Woodward-Clyde

Engineering & sciences applied to the earth & its environment

ENVIRONMENTAL PROTECTION

96 DEC 27 PM 3:08

December 18, 1996
93C0276A-5000

① Well W-3s W-Bs should also be analyzed for TPHd

② Continue QMR for 2 more qtrs, then possibly reduce to semi-annual basis

③ Historic GW data in one table.

Ms. Rita Sullins
Don-Sul, Inc.
187 North L Street
Livermore, CA 94550

Subject: **Quarterly Monitoring at 187 North L Street, Livermore 94550, California**

Dear Ms. Sullins:

INTRODUCTION

Woodward-Clyde Consultants (WCC) has completed the sampling and analysis of groundwater samples from monitoring wells W-Es, W-1s, W-Bs, and W-3s at the Arrow Rentals Site. This report discusses the results of the analysis of the groundwater samples.

DESCRIPTION OF FIELD ACTIVITIES

Groundwater Sampling

Groundwater sampling was performed on November 22, 1996 in wells W-1s, W-Bs, W-3s, and W-Es by a WCC Staff Engineer. These well locations are shown on Figure 1. The purged water from the four wells was stored in four 55-gallon barrels on site and labeled by WCC Personnel. The Groundwater Sampling Logs are shown in Appendix A.

The groundwater was sampled by using a Grundfos 2'' submersible pump. The length of hose was decontaminated before sampling each well. The samples were placed into appropriate pre-labeled, laboratory-supplied sample containers. Sample vials were then immediately placed into a chilled cooler. The cooler was delivered to Inchcape Testing Services Anametrix Laboratories, San Jose, California, under chain-of-custody procedures. Each groundwater sample was analyzed for TPH gasoline using modified EPA Method 8015, benzene, toluene, ethyl benzene, xylenes (BTEX) and MTBE using modified EPA Method 8020.

Before sampling, stabilized groundwater levels were measured in monitoring wells W-Es, W-3s, W-1s, and W-Bs with an electrical water level indicator. Between each groundwater level measurement, the interface probe was decontaminated using Alconox soap and clean water.

Woodward-Clyde Consultants • A subsidiary of Woodward-Clyde Group, Inc.
500 12th Street, Suite 200 • Oakland, California 94607-4014
(510) 893-3600 • Fax (510) 874-3268

RESULTS OF FIELD ACTIVITIES

Groundwater Results

Water depths were measured at 28.00 feet in W-Es, 25.45 feet in W-3s, 25.00 feet in W-1s, and 25.70 feet in W-Bs (Table 1). Local groundwater flow direction is calculated to be toward west (Figure 2).

Water samples were analyzed for TPH gasoline using modified EPA Method 8015, benzene, toluene, ethyl benzene, xylenes (BTEX) and MtBE using modified EPA Method 8020. The data were reviewed by WCC and found to be of acceptable quality. The laboratory analytical data for Wells W-Es, W-1s, W-Bs, and W-3s are summarized in Table 2 and the laboratory reports are shown in Appendix B.

Groundwater samples from the monitoring wells W-1s and W-Bs in the central area of the site were reported to contain 170,000 µg/L and 47,000 µg/L total petroleum hydrocarbons (TPH) quantified as gasoline, respectively. Benzene was reported at concentrations of 13,000 µg/L and 5,100 µg/L in the two monitoring wells. Toluene was detected in wells W-1s and W-Bs respectively at 18,000 and 3,100 µg/L, ethylbenzene was detected in wells W-1s and W-Bs respectively at 3,500 and 1,400 µg/L, and total xylenes were detected in wells W-1s and W-Bs respectively at 18,000 and 7,800 µg/L.

The groundwater sample from monitoring well W-3s in the western corner of the site was reported with 3,200 µg/L TPH-gasoline, 270 µg/L benzene, 29 µg/L toluene, 63 µg/L ethylbenzene, and 100 µg/L total xylenes. TPH-gasoline was reported at 280 µg/L from the off-site monitoring well W-Es, located approximately 225 feet west of the western site boundary. Benzene, toluene, ethylbenzene, and total xylenes were reported at 24, 0.6, 1.8, and 2.2, respectively. concentrations exceeding their respective detection limits in the groundwater sample. MTBE was not reported at concentrations exceeding the detection limits in samples from any of the four monitoring wells.

Waste Disposal

The water results are from the wells and therefore representative of the purge water (Table 2). Four 55-gallon drums of waste water will be transported and disposed.

CONCLUSIONS AND RECOMMENDATIONS

Review of the field sampling and laboratory test results indicate that sheen and gasoline odor were observed in groundwater from W-1s during the 11-22-96 sampling and analysis.

Comparison of the laboratory results from the previous groundwater sampling of the wells on 3-22-96 to the current 11-22-96 sampling and analysis results shows that there has been an increase in detected concentrations of BTEX and TPH gasoline (see Table 2 and 2A).

There is only one exception to the increase in concentrations of BTEX and TPH gasoline. The concentration of BTEX and TPH gasoline in groundwater, collected on 11-22-96, from well W-Bs is lower than that reported for a groundwater sample, collected on 3-22-96, from well W-Bs (see Tables 2 and 2A).

In September 1995 benzene was reported at a concentration of 4 µg/L for groundwater from the downgradient well W-E. However, in the March 1996 sampling of well W-Es the laboratory reports no detection above the reporting limit of 0.5 µg/L for benzene. In November 1996 benzene was reported at a concentration of 24 µg/L.

We believe that these observed fluctuations in the concentration of BTEX and TPH gasoline in groundwater from these wells are a result of groundwater level seasonal variations. Since beginning this project in 1990 groundwater levels have risen about 20 feet, with some seasonal variations. We believe that the current increased concentrations of BTEX and TPH-gasoline are a result of rising groundwater levels. Actually, the Nov 1996 monitoring event showed a drop of 8-10' in GW elevation.

We recommend that future groundwater monitoring be performed on a semi-annual schedule, which would monitor groundwater at the higher and lower groundwater elevations. We suggest groundwater sampling to be performed in April, when groundwater elevation is higher, and in September, when groundwater elevation is lower.

Please call if you have any questions.

Sincerely,

Albert P. Ridley, CEG
Project Manager

Jerome Lebegue
Staff Engineer

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Attachments: Table 1 Groundwater Elevations
Table 2 Results of Laboratory Analyses of Groundwater for 11-22-96
Table 2A Results of Laboratory Analyses of Groundwater for 3-22-96
Figure 1 Site Plan
Figure 2 Groundwater Elevation Contour Map
Appendix A Groundwater Sampling Logs
Appendix B Laboratory Reports.

TABLE 1
GROUNDWATER ELEVATIONS

Well Number	Top of Casing Elevation [feet, MSL]	Depth to Water [feet below TOC]	Water Elevation [feet, MSL]
W-Es	474.66	28.00	446.66
W-3s	476.98	25.45	451.53
W-1s	479.09	25.00	454.09
W-Bs	478.82	25.70	453.12

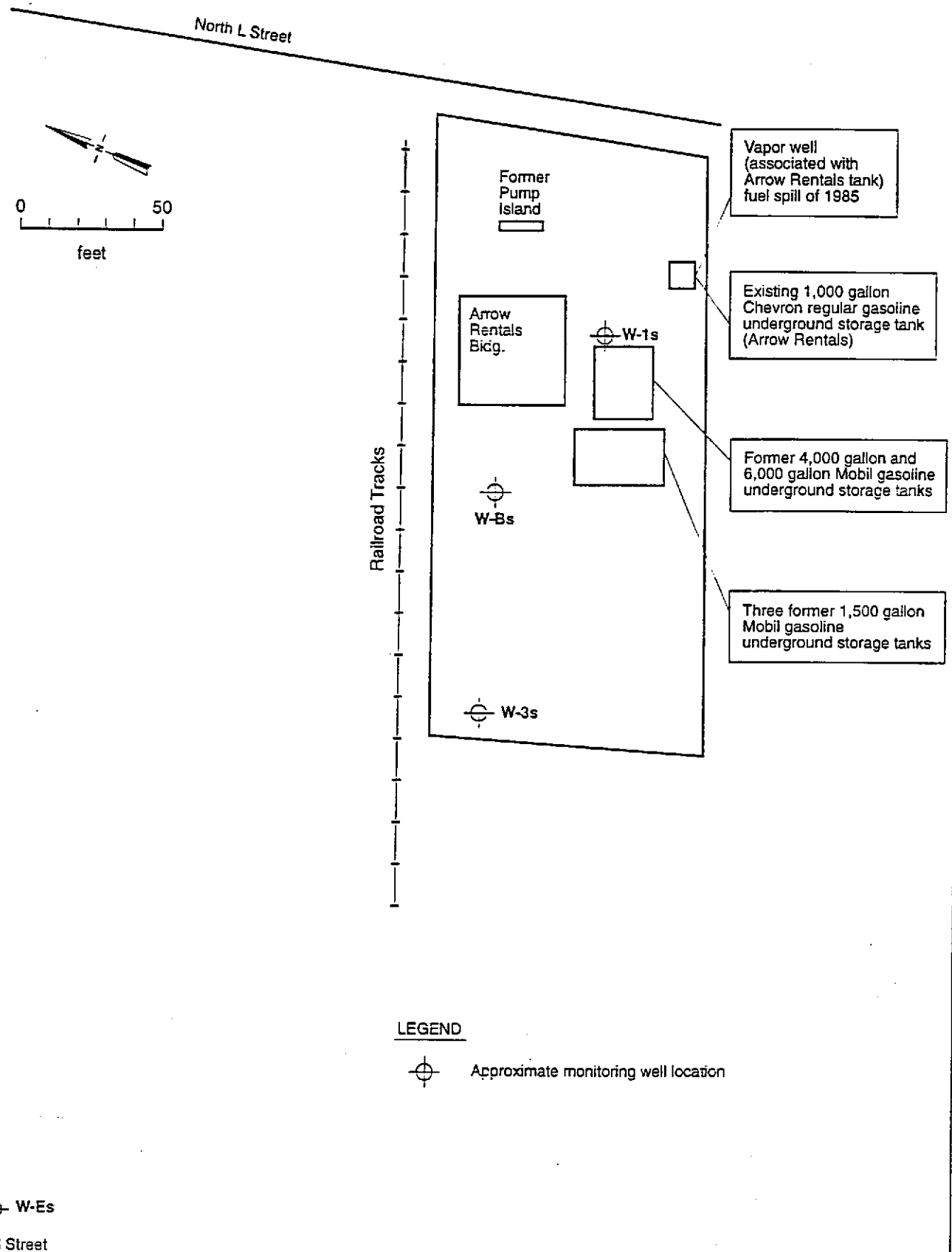
Legend:
TOC: Top of PVC Casing
MSL: Mean Sea Level (elevations based on City of Livermore datum)
Groundwater levels measured on November 22, 1996.

TABLE 2
RESULTS OF LABORATORY ANALYSES OF GROUNDWATER FOR 11-22-96

	Chemical [µg/L]					
Location	**MTBE**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH-gasoline**
W-Es	< 5	24	0.6	1.8	2.2	280
W-1s	< 10,000	13,000	18,000	3,500	18,000	170,000
W-Bs	< 2,500	5,100	3,100	1,400	7,800	47,000
W-3s	< 100	270	29.0	63.0	100	3,200

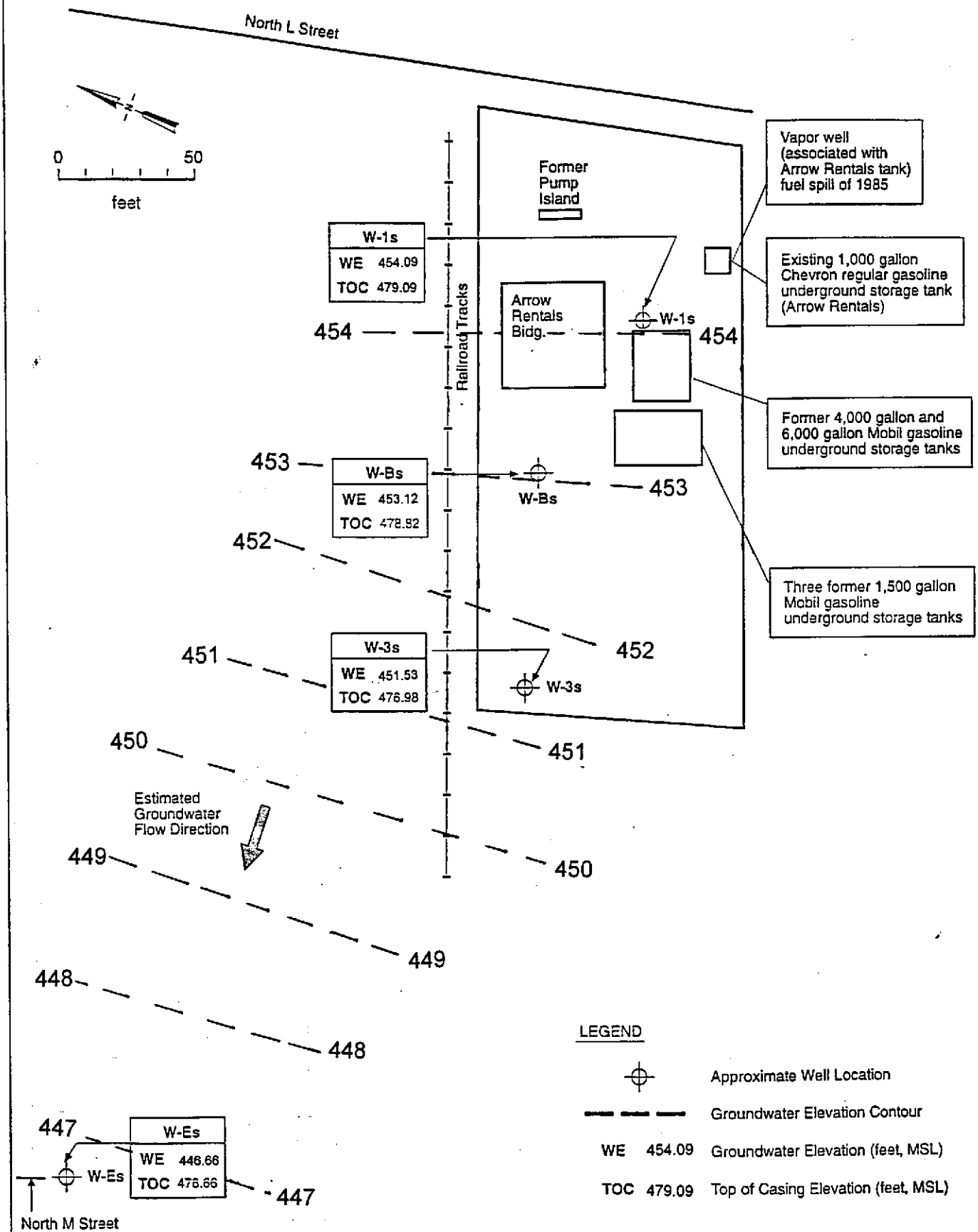
TABLE 2A
RESULTS OF LABORATORY ANALYSES OF GROUNDWATER FOR 3-22-96

	Chemical [µg/L]					
Location	**MTBE**	**Benzene**	**Toluene**	**Ethylbenzene**	**Total Xylenes**	**TPH-gasoline**
W-Es	<5	<0.5	<0.5	<0.5	<0.5	<50
W-1s	<500	580	470	85	1,100	6,400
W-Bs	<5000	9,800	8,000	2,200	11,000	61,000
W-3s	<5	13	6.9	5.3	14	100



Project No. 90C0321A	ARROW RENTALS 187 North L Street, Livermore, California	SITE PLAN	Figure 1
Woodward-Clyde Consultants			

90C0321A-4300/052196/gos



Project No. 90C0321A	ARROW RENTALS 187 North L Street, Livermore, California	GROUNDWATER ELEVATION CONTOUR MAP	November 1996
Woodward-Clyde Consultants			Figure 2

90C0321A-4300/052196/graphics/gos.mci

APPENDIX A
GROUNDWATER SAMPLING LOGS

WATER SAMPLE LOG

Sample No. W-1S

Project No.: 9360276A Date: 11/22/96
Project Name: ARROW RENTALS
Sample Location: W-1S
Well Description: 6"
Weather Conditions: raining
Observations / Comments: /

Quality Assurance

Sampling Method: Grundfos Pump
Method to Measure Water Level: Solinst
Pump Lines: New / (Cleaned) Bailer Lines: New / Cleaned
Method of cleaning Pump / Bailer: Alconox + Clean water
pH Meter No.: Calibrated 4.00/7.00
Specific Conductance Meter No.: Calibrated red line
Comments: /

Sampling Measurements

Water Level (below MP) at Start: 25.00 End: 25.00
Measuring Point (MP): TOC

Time	Discharge (gallons)	pH	Temp. (°C)	Specific Conductance (µmhos / cm)	Turbidity	Color	Odor	Comments
15:30	60	4.1	18	1000	high	NA	gas	strong gas smell
15:35	65	3.9	↓	1000	↓	↓	↓	↓
15:40	70	3.9		995				
15:45	75	3.9		995				
15:50	80	2.3		995				

Total Discharge: 80 gallons Casing Volumes Removed: 3
Method of disposal of discharged water: 55-gallon Drum
Number and size of sample containers filled: 3 VOAs

Collected by: Jerome Lebegue

Woodward-Clyde Consultants
500 12th Street, Suite 100, Oakland, CA 94607-4014
(415) 893-3600

WATER SAMPLE LOG

Sample No. W-BS

Project No.: 9360276A Date: 11/22/96
Project Name: ARROW RENTALS
Sample Location: W-BS
Well Description: 6"
Weather Conditions: clear /
Observations / Comments: /

Quality Assurance

Sampling Method: Grundfos Pump
Method to Measure Water Level: Solinst
Pump Lines: New / (Cleaned) Bailer Lines: New / Cleaned
Method of cleaning Pump / Bailer: Alconox + Clean water
pH Meter No.: Calibrated 4.00/7.00
Specific Conductance Meter No.: Calibrated red line
Comments: /

Sampling Measurements

Water Level (below MP) at Start: 25.7 End: 25.7
Measuring Point (MP): TOC

Time	Discharge (gallons)	pH	Temp. (°C)	Specific Conductance (µmhos / cm)	Turbidity	Color	Odor	Comments
14:15	60	3.9	18	700	high	NA	gas	gas smell
14:20	65	4.1	↓	500	↓	↓	↓	↓
14:25	70	4.0		700				
14:30	75	4.0		800				
14:35	80	4.0		700	low			

Total Discharge: 80 gallons Casing Volumes Removed: 3
Method of disposal of discharged water: 55-gallon drum
Number and size of sample containers filled: 3 VOAs

Collected by: Jerome Lebegue

Woodward-Clyde Consultants
500 12th Street, Suite 100, Oakland, CA 94607-4014
(415) 893-3600

WATER SAMPLE LOG

Sample No. W-ES

Project No.: 9360276A Date: 11/22/96

Project Name: ARROW RENTALS

Sample Location: W-ES

Well Description: 2"

Weather Conditions: raining.

Observations / Comments: /

Quality Assurance

Sampling Method: Grundfos Pump

Method to Measure Water Level: 200' Solinst

Pump Lines: (New) Cleaned Bailer Lines: New / Cleaned

Method of cleaning Pump / Bailer: Green Alconox + clean water

pH Meter No.: Calibrated 4.00/7.00

Specific Conductance Meter No.: Calibrated red-line

Comments:

Sampling Measurements

Water Level (below MP) at Start: 28 End: 28

Measuring Point (MP): TOC

Time	Discharge (gallons)	pH	Temp. (°C)	Specific Conductance (µmhos / cm)	Turbidity	Color	Odor	Comments
11:00	6	5.72	18	800	high	NA	NO	/
11:05	7	5.61	18	800	↓	↓	↓	
11:10	10	5.51	18	800				

Total Discharge: 10 gallons Casing Volumes Removed: 3

Method of disposal of discharged water: 55-gallon Drum

Number and size of sample containers filled: 3 VOAs

Collected by: Jerome Lebegue

Woodward-Clyde Consultants
500 12th Street, Suite 100, Oakland, CA 94607-4014
(415) 893-3600

WATER SAMPLE LOG

Sample No. W-3S

Project No.: 9360276A Date: 11/22/96

Project Name: ARROW RENTALS

Sample Location: W-3S

Well Description: 4"

Weather Conditions: raining

Observations / Comments: /

Quality Assurance

Sampling Method: Grundfos Pump

Method to Measure Water Level: Solinst

Pump Lines: New / (Cleaned) Bailer Lines: New / Cleaned

Method of cleaning Pump / Bailer: alconox + clean water

pH Meter No.: Calibrated 4.00/7.00

Specific Conductance Meter No.: Calibrated red Line

Comments: /

Sampling Measurements

Water Level (below MP) at Start: 25.45 End: 25.45

Measuring Point (MP): TOC

Time	Discharge (gallons)	pH	Temp. (°C)	Specific Conductance (µmhos / cm)	Turbidity	Color	Odor	Comments
13:00	30	4.2	18	800	high	NA	NO	/
13:05	35	4.0	18	700	↓	↓	↓	
13:10	40	4.0	18	700				
13:15	65	4.0	18	720				

Total Discharge: 65 gallons Casing Volumes Removed: 3

Method of disposal of discharged water: 55-gallon drum

Number and size of sample containers filled: 3 VOAs

Collected by: Jerome Lebegue

Woodward-Clyde Consultants
500 12th Street, Suite 100, Oakland, CA 94607-4014
(415) 893-3600

APPENDIX B
LABORATORY REPORTS

Inchcape Testing Services
Environmental Laboratories

1961 Concourse Drive
Suite E
San Jose, CA 95131
Tel: 408-432-8192
Fax: 408-432-8198

MR. AL RIDLEY
WOODWARD-CLYDE CONSULTANTS
500 12TH STREET, SUITE 100
OAKLAND, CA 94607-4014

Workorder # : 9611246
Date Received : 11/22/96
Project ID : 93C0276
Purchase Order: N/A

The following samples were received at Inchcape for analysis :

ANAMETRIX ID	CLIENT SAMPLE ID
9611246- 1	W-1S
9611246- 2	W-ES
9611246- 3	W-BS
9611246- 4	W-3S
9611246- 5	TBLANK

This report is organized in sections according to the specific Inchcape laboratory group which performed the analysis(es) and generated the data.

The results contained within this report relate to only the sample(s) tested. Additionally, these data should be considered in their entirety and Inchcape cannot be responsible for the detachment, separation, or otherwise partial use of this report.

Inchcape is certified by the California Department of Health Services (DHS) to perform environmental testing under Certificate Number 1234.

If you have any further questions or comments on this report, please call your project manager as soon as possible. Thank you for using Inchcape Testing Services.

Project Manager

12/06/96
Date

This report consists of 20 pages.

REPORT SUMMARY
INCHCAPE, INC. (408)432-8192

MR. AL RIDLEY
WOODWARD-CLYDE CONSULTANTS
500 12TH STREET, SUITE 100
OAKLAND, CA 94607-4014

Workorder # : 9611246
Date Received : 11/22/96
Project ID : 93C0276
Purchase Order: N/A
Department : GC
Sub-Department: TPH

SAMPLE INFORMATION:

INCHCAPE SAMPLE ID	CLIENT SAMPLE ID	MATRIX	DATE SAMPLED	METHOD
9611246- 1	W-1S	WATER	11/22/96	TPHgBTEX
9611246- 2	W-ES	WATER	11/22/96	TPHgBTEX
9611246- 3	W-BS	WATER	11/22/96	TPHgBTEX
9611246- 4	W-3S	WATER	11/22/96	TPHgBTEX
9611246- 5	TBLANK	WATER	11/22/96	TPHgBTEX

REPORT SUMMARY
INCHCAPE, INC. (408)432-8192

MR. AL RIDLEY
WOODWARD-CLYDE CONSULTANTS
500 12TH STREET, SUITE 100
OAKLAND, CA 94607-4014

Workorder # : 9611246
Date Received : 11/22/96
Project ID : 93C0276
Purchase Order: N/A
Department : GC
Sub-Department: TPH

QA/QC SUMMARY :

- All holding times have been met for the analyses reported in this section.

M. Hosseini 12/3/96
Department Supervisor Date

Chemist 12/03/96
Chemist Date

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	9611246-01	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	W-1S
Date Sampled:	11/22/96	Instrument ID:	HP4
Date Analyzed:	11/27/96	Surrogate Recovery:	105%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	2000	10000	ND
Benzene	2000	1000	13000
Toluene	2000	1000	18000
Ethylbenzene	2000	1000	3500
Total Xylenes	2000	1000	18000
Gasoline	2000	100000	170000

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	9611246-02	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	W-ES
Date Sampled:	11/22/96	Instrument ID:	HP4
Date Analyzed:	11/26/96	Surrogate Recovery:	106%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	1	5	ND
Benzene	1	0.5	24
Toluene	1	0.5	0.6
Ethylbenzene	1	0.5	1.8
Total Xylenes	1	0.5	2.2
Gasoline	1	50	280

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	9611246-03	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	W-BS
Date Sampled:	11/22/96	Instrument ID:	HP4
Date Analyzed:	11/27/96	Surrogate Recovery:	105%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	500	2500	ND
Benzene	500	250	5100
Toluene	500	250	3100
Ethylbenzene	500	250	1400
Total Xylenes	500	250	7800
Gasoline	500	25000	47000

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	9611246-04	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	W-3S
Date Sampled:	11/22/96	Instrument ID:	HP4
Date Analyzed:	11/27/96	Surrogate Recovery:	100%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	20	100	ND
Benzene	20	10	270
Toluene	20	10	29
Ethylbenzene	20	10	63
Total Xylenes	20	10	100
Gasoline	20	1000	3200

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	9611246-05	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	TBLANK
Date Sampled:	11/22/96	Instrument ID:	HP4
Date Analyzed:	11/26/96	Surrogate Recovery:	110%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	1	5	ND
Benzene	1	0.5	ND
Toluene	1	0.5	ND
Ethylbenzene	1	0.5	ND
Total Xylenes	1	0.5	ND
Gasoline	1	50	ND

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	BN2501E1	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	METHOD BLANK
Date Sampled:	N/A	Instrument ID:	HP4
Date Analyzed:	11/25/96	Surrogate Recovery:	108%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	1	5	ND
Benzene	1	0.5	ND
Toluene	1	0.5	ND
Ethylbenzene	1	0.5	ND
Total Xylenes	1	0.5	ND
Gasoline	1	50	ND

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	BN2505E1	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	METHOD BLANK
Date Sampled:	N/A	Instrument ID:	HP4
Date Analyzed:	11/26/96	Surrogate Recovery:	107%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	1	5	ND
Benzene	1	0.5	ND
Toluene	1	0.5	ND
Ethylbenzene	1	0.5	ND
Total Xylenes	1	0.5	ND
Gasoline	1	50	ND

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE WITH BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

DATA SUMMARY FORM

Laboratory ID:	BN2701E1	Client Project ID:	93C0276
Matrix:	WATER	Client Sample ID:	METHOD BLANK
Date Sampled:	N/A	Instrument ID:	HP4
Date Analyzed:	11/27/96	Surrogate Recovery:	107%
Date Released:	12/2/96	Concentration Units:	ug/L

COMPOUND	Dilution Factor	Reporting Limit	Amount Found
MtBE	1	5	ND
Benzene	1	0.5	ND
Toluene	1	0.5	ND
Ethylbenzene	1	0.5	ND
Total Xylenes	1	0.5	ND
Gasoline	1	50	ND

ND: Not detected at or above the reporting limit for the method.

TPHg: Total Petroleum Hydrocarbons as gasoline is determined by GC/FID (modified EPA Method 8015) following sample purge and trap by EPA Method 5030

BTEX: BTEX as Methyl tert-Butyl Ether, Benzene, Toluene, Ethylbenzene, and Total Xylenes is determined by GC/PID (modified EPA Method 8021) following sample purge and trap by EPA Method 5030.

Surrogate recovery quality control limits for p-Bromofluorobenzene are 61-139%.

All testing procedures follow California Department of Health Services approved methods.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

LABORATORY CONTROL SAMPLE REPORT

Client Project ID:	93C0276	Laboratory ID:	MN2501E1
Matrix:	WATER	Date Released:	12/2/96
Date Analyzed:	11/25/96	Instrument ID:	HP4
		Concentration Units:	ug/L

COMPOUND NAME	SPIKE AMT	LCS CONC	%REC LCS
Gasoline	400	440	110%
p-Bromofluorobenzene			112%

Quality control limits for gasoline LCS recovery are 67-127%

Quality control limits for p-Bromofluorobenzene recovery are 61-139%.

TOTAL PETROLEUM HYDROCARBONS AS BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

LABORATORY CONTROL SAMPLE REPORT

Client Project ID:	93C0276	Laboratory ID:	NN2501E3
Matrix:	WATER	Date Released:	12/2/96
Date Analyzed:	11/25/96	Instrument ID:	HP4
		Concentration Units:	ug/L

COMPOUND NAME	SPIKE AMT	LCS CONC	%REC LCS
Methyl tert-butyl ether	10.0	9.1	91%
Benzene	10.0	9.4	94%
Toluene	10.0	10.1	101%
Ethylbenzene	10.0	10.7	107%
Total Xylenes	10.0	10.7	107%
p-Bromofluorobenzene			103%

Quality control limits for LCS recovery are 50-150% for MTBE, 52-133% for benzene, 57-136% for toluene, 56-139% for ethylbenzene, and 56-141% for total xylenes.

Quality control limits for p-Bromofluorobenzene recovery are 61-139%.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES
(408) 432-8192

LABORATORY CONTROL SAMPLE REPORT

Client Project ID:	93C0276	Laboratory ID:	MN2601E1
Matrix:	WATER	Date Released:	12/2/96
Date Analyzed:	11/26/96	Instrument ID:	HP4
		Concentration Units:	ug/L

COMPOUND NAME	SPIKE AMT	LCS CONC	%REC LCS
Gasoline	400	410	103%
p-Bromofluorobenzene			92%

Quality control limits for gasoline LCS recovery are 67-127%

Quality control limits for p-Bromofluorobenzene recovery are 61-139%.

TOTAL PETROLEUM HYDROCARBONS AS BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

LABORATORY CONTROL SAMPLE REPORT

Client Project ID:	93C0276	Laboratory ID:	NN2601E3
Matrix:	WATER	Date Released:	12/2/96
Date Analyzed:	11/26/96	Instrument ID:	HP4
		Concentration Units:	ug/L

COMPOUND NAME	SPIKE AMT	LCS CONC	%REC LCS
Methyl tert-butyl ether	10.0	8.4	84%
Benzene	10.0	8.1	81%
Toluene	10.0	8.7	87%
Ethylbenzene	10.0	9.2	92%
Total Xylenes	10.0	9.3	93%
p-Bromofluorobenzene			106%

Quality control limits for LCS recovery are 50-150% for MTBE, 52-133% for benzene, 57-136% for toluene, 56-139% for ethylbenzene, and 56-141% for total xylenes.

Quality control limits for p-Bromofluorobenzene recovery are 61-139%.

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

LABORATORY CONTROL SAMPLE REPORT

Client Project ID:	93C0276	Laboratory ID:	MN2701E1
Matrix:	WATER	Date Released:	12/2/96
Date Analyzed:	11/27/96	Instrument ID:	HP4
		Concentration Units:	ug/L

COMPOUND NAME	SPIKE AMT	LCS CONC	%REC LCS
Gasoline	400	440	110%
p-Bromofluorobenzene			98%

Quality control limits for gasoline LCS recovery are 67-127%

Quality control limits for p-Bromofluorobenzene recovery are 61-139%.

TOTAL PETROLEUM HYDROCARBONS AS BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES
(408) 432-8192

LABORATORY CONTROL SAMPLE REPORT

Client Project ID:	93C0276	Laboratory ID:	NN2701E3
Matrix:	WATER	Date Released:	12/2/96
Date Analyzed:	11/27/96	Instrument ID:	HP4
		Concentration Units:	ug/L

COMPOUND NAME	SPIKE AMT	LCS CONC	%REC LCS
Methyl tert-butyl ether	10.0	9.2	92%
Benzene	10.0	8.8	88%
Toluene	10.0	9.7	97%
Ethylbenzene	10.0	10.6	106%
Total Xylenes	10.0	10.4	104%
p-Bromofluorobenzene			104%

Quality control limits for LCS recovery are 50-150% for MTBE, 52-133% for benzene, 57-136% for toluene, 56-139% for ethylbenzene, and 56-141% for total xylenes.

Quality control limits for p-Bromofluorobenzene recovery are 61-139%.

TOTAL PETROLEUM HYDROCARBONS AS BTEX

INCHCAPE TESTING SERVICES/ ENVIRONMENTAL LABORATORIES

(408) 432-8192

MATRIX SPIKE RECOVERY REPORT

Client Project ID:	93C0276	Laboratory ID:	9611222-03
Client Sample ID:	88W10	Date Released:	12/4/96
Date Sampled:	11/21/96	Instrument ID:	HP4
Date Analyzed:	11/26/96	Matrix:	WATER
		Concentration Units:	ug/L

COMPOUND NAME	SPIKE AMT	SAMPLE CONC	MS CONC	% REC MS	MSD CONC	%REC MSD	RPD
MTBE	250	0	260	104%	250	100%	4%
Benzene	250	230	400	68%	440	84%	10%
Toluene	250	50	250	80%	290	96%	15%
Ethylbenzene	250	99	320	88%	360	104%	-12%
Total Xylenes	250	280	460	72%	500	88%	-8%
p-Bromofluorobenzene				98%		99%	

Quality control limits for MS/MSD recovery are 50-150% for MTBE, 45-139% for benzene, 51-138% for toluene, 48-146% for ethylbenzene, and 50-139% for total xylenes.

Quality control limits for RPD(relative percent difference) are +/- 30%.

Quality control limits for p-Bromofluorobenzene recovery are 61-139%.

9611246 6°C

Woodward-Clyde Consultants
500 12th Street, Suite 100, Oakland, CA 94607-4014
(510) 893-3600

Chain of Custody Record

PROJECT NO. 9360276

SAMPLERS: (Signature) Jerome Lebeque

DATE	TIME	SAMPLE NUMBER	Sample Matrix (S)oil, (W)ater, (A)ir	ANALYSES: EPA Method 8015 (TPH-gas + MTBE)	EPA Method 8020 (BTEX)	EPA Method	EPA Method	Number of Containers	REMARKS (Sample preservation, handling procedures, etc.)
11/21/96	15:30	W-1S	W	X	X			1	4 Samples for:
	11:00	W-ES	W	X	X			1	- TPH-gasoline
	14:15	W-BS	W	X	X			1	- BTEX
	13:00	W-3S	W	X	X			1	- MTBE
		TRIPBLANK		X	X			1	

Questions/Results:
Al Ridley
(510) 874 3125

TOTAL NUMBER OF CONTAINERS: 4

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)
	11/22/96 17:15				

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER: (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
				11/22 1725

Inchcape Testing Services
Environmental Laboratories

1961 Concourse Drive
Suite E
San Jose, CA 95131
Tel: 408-432-8192
Fax: 408-432-8198

SAMPLE RECEIVING CHECKLIST

Workorder Number: 9611246	*Client Project ID:* 93C0276	*Quote Number:*

Cooler			
Shipping documentation present? If YES, enter Carrier and Airbill #:	YES	NO	(N/A)
Custody Seal on the outside of cooler? *Condition*: Intact Broken	YES	NO	(N/A)
Temperature of sample(s) within range? List temperatures of cooler(s): 6 °C **Note:** If all samples taken within previous 4 hr, circle N/A and place in sample storage area as soon as possible.	(YES) IR-1	NO Temp Blank	N/A ____
Samples			
Chain of custody seal present for each container? *Condition*: Intact Broken	YES	NO	(N/A)
Samples arrived within holding time?	(YES)	NO	N/A
Samples in proper containers for methods requested? *Condition of containers*: (Intact) Broken If NO, were samples transferred to proper container(s)? Yes No	(YES)	NO	
VOA containers received with zero headspace or bubbles < 6 mm?	(YES)	NO	N/A
Container labels complete? (ID, date, time, preservative)	(YES)	NO	N/A
Samples properly preserved? If NO, was the preservative added at time of receipt? Yes No	(YES)	NO	N/A
pH check of samples required at time of receipt?(volatiles checked at analysis) If YES, pH checked and recorded by:	YES	(NO)	
Sufficient amount of sample received for methods requested? If NO, has the client or PM been notified? Yes No	(YES)	NO	
Field blanks received with sample batch?	YES	NO	(N/A)
Trip blanks received with sample batch?	(YES)	NO	N/A
Chain of Custody			
Chain of custody form received with samples?	(YES)		NO
Has it been filled out completely and in ink?	(YES)		NO
Sample IDs on chain of custody form agree with labels?	(YES)		NO
Number of containers on chain agree with number received?	YES		(NO)
Analysis methods specified?	(YES)		NO
Sampling date and time indicated?	(YES)		NO
Proper signatures of sampler, courier and custodian in appropriate spaces? With time and date? (Yes) No	(YES)		NO
Turnaround time? (Standard) Rush			

Any NO responses and/or any BROKEN that was checked must be detailed in a Corrective Action Form.

Sample Custodian: JP Date: 11-22-96 Project Manager: [signature] Date: 11/25/96

f:\forms\newscr2.doc