PORT OF OAKLAND

Re: 414

November 5, 1998

Mr. Barney Chan
Alameda County Health Care Services Agency
Environmental Protection Division
1131 Harbor Bay Parkway, #250
Alameda, CA 94502-6577

1049

SUBJECT: RESULTS OF ADDITIONAL SITE INVESTIGATION
UNITED AIRLINES HANGAR AREA - ECONOMY PARKING LOT
METROPOLITAN OAKLAND INTERNATIONAL AIRPORT, SOUTH FIELD
1100 AIRPORT DRIVE, OAKLAND, CALIFORNIA

Dear Mr. Chan:

Enclosed is a copy of the October 21, 1998 *Results of Additional Site Investigation, United Airlines Hangar Area - Economy Parking Lot Site, Municipal Oakland International Airport (MOIA)*, 1100 Airport Drive, Oakland, California. Site investigation activities were performed by Innovative Technical Solutions, Inc. (ITSI), one of the former "as-needed" consultants retained by the Port of Oakland (Port).

For you information, the Port is in the process of retaining a new "as-needed" consultant to perform the next phase of the site investigation, namely the introduction of oxygen-releasing compounds (ORC's), and to continue the quarterly groundwater monitoring program.

Should you have any questions or need additional information, please contact me at 272-1118. Thank you for your on-going assistance and support on this project.

Sincerely,

Dale Klettke

Dale Klettke, CHMM
Associate Environmental Scientist
Environmental Health & Safety Compliance

enclosure

c: Neil Werner - EH & SC (w/o enc)
Files - EH & SC (w/o enc)
Jeff Hess - ITSI (w/o enc)

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INNOVATIVE TECHNICAL SOLUTIONS, Inc.

ITSI

Ro 419

October 21, 1998

Project No. 95-113.53

Mr. Dale Klettke
Associate Environmental Scientist
Port of Oakland
530 Water Street
Oakland, California 94607

Results of Additional Site Investigation
United Airlines Hangar Area - Economy Parking Lot
Municipal Oakland International Airport (MOIA), South field
1100 Airport Drive
Oakland, California
(Work Order No. 028691)

Dear Mr. Klettke:

Innovative Technical Solutions, Inc. (ITSI) is pleased to provide the results of a soils and groundwater investigation conducted in the area of two former underground storage tanks (USTs) at the United Airlines Hangar Area - Economy Parking Lot, 1100 Airport Drive in Oakland, California. This investigation was performed on behalf of the Port of Oakland to further characterize the lateral extent of soil and groundwater containing petroleum hydrocarbons and volatile organic compounds identified during previous investigations.

Figure 1 shows the approximate location of the site, and Figure 2 shows the general site layout. Field activities were performed during the period of March through May 1998, and were performed as outlined in our December 16, 1997 *Workplan for Additional Site Investigation, Former USTs MF25 and MF26, United Airlines Hanger-Economy Parking Lot Site.*

BACKGROUND

Phase I and Phase II soil investigations were performed in 1988 by BASELINE in the area of two underground storage tanks (USTs) MF-25 and MF-26 formerly used for the storage of waste oil and solvents. Petroleum hydrocarbons reported as gasoline and jet fuel were identified in soil samples in the area of the USTs.

1330 Broadway, Suite 1625, Oakland, CA 94612 (510) 286-8888 (510) 286-8889 fax

The USTs were removed in March 1992. Approximately 700 cubic yards of impacted soil was removed and confirmation soil samples were collected following removal of the soil. Monitoring well MW-1 was installed in 1992. TPHd and TPHmo were reported in elevated concentrations in MW-1. Two additional monitoring wells were installed in 1995. Free product was reported in MW-2 and MW-3 starting in 1996.

As part of discussions for closure of this site and adjoining taxiway site with Alameda County, additional characterization of the site was requested, along with recovery of free product. In response, previous activities at the site were reviewed, and an approach was developed for addressing Alameda County concerns, as presented in *Findings and Recommendations, Tanks MF25 and MF26, United Airlines Hangar-Economy Parking Lot Site,* dated April 25, 1997.

Completed activities included the following:

- Redeveloped the existing three monitoring wells at the site.
- Collected a product sample from two monitoring wells for fuel-fingerprint analysis at the time of well development.
- Completed July 1997 quarterly monitoring event.

Results of the above activities were discussed in the quarterly monitoring report for July 1997[1], and are briefly summarized below.

Product samples of free product collected during redevelopment of the monitoring wells were submitted for fuel fingerprinting at Curtis and Tompkins. According to Curtis and Tompkins, the chromatograms for the free product samples are reportedly consistent with the JP-5 laboratory standard. Also, chromatograms for both samples contained peaks from heavier petroleum hydrocarbons (approximately C_{26} to C_{30}) which did not match any of their fuel standards.

After redevelopment of the existing monitoring wells, free product was not observed. The monitoring wells will continue to be monitored for free product during future quarterly monitoring events.

Following receipt of the analytical results for free product samples, the chromatograms for groundwater samples collected during July 1997 quarterly monitoring and sampling were re-evaluated by Pace Analytical. The chromatograms for extractable petroleum hydrocarbons were consistent with JP-5 jet fuel.

PROPOSED SCOPE OF WORK

The proposed scope of work included the following tasks:

[1] *Groundwater Monitoring and Sampling Report, Tanks MF25 and MF26, United Airlines Hangar - Economy Parking Lot Site*, Innovative Technical Solutions, Inc., November 17, 1997.

- Prepare site-specific Health and Safety Plan.
- Field meet with airport operations, plan and coordinate field activities, and obtain drilling permit from City of Oakland.
- Notify USA and perform subsurface utility clearance of the proposed locations using an independent underground utility locator.
- Installation of four monitoring wells and one remediation well, and reconstruction of existing monitoring well MW-2. Collect soil and groundwater samples and coordinate delivery of samples to laboratory.
- Develop and sample monitoring wells and coordinate delivery of samples to laboratory.
- Survey the vertical and horizontal location of the new and existing monitoring wells.
- Prepare a draft and final report which documents the investigation activities and findings.
- Develop appropriate methodology for use of oxygen-releasing compounds (ORCs), and initiate placement into groundwater, as appropriate.

FIELD ACTIVITIES

Field activities performed as part of this investigation are discussed below.

Health and Safety

A site-specific Health and Safety Plan was prepared for the field activities by Environmental Health Consultants, and was signed and approved on April 4, 1998 by Ms. Irene Fanelli, CIH. Field activities were performed consistent with requirements of the Health and Safety Plan. A copy of the Health and Safety Plan is included as Attachment A.

Subsurface Utility Clearance

On March 26, 1998, soil boring and monitoring well locations were outlined in the field for Underground Service Alert (USA) utility clearance. Additionally, California Utility Surveys (CUS), an independent utility locating contractor, was utilized to clear the locations of the proposed soil boring and monitoring well.

Drilling of Soil Borings and Collection of Soil Samples

On May 5, 1998, five soil borings were drilled by Exploration Drilling Services, Inc. (EDS) using a drilling rig equipped with hollow-stem flight augers. The borings were drilled under permit number 97WR114 from Alameda County Public Works Agency. A copy of the permit is included in Attachment B.

Soil samples were collected from the five soil borings at depths of approximately 1.5 to 2.0 feet below ground surface (bgs). Soil samples were collected using a spilt spoon sampler equipped

with three, 6-inch long by 2-inch diameter, clean brass sleeves driven with a 140-pound hammer into undisturbed soil. The bottom brass sleeve sample was then capped with Teflon patches and plastic friction caps, properly labeled, and placed in an iced cooler for transport to the laboratory. The samples were logged by a field geologist according to the Unified Soils Classification System (USCS). Copies of the boring logs are included in Attachment C.

The soil samples were submitted to Curtis and Tompkins, Ltd., a California-certified analytical laboratory located in Berkeley, California. The soil samples were analyzed for the following:

- Total petroleum hydrocarbons as gasoline (TPHg) by Modified EPA Method 8015.
- Benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA Method 8020.
- TPH as diesel (TPHd), JP5 (TPHj), and motor oil (TPHmo) by Modified EPA Method 8015 with silica gel cleanup.
- Purgable halocarbons by EPA Method 8010.

Selected soil samples were screened in the field using an organic vapor meter equipped with photoionization detector (PID) by placing a small portion of the soil in a sealed container. The concentration of organic vapor in the headspace of the container was then measured with the PID, and the concentration recorded on the boring log.

Construction of Monitoring Wells

Following drilling, monitoring wells were constructed in the five soil borings. Monitoring wells were completed with Schedule 40, polyvinyl chloride (PVC) casing, 0.010-inch machine-cut screen, #3 Lonestar sand, Enviroplug bentonite pellets, neat cement grout, locking compression well caps, and heavy duty, traffic-rated Emco Wheaton well boxes set in concrete placed flush with the surrounding surface.

Completion information is summarized below, and well construction details are provided on the boring logs.

Monitoring Well ID	Casing Diameter (inches)	Total Depth (feet bgs)	Screen Interval (feet bgs)	Sand Interval (feet bgs)	Bentonite Interval (feet bgs)	Surface Seal (feet bgs)
MW-4	4	10	2-10	1.5-2	1.33-1.5	0-1.33
MW-5	2	8	2-8	1.5-2	1.33-1.5	0-1.33
MW-6	2	8	2-8	1.5-2	1.33-1.5	0-1.33
MW-7	2	8.5	2-8.5	1.5-2	1.33-1.5	0-1.33
MW-8	2	9.5	2-9.5	1.5-2	1.33-1.5	0-1.33

A State of California Well Completion Report was filed with Alameda County Public Works Agency on June 22, 1998.

Monitoring Well Location Survey

On May 13, 1998, the groundwater monitoring wellheads were surveyed for vertical elevation and horizontal location by PLS Surveys, Inc., a California-licensed land surveyor. The vertical elevations were surveyed relative to the Port of Oakland datum. Surveying results are shown on the survey map included in Attachment D.

Monitoring Well Development and Groundwater Sampling

On May 13, 1998, the monitoring wells were monitored, developed and sampled. The wells were initially gauged for depth to water and checked for the presence of separate phase hydrocarbons. **No separate phase hydrocarbons were observed in the monitoring wells.** The depth to water measurement was recorded on the Monitoring Well Development / Purge and Sample Form. A copy of the form is included in Attachment E. Depth to water and groundwater elevation data is summarized in Table 1. The groundwater elevation was calculated using the measured depth to water and survey elevation of top of casing. Figure 2 shows the groundwater elevation.

EDS performed well development and purging using a combination of bailer and pumping techniques. The monitoring wells were developed using a stainless steel bailer for the first approximately three to six well volumes, to remove sediment from the wells, followed by purging additional well volumes using a centrifugal pump until stability was reached. Physical parameters, including pH, electrical conductivity, and temperature, were measured following each purge cycle (approximately three well volumes). Field parameters and development data were recorded on the Monitoring Well Development / Purge and Sample Form.

Groundwater samples were then collected from the new wells after greater than 80 percent recovery of the water level in the monitoring well. The water samples were collected using clean disposable bailers and placed into laboratory provided containers. The sample containers were properly labeled and placed into an iced cooler for transport to the laboratory.

The groundwater sample was sent under chain-of-custody procedures to Curtis and Tompkins, Ltd., and were analyzed for the following:

- TPHg by Modified EPA Method 8015.
- BTEX by EPA Method 8020.
- TPHd, TPHj, and TPHmo by Modified EPA Method 8015 with silica gel cleanup procedure.
- Purgable halocarbons by EPA Method 8010.
- Ferrous/Ferric Iron, Nitrate, Sulfate, Orthophosphates, Redox/ORP
- Total Organic Carbon (TOC) by EPA Method 415.2.

Quality Assurance and Quality Control

Appropriate quality assurance and quality control (QA/QC) procedures were implemented during the soil and groundwater investigation, including:

- One field duplicate sample (designated QC-1) was collected of groundwater from MW-4 and was analyzed for volatile target compounds (TPHg and BTEX).

- Disposable sampling equipment was utilized for the collection of the groundwater sample, avoiding potential cross-contamination issues.
- Non-disposable development and sampling equipment (e.g., split spoon samplers, stainless steel bailers) were decontaminated prior to collecting each soil sample by washing with a non-phosphate detergent and double rinsing with water.

Investigation Derived Waste

Rinse and purge water from decontamination and well development activities, and soil cuttings generated during drilling, were placed in 55-gallon drums and labeled as to the source and date of accumulation. Disposal of the water and soil cuttings will be performed by the current Port of Oakland disposal contractor.

FINDINGS

Tables 2 through 5 provides a summary of laboratory results for the soil and groundwater samples, and Figures 3 through 6 show the distribution of the laboratory results. Copies of the laboratory reports, chromatograms and chain-of-custody forms are included in Attachment F.

Soil

Results of the soil sampling and analyses are summarized below:

- TPHg, benzene, toluene, ethylbenzene, and xylenes (BTEX), and TPHj were reportedly not detected in the soil samples collected.
- TPHd and TPHmo were reportedly detected in the soil sample from MW-1 (at a depth of 2 feet) at concentrations of 3.5 mg/kg and 46 mg/kg, respectively. TPHd and TPHmo were reportedly not detected in the remaining soil samples collected.
- Halogenated volatile organic compounds (HVOCs) were reportedly not detected in the soil samples collected.

Groundwater

Results of the groundwater monitoring well sampling and analyses are summarized below:

- TPHg was reportedly detected in groundwater samples from monitoring wells MW-2 and MW-4 at concentrations of 4,000 µg/l and 1,400 µg/l, respectively. TPHg was reportedly not detected in the remaining samples collected.
- Benzene, toluene, ethylbenzene and/or xylenes, were reportedly detected in groundwater samples from MW-2, MW-4, MW-7 and MW-8. Benzene was reportedly detected at concentrations above its Maximum Contaminant Level (MCL) of 1µg/l in MW-2, MW-4 and MW-8, with a high of 150 µg/l reported in the sample from MW-2.
- TPHd and TPHj were reportedly detected in groundwater samples from MW-2 and MW-4 at concentrations ranging from a low of 2,000 µg/l TPHd in MW-4 to a high of 3,400 µg/l TPHj in MW-2.
- TPHmo was reportedly not detected in the groundwater samples collected.

and total lead were reportedly not detected in the groundwater sample collected.

- HVOCs were reportedly detected in groundwater samples from MW-2, MW-4, MW-7 and MW-8, with several HVOCs reported at concentrations above their Maximum Contaminant Levels (MCLs).
- Reported results for bio-indicator parameters were generally supportive of biodegredation occurring in the groundwater. For example, electron receptor sulfate is lowest in the wells with the highest concentrations of petroleum hydrocarbons (MW-2 and MW-4), and soluble (ferrous) iron, an indicator of reduction of ferric iron, is highest in these same wells.
- TDS reportedly ranged from a low of 1,380 mg/l to a high of 8,300 mg/l in the groundwater samples collected. Several of the concentrations were reportedly in excess of the 3,000 mg/l limit for drinking water as outlined in State Water Resources Control Board Resolution No. 88-63.

The presence and distribution of HVOCs above MCLs in the groundwater beneath the site may indicate the presence of another potential source other than the former USTs at the site. For example, 1,2-DCA and vinyl chloride were only detected in upgradient monitoring well MW-8, and the reported concentrations of 1,1-DCE and 1,1-DCA were significantly higher in MW-8

POTENTIAL REMEDIAL APPROACH

The Economy Parking Lot Site is scheduled for redevelopment as part of the upcoming overall airport redevelopment activities. Given the limited distribution of petroleum hydrocarbons in the groundwater, and the planned redevelopment of the site, insitu remediation of the petroleum hydrocarbons (and HVOCs) is the recommended approach. Specifically, use of a supplemental oxygen source (e.g., oxygen-releasing compounds or hydrogen peroxide) to enhance the oxygen content of the groundwater and promote the natural biodegradation of the petroleum hydrocarbons (and HVOCs) in groundwater beneath the site is recommended.

To calculate potential supplemental oxygen requirements, several parameters are needed, including groundwater velocity, contaminant concentration, and plume dimension.

Groundwater Velocity Calculations

Groundwater velocity can be estimated using the following equation (U.S.G.S. Water-Supply Paper 2220):

$$v = \frac{K}{n}\frac{dh}{dl}$$

Where:

v = velocity
K = hydraulic conductivity
n = porosity
dh/dl = groundwater gradient

For the Economy Parking Lot Site, the hydraulic conductivity (K) is unknown, but the remaining parameters are known based on the results of recent soil testing and groundwater monitoring and sampling activities. Soil samples from three newly installed monitoring wells were collected and analyzed for grain-size distribution, porosity, and other factors. Also, groundwater monitoring and sampling of the newly installed monitoring wells provides the current groundwater gradient.

The hydraulic conductivity (in cm/sec) can be estimated using a method developed by Hazen (Freeze and Cherry):

$$K = Ad_{10}^{\ 2}$$

Where:

d_{10} = the grain size (in mm) where 90% of the particles by weight are larger in size.
A = A factor of 1 for fine-grained sand.

Selected soil samples were collected during drilling of the monitoring wells installed. The following values are the results used as part of estimation of the groundwater velocity:

Sample ID	Depth (feet)	USCS Classification	d_{10} Value (mm)	Porosity (%)
MW-4	7	SP	0.994	37.8
MW-5	5	SP-SM	0.0569	36.1
MW-8	6	SP-SM	0.0648	36.8

Values for d_{10} were consistent for two of the three samples (MW-5 and MW-8), which were most representative of the aquifer material encountered during drilling of the five monitoring wells installed. An average d_{10} value from these two samples was then used to estimate the hydraulic conductivity:

$$K = (1)0.6085^2 = 3.7x10^{-3}\frac{cm}{\sec}$$

The above value was converted to feet/day by multiplying by $2.83x10^3$.

$$K = 3.7x10^{-3}\frac{cm}{\sec}(2.83x10^3) = 10.48\frac{ft}{day}$$

Therefore, based on the estimated hydraulic conductivity above, the average porosity based on the same two samples used to estimate the hydraulic conductivity, and the groundwater gradient from the most recent monitoring and sampling activity, groundwater velocity is estimated as follows:

$$v = \frac{(10.48 \frac{ft}{day})}{0.365} \frac{(5.10' - 4.35')}{200'} = 0.11 \frac{ft}{day}$$

Oxygen Loading Calculations

There are two basic approaches to providing supplemental oxygen to the groundwater:

- Placement of oxygen-releasing compounds (ORCs) in the saturated zone
- Injection of hydrogen peroxide into the groundwater.

Oxygen-Releasing Compounds (Magnesium Peroxide)

To evaluate potential volume requirements for ORC application, ORC Application Software Version 2.0 from Regenesis Bioremediation Products (Regenesis) was used. Two approaches were modeled, use of Regenesis well socks in new monitoring well MW-4, and use of ORC grout injected using a Geoprobe-type drill rig in the area of the former tank excavation. Printouts of the results of the ORC Application Software are included in Attachment G.

Both methods were modeled using the information developed above, and using the laboratory results for samples from the monitoring wells obtained during initial sampling following well installation. The laboratory results yield a maximum total hydrocarbon level of 10.95 mg/l, inclusive of TPH and BTEX components.

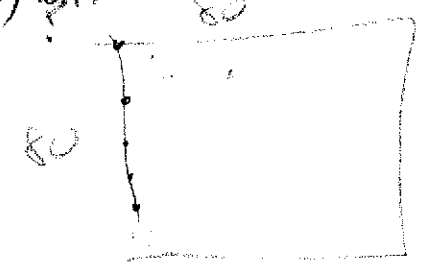
Well Socks

This approach involves placement of 4-inch diameter by 12-inch long well socks in a 4-inch monitoring well (MW-4) placed within the limits of the former tank excavation and with a saturated interval of approximately 7.5 feet. Well socks have an effective life of approximately 6 months, and yield of approximately 2.2 pounds of ORC material per well sock. With a saturated interval of 8 feet, a total of 8 one-foot well socks were specified, resulting in approximately 17.6 pounds of ORC per application or "charge".

According to the Regenesis software, the minimum number of charges for completion of remediation is 8 charges, which would result in an application of approximately 140 pounds of ORC. This would result in an approximately 4-year treatment time, assuming a 6 month life expectancy of the well socks.

ORC Grout

This approach involves injecting ORC grout via direct-push borings placed on 10-foot centers throughout the impacted zone, estimated at 80 feet by 80 feet. According to the Regenesis software, each boring would require approximately 48 pounds of ORC placed in the saturated zone. Based on 64 borings, this would result in over 3,000 pounds of ORC into the saturated zone.



34g/mole → 16g/mole
1# → 0.47 #

Hydrogen Peroxide

The injection of hydrogen peroxide into the groundwater can provide a significant source of supplemental oxygen to promote the natural biodegradation of the petroleum hydrocarbons in groundwater. A secondary advantage with hydrogen peroxide injection is that at higher concentrations it can lead to chemical oxidation of the contaminants (although at higher concentrations, hydrogen peroxide can kill the bacteria present in the soil and groundwater.)

$H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2\uparrow$

Hydrogen peroxide breaks down to water and oxygen, with one pound of hydrogen peroxide yielding approximately 0.47 pounds of oxygen. Based on an impacted zone estimated at 80 feet by 80 feet, with a 7.5-foot thick saturated interval, and a maximum contaminant concentration of 10.95 mg/l, an estimated 12 pounds of petroleum hydrocarbons are present in the impacted zone Using a ratio of 3 pounds oxygen per pound of petroleum hydrocarbon, an estimated 36 pounds of oxygen are required for biodegradation of the petroleum hydrocarbons.

With oxygen representing 47% of hydrogen peroxide, an estimated 76.5 pounds of hydrogen peroxide is required for biodegradation of 12 pounds of petroleum hydrocarbons. Application of hydrogen peroxide in excess of approximately 1% concentration may result in the destruction of much or all of the bacteria in the application zone. If applied in a 1% solution, an estimated 2,185 gallons of hydrogen peroxide solution would be required, ideally dosed over an extended period of time. Higher concentrations could be injected into the groundwater under pressure, similar to the ORC grout injection. Such an application could be performed in a single application. (problem is that the O_2 generated only a small % oxidizes HC, the rest oxidizes organics or is released to atmosphere.

RECOMMENDATIONS

Use of ORC grout (or hydrogen peroxide) would greatly reduce the overall treatment time and should provide a much more effective treatment of the impacted zone. Advantages are a single application over several days (as opposed to periodic dosing of hydrogen peroxide over time), and significant volume of ORC or hydrogen peroxide (as opposed to the limited volume of ORC in well socks). An interim approach could involve placement of an ORC well sock in MW-4 until such time as an ORC grout or hydrogen peroxide injection approach is implemented.

Additionally, continued groundwater monitoring should be performed to monitor HVOC concentrations and evaluate the potential for an additional source other than the former UST's.

Please feel free to give us a call if you have any questions or need additional information.

Sincerely,

Jeffrey D. Hess, R.G.
Project Director

REGISTERED GEOLOGIST JEFFREY D. HESS No. 4776 Exp. 4/00 STATE OF CALIFORNIA

Attachments

TABLE 1

GROUNDWATER ELEVATIONS IN NEWLY INSTALLED MONITORING WELLS
TANKS MF25 AND MF26 (UNITED AIRLINES HANGAR - ECONOMY PARKING LOT)
METROPOLITAN OAKLAND INTERNATIONAL AIRPORT (MOIA)
1100 AIRPORT DRIVE
OAKLAND, CALIFORNIA

Monitoring Well ID	Elevation of Top of Casing (feet)	Date of Monitoring	Measured Depth to Water (feet)	Product Thickness (feet)	Groundwater Elevation (feet)	Note
MW-2	6.58	5/13/98	1.80	sheen	4.78	1
MW-4	6.92	5/13/98	2.01	sheen	4.91	
MW-5	5.79	5/13/98	1.05	-	4.74	
MW-6	6.39	5/13/98	1.91	-	4.48	
MW-7	5.86	5/13/98	1.51	-	4.35	
MW-8	7.56	5/13/98	2.46	-	5.10	

1- Monitoring well was drilled out and reconstructed per original specifications.

TABLE 2

SUMMARY OF LABORATORY RESULTS FOR PETROLEUM HYDROCARBONS IN SOIL
TANKS MF25 AND MF26 (UNITED AIRLINES HANGAR AREA - ECONOMY PARKING LOT)
METROPOLITAN OAKLAND INTERNATIONAL AIRPORT (MOIA)
1100 AIRPORT DRIVE
OAKLAND, CALIFORNIA

Monitoring Well ID	Depth of Sample (feet)	Date of Sampling	TPHg (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	TPHj (mg/kg)	TPHd (mg/kg)	TPHmo (mg/kg)
MW-4	2	5/5/98	<1	<0.005	<0.005	<0.005	<0.01	<1	**3.5**[1,2]	**46**[1,2]
MW-5	2	5/5/98	<1	<0.005	<0.005	<0.005	<0.01	<1	<1	<5
MW-6	2	5/5/98	<1	<0.005	<0.005	<0.005	<0.01	<1	<1	<5
MW-7	1.5	5/5/98	<1	<0.005	<0.005	<0.005	<0.01	<1	<1	<5
MW-8	2	5/5/98	<1	<0.005	<0.005	<0.005	<0.01	<1	<1	<5

Note: Bold values indicate detected concentrations.

1 Hydrocarbons present do not match profile of laboratory standard.

2 Hydrocarbons are heavier than indicated standard.

TABLE 3

SUMMARY OF LABORATORY RESULTS FOR PETROLEUM HYDROCARBONS IN GROUNDWATER TANKS MF25 AND MF26 (UNITED AIRLINES HANGAR AREA - ECONOMY PARKING LOT) METROPOLITAN OAKLAND INTERNATIONAL AIRPORT (MOIA) 1100 AIRPORT DRIVE OAKLAND, CALIFORNIA

Monitoring Well ID	Date of Sampling	TPHg (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethylbenzene (µg/l)	Xylenes (µg/l)	TPHj (µg/l)	TPHd (µg/l)	TPHmo (µg/l)
MW-1	3/26/98	<50	<0.5	<0.5	<0.5	<1	<48	<48	<290
MW-2	5/13/98	**4,000**	**150**	**270**	**94**	**440**	**3,400**	**2,600**[1,2]	<290
MW-3	3/26/98	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]
MW-4	5/13/98	**1,400**	**9.8**	**23**	**13**	**79**	**2,300**	**2,000**[1,2]	<310
MW-5	5/13/98	<50	<0.5	<0.5	<0.5	<1	<50	<50	<300
MW-6	5/13/98	<50	<0.5	<0.5	<0.5	<1	<48	<48	<290
MW-7	5/13/98	<50	<0.5	**0.6**	<0.5	<1	<51	<51	<310
MW-8	5/13/98	<50	**2**	<0.5	<0.5	<1	<47	<47	<280
MCLs		-	1	150	700	1,750	-	-	-

Note: Laboratory results represent the highest concentrations reported for either the sample or field duplicate sample (QC-1).
Bold values indicate detected concentrations, shaded values indicate concentrations above MCLs.
Laboratory data for MW-1 and MW-3 from quarterly monitoring activities in March 1998.

1 Hydrocarbons present do not match profile of laboratory standard.

2 Hydrocarbons are lighter than indicated standard.

3 Not analyzed due to the presence of free product.

Total TPH ≥ 4
3.4
2.6
1.4
2.3
2
5.7mg/l

ITSI

TABLE 4

SUMMARY OF LABORATORY RESULTS FOR HALOGENATED VOLATILE ORGANICS IN GROUNDWATER TANKS MF25 AND MF26 (UNITED AIRLINES HANGAR AREA - ECONOMY PARKING LOT) METROPOLITAN OAKLAND INTERNATIONAL AIRPORT (MOIA) 1100 AIRPORT DRIVE OAKLAND, CALIFORNIA

Monitoring Well ID	Date of Sampling	Vinyl Chloride (µg/l)	1,1-DCE (µg/l)	1,1-DCA (µg/l)	cis-1,2-DCE (µg/l)	1,2-DCA (µg/l)	Chloroethane (µg/l)	PCE (µg/l)
MW-1	3/26/98	<2	<1	5.3	8.1	<1	<1	<1
MW-2	5/13/98	<2	<1	51	140	<1	3.4	<1
MW-3	3/26/98	[3]	[3]	[3]	[3]	[3]	[3]	[3]
MW-4	5/13/98	<2	<1	31	9.9	<1	2.8	2.8
MW-5	5/13/98	<2	<1	<1	<1	<1	<2	<1
MW-6	5/13/98	<2	<1	<1	<1	<1	<2	<1
MW-7	5/13/98	<2	3.4	8.0	<1	<1	<2	<1
MW-8	5/13/98	6.0	180	180	1.9	2.7	<2	<1
MCLs (California/Federal)		0.5/2	6/7	5/-	6/70	0.5/5	-/-	5/5

Note: Laboratory results represent the highest concentrations reported for either the sample or field duplicate sample (QC-1).
Bold values indicate detected concentrations, shaded values indicate concentrations above MCLs.
Laboratory data for MW-1 and MW-3 from quarterly monitoring activities in March 1998.

1 Hydrocarbons present do not match profile of laboratory standard.

2 Hydrocarbons are lighter than indicated standard.

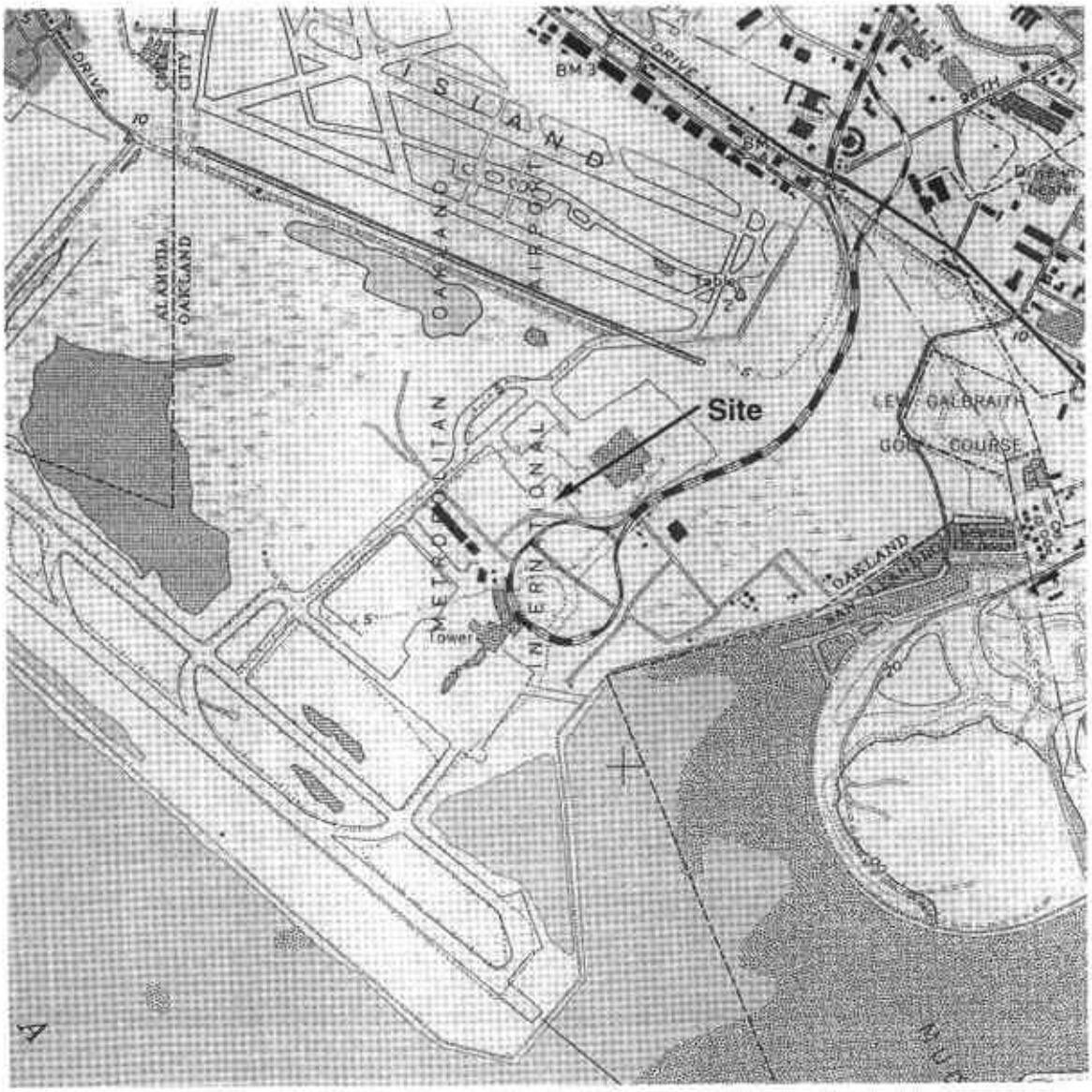
TABLE 5

SUMMARY OF LABORATORY RESULTS FOR INORGANIC ANALYSES IN GROUNDWATER TANKS MF25 AND MF26 (UNITED AIRLINES HANGAR AREA - ECONOMY PARKING LOT) METROPOLITAN OAKLAND INTERNATIONAL AIRPORT (MOIA) 1100 AIRPORT DRIVE OAKLAND, CALIFORNIA

Monitoring Well ID	Date of Sampling	Ferrous Iron-Fe^{2+} (mg/l)	Ferric Iron-Fe^{3+} (mg/l)	Nitrogen, Nitrate (mg/l)	Sulfate (mg/l)	Ortho-phosphate (mg/l)	TOC (mg/l)	REDOX (millivolts)	TDS (mg/l)
MW-1	3/26/98	0.41	2.1	<0.2	110	-	-	-	3,240
MW-2	5/13/98	0.53	8.0	<0.05	12	0.72	76	123	1,860
MW-3	3/26/98	-[1]	-[1]	-[1]	-[1]	-	-	-	-[1]
MW-4	5/13/98	0.53	2.9	<0.05	20	2.1	66	168	1,420
MW-5	5/13/98	<0.2	0.7	0.36	250	0.47	20	150	2,300
MW-6	5/13/98	<0.2	0.69	2.1	400	0.15	13	126	4,240
MW-7	5/13/98	<0.2	0.62	0.9	100	<0.03	7	132	1,380
MW-8	5/13/98	<0.2	2.2	<0.5	500	0.08	9.9	60.4	8,300

* Laboratory results represent the highest concentrations reported for either the sample or field duplicate sample (QC-1).

1 Not sampled due to presence of free product in monitoring well.



0 2,000 Feet 4,000 Feet

Approximate Scale

FIGURE 1

SITE LOCATION MAP

United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

INNOVATIVE TECHNICAL SOLUTIONS, INC.

Source: San Leandro, California 7.5-minute U.S.G.S. Quadrangle, dated 1959, and photorevised 1980

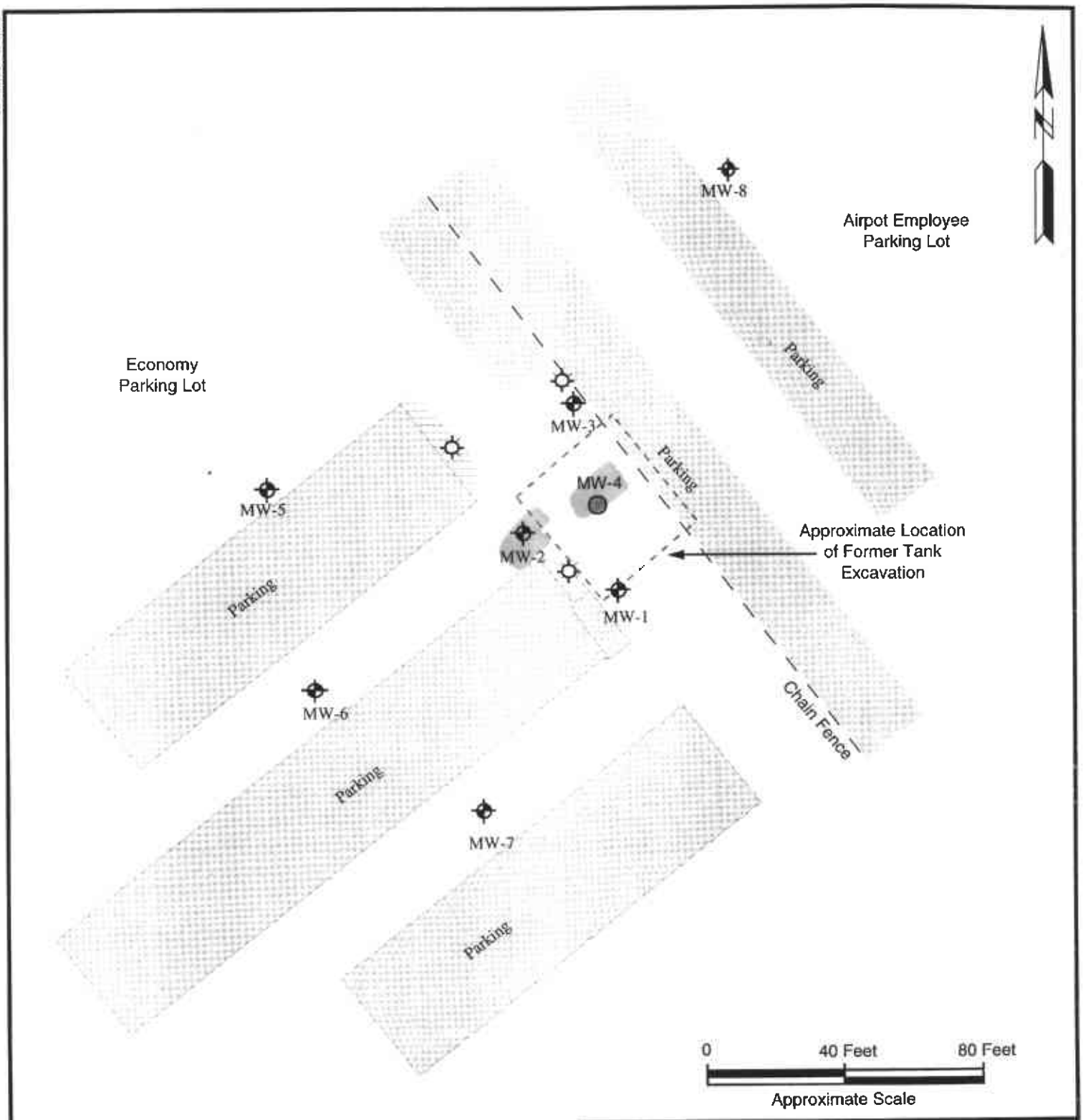


FIGURE 2

APPROXIMATE LOCATIONS OF NEW AND EXISTING MONITORING WELLS

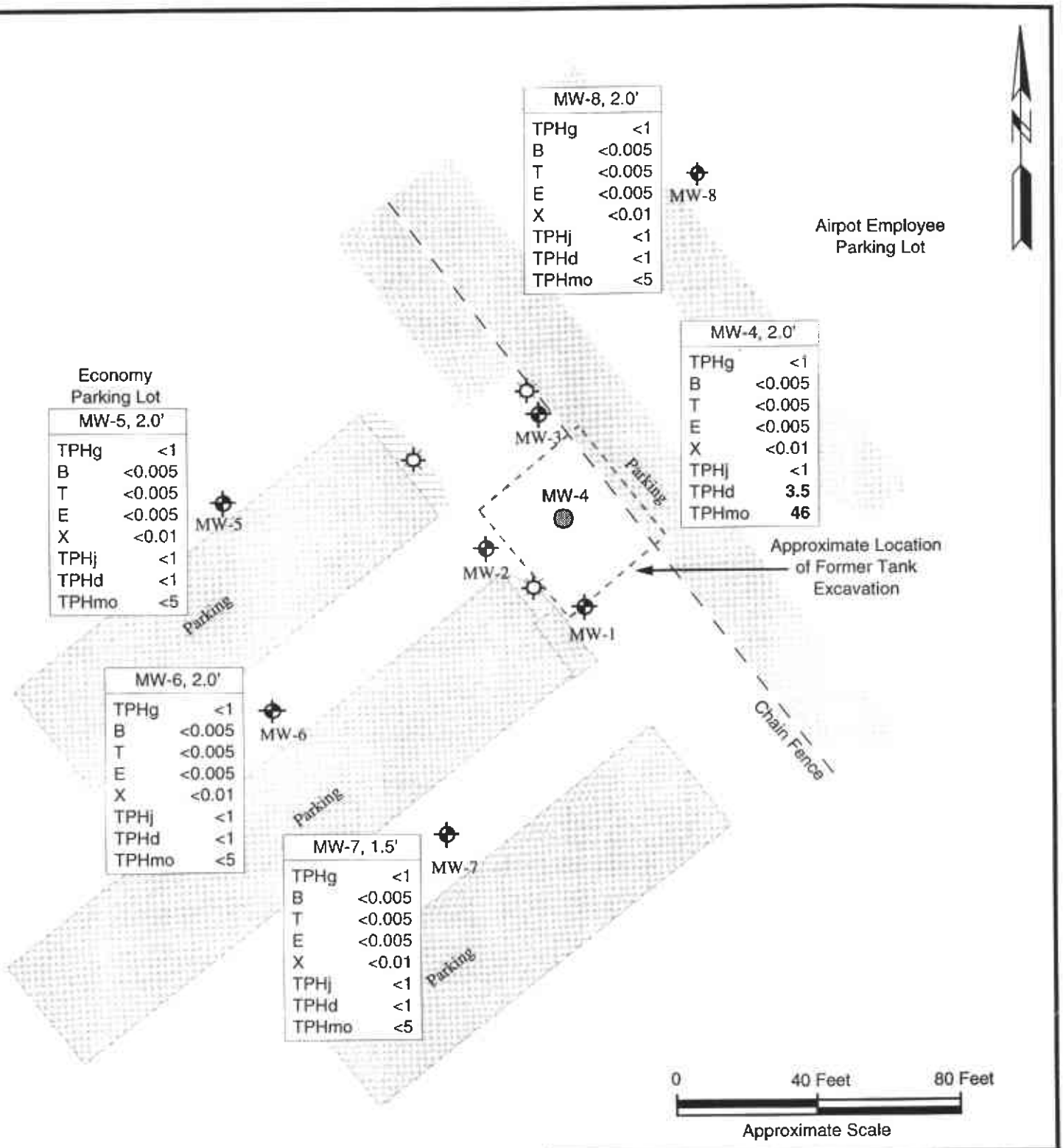
United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

95-113.53/F 2-Wells



Legend

- Monitoring Well
- Remediation Well
- Light Pole

TPH AND BTEX Concentrations in mg/kg from Soil Samples Collected on May 5, 1998

FIGURE 3

PETROLEUM HYDROCARBONS IN SOIL IN NEWLY INSTALLED MONITORING WELLS

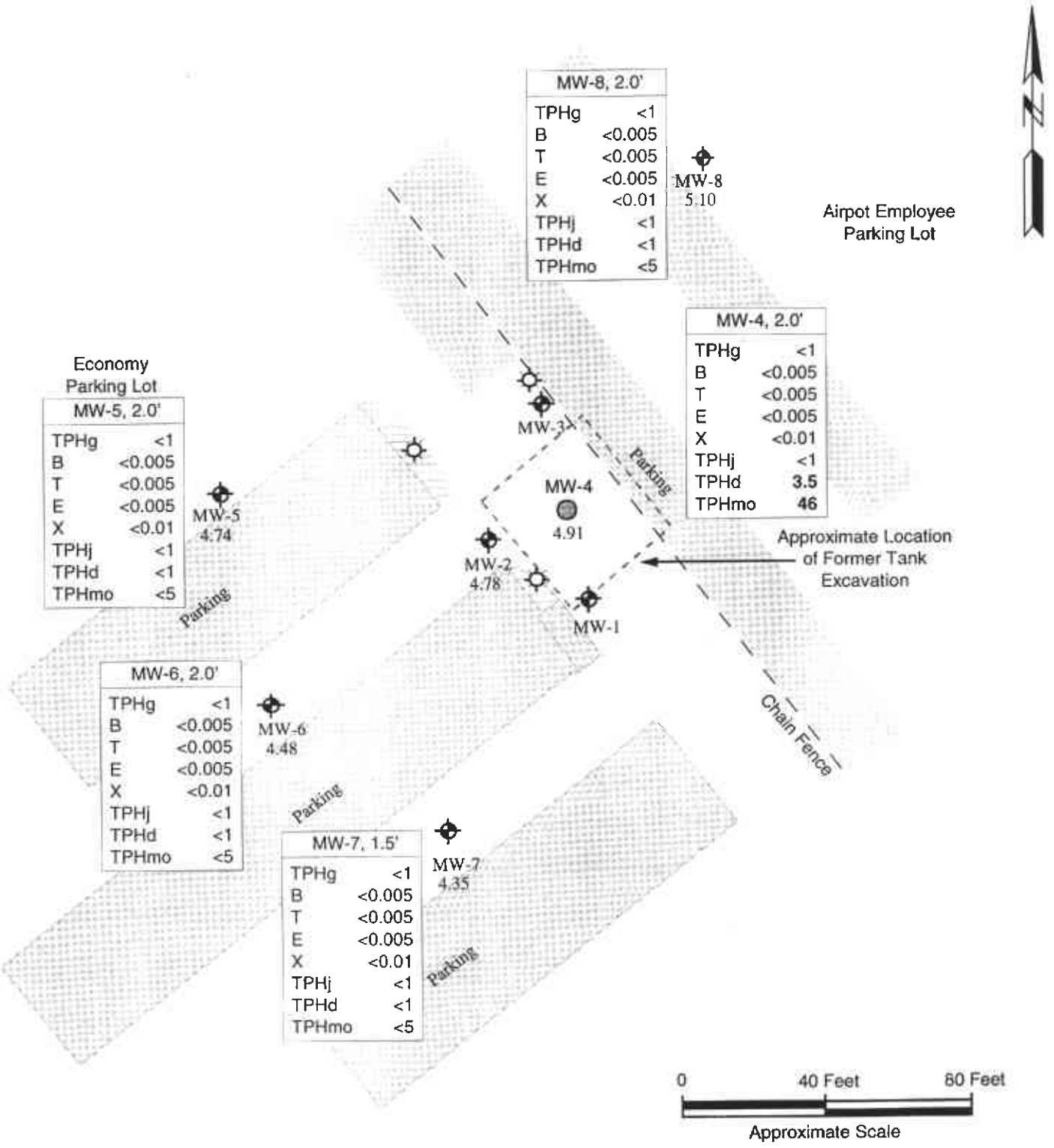
United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

95-113.59/F-2-Wells



Legend

- Monitoring Well
- Remediation Well
- Light Pole

Groundwater Elevations as Measured on May 13, 1998

FIGURE 4

GROUNDWATER ELEVATIONS IN NEWLY INSTALLED MONITORING WELLS

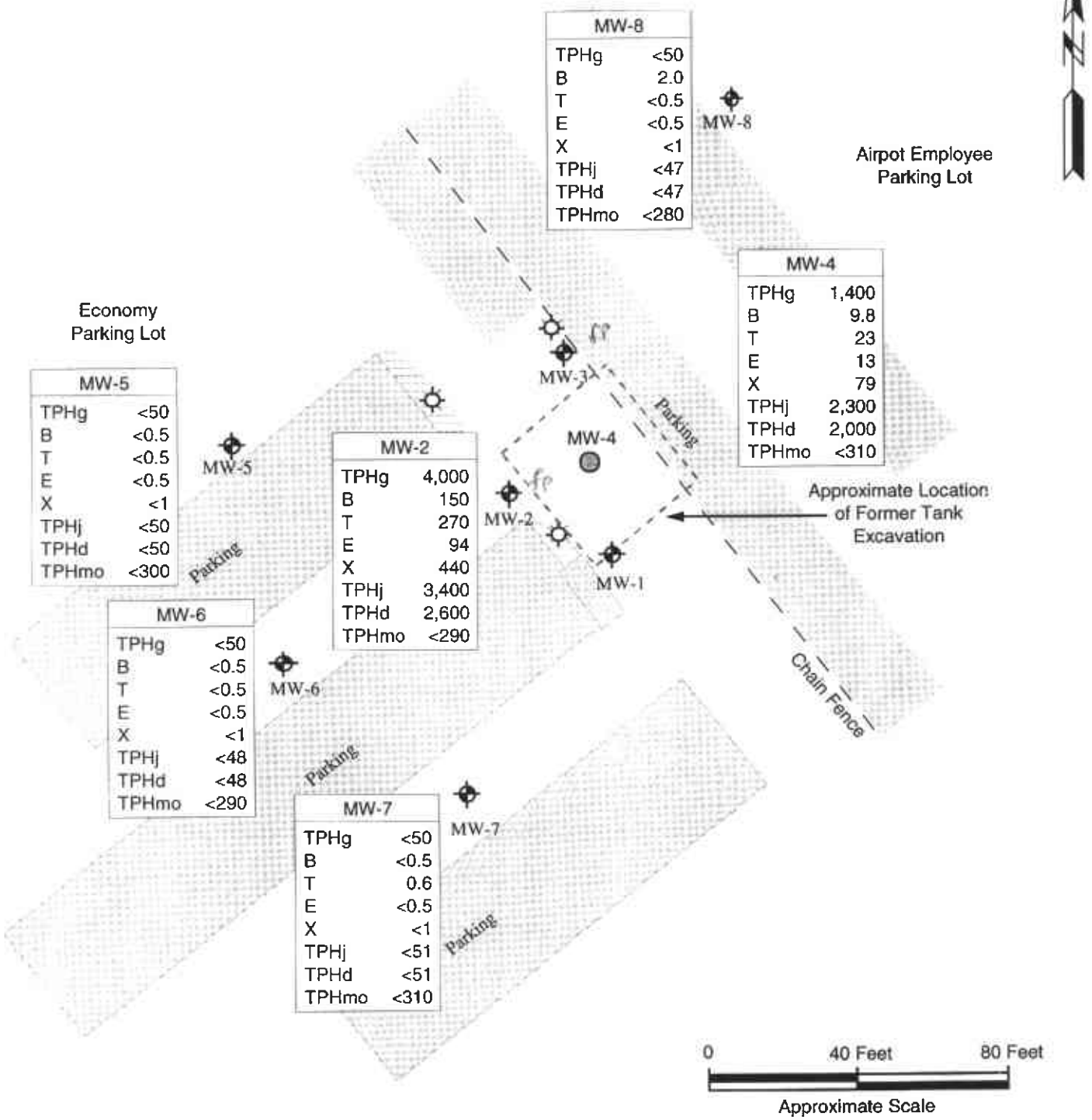
United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

95-113.53/F 2-Wells



Legend

- Monitoring Well
- Remediation Well
- Light Pole

TPH AND BTEX Concentrations in µg/l from Groundwater Samples Collected on May 13, 1998

FIGURE 5

PETROLEUM HYDROCARBONS IN WATER IN NEWLY INSTALLED MONITORING WELLS

United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

95-113.53/F.2-Wells

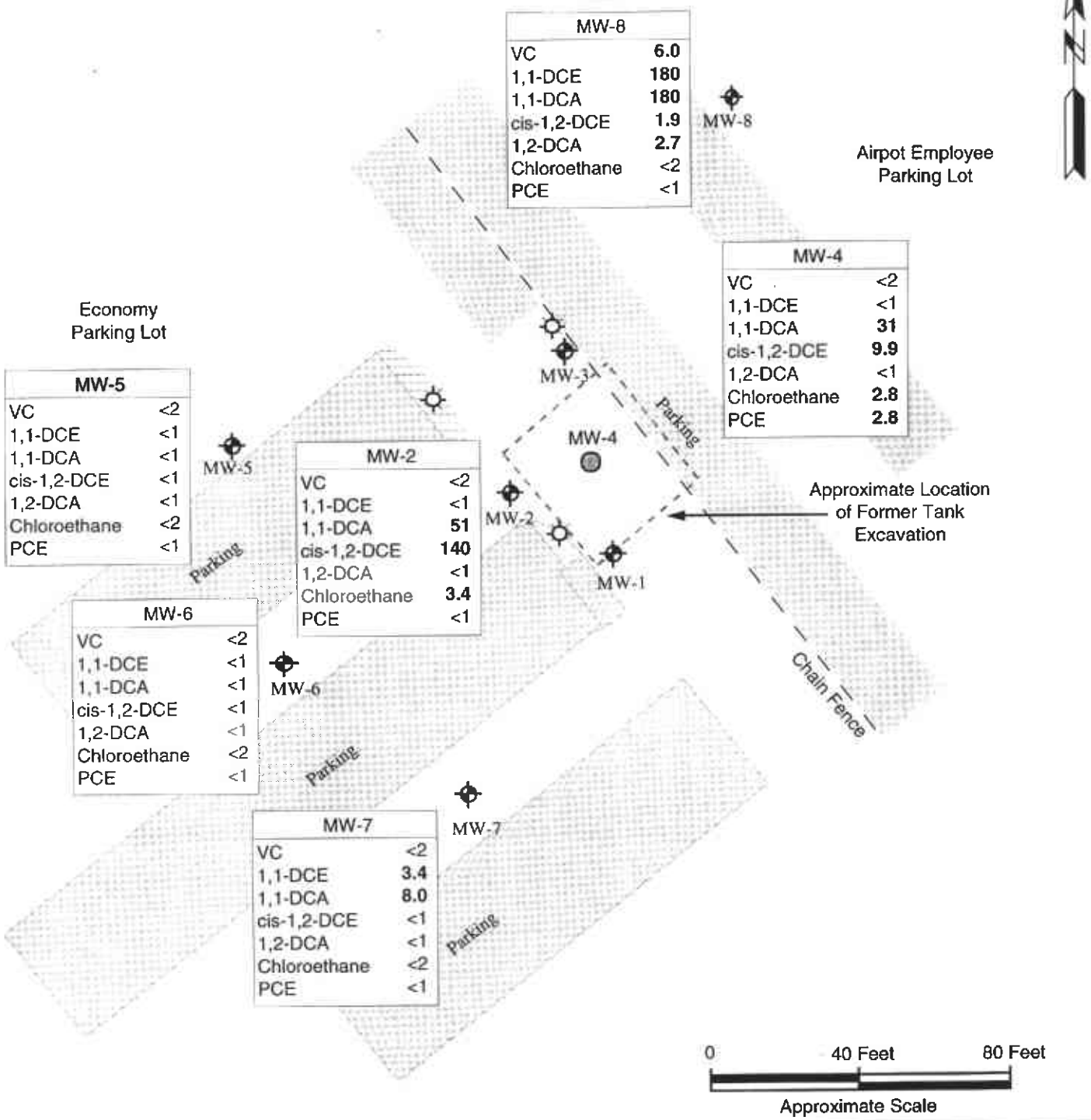


FIGURE 6

VOCS IN WATER IN NEWLY INSTALLED MONITORING WELLS

United Airlines Hangar-Economy Parking Lot Site
Oakland International Airport
1100 Airport Drive

PORT OF OAKLAND

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

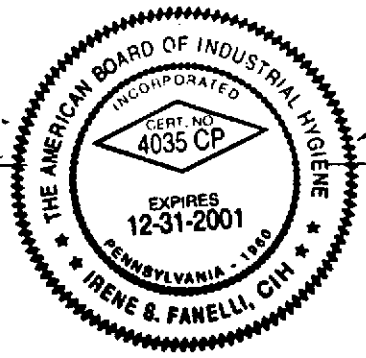
ATTACHMENT A

COPY OF HEALTH AND SAFETY PLAN

This health and safety plan has been developed for drilling and monitoring well installation activities to be conducted at the Municipal Oakland International Airport Economy Parking Lot Facilities in Oakland, California. The plan has been prepared in accordance with project specifications, 8 CCR 5192 and other applicable regulations, and good industrial hygiene practice.

This plan is intended to apply to drilling and monitoring well installation activities at the above listed site only, and must not be extrapolated to other substances, work activities or project locations without modification to address the specific hazards associated with those substances, activities and/or any other specific regulatory requirements.

Irene S. Fanelli



Irene S. Fanelli, CIH

4/14/98

Date

HEALTH AND SAFETY PLAN

DRILLING AND MONITORING WELL INSTALLATION ACTIVITIES
MUNICIPAL OAKLAND INTERNATIONAL AIRPORT
ECONOMY PARKING LOT FACILITIES
PORT OF OAKLAND

A.1 INTRODUCTION

This Health and Safety Plan (Plan) will be in effect during drilling and monitoring well installation activities at the Municipal Oakland International Airport Economy Parking Lot in Oakland, California. This Plan addresses the potential exposure to soils and groundwater containing petroleum hydrocarbons and chlorinated solvents during drilling and monitoring well installation activities.

This Plan covers ITSI personnel only. All other personnel on site will be expected to possess the appropriate training, experience, and personal protective equipment. If circumstances outside the scope of this Plan occur on site, the Plan will be amended to account for such circumstances.

A.2 PERSONNEL

Site Health and Safety Officer - The Site Health and Safety Officer will be responsible for briefing field personnel and contractors on the potential site hazards, personal protective equipment to be used on site, work rules and safe work practices, and implementation of the Plan, prior to initiation of work.

The Health and Safety Officer will also conduct tailgate safety meetings as appropriate during field operations, to inform the field personnel and contractors of changing field conditions and any potential changes in the Plan.

Project Manager - The Project Manager, Jeff Hess, will be responsible for all technical aspects of the project, and will assure that the requirements of the Plan are implemented.

Consulting Certified Industrial Hygienist - The Consulting Certified Industrial Hygienist, Irene S. Fanelli, CIH, has reviewed this Health and Safety Plan, and will provide consulting support for the project activities on an as-needed basis.

Field Personnel - Field personnel will be responsible for understanding and complying with the requirements of this Plan. They will acknowledge and sign a copy of this Plan, and will attend tailgate safety meetings, as required.

Field personnel will have the appropriate prior experience and training, in compliance with 8 CCR 5192. Such training includes the 40-hour basic training, three days of supervised field experience, 8-hour update training, and 8-hour supervisory training, as appropriate.

A.3 CONTAMINANTS

The potential chemical hazards on site consist of soils and groundwater containing petroleum hydrocarbons, aromatic hydrocarbons, and chlorinated solvents as listed below. General symptoms of exposure to these chemicals include: irritation of the eyes, nose, mucous membranes, and respiratory system; headache; nausea, vomiting, abdominal pain; giddiness, excitement, dizziness, staggered gait; fatigue, weakness, lassitude; anorexia; corneal vacuolization; dermatitis; and bone marrow depression (benzene). Target organs include the central nervous system, eyes, skin, gastrointestinal tract, blood, liver, and kidneys.

Benzene, 1,1-dichloroethane, and 1,2-dichloroethane are listed under California's Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as chemicals known to the State of California to cause cancer. Toluene is listed as a chemical known to cause reproductive harm. For this reason, the following warning will be given to all on-site personnel:

> "This area contains chemicals known to the State of California to cause cancer and reproductive harm."

Table I lists toxicological information for the site contaminants.

A.4 POTENTIAL FOR EXPOSURE AND ROUTES OF ENTRY

Chemical hazards may be encountered during the drilling operations. During these operations, site personnel may be exposed to any or all of the chemicals noted in the table. Exposure may occur through inhalation, ingestion, and dermal contact, although due to the nature of the work, the potential for exposure through inhalation is considered to be minimal. Dermal exposure will be controlled by limiting contact through safe work practices, the use of chemical protective clothing, and personal hygiene. Ingestion hazards will be controlled by strict limitation of eating, drinking, and smoking in the work areas, and by rigorous application of decontamination and personal hygiene protocols.

A.5 PHYSICAL HAZARDS

No confined spaces will be entered during the work.

Notable physical hazards will be posed by aircraft operations and vehicle traffic as part of daily operations at the Municipal Oakland International Airport facilities. All vehicles will be appropriately identified and flagged while working in areas of aircraft operations. In addition, all personnel working in aircraft and vehicle traffic areas will wear orange reflective vests for improved visibility.

Excessive noise may be encountered while working under the aircraft flight paths or in taxiing areas. Personnel working in these areas will utilize their choice of hearing protection.

Heat stress may also be a potential physical hazard during the work. Personnel must be familiar with the symptoms of heat stress, and the conditions during which it may occur. Heat stress symptoms may include nausea, headache, lightheadedness, lack of coordination, or slurred speech. The use of protective clothing greatly enhances the likelihood of heat stress. Where site conditions warrant, site personnel will monitor for heat stress and implement work/rest regimens, if necessary. Potable water and/or an electrolyte replacement fluid such as Gatorade will be available on-site at all times.

Working around heavy equipment, including drilling equipment, presents crushing and caught between/pinch point hazards. Only trained personnel are allowed to operate drilling equipment. Personnel not involved with drilling operations will remain clear.

A.6 SITE ZONES

During drilling operations the exclusion zone will be the area immediately surrounding the drilling. Barricades, caution tape, or some other visible barrier will be used to delineate the exclusion zone. A decontamination (decon) area will be set up adjacent to the exclusion zone. The decon area will be set up to enable adequate decontamination of personnel and equipment working in the exclusion zone. Everything that exits the exclusion zone must be decontaminated or disposed of properly.

A.7 AIR MONITORING/ACTION LEVELS

Direct reading air monitoring will be conducted during the initial day of drilling activities for organic vapors using a Photo Ionization Detector (PID). All direct-reading monitoring results will be compared to background levels, as measured at locations upwind of the work area. All equipment will be calibrated at least daily, according to the manufacturer's instructions.

Additional calibration will be carried out as necessary. Calibration and monitoring data will be recorded in the field log for the project.

All site workers will be informed that they are always entitled to make use of respiratory protection prior to reaching a work area action level. Once an action level is reached, designated protection levels will be mandatory. All respiratory protection will be NIOSH/MSHA approved equipment. If PID readings are at background in the breathing zone, no respiratory protection will be required. If PID readings in the breathing zone exceed background levels but are less than 50 PPM continuously for five minutes or more, workers will upgrade to respirators with organic vapor cartridges. If PID breathing zone readings consistently reach or exceed 50 PPM, workers will leave the area until organic vapor levels are below this level.

A.8 PERSONAL PROTECTIVE EQUIPMENT

All personnel in the active work area will be required to wear a hard hat, steel-toed boots, and safety glasses to protect against injury, and orange safety vests in traffic areas. Personnel working in flight path or taxiing areas will utilize their choice of hearing protection. Personnel will also be required to wear poly-coated Tyvek coveralls and nitrile gloves when working around free product, groundwater or soils potentially containing petroleum hydrocarbons or chlorinated solvents. Personnel will utilize appropriate decontamination techniques prior to leaving the work area. These measures include proper containment and disposal of disposable protective equipment, washing and rinsing of reusable equipment, and washing of hands before eating, drinking, or smoking.

A.9 EMERGENCIES IN THE FIELD

In case an accident should occur in the field while within the airport, the **airport security office** should be notified immediately at **extension 4080**, using white courtesy phones located throughout the airport. If outside the airport, the nearest appropriate emergency facility will be notified immediately. The locations of the nearest emergency facilities to the project site are:

Hospital

- San Leandro Hospital (510) 357-6500
  13855 East 14th Street, San Leandro

Police Department

- Oakland Police Department 911 or (510) 238-3481

Fire Department

- Oakland Fire Department 911 or (510) 238-3851

Other Numbers

- ITSI - Jeff Hess (510) 256-8898 ext. 104
- EHCI - Irene Fanelli (415) 347-9205

To get to the hospital from the Municipal Oakland International Airport, go east on Airport Drive, then right on Doolittle Drive, then left on Davis Street, then right on East 14th Street. San Leandro Hospital is on the right.

Spills will be controlled using sorbent material. Used sorbent materials will be disposed of properly.

A.10 ACCIDENT REPORT

In case of accident, the on-site Health and Safety Officer will provide a report to the Project Manager describing the following:

- The nature of the event that required notification of off-site personnel or agencies.
- The date, time and names of personnel and agencies notified, and their response.
- A description of personal injury and/or property damage.
- A description of the resolutions of the incident.

A.11 ACKNOWLEDGEMENT AND UNDERSTANDING OF THIS PLAN

Field personnel will be briefed on the nature of the work at the site, potential hazards, and protective clothing requirements prior to site work. The personnel will then be asked to sign the following statement:

This Health and Safety Plan has been explained to me. I acknowledge receipt of this Plan and obligate myself to read it. I agree to abide by the Plan and procedures outlined herein. I understand that non-compliance with the Plan may lead to termination of my employment.

Signature:	Date:
_____	_____
_____	_____

TABLE I
SITE CONTAMINANTS

Chemical	Cal/OSHA PEL or TLV (PPM)	Carcinogen?	Absorbed through skin?
Gasoline	300	No	Yes
JP-6 Jet Fuel	None	No	No
Diesel	None	No	No
Benzene	1	Yes	Yes
Toluene	50	No	Yes
Ethylbenzene	100	No	No
Xylenes	100	No	No
Motor oil	None	No	No
1,2-Dichloroethane	1	Yes	Yes
1,1-Dichloroethane	100	Yes	No

Notes:

1.Data is taken from Title 8 CCR 5155, the NIOSH Pocket Guide to Chemical Hazards, 1997, and the ACGIH Threshold Limit Values, 1997.

2. The PEL/TLV is the lower of the two values.

ATTACHMENT B

COPY OF DRILLING PERMIT FROM ALAMEDA COUNTY PUBLIC WORKS AGENCY

MAR-16-'98 MON 10:17 ID:ALAMEDA CO PUBLIC WK FAX NO:510/670-5262 #910 P02

03/12/98 14:39 ☎ 002/003

FILE

ZONE 7 WATER AGENCY

5997 PARKSIDE DRIVE, PLEASANTON, CALIFORNIA 94588-5127 PHONE (510) 484-2600 X235
FAX (510) 462-3914

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT Economy Parking Lot site, Metropolitan Oakland Internat'l. Airport, 1100 Airport Dr., Oakland, Calif. (West of United Maintenance Hangar)

California Coordinates Source — ft. Accuracy ± — ft.
CCN — ft. CCE — ft.
APN 42-4520-4

CLIENT
Name Port of Oakland (Contact: [illegible])
Address 530 Water St. Phone 510-272-1117
City Oakland, CA Zip 94607

APPLICANT
Name Innovative Technical Solutions, Inc. (ITSI)
Contact: Jim Schollard Fax 510-286-8889
Address 1330 Broadway, Ste. 1625 Phone 510-286-8888
City Oakland CA Zip 94612

TYPE OF PROJECT
Well Construction
- Cathodic Protection ☐
- Water Supply ☐
- Monitoring ☑

Geotechnical Investigation
- General ☐
- Contamination ☐
- Well Destruction ☐

PROPOSED WATER SUPPLY WELL USE
- New Domestic ☐
- Municipal ☐
- Industrial ☐
- Replacement Domestic ☐
- Irrigation ☐
- Other Soil/H2O assess. ☑

DRILLING METHOD:
- Mud Rotary ☐
- Cable ☐
- Air Rotary ☐
- Other ☐
- Auger ☑

DRILLER'S LICENSE NO. 484288 (C-57)

WELL PROJECTS
Drill Hole Diameter 8-12 in. Maximum Depth 15 ft.
Casing Diameter 2-4 in. Number 6*
Surface Seal Depth min. 2 ft.
* one existing 2" well will be overdrilled + reconstructed.

GEOTECHNICAL PROJECTS
Number of Borings NA Maximum
Hole Diameter NA in. Depth NA ft.

ESTIMATED STARTING DATE March 30, 1998
ESTIMATED COMPLETION DATE April 1, 1998

I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE [signature] /ITSI Date 3/12/98

FOR OFFICE USE

PERMIT NUMBER 98WR114
WELL NUMBER
APN

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
(2) Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
(3) Permit is void if project not begun within 90 days of approval date.

B. WATER SUPPLY WELLS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved.

(C.) GROUNDWATER MONITORING WELLS INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.

D. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

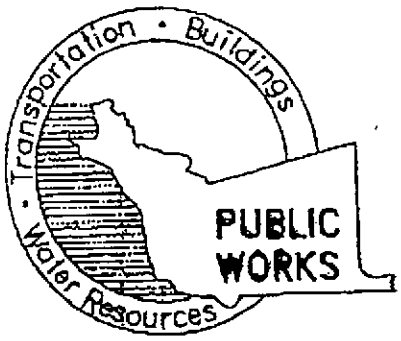
E. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

F. WELL DESTRUCTION. See attached.

G. SPECIAL CONDITIONS

Approved [signature] Date 3/13/98

1019



COUNTY OF ALAMEDA
PUBLIC WORKS AGENCY
951 Turner Court, Hayward, CA 94545
(510) 670-5543

DATE: 3/16/98

No of Pages (including cover): 2

FAX TRANSMITTAL

TO	JIM SCHOLLARD
	ITSI
	FAX: 286-8889

FROM	ALVIN KAN
	FAX: (510) 670-5262

Should you have problems receiving this FAX transmittal, please call: (510) 670-5248

SUBJECT: WELL PERMIT APPLICATION

TRANSMITTING THE FOLLOWING:

ATTACHMENT C

COPIES OF BORING LOGS

BORING NO. MW-4

PROJECT: Port of Oakland - Economy Lot
LOGGED BY: Jim Schollard
SHEET 1 OF 1

PROJECT NUMBER: 95-113.53
DATE DRILLED: May 6, 1998

LOCATION: 1100 Airport Dr., MOIA
TOTAL DEPTH: 11½'

SURFACE ELEVATION: 7.32'
BORING DIAMETER: 12"

DRILLING COMPANY: Explor. GeoServices
DRILLING METHOD: Hollow Stem Auger

BORING LOCATION

Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0–1			0.4 (1')			GW	Asphalt (4" thick) GRAVEL with Sand (baserock), fine to coarse grained sand and gravel, gravel angular to subrounded (up to 1" diam.), medium brown, damp; no odor.
2	MW4-2' (1200)	10/10/8 (partial recovery)	0.4 (2½)	2¼ ▽ 1½ ▼			wet at approx. 2¼ feet
5						SW/SM	Well graded SAND with Silt and Gravel, fine to coarse grained sand (predominantly coarse), fine grained subangular to rounded gravel (up to ~¼" diam.), gray, wet, medium dense; moderate petroleum odor, (poor recovery); tank excavation fill material.
7	MW4-7' (1315) (sieve)	3/5/4	48 (6½)				
8.5		3/2/1	165 (9')			SP	Poorly graded SAND, fine grained sand, olive gray, wet, very loose; moderate to strong petroleum odor, seams of discoloration (darker gray) present.
10	Terz sample	9/0/2	0.0 (10.5)			CL	Sandy CLAY with silt, gray to olive gray, moist, low plasticity, very soft to soft, fine grained sand; organic odor, lensed with up to 2" thick fine grained sand and shell fragments, moist to wet (used 1" Terzaghi Sampler). • Decreased sand content and increased plasticity at approx. 11 feet.
11½						TD=11½	

Depth scale: 5, 10, 15, 20, 25, 30

CASING DIAMETER 4" CASING LENGTH 10' FROM 0 TO 10'

SCREEN SIZE 0.010" SCREEN LENGTH 8' FROM 2' TO 10'

SAND TYPE #3 Lonestar FROM 1½' TO 2'

BENTONITE TYPE Enviroplug Pellets FROM 16" TO 18" (1½')

CEMENT/GROUT Quikrete/Neat FROM 0 TO 16"

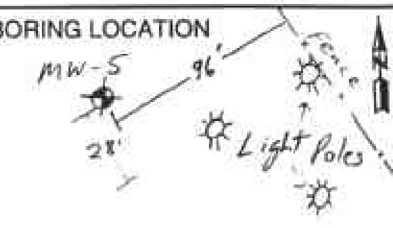
12" EMCO Wheaton well box

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

PROJECT	Port of Oakland - Economy Lot	LOGGED BY	Jim Schollard	**BORING NO.**	**MW-5**
PROJECT NUMBER	95-113.53	DATE DRILLED	May 5, 1998	SHEET	1 OF 1
LOCATION	1100 Airport Dr, MOIA	TOTAL DEPTH	10'		
SURFACE ELEVATION	6.31'	BORING DIAMETER	8"		
		DRILLING COMPANY	Explor. GeoServices		
		DRILLING METHOD	Hollow stem Auger		

BORING LOCATION



Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0						AC / GW	Asphalt (4" thick) GRAVEL with SAND, (Baserock), fn-crs. sand, fn. subang-subrnd. gravel (to ½" d.) grey,
MW5-2'		19/20/35	3.9	2.1 / 2.4		SP	SAND, poorly graded, fine grained, olive gray, moist, very dense; no odor, homogeneous. Wet at approx 2½ feet; pull augers (≈15 min) DTW = 2.1'; dense.
		13/19/24					
5 / MW5-5' (1045)		15/15/22	1.9				color change to medium brown, trace medium grained sand at ~5 feet.
		11/4/3					Density change to loose.
		1/1/1	2.9				Density change to very loose.
		1/1/1				CL	Sandy CLAY with silt, gray, moist, low plasticity, very soft - soft; Organic odor, fine grained sand, lense of shell fragments approx. 1½-inches thick, wet (used 1" Terzaghi sampler).
10 / Terz Smpl			3.1			TD = 10'	
15							
20							
25							
30							

CASING DIAMETER 2" CASING LENGTH 8' FROM 0' TO 8'

SCREEN SIZE 0.010" SCREEN LENGTH 6' FROM 2' TO 8'

SAND TYPE #3 Lonestar FROM 1½ TO 2'

BENTONITE TYPE Enviroplug Pellets FROM 16" TO 18" (1½')

CEMENT/GROUT Neat Cement / Quickrete FROM 0 TO 16"

12" Emco-Wheaton Well Box

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

PROJECT Port of Oakland - Economy Lot | LOGGED BY Jim Schollard | **BORING NO. MW-6**

PROJECT NUMBER 95-112-53 | DATE DRILLED May 5, 1998 | SHEET 1 OF 1

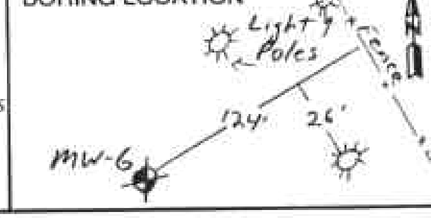
LOCATION 1100 Airport Dr., MOIA | TOTAL DEPTH 9'

SURFACE ELEVATION 6.89' | BORING DIAMETER 8"

DRILLING COMPANY Explor GeoServices

DRILLING METHOD Hollow Stem Auger

BORING LOCATION



Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
			0.9			AC / GW	Asphalt (~4" thick) GRAVEL with sand (Baserock), fine-coarse sand and gravel, subangular to subrounded gravel (to 1" diam.), brown, damp; no odor.
MW6-2' (1500)		11/24/35	0.7	2¼ / 2.4		SP	SAND, poorly graded, fine grained, medium brown, moist-wet, very dense; no odor, homogeneous. Wet at approx 2¼ feet.
5							
		5/1/1	0.9			CL	Silty CLAY, olive gray, wet, low plasticity, very soft-soft; no odor, homogeneous. Color change to gray, moist, increased plasticity at approx. 8¾'. (Terzaghi Sampler)
Terz. Smplr.		1/1/1	5.4				
10						TD = 9'	
15							
20							
25							
30							

CASING DIAMETER 2" CASING LENGTH 8 FROM 0 TO 8'

SCREEN SIZE 0.010" SCREEN LENGTH 6' FROM 2' TO 8'

SAND TYPE #3 Lonestar FROM 1½' TO 2'

BENTONITE TYPE Enviroplug Pellets FROM 16" TO 18" (1½')

CEMENT/GROUT Quikrete / Neat FROM 0 TO 16"

12" EMCO Wheaton Well Box

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

PROJECT Port of Oakland - Economy Lot | LOGGED BY Jim Schollard | **BORING NO.** MW-7

PROJECT NUMBER 95-113.53 | DATE DRILLED May 5, 1998 | SHEET 1 OF 1

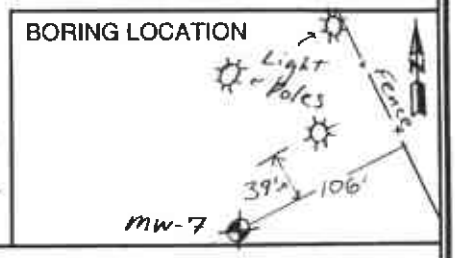
LOCATION 1100 Airport Dr., MOTA | TOTAL DEPTH 9'

SURFACE ELEVATION 6.48' | BORING DIAMETER 8"

DRILLING COMPANY Explor GeoServices

DRILLING METHOD Hollow Stem Auger

BORING LOCATION



Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
						AC GW	Asphalt (4" Thick) GRAVEL with Sand (Baserock), fine to coarse sand and gravel, subangular to subrounded gravel (to 1 1/4" diam.), brown, damp; no odor.
MW7-1½ (1510)		11/10/21	1.4			SP	SAND, poorly graded, fine grained sand, medium brown, moist - wet, dense, no odor, homogeneous. - Wet at approx 2'.
		1/1/6	1.9			CL	Sandy CLAY with silt, olive gray, wet, medium stiff, fine grained sand; no odor, homogeneous.
		0/1/3	0.0				Silty CLAY with Sand, mottled olive gray, wet, soft, fine grained sand, no odor, homogeneous.
						TD=	9' Color & moisture change at approx 8'4" to dark grey and moist, increased plasticity, organic odor present.

CASING DIAMETER 2" | CASING LENGTH 8½' | FROM 0 | TO 8½

SCREEN SIZE 0.010" | SCREEN LENGTH 6½ | FROM 2' | TO 8½

SAND TYPE #3 Lonestar | FROM 1½' | TO 2'

BENTONITE TYPE Enviroplug Pellets | FROM 16" | TO 18" (1½')

CEMENT/GROUT Quikrete/Neat | FROM 0 | TO 16"

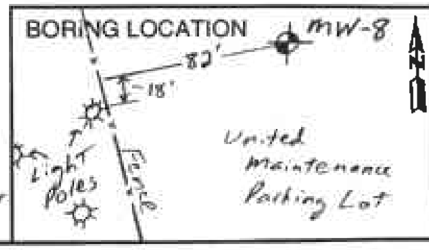
12" Emco Wheaton Box

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

PROJECT	Port of Oakland - Economy Lot
LOGGED BY	Jim Schollard
BORING NO.	MW-8
PROJECT NUMBER	95-113.53
DATE DRILLED	May 6, 1998
SHEET	1 OF 1
LOCATION	1100 Airport Dr., MOIA
TOTAL DEPTH	10½'
SURFACE ELEVATION	7.85'
BORING DIAMETER	8"
DRILLING COMPANY	Explor. GeoServices
DRILLING METHOD	Hollow Stem Auger

BORING LOCATION



Depth (Feet)	Sample Interval	Blow Counts	PID (ppm) B-zone/stem/sample	Water Level	Well Construction	Lithology / USCS	DESCRIPTION
0						AC	Asphalt (9" thick)
1			0.2			GW	GRAVEL with Sand (baserock), fine to coarse grained sand and gravel, angular to subrounded gravel (to 1½" diam.), dark brown, damp; unidentified odor.
2	mw8-2' (plus)	20/29/44	1.4	2½' ▽ 3'		SP	SAND, poorly graded, fine grained sand, medium brown, moist-wet, very dense, no odor, homogeneous. -Color change to light olive grey at approx. 2½ feet. -Water at approx. 2½ feet after approx. 15 min. (augers pulled).
5							
6	mw8-6' (100S) (Sieve)	10/5/12	0.0				-density change to medium dense, wet.
7		5/9/14					-light olive brown.
9			0.0				
10	Terz. Smpl.	1/1/1	0.0			CL	Silty CLAY with sand, olive grey, wet, low-medium plasticity, very soft-soft, no odor, fine grained sand, lense of silty sand, fine grained (approx. 2" thick) [Terzaghi sampler followed by overdrilling].
10½						TD = 10½'	Silty CLAY, [illegible] grey, moist, medium-high plasticity, unidentified odor (possibly organic) at approx. 10 feet.
15							
20							
25							
30							

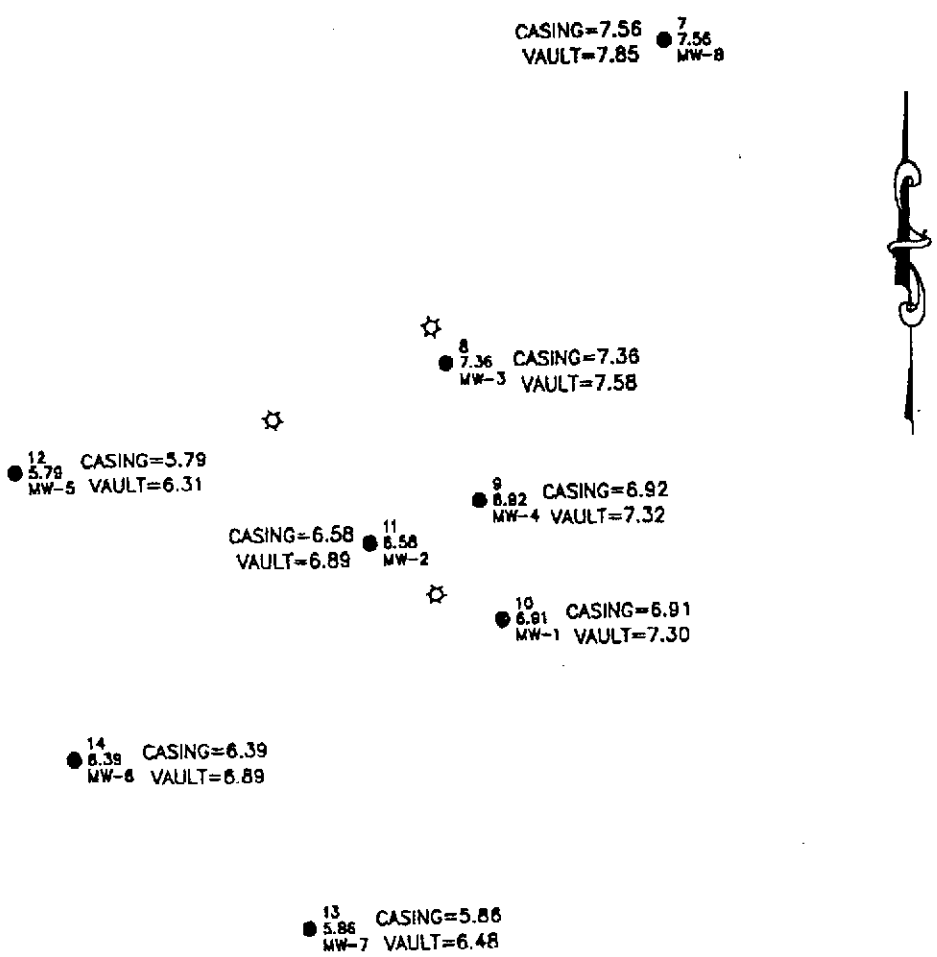
CASING DIAMETER 2"	CASING LENGTH	9½	FROM 0	TO 9½
SCREEN SIZE 0.010"	SCREEN LENGTH	7½	FROM 2	TO 9½
	SAND TYPE	#3 Lonestar	FROM 1½'	TO 2'
	BENTONITE TYPE	Enviroplug Pellets	FROM 16"	TO 18" (1½')
	CEMENT/GROUT	Quickrete/Neat (12" Emco Wheaton well box)	FROM 0	TO 16"

ITSI

INNOVATIVE TECHNICAL SOLUTIONS, INC.

ATTACHMENT D

RESULTS OF LAND SURVEY OF MONITORING WELLS



98028.dwg 5-13-98 1:23:37 pm

PLS SURVEYS, INC.
LAND & HYDROGRAPHIC SURVEYORS
27A Embarcadero Cove
Oakland, California 94605-5203
510.261.0900 FAX 510.261.3303
e-mail: plssurv@pacbell.net

UNITED AIRLINES HANGER
ECONOMY PARKING LOTSITE

1100 AIRPORT DRIVE
OAKLAND INTERNATIONAL AIRPORT

SCALE	1" = 40'
DATE	05/13/98
BY	J.B.
JOB NO.	98028

ATTACHMENT E

COPIES OF MONITORING WELL DEVELOPMENT AND SAMPLING FORMS

MONITORING WELL
DEVELOPMENT AND SAMPLING FORM

PROJECT NAME: P/O - Economy Parking Lot PROJECT NO.: 95-113.53

WELL NO.: MW-2 TESTED BY: J. Schollard DATE: 5/13/98

Measuring Point Description: Black mark, T.O.C. Static Water Level (ft.): 1.80

Total Well Depth (ft.): 10.97 Sample Method: Disposable Bailer

Water Level Measurement Method: Solinist I probe Time Sampled: 1525

Development Method: Bail & Pump Sample Depth (ft.): 2'

Time Start Develop: ~1140 Field Filtering: NA

Time End Develop: 1225 Field Preservation: H_2O Ice

Comments: reddish brown fine oily droplets/sheen on first ~30 well volumes of purge water

Well Volume Calculation (fill in before purging)	Total Depth (ft)		Depth to Water (ft)		Water Column (ft)	x	Multiplier for Casing Diameter (in)			=	Casing Volume (gal)
	10.97	-	1.80	=	9.17		2	4	6		1.5 (3 vols = 4.5)
							0.16	0.64	1.44		

Time	1146	1151	1204	1225			
Volume Purged (gals)	5.0	5.0	5.0	5.0			
Cumulative Volume Purged (gals)	5.0	10.0	15.0	20.0			
Cumulative Number of Casing Volumes	3.33	6.67	10	13.3			
Purge Rate (gpm)	Bail	Bail	0.4 pump	0.23 pump			
Temperature (F°) or (C°)	75.3	74.7	82.2	87.3			
pH	7.40	7.35	7.80	7.85			
Specific Conductivity (µmhos/cm)	2.98	3.76	~~6.8~~ 4.63	4.38			
Dissolved Oxygen (mg/L)	4.85	3.33	6.86	6.33			
Turbidity/Color (NTU)	High sed. laden olive grey	→	mod. sands no sed. olive	low sands no sed. clear			
Odor	Moderate Product odor	slight product	Trace	Trace			
Dewatered?	NO	No	starting	→			

ITSI

MONITORING WELL DEVELOPMENT AND SAMPLING FORM

PROJECT NAME: I/O - Economy Parking Lot PROJECT NO.: 55-113.53

WELL NO.: MW4 TESTED BY: J. Schofield DATE: 5/13/98

Measuring Point Description: Black mark, T.O.C. Static Water Level (ft.): 2.01

Total Well Depth (ft.): 10.07 Sample Method: Disposable Bailer

Water Level Measurement Method: Solinst I Probe Time Sampled: ~~1555~~ 1600 + QC-1 @ 1600

Development Method: Bail + Pump Sample Depth (ft.): 2'

Time Start Develop: 1220 Field Filtering: N/A

Time End Develop: 1241 Field Preservation: H_2O Ice

Comments: droplets of product in water during initial pumping/sheen; Collected field duplicate QC-1 from well

Well Volume Calculation (fill in before purging)	Total Depth (ft)		Depth to Water (ft)		Water Column (ft)	x	Multiplier for Casing Diameter (in)			=	Casing Volume (gal)
							2	4	6		5.16
	10.07	-	2.01	=	8.06		0.16	0.64	1.44		(3 vols = 15.5)

Time	1228	1232	1237	1241			
Volume Purged (gals)	18	16	16	16			
Cumulative Volume Purged (gals)	18	34	50	66			
Cumulative Number of Casing Volumes	3.5	6.6	9.7	12.8			
Purge Rate (gpm)	Bail	Bail	3.2 pump	4.0 pump			
Temperature (F°) or (C°)	82.2	80.4	78.3	76.7			
pH	7.24	7.22	7.24	7.11			
Specific Conductivity (µmhos/cm)	3.73	3.39	3.18	2.99			
Dissolved Oxygen (mg/L)	4.04	3.00	5.50	1.99			
Turbidity/Color (NTU)	high, sed. Color olive grey	→	moderate some seds	grey clear			
Odor	mod product odor	→	None	None			
Dewatered?	No observable drawdown			→			

ITSI

MONITORING WELL DEVELOPMENT AND SAMPLING FORM

PROJECT NAME: P/O - Economy Parking Lot PROJECT NO.: 95-113.53

WELL NO.: MW5 TESTED BY: JSchollard DATE: 5/13/98

Measuring Point Description: T.O.C. Static Water Level (ft.): 1.05

Total Well Depth (ft.): 8.01 Sample Method: Disposable Bailer

Water Level Measurement Method: Solinst IP Time Sampled: 1330

Development Method: Bail & pump Sample Depth (ft.): 1.25

Time Start Develop: 0915 Field Filtering: NA

Time End Develop: 0954 Field Preservation: H_2O Ice

Comments:

Well Volume Calculation (fill in before purging)	Total Depth (ft)		Depth to Water (ft)		Water Column (ft)	x	Multiplier for Casing Diameter (in)			=	Casing Volume (gal)
							2	4	6		1.11
	8.01	-	1.05	=	6.96		0.16	0.64	1.44		(3 vols = 3.3)

Time	0920	0927	0947	0954			
Volume Purged (gals)	4.0	4.0	4.0	3.0			
Cumulative Volume Purged (gals)	4.0	8.0	12	15			
Cumulative Number of Casing Volumes	~~3.6~~ 1.2	~~7.3~~ 2.4	~~10.8~~ 4.8	13.5			
Purge Rate (gpm)	Bail	Bail	~.3gpm (pump)	0.4 →			
Temperature (F°) or (C°)	63.3	62.9	63.1	65.2			
pH	7.98	7.93	8.33	8.10			
Specific Conductivity (µmhos/cm)	4.12	5.19	4.90	5.30			
Dissolved Oxygen (mg/L)	5.38	4.96	7.85	7.80			
Turbidity/Color (NTU)	High / Sed. laden brown →		moderate brown	slight / light no sed / tan			
Odor	None →						
Dewatered?	No →						

ITSI

MONITORING WELL
DEVELOPMENT AND SAMPLING FORM

PROJECT NAME: P/O - Economy Car Rental PROJECT NO.: 95-113.53

WELL NO.: MW6 TESTED BY: J. Schollard DATE: 5/13/98

Measuring Point Description: Black mark, T.O.C. Static Water Level (ft.): 1.91

Total Well Depth (ft.): 8.30 Sample Method: Disposable Bailer

Water Level Measurement Method: Solinist I Probe Time Sampled: 1435

Development Method: Bail + pump Sample Depth (ft.): 2'

Time Start Develop: ~1100 Field Filtering: NA

Time End Develop: 1113 Field Preservation: H_2O Ice

Comments:

Well Volume Calculation (fill in before purging)	Total Depth (ft)	-	Depth to Water (ft)	=	Water Column (ft)	x	Multiplier for Casing Diameter (in)			=	Casing Volume (gal)
							2	4	6		1.02
	8.30	-	1.91	=	6.39	x	0.16	0.64	1.44	=	3 vols = 3.07

Time	1102	1106	1113				
Volume Purged (gals)	3.5	3.5	3.5				
Cumulative Volume Purged (gals)	3.5	7.0	10.5				
Cumulative Number of Casing Volumes	3.43	6.86	10.3				
Purge Rate (gpm)	Bail	0.9 Pump	0.5 Pump				
Temperature (F°) or (C°)	72.6	78.9	81.3				
pH	8.05	8.12	8.02				
Specific Conductivity (µmhos/cm)	5.49	5.90	6.35				
Dissolved Oxygen (mg/L)	4.25	7.57	7.68				
Turbidity/Color (NTU)	mod. some seds med. brn	low no seds lt. brown	relatively clear				
Odor	None	→	→				
Dewatered?	No	→	starting				

ITSI

MONITORING WELL
DEVELOPMENT AND SAMPLING FORM

PROJECT NAME: R/O- Economy Parking Lot PROJECT NO.: 95-113.53

WELL NO.: MW 7 TESTED BY: J. Schillard DATE: 5/13/98

Measuring Point Description: T.O.C. Static Water Level (ft.): 1.51

Total Well Depth (ft.): 8.54 Sample Method: Disposable Bailer

Water Level Measurement Method: Solinst I/F Probe Time Sampled: 1515

Development Method: Bail + Pump Sample Depth (ft.): 1.5'

Time Start Develop: 1022 Field Filtering: NA

Time End Develop: 1050 Field Preservation: H_2O Ice

Comments:

Well Volume Calculation (fill in before purging)	Total Depth (ft)	-	Depth to Water (ft)	=	Water Column (ft)	x	Multiplier for Casing Diameter (in)			=	Casing Volume (gal)
							2	4	6		1.12
	8.54		1.51		7.03		0.16	0.64	1.44		3 vols = 3.4

Time	1025	1030	1047	1050			
Volume Purged (gals)	4.0	4.0	2.0	2.0			
Cumulative Volume Purged (gals)	4.0	8.0	10.0	12.0			
Cumulative Number of Casing Volumes	3.6	7.14	8.9	10.7			
Purge Rate (gpm)	Bailer	Bail	0.18 pump	0.22 pump			
Temperature (F°) or (C°)	65.2	66.3	72.3	74.3			
pH	8.40	8.20	8.47	8.51			
Specific Conductivity (µmhos/cm)	1.56	2.47	3.69	3.83			
Dissolved Oxygen (mg/L)	5.10	5.42	7.55	7.25 7.55			
Turbidity/Color (NTU)	High-sed. laden/brown	moderate some sed	slight/sl. clear	clear			
Odor	None	—	—	→			
Dewatered?	No	No	starting	nearly			

ITSI

MONITORING WELL DEVELOPMENT AND SAMPLING FORM

PROJECT NAME: P/G - Economy Parking Lot PROJECT NO.: 95-113.53

WELL NO.: MW-8 TESTED BY: J. Scholler DATE: 5/17/98

Measuring Point Description: Black mark, T.O.C. Static Water Level (ft.): 2.46

Total Well Depth (ft.): 11.13 Sample Method: Disposable Bailer

Water Level Measurement Method: Solinst Probe Time Sampled: 1445

Development Method: Bail & Pump Sample Depth (ft.): 3'

Time Start Develop: 1320 Field Filtering: NA

Time End Develop: 1344 Field Preservation: H_2O Ice

Comments:

Well Volume Calculation (fill in before purging)	Total Depth (ft)	-	Depth to Water (ft)	=	Water Column (ft)	x	Multiplier for Casing Diameter (in)			=	Casing Volume (gal)
							2 (circled)	4	6		
	11.13	-	2.46	=	8.67	x	0.16	0.64	1.44	=	1.39 (3 Vols = 4.16)

Time	1320	1331	1344				
Volume Purged (gals)	4.5	4.5	5.0				
Cumulative Volume Purged (gals)	4.5	9.0	14.0				
Cumulative Number of Casing Volumes	3.24	6.47	10.07				
Purge Rate (gpm)	Bail	Bail	0.4 pump				
Temperature (F°) (circled) or (C°)	77.0	74.3	74.9				
pH	7.68	7.60	7.62				
Specific Conductivity (μmhos/cm)	8.64	10.13	10.83				
Dissolved Oxygen (mg/L)	4.87	4.55	6.79				
Turbidity/Color (NTU)	High seds & fine Brown	low trace seds grey	Rel. clear				
Odor	None	None	None				
Dewatered?	No	→	→				

ITSI

ATTACHMENT F

COPIES OF LABORATORY REPORTS, CHROMATOGRAMS AND CHAIN-OF-CUSTODY FORMS FOR SOIL AND GROUNDWATER SAMPLES

Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

ANALYTICAL REPORT

Prepared for:

Innovative Technical Solutions, Inc.
2855 Mitchell Dr.
Suite 118
Walnut Creek, CA 94598

Date: 21-MAY-98
Lab Job Number: 133513
Project ID: 95-113.53
Location: P.O.O. Economy Parking

Reviewed by: Damara Moore

Reviewed by:

TEH-Tot Ext Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: CA LUFT

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133513-001	MW5-2'	40794	05/05/98	05/12/98	05/16/98	
133513-003	MW6-2'	40794	05/05/98	05/12/98	05/16/98	
133513-004	MW7-1 1/2'	40794	05/05/98	05/12/98	05/16/98	
133513-005	MW8-2'	40794	05/06/98	05/12/98	05/16/98	

Matrix: Soil

Analyte	Units	133513-001	133513-003	133513-004	133513-005
Diln Fac:		1	1	1	1
JP-5, C10-C16	mg/Kg	<1	<1	<1	<1
Diesel C12-C22	mg/Kg	<1	<1	<1	<1
Motor Oil C22-C50	mg/Kg	<5	<5	<5	<5
Surrogate					
Hexacosane	%REC	94	104	111	112

TEH-Tot Ext Hydrocarbons

Client: Innovative Technical Solutions,Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: CA LUFT

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133513-007	MW4-2'	40794	05/06/98	05/12/98	05/16/98	

Matrix: Soil

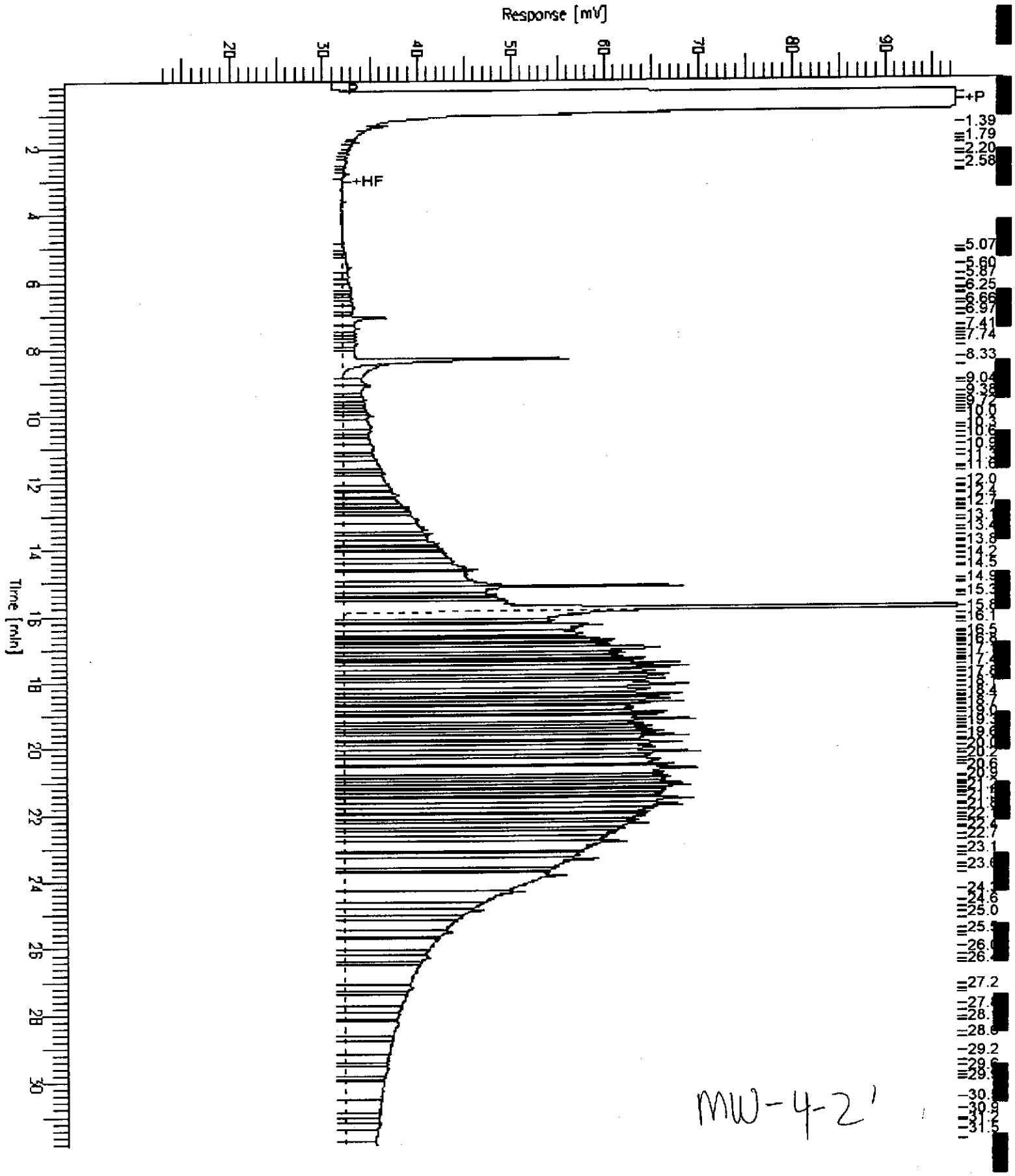
Analyte	Units	133513-007
Diln Fac:		1
JP-5, C10-C16	mg/Kg	<1
Diesel C12-C22	mg/Kg	3.5YH
Motor Oil C22-C50	mg/Kg	46 YH
Surrogate		
Hexacosane	%REC	83

Y: Sample exhibits fuel pattern which does not resemble standard
H: Heavier hydrocarbons than indicated standard

Chromatogram

Sample Name : 133513-007,40794
FileName : G:\GC11\CHA\134A071.RAW
Method : ATEH135.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 12 mV

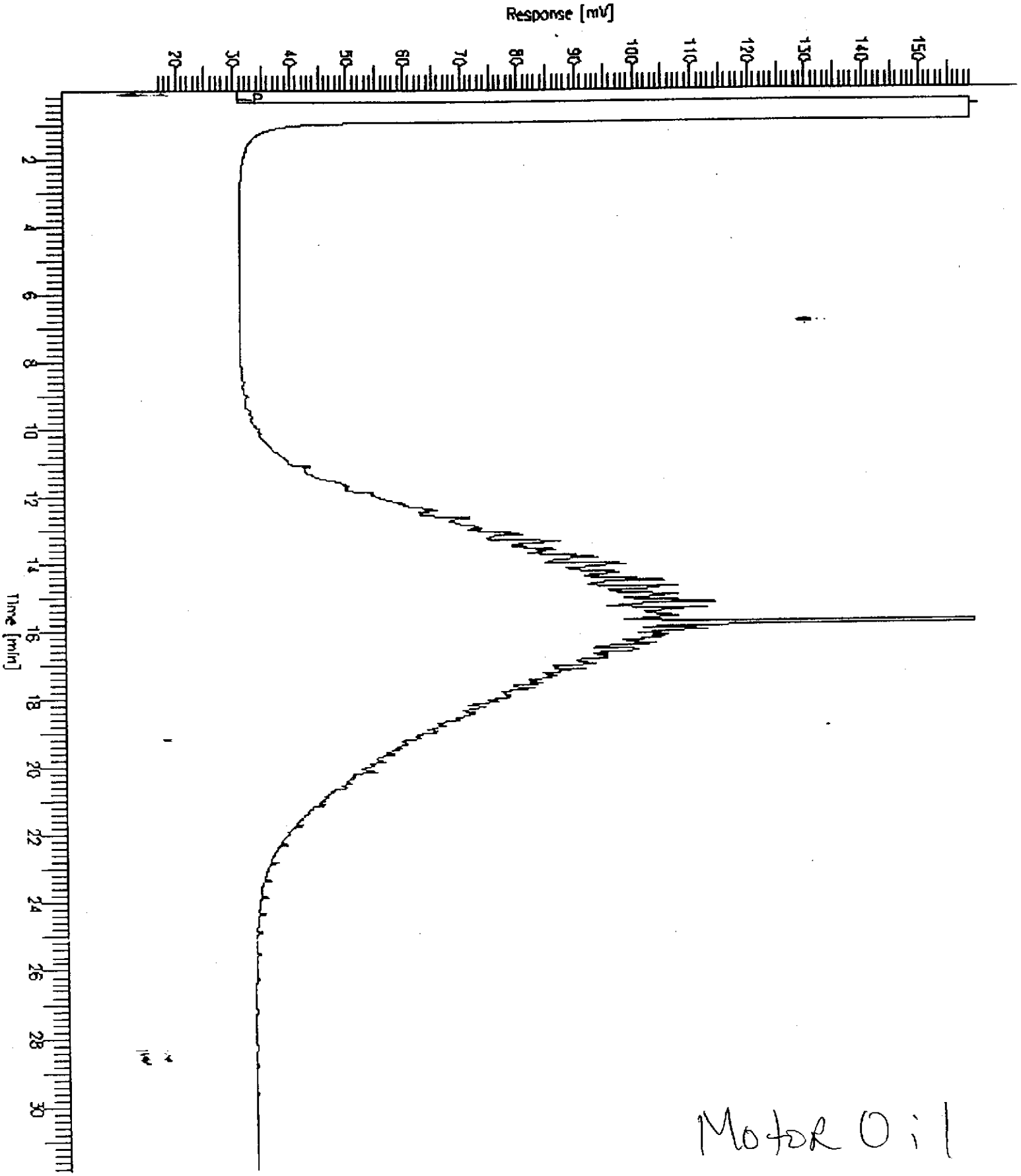
Sample #: 40794
Date : 5/18/98 01:07 PM
Time of Injection: 5/16/98 01:54 PM
Low Point : 12.03 mV High Point : 97.57 mV
Plot Scale: 85.5 mV



Chromatogram

Sample Name : CCV,98WS5635,MO
FileName : G:\GC11\CHA\134A074.RAW
Method : ATEH135.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 17 mV

Sample #: 500MG/L
Date : 5/18/98 11:38 AM
Time of Injection: 5/16/98 03:55 PM
Low Point : 16.50 mV High Point : 159.03 mV
Plot Scale: 142.5 mV

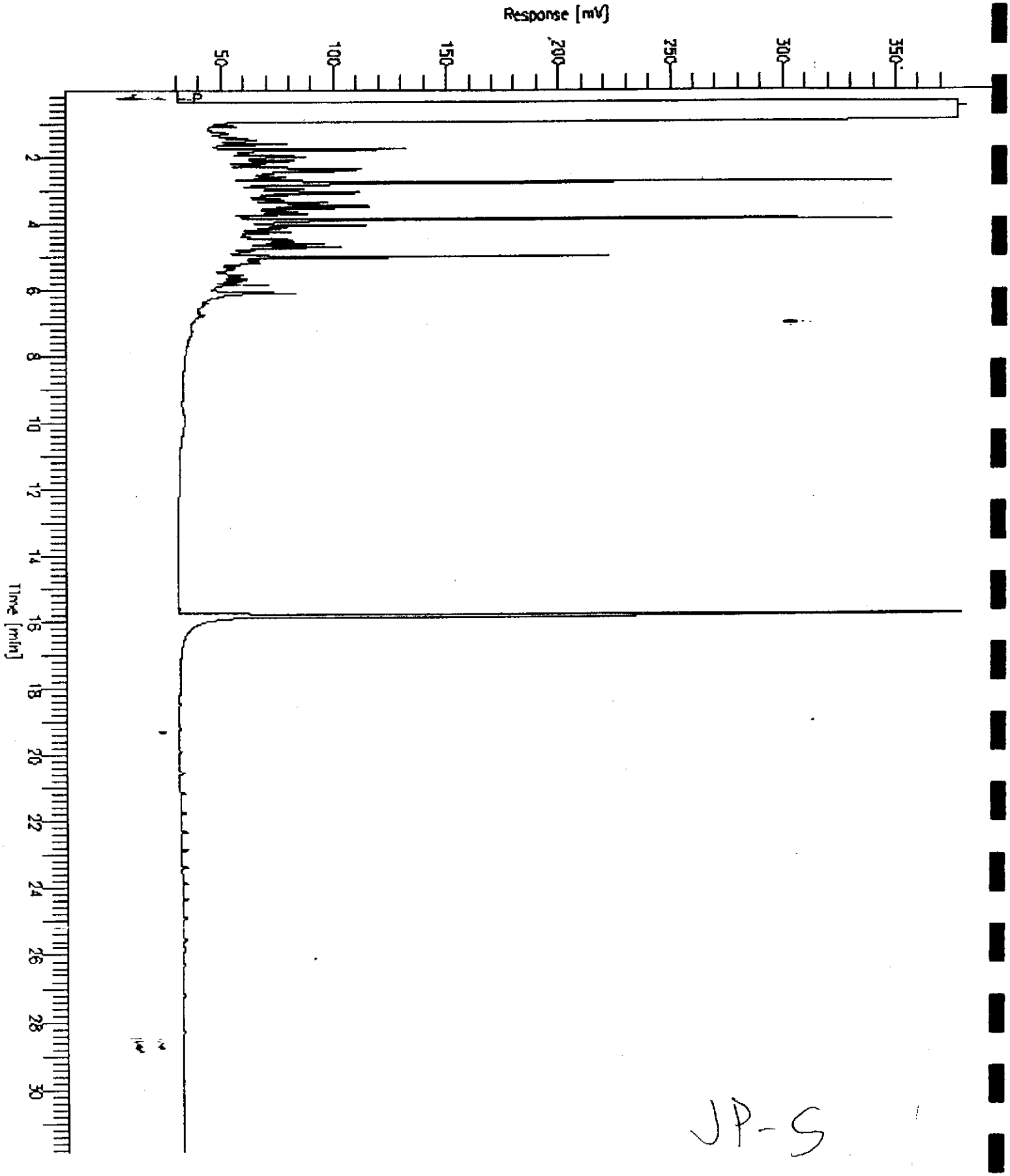


Motor Oil

Chromatogram

Sample Name : CCV,98WS5438,JPS
FileName : G:\GC11\CHA\134A076.RAW
Method : ATEH135.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 21 mV

Sample #: 250MG/L Page 1 of 1
Date : 5/18/98 11:37 AM
Time of Injection: 5/16/98 05:16 PM
Low Point : 21.08 mV High Point : 377.64 mV
Plot Scale: 356.6 mV

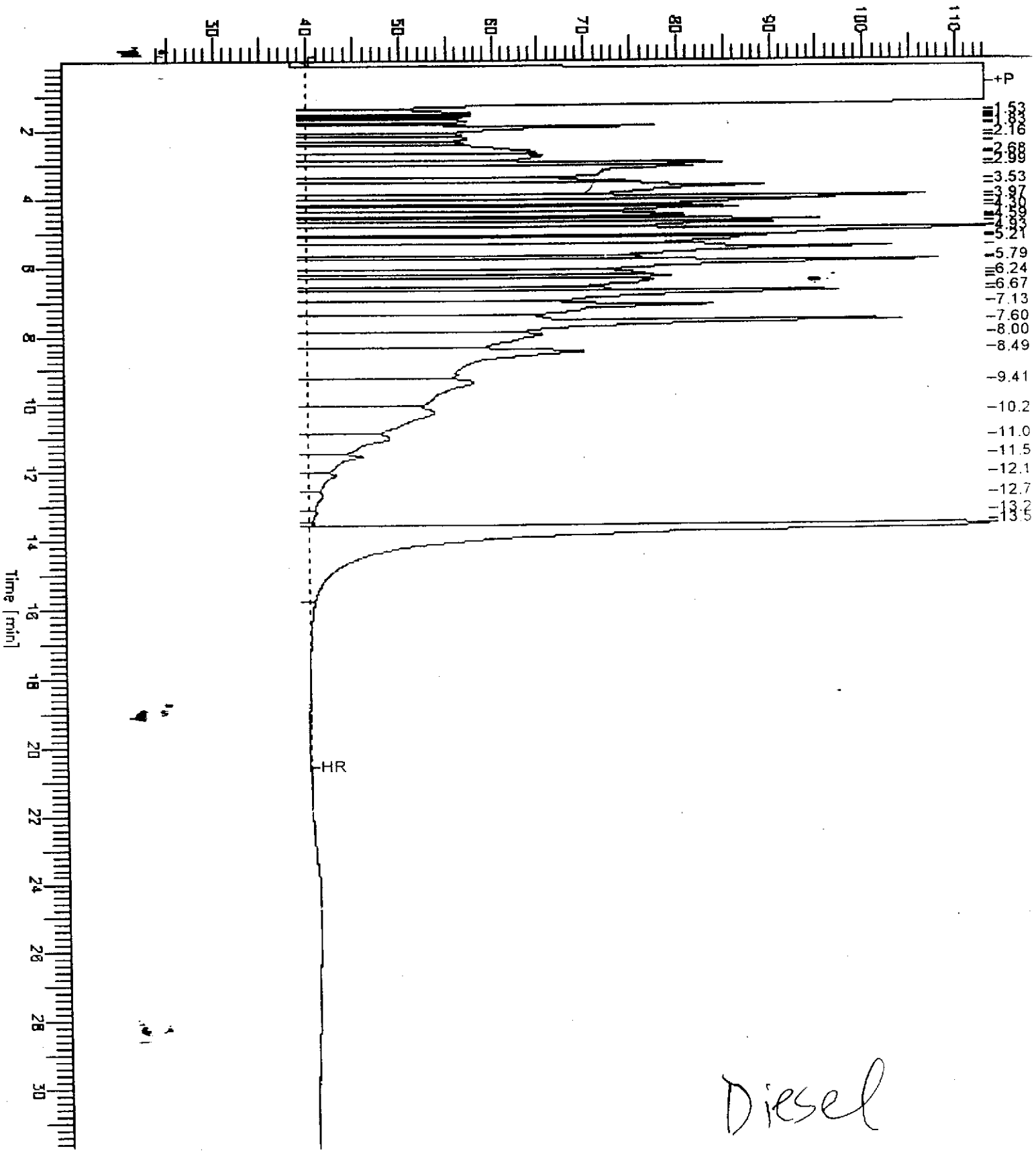


JP-5

GC15 Channel B TEH

Sample Name : CCV,98WS5843,DS
FileName : G:\GC15\CHB\133B003.RAW
Method : B111TEH.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 24 mV

Sample #: 500MG/L
Date : 5/14/98 10:40 AM
Time of Injection: 5/13/98 08:05 PM
Low Point : 23.88 mV High Point : 113.19 mV
Plot Scale: 89.3 mV



Diesel

Lab #: 133513

BATCH QC REPORT

Curtis & Tompkins, Ltd.

TEH-Tot Ext Hydrocarbons

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8015M
Project#:	95-113.53	Prep Method:	CA LUFT
Location:	P.O.O. Economy Parking		

METHOD BLANK

Matrix:	Soil	Prep Date:	05/12/98
Batch#:	40794	Analysis Date:	05/16/98
Units:	mg/Kg		
Diln Fac:	1		

MB Lab ID: QC70363

Analyte	Result
JP-5, C10-C16	<1.0
Diesel C12-C22	<1.0
Motor Oil C22-C50	<5.0

Surrogate	%Rec	Recovery Limits
Hexacosane	118	48-142

Lab #: 133513 BATCH QC REPORT Curtis & Tompkins Ltd.

TEH-Tot Ext Hydrocarbons

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8015M
Project#:	95-113.53	Prep Method:	CA LUFT
Location:	P.O.O. Economy Parking		

LABORATORY CONTROL SAMPLE

Matrix:	Soil	Prep Date:	05/12/98
Batch#:	40794	Analysis Date:	05/16/98
Units:	mg/Kg		
Diln Fac:	1		

LCS Lab ID: QC70364

Analyte	Result	Spike Added	%Rec #	Limits
Diesel C12-C22	53.1	49.5	107	49-108
Surrogate	**%Rec**	**Limits**		
Hexacosane	128	48-142		

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 1 outside limits

Lab #: 133513 BATCH QC REPORT Curtis & Tompkins, Ltd.

TEH-Tot Ext Hydrocarbons

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8015M
Project#:	95-113.53	Prep Method:	CA LUFT
Location:	P.O.O. Economy Parking		

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID:	ZZZZZZ	Sample Date:	05/08/98
Lab ID:	133556-005	Received Date:	05/09/98
Matrix:	Soil	Prep Date:	05/12/98
Batch#:	40794	Analysis Date:	05/14/98
Units:	mg/Kg dry weight	Moisture:	18%
Diln Fac:	1		

MS Lab ID: QC70365

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Diesel C12-C22	60.37	65.72	92.2	44	34-121

Surrogate	%Rec	Limits
Hexacosane	70	48-142

MSD Lab ID: QC70366

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Diesel C12-C22	60.37	150.9	141 *	34-121	48 *	36

Surrogate	%Rec	Limits
Hexacosane	86	48-142

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 1 out of 1 outside limits
Spike Recovery: 1 out of 2 outside limits

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133513-001	MW5-2'	40800	05/05/98	05/13/98	05/13/98	
133513-003	MW6-2'	40800	05/05/98	05/13/98	05/13/98	
133513-004	MW7-1 1/2'	40800	05/05/98	05/13/98	05/13/98	
133513-005	MW8-2'	40800	05/06/98	05/13/98	05/13/98	

Matrix: Soil

Analyte	Units	133513-001	133513-003	133513-004	133513-005
Diln Fac:		1	1	1	1
Gasoline C7-C12	mg/Kg	<1	<1	<1	<1
Surrogate					
Trifluorotoluene	%REC	113	112	112	116
Bromofluorobenzene	%REC	99	97	105	100

BTXE

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8020A
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133513-001	MW5-2'	40800	05/05/98	05/13/98	05/13/98	
133513-003	MW6-2'	40800	05/05/98	05/13/98	05/13/98	
133513-004	MW7-1 1/2'	40800	05/05/98	05/13/98	05/13/98	
133513-005	MW8-2'	40800	05/06/98	05/13/98	05/13/98	

Matrix: Soil

Analyte	Units	133513-001	133513-003	133513-004	133513-005
Diln Fac:		1	1	1	1
Benzene	ug/Kg	<5	<5	<5	<5
Toluene	ug/Kg	<5	<5	<5	<5
Ethylbenzene	ug/Kg	<5	<5	<5	<5
m,p-Xylenes	ug/Kg	<5	<5	<5	<5
o-Xylene	ug/Kg	<5	<5	<5	<5
Surrogate					
Trifluorotoluene	%REC	83	82	89	89
Bromofluorobenzene	%REC	81	80	87	86

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133513-007	MW4-2'	40800	05/06/98	05/13/98	05/13/98	

Matrix: Soil

Analyte	Units	133513-007
Diln Fac:		1
Gasoline C7-C12	mg/Kg	<1
Surrogate		
Trifluorotoluene	%REC	117
Bromofluorobenzene	%REC	108

BTXE

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8020A
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133513-007	MW4-2'	40800	05/06/98	05/13/98	05/13/98	

Matrix: Soil

Analyte	Units	133513-007
Diln Fac:		1
Benzene	ug/Kg	<5
Toluene	ug/Kg	<5
Ethylbenzene	ug/Kg	<5
m,p-Xylenes	ug/Kg	<5
o-Xylene	ug/Kg	<5
Surrogate		
Trifluorotoluene	%REC	90
Bromofluorobenzene	%REC	88

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 40800
Units: mg/Kg
Diln Fac: 1

Prep Date: 05/12/98
Analysis Date: 05/12/98

MB Lab ID: QC70386

Analyte	Result
Gasoline C7-C12	<1.0

Surrogate	%Rec	Recovery Limits
Trifluorotoluene	101	53-157
Bromofluorobenzene	91	53-157

BTXE

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8020A
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 40800
Units: ug/Kg
Diln Fac: 1

Prep Date: 05/12/98
Analysis Date: 05/12/98

MB Lab ID: QC70386

Analyte	Result
Benzene	<5.0
Toluene	<5.0
Ethylbenzene	<5.0
m,p-Xylenes	<5.0
o-Xylene	<5.0

Surrogate	%Rec	Recovery Limits
Trifluorotoluene	79	53-126
Bromofluorobenzene	72	35-144

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 40800
Units: mg/Kg
Diln Fac: 1

Prep Date: 05/12/98
Analysis Date: 05/12/98

LCS Lab ID: QC70385

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline C7-C12	9.83	10	98	78-120

Surrogate	%Rec	Limits
Trifluorotoluene	139	53-157
Bromofluorobenzene	103	53-157

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 1 outside limits

BTXE

Client: Innovative Technical Solutions,Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8020A
Prep Method: EPA 5030

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Soil
Batch#: 40800
Units: ug/Kg
Diln Fac: 1

Prep Date: 05/13/98
Analysis Date: 05/13/98

BS Lab ID: QC70387

Analyte	Spike Added	BS	%Rec #	Limits
Benzene	100	77.98	78	69-118
Toluene	100	80.32	80	73-118
Ethylbenzene	100	76.84	77	68-124
m,p-Xylenes	100	84.84	85	67-124
o-Xylene	100	81.24	81	73-127

Surrogate	%Rec	Limits
Trifluorotoluene	82	53-126
Bromofluorobenzene	84	35-144

BSD Lab ID: QC70388

Analyte	Spike Added	BSD	%Rec #	Limits	RPD #	Limit
Benzene	100	80.46	80	69-118	3	14
Toluene	100	83.57	84	73-118	4	21
Ethylbenzene	100	78.89	79	68-124	3	22
m,p-Xylenes	100	87.32	87	67-124	3	22
o-Xylene	100	83.11	83	73-127	2	26

Surrogate	%Rec	Limits
Trifluorotoluene	84	53-126
Bromofluorobenzene	85	35-144

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: MW7-1 1/2'
Lab ID: 133513-004
Matrix: Soil
Batch#: 40800
Units: mg/Kg
Diln Fac: 1

Sample Date: 05/05/98
Received Date: 05/06/98
Prep Date: 05/13/98
Analysis Date: 05/13/98

MS Lab ID: QC70389

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Gasoline C7-C12	10	<1	9.88	99	38-132

Surrogate	%Rec	Limits
Trifluorotoluene	145	53-157
Bromofluorobenzene	111	53-157

MSD Lab ID: QC70390

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Gasoline C7-C12	10	9.67	97	38-132	2	26

Surrogate	%Rec	Limits
Trifluorotoluene	147	53-157
Bromofluorobenzene	111	53-157

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 1 outside limits
Spike Recovery: 0 out of 2 outside limits

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: MW5-2'
Lab ID: 133513-001
Matrix: Soil
Batch#: 40739
Units: ug/Kg
Diln Fac: 1

Sampled: 05/05/98
Received: 05/06/98
Extracted: 05/08/98
Analyzed: 05/08/98

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	106	75-130
Toluene-d8	98	89-110
Bromofluorobenzene	107	83-117

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: MW6-2'
Lab ID: 133513-003
Matrix: Soil
Batch#: 40739
Units: ug/Kg
Diln Fac: 1

Sampled: 05/05/98
Received: 05/06/98
Extracted: 05/08/98
Analyzed: 05/08/98

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	106	75-130
Toluene-d8	96	89-110
Bromofluorobenzene	107	83-117

Halogenated Volatile Organics
EPA 8010 Analyte List

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8260
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

Field ID:	MW7-1 1/2'	Sampled:	05/05/98
Lab ID:	133513-004	Received:	05/06/98
Matrix:	Soil	Extracted:	05/08/98
Batch#:	40739	Analyzed:	05/08/98
Units:	ug/Kg		
Diln Fac:	1		

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	105	75-130
Toluene-d8	96	89-110
Bromofluorobenzene	105	83-117

Halogenated Volatile Organics
EPA 8010 Analyte List

Client:	Innovative Technical Solutions,Inc.	Analysis Method:	EPA 8260
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

Field ID:	MW8-2'	Sampled:	05/06/98
Lab ID:	133513-005	Received:	05/06/98
Matrix:	Soil	Extracted:	05/08/98
Batch#:	40739	Analyzed:	05/08/98
Units:	ug/Kg		
Diln Fac:	1		

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	107	75-130
Toluene-d8	97	89-110
Bromofluorobenzene	110	83-117

Halogenated Volatile Organics
EPA 8010 Analyte List

Client:	Innovative Technical Solutions,Inc.	Analysis Method:	EPA 8260
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

Field ID:	MW4-2'	Sampled:	05/06/98
Lab ID:	133513-007	Received:	05/06/98
Matrix:	Soil	Extracted:	05/08/98
Batch#:	40739	Analyzed:	05/08/98
Units:	ug/Kg		
Diln Fac:	1		

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	107	75-130
Toluene-d8	96	89-110
Bromofluorobenzene	113	83-117

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 40739
Units: ug/Kg
Diln Fac: 1

Prep Date: 05/08/98
Analysis Date: 05/08/98

MB Lab ID: QC70171

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	107	75-130
Toluene-d8	98	89-110
Bromofluorobenzene	101	83-117

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Soil
Batch#: 40739
Units: ug/Kg
Diln Fac: 1

Prep Date: 05/08/98
Analysis Date: 05/08/98

MB Lab ID: QC70194

Analyte	Result	Reporting Limit
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5.0
Freon 113	ND	5.0
1,1-Dichloroethene	ND	5.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	5.0
1,1-Dichloroethane	ND	5.0
cis-1,2-Dichloroethene	ND	5.0
Chloroform	ND	5.0
1,1,1-Trichloroethane	ND	5.0
Carbon Tetrachloride	ND	5.0
1,2-Dichloroethane	ND	5.0
Trichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
Bromodichloromethane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Dibromochloromethane	ND	5.0
Chlorobenzene	ND	5.0
Bromoform	ND	10
1,1,2,2-Tetrachloroethane	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,2-Dichlorobenzene	ND	5.0

Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	104	75-130
Toluene-d8	96	89-110
Bromofluorobenzene	107	83-117

Lab #: 133513

BATCH QC REPORT

Curtis & Tompkins, Ltd.

Halogenated Volatile Organics

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Soil
Batch#: 40739
Units: ug/Kg
Diln Fac: 1

Prep Date: 05/08/98
Analysis Date: 05/08/98

LCS Lab ID: QC70170

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	53.52	50	107	60-156
Trichloroethene	50.77	50	102	80-130
Chlorobenzene	49.66	50	99	88-124

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	100	75-130
Toluene-d8	103	89-110
Bromofluorobenzene	100	83-117

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 3 outside limits

Halogenated Volatile Organics

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: MW5-2'
Lab ID: 133513-001
Matrix: Soil
Batch#: 40739
Units: ug/Kg
Diln Fac: 1

Sample Date: 05/05/98
Received Date: 05/06/98
Prep Date: 05/08/98
Analysis Date: 05/08/98

MS Lab ID: QC70192

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	50	<5	49.56	99	33-153
Trichloroethene	50	<5	51.86	104	38-144
Chlorobenzene	50	<5	47.47	95	39-127

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	105	75-130
Toluene-d8	99	89-110
Bromofluorobenzene	100	83-117

MSD Lab ID: QC70193

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	50	52.31	105	33-153	5	27
Trichloroethene	50	52.05	104	38-144	0	29
Chlorobenzene	50	47.07	94	39-127	1	27

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	103	75-130
Toluene-d8	99	89-110
Bromofluorobenzene	97	83-117

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 3 outside limits
Spike Recovery: 0 out of 6 outside limits

COOPER TESTING LABORATORY

COOPER TESTING LABORATORY
1951 Colony, Unit X
Mountain View, California 94043
Tel: 415 968-9472 FAX: 415 968-4228

LETTER OF TRANSMITTAL

TO: Curtis & Tompkins
2323 5th St.
Berkeley, CA 94710
Attn: Damara Moore

DATE: May 19, 1998

PROJECT: 133513

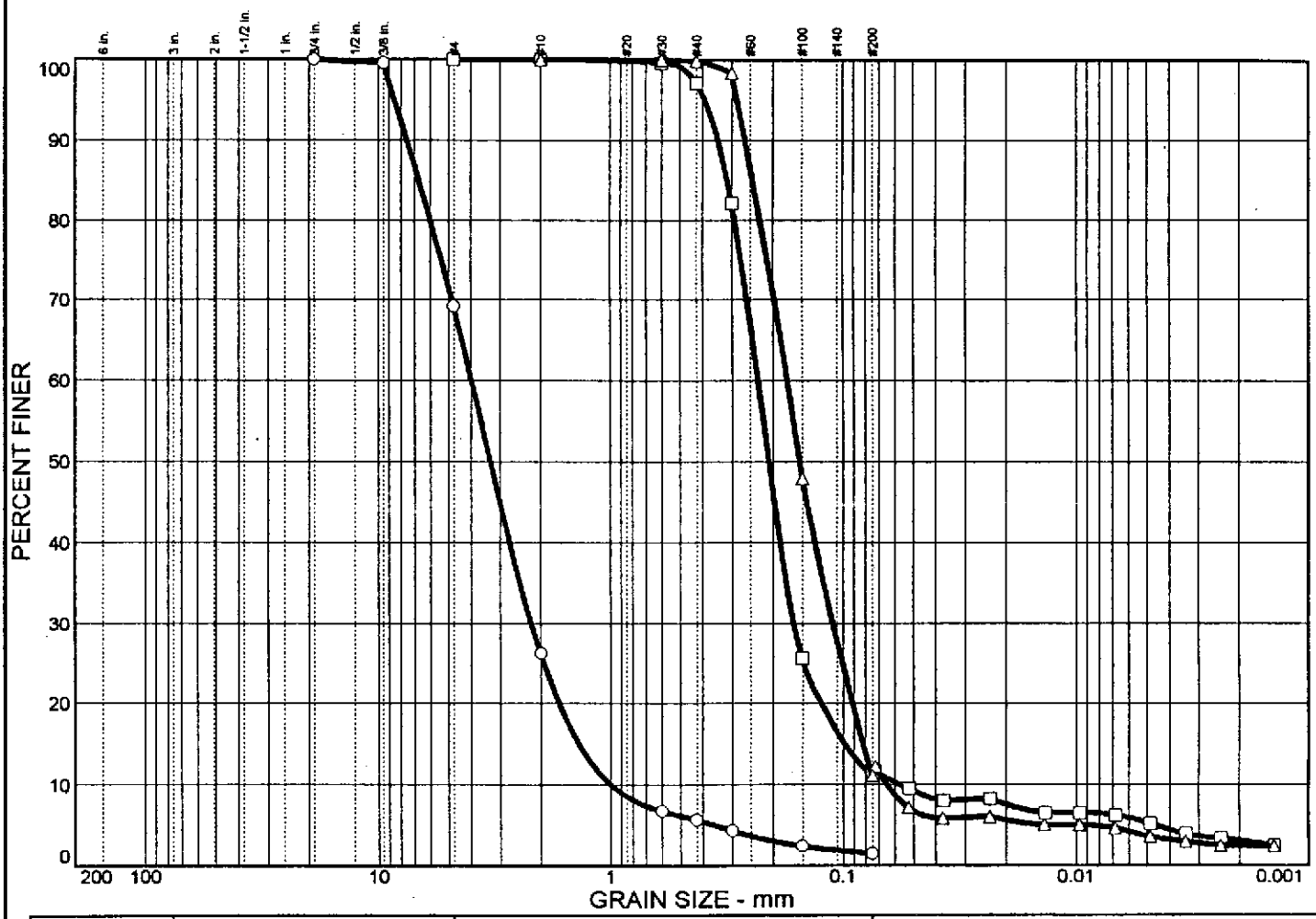
CTL#: 202-008

ENCLOSED: Laboratory soil test data.

REMARKS:

COOPER TESTING LABS

PARTICLE SIZE DISTRIBUTION CURVES



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	30.8	43.0	20.6	4.1	1.5	
□	0.0	0.0	0.0	0.0	2.8	86.1	5.8	5.3
△	0.0	0.0	0.0	0.0	0.1	88.8	7.4	3.7

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			6.70	3.97	3.30	2.20	1.36	0.994	1.22	4.00
□			0.313	0.232	0.208	0.163	0.0978	0.0569	2.01	4.07
△			0.244	0.173	0.153	0.110	0.0818	0.0648	1.09	2.67

MATERIAL DESCRIPTION	USCS	AASHTO
○ gray SAND w/gravel	SP	
□ yellow brown SAND w/silt	SP-SM	
△ yellow brown SAND w/silt	SP-SM	

Project No. 202-008 **Client:** Curtis & Tompkins

Project: 133513

○ **Source:** MW-4 **Elev./Depth:** 7'

□ **Source:** MW-5 **Elev./Depth:** 5'

△ **Source:** MW-8 **Elev./Depth:** 6'

Remarks:

○

□

△

PARTICLE SIZE DISTRIBUTION CURVES

COOPER TESTING LABORATORY

Plate

Organic Content
ASTM D2974

Cooper Testing Lab

JOB NO.: 202-008					
CLIENT: Curtis & Tompkins			DATE:	05/13/98	
PROJECT 133513			BY:	DC	
BORING:	MW-4	MW-5	MW-8		
SAMPLE:					
DEPTH, ft.:	7	5	6		
SOIL CLASSIFICATION:	see				
(visual)	sieve				
SOIL, ORGANICS & DISH, gm:	130.18	124.72	120.19		
SOIL & DISH, gm:	129.92	124.49	119.96		
DISH, gm:	81.76	81.07	77.24		
SOIL, gm:	48.16	43.42	42.72	0	0
SOIL & ORGANICS, gm:	48.42	43.65	42.95	0	0
% ORGANICS:	0.5	0.5	0.5	ERR	ERR

COOPER TESTING LABS

MOISTURE DENSITY - POROSITY DATA SHEET

Job #	202-008
Client	Curtis & Tompkins
Project/Location	133513
Date	5/13/98

Boring #	MW-5	MW-8	MW-4		
Depth (ft)	5	6	7		
Soil Type	see sieve	see sieve	see sieve		
Specific Gravity	2.70 ASSUMED	2.75 ASSUMED	2.70 ASSUMED		
Volume Total cc	237.226	228.656	284.672		
Volume of Solids	151.552	144.553	177.075		
Volume of Voids	85.674	84.103	107.597		
Void Ratio	0.565	0.582	0.608		
Porosity %	36.1%	36.8%	37.8%		
Saturation %	94.1%	99.3%	28.4%		
Moisture %	19.7%	21.0%	6.4%		
Dry Density (pcf)	107.7	108.5	104.8		

Remarks

INNOVATIVE TECHNICAL SOLUTIONS, Inc.

ITSI
1330 Broadway, Suite 1625
Oakland, California 94612
(510) 286-8888 (Tel), (510) 286-8889 (Fax)

PROJECT NAME: Port of Oakland - Economy Parking Lot Investig.
PROJECT NUMBER: 95-113.53
SITE LOCATION: 1100 Airport Dr., MOIA, Oakland

DATE: 5/6/98
PAGE: 1 of 1

CHAIN OF CUSTODY

Curtis & Tompkins
Berkeley, CA

SAMPLE I.D.	SAMPLE DEPTH	DATE	TIME	NUMBER OF CONTAINERS	TYPE OF CONTAINERS	SAMPLE MATRIX	ANALYSIS: TPH as Gas/BTEX - 8015/8020	TPH as Diesel - 8015	TPH as Diesel - 8015 (w/ Silica Gel Cleanup)	TEPH - 8015	TEPH-8015 (w/ Silica Gel Cleanup)	TRPH - 418.1	Oil and Grease - 5520	Purgeable Halocarbons - 601/8010	VOCs - 624/ 8240	SVOCs - 625/8270	LUFT Metals (Cd, Cr, Ni, Pb, Zn)	CAM 17 Metals	TPH gas + m.p. w/ silica gel (8015)	ASTM D-422 (Grain Size Distribution)	Bulk Density	Tot. Org. Carbon (4453)	SPECIAL INSTRUCTIONS/COMMENTS
MW5-2'	2'	5/5/98	1030	1	Sleeve	S	X		X					X					X				
MW5-5'	5'		1045	1	Brass	S	X		X					X					X	X	X	X	
MW6-2'	2'		1350	1		S	X		X					X					X				
MW7-1½'	1½'		1510	1		S	X		X					X					X				
MW8-2'	2'	5/6/98	0945	1		S	X		X					X					X				
MW8-6'	6'		1005	1		S	X		X					X					X	X	X	X	
MW4-2'	2'		1200	1		S	X		X					X					X				
MW4-7'	7'		1215	1		S	X		X					X					X	X	X	X	
TOTAL NUMBER OF CONTAINERS				8	TOTAL TESTS		5		5					5					5	3	3	3	

SAMPLED BY: Jim Scholland
SIGNATURE: Jim Scholland

SPECIAL INSTRUCTIONS/COMMENTS: Standard T.A.T.
Provide Chromats.

RELINQUISHED BY: Jim Scholland / Jim Scholland
Printed Name / Signature
ITSI - 5/6/98 1638
Company / Date and Time

RECEIVED BY: Tracy Babjci
Printed Name / Signature
CET - 5/6/98
Company / Date and Time

RELINQUISHED BY: _____ / _____
Printed Name / Signature
_____ / _____
Company / Date and Time

RECEIVED BY: _____ / _____
Printed Name / Signature
_____ / _____
Company / Date and Time

RELINQUISHED BY: _____ / _____
Printed Name / Signature
_____ / _____
Company / Date and Time

RECEIVED BY: _____ / _____
Printed Name / Signature
_____ / _____
Company / Date and Time

SEND RESULTS TO: Jim Scholland Fax 510-256-8998 / ITSI - Walnut Creek address

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

ANALYTICAL REPORT

Prepared for:

Innovative Technical Solutions, Inc.
2855 Mitchell Dr.
Suite 118
Walnut Creek, CA 94598

Date: 28-MAY-98
Lab Job Number: 133608
Project ID: 95-113.53
Location: P.O.O. Economy Parking

Reviewed by: _____

Reviewed by: Damara Moore

Curtis & Tompkins, Ltd.

Laboratory Number: **133608**
Client: **Innovative Technical Solutions**
Project#: **95-113.53**
Location: **POO Economy Parking**

Receipt Date: **05/13/98**

CASE NARRATIVE

This hardcopy data package contains sample and QC results for eight water samples which were received from the site referenced above on May 13, 1998. The oxidation-reduction potential analysis was subcontracted to Columbia Analytical Services. The nitrate and sulfate analyses were subcontracted to Clayton Laboratory Services.

TPH/Extractables: A silica-gel cleanup was performed on these extracts to reduce biogenic interferences.

Halogenated VOCs: For sample MW8 (CT# 133608-003), the 1,1-dichloroethane was reported from a 1:2 dilution that was analyzed on May 18 in batch 40903. All other results for this sample are reported from an undiluted analysis that was performed on May 16, in batch 40894.

No other analytical difficulties were encountered.

TEH-Tot Ext Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 3520

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133608-002	MW5	40859	05/13/98	05/14/98	05/20/98	
133608-003	MW8	40859	05/13/98	05/14/98	05/20/98	
133608-004	MW6	40859	05/13/98	05/14/98	05/20/98	
133608-005	MW7	40859	05/13/98	05/14/98	05/20/98	

Matrix: Water

Analyte	Units	133608-002	133608-003	133608-004	133608-005
Diln Fac:		1	1	1	1
JP-5, C10-C16	ug/L	<50	<47	<48	<51
Diesel C12-C22	ug/L	<50	<47	<48	<51
Motor Oil C22-C50	ug/L	<300	<280	<290	<310
Surrogate					
Hexacosane	%REC	103	107	98	98

TEH-Tot Ext Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 3520

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133608-006	MW2	40859	05/13/98	05/14/98	05/20/98	
133608-008	MW4	40859	05/13/98	05/14/98	05/20/98	

Matrix: Water

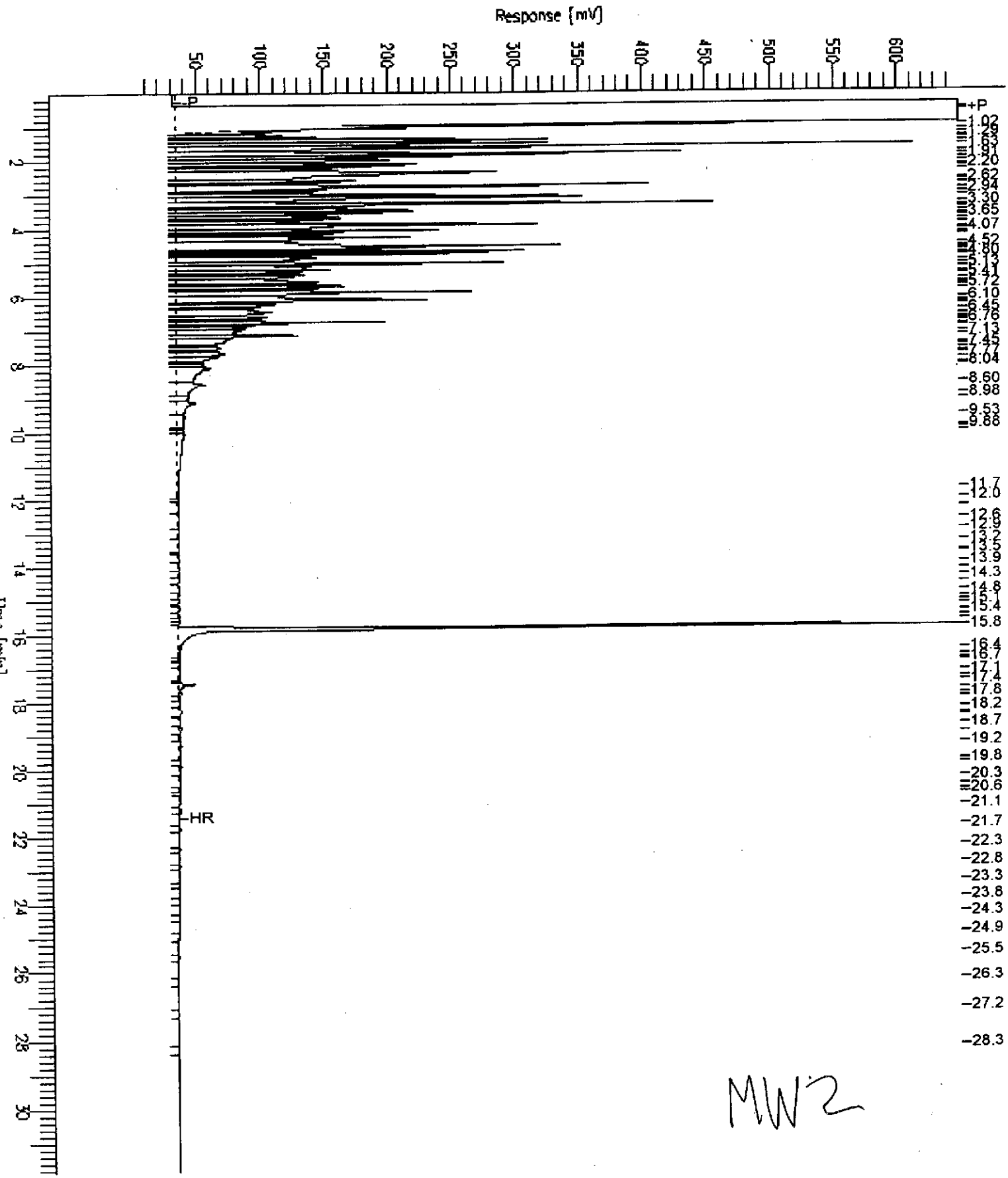
Analyte	Units	133608-006		133608-008	
Diln Fac:		1		1	
JP-5, C10-C16	ug/L	3400		2300	
Diesel C12-C22	ug/L	2600	YL	2000	YL
Motor Oil C22-C50	ug/L	<290		<310	
Surrogate					
Hexacosane	%REC	97		130	

Y: Sample exhibits fuel pattern which does not resemble standard
L: Lighter hydrocarbons than indicated standard

Chromatogram

Sample Name : 133608-006,40859
FileName : G:\GC11\CHA\138A054.RAW
Method : ATEH135.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 7 mV

Sample #: 40859 Page 1 of 1
Date : 5/21/98 01:12 PM
Time of Injection: 5/20/98 04:25 AM
Low Point : 7.09 mV High Point : 649.66 mV
Plot Scale: 642.6 mV

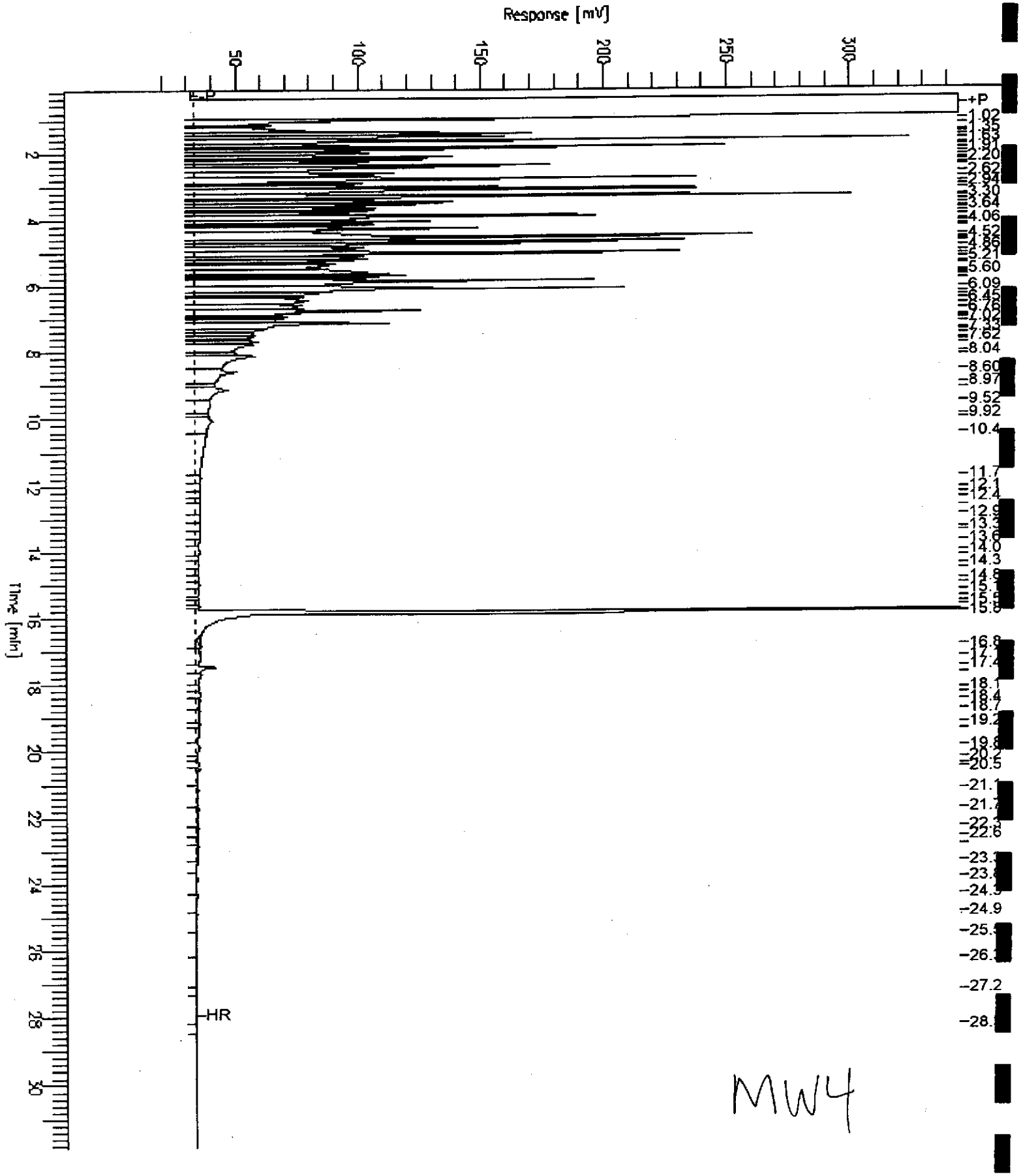


MW2

Chromatogram

Sample Name : 133608-008,40859
FileName : G:\GC11\CHA\138A055.RAW
Method : ATEH135.MTH
Start Time : 0.00 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 17 mV

Sample #: 40859
Date : 5/20/98 10:54 AM
Time of Injection: 5/20/98 05:05 AM
Low Point : 17.36 mV High Point : 345.02 mV
Plot Scale: 327.7 mV



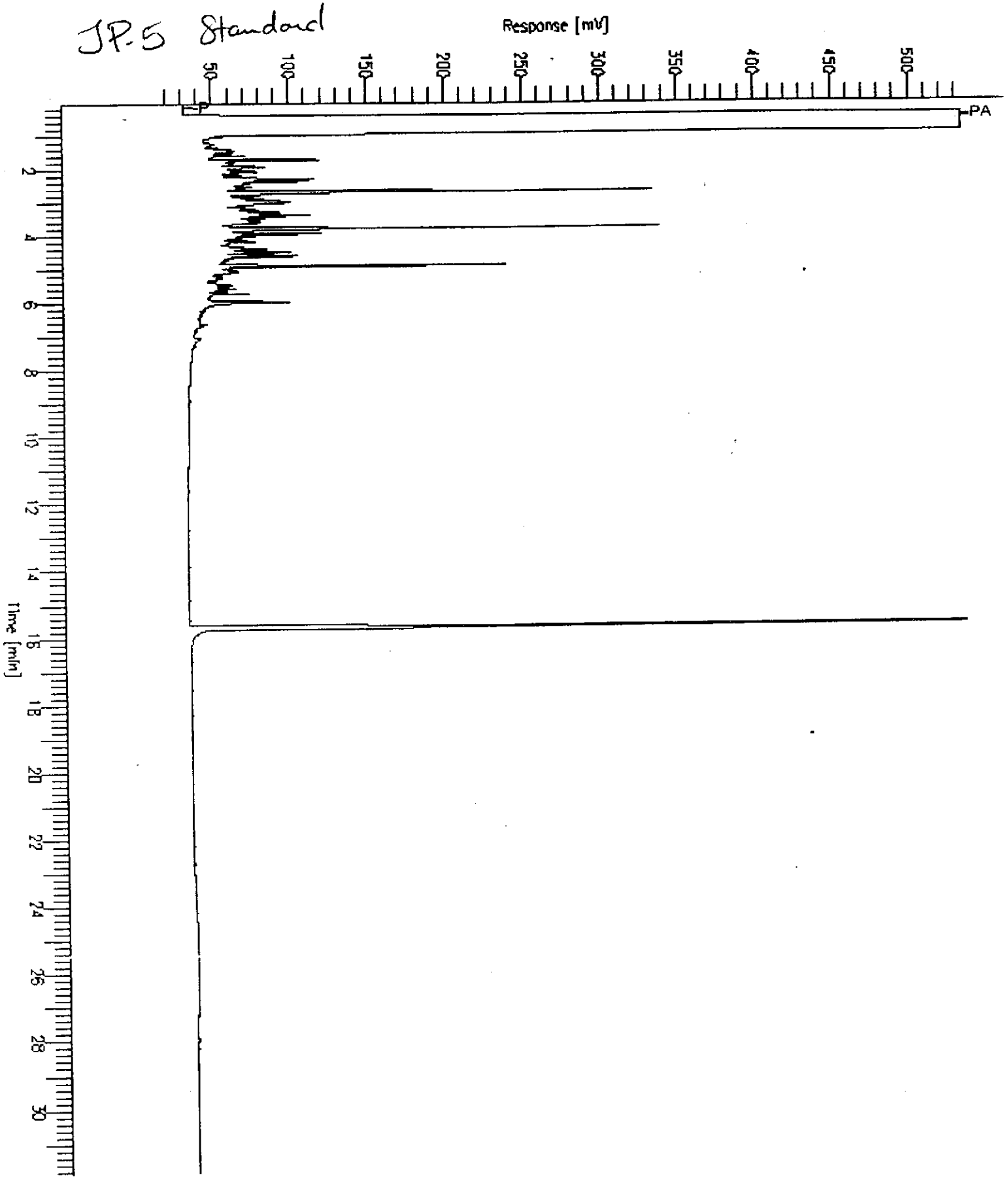
MW4

Chromatogram

Sample Name : CCV,98WS5430,JP5
FileName : G:\GC13\CHB\139B077.RAW
Method : BTEH134.MTH
Start Time : 0.07 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 12 mV

Sample f: 250MG/L
Date : 5/22/98 11:46 AM
Time of Injection: 5/21/98 11:37 PM
Low Point : 12.46 mV High Point : 534.39 mV
Plot Scale: 521.9 mV

JP-5 Standard

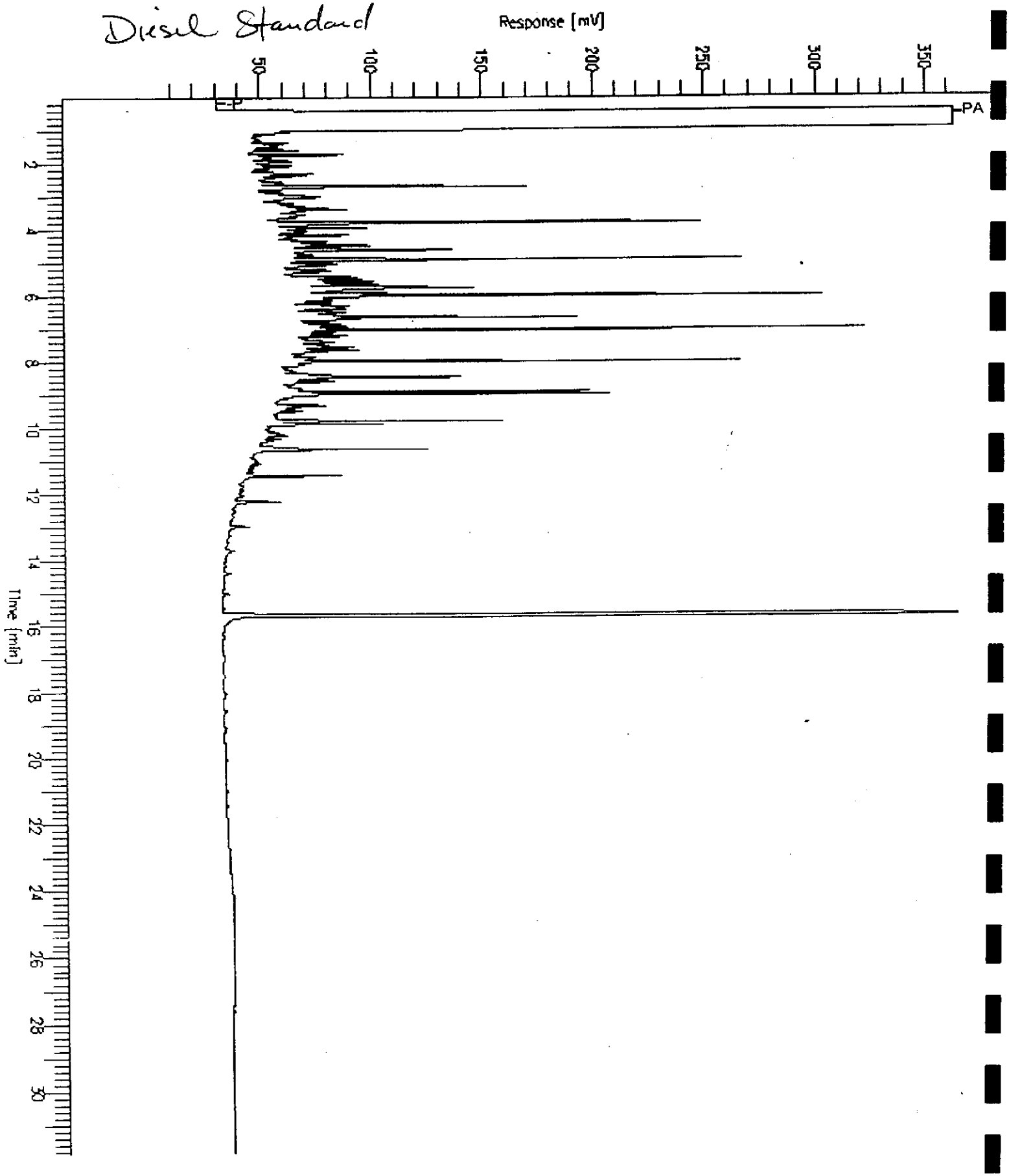


Chromatogram

Sample Name : CCV,98WS5843,DS
FileName : G:\GC13\CHB\139B072.RAW
Method : BTEH134.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 2 mV

Sample #: 500MG/L
Date : 5/22/98 11:44 AM
Time of Injection: 5/21/98 08:07 PM
Low Point : 2.23 mV High Point : 362.84 mV
Plot Scale: 360.6 mV

Diesel Standard

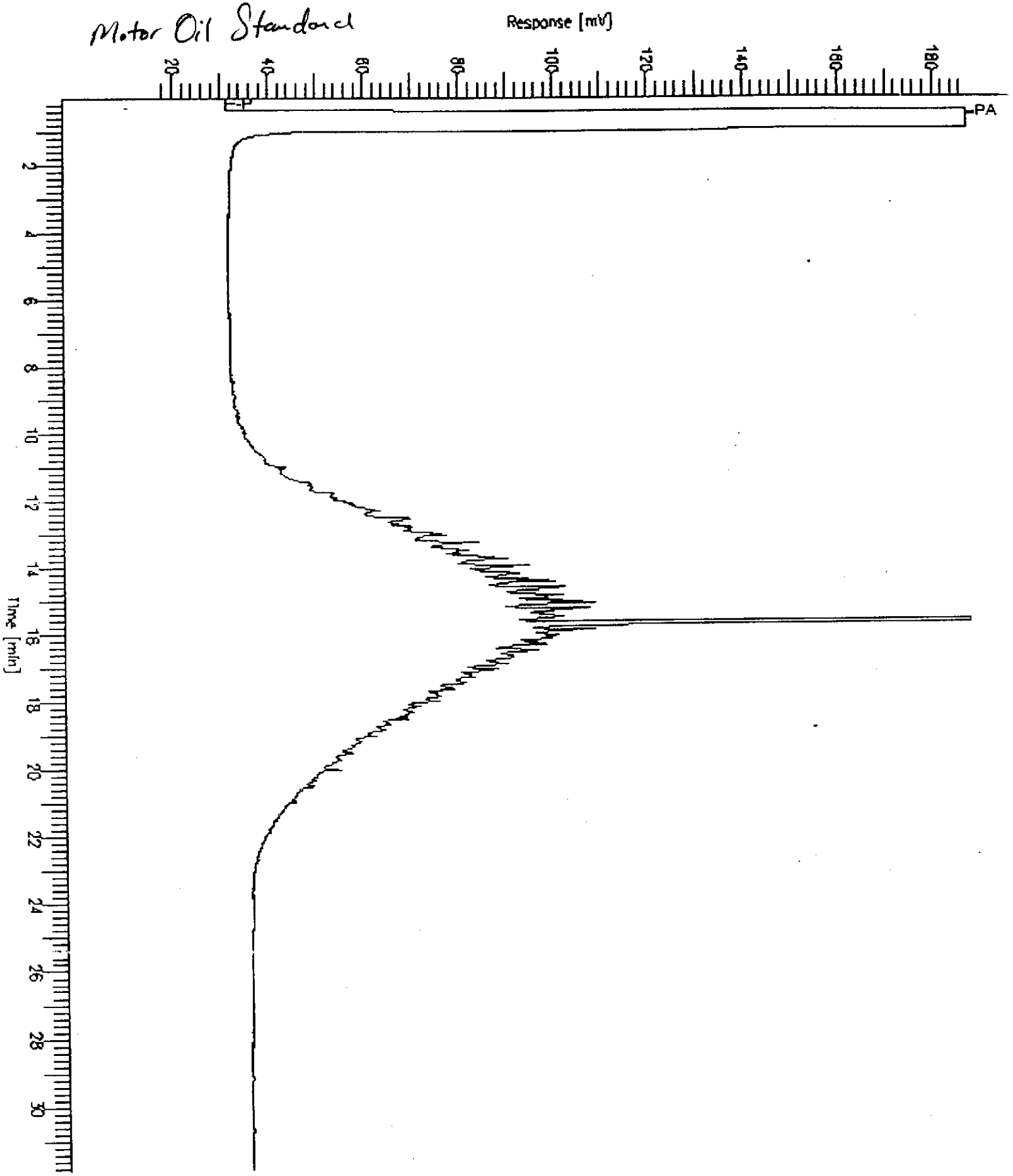


Chromatogram

Sample Name : CCV,98WS5635,MO
FileName : G:\GC13\CHB\139B074.RAW
Method : BTEH134.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 16 mV

Sample #: 500MG/L
Date : 5/22/98 11:45 AM
Time of Injection: 5/21/98 09:31 PM
Low Point : 16.34 mV High Point : 187.27 mV
Plot Scale: 170.9 mV

Motor Oil Standard



TEH-Tot Ext Hydrocarbons

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8015M
Project#:	95-113.53	Prep Method:	EPA 3520
Location:	P.O.O. Economy Parking		

METHOD BLANK

Matrix:	Water	Prep Date:	05/14/98
Batch#:	40859	Analysis Date:	05/22/98
Units:	ug/L		
Diln Fac:	1		

MB Lab ID: QC70583

Analyte	Result
JP-5, C10-C16	<50
Diesel C12-C22	<50
Motor Oil C22-C50	<300

Surrogate	%Rec	Recovery Limits
Hexacosane	119	53-136

BATCH QC REPORT

Curtis & Tompkins, Ltd.

TEH-Tot Ext Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 3520

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Water
Batch#: 40859
Units: ug/L
Diln Fac: 1

Prep Date: 05/14/98
Analysis Date: 05/22/98

BS Lab ID: QC70584

Analyte	Spike Added	BS	%Rec	#	Limits
Diesel C12-C22	2475	2222	90		58-110
Surrogate	**%Rec**	**Limits**			
Hexacosane	105	53-136			

BSD Lab ID: QC70585

Analyte	Spike Added	BSD	%Rec	#	Limits	RPD	#	Limit
Diesel C12-C22	2475	2597	105		58-110	16		21
Surrogate	**%Rec**	**Limits**						
Hexacosane	122	53-136						

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 1 outside limits
Spike Recovery: 0 out of 2 outside limits

Lab#: 133608
Page 1 of 1

Curtis & Tompkins, Ltd.

Total Dissolved Solids (TDS)

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 160.1
Prep Method: EPA 160.1

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
133608-002	MW5	40953	13-MAY-98	19-MAY-98	-
133608-003	MW8	40953	13-MAY-98	19-MAY-98	-
133608-004	MW6	40953	13-MAY-98	19-MAY-98	-
133608-005	MW7	40953	13-MAY-98	19-MAY-98	-
133608-006	MW2	40953	13-MAY-98	19-MAY-98	-
133608-008	MW4	40953	13-MAY-98	19-MAY-98	-
QC70930	Method Blank	40953	-	19-MAY-98	-

Analyte: Total Dissolved Solids **Matrix:** Water **Units:** mg/L

Sample #	Client ID		Result	Reporting Limit	Dilution Factor
133608-002	MW5		2300	10	1
133608-003	MW8		8300	10	1
133608-004	MW6		4240	10	1
133608-005	MW7		1380	10	1
133608-006	MW2		1860	10	1
133608-008	MW4		1420	10	1
QC70930	Method Blank	ND		10	1

ND = None Detected at or above Reporting Limit

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133608-001	TRIP BLANK	40942	05/13/98	05/19/98	05/19/98	
133608-002	MW5	40942	05/13/98	05/19/98	05/19/98	
133608-003	MW8	40942	05/13/98	05/19/98	05/19/98	
133608-004	MW6	40942	05/13/98	05/19/98	05/19/98	

Matrix: Water

Analyte Diln Fac:	Units	133608-001 1	133608-002 1	133608-003 1	133608-004 1
Gasoline C7-C12	ug/L	<50	<50	<50	<50
Surrogate					
Trifluorotoluene	%REC	115	117	115	118
Bromofluorobenzene	%REC	102	109	103	109

BTXE

Client: Innovative Technical Solutions,Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8020A
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133608-001	TRIP BLANK	40942	05/13/98	05/19/98	05/19/98	
133608-002	MW5	40942	05/13/98	05/19/98	05/19/98	
133608-003	MW8	40942	05/13/98	05/19/98	05/19/98	
133608-004	MW6	40942	05/13/98	05/19/98	05/19/98	

Matrix: Water

Analyte Diln Fac:	Units	133608-001 1	133608-002 1	133608-003 1	133608-004 1
Benzene	ug/L	<0.5	<0.5	2	<0.5
Toluene	ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	ug/L	<0.5	<0.5	<0.5	<0.5
Surrogate					
Trifluorotoluene	%REC	89	92	90	92
Bromofluorobenzene	%REC	86	90	87	92

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions,Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133608-005	MW7	40942	05/13/98	05/19/98	05/19/98	
133608-006	MW2	40942	05/13/98	05/20/98	05/20/98	
133608-007	QC-1	40942	05/13/98	05/19/98	05/19/98	
133608-008	MW4	40942	05/13/98	05/19/98	05/19/98	

Matrix: Water

Analyte Diln Fac:	Units	133608-005 1	133608-006 2	133608-007 1	133608-008 1
Gasoline C7-C12	ug/L	<50	4000	1400	1400
Surrogate					
Trifluorotoluene	%REC	116	116	114	113
Bromofluorobenzene	%REC	105	115	118	116

BTXE

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8020A
Prep Method: EPA 5030

Sample #	Client ID	Batch #	Sampled	Extracted	Analyzed	Moisture
133608-005	MW7	40942	05/13/98	05/19/98	05/19/98	
133608-006	MW2	40942	05/13/98	05/20/98	05/20/98	
133608-007	QC-1	40942	05/13/98	05/19/98	05/19/98	
133608-008	MW4	40942	05/13/98	05/19/98	05/19/98	

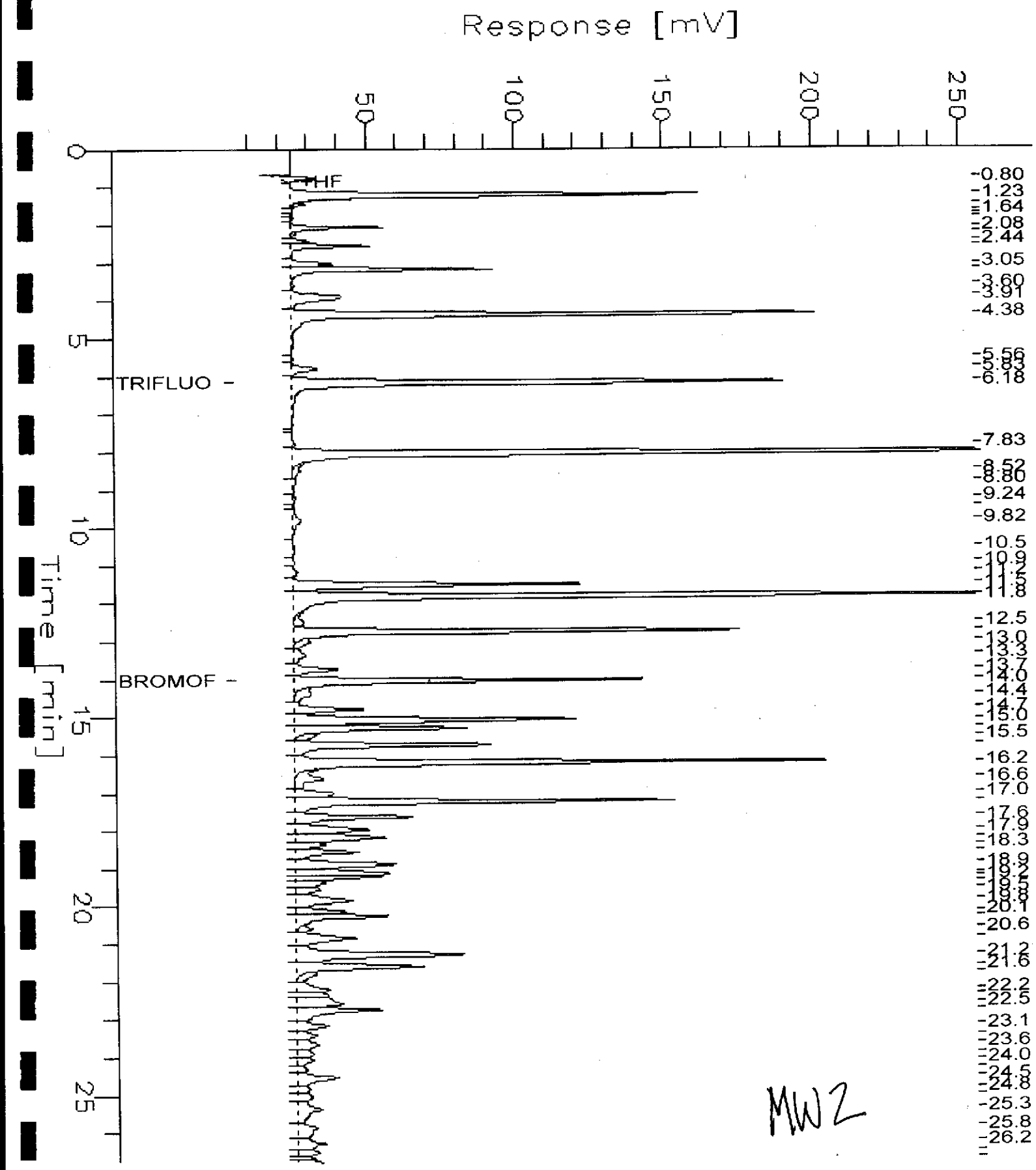
Matrix: Water

Analyte	Units	133608-005	133608-006	133608-007	133608-008
Diln Fac:		1	2	1	1
Benzene	ug/L	<0.5	150	8.5	9.8
Toluene	ug/L	0.6	270	17	23
Ethylbenzene	ug/L	<0.5	94	11	13
m,p-Xylenes	ug/L	<0.5	280	42	50
o-Xylene	ug/L	<0.5	160	27	29
Surrogate					
Trifluorotoluene	%REC	91	91	91	90
Bromofluorobenzene	%REC	88	99	104	101

GC05 'H' File TVH

Sample Name : RR,D,133608-006,40942,
FileName : G:\GC05\DATA\139G029.RAW
Method :
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 5 mV

Sample #: Page 1 of 1
Date : 5/20/98 09:39 AM
Time of Injection: 5/20/98 08:49 AM
Low Point : 4.95 mV High Point : 254.95 mV
Plot Scale: 250.0 mV

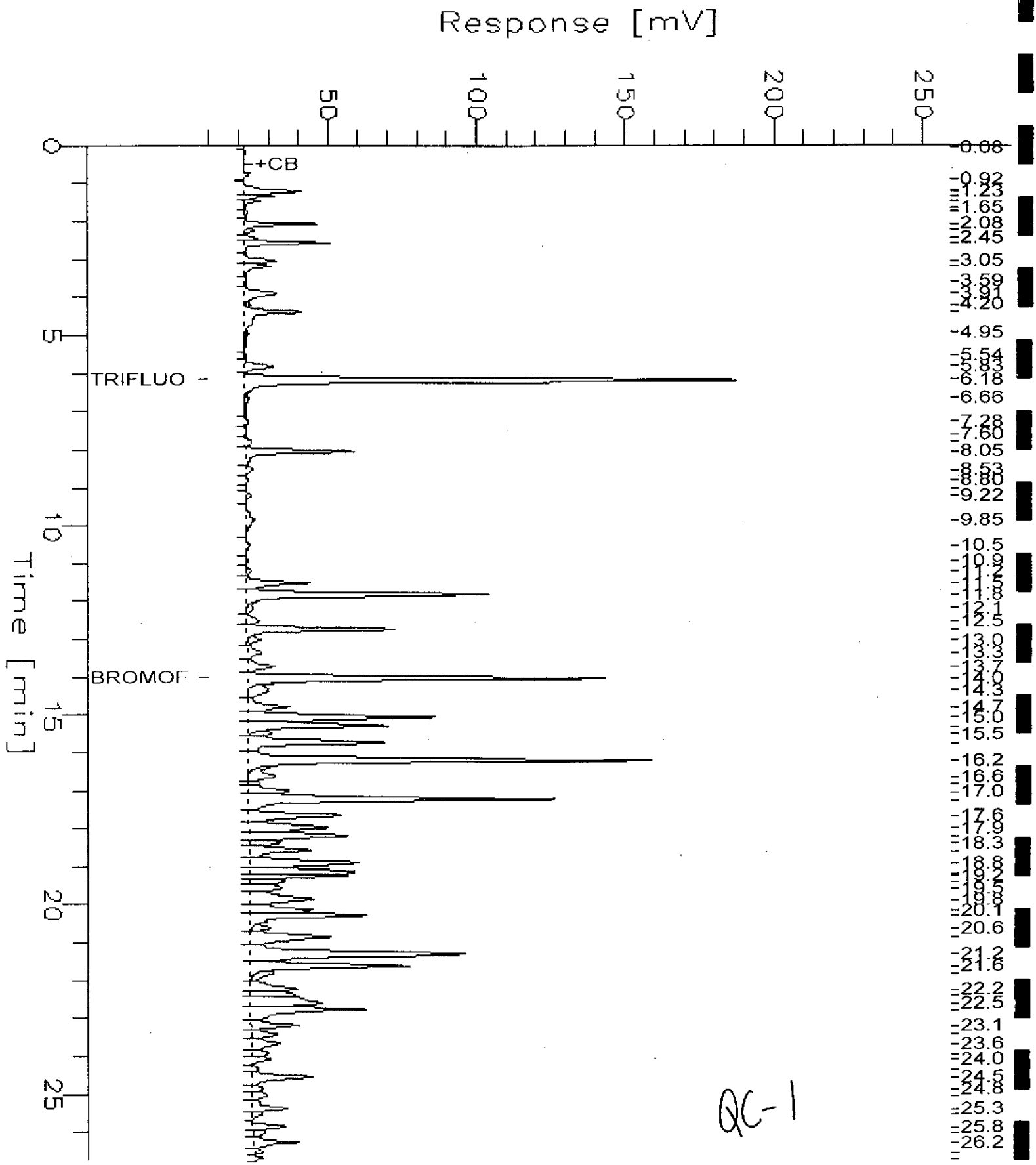


MW2

GC05 'H' File TVH

Sample Name : S,133608-007,40942,
FileName : G:\GC05\DATA\139G012.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 9 mV

Sample #: Page 1 of 1
Date : 5/19/98 10:58 PM
Time of Injection: 5/19/98 10:30 PM
Low Point : 9.39 mV High Point : 259.39 mV
Plot Scale: 250.0 mV

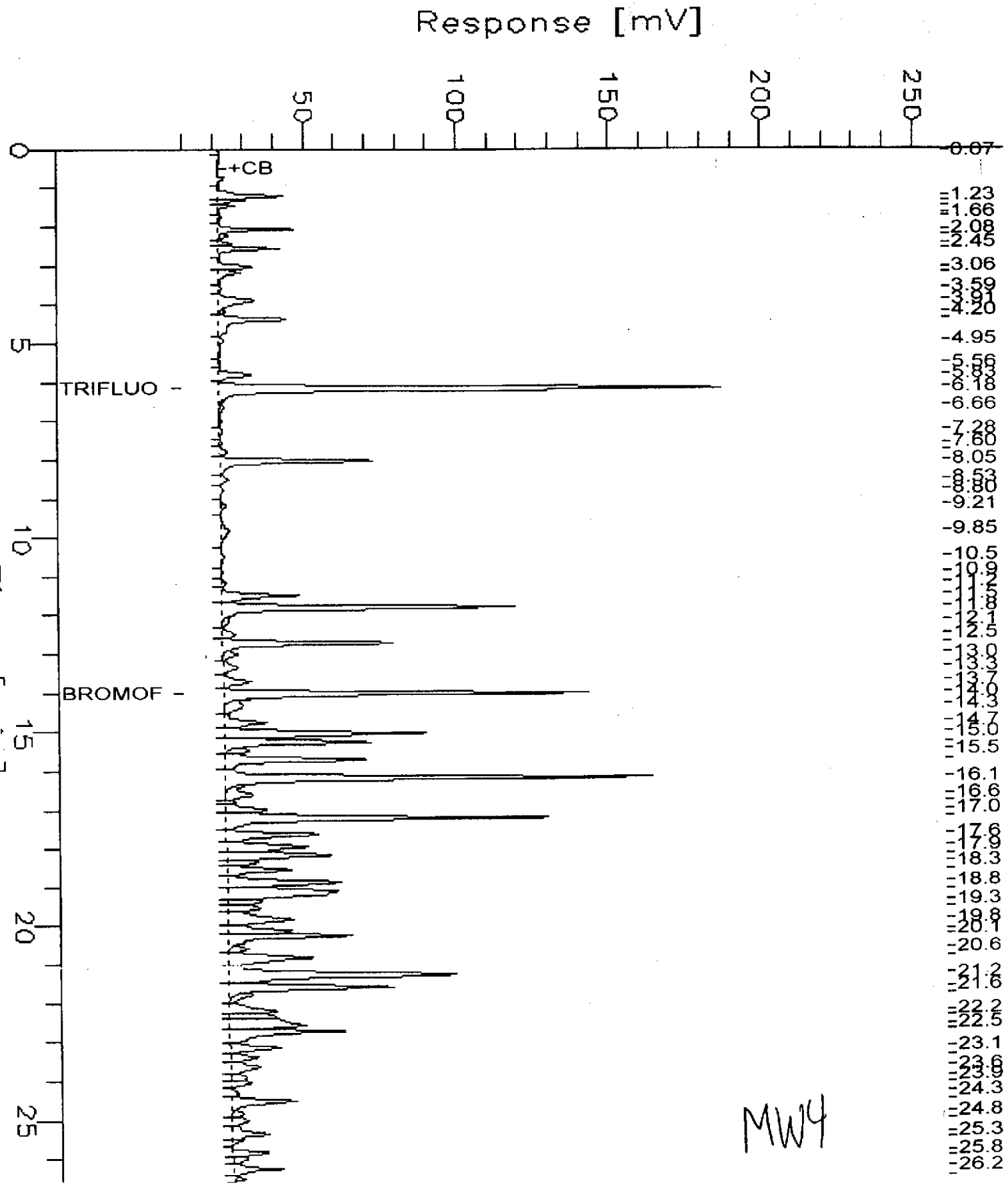


QC-1

GC05 'H' File TVH

mple Name : S,133608-008,40942,
leName : G:\GC05\DATA\139G013.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 10 mV

Sample #:
Date : 5/19/98 11:35 PM
Time of Injection: 5/19/98 11:06 PM
Low Point : 9.53 mV High Point : 259.53 mV
Plot Scale: 250.0 mV

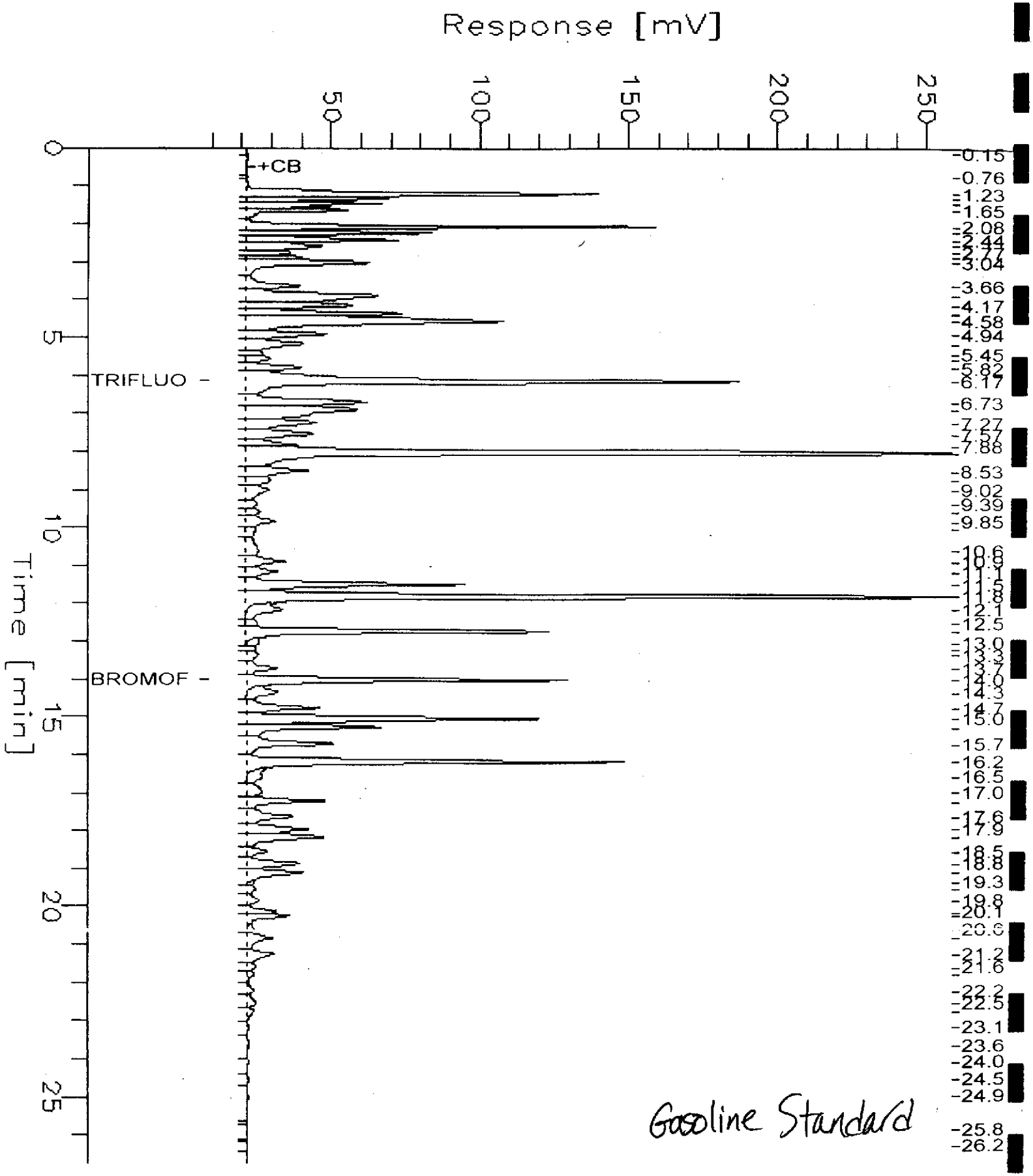


MW4

GC05 'H' File TVH

Sample Name : CCV/LCS,QC70885,98WS5733,40942,
FileName : G:\GC05\DATA\139G002.raw
Method : TVHBTXE
Start Time : 0.00 min End Time : 26.80 min
Scale Factor: -1.0 Plot Offset: 9 mV

Sample #: GAS Page 1 of 1
Date : 5/19/98 04:54 PM
Time of Injection: 5/19/98 04:26 PM
Low Point : 9.10 mV High Point : 259.10 mV
Plot Scale: 250.0 mV



Gasoline Standard

TVH-Total Volatile Hydrocarbons

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8015M
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 40942
Units: ug/L
Diln Fac: 1

Prep Date: 05/19/98
Analysis Date: 05/19/98

MB Lab ID: QC70887

Analyte	Result
Gasoline C7-C12	<50

Surrogate	%Rec	Recovery Limits
Trifluorotoluene	109	59-162
Bromofluorobenzene	97	59-162

BATCH QC REPORT

Curtis & Tompkins, Ltd.

BTXE

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8020A
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

METHOD BLANK

Matrix:	Water	Prep Date:	05/19/98
Batch#:	40942	Analysis Date:	05/19/98
Units:	ug/L		
Diln Fac:	1		

MB Lab ID: QC70887

Analyte	Result
Benzene	<0.5
Toluene	<0.5
Ethylbenzene	<0.5
m,p-Xylenes	<0.5
o-Xylene	<0.5

Surrogate	%Rec	Recovery Limits
Trifluorotoluene	83	53-124
Bromofluorobenzene	79	41-142

BATCH QC REPORT

Curtis & Tompkins Ltd.

TVH-Total Volatile Hydrocarbons

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8015M
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

LABORATORY CONTROL SAMPLE

Matrix:	Water	Prep Date:	05/19/98
Batch#:	40942	Analysis Date:	05/19/98
Units:	ug/L		
Diln Fac:	1		

LCS Lab ID: QC70885

Analyte	Result	Spike Added	%Rec #	Limits
Gasoline C7-C12	1878	2000	94	80-119

Surrogate	%Rec	Limits
Trifluorotoluene	138	59-162
Bromofluorobenzene	106	59-162

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 1 outside limits

Lab #: 133608

BATCH QC REPORT

Curtis & Tompkins, Ltd.

BTXE

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8020A
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 40942
Units: ug/L
Diln Fac: 1

Prep Date: 05/19/98
Analysis Date: 05/19/98

LCS Lab ID: QC70886

Analyte	Result	Spike Added	%Rec #	Limits
Benzene	17.99	20	90	69-109
Toluene	18.86	20	94	72-116
Ethylbenzene	18.4	20	92	67-120
m,p-Xylenes	19.86	20	99	69-117
o-Xylene	19.06	20	95	75-122

Surrogate	%Rec	Limits
Trifluorotoluene	83	53-124
Bromofluorobenzene	78	41-142

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 5 outside limits

Lab #: 133608

BATCH QC REPORT

Curtis & Tompkins, Ltd.

BTXE

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8020A
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID:	ZZZZZZ	Sample Date:	05/14/98
Lab ID:	133612-001	Received Date:	05/14/98
Matrix:	Water	Prep Date:	05/20/98
Batch#:	40942	Analysis Date:	05/20/98
Units:	ug/L		
Diln Fac:	1		

MS Lab ID: QC70888

Analyte	Spike Added	Sample	MS	%Rec #	Limits
Benzene	20	<0.5	18.7	94	55-125
Toluene	20	<0.5	19.4	97	65-126
Ethylbenzene	20	<0.5	19.21	96	60-129
m,p-Xylenes	20	<0.5	21	105	68-116
o-Xylene	20	<0.5	20.38	102	69-129

Surrogate	%Rec	Limits
Trifluorotoluene	93	53-124
Bromofluorobenzene	94	41-142

MSD Lab ID: QC70889

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
Benzene	20	19.27	96	55-125	3	11
Toluene	20	20.23	101	65-126	4	11
Ethylbenzene	20	19.84	99	60-129	3	12
m,p-Xylenes	20	21.52	108	68-116	2	11
o-Xylene	20	20.96	105	69-129	3	12

Surrogate	%Rec	Limits
Trifluorotoluene	93	53-124
Bromofluorobenzene	92	41-142

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

Halogenated Volatile Organics
EPA 8010 Analyte List

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8260
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

Field ID:	TRIP BLANK	Sampled:	05/13/98
Lab ID:	133608-001	Received:	05/13/98
Matrix:	Water	Extracted:	05/16/98
Batch#:	40894	Analyzed:	05/16/98
Units:	ug/L		
Diln Fac:	1		

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	104	85-121
Toluene-d8	98	92-110
Bromofluorobenzene	103	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: MW5
Lab ID: 133608-002
Matrix: Water
Batch#: 40894
Units: ug/L
Diln Fac: 1

Sampled: 05/13/98
Received: 05/13/98
Extracted: 05/16/98
Analyzed: 05/16/98

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	106	85-121
Toluene-d8	98	92-110
Bromofluorobenzene	104	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8260
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

Field ID:	MW8	Sampled:	05/13/98
Lab ID:	133608-003	Received:	05/13/98
Matrix:	Water	Extracted:	05/16/98
Batch#:	40894	Analyzed:	05/16/98
Units:	ug/L		
Diln Fac:	1		

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	6.0	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	180	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	180	2.0
cis-1,2-Dichloroethene	1.9	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	2.7	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	104	85-121
Toluene-d8	97	92-110
Bromofluorobenzene	102	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8260
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

Field ID:	MW6	Sampled:	05/13/98
Lab ID:	133608-004	Received:	05/13/98
Matrix:	Water	Extracted:	05/16/98
Batch#:	40894	Analyzed:	05/16/98
Units:	ug/L		
Diln Fac:	1		

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	106	85-121
Toluene-d8	97	92-110
Bromofluorobenzene	103	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: MW7
Lab ID: 133608-005
Matrix: Water
Batch#: 40894
Units: ug/L
Diln Fac: 1

Sampled: 05/13/98
Received: 05/13/98
Extracted: 05/16/98
Analyzed: 05/16/98

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	3.4	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	8.0	1.0
cis-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	107	85-121
Toluene-d8	97	92-110
Bromofluorobenzene	103	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: MW2
Lab ID: 133608-006
Matrix: Water
Batch#: 40894
Units: ug/L
Diln Fac: 1

Sampled: 05/13/98
Received: 05/13/98
Extracted: 05/16/98
Analyzed: 05/16/98

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	3.4	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	51	1.0
cis-1,2-Dichloroethene	140	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	105	85-121
Toluene-d8	97	92-110
Bromofluorobenzene	98	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

Field ID: QC-1
Lab ID: 133608-007
Matrix: Water
Batch#: 40894
Units: ug/L
Diln Fac: 1

Sampled: 05/13/98
Received: 05/13/98
Extracted: 05/16/98
Analyzed: 05/16/98

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	2.6	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	29	1.0
cis-1,2-Dichloroethene	9.2	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	3.0	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	104	85-121
Toluene-d8	96	92-110
Bromofluorobenzene	99	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client:	Innovative Technical Solutions, Inc.	Analysis Method:	EPA 8260
Project#:	95-113.53	Prep Method:	EPA 5030
Location:	P.O.O. Economy Parking		

Field ID:	MW4	Sampled:	05/13/98
Lab ID:	133608-008	Received:	05/13/98
Matrix:	Water	Extracted:	05/16/98
Batch#:	40894	Analyzed:	05/16/98
Units:	ug/L		
Diln Fac:	1		

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	2.8	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	31	1.0
cis-1,2-Dichloroethene	9.9	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	2.8	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Recovery	Recovery Limits
1,2-Dichloroethane-d4	101	85-121
Toluene-d8	97	92-110
Bromofluorobenzene	100	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 40894
Units: ug/L
Diln Fac: 1

Prep Date: 05/16/98
Analysis Date: 05/16/98

MB Lab ID: QC70703

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	105	85-121
Toluene-d8	97	92-110
Bromofluorobenzene	101	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 40903
Units: ug/L
Diln Fac: 1

Prep Date: 05/18/98
Analysis Date: 05/18/98

MB Lab ID: QC70744

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	104	85-121
Toluene-d8	99	92-110
Bromofluorobenzene	102	84-115

Halogenated Volatile Organics
EPA 8010 Analyte List

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 40903
Units: ug/L
Diln Fac: 1

Prep Date: 05/18/98
Analysis Date: 05/18/98

MB Lab ID: QC70745

Analyte	Result	Reporting Limit
Chloromethane	ND	2.0
Vinyl Chloride	ND	2.0
Bromomethane	ND	2.0
Chloroethane	ND	2.0
Trichlorofluoromethane	ND	1.0
Freon 113	ND	1.0
1,1-Dichloroethene	ND	1.0
Methylene Chloride	ND	20
trans-1,2-Dichloroethene	ND	1.0
1,1-Dichloroethane	ND	1.0
cis-1,2-Dichloroethene	ND	1.0
Chloroform	ND	1.0
1,1,1-Trichloroethane	ND	1.0
Carbon Tetrachloride	ND	1.0
1,2-Dichloroethane	ND	1.0
Trichloroethene	ND	1.0
1,2-Dichloropropane	ND	1.0
Bromodichloromethane	ND	1.0
cis-1,3-Dichloropropene	ND	1.0
trans-1,3-Dichloropropene	ND	1.0
1,1,2-Trichloroethane	ND	1.0
Tetrachloroethene	ND	1.0
Dibromochloromethane	ND	1.0
Chlorobenzene	ND	1.0
Bromoform	ND	2.0
1,1,2,2-Tetrachloroethane	ND	1.0
1,3-Dichlorobenzene	ND	1.0
1,4-Dichlorobenzene	ND	1.0
1,2-Dichlorobenzene	ND	1.0

Surrogate	%Rec	Recovery Limits
1,2-Dichloroethane-d4	104	85-121
Toluene-d8	98	92-110
Bromofluorobenzene	102	84-115

Lab #: 133608

BATCH QC REPORT

Curtis & Tompkins, Ltd.

Halogenated Volatile Organics

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

LABORATORY CONTROL SAMPLE

Matrix: Water
Batch#: 40894
Units: ug/L
Diln Fac: 1

Prep Date: 05/16/98
Analysis Date: 05/16/98

LCS Lab ID: QC70706

Analyte	Result	Spike Added	%Rec #	Limits
1,1-Dichloroethene	44.47	50	89	69-137
Trichloroethene	50.5	50	101	83-116
Chlorobenzene	50.43	50	101	87-117

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	104	85-121
Toluene-d8	98	92-110
Bromofluorobenzene	99	84-115

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
Spike Recovery: 0 out of 3 outside limits

Halogenated Volatile Organics

Client: Innovative Technical Solutions,Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Water
Batch#: 40903
Units: ug/L
Diln Fac: 1

Prep Date: 05/18/98
Analysis Date: 05/18/98

BS Lab ID: QC70742

Analyte	Spike Added	BS	%Rec #	Limits
1,1-Dichloroethene	50	41.98	84	69-137
Trichloroethene	50	48.9	98	83-116
Chlorobenzene	50	50.91	102	87-117

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	98	85-121
Toluene-d8	97	92-110
Bromofluorobenzene	99	84-115

BSD Lab ID: QC70743

Analyte	Spike Added	BSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	50	42.19	84	69-137	0	14
Trichloroethene	50	49.1	98	83-116	0	10
Chlorobenzene	50	50.6	101	87-117	1	10

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	100	85-121
Toluene-d8	98	92-110
Bromofluorobenzene	99	84-115

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 3 outside limits
Spike Recovery: 0 out of 6 outside limits

BATCH QC REPORT

Curtis & Tompkins, Ltd.

Halogenated Volatile Organics

Client: Innovative Technical Solutions, Inc.
Project#: 95-113.53
Location: P.O.O. Economy Parking

Analysis Method: EPA 8260
Prep Method: EPA 5030

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Field ID: ZZZZZZ
Lab ID: 133524-001
Matrix: Water
Batch#: 40894
Units: ug/L
Diln Fac: 2

Sample Date: 05/06/98
Received Date: 05/07/98
Prep Date: 05/17/98
Analysis Date: 05/17/98

MS Lab ID: QC70704

Analyte	Spike Added	Sample	MS	%Rec #	Limits
1,1-Dichloroethene	100	0.597	79.65	79	63-126
Trichloroethene	100	50.25	144	94	69-117
Chlorobenzene	100	<2	96.1	96	79-115

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	97	85-121
Toluene-d8	96	92-110
Bromofluorobenzene	99	84-115

MSD Lab ID: QC70705

Analyte	Spike Added	MSD	%Rec #	Limits	RPD #	Limit
1,1-Dichloroethene	100	81.72	81	63-126	3	10
Trichloroethene	100	149.6	99	69-117	4	10
Chlorobenzene	100	98.75	99	79-115	3	10

Surrogate	%Rec	Limits
1,2-Dichloroethane-d4	99	85-121
Toluene-d8	95	92-110
Bromofluorobenzene	99	84-115

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits
RPD: 0 out of 3 outside limits
Spike Recovery: 0 out of 6 outside limits

Lab#: 133608
Page 1 of 1

Curtis & Tompkins, Ltd.

Total Dissolved Solids (TDS)

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 160.1
Prep Method: EPA 160.1

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
QC70931	SDUP of 133620-002	40953	14-MAY-98	19-MAY-98	-

Analyte: Total Dissolved Solids **Matrix:** Water **Units:** mg/L

Sample #	Sample Type	Result	%RPD	Limit
QC70931	SDUP of 133620-002	498.0	4	25
133620-002	ZZZZZZZZ	478.0		

Curtis & Tompkins, Ltd.

Total Organic Carbon (TOC)

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 415.2
Prep Method: EPA 415.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
133608-002	MW5	40878	13-MAY-98	15-MAY-98	-
133608-003	MW8	40878	13-MAY-98	15-MAY-98	-
133608-004	MW6	40878	13-MAY-98	15-MAY-98	-
133608-005	MW7	40878	13-MAY-98	15-MAY-98	-
133608-006	MW2	40878	13-MAY-98	15-MAY-98	-
133608-007	QC-1	40878	13-MAY-98	15-MAY-98	-
133608-008	MW4	40878	13-MAY-98	15-MAY-98	-
QC70655	Method Blank	40878	-	15-MAY-98	-

Analyte: Total Organic Carbon **Matrix:** Water **Units:** mg/L

Sample #	Client ID		Result	Reporting Limit	Dilution Factor
133608-002	MW5		20	1.0	1
133608-003	MW8		9.9	1.0	1
133608-004	MW6		13	1.0	1
133608-005	MW7		7.0	1.0	1
133608-006	MW2		76	4.0	4
133608-007	QC-1		63	3.0	3
133608-008	MW4		66	3.0	3
QC70655	Method Blank	ND		1.0	1

ND = None Detected at or above Reporting Limit

Lab#: 133608
Page 1 of 1

Curtis & Tompkins, Ltd.

Total Organic Carbon (TOC)

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 415.2
Prep Method: EPA 415.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
QC70656	Lab Control Sample	40878	-	15-MAY-98	-

Analyte: Total Organic Carbon **Matrix:** Water **Units:** mg/L

Sample #	Sample Type	Spike Amt.	Result	%Recovery	Limits
QC70656	Lab Control Sample	10.00	10.60	106	80-120

Lab#: 133608
Page 1 of 1

Curtis & Tompkins, Ltd.

Total Organic Carbon (TOC)

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 415.2
Prep Method: EPA 415.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
QC70657	MS of 133608-002	40878	13-MAY-98	15-MAY-98	-
QC70658	MSD of 133608-002	40878	13-MAY-98	15-MAY-98	-

Analyte: Total Organic Carbon **Matrix:** Water **Units:** mg/L

Sample #	Client ID	Spikeamt	Result	%Rec	Limits	%RPD	Limit
QC70657	MS of 133608-002	10.00	31.80	118	75-125		
QC70658	MSD of 133608-002	10.00	32.10	121	75-125	1	35
133608-002	MW5		20.00				

Curtis & Tompkins, Ltd.

Phosphate, Ortho-

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 365.2
Prep Method: EPA 365.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
133608-002	MW5	40845	13-MAY-98	14-MAY-98	-
133608-003	MW8	40845	13-MAY-98	14-MAY-98	-
133608-004	MW6	40845	13-MAY-98	14-MAY-98	-
133608-005	MW7	40845	13-MAY-98	14-MAY-98	-
133608-006	MW2	40845	13-MAY-98	14-MAY-98	-
133608-008	MW4	40845	13-MAY-98	14-MAY-98	-
QC70536	Method Blank	40845	-	14-MAY-98	-

Analyte: Orthophosphate (as P) **Matrix:** Water **Units:** mg/L

Sample #	Client ID		Result	Reporting Limit	Dilution Factor
133608-002	MW5		0.47	0.030	1
133608-003	MW8		0.080	0.030	1
133608-004	MW6		0.15	0.030	1
133608-005	MW7		ND	0.030	1
133608-006	MW2		0.72	0.060	2
133608-008	MW4		2.1	0.12	4
QC70536	Method Blank	ND		0.030	1

ND = None Detected at or above Reporting Limit

Lab#: 133608
Page 1 of 1

Curtis & Tompkins, Ltd.

Phosphate, Ortho-

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 365.2
Prep Method: EPA 365.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
QC70537	Lab Control Sample	40845	-	14-MAY-98	-

Analyte: Orthophosphate (as P) **Matrix:** Water **Units:** mg/L

Sample #	Sample Type	Spike Amt.	Result	%Recovery	Limits
QC70537	Lab Control Sample	0.2000	0.1970	99	90-110

Lab#: 133608
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Curtis & Tompkins, Ltd.

Phosphate, Ortho-

Client: Innovative Technical Solutions, Inc.
Project #: 95-113.53
Location : P.O.O. Economy Parking

Analysis Method: EPA 365.2
Prep Method: EPA 365.2

Sample #	Client ID	Batch#	Sampled	Analyzed	Moisture
QC70538	MS of 133590-001	40845	12-MAY-98	14-MAY-98	-
QC70539	MSD of 133590-001	40845	12-MAY-98	14-MAY-98	-

Analyte: Orthophosphate (as P) **Matrix:** Water **Units:** mg/L

Sample #	Client ID	Spikeamt	Result	%Rec	Limits	%RPD	Limit
QC70538	MS of 133590-001	0.2000	0.2740	98	80-120		
QC70539	MSD of 133590-001	0.2000	0.2800	101	80-120	2	10
133590-001	ZZZZZZZZ		0.09300				

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 133608
CLIENT: INNOVATIVE TECHNICAL SOLUTIONS
PROJECT#: 95-113.53
LOCATION: POO ECONOMY PARKING

DATE SAMPLED: 05/13/98
DATE RECEIVED: 05/13/98
DATE ANALYZED: 05/14/98
QC BATCH#: 40850

ANALYSIS: FERROUS IRON
METHOD REFERENCE: SMWW 18:3500 FE-D

LAB ID	SAMPLE ID	RESULT	UNITS	REPORTING LIMIT
133608-002	MW 5	ND	mg/L	0.20
133608-003	MW 8	ND	mg/L	0.20
133608-004	MW 6	ND	mg/L	0.20
133608-005	MW 7	ND	mg/L	0.20
133608-006	MW 2	0.53	mg/L	0.20
133608-008	MW 4	0.53	mg/L	0.20
133608-METHOD BLANK		ND	mg/L	0.20

ND = Not detected at or above the reporting limit.

QA/QC SUMMARY: MS/MSD of 133608-008

RPD, %	1
RECOVERY,%	110

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 133608
CLIENT: INNOVATIVE TECHNICAL SOLUTIONS
PROJECT#: 95-113.53
LOCATION: POO ECONOMY PARKING

DATE SAMPLED: 05/13/98
DATE RECEIVED: 05/13/98
DATE ANALYZED: 05/18/98
QC BATCH#: 40882

ANALYSIS: FERRIC IRON
METHOD REFERENCE: EPA 6010A

LAB ID	SAMPLE ID	RESULT	UNITS	REPORTING LIMIT
133608-002	MW 5	0.70	mg/L	0.20
133608-003	MW 8	2.2	mg/L	0.20
133608-004	MW 6	0.69	mg/L	0.20
133608-005	MW 7	0.62	mg/L	0.20
133608-006	MW 2	8.0	mg/L	0.20
133608-008	MW 4	2.9	mg/L	0.20
133608-METHOD BLANK		ND	mg/L	0.20

ND = Not detected at or above the reporting limit.

QA/QC SUMMARY: BS/BSD

RPD, %	1
RECOVERY,%	104

Columbia Analytical Services INC.
An Employee-Owned Company

May 26, 1998

Service Request No: K9803185

Damara Moore
Curtis & Tompkins, Ltd.
2323 Fifth Street
Berkeley, CA 94710

Re: 133608

Dear Damara:

Enclosed are the results of the rush sample(s) submitted to our laboratory on May 20, 1998. For your reference, these analyses have been assigned our service request number K9803185.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Client Services Manager

LAH/jcb

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/ 577-7222 • Fax 360/636-106

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Curtis & Tompkins, Ltd.
Project: 133608
Sample Matrix: Water

Service Request: K9803185
Date Collected: 5/13/98
Date Received: 5/20/98
Date Extracted: NA
Date Analyzed: 5/21/98

Oxidation-Reduction Potential
EPA Method D1498-76
Units: Millivolts

Sample Name	Lab Code	Result
MW5	K9803185-001	150
MW8	K9803185-002	60.4
MW6	K9803185-003	126
MW7	K9803185-004	132
MW2	K9803185-005	123
MW4	K9803185-006	168

Approved By: _____ Date: 5/22/98

Kap03185

Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878
2323 Fifth Street
Berkeley, CA 94710
(510)486-0900 ph
(510)486-0532 fx

Project Number: 133608

Subcontract Lab:

Columbia Analytical Services
1317 South 13th Ave
Kelso, WA 98626
(360) 577-7222

Please send report to: Damara Moore

Turnaround Time: 1 week

Report Level: II

Sample ID	Date Sampled	Matrix	Analysis	C&T Lab #
MW5	13-MAY-98	Water	REDOX	133608-002
MW8	13-MAY-98	Water	REDOX	133608-003
MW6	13-MAY-98	Water	REDOX	133608-004
MW7	13-MAY-98	Water	REDOX	133608-005
MW2	13-MAY-98	Water	REDOX	133608-006
MW4	13-MAY-98	Water	REDOX	133608-008

***Please report using Sample ID instead of C&T Lab #.

Notes:

RELINQUISHED BY:	RECEIVED BY:
5/19/98	5/20/98 1040
Date/Time	Date/Time
Date/Time	Date/Time

Signature on this form constitutes a firm Purchase Order for the services requested above.

San Francisco Regional Office

1252 Quarry Lane
P.O. Box 9019
Pleasanton, CA 94566
(510) 426-2600
Fax (510) 426-0106

Clayton
LABORATORY
SERVICES

May 26, 1998

Ms. Damara Moore
CURTIS & TOMPKINS, LTD.
2323 Fifth Street
Berkeley, CA 94710

Client Ref.: 133608
Clayton Project No.: 98052.34

Dear Ms. Moore:

Attached is our analytical laboratory report for the samples received on May 15, 1998. Following the cover letter is the Quality Control Narrative detailing sample information/problems and a summary of the quality control issues. Also enclosed is a copy of the Chain-of-Custody record acknowledging receipt of these samples.

Please note that any unused portion of the samples will be discarded after June 25, 1998, unless you have requested otherwise.

We appreciate the opportunity to assist you. If you have any questions concerning this report, please contact Client Services at (510) 426-2687.

Sincerely,

Karen Dahl
Client Services Representative
San Francisco Regional Office

KMD/kmd

Attachments

QUALITY CONTROL NARRATIVE
for
Clayton Environmental Consultants
Client Reference: 133608
Clayton Project No. 98052.34

Sample Information/Problems:

There were no problems encountered with sample receipt.

Analytical Information/Problems:

The nitrate reporting limit is elevated for sample MW8 due to matrix interference.

Quality Control:

The quality control data is summarized in the Quality Assurance Data Package, which follows the analytical report.

- MS/MSD: A matrix spike and matrix spike duplicate were analyzed where applicable, and all results were acceptable.
- LCS/LCSD: A laboratory control sample and duplicate were analyzed where applicable and all results were acceptable.
- CCV: Response for all analytes met Clayton acceptance criteria.
- Surrogate Recoveries: All surrogate recoveries were acceptable. The surrogate recoveries, where applicable are listed on the report pages.

Analytical Results
for
Curtis & Tompkins, Ltd.
Client Reference: 133608
Clayton Project No. 98052.34

Sample Identification: See Below
Lab Number: 9805234
Sample Matrix/Media: WATER
Method Reference: EPA 300.0

Date Received: 05/15/98
Date Analyzed: 05/15/98

Lab Number	Sample Identification	Date Sampled	Nitrate-N (mg/L)	Method Detection Limit (mg/L)	
-01	MW5	05/13/98	0.36	0.05	
-02	MW8	05/13/98	<0.5	0.5	a
-03	MW6	05/13/98	2.1	0.05	
-04	MW7	05/13/98	0.90	0.05	
-05	MW2	05/13/98	<0.05	0.05	
-06	MW4	05/13/98	<0.05	0.05	
-07	METHOD BLANK	--	<0.05	0.05	

ND: Not detected at or above limit of detection
--: Information not available or not applicable

a Note: Detection limits increased due to matrix interference.

Clayton
LABORATORY
SERVICES

Analytical Results
for
Curtis & Tompkins, Ltd.
Client Reference: 133608
Clayton Project No. 98052.34

Sample Identification: See Below
Lab Number: 9805234
Sample Matrix/Media: WATER
Method Reference: EPA 300.0

Date Received: 05/15/98
Date Analyzed: 05/15/98

Lab Number	Sample Identification	Date Sampled	Sulfate (mg/L)	Method Detection Limit (mg/L)
-01	MW5	05/13/98	250	0.1
-02	MW8	05/13/98	500	0.1
-03	MW6	05/13/98	400	0.1
-04	MW7	05/13/98	100	0.1
-05	MW2	05/13/98	12	0.1
-06	MW4	05/13/98	20	0.1
-07	METHOD BLANK	--	<0.1	0.1

ND: Not detected at or above limit of detection
--: Information not available or not applicable

Clayton
LABORATORY
SERVICES

Quality Assurance Results Summary

Matrix Spike/Matrix Spike Duplicate Results

for

Clayton Project No. 98052.34

Quality Assurance Results Summary - Matrix Spike/Matrix Spike Duplicate
for
Clayton Project No. 98052.34

Clayton Lab Number:	LCS	Analytical Method:	EPA 300.0
Ext./Prep. Method:	--	Instrument ID:	02739
Date:	05/15/98	Date:	05/15/98
Analyst:		Time:	12:00
Std. Source:	IC980515A	Analyst:	DC
Sample Matrix/Media:	WATER	Units:	MG/L
		QC Batch No:	98051530

Analyte	Sample Result	Spike Level	Matrix Spike Result	MS Recovery (%)	Matrix Spike Duplicate Result	MSD Recovery (%)	Average Recovery (% R)	LCL (% R)	UCL (% R)	RPD (%)	UCL (%RPD)
CHLORIDE	ND	15.0	14.2	95	14.2	94	95	79	108	0.4	20
NITRATE AS NITROGEN	ND	5.00	4.81	96	4.83	97	96	77	103	0.4	20
NITRITE	ND	5.00	5.09	102	5.05	101	101	81	109	0.8	20
SULFATE	ND	20.0	20.1	100	19.9	99	100	74	109	0.9	20

ND = Not detected at or above limit of detection
SOR = Spike out of range due to high sample concentration.

LCL = Lower Control Limit

UCL = Upper Control Limit

Quality Assurance Results Summary - Matrix Spike/Matrix Spike Duplicate
for
Clayton Project No. 98052.34

Clayton Lab Number: 9805110-11
Ext./Prep. Method: --
Date: 05/18/98
Analyst:
Std. Source: IC980515A
Sample Matrix/Media: WATER

Analytical Method: EPA 300.0
Instrument ID: 02739
Date: 05/18/98
Time: 09:30
Analyst: DC
Units: MG/L
QC Batch No: 9805182D

Analyte	Sample Result	Spike Level	Matrix Spike Result	MS Recovery (%)	Matrix Spike Duplicate Result	MSD Recovery (%)	Average Recovery (% R)	LCL (% R)	UCL (% R)	RPD (%)	UCL (%RPD)
CHLORIDE	74.1	150	228	103	228	103	103	79	108	0.1	20
FLUORIDE	1.17	50.0	49.8	97	50.0	98	97	86	106	0.5	20
SULFATE	53.4	200	256	101	257	102	101	74	109	0.5	20

ND = Not detected at or above limit of detection
SOR = Spike out of range due to high sample concentration.
LCL = Lower Control Limit
UCL = Upper Control Limit

Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878
2323 Fifth Street
Berkeley, CA 94710
(510)486-0900 ph
(510)486-0532 fx

9805234

Project Number: 133608

Subcontract Lab:

Clayton Group Services
1252 Quarry Lane
Pleasanton, CA 94566
(925) 426-2600

Please send report to: Damara Moore

Turnaround Time: 1 week

Report Level: II

Sample ID	Date Sampled	Matrix	Analysis	C&T Lab #
MW5	13-MAY-98	Water	NITRATE	133608-002
MW5	13-MAY-98	Water	SULFATE	133608-002
MW8	13-MAY-98	Water	NITRATE	133608-003
MW8	13-MAY-98	Water	SULFATE	133608-003
MW6	13-MAY-98	Water	NITRATE	133608-004
MW6	13-MAY-98	Water	SULFATE	133608-004
MW7	13-MAY-98	Water	NITRATE	133608-005
MW7	13-MAY-98	Water	SULFATE	133608-005
MW2	13-MAY-98	Water	NITRATE	133608-006
MW2	13-MAY-98	Water	SULFATE	133608-006
MW4	13-MAY-98	Water	NITRATE	133608-008
MW4	13-MAY-98	Water	SULFATE	133608-008

25 mg/kg MRL per client

***Please report using Sample ID instead of C&T Lab #.

Notes:

RELINQUISHED BY:	RECEIVED BY:
Date/Time: 5-15-98 8:35	Date/Time: 5/15/98 8:3
Date/Time: 5/15/98 9:23	Date/Time: 5/15/98 9:2

INNOVATIVE TECHNICAL SOLUTIONS, Inc.

ITSI
1330 Broadway, Suite 1625
Oakland, California 94612
(510) 286-8888 (Tel), (510) 286-8889 (Fax)

133600

PROJECT NAME: 110 - Economy ~~Contractor~~ Parking Lot - Remed.
PROJECT NUMBER: 95-113.53
SITE LOCATION: 1100 Airport Rd., MOIA, Oakland

CHAIN OF CUSTODY

DATE: 5/13/98
PAGE: 1 of 3

SAMPLE I.D.	SAMPLE DEPTH	DATE	TIME	NUMBER OF CONTAINERS	TYPE OF CONTAINERS	SAMPLE MATRIX	ANALYSIS: TPH as Gas/BTEX - 8015/8020	TPH as Diesel - 8015	TPH as Diesel - 8015 (w/ Silica Gel Cleanup)	TEPH - 8015	TEPH-8015 (w/ Silica Gel Cleanup)	TRPH - 418.1	Oil and Grease - 5520	Purgeable Halocarbons - 601/8010 VOCs	VOCs - 624/ 8240	SVOCs - 625/8270	LUFT Metals (Cd, Cr, Ni, Pb, Zn)	~~CAM 17 Metals~~ Fe2+ and Fe3+	Nitrate, Sulfate, TDS, orthophosphates	Redox / ORP	T.O.C. (415.2)	SPECIAL INSTRUCTIONS/COMMENTS
Trip Blank	—	Lab Provided		3	VOA	W	X							X							X	
MW5	—	5/13/98	1330	5	VOAs	W	X							X							X	
				2	1l poly	W												X	X			
				1	1 500ml poly	W														X		
			↓	1	1lA	W			X													
MW 8			1445	5	VOAs	W	X							X							X	
				2	1l poly	W												X	X			
				1	500ml	W														X		
			↓	1	1lA	W			X													
MW6			1435	5	VOAs	W	X							X							X	
				2	1l poly	W												X	X			
↓	↓	↓	↓	1	500ml	W														X		
TOTAL NUMBER OF CONTAINERS					TOTAL TESTS		4/	2						4				3	3	3	3	

Curtis & Tomplin
Berkeley, CA
(Task order #53)

SAMPLED BY: Jim Scholland & Ashley Foster
SIGNATURE: Jim Scholland

SPECIAL INSTRUCTIONS/COMMENTS: Standard TAT, provide Chromats.

RELINQUISHED BY: Jim Scholland Jim Scholland
Printed Name Signature
ITI 5/13/98 @ 1745
Company Date and Time

RECEIVED BY: Lacy Bolin
Printed Name Signature
CAT 5/13/98 5:45
Company Date and Time

RELINQUISHED BY: _____
Printed Name Signature
_____
Company Date and Time

RECEIVED BY: _____
Printed Name Signature
_____
Company Date and Time

RELINQUISHED BY: _____
Printed Name Signature
_____
Company Date and Time

RECEIVED BY: _____
Printed Name Signature
_____
Company Date and Time

SEND RESULTS TO: Jim Scholland Fax 510-256-8998 @ Walnut Creek office

INNOVATIVE TECHNICAL SOLUTIONS, Inc.

ITSI
1330 Broadway, Suite 1625
Oakland, California 94612
(510) 286-8888 (Tel), (510) 286-8889 (Fax)

133608

PROJECT NAME: P/O - Economy [struck text] Lot
PROJECT NUMBER: 95-113.53
SITE LOCATION: MOIA

CHAIN OF CUSTODY

DATE: 5/13/98
PAGE: 2 of 3

ANALYSIS

Curtis & Tompkins (Task order #53)

	SAMPLE I.D.	SAMPLE DEPTH	DATE	TIME	NUMBER OF CONTAINERS	TYPE OF CONTAINERS	SAMPLE MATRIX	TPH as Gas/BTEX - 8015/8020	TPH as Diesel - 8015	TPH as Diesel - 8015, mojps (w/ Silica Gel Cleanup)	TEPH - 8015	TEPH-8015 (w/ Silica Gel Cleanup)	TRPH - 418.1	Oil and Grease - 5520	Purgeable Halocarbons - 601/8010 VOCs	VOCs - 624/8240	SVOCs - 625/8270	LUFT Metals (Cd, Cr, Ni, Pb, Zn)	~~CAM 17 Metals~~ Fe^{2+} Fe^{3+}	Nitrate, sulfate, TDS, orthophosphates	Redox / ORP	T.O.C. (415.2)	SPECIAL INSTRUCTIONS/COMMENTS
-4	MW6	—	5/13/98	1435	1	1lA	W			X													
	MW7	—	↓	↓	5	VOAs	↓	X							X							X	
5					2	1l poly													X	X			
					1	stoke															X		
	↓			↓	1	1lA				X													
	MW2			1525	5	VOAs		X							X							X	
					2	1l poly													X	X			
					1	500ml															X		
-6	↓			↓	1	1lA				X													
-7	QC-1			[illegible, struck]	5	VOAs		X							X							X	
	MW4			~~1555~~	5	VOAs		X							X							X	
-8	↓	↓	↓		2	1l poly	↓												X	X			
	TOTAL NUMBER OF CONTAINERS					TOTAL TESTS		4		3					4				3	3	2	4	

SAMPLED BY: Jim Schollard & Ashley Foster
SIGNATURE: [signatures]

SPECIAL INSTRUCTIONS/COMMENTS: Standard TAT, Provide Chromats

RELINQUISHED BY: Jim Schollard [signature]
Printed Name Signature
ITSI 5/13/98 @ 1745
Company Date and Time

RECEIVED BY: Tracy Baker [signature]
Printed Name Signature
C&T 5/13/98 5:45
Company Date and Time

RELINQUISHED BY: ____
Printed Name Signature
Company Date and Time

RECEIVED BY: ____
Printed Name Signature
Company Date and Time

RELINQUISHED BY: ____
Printed Name Signature
Company Date and Time

RECEIVED BY: ____
Printed Name Signature
Company Date and Time

SEND RESULTS TO: Jim Schollard in Walnut Creek

INNOVATIVE TECHNICAL SOLUTIONS, Inc.

ITSI
1330 Broadway, Suite 1625
Oakland, California 94612
(510) 286-8888 (Tel), (510) 286-8889 (Fax)

133608

PROJECT NAME: 0/0 - Economy Parking Lot
PROJECT NUMBER: 95-113.53
SITE LOCATION: MOIA

CHAIN OF CUSTODY

DATE: 5/13/98
PAGE: 1 of 3

SAMPLE I.D.	SAMPLE DEPTH	DATE	TIME	NUMBER OF CONTAINERS	TYPE OF CONTAINERS	SAMPLE MATRIX	ANALYSIS: TPH as Gas/BTEX - 8015/8020	TPH as Diesel - 8015	TPH as Diesel - 8015 (w/ Silica Gel Cleanup)	TEPH - 8015	TEPH-8015 (w/ Silica Gel Cleanup)	TRPH - 418.1	Oil and Grease - 5520	Purgeable Halocarbons -601/8010	VOCs -624/ 8240	SVOCs -625/8270	LUFT Metals (Cd, Cr, Ni, Pb, Zn)	CAM 17 Metals	Redox. / DER	SPECIAL INSTRUCTIONS/COMMENTS
MW4	—	5/13/98	1555	1	500ml	W													X	Curtis & Tompkins (Task order #53)
↓	—	↓	↓	1	1LA	W			X											
			Not used																	
TOTAL NUMBER OF CONTAINERS					TOTAL TESTS				1										1	

SAMPLED BY: Jim Schollard & Kelley Foster
SIGNATURE: [signature]

SPECIAL INSTRUCTIONS/COMMENTS: Standard T.A.T., Provide Chromat.

RELINQUISHED BY: Jim Schollard [signature]
Printed Name / Signature
FTS 5/13/98 @ 1745
Company / Date and Time

RECEIVED BY: Tracy Babica
Printed Name / Signature
CAT 5/13/98 5:45
Company / Date and Time

RELINQUISHED BY: _____
Printed Name / Signature
_____
Company / Date and Time

RECEIVED BY: _____
Printed Name / Signature
_____
Company / Date and Time

RELINQUISHED BY: _____
Printed Name / Signature
_____
Company / Date and Time

RECEIVED BY: _____
Printed Name / Signature
_____
Company / Date and Time

SEND RESULTS TO: Jim Schollard in Walnut Creek

ATTACHMENT G

RESULTS OF ORC LOADING CALCULATIONS USING ORC APPLICATION SOFTWARE BY REGENESIS

ORC SLURRY INJECTION

Dissolved Hydrocarbon Level (ppm)	10.95
(For gasoline sites use BTEX measurements)	
Treatment Zone Width (ft)	80
Treatment Zone Length (ft)	80
Thickness of Saturated Treatment Zone (ft)	8
Porosity	0.369
(sand = 0.3, silt = 0.35, clay = 0.4)	
Total Treatment Zone Volume (cu. ft)	51,200
Dissolved Phase Hydrocarbon Mass (lbs)	12.9
Additional Demand Factor	8
(REGENESIS recommends a factor of about 8)	
Loaded Hydrocarbon Mass (lbs)	103.2
Oxygen Required (lbs)	309.6
ORC Required (lbs)	3,096.0
ORC Unit Cost	$ 10.00
Total Cost of ORC	$ 30,960.00

Solids Content (%)	40%
Hole Spacing (ft)	10
Number of Holes in Grid	64
ORC per Hole (lbs)	48.4
Water needed per Hole for Slurry (gal)	8.7

APPLICATION COMMENTS

* ORC per hole is above lower limit of 1 pound per linear foot.

$51,200\ ft^3 \times .369 = 18,892\ ft^3 \times 28.3\ l/ft^3 = 534,666\ l$

$134,666\ l \times 11\ mg/l \times 10^{-3}\ g/mg \times \frac{1}{454}\ \#/g = 12.95\ \#$

$12.9 \times (8) \times 3 \times 10 = 3096\ \#\ ORC$ @ 10%

$6400/100 = 64$ holes $\rightarrow \frac{3096}{64} = 48.4\ \#\ ORC/hole$

FOR SOLUTE TRANSPORT MODEL ENTER VALUES BELOW

GW Velocity (ft / day)	0.11
Compliance Pt. (ft)	35
Ratio of O2 provided : O2 required (percent)	75%
HC Level at compliance point after selected ratio of oxygen in ppm	0.633