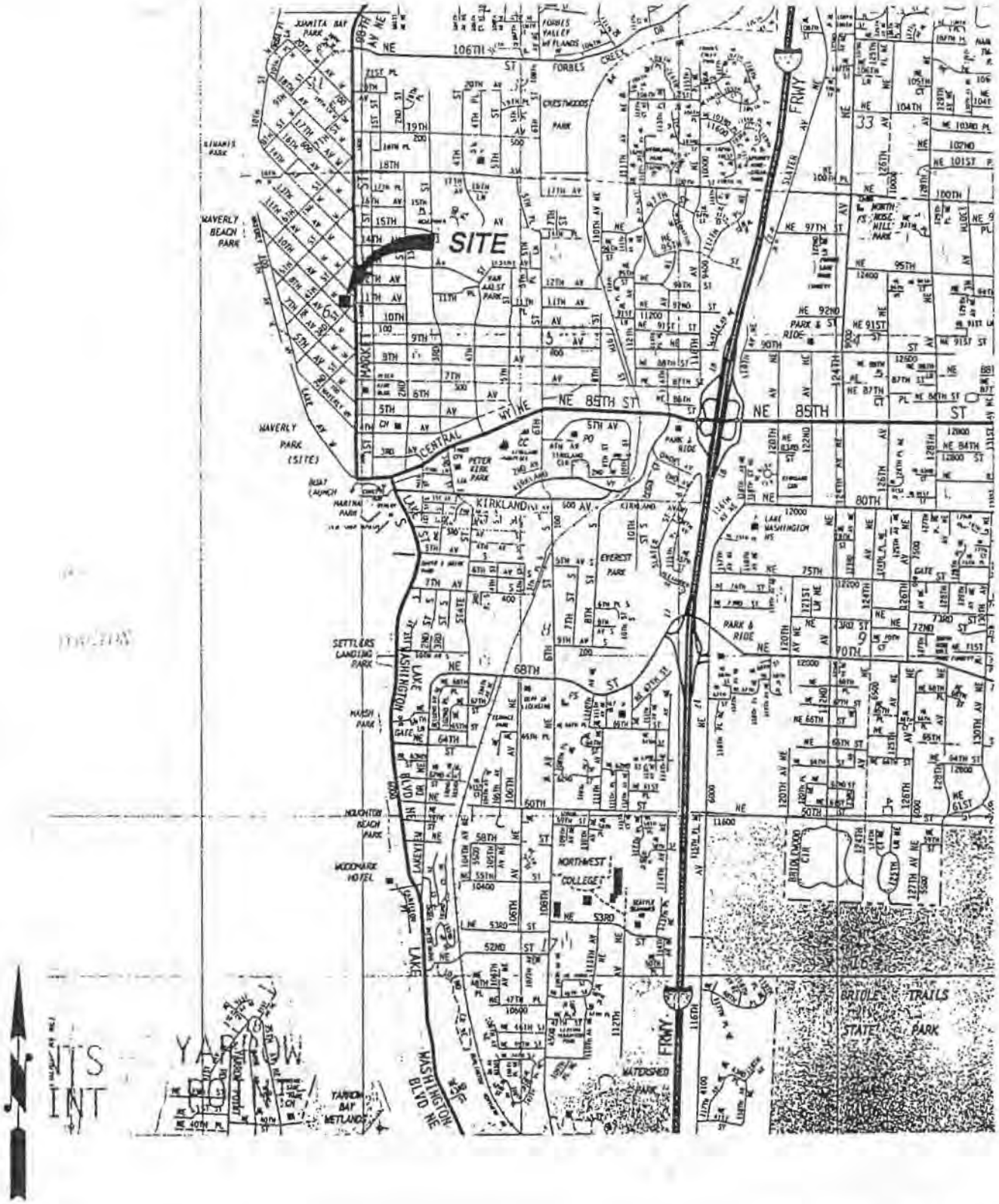

FIGURE 1

AGRA
Earth & Environmental
E. 520 North Foothills Drive
Suite 600
Spokane, WA, U.S.A. 99207

W.O.	12-01232-01
DESIGN	JK
DRAWN	JMR
DATE	SEP 1995
SCALE	N.T.S.

1029 MARKET STREET
KRIKLAND, WASHINGTON

LOCATION MAP

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING NO. \12\01232\TASK05\LOCATION.DW