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October 18, 1995

Mr. Don Abbott
Washington Department of Ecology
Central Region
15 West Yakima Avenue
Yakima, WA 98902-3387

RE: Transmittal of:
Subsurface Petroleum Hydrocarbon Assessment and Remedial Investigation Report,
Results of Bank/Seep Sampling on Columbia River, and
Groundwater Monitoring and Status Report

Time Oil Co. Property 01-056; Jackpot Food Mart
500 George Washington Way; Richland, Washington

Dear Mr. Abbott,

Please find enclosed herewith copies of the above referenced documents produced for Time Oil Co. by AGRA Earth & Environmental, Inc. The following paragraphs present a brief history of the site, a synopsis of conditions encountered during the hydrocarbon assessment/remedial investigation, and our plans for future work. The hydrocarbon assessment/remedial investigation report contains a more detailed description of the site and the investigation. The groundwater monitoring report contains a description of our most recent monitoring event in which groundwater conditions were very similar to those documented during the groundwater sampling phase of the hydrocarbon assessment. The bank/seep sampling report contains the results of a sampling effort conducted to assess the possibility of an impact to the Columbia River. Please contact me should you require any additional information.

Site History:
The subject property was operated as a bus depot and gasoline service station prior to being purchased by Time Oil Co. in the late 1950's. The bus depot has since been demolished, and a Jackpot Food Mart convenience store has been constructed in the central area of the site.

Four carbon steel USTs were previously located near the southeastern corner of the site. Three of these tanks and their associated product piping and dispenser islands were removed in 1990 and replaced with a new tank system located in another portion of the site. Analytical testing of soil samples recovered during UST removal determined that gasoline concentrations exceeding MTCA Method A Cleanup Levels - Soil (Soil Cleanup Levels) were present in soils within the UST cavity. The new dispenser complex was constructed in the same location as the original complex, and the new underground tanks are located slightly northeast of the dispenser islands (the current site layout is presented on Figure 2 of the enclosed site assessment report). The former UST cavity was roughly centered around the location of monitoring well MW-1.

There are no closure records for the fourth steel tank; however, this tank was believed to have been located immediately adjacent to the three that were removed. The fourth tank was searched for and not

encountered during removal of the other tanks; thus, we believe this tank was either not installed, or may have been removed at some point prior to 1990. In addition to the former vehicle fueling tanks, a 750-gallon heating oil tank is believed to have been located along the western wall of the former bus depot. It is not known whether this tank was removed during demolition of the depot.

An initial site assessment consisting of the performance of a soil vapor survey, installation of six groundwater monitoring/vapor extraction wells, and vapor extraction testing was completed in 1993. Results of this assessment determined that soils impacted by gasoline were present beneath the former UST cavity, gasoline impacted soils were likely present beneath the dispenser islands, and weathered gasoline affected groundwater was present beneath both the former UST and dispenser areas. The extent of affected groundwater was not delineated, and affected groundwater appeared to be flowing off-site to the east. Results of vapor extraction testing determined that vapor extraction would be a suitable cleanup technology for impacted soils.

The expanded hydrocarbon assessment discussed in the following paragraphs and enclosed site assessment report was conducted in an attempt to define the full extent of the groundwater impact and perform remedial testing for the design of a groundwater remediation system.

Results of Assessment:

Drilling Program/Physical Soil & Groundwater Conditions:

The drilling program included the installation of six groundwater monitoring wells (MW-6 through MW-11), one groundwater/vapor extraction well (RW-1), and one groundwater air sparging well (SW-1). Well locations are presented on Figure 2 of the enclosed site assessment report.

Soils beneath the site primarily consisted of coarse grained cobbly gravels with a sandy to silty matrix filling voids between the gravel and cobbles. Lesser amounts of gravely sand were encountered at depth, and a relatively thick silty fine sand was noted in well MW-10. Groundwater was encountered at depths of approximately 27 feet below grade in the elevated western area of the site and approximately 9 feet below grade in the park to the east of the site during well installation. Generalized cross sections of subsurface soils are presented as Figures 3 and 4 of the enclosed site assessment report.

New well locations were based on groundwater flow information from the previous assessment. Monitoring wells MW-6, MW-8, and MW-9 were installed cross-gradient from the plume in order to define the lateral limits of affected groundwater on the sides of the plume. Wells MW-11, MW-7, and MW-10 were installed in a linear arrangement aligned within the suspected axis of the groundwater plume in order to assess groundwater quality upgradient from the site and at two locations downgradient from the site.

Soil Analytical Results:

Since the investigation was conducted primarily to define groundwater conditions at relatively distal locations from potential source areas, impacted vadose zone soils were not encountered in any well boring. Samples of capillary fringe zone soils from all well borings were found not to contain detectable concentrations of petroleum hydrocarbons. However, all well borings located within the area of affected groundwater (MW-7, MW-10, MW-11, RW-1, and SW-1) encountered a 5-foot thick layer of submerged soil contamination located approximately 5 to 10 feet below the groundwater surface. This layer of submerged contaminated soil is referred to as the "smear zone" in the enclosed site assessment report. Soil samples from the submerged smear zone were collected from well borings MW-10 and RW-1. The soil sample collected from the submerged smear zone in well boring MW-10 did not contain detectable hydrocarbon concentrations; however, the soil sample collected from the submerged smear zone in well boring RW-1 contained concentrations of total petroleum hydrocarbons (TPH) and BTEX constituents exceeding Soil Cleanup Levels. The approximate horizontal extent of the submerged smear zone is presented on Figure 5 of the enclosed site assessment report.

Groundwater Analytical Results:
Groundwater samples were collected from all existing monitoring wells and analyzed for TPH-gasoline, TPH-diesel, BTEX, and the halogenated volatile organic compounds (HVOCs) tetrachloroethene (PCE) and trichloroethene (TCE). Analysis for PCE and TCE was conducted due to the reported presence of these compounds at many other nearby sites.

Groundwater samples collected from wells MW-5, MW-6, MW-8, and MW-9 were found to either not contain detectable concentrations of TPH-gasoline, TPH-diesel, and BTEX or to contain these analytes at concentrations below Groundwater Cleanup Levels. Groundwater samples collected from wells MW-1 through MW-4, MW-7, MW-10, MW-11, and RW-1 were found to contain one or more of the target analytes at concentrations exceeding MTCA Method A Cleanup Levels-Groundwater (Groundwater Cleanup Levels).

Low levels of PCE and TCE were detected in groundwater samples recovered from wells MW-2, MW-3, MW-5, MW-6, MW-8, MW-9, and MW-11; however, none of the detected HVOC concentrations were above Groundwater Cleanup Levels. It is likely that HVOCs were present at similar low concentrations in samples collected from other wells; however, interference from relatively high gasoline concentrations resulted in elevated HVOC detection limits of 5.0 parts per billion for many of the samples.

Groundwater Flow Conditions:
Groundwater level measurements determined that the average depth to groundwater was approximately 27 feet below grade in the elevated western area of the site and approximately 9 feet below grade in the park to the east of the site. Groundwater level measurements, and results of a wellhead survey completed following installation of the new wells, indicate a groundwater flow direction to the northeast. However, results of groundwater contouring conducted during the previous assessment, current groundwater contaminant concentrations, and the orientation of the submerged smear zone indicate that groundwater is likely flowing in an easterly direction. In an attempt to reconcile these differences, groundwater elevations were measured on three separate occasions in April and May 1995. Results of each well gauging event indicated a groundwater flow direction to the northeast.

Since it is unlikely that the groundwater plume is oriented in a direction skewed 45 degrees from the direction of groundwater flow, we intend to retain a different surveying firm to independently measure all wellhead elevations following installation of additional wells in November 1995. Should an error in the wellhead elevations recorded from the previous survey be identified, groundwater flow maps will be revised. Should the upcoming survey confirm the previous results, the anomalous groundwater flow direction will be factored into future remedial plans. Groundwater flow directions calculated from the three gauging events are presented on Figures 6 through 8 of the enclosed site assessment report.

Groundwater Sparge Testing:
A 24-hour groundwater sparge test was performed utilizing well SW-1 as the air injection well. Air was injected through well SW-1, which is screened from 45 to 50 feet below ground surface (approximately 17 to 22 feet below the groundwater surface), at a flow rate of 27 cubic feet per minute (CFM). Soil vapor was simultaneously extracted from well RW-1, which is constructed with more than 20 feet of well screen in the vadose zone, at a flow rate of approximately 200 CFM during the sparge test. The simultaneous vapor extraction was conducted in order to capture hydrocarbon vapors mobilized from the submerged smear zone and affected groundwater, and to estimate the operating parameters of a combined air sparging/vapor extraction remediation system.

Dissolved oxygen concentrations in groundwater within wells RW-1, MW-1, MW-3, MW-4, MW-5, and MW-7 were periodically measured during the sparge test to evaluate the sparging well's radius of influence. During the test, marked increases in dissolved oxygen levels were observed in wells RW-1, MW-1, and MW-4. Although some fluctuations in dissolved oxygen concentrations were observed in other wells, only RW-1, MW-1, and MW-4 were interpreted to be located within the zone of effective influence. A conservative sparging radius of influence of 24 feet was calculated for well SW-1 based on the test data.

Additional Vapor Extraction Testing:
Vapor extraction testing was conducted on wells RW-1 and MW-7 to confirm results of the previous vapor extraction test and further evaluate vapor extraction as a remedial method for the site. Observed and calculated radii of influence from wells RW-1 and MW-7 ranged from 40 feet (RW-1) to 43 feet (MW-7) using a Rotron ER-707 blower during the test. These results closely correlate with those observed during the previous vapor extraction test and will be used to design the site's pilot remediation system.

Future Work:
In response to the discovery of a rather large affected groundwater plume, Time Oil Co. plans to complete the tasks listed below in a relatively short time frame. As was discussed during our August 8, 1995 meeting, some of the tasks are underway or have already been completed; thus, the status of each task is also discussed below.

* Quarterly Groundwater Monitoring: A quarterly groundwater monitoring program has been initiated to evaluate groundwater flow characteristics and contaminant concentrations as an early warning system for potential plume migration. The monitoring program began with the July 1995 sampling event and groundwater conditions were very similar to those observed during the expanded site assessment (discussed above). The first "Groundwater Monitoring and Status Report", dated August 25, 1995, is enclosed with this letter (the groundwater flow direction measured during the first monitoring event was also anomalous and may be revised based upon additional survey data).

* Columbia River Bank Sampling: Soil and groundwater samples were collected from the western bank of the Columbia River, approximately 700 feet due east from the site, on August 3, 1995 in order to evaluate the potential for an impact to the River. Four soil samples (collected from the river bank at an elevation slightly above the groundwater level) were found not to contain detectable TPH-gasoline or BTEX concentrations. Likewise, of two groundwater samples collected near the river, one sample contained only a very low toluene concentration (0.66 ppb, potentially attributable to boat activity on the river), and the other sample did not contain any of the target analytes. The report outlining results of the bank sampling, dated August 17, 1995, is also enclosed with this letter.

* Hydrology Study: Results of the site assessment raised some important questions concerning the local hydrology in the site vicinity. In order to efficiently design a remediation system we must determine how the submerged smear zone became situated in its present location, and if the hydrogeologic conditions which placed this horizon below the current groundwater interface are likely to return during remediation. In addition, the affected groundwater plume appears to have migrated a significant distance upgradient from the Time Oil Co. property. The possibility that historical pumping from water supply wells may have caused anomalous groundwater flow directions must be researched in order to evaluate optimum placement for remedial wells. The hydrology study is nearing completion and the report will be issued once a groundwater velocity study has been completed and results of the new wellhead survey have been received.

* Exposure Assessment for Users of Howard Amon Park: A limited risk assessment was conducted to determine whether the presence of the gasoline plume beneath Howard Amon Park may present a risk to recreational users of the park. Preliminary information received from our consultant suggests that the plume does not appear to present a risk to recreational users of the park. The report detailing the Exposure Assessment is nearing completion and will be submitted to your office shortly.

* Additional Well Installation: One upgradient well and several downgradient wells will be installed between November 7th and 22nd, 1995 in an effort to define the remainder of the affected groundwater plume. Installation of these wells will require drilling in Howard Amon Park and upon other properties owned by the City of Richland. We have briefed the City of Richland on the results of the site assessment and they have offered their assistance in securing access to drilling locations. In order to monitor concentrations of HVOCs migrating onto the site, an upgradient well will be

completed with two strings of casing. One casing string will be screened across the groundwater surface to monitor for light petroleum hydrocarbon contaminants, and the other casing string will be screened well below the groundwater surface to monitor for heavier halogenated compounds.

* Interim/Pilot Remediation System: Design of an interim/pilot remediation system from the existing test data is nearing completion. We intend to install a reactive air sparging cut-off gallery at the eastern (downgradient) edge of our property in order to begin restoration of groundwater quality downgradient from the Time Oil Co. property. The air sparging and vapor extraction wells would be located roughly between wells MW-3 and MW-5. We plan to install air injection and vapor extraction wells for the interim/pilot system, and connect the wells to a treatment area via subsurface piping during the additional site assessment activities planned for mid November 1995. We expect to install treatment equipment for the interim/pilot system in early to mid 1996.

It was a pleasure meeting with you on August 8th to discuss project details, and we look forward to working with you to resolve this site's challenging conditions. If you have any questions or comments concerning this letter, the report, or the information contained within, please call me at (206) 286-6457. I would also be happy to visit your office on my next trip to Richland to review any aspect of the project you might wish to discuss.

Sincerely,

Scott B. Sloan
Geologist

Encls: "Subsurface Petroleum Hydrocarbon Assessment Report"
"Results of Bank/Seep Sampling on Columbia River"
"Groundwater Monitoring and Status Report"

cc: Mr. Bruce Williams - AGRA Earth & Environmental, Inc. (w/o enclosures)
Mr. Roger Wright - City of Richland

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SEATTLE, WA 98199-1233
SEATTLE, WA 98124-0447

October 18, 1995

Mr. Don Abbott
Washington Department of Ecology
Central Region
106 South Sixth Avenue
Yakima, WA 98902-3387

RE: Transmittal of:
Second Quarter 1995 Groundwater Monitoring Report
Time Oil Co. Property 01-052: Kennewick Jackpot Food Mart
524 West Columbia Drive; Kennewick, Washington

Dear Mr. Abbott,

Please find enclosed herewith a copy of the above referenced document produced for Time Oil Co. by AGRA Earth & Environmental, Inc. (AGRA). The enclosed report documents groundwater conditions encountered during the second monitoring event of a planned one year quarterly monitoring program. Previous site assessment activities have documented the apparent lack of a groundwater impact at the site; thus, the monitoring program is being conducted to verify these conditions in preparation for site closure. The following paragraphs present a brief history of the site, a short synopsis of groundwater conditions documented during the monitoring event, and our plans for future work. The enclosed report contains a more detailed description of the monitoring event. Please contact me should you require any additional information.

Site History:
The property was purchased by Time Oil Co. prior to 1962, and has operated as a gasoline service station since at least 1962. The site has undergone two major renovations since that time. Approximate locations of historical structures associated with gasoline dispensing activities are presented on Figure 2 of the enclosed report.

The original service station was located on the western portion of the site. The eastern portion of the property was vacated by the U. S. government in 1972 and purchased by Time Oil Co. in order to expand the site. Three underground storage tanks associated with the original service station are believed to have been located near the northwest corner of the site. To the best of our knowledge, two of these tanks and their associated dispenser islands were taken out of service in 1975 and replaced by carbon steel tanks and a new dispenser island complex located in the central area of the site. During the same system upgrade, we believe that the third tank (an 8,000-gallon UST) was relocated to the new tank complex.

The three carbon steel USTs located in the "new" tank complex were removed in 1990 and replaced with three double-walled fiberglass-clad steel tanks which are currently located north of the dispenser islands. Although some excavation and above ground treatment of impacted soils was conducted during the UST replacement project, soil samples recovered from the fill ends of the tanks were found to contain gasoline range petroleum hydrocarbons (GRPH) at concentrations exceeding MTCA Method A Cleanup Levels-Soil (Soil Cleanup Levels).

A site assessment was undertaken in 1993 to assess the nature and extent of remaining impacted soils (if any) and to determine whether impacted groundwater may be present beneath the site. All soil and groundwater samples collected during the assessment were either found not to contain detectable levels of GRPH or benzene, toluene,

ethylbenzene, and total xylenes (BTEX), including samples collected within and immediately adjacent to the former UST system. In addition, analytical results from extracted soil vapor samples collected during vapor extraction testing did not suggest the potential presence of additional impacts in unexplored areas of the site.

As a result of the favorable site assessment findings, a decision was made to perform quarterly groundwater monitoring throughout a complete hydrologic cycle to confirm conditions observed during the site assessment and provide a technically sound case for site closure. The first monitoring event was conducted in February 1995 when all groundwater samples were found not to contain detectable levels of GRPH and BTEX. The enclosed report documents conditions encountered during the second monitoring event conducted in April 1995.

Results of Monitoring Event:
Groundwater samples were collected from all site monitoring wells (MW-1 through MW-4) on April 18, 1995. Each groundwater sample was analyzed for GRPH and BTEX. GRPH and BTEX were not detected in the sample collected from well MW-2. Low concentrations of toluene and total xylenes were detected in samples collected from wells MW-1, MW-3, and MW-5; however, the detected concentrations were all well below MTCA Method A Cleanup Levels - Groundwater (0.61 to 1.0 parts per billion). Well locations and analytical results are displayed in Table 2 and on Figure 2 of the enclosed report.

Groundwater level measurements determined that the average depth to groundwater was approximately 12.7 feet below grade, representing a groundwater level decline of approximately 0.5 feet since the February 1995 monitoring event. The site's groundwater flow direction was measured to be west southwesterly. The groundwater gradient was calculated to be approximately 0.00952 feet per foot. The groundwater flow direction and gradient are similar to those calculated during previous monitoring events. Groundwater elevations are presented in Table 1 and on Figure 2 of the enclosed report.

Conclusions/Future Work:
Data collected during the second quarter 1995 (April) groundwater monitoring event appears to confirm the lack of a groundwater impact exceeding MTCA Method A Cleanup Levels - Groundwater at the site. Toluene and total xylenes were detected in groundwater samples collected from some of the site's wells; however, the detected concentrations of these analytes did not exceed 1.0 parts per billion. The current quarter represents the second consecutive monitoring event in which groundwater impacts exceeding applicable cleanup levels were not detected.

Quarterly groundwater monitoring will continue until groundwater data has been collected throughout a complete hydrogeologic cycle. Should groundwater contaminant concentrations remain below MTCA Method A Cleanup Levels - Groundwater throughout the monitoring program, additional monitoring or remediation will not likely be conducted. Results of a sampling event completed in July 1995 will be presented in a forthcoming report.

If you have any questions or comments concerning this letter, the report, or the information contained within either, please call me at (206) 286-6457.

Sincerely,
Time Oil Co.

Scott B. Sloan
Geologist

Encl: Groundwater Monitoring Report

cc: Mr. Bruce Williams - AGRA Earth & Environmental, Inc. (w/o enclosure)

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SUBSURFACE PETROLEUM HYDROCARBON ASSESSMENT
AND REMEDIAL INVESTIGATION
RICHLAND JACKPOT FOODMART (TIME OIL CO. PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

12-01238-0

1.0 SUMMARY

The following report presents results of our Subsurface Petroleum Hydrocarbon Assessment and Remedial Investigation for the Jackpot Foodmart (Time Oil Co. Property 01-056) located at 500 George Washington Way in Richland, Washington. Our work consisted of the following: 1) conducting a groundwater monitoring event on the existing five wells located at the subject site prior to initiation of the subsurface investigation; 2) performing a subsurface investigation including drilling seven borings, collecting soil samples from each boring, and installing seven groundwater monitoring wells; 3) installing one deep in-situ sparging well; 4) conducting a groundwater sampling event on all site groundwater monitoring wells after the subsurface investigation; 5) evaluating all field and laboratory results; 6) conducting a 24-hour in-situ air sparging pilot test; 7) conducting vapor extraction tests; 8) disposing soil cuttings and treating all purge, development and decontamination water; and 9) preparing this report. The following summary presents significant findings detailed in this report:

- The subsurface exploration program involved advancing seven exploratory soil borings around the site property and the adjacent City of Richland park (Howard Amon Park) to depths ranging from approximately 18.9 to 44.5 feet below grade, collecting soil samples at approximately five-foot intervals, and installing groundwater monitoring wells in all seven borings. One boring was completed as a 4-inch diameter groundwater (recovery) monitoring/vapor extraction well (RW-1). Six borings were completed as 2-inch diameter groundwater monitoring/vapor extraction wells (MW-6, MW-7, MW-8, MW-9, MW-10 and MW-11). An eighth boring, from which no soil samples were collected, was completed to a depth of 50.3 feet in order to install a 2-inch diameter in-situ air sparging well.

- Subsurface soil conditions varied over the full extent of the area explored. Soils encountered beneath the upper plateau generally consisted of, in descending order: gravelly sand (fill), over sandy silt with gravel, over silty fine to medium sand with trace gravel, over a sandy gravel grading to a gravelly sand. Soils encountered in the vicinity of the ball field generally consisted of a gravelly sand (fill) over a sandy gravel with some interbeds of medium to coarse sand. Subsurface soils encountered in well boring MW-10 consisted of a silty fine sand to a depth of 13 feet underlain by a sandy gravel.

- At the time of our explorations, groundwater was encountered at depths of approximately 27.2 to 28.5 feet below the elevated grade in the western area of the site and 9.6 to 11.7 feet below grade in the park. Once groundwater monitoring wells were installed, the depth to groundwater was measured between 26.86 and 28.69 feet below the top of casing, or an elevation of approximately 345 to 346 feet above mean sea level in the wells located on the elevated grade. Monitoring wells installed east of the subject site, in the park, had depth to water measurements between 8.36 and 10.95 feet below the top of casing, or an elevation of approximately 345 feet above mean sea level. Groundwater beneath the site is interpreted to generally flow towards the north-northeast at a shallow gradient of 0.0016 ft/ft, however direction and gradient vary seasonally.

- A hydrocarbon impacted soil smear zone was identified in soil borings MW-7, MW-10, MW-11, SW-1, and RW-1. The smear zone is located approximately 5 to 10 feet below the water interface.

- During drilling activities, soil samples were collected at approximately five-foot intervals. Each soil sample was screened in the field with an organic vapor meter (OVM) and, based upon OVM readings, selected samples were submitted to a laboratory for analysis. Twelve soil samples were analyzed for diesel range petroleum hydrocarbons (DRPH), gasoline range petroleum hydrocarbons (GRPH), and the aromatic hydrocarbons benzene, toluene, ethylbenzene, and xylene (BTEX) distinction by Washington Department of Ecology (Ecology) Methods WTPH-D and WTPH-G/BTEX, respectively.

- Following development, all twelve groundwater monitoring wells (MW-1 through MW-11 and RW-1) were sampled. In addition, one sample was collected from the sparging well (SW-1) which is screened from 17 to 22 feet below the groundwater interface. All groundwater samples were analyzed for GRPH and BTEX by Ecology Method WTPH-G/BTEX, DRPH by Ecology Method WTPH-D, and trichloroethylene (TCE) and tetrachloroethylene (PCE) by EPA Method 8010.

- Analytical laboratory test results of soil samples collected while drilling indicate one of the twelve soil samples (RW-1 S-2) contained concentrations of analytes above the soil cleanup levels listed in Method A of the Model Toxics Control Act (MTCA). None of the remaining soil samples contained detectable levels of GRPH, DRPH, or BTEX.

- Analytical laboratory test results of groundwater samples collected indicate eight of the thirteen samples contained concentrations of analytes above the groundwater cleanup levels listed in Method A of MTCA for GRPH, DRPH, and/or BTEX.

- A sparging pilot test was conducted at the subject site using the sparge well SW-1, which was specifically designed for conducting this test. The test was performed for 24 hours at an average flow rate of 27 cubic feet per minute (cfm) and under a pressure of 10 pounds per square inch (psi). The test resulted in an estimated dissolved oxygen minimum radius of influence of 24 feet.

- Three vapor extraction tests conducted at the site removed measurable levels of hydrocarbons from the subsurface. A vapor sample was collected at the initiation and conclusion of each of the two dedicated vapor extraction tests and at the beginning and end of the sparge test. Vapor samples were submitted for analysis of total non-methane hydrocarbons (TNMHC) and hydrocarbon speciation (51 hydrocarbon compounds ranging from C_2 through C_{10}). Results of the six sample analyses indicate the presence of hydrocarbons in all samples; TNMHC results ranged from 23.0 to 5500.0 parts per million as carbon (ppmC), with the highest concentrations in the sample collected from RW-1 at the beginning of the sparge test. Preliminary analysis of the vapor extraction tests suggests an effective radius of influence (1% of the applied vacuum) of 40 feet within the vadose zone soils in the vicinity of RW-1 and 42 feet within the vadose zone soils in the vicinity of MW-7.

This summary is presented for introductory purposes and should only be used in conjunction with the full text of this report. Our observations of subsurface conditions, installation of groundwater wells, and laboratory analyses are included in the text of this report. Analytical laboratory testing procedures and test certificates are included in Appendices B, C, D, F, G and H of this report.

2.0 SITE AND PROJECT DESCRIPTION

The Richland Jackpot Foodmart is located at 500 George Washington Way in Richland, Washington (Figure 1 - Site Vicinity Map). The site is located in a primarily commercial area, with some residences in the vicinity along George Washington Way to the south of the site. The Columbia River is located approximately 800 feet east-northeast of the site. Site features include one retail building, three underground storage tanks (USTs), and two pump islands. Site features are presented in Figure 2 (Site and Exploration Plan).

The purpose of this investigation was to evaluate the subsurface soil and groundwater conditions with respect to potential petroleum hydrocarbon impact around the subject site and in the vicinity of Howard Amon Park (the park) located east of the site, to evaluate extent of hydrocarbon impacted soil and groundwater and to assess the potential remedial alternatives of the impacted media. This investigation follows the initial characterization performed at the subject site by Environmental Science & Engineering, Inc. in June 1993.

Our original scope of services included the following:

- Perform an initial site visit at which time the five existing site groundwater monitoring wells and one vapor extraction well were sampled for GRPH/BTEX, DRPH Extended, TCE and PCE.
- Meet with members of the One Call locating service at the subject site to clear all drilling locations for underground utilities.
- Drill seven borings to depths of 20 to 45 feet below grade. During drilling activities, soil samples were to be collected at five-foot depth intervals, and screened with an organic vapor meter (OVM) for the presence of volatile organic vapors. Based upon these field screening results, selected samples were chosen to be analyzed for GRPH, DRPH, and BTEX.
- Install one groundwater recovery/monitoring well and six groundwater monitoring wells in the seven exploratory borings.
- Install one 2-inch diameter in-situ air sparging well to a depth of 50 feet and screened from a depth of 45 to 50 feet.
- Develop the new groundwater monitoring wells using surge blocks and Grundfos pumps. Following development, sample all on site groundwater monitoring wells. Groundwater samples were to be analyzed for DRPH, GRPH/BTEX, TCE and PCE.
- Employ a licensed surveyor to survey all well and ground elevations to a United States Geological Survey (USGS) benchmark or equivalent mark, and measure the northings and eastings of significant site features.
- Conduct vapor extraction tests on each of the two vapor extraction wells individually (RW-1 and MW-7) In addition, apply a vacuum to each well and monitor vacuum influences during the 24 hour sparge test.

- Conduct a 24-hour in-situ air sparging pilot test to define dissolved oxygen radius of influence and remedial effectiveness of a potential air sparging system.

- Dispose soil cuttings and purge and development water.

- Evaluate all data and prepare this report.

This report has been prepared for the exclusive use of Time Oil Co. and their agents for specific application to the project site in accordance with generally accepted environmental assessment practices and the constraints of our approved scope of services. No other warranty, express or implied, is made. In the event that other information regarding site conditions becomes known, or if there are any changes to the conditions on the existing site or nearby properties, the conclusions of this report should be reviewed and, if necessary, revised to reflect updated information.

3.0 SITE HISTORY

The subject site was operated as a bus depot and gasoline service station prior to being purchased by Time Oil Co. in 1968. The bus depot was demolished and a retail store constructed in the central area of the subject site. Three UST's and their associated product piping and dispenser islands were removed from the southwestern area of the site in 1990 and replaced with a new tank system. The new dispenser complex was constructed in the same location as the original complex, and the new underground storage tanks were relocated slightly east of the dispenser islands. Analytical testing of soils samples collected during the tank removal operations discovered levels of TPH-gasoline exceeding MTCA Method A Cleanup Levels. A 750-gallon heating oil tank is also believed to have been located along the western wall of the former bus depot. However, it is not known whether this heating oil tank was removed during demolition of the bus depot.

3.1 Previous Site Investigations

A soil and groundwater site assessment was performed in 1993 by Environmental Science & Engineering, Inc. During this assessment, five groundwater monitoring wells (MW-1 through MW-5) and one vapor extraction well (VW-1) were installed at the subject site. This assessment detected the presence of soil contamination beneath the former UST cavity. Hydrocarbon impacted groundwater was also identified which apparently was emanating from both the former UST cavity and pump island complex. Groundwater flow direction and chemical testing of dissolved phase hydrocarbons indicated that groundwater contamination was migrating towards the east under an average apparent hydraulic gradient of 0.01 ft/ft.

4.0 REGIONAL GEOLOGY/HYDROGEOLOGY

The study area lies in the east-central part of the Pasco Basin, which was formed by a slight structural downwarp in the otherwise relatively flat-lying sequence of basalt flows of the Columbia River Group. The basalt was laid down during Miocene time (26 million years before present) as widespread flows that were generated from numerous fissures located across southeastern Washington, northeastern Oregon, and southern Idaho. During the basalt extrusions, the Columbia and Snake Rivers periodically were pushed into new courses; evidence for ancient channels of these rivers is indicated by the presence of some river gravels interbedded with the basalt flows.

Several times during the Pleistocene "Ice Age", vast glaciers originating in Canada advanced into the northern part of the Columbia Plateau, northern Idaho, and Montana. Glacial meltwater streams

from northern Washington, along with gigantic floods caused by sudden breakage of ice-damned lakes in the Selkirk and Rocky Mountains to the northeast of the Columbia Plateau (Glacial Lake Missoula) cut deep channels (coulees) across the Colombia Plateau. Occasionally, the water was partially impounded by both ice blocks and landslide debris in the lower Columbia River Valley, and by the restricted outlet from the Pasco Basin at Wallula Gap. Temporary large lakes formed in the vicinity of the study area, depositing silt and clay sediments within the river valleys. As the natural dams periodically broke, draining the lakes, the fine-grained lacustrine deposits were eroded by the flood waters. During the latter stages of the glacial period, thick accumulations of wind eroded fine-grained soil (loess) were deposited across the landscape of the plateau.

A unique feature in the immediate vicinity of the study area are the large gravel bars within the basin. Immediately north of Richland, the largest and longest gravel bars within the entire scabland area are located. Gravel bars have been identified to extend lengths of 12 miles and covering up to 20 square miles. These large gravel bars were deposited by the large flood "rivers" which passed through the Columbia River in the vicinity of the subject site. The site is in the vicinity where all the scabland rivers merged (the Yakima, Columbia, Snake, and Walla Walla Rivers) along with numerous creek outlets that drained the upper basins (Crab Creek, Cold Creek, etc.). These gravel bars are the depositional remnants of the creeks and rivers which eventually filled the Pasco Basin with massive quantities of water. This water was restricted by the Wallula Gap which caused a large backwash of the flood waters and allowed the large sediments to fall from suspension and form the large gravel bars. Wallula Gap is an erosional feature where the Columbia River cuts through the Horse Heaven Hills anticline. Flood scours and marks are found on the steep walls of the gap approximately 800 feet above the current day river elevation. All floodwater from the Pasco Basin had to escape through this constricted notch and flowed eventually to the Pacific Ocean. Estimates have been calculated that nearly 39 cubic miles of water escaped daily through the gap during maximum flood levels.

The geology of the subject site is characterized by these glaciofluvial sediments deposited over basalt bedrock of the Columbia River Group. These sediments were originally deposited during the last major glacial advance which ended approximately 12,000 years ago. During this time, the thick intervals of flood deposits (chiefly cobbles, gravels, and sands) were deposited. After the glacial flood period ended, glacial deposits in the low lying areas of the drainage basin were reworked by local streams and rivers, chiefly the Columbia River at the subject site.

The soils located beneath the subject site consist of coarse gravels with some cobbles in a sandy matrix. These soils were probably initially derived from the large floods which occurred approximately 12,000 years ago. Soil clasts at the site primarily consist of rounded basalt fragments of the Columbia River Group with rounded Precambrian argillites and quartizites and Cretaceous granites probably derived from Idaho. Since initial deposition of the coarse material, the sediments have been reworked by the Columbia River; the river's present day coarse is located approximately 800 feet east-northeast of the subject site. The Columbia River is presently dammed by the McNary Dam, which forms Lake Wallula east of the site. Shallow groundwater beneath the site appears associated with the current lake water table and fluctuates seasonally with river and lake levels. Groundwater flow directions may also be directly effected by river levels and discharge of the Yakima River which confluences with the Columbia River approximately 2 miles southeast of the subject site. The Yakima River course flows southerly approximately 6,500 feet west of the subject site.

The Columbia River Basalt Group hosts the area's regional aquifer system. These basalt flows compose a multilayered aquifer system with major aquifers located within the basalt interbeds (which typically average 5 to 30 percent of the total flow thickness). General regional groundwater flow is to the south. Some aquifers are connected hydraulically through vertical fractures or columnar jointing within the thinner basalt flows. These deep aquifers are the predominant water source for most municipal, industrial, domestic, and agricultural needs. Locally, shallow perched aquifers may exist. The shallow aquifer beneath the site occurs at a depth of approximately 30 feet below grade at the subject site and approximately 8 to 10 feet below grade within the park and appears to be part of the Lake Wallula water system. Drinking and industrial water for the City of Richland is primarily derived directly from the Columbia River. The City also maintains 18 deep wells (approximately 120 to 150 feet deep) placed in five separate well field locations around the city for drinking water. These wells are screened within the unconsolidated flood deposits, except for one well which is located south of Richland and is screened within a basalt interflow at a depth of approximately 1,200 feet. The closest well field to the subject site is the Wellsian Way well field located approximately 4,000 feet west-southwest of the site. This well field was shut down between October 1991 and August 1992 due to the presence of chlorinated solvents detected within the groundwater supply.

5.0 SUBSURFACE EXPLORATION

Prior to drilling any borings, the well locations were cleared by utilizing the one call utility locate system. A meeting was scheduled at the subject site on 19 March 1995 with representatives from each of the utility companies. Company representatives approved all drilling locations. In addition, the City of Richland approval drilling locations for all wells located in the park.

5.1 Introduction

The subsurface exploration program completed for this site consisted of advancing seven exploratory borings (MW-6 through MW-11 and RW-1) to depths ranging from 18.9 to 44.5 feet below grade. All borings were drilled from 20 through 24 March 1995 by Ruen Drilling, Inc. of Clark Fork, Idaho under subcontract to our firm and were continuously observed and logged by an experienced AGRA Earth & Environmental, Inc. (AEE) geologist. Each boring was advanced using a truck mounted Schramm drill rig. Six-inch inside diameter (I.D.) threaded steel casing was used on all borings completed, except for boring RW-1 which was drilled with eight-inch diameter threaded steel casing. In addition, on 24 and 25 March 1995, one two-inch diameter PVC in-situ air sparging well was drilled and installed. This boring was advanced using 10-inch steel casing which required welding every 20 feet. The sparge well was installed to a depth of approximately 50 feet. Prior to drilling, the drilling equipment and sampling tools were decontaminated by steam cleaning methods. During drilling operations, soil samples were collected at approximately five-foot depth intervals (except for borings RW-1, at which a sample was only collected at the water interface and approximately 5 feet below the water interface, and boring SW-1 at which no samples were collected) and preserved for shipment to the laboratory for future analysis. Each sample was screened in the field for the presence of volatile organic compounds utilizing an OVM to facilitate the selection of soil samples for laboratory analysis. Upon completion of drilling procedures, two-inch diameter groundwater monitoring wells were installed in six of the borings (MW-6 through MW-11). A four-inch diameter groundwater monitoring/vapor recovery well was installed in boring RW-1.

Approximate locations of all borings (monitoring wells) are presented in Figure 2. Monitoring well as-built diagrams are shown on the attached boring logs in Appendix A. Exploration and sampling procedures are described in detail in Appendix A.

5.2 Subsurface Soil Conditions

Subsurface conditions are described in the two independent areas of the site where the exploration program was completed: 1) on the elevated grade immediately below the paved parking area of the subject site and across George Washington Way, and 2) on the lower grade located in the vicinity of the park east of the subject site. In general, subsurface soils beneath the subject site typically consist of a thin (approximately 3 feet) gravelly sand (Fill) layer above sandy silt and/or silty SAND with gravel to a depth of approximately 8 to 10 1/2 feet. The sand and silt overlie a medium dense brown to grayish brown sandy GRAVEL with cobbles which grades into a gravelly medium to coarse SAND with trace silt to the full depths explored (approximately 45 feet). At a depth of approximately 42.5 to 45.5 feet below the site grade in exploration MW-9, a hard to very stiff, dry, dark tan clayey SILT to silty CLAY was encountered. Within the upper 10 feet most soils beneath the site appeared to be aeolean or overbank deposits which overlie the coarser glacio-fluvial, clast supported sediments which were encountered to depths of approximately 45 feet. The deep in-situ sparging well appeared to encounter very coarse gravels, cobbles and boulders at a depth of approximately 48 feet to the full depth explored (50.5 feet).

The borings completed in the vicinity of the park encountered medium dense, damp, brown gravelly SAND (Fill) over the native sandy GRAVEL and gravelly SAND with interbedded medium to coarse (well sorted) sand (glacio-fluvial deposits). A generalized north-south geologic cross section of the subject site is presented in Figure 3. Figure 4 presents a generalized east-west geologic cross-section which traverses across the Jackpot Foodmart property to the park. Location of cross-sections are identified in Figure 2.

Soil samples were screened in the field for the presence of organic vapors using the field headspace measurement procedure described in Appendix A. A summary of OVM readings is presented in Table 1 and the measurements are also presented on the boring logs in Appendix A. The field measurements of organic vapors using the photoionization detector and the head space procedures provide a general indication of the total organic vapor concentration but cannot identify specific organic compounds. For the purpose of this study, field organic vapor measurements greater than 0.0 parts per million (ppm) are considered to be above the natural, ambient background concentration. Based on this criteria, greater than background organic vapor measurements occur in soil samples MW-7 S-3 (12.8 - 14.3 ft), MW-8 S-2 (9.0 - 10.5 ft). MW-9 S-2 (19 - 20.5 ft), MW-10 S-3 (14.5 - 16.0 ft), MW-11 S-5 (34.0 - 35.5 ft) and RW-1 S-2 (33.0 - 34.5 ft). None of the samples from other borings exhibited detectable organic vapors with the OVM.

An identifiable hydrocarbon smear zone was logged in exploratory borings. Exploratory borings MW-7, MW-10, RW-1 and SW-1 intercepted this submerged smear zone approximately 5 to 10 feet beneath the groundwater interface east of the former tank field. The smear zone was also identified in exploration MW-11 located west of the subject site across George Washington Way. Due to the submerged nature of the smear zone, it is evident that the groundwater table has risen since release of the hydrocarbons and, at some time in the past, groundwater flow may also have been oriented to the west towards the Wellsian well field. Figure 5 presents an approximate outline of the extent of the submerged hydrocarbon smear zone as identified in this most recent and past explorations.

5.3 Groundwater Conditions

Groundwater was encountered at depths ranging from 27.2 to 28.5 feet below the elevated grade at the time of drilling and 9.6 to 11.7 feet below the lower grade by the park. Following well development with surge blocks and a Grundfos pump, the monitoring wells were allowed to equilibrate ten days before obtaining groundwater elevation measurements. Depth to groundwater measurements were then collected in the seven new groundwater monitoring wells, the sparge well and the previously installed 5 groundwater monitoring wells and one vapor recovery well. Based upon the water level measurements collected on 5 April 1995, the depth to groundwater from the top of casing ranged from 26.86 to 28.69 feet in those wells located on the elevated grade and 8.36 to 10.95 feet below the top of casing for those wells located by the park. Groundwater elevations were also collected on 19 April 1995 and 18 May 1995, approximately four and nine weeks after well installation. During our 19 April 1995 site visit the depth to groundwater from the top of casing ranged from 26.77 to 28.59 feet in the site monitoring wells and 8.26 to 10.86 feet in the wells located near the park. Water elevations over this period from 4 April to 19 April 1995 rose between 0.07 and 0.18 feet in site monitoring wells. Depth to groundwater during our 18 May 1995 site visit was 26.56 to 28.0 feet below the top of casing in the wells on the elevated grade and 7.99 to 10.6 feet below the top of casing in wells located by the park. Groundwater elevations rose approximately 0.12 to 0.24 feet from our 19 April to 18 May 1995 site visits. This rise in groundwater elevation is interpreted to be directly related to the rising of the lake level (located approximately 800 feet east of the site) and the increase in discharge of the Yakima River due to excessive rains and snow melt. Figures 6, 7 and 8 present groundwater elevation maps for data collected 4 April, 19 April and 18 May 1995, respectively.

Stratton Surveying & Mapping of Richland, Washington was on site on 4 April 1995 to survey the elevations of all wells (both ground surface and top of PVC casing), and to measure the horizontal and vertical location of each well. All elevations are referenced to a City of Richland Datum brass cap located at the intersection of Lee Boulevard and George Washington Way north of the subject site (elevation = 372.49 feet above mean sea level). Based upon the water level measurements of 4 April 1995, groundwater elevations ranged from 345.47 to 346.10 feet above sea level. An approximate groundwater gradient of 0.00125 ft/ft (0.125 feet vertical fall in 100 feet horizontal) was calculated, with groundwater flow trending towards the north-northeast. Fluid level measurements collected on 19 April 1995 indicated an approximate hydraulic gradient of 0.0016 ft/ft (0.16 feet vertical fall in 100 feet horizontal). Groundwater migration direction during this site visit was interpreted to flow to the north-northeast. Groundwater migration during our 18 May 1995 site visit exhibited the same migrational direction under an apparent hydraulic gradient of 0.0013 (0.13 vertical fall in 100 feet horizontal). Groundwater elevations during our 18 May 1995 site visit ranged from 345.84 to 346.40 above mean sea level. A summary of groundwater elevations and depths is presented in Table 2.

Groundwater elevations and flow directions are probably directly controlled by water level fluctuations in Lake Wallula (Columbia River) located 800 feet east of the subject site and the relative flow/discharge of the Yakima River located approximately 1 1/2 miles west-southwest of the subject site. Lake Wallula is controlled by the McNary Dam located approximately 45 miles downstream near Umatilla, Oregon. During the time this study was conducted, excessive rains had occurred in the surrounding area, extensive snow melt in the mountains to the west was occurring, and high flows in the Yakima River were being observed. Tables 3 and 4 present a summary of pool elevations of Lake Wallula and discharge of the Yakima River, respectively. It should be noted that

shallow groundwater elevation and flow direction beneath the subject site may vary with seasonal fluctuations in precipitation and water levels in Lake Wallula (Columbia River) and with seasonal discharge variations within the Yakima River.

It is apparent that groundwater elevations and migration directions fluctuate beneath the subject site as indicated by the orientation of the identified smear zone beneath the site. This zone (Figure 5) has been identified emanating from the former tank pit area and migrating due east beneath the park. This orientation would indicate that groundwater flow directions were towards the east during the contaminant migration. The impacted soil zone was also identified in exploration MW-11 located west of the subject site across George Washington Way. The extent of the contaminant plume to the west has not been fully defined. It is interpreted that the migration of the plume to the west is a result of operation of the Wellsian well field located approximately 4,000 feet west-southwest of the subject site. This well field supplied drinking water to the city of Richland until chlorinated solvents were detected within the water supply. At that time (between October 1991 and August 1992) the wells were shut down. The well field contained a minimum of 4 recovery wells which pumped groundwater at several thousand gallons per minute. It is interpreted that this well field could have reversed the natural groundwater gradient beneath the subject site towards the west, thus causing migration of the contaminants in that direction. The zone which is impacted by hydrocarbons is currently located approximately 5 to 10 feet below the groundwater interface, providing evidence that a rise in groundwater has occurred since migration of the plume.

6.0 QUANTITATIVE ANALYSES

6.1 Analytical Results: Soil

A total of twelve soil samples were submitted to National Environmental Testing, Inc (NET) of Portland, Oregon for chemical analyses. All samples were submitted under AEE chain-of-custody procedures and analyzed for the following:

- Gasoline range petroleum hydrocarbons by Ecology Method WTPH-G;
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020; and
- Diesel range petroleum hydrocarbons by Ecology Method WTPH-D.

No detectable concentrations of GRPH were found in samples collected from borings completed during the subsurface exploration phase of this study and submitted for analysis, except for sample RW-1 S-2 which exhibited a purgeable hydrocarbon concentration of 2,900 mg/kg. Laboratory detection limit for purgeable hydrocarbons was 3.0 mg/kg (ppm). None of the soil samples submitted contained detectable concentrations of the aromatic hydrocarbons benzene or toluene and only sample RW-1 S-2 exhibited a concentration of ethylbenzene (27.0 mg/kg) and xylene (110.0 mg/kg). Laboratory detection limits were 0.3 to 0.4 mg/kg for benzene, toluene, and ethylbenzene, and xylenes except for the analysis on RW-1 S-2 which contained a benzene and toluene detection limit of 22.0 mg/kg. Sample RW-1 S-2 was collected approximately 5 feet below the water interface in the heavily impacted soil smear zone that is currently submerged.

None of the samples submitted for laboratory analysis of DRPH exhibited concentrations above the laboratory detection of 15.0 to 18.0 mg/kg except for sample RW-1 S-2 which exhibited a diesel concentration of 220.0 mg/kg.

Of the samples submitted for laboratory analysis only sample RW-1 S-2 contained analyte concentrations (GRPH, DRPH, ethylbenzene and xylenes) exceeding the soil cleanup levels.

A summary of laboratory results for the soil samples submitted during the drilling phase is presented in Table 5. Analytical test certificates are included in Appendix B. Copies of gas chromatographs are included under separate cover.

6.2 Analytical Results: Groundwater

Two separate groundwater sampling events occurred at the subject site from which a total of 22 water samples were collected (including three QA/QC samples). All samples were delivered to NET laboratory in Portland, Oregon for chemical analysis under AEE chain-of-custody procedures.

6.2.1 1 February 1995 Sampling Event

Before AEE conducted any subsurface site investigations, a representative visited the subject site on 1 February 1995 to collect groundwater samples from the existing 5 groundwater monitoring wells and one vapor extraction well. One groundwater sample was collected from each of the six site monitoring wells, in addition to one duplicate sample (identified as MW-16). Samples were submitted to NET laboratory for chemical analysis. Each sample was analyzed for the following constituents:

- GRPH by Ecology Method WTPH-G;
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 602;
- DRPH (C_{12} - C_{36}) by Ecology Method WTPH-D Extended.

In addition, the groundwater samples collected from MW-1, MW-2, MW-5 and VW-1 were analyzed for trichloroethylene (TCE) and tetrachloroethylene (PCE) by EPA Method 8260.

Detectable concentrations of GRPH were present in the groundwater samples collected from monitoring wells MW-1, MW-2, MW-3, MW-4 and VW-1 (and the duplicate sample MW-16). However, only the samples from MW-1, MW-2 MW-4 and VW-1 exceeded the groundwater cleanup levels of 1,000 ug/L (ppb). The highest concentration was 30,000 ug/L collected from MW-1.

Detectable concentrations of benzene were found in groundwater samples collected from monitoring wells MW-1, MW-3, MW-4, VW-1 (and the duplicate sample MW-16). These samples contained benzene concentrations in excess of the groundwater cleanup levels of 5 ppb. Although the sample from MW-2 exhibited a non-detectable result, the laboratory method detection limit for this sample was 10 ppb which is above the cleanup criteria. Method detection limits for other samples were 0.5 ppb. The highest reported benzene concentration for this sampling event was detected in MW-1 (39 ug/L).

Detectable levels of toluene were found in four of the six groundwater samples submitted (MW-1, MW-2, MW-4, and VW-1) and the duplicate sample MW-16. However, only monitoring wells MW-1 and MW-2 exhibited toluene concentrations in excess of the cleanup standard of 40.0 ppb. The highest concentration was 890.0 ppb collected from MW-1.

Detectable concentrations of ethylbenzene were found in all groundwater samples submitted except for sample MW-5. All remaining samples except sample MW-3 contained ethylbenzene concentrations in excess of the groundwater cleanup levels of 30.0 ppb. The highest concentration was 430.0 ppb collected from MW-1.

Total xylene concentrations were exhibited by all samples submitted except samples collected from monitoring wells MW-3 and MW-5. All other samples contained xylenes concentrations in excess of the groundwater cleanup levels of 20.0 ppb. The highest concentration was 3,700 ppb collected from MW-1.

Extractable hydrocarbons from the C_{12} through C_{36} range were analyzed using Ecology Method WTPH-D Extended. Detectable concentrations of extractable hydrocarbons (diesel C_{12} - C_{24}) were reported from the sample collected from MW-1 (1,800 ug/L), MW-2 (330 ug/L), MW-4 (610 ug/L), VW-1 (970 ug/L) and the duplicate sample MW-16 (520 ug/L). The sample collected from MW-1 is the only sample which contains concentrations of extractable hydrocarbons above the groundwater cleanup level of 1,000 ppb. The laboratory detection limit for extractable hydrocarbons in the C_{12} - C_{24} range was 250 ug/L. No detectable concentrations of heavy oil range hydrocarbons from C_{24} through C_{36} were detected in any of the samples submitted for analytical testing. Laboratory method detection limits for heavy oils is 750 ppb. Cleanup criteria as set forth in Method A of MTCA is 1,000 ppb. Samples which contained detectable levels of extractable hydrocarbons were flagged by the laboratory as extending to a lighter hydrocarbon range than diesel (i.e., it appears to be heavily weathered gasoline).

TCE and PCE were also analyzed in samples MW-1, MW-2, MW-5 and VW-1 by EPA Method 8260. Detectable TCE concentrations above the laboratory detection limit of 1.0 ppb were found in samples MW-2 and MW-5. However, no samples exhibited TCE concentrations above the groundwater cleanup level of 5.0 ppb. Detectable levels of PCE were only identified in the sample collected from MW-2. However, this result was also below the groundwater cleanup level of 5.0 ppb.

A summary of laboratory results for the groundwater samples submitted during the sampling event is presented in Table 6. Analytical test certificates are included in Appendix C and copies of gas chromatographs are included under separate cover.

6.2.2 4 April 1995 Sampling Event

After completion of the subsurface exploration program which was conducted at the subject site in March 1995, a second groundwater sampling event occurred. During this sampling event, all groundwater monitoring wells which were located on the subject site and in the vicinity of the park were sampled. A representative from AEE visited the subject site of 4 April 1995 to collect groundwater samples from the 11 groundwater monitoring wells, the one recovery/extraction well and the one sparge well. No sample was collected from the one vapor extraction well (VW-1) during this site visit. One groundwater sample was collected from each of the thirteen site wells, in addition to one duplicate sample (identified as MW-13, duplicate of RW-1), and a rinsate sample (MW-12).

Prior to collecting groundwater samples, fluid level measurements were obtained from each well. Monitoring wells were purged prior to sampling by removing a minimum three well volumes using 2-inch and 4-inch diamater PVC bailers. The bailers were decontaminated between each well

utilizing a liquinox and water mixture followed by a potable and distilled water rinse. A sample (identified as MW-12) was collected from the final rinse bucket and also submitted for analytical testing. Each sample was submitted to NET laboratory for chemical analysis. Each sample was analyzed for the following constituents:

- GRPH Ecology Method WTPH-G;
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 602;
- DRPH (C_{12} - C_{24}) by Ecology Method WTPH-D (except for rinsate sample MW-12); and .
- Trichloroethylene (TCE) and Tetrachloroethylene (PCE) by EPA Method 8260.

Detectable concentrations of GRPH were present in the groundwater samples collected from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-7, MW-10, MW-11, RW-1 and SW-1 (and the duplicate sample MW-13). However, only the samples from MW-1, MW-2, MW-4, MW-7, MW-10, MW-11 and RW-1 exceeded the groundwater cleanup levels of 1,000 ug/L (ppb). The highest concentration was 44,000 ug/L collected from RW-1.

Detectable concentrations of benzene were found in groundwater samples collected from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-7, MW-10 and RW-1 (and the duplicate MW-13). These samples contained benzene concentrations in excess of the groundwater cleanup level of 5 ppb. Laboratory method detection limits for samples were 0.5 ppb. The highest reported benzene concentration for this sampling event was detected in MW-7 (72 ug/L).

Detectable levels of toluene were found in groundwater samples collected from MW-1, MW-2, MW-3, MW-4, MW-6, MW-7, MW-10, MW-11 and RW-1 (and the duplicate sample MW-13). Only monitoring wells MW-1, MW-2, MW-4, MW-7, MW-10 and RW-1 exhibited toluene concentrations in excess of the groundwater cleanup level of 40.0 ppb. The highest concentration was 850.0 ppb collected from MW-1.

Detectable concentrations of ethylbenzene were found in all groundwater samples submitted except for sample MW-5, MW-6, MW-8, MW-9 and rinsate MW-12 which exhibited concentrations below the laboratory method detection limit of 0.5 ppb. All remaining samples except sample MW-11 and SW-1 contained ethylbenzene concentrations in excess of the groundwater cleanup level of 30.0 ppb. The highest concentration was 1,400 ppb collected from MW-7.

Total xylene concentrations were exhibited by all samples submitted except samples collected from monitoring wells MW-5, MW-8, MW-9 and rinsate MW-12 which exhibited concentrations below the laboratory method detection limit of 0.5 ppb. However, only samples MW-1, MW-2, MW-4, MW-7, MW-10 and RW-1 contained xylene concentrations in excess of the groundwater cleanup level of 20.0 ppb.

Extractable hydrocarbons from the C_{12} through C_{24} range were analyzed using Ecology Method WTPH-D. Detectable concentrations of DRPH were reported from the sample collected from MW-1 (1,300 ug/L), MW-2 (720 ug/L), MW-4 (1,100 ug/L), MW-7 (2,000 ug/L), MW-10 (660 ug/L), RW-1 (2,700 ug/L) and the duplicate sample MW-13 (2,700 ug/L). The samples collected from MW-1,

MW-4, MW-7 and RW-1 are the only samples which contain concentrations of DRPH above the groundwater cleanup level of 1,000 ppb set forth in Method A of MTCA. The laboratory detection limit for extractable hydrocarbons in the C_{12} - C_{24} range was 250 ug/L. Samples which contained detectable levels of extractable hydrocarbons were flagged by the laboratory as extending to a lighter hydrocarbon range than diesel (i.e., it appears to be heavily weathered gasoline).

TCE and PCE were also analyzed in all thirteen groundwater samples submitted during this monitoring event (and also in the rinsate sample MW-12 and the duplicate MW-13). Detectable levels of TCE were only identified in the sample collected from MW-3 (1.2 ppb). Detectable levels of PCE were identified in the groundwater samples collected from MW-6 (2.5 ppb), MW-8 (2.7 ppb), MW-9 (3.7 ppb) and MW-11 (2.5 ppb). However, detection limits for MW-1, MW-2, MW-4, MW-5, MW-7, MW-10 and RW-1 were 5.0 ppb for both TCE and PCE due to high interference with the gasoline hydrocarbon compounds. Analytical test results reveal that TCE and PCE are currently below the groundwater cleanup levels of 5.0 ppb.

A summary of laboratory results for the groundwater samples submitted during the sampling event is presented in Table 6. Analytical test certificates are included in Appendix D and copies of gas chromatographs are included under separate cover.

6.3 Quality Assurance/Quality Control (QA/QC)

During each soil and groundwater sampling event, QA/QC samples were collected and submitted to the analytical laboratory. These samples consisted of duplicate samples, trip blanks, and rinsate blanks. In addition, the analytical laboratory performs several internal QA/QC tests including surrogate recoveries, laboratory duplicate and blank samples, and spiked samples. Results of all QA/QC analyses were within acceptable levels. A detailed description of the QA/QC review are presented in Appendices B, C, and D.

7.0 REMEDIAL INVESTIGATION - SPARGE TEST ANALYSIS

Air injection, or sparging, tests are conducted to evaluate the achievable radius of influence of increasing dissolved oxygen around an air injection point in groundwater. An additional benefit of air injection is the passage of injection gas through soil channels and the subsequent partitioning of volatile hydrocarbons into that gas. The increased oxygen and gas phase flow within the radius of influence can lead to increased biodegradation by indigenous contaminant degrading aerobic microorganisms both in the saturated and unsaturated zones and transport of volatile components from the groundwater and soil, through the unsaturated zone pore spaces, where it can be recovered with soil vapor extraction wells. The injection of air into aquifers results in a transient (short term) displacement of water away from the sparging well. Once the gas phase pathways (channels) have reached a maximum volume, the pressure gradient ceases and macroscale displacement stops. Displacement in all directions may continue on the scale of channel widths (inches). Also, as the injected air comes in contact with the impacted groundwater and/or soil, volatile contaminants partition from the dissolved phase into this air by evaporation. Therefore, in-situ air sparging enhances both remediation methods, biodegradation and volatilization.

A 24-hour in-situ groundwater air sparging pilot test was performed at the subject site on 19 and 20 April 1995 to evaluate the aquifer parameters and assess the feasibility of installing an in-situ air sparging system at the subject site. A sparging well (SW-1) was installed during the subsurface exploration program on 24 and 25 March 1995. The well was specifically designed to conduct the

sparging pilot test at the subject site. The 2-inch PVC sparge well was installed to a depth of approximately 50 feet below grade. Groundwater at the subject site is approximately 28 feet below grade. Due to the identified submerged smear zone (identified typically by a heavily stained soil zone located 5 to 10 feet below the groundwater interface), the well was installed to the desired depth and constructed with a 5 foot section of 0.020 slot well screen from 45 to 50 feet below grade. The well was constructed at this depth in order to allow injected air and dissolved oxygen to migrate through the submerged smear zone and to allow a potentially greater radius of influence due to the porous nature of the soils beneath the site.

The 2-inch sparge well was constructed within 10-inch steel casing. A select sand filter pack was placed within the annulus of the casing to a depth approximately 3 feet above the well screen. The annulus was then bentonited to a depth of approximately 16 feet below grade. The remaining portion of the boring was cemented with a 5% bentonite/cement grout to the surface. The well was then completed with a flush-mounted steel monument. The sparge well was located approximately 12 feet west of RW-1 and 24 feet west of MW-4. Well location was selected in order to allow monitoring of two down-gradient wells and utilization of well RW-1 as a vapor recovery well during the sparging pilot test.

7.1 Sparge Test Procedures

The test was conducted on sparge well SW-1 utilizing the following configuration: A Sullair 185Q air compressor was utilized to inject an air stream through a sparging regulator before introduction of the air to the sparging well. The sparging regulator consisted of a flow meter, pressure meter and a filter to remove any errant hydrocarbons which may be produced by the compressor. A vacuum was also applied to recovery well RW-1 located approximately 12 feet northeast of the sparge well. A vacuum was induced utilizing a Rotron DR 707 regenerative blower with a maximum flow rate of 280 cfm. All power was supplied to the test equipment by a Deno Power MQ 3-phase generator.

A Perstorp Analytical Water Analyzer Model 51500 dissolved oxygen meter was used to determine dissolved oxygen (D.O.) concentrations in the monitoring wells during the sparging pilot test. The dissolved oxygen measurements were collected by lowering the D.O. probe into the well and obtaining direct measurements without having to remove water from the well. Measurements were collected approximately one foot below the water interface and five feet below the water interface within the hydrocarbon smear zone. Temperature, conductivity and pH of the in-situ groundwater were also recorded utilizing the probe. Dissolved oxygen concentrations were typically measured every 60 to 120 minutes and were collected until the termination of the test. Groundwater measurements were also obtained periodically utilizing a Flexidip interface probe which is capable of detecting both water and liquid phase hydrocarbons. Wells RW-1, MW-4, MW-7, MW-1, MW-5 and MW-10 were monitored during the test.

During the pilot test, off-gas from the vapor extraction test well (RW-1) was monitored to determine volatile aromatic hydrocarbon concentrations in the off-gas. Measurements were typically collected every 60 minutes with an OVM. A vapor sample was also collected at the initiation and termination of the sparging pilot test for laboratory analysis. Vapor samples were collected in Summa® canisters and sent to Performance Analytical, Inc. in Canoga Park, California.

7.2 Interpretation of Sparge Test Data

Prior to the pilot test system start up, background measurements for dissolved oxygen, pH, conductivity, and temperature were obtained from relevant site monitoring wells and results are presented in Table 7. Measurements were obtained from both intervals located 1 foot and 5 feet below the groundwater interface. Groundwater samples were also collected from monitoring wells SW-1, RW-1, MW-4 and MW-7 prior to the test and after completion of the sparge test. Samples from these wells were analyzed for WTPH-G/BTEX and dissolved metals lead (Pb), iron (Fe), calcium (Ca), magnesium (Mg), manganese (Mn), arsenic (As), chromium (Cr) and zinc (Zn). Monitoring well MW-4's (pretest sample) sample container cap broke during shipping, therefore, no dissolved metals were run for this sample. However, enough preserved sample was received by the laboratory to complete a total metals analysis. Therefore, both samples from MW-4 were analyzed for total metals. Groundwater samples collected before (4/19/95) and after (4/20/95) the sparging test were analyzed. A summary of analytical testing for these four wells is presented in Table 8. A compilation of all laboratory and field data collected throughout the sparge pilot test is presented in Appendices E and F.

During the test, dissolved oxygen concentrations were monitored in RW-1, MW-4, MW-7, MW-5 and MW-1 at depths of 1 foot and 5 feet below the groundwater interface. Data gathered during the test is presented graphically in Figure 9. During the test a noticeable increase in the dissolved oxygen content occurred in wells RW-1, MW-4 and MW-1. Although slight variations in dissolved oxygen concentrations were noted in the remaining site wells, fluctuations may have been a result of normal oxygen fluctuations characteristic to the aquifer. Groundwater temperatures were also measured within the observation wells. An average water temperature of approximately 61 degrees Fahrenheit (16 degree Celsius) was observed. At this temperature, the groundwater will become saturated with oxygen at about 10 mg/l. As shown on Figure 9, dissolved oxygen in RW-1 achieved saturation within approximately 30 minutes of the initiation of sparging activities. MW-4 achieved saturation approximately 45 minutes into the test and MW-1 approximately 60 minutes into the test. Based on this data, an effective radius of sparging influence of approximately 24 feet was interpreted for the test configuration. However, a radius of influence up to 52 feet may occur. Based on our past experience, typical sparging radii of influence (as measured by dissolved oxygen readings) is 10 to 20 feet in similar porous soils as those found beneath the site.

Interpretation of dissolved oxygen readings determined that time to dissolved oxygen saturation in the groundwater beneath the site within a fifty foot radius of the air injection point will occur within two hours after the initiation of the sparging activities. It appears that wells outside this radius will not achieve saturation as exhibited by the 24-hour sparge pilot test completed at the site. In our opinion, the increased radius (greater than 50 feet) of dissolved oxygen in the porous medium is unusual. Dissolved oxygen may be migrating along the bottom of the less permeable submerged smear zone. Once the hydrocarbons are removed from this zone, the radius may decrease as the smear zone becomes more permeable. Therefore, for the purpose of this study and the assumption that the smear zone will become more permeable as the hydrocarbons are remediated (either by stripping or remobilization), an effective dissolved oxygen radius of influence of 24 feet is utilized for remedial design. In our opinion, once a sparging pilot system has been installed at the subject site, a re-evaluation of the dissolved oxygen radius of influence should be conducted in one to two years.

During the duration of the test, monitoring of conductivity within the water column exhibited a general decrease in readings. The slight decrease in conductivity may be a result of a small amount of

dissolved metals precipitating from the water column or a result in the change to a more oxidized environment. Analytical testing of metals exhibited a minimal decrease in dissolved metal concentrations. Therefore, in our opinion, fouling of the sparge well sand packs and screens due to metal precipitation should not inhibit remediation activities. Conductivity trends, as measured throughout the sparging test, are presented in Figure 10. Measured pH was also recorded for each well throughout the test. Results are presented graphically in Figure 11. The slight increase in pH detected within the wells is primarily a result of decreased dissolved CO_2 within the water column. The air sparging activity creates the CO_2 gas from the oxidation of the hydrocarbons and forces the gas through the water column into the vadose zone, effectively increasing the pH values.

Sparging within the porous sand and gravel aquifer located beneath the site creates air channels within the groundwater. At the initiation of sparging the air channels begin to displace the groundwater within the pore space. A mounding within the groundwater appears due to this displacement. As the air channels connect through the pore space, they eventually breakthrough the groundwater interface and the channel emits the pressurized air directly to the vadose zone. After a period of time the mounding of the groundwater table will eventually stabilize. The air channels which are formed through the soil and water medium take the least resistant path. As these channels pass by hydrocarbon smeared soil particles, they will effectively strip the hydrocarbons from the submerged soil particles. This portion of the air sparging process coupled with the dissolved oxygen within the water column breaks down the hydrocarbons. To more effectively remediate the groundwater and allow the air channels to form in different areas, the air sparging system can be pulsed. By shutting down the air injection point, the air channels will collapse and cause water to rush into the channel. This effectively moves the groundwater around to allow a greater area to be effected by the air column. Also, by creating vacuums in adjacent vapor extraction wells, and operating these in different configurations, the air sparging channels will tend to form in different areas by preferentially flowing to the groundwater interface with the least applied pressure. This configuration and the pulsing of the sparging units will allow a greater area of the water column to be addressed by the dissolved oxygen and allow a greater area of the submerged smear zone to be stripped from the air channels.

7.3 Stack Off-Gas Monitoring and Analytical Results

Throughout the in-situ air sparging test, off-gas emissions from the vapor extraction well (RW-1) were monitored approximately every 60 minutes. Collected measurements of off-gas concentrations are presented on Table 9. Throughout the test a general decrease in off-gas concentrations were noted. Figure 12 graphically presents the off-gas concentrations as measured with a Model B OVM versus the time the sparging test was conducted. A sample of the off-gas was collected at the initiation of the test (ST-1). Samples were collected utilizing Summa® canisters and submitted to Performance Analytical, Inc. for testing of non-methane hydrocarbons by Method TO-14. Analytical results from sample ST-1 exhibit high concentrations of light and heavy end compounds in the gasoline range. However, a noticeable decrease in the amount of volatiles being removed was noticed at the termination of the sparge test, as evidenced in the sample results from vapor sample ST-2.

The decrease in volatile organic compounds between the two vapor samples could be attributed to the following possibility. At the beginning of the test, the vacuum applied in RW-1 likely removed volatile compounds from the vadose zone soils in the vicinity of the former tank area and from the petroleum hydrocarbons released from the submerged smear zone soils in the vicinity of the sparge

well. As the sparge/vacuum test continued, the lighter end hydrocarbons contained within the vadose zone soils likely had been mobilized and removed through the vapor extraction process. The remaining hydrocarbons (as observed in the sample results from ST-2) consisted primarily of heavier end hydrocarbons, which do not mobilize as readily as the lighter hydrocarbons. In addition, the amount of air flow introduced into the sparge well may have been too great, causing a significant amount of the introduced air to migrate in a near vertical direction upon exiting the screened interval of the sparge well. As the test progressed, most of the petroleum hydrocarbons within the smear zone soils near the sparge well likely had been mobilized out of the subsurface formation. This potentially manifested into creation of a preferential path for clean (non-petroleum hydrocarbon laden) air from the sparge well towards the vapor extraction well (RW-1), thus diluting the vapor stream entering the vapor extraction well.

The latter portion of this justification can be supported by the fact that positive pressure was observed in MW-4 (located approximately 24 feet from the sparge well) during the test indicating that excess air was being introduced into the sparge well. Further, off-gas readings measured throughout the test (using an OVM), decreased in RW-1 while they increased and eventually remained constant in MW-4 over the same time period indicating that the air flow to RW-1 was possibly diluted by clean air.

7.4 Analytical Test Results for Groundwater

Samples of groundwater from SW-1 (sparge well), RW-1 (vapor extraction well), MW-4 and MW-7 were collected prior to the in-situ air sparging test on 19 April 1995 and after completion of sparging on 20 April 1995. Groundwater samples were collected from the upper 3 feet of the water column in each of the wells. Wells were not purged prior to sampling. Samples were immediately transferred to a chilled cooler and transported to NET laboratory under AEE chain-of-custody procedures. Analytical test results for samples taken before and after the sparge test are presented in Table 8. Laboratory test certificates for this phase of sampling are presented in Appendix E.

7.4.1 Petroleum Hydrocarbons

Samples collected from the sparging well SW-1 and observation well MW-4 exhibited an increase in gasoline range hydrocarbons as a result of the sparging process. The aromatic hydrocarbons BTEX in MW-4 increased as did ethylbenzene and xylenes in SW-1. In SW-1 the constituents ethylbenzene and xylene increased 89 to 98 percent while benzene and toluene remained non-detectable. Figure 13 presents a bar graph of the change in aromatic hydrocarbons in SW-1 over the coarse of the pilot test; GRPH increased 91%. An increase of 40 to 75% was observed in the BTEX constituents of MW-4; GRPH increased 64%. Figure 14 presents a bar graph detailing the BTEX analytical test results.

The increase in hydrocarbon concentrations observed in well SW-1 and MW-4 may be a result of the remobilization of petroleum hydrocarbons located within the submerged smear zone located approximately 5 to 10 feet below the water interface into the upper portion of the aquifer where sample collection occurs. It appears the sparging process is able to penetrate through this submerged zone and free up the hydrocarbons where they can be addressed by the dissolved oxygen and/or vapor extraction within the upper portion of the aquifer. Increases in petroleum hydrocarbons in SW-1 (sparge well) may be a result of circulation of the impacted groundwater

towards the sparge well screen. Once termination of sparging occurred, the impacted groundwater containing dissolved phase hydrocarbons may have entered the sparge screen during recharge of the depressed water column in the well.

The vapor extraction well (RW-1) exhibited a decrease in most volatile aromatic hydrocarbons as a result of the sparging and vapor extraction processes. In well RW-1 the constituents toluene, ethylbenzene and xylenes decreased 43 to 66% while benzene increased 7%. Figure 15 presents a bar graph of the analytical testing of the groundwater samples collected from RW-1. Gasoline range hydrocarbons also decreased approximately 37% in RW-1. It is interpreted that the decrease in the dissolved phase hydrocarbons in well RW-1 may be a direct result of the vacuum applied to this well. Although off-gas measurements declined throughout the sparge test, excessive air introduced from the sparge well was likely allowing breakdown of the hydrocarbons. Further groundwater remediation during the test was likely a direct result of vapor extraction.

Groundwater samples collected from MW-7 exhibited no general decrease or increase. Variations in the test results appear to be within analytical variations. Therefore, in our opinion, monitoring well MW-7 was outside the effective air sparging radius of influence generated from the pilot test. Monitoring well MW-7 is located approximately 137 feet downgradient of the sparging point.

Analytical test results of samples taken prior to and after the in-situ air sparging test indicate in-situ sparging is generally effective at removing and transporting the volatile aromatic hydrocarbons from the submerged smear zone located beneath the subject site. Although a pronounced increase in BTEX and TPH was observed in wells SW-1 and MW-4, in our opinion, this is evidence of the mobilization of the hydrocarbons. A general decrease in BTEX and TPH was observed in RW-1, the well which had an applied vacuum. The decrease in the hydrocarbon concentrations indicate that a series of vapor extraction wells are required in the vicinity of the sparging wells in order to allow further remediation once the hydrocarbons have been mobilized from the submerged smear zone. A minimum effective radius of sparging influence of 24 feet can be projected due to the obvious effects of the hydrocarbons in well MW-4 located 24 feet northeast of the sparging point. Although no samples were collected from MW-1, located approximately 54 feet west of the sparge well (upgradient) and MW-5 located 88 feet southeast of the sparge well (cross-gradient), some minimal effects of D.O., conductivity and pH indicative of sparging were observed during the pilot test. Therefore, a radius of influence which extends to these distances in regards to the gradient may be assumed, although the changes in D.O. observed in wells MW-1 and MW-5 may not effectively remediate subsurface soils in these areas.

7.4.2 Dissolved Metals

Groundwater samples collected from SW-1, RW-1, MW-4 and MW-7 were analyzed for the dissolved metals As, Ca, Cr, Fe, Pb, Mg, Mn and Zn. Monitoring well MW-4 pre-test and post-test samples were only analyzed for total metals. No noticeable increase or decrease in metal concentrations were observed in the groundwater samples as a result of the sparging process. Calcium concentrations were the most prevalent, most likely a result of slight caliche cementation found throughout sediments in the Richland area. Magnesium concentrations were also detected in groundwater samples as were low levels of iron and zinc. These metals likely are a result of the abundant basalt found in the Columbia Plateau. It appears that dissolved metals in solution are minimal and are not oxidizing and precipitating out of the groundwater. Therefore, fouling of the well screens and sand packs within the sparging wells does not appear to be a factor in the sparging system design.

8.0 VAPOR EXTRACTION TEST

Two pilot vacuum tests were conducted at the subject site utilizing the existing wells installed during the site assessment phase of the project. Monitoring wells RW-1 and MW-7 were utilized as extraction points. A Rotron Model 707 regenerative blower was connected to the extraction point and all site monitoring wells were monitored with magnehelic gauges in order to determine subsurface vacuum and radius of influence in the unsaturated soils. Table 10 presents the measurements collected for each test and calculated parameters used in the analysis. During each test, off-gas measurements were monitored with an OVM. Table 11 presents the off-gas measurements recorded during the 2 hour test conducted on RW-1 and the one hour test conducted on MW-7. An applied vacuum of approximately 41 inches of water (IOW) could be sustained on the RW-1 test. However, due to the siltier nature of the soils in the vicinity of MW-7, a higher vacuum (54 IOW) was applied when the closed system was connected to the well. This vacuum resulted in moisture being transported up the well and into the system (groundwater is at approximately 9 feet bgs). Therefore, the system was diluted at the knockout tank and an applied vacuum of 40 IOW sustained for the one hour test.

Measurements collected during the pilot vacuum tests on site monitoring wells (RW-1 and MW-7) were utilized to determine if vapor extraction is a feasible remediation method. A summary of data is presented in Table 10. Vacuum pressure measured at the point at which the vacuum is directly applied is designated P_o and vacuum influence measured in the surrounding observation wells is designated P. Figure 16 presents a semi-logarithmic data plot of the ratio P/P_o versus the distance to the observation well for the test conducted on RW-1. Figure 17 presents the data plots for the tests conducted on MW-7. The distance affected by 1 percent of the total vacuum is interpreted to be the effective radius of vacuum influence for accomplishing removal of volatiles from the subsurface. For this site, the effective vacuum radii of influence is approximately 40 feet for the test conducted on RW-1 and 43 feet for the test conducted on MW-7. Figure 18 presents the approximate radius of influence from each extraction point based on the vacuum applied to each well.

Vacuum measurements were also collected during the sparging pilot test. During this test a vacuum was applied to RW-1. Results reveal that the sparging system (as configured during the pilot test) does effect the vacuum radius of influence. Due to the injection of air near the vacuum port, vacuum is reduced thus minimizing the vacuum radius. Figure 19 presents a semi-logarithmic plot of data collected from site monitoring wells during the sparging pilot study. These results indicate that the eventual design of a remedial design may require a lower flow sparging system coupled with a higher vacuum from the VES. Well screens within the VES wells may be required to be screened at lower depths than the current configuration of RW-1 (ie. extraction wells only screened in the upper 5 feet immediately above the groundwater table). This would allow the movement of air to be directed to this immediate area, potentially removing more of the volatile aromatic hydrocarbons being volatilized by the sparging system.

8.1 Off-Gas Analytical Testing

One vapor sample of the off-gas was collected at the initiation and conclusion of each test (3 sets of samples). Samples were drawn into an evacuated 6.0-liter capacity, stainless steel, Summa® canister and submitted to Performance Analytical, Inc. of Canoga Park, California for analyses of hydrocarbon speciation (hydrocarbons from C_2 through C_{10}) and Total Non-Methane Hydrocarbons (TNMHC). All six vapor samples indicated the presence of hydrocarbons, particularly in the

weathered gasoline range. Sample ST-1, collected from RW-1 at the start of the sparging test, had the highest concentrations of most compounds and the highest TNMHC concentration. A dramatic decrease in TNMHC was exhibited throughout the four samples collected from RW-1. ST-1 was collected at the start of the sparge test, ST-2 at the conclusion of the sparge test, VTRW-1A collected at the initiation of the independent vacuum test on RW-1 (conducted several hours after the completion of the sparge test) and VTRW-1B collected at the end of the 2-hour vacuum test on RW-1. The large decrease in VTRW-1B may be attributed to the fact that no more hydrocarbons were being volatilized by the sparging operation. Samples VTMW-7A and VTMW-7B were collected at the beginning and end of the one hour test conducted on MW-7 located on the lower plateau by the park. This area is unpaved and groundwater is located approximately 9 feet below the ground surface. The hydrocarbons removed from this well were relatively low compared to the RW-1 samples. However, this well is approximately 190 feet downgradient of the former tank pit. The test on MW-7 did remove some volatile aromatic hydrocarbons from the subsurface. Table 12 presents the results of these analyses conducted on vapor samples from the vacuum tests.

Results of the analytical testing of the off-gas collected during the pilot test and calculated emissions in pounds per day (ppd) for the aromatic hydrocarbons BTEX are presented in Table 13. As evident in samples collected from RW-1 during sparging and after cessation of the sparging, hydrocarbons can effectively be removed from the subsurface soils beneath the subject site. Laboratory certificates for analytical testing of off-gas samples are presented in Appendix G.

Laboratory Duplicate and Laboratory Blank Samples were run on the six vapor samples submitted for analysis. Results of the duplicate sample were within the acceptance level. Results of the method blank were all non-detected.

8.2 Groundwater Sample - MW-7

An additional groundwater sample was collected from MW-7 after completion of the vacuum test in order to determine if vapor extraction can successfully remove dissolved phase hydrocarbons from the groundwater interface. Results of this sample (MW-7VT) are presented in Table 8. A slight decrease in the TPH and BTEX concentrations were observed from sampling before and after the vacuum test. In our opinion, the applied vacuum to the water table, coupled with the sparging activities of nearby wells, will effectively remove hydrocarbons from the groundwater and vadose zone soils.

9.0 INVESTIGATION DERIVED WASTES

During drilling, well development, and groundwater sampling activities, a total of twenty-one 55-gallon drums of soil cuttings, and twelve 55-gallon drums of decontamination, development and purge water were generated. All drums were stored behind the retail building in the northeast area of the Jackpot Foodmart property.

9.1 Soil Cuttings

Based upon the results of the soil sample analyses, some soil cuttings contained concentrations of petroleum hydrocarbons above the soil cleanup levels. Although most soil samples did not exhibit elevated hydrocarbon concentrations, groundwater in the explorations was above cleanup criteria. Much of the soils were contained and mixed with groundwater due to the air rotary drilling process. Soils from previous investigations were stockpiled on the adjacent vacant lot owned by Time Oil Co. On 18 and 19 April 1995, representatives from AEE graded an area on this vacant lot for stockpiling

of the drill cuttings generated from the exploratory drilling in March 1995. Before emptying the 55-gallon barrels, all water contained within the soil drums was removed and cleaned with the purge water as discussed below. An 8-mil thick visqueen sheet was placed on the ground surface and soil cuttings were emptied from the drums and stockpiled on the visqueen. Approximately 5 cubic yards of soil was stockpiled. A visqueen layer was then placed over the stockpile and secured to prevent rain water from seeping into the pile.

9.2 Purge, Development and Decontamination Water

Based upon the results of the groundwater sample analyses, some drums contained water with significant concentrations of petroleum hydrocarbons. Therefore, all development, purge, and decontamination water was cleaned utilizing granular activated carbon units. Water was pumped from the drums and through a WSU-55 carbon scrub unit. After cleaning, water was collected into a 600 gallon holding tank before discharge took place.

A composite sample of the filtered water was collected on 18 April 1995 and sent to North Creek Analytical laboratory in Spokane, Washington for analytical testing of GRPH/BTEX, DRPH and pH. Analytical results for GRPH/BTEX and DRPH were all below method detection limits. A pH result of 6.10 was reported for the discharge sample. Laboratory test certificates for the discharge sample is presented in Appendix H. Over 300 gallons of barreled water, as measured using a flowmeter, was filtered through the GAC unit and utilized for irrigation purposes at the subject site. All empty drums were transported to the Time Oil storage facility in Yakima located on North Sixth Avenue.

10.0 CONCLUSIONS

Native soils at the site consist of a dense, dry to damp, brown, gravelly SAND (fill) to a depth of approximately 3 feet over a dense to very dense, dry to moist, brown sandy SILT to a silty medium SAND to a depth of approximately 10 feet. Below the sand and silts, a very dense sandy GRAVEL with cobbles which grades down to a gravelly SAND was encountered to the full depths explored (approximately 45 feet). Exploration SW-1 encountered some large cobbles and boulders at a depth of 48 feet. MW-9 also encountered a silt and clay layer from approximately 42.5 to 45.5 feet below site grade. An noticeable hydrocarbon impacted smear zone which appears to emanate from the former tank pit was identified in several of the borings. The smear zone trends east-northeast of the subject site and had been identified across the park in MW-10 located approximately 400 feet east of the former tank pit. The smear zone is approximately five feet thick and was consistently identified between approximately 5 and 10 feet below the existing groundwater interface. Due to the submerged nature of the smear zone, it is apparent that groundwater elevations have risen since release and transport of the petroleum hydrocarbons from the former tank pit location. The smear zone was also identified in exploration MW-11 located west of the site across George Washington Way. The identification of the smear zone in this boring indicates that groundwater gradient at one time may have been to the west.

The apparent change in groundwater flow could have been a direct result of the Wellsian Well Field which was operated by the city of Richland as a drinking water supply. The well field has several wells screened in the unconsolidated sands and gravels which removed several thousand gallons per minute from the aquifer. Chlorinated solvents were detected within these wells in the early 1990's at which time the wells were shut down. It appears since discontinuation of pumping from the well field, groundwater gradient has once again changed to its natural course towards the Columbia River. Low levels of TCE and PCE have been detected in site monitoring wells. The

presence of these solvents in the aquifer could be a result of the well field. The well field drew the PCE/TCE towards the wells across the natural gradient. Once pumping ceased, groundwater migration likely returned to its natural course potentially allowing TCE and PCE to migrate towards the subject site. However, contribution from other nearby potential sources of solvent impacts can not be dismissed.

Groundwater at the site was encountered at depths ranging from 27.2 to 28.5 feet below the elevated grade and 9.6 feet to 11.7 feet below grade by the park (approximate elevation of 345 to 346 feet above sea level), and is interpreted to generally flow towards the north-northeast at a gradient of 0.00125 (on 4 April 1995) to 0.0016 ft/ft (on 19 April 1995). Groundwater flow direction as determined two weeks after well installation (19 April 1995) had risen approximately 0.1 feet from our 4 April 1995 site visit. Measurements were again collected on 18 May 1995. Groundwater elevations during this site visit had risen approximately 0.2 feet from our 19 April 1995 site visit. Groundwater migration maintained a north-northeasterly direction under an apparent hydraulic gradient of 0.0013 ft/ft. Groundwater gradient beneath the subject site appears to change seasonally due to water level fluctuations of Lake Wallula (Columbia River) located immediately east of the site and probably a direct result of discharge quantities in the Yakima River located southwest of the subject property.

Results of soil sample testing for chemical analysis indicated only one of the twelve soil samples submitted contained detectable concentrations of GRPH above soil cleanup levels, (sample RW-1 S-2). Aromatic hydrocarbons (BTEX) were also not detected above soil cleanup levels in any of the soils tested except RW-1 S-2.

A preliminary groundwater sampling event occurred at the subject site on 1 February 1995 on the six existing site monitoring wells installed during previous site investigations. Detectable concentrations of GRPH and/or the aromatic hydrocarbons BTEX were found in groundwater samples MW-1, MW-2, MW-3, MW-4 and VW-1. Detectable levels of DRPH were also identified in samples MW-1, MW-2, MW-4 and VW-1. However, samples which contained detectable diesel range hydrocarbons (C_{12}-C_{24}) were flagged by the laboratory as hydrocarbons which appeared to extend to a lighter hydrocarbon range than diesel (ie. it appears to be heavily weathered gasoline). TCE and PCE were also identified in wells MW-1, MW-2, MW-5 and VW-1. However, all TCE and PCE concentrations were below the groundwater cleanup levels of 5.0 ppb.

A second groundwater sampling event occurred after installation of the additional site monitoring wells on 4 April 1995. GRPH above groundwater cleanup levels for purgeable and aromatic hydrocarbons were identified in MW-1, MW-2, MW-4, MW-7, MW-10, MW-11 and RW-1. Samples from monitoring wells MW-1, MW-4, MW-7 and RW-1 also exhibited DRPH above 1,000 ppb. TCE and/or PCE were identified in samples collected from MW-3, MW-6, MW-8, MW-9 and MW-11. However, several sample detection limits were 5.0 ppb. No samples submitted contained TCE or PCE concentrations above the groundwater cleanup levels of 5.0 ppb.

A 24-hour in-situ air sparging pilot test was also conducted at the subject site utilizing a pre-installed 2-inch air sparging well (SW-1) which was constructed with 5 foot of screen located 17 to 22 feet below the groundwater interface. During the sparge test, a vacuum was applied to RW-1 and the off-gas monitored. Based on the results of the air sparing pilot test, remediation of groundwater at the site via an in-situ air sparging coupled with vapor extraction is a feasible remedial alternative. The pilot test conducted for this study reveals a minimum effective radius of influence of at least 24

feet for injection of oxygen into the groundwater. A radius of influence may be as large as 50 feet for introduction of dissolved oxygen into the aquifer. Figure 20 presents a semi-logarithmic plot of change in dissolved oxygen by the log distance. Change in dissolved oxygen is recorded from an average background to the maximum concentration measured during the test. An average background reading of 3 ppm was determined for the aquifer beneath the site. A line was drawn on the plot to determine the theoretical zero point - the point where no dissolved oxygen is being introduced to the aquifer from the sparging point. As shown on Figure 20, the theoretical zero point for the aquifer below the subject site is approximately 73 feet.

Analytical testing of groundwater samples collected before and after the sparging test indicate a general increase in dissolved phase hydrocarbons in wells which did not have an applied vacuum. In our opinion, the increase of dissolved hydrocarbons is representative of the air stream mobilizing and/or volatilizing adhered hydrocarbons located within the smear zone located 5 to 10 feet below the groundwater interface. In well RW-1, which had an applied vacuum during the test, dissolved hydrocarbon concentration decreased through the duration of the test. Therefore, it is apparent that the applied vacuum aids in the further removal of hydrocarbons which have been mobilized by the air sparging activities from the groundwater interface.

Dissolved metals were analyzed in monitoring wells immediately effected by the sparging activities. Results of metal analyses indicate that dissolved metals are not prevalent in the aquifer located below the subject site. Detectable levels of dissolved metals were within laboratory variation and, in our opinion, will not effect the sparging process by allowing metals to precipitate from solution thus causing fouling of the sparging screens and sand pack.

Vapor extraction tests conducted on the existing site monitoring wells (RW-1 and MW-7) indicate that high levels of hydrocarbons can be removed from the subsurface using this technology in the immediate vicinity of the sparging wells and in the general vicinity of the former tanks. The vacuum test conducted on MW-7 located approximately 190 feet east of the former tank pit, removed low levels of hydrocarbons. However, the vacuum test conducted on this well did decrease hydrocarbon concentrations in the groundwater as represented from water samples collected before and after the vacuum test. Preliminary analysis suggests a maximum radius of influence of 40 to 43 feet within the vadose zone soils. Interpretation of data from the vapor extraction tests indicates that a vapor extraction system may be a feasible remediation alternative for vadose zone soils and/or groundwater.

Interpretation of both remedial technologies indicate that site remediation in areas impacted with petroleum hydrocarbons within submerged soils may be most feasible by coupling air sparging with vapor extraction, whereas areas impacted with petroleum hydrocarbons in vadose zone soils only would best be remediated using vapor extraction.

11.0 CLOSURE

Information contained in this report is based upon site characterization, field observations, and the laboratory analyses accomplished for this study. Conclusions presented are professional opinions based upon our interpretation of the analytical laboratory test results, as well as our experience and observations during the project field characterizations. The number, locations, and depth of exploration during the characterization program, including the analytical testing scope, were completed within the site and proposal constraints so as to yield the information utilized to formulate our conclusions.

We appreciate being of continued service to Time Oil Co. If you have any questions regarding this report, please do not hesitate to call us at your earliest convenience.

Respectfully submitted,
AGRA Earth & Environmental, Inc.

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TABLE 1 - SUMMARY OF FIELD OVM READINGS
RICHLAND JACKPOT (TIME OIL PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

BORING NUMBER	SAMPLE NUMBER				
	S-1	S-2	S-3	S-4	S-5
MW-6	0.0	0.0	0.0	--	--
MW-7	0.0	0.0	13.7	--	--
MW-8	0.0	1.9	0.0	--	--
MW-9	0.0	29.0	0.0	0.0	0.0
MW-10	0.0	0.0	76.4	--	--
MW-11	0.0	0.0	0.0	0.0	631.0
RW-1	0.0	862.0	--	--	--

All results in parts per million (ppm).
Shaded samples submitted for laboratory analytical testing.

TABLE 2 - SUMMARY OF FLUID LEVEL MEASUREMENTS

RICHLAND JACKPOT (PROPERTY 01-056)

500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	DATE MEASURED	CASING ELEVATION (feet)	DEPTH TO PRODUCT (feet)	DEPTH TO GROUNDWATER (feet)	GROUNDWATER ELEVATION (feet)	ELEVATION DIFFERENCE (feet)
MW-1	1 Feb 95	371.15	0.00	28.16	342.99	--
MW-2	1 Feb 95	371.23	0.00	28.13	343.10	--
MW-3	1 Feb 95	370.66	0.00	28.88	341.78	--
MW-4	1 Feb 95	370.95	0.00	28.50	342.45	--
MW-5	1 Feb 95	370.87	0.00	28.51	342.36	--
VW-1	1 Feb 95	370.97	0.00	28.40	342.57	--
MW-1	4 Apr 95	373.88	0.00	27.97	345.91	2.92
MW-2	4 Apr 95	373.80	0.00	27.95	345.85	2.75
MW-3	4 Apr 95	374.40	0.00	28.69	345.71	3.93
MW-4	4 Apr 95	374.10	0.00	28.32	345.78	3.33
MW-5	4 Apr 95	374.17	0.00	28.28	345.89	3.53
MW-6	4 Apr 95	354.52	0.00	8.68	345.84	--
MW-7	4 Apr 95	355.82	0.00	10.10	345.72	--
MW-8	4 Apr 95	356.54	0.00	10.95	345.59	--
MW-9	4 Apr 95	373.57	0.00	28.03	345.54	--
MW-10	4 Apr 95	353.83	0.00	8.36	345.47	--
MW-11	4 Apr 95	372.96	0.00	26.86	346.10	--
VW-1	4 Apr 95	374.06	0.00	28.18	345.88	3.31
RW-1	4 Apr 95	374.08	0.00	28.26	345.82	--
SW-1	4 Apr 95	374.15	0.00	28.29	345.86	--
MW-1	19 Apr 95	373.88	0.00	27.87	346.01	0.10
MW-2	19 Apr 95	373.80	0.00	27.77	346.03	0.18
MW-3	19 Apr 95	374.40	0.00	28.59	345.81	0.10
MW-4	19 Apr 95	374.10	0.00	28.23	345.87	0.09
MW-5	19 Apr 95	374.17	0.00	28.19	345.98	0.09
MW-6	19 Apr 95	354.52	0.00	8.60	345.92	0.08
MW-7	19 Apr 95	355.82	0.00	10.01	345.81	0.09
MW-8	19 Apr 95	356.54	0.00	10.86	345.68	0.09
MW-9	19 Apr 95	373.57	0.00	27.93	345.64	0.10
MW-10	19 Apr 95	353.83	0.00	8.26	345.57	0.10
MW-11	19 Apr 95	372.96	0.00	26.77	346.19	0.09
VW-1	19 Apr 95	374.06	0.00	28.10	345.96	0.08
RW-1	19 Apr 95	374.08	0.00	28.16	345.92	0.10
SW-1	19 Apr 95	374.15	0.00	28.22	345.93	0.07

All measurements listed in feet.

All elevations based upon City of Richland datum. Benchmark is located at the intersection of George Washington Way and Lee Boulevard (Elevation 372.49).

Site was resurveyed by Bob Stratton Surveyors on 4 April 1995.

ELEVATION DIFFERENCE - Indicates change in groundwater elevation from previous measurement.

TABLE 2 - SUMMARY OF FLUID LEVEL MEASUREMENTS

RICHLAND JACKPOT (PROPERTY 01-056)

500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	DATE MEASURED	CASING ELEVATION (feet)	DEPTH TO PRODUCT (feet)	DEPTH TO GROUNDWATER (feet)	GROUNDWATER ELEVATION (feet)	ELEVATION DIFFERENCE (feet)
MW-1	18 May 95	373.88	0.00	27.65	346.23	0.22
MW-2	18 May 95	373.80	0.00	27.65	346.15	0.12
MW-3	18 May 95	374.40	0.00	28.36	346.04	0.23
MW-4	18 May 95	374.10	0.00	28.00	346.10	0.23
MW-5	18 May 95	374.17	0.00	27.96	346.21	0.23
MW-6	18 May 95	354.52	0.00	8.36	346.16	0.24
MW-7	18 May 95	355.82	0.00	9.78	346.04	0.23
MW-8	18 May 95	356.54	0.00	10.60	345.94	0.26
MW-9	18 May 95	373.57	0.00	27.70	345.87	0.23
MW-10	18 May 95	353.83	0.00	7.99	345.84	0.27
MW-11	18 May 95	372.96	0.00	26.56	346.40	0.21
VW-1	18 May 95	374.06	0.00	27.86	346.20	0.24
RW-1	18 May 95	374.08	0.00	27.94	346.14	0.22
SW-1	18 May 95	374.15	0.00	27.98	346.17	0.24

All measurements listed in feet.

All elevations based upon City of Richland datum. Benchmark is located at the intersection of George Washington Way and Lee Boulevard (Elevation 372.49).

Site was resurveyed by Bob Stratton Surveyors on 4 April 1995.

ELEVATION DIFFERENCE - Indicates change in groundwater elevation from previous measurement.

TABLE 3 - COLUMBIA RIVER SURFACE ELEVATIONS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	AVERAGE
JAN	340.06	339.92	340.26	340.44	341.15	NA	340.50	340.14	340.41	339.83	NA	340.30
FEB	340.58	339.83	339.79	339.80	341.05	340.93	NA	339.72	339.74	340.54	NA	340.22
MAR	340.40	339.81	339.47	339.88	341.05	340.76	339.88	339.80	339.73	341.85	NA	340.26
APR		339.90	339.48	339.96	342.11	340.68	340.14	339.81	340.54	341.25	NA	340.43
MAY		340.90	341.32	340.91	341.99	341.11	340.78	340.34	341.48	340.97	NA	341.09
JUN		340.89	340.59	340.60	342.07	343.80	340.19	340.02	340.03	340.61	NA	340.98
JUL		340.27	340.29	340.03	341.50	341.21	339.12	340.02	339.89	340.04	NA	340.26
AUG		339.39	339.32	339.42	340.47	340.38	339.29	339.77	339.47	339.44	NA	339.66
SEP		339.39	338.81	339.40	339.49	339.40	339.62	339.84	339.59	339.08	NA	339.40
OCT		339.13	338.28	339.63	340.05	339.64	339.69	339.78	340.05	339.68	340.36	339.63
NOV		339.95	339.74	340.13	340.18	340.82	340.17	340.25	340.05	340.22	340.52	340.20
DEC		339.61	339.97	340.51	340.27	341.42	NA	340.62	340.42	340.45	340.47	340.42
AVERAGE	340.35	339.92	339.78	340.06	340.95	340.92	339.94	340.01	340.12	340.33	340.45	340.26

Mean monthly elevation (Feet NGVD).
Elevations measured at USGS Gauging Station 12473520 - Richland, Washington located approximately 3.0 river miles upstream of the project site.
NA - Information Not Available.

TABLE 4 - YAKIMA RIVER DISCHARGE DATA
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

	1995	1994	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	AVERAGE
JAN	3578	2156	1833	2453	4044	3369	2446	1953	2013	2474	2002		2575
FEB	10680	1878	2211	3972	6984	3155	2157	2482	2633	4445	2431		3912
MAR	7414	2629	3705	4124	4263	3203	3166	2118	4885	9334	2637		4316
APR		2477	3760	2215	4192	4808	5534	3157	2912	3616	4154		3683
MAY		1479	2711	1752	3152	3110	3608	2215	3605	2182	2639		2645
JUN		869	1514	1167	3519	4696	1855	1792	1442	1747	2333		2093
JUL		598	1105	1169	1964	1385	1320	1172	1251	1475	1210		1265
AUG		755	1195	1101	1497	1960	1392	1282	1152	1290	1522		1315
SEP		856	1552	1442	1682	1833	1532	1562	1131	2099	2144		1583
OCT		1295	1588	1716	1740	2223	1916	1715	1493	NA	2435	2524	1612
NOV		2101	1497	1780	2468	5604	2546	2389	1462	2638	2764	2587	2295
DEC		3098	1824	1674	3092	7068	2789	2357	2224	2324	2028	2157	2589
AVERAGE	7224	1683	2041	2047	3216	3535	2522	2016	2184	3057	2358	2423	2657

Mean monthly discharge listed in cubic feet per minute (cfm).
Discharges measured at USGS Gauging Station 12510500 (Kiona, Washington), located approximately 30 miles upstream of the confluence of the Yakima and Columbia Rivers.

TABLE 5 - SUMMARY OF SOIL SAMPLING RESULTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

SAMPLE NUMBER	DATE SAMPLED	SAMPLE DEPTH (ft)	GRPH (mg/kg)	DRPH (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBENZENE (mg/kg)	XYLENES (mg/kg)
MW-6 S-2	21 Mar 95	9.2-10.7	<3.0	<17.0	<0.3	<0.3	<0.3	<0.3
MW-7 S-2	20 Mar 95	8.0-9.0	<3.0	<15.0	<0.3	<0.3	<0.3	<0.3
MW-7 S-3C	20 Mar 95	15.0-16.0	<3.0	<16.0	<0.3	<0.3	<0.3	<0.3
MW-8 S-2	21 Mar 95	9.0-10.4	<3.0	<16.0	<0.3	<0.3	<0.3	<0.3
MW-9 S-1	22 Mar 95	9.0-10.5	<3.0	<16.0	<0.3	<0.3	<0.3	<0.3
MW-9 S-3	22 Mar 95	27.0-28.5	<3.0	<16.0	<0.3	<0.3	<0.3	<0.3
MW-10 S-1	21 Mar 95	4.5-6.0	<4.0	<18.0	<0.4	<0.4	<0.4	<0.4
MW-10 S-2	21 Mar 95	10.0-12.0	<4.0	<18.0	<0.4	<0.4	<0.4	<0.4
MW-10 S-3	21 Mar 95	14.5-16.0	<3.0	<16.0	<0.3	<0.3	<0.3	<0.3
MW-11 S-2	22 Mar 95	19.0-20.0	<3.0	<15.0	<0.3	<0.3	<0.3	<0.3
MW-11 S-4	22 Mar 95	27.5-28.5	<3.0	<16.0	<0.3	<0.3	<0.3	<0.3
RW-1 S-2	23 Mar 95	33.0-34.5	2900	220	<22.0	<22.0	27.0	110.0
Soil Cleanup Criteria			100.0	200.0	0.5	40.0	20.0	20.0

GRPH Gasoline range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-G.
DRPH Diesel range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-D.
BTEX Benzene, toluene, ethylbenzene, and total xylenes as analyzed by EPA Method 8020.
mg/kg Milligrams per kilogram, or parts per million (ppm).
Indicates sample result equals or exceeds soil cleanup criteria.
Soil cleanup criteria are levels promulgated in WAC 173-340-740 (MTCA).

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TABLE 6 - SUMMARY OF GROUNDWATER SAMPLING RESULTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	DATE SAMPLED	GRPH (ppb)	DRPH (ppb)	HORPH (ppb)	BENZENE (ppb)	TOLUENE (ppb)	ETHYLBENZENE (ppb)	XYLENES (ppb)	TCE (ppb)	PCE (ppb)
MW-1	1 Feb 95	60000	1600	<750	39	680	430	3700	<1.0	<1.0
MW-2	1 Feb 95	15000	330	<750	<10	320	250	2600	1.2	1.6
MW-3	1 Feb 95	110	<250	<750	1.8	<0.5	2.0	<0.5	NT	NT
MW-4	1 Feb 95	10000	610	<750	38	28	300	560	NT	NT
MW-5	1 Feb 95	<50	<250	<750	<0.5	<0.5	<0.5	<0.5	1.4	<1.0
VW-1	1 Feb 95	16000	970	<750	15	13	400	1500	<1.0	<1.0
MW-16 (1)	1 Feb 95	10000	520	<750	28	28	260	900	NT	NT
MW-1	4 Apr 95	26000	1300	NT	53	650	430	3000	<5.0	<5.0
MW-2	4 Apr 95	14000	720	NT	12	390	260	2800	<5.0	<5.0
MW-3	3 Apr 95	780	<250	NT	6.7	2.9	30	4.4	1.2	<1.0
MW-4	3 Apr 95	25000	1100	NT	42	77	560	2400	<5.0	<5.0
MW-5	3 Apr 95	<50	<250	NT	<0.5	<0.5	<0.5	<0.5	<5.0	<5.0
MW-6	3 Apr 95	<50	<250	NT	<0.5	0.63	<0.5	0.95	<1.0	2.5
MW-7	3 Apr 95	36000	2000	NT	72	470	1400	5400	<5.0	<5.0
MW-8	3 Apr 95	<50	<250	NT	<0.5	<0.5	<0.5	<0.5	<1.0	2.7
MW-9	3 Apr 95	<50	<250	NT	<0.5	<0.5	<0.5	<0.5	<1.0	3.7
MW-10	3 Apr 95	20000	660	NT	57	94	620	1500	<5.0	<5.0
MW-11	4 Apr 95	7400	NT	NT	<0.5	2.4	4.4	15	<1.0	2.5
RW-1	4 Apr 95	44000	2700	NT	48	140	1200	6100	<5.0	<5.0
SW-1	4 Apr 95	710	<250	NT	<0.5	<0.5	0.82	11	<1.0	<1.0
MW-12 (2)	3 Apr 95	<50	NT	NT	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0
MW-13 (3)	4 Apr 95	45000	2700	NT	55	180	1400	7700	<5.0	<5.0
GW Cleanup Criteria		1000	1000	1000	5.0	40.0	30.0	20.0	5.0	5.0

GRPH Gasoline range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-G.
DRPH Diesel range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-D.
HORPH Heavy oils range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-D-Extended.
TCE Trichloroethene as analyzed by EPA Method 8260.
PCE Tetrachloroethene as analyzed by EPA Method 8260.
BTEX Benzene, toluene, ethylbenzene, and total xylenes as analyzed by EPA Method 8020.
ppb Parts per billion, or micrograms per liter (ug/L).
(1) MW-16 is a duplicate sample of MW-4.
(2) MW-12 is a rinsate sample of decontamination water.
(3) MW-13 is a duplicate sample of RW-1.
Indicates sample result equals or exceeds groundwater cleanup criteria.
GW (Groundwater) cleanup criteria are levels promulgated in WAC 173-340-720 (MTCA).

TABLE 7 - BACKGROUND MEASUREMENTS FOR ON-SITE MONITORING WELLS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL	WATER	DISSOLVED OXYGEN		CONDUCTIVITY		TEMPERATURE		pH	
NUMBER	LEVEL (ft)	1 FOOT	5 FEET	1 FOOT	5 FEET	1 FOOT	5 FEET	1 FOOT	5 FEET
SW-1	28.22	8.1	2.6	654	692	60.1	62.3	7.77	7.79
RW-1	28.16	3.1	5.2	570	591	62.0	62.3	7.44	7.45
MW-4	28.23	2.4	1.8	567	569	62.0	62.2	7.38	7.35
MW-7	10.01	2.1	1.1	533	527	61.0	61.7	7.25	7.24
MW-1	27.87	3.5	10.9	432	431	62.4	62.0	6.94	7.21
MW-5	28.19	2.3	1.0	490	487	61.2	61.7	7.26	7.24
MW-10	8.26	4.5	3.2	434	426	58.4	59.0	7.41	7.40

Measurements collected prior to sparge test (19 April 1995).

TABLE 8 - SUMMARY OF GROUNDWATER SAMPLING - SPARGE TEST

RICHLAND JACKPOT (PROPERTY 01-058)

500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	UNITS	SW-1	SW-1	RW-1	RW-1	MW-4	MW-4	MW-4	MW-7	MW-7	MW-7VT	GROUNDWATER
DATE SAMPLED		4/19/95	4/20/95	4/19/95	4/20/95	4/19/95	4/20/95	4/20/95	4/19/95	4/20/95	4/20/95	CLEANUP
TIME SAMPLED		0740	1220	0750	1310	0800	1155	1155	0805	1210	1440	CRITERIA
DISS.ARSENIC	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005*	<0.005	<0.005*	<0.005	<0.005	NT	0.005
DISS. CALCIUM	mg/L	51	66	55	46	64*	46	44*	54	53	NT	NA
DISS. CHROMIUM	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005*	<0.005	<0.005*	<0.005	<0.005	NT	0.050*
DISS. IRON	mg/L	0.012	0.013	0.089	0.019	3.2*	0.02	0.15*	0.098	0.03	NT	NA
DISS. LEAD	mg/L	<0.005	<0.005	<0.005	0.008	<0.005*	<0.005	<0.005*	<0.005	<0.005	NT	0.005
DISS.MAGNESIUM	mg/L	15	24	20	16	26*	16	15*	18	17	NT	NA
DISS. MANGANESE	mg/L	<0.240	0.44	0.56	0.46	0.55*	0.28	0.28*	0.88	0.88	NT	NA
DISS. ZINC	mg/L	0.024	0.024	0.05	0.048	0.014*	0.026	<0.005*	0.027	0.028	NT	NA
BENZENE	ug/L	<0.5	<0.5	56	59	22	37	37	89	96	66	5.0
TOLUENE	ug/L	<0.5	<0.5	86	83	13	33	33	590	650	550	40.0
ETHYLBENZENE	ug/L	<0.5	4.7	700	490	150	330	350	1900	1800	1900	30.0
XYLENES	ug/L	<0.5	25	4100	1400	810	1900	1900	8100	7900	7500	20.0
GRPH	ug/L	<50	580	36000	24000	7400	21000	21000	37000	56000	75000	1000.0

GRPH	Gasoline range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-G.
mg/l	Milligrams per liter or parts per million (ppm).
ug/L	Micrograms per liter or parts per billion (ppb).
*	Sample analyzed for total metals.
NT	Not tested.
NA	Not applicable.
	Shaded areas indicate results equals or exceeds groundwater cleanup criteria.

GW (Groundwater) cleanup criteria are levels promulated in WAC 173-340-720 Method A (MTCA).

Sparge test operated from 19 April 1995 (11:03 AM) to 20 April 1995 (11:03 AM)

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TABLE 9 - SUMMARY OF AIR SPARGING TEST VALUES AT SYSTEM RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

TIME (min)	SPARGE FLOW (cfm)	SPARGE PRESSURE (psi)	VACUUM AT RW-1 (IOW)	FLOW FROM RW-1 (cfm)	OVM AT STACK (ppm)
1	40	10	40	200	315
3	30	10	40	200	--
16	25	10	40	200	266
40	22	10	40	200	247
58	27	10	40	200	329
73	27	10	40	200	304
99	27	10	40	200	313
157	27	10	40	200	321
213	27	10	40	200	263
260	27	10	39	205	244
359	27	10	42	193	239
409	27	10	41	196	244
459	27	10	40	200	229
543	27	10	40	200	212
626	27	10	40	200	235
738	27	10	40	200	208
815	27	10	40	200	195
862	26	10	40	200	191
912	26	10	40	200	180
984	26	10	40	200	164
1082	27	10	40	200	164
1157	26	10	40	200	181
1207	26	10	40	200	155
1272	26	10	40	200	119
1372	27	10	40	200	108
1427	27	10	40	200	110

TABLE 10 - VACUUM EXTRACTION TEST DATA
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	Po (IOW)	P (IOW)	P/Po	DISTANCE (ft)	OVM (ppm)	A*
EXTRACTION POINT: RW-1						
RW-1	41.0	--	--	--	112	
MW-1	41.0	0.110	0.0027	65	--	-0.09111
MW-2	41.0	0.060	0.0015	124	--	-0.05266
MW-3	41.0	0.080	0.0020	108	--	-0.05777
MW-4	41.0	1.100	0.0268	14	--	-0.25845
MW-5	41.0	0.100	0.0024	90	--	-0.06694
VW-1	41.0	0.100	0.0024	83	--	-0.07248
MW-6	41.0	0.005	0.0001	150	--	-0.06019
MW-7	41.0	0.020	0.0005	128	--	-0.05954
MW-8	41.0	0.015	0.0004	168	--	-0.04704
MW-9	41.0	0.030	0.0007	190		-0.03801

WELL NUMBER	Po (IOW)	P (IOW)	P/Po	DISTANCE (ft)	OVM (ppm)	A*
EXTRACTION POINT: MW-7						
MW-7	41.0	--	--	--	4.3	
MW-3	41.0	0.000	0.0000	155	--	--
MW-4	41.0	0.010	0.0002	115	--	--
MW-5	41.0	0.000	0.0000	140	--	-0.07234
MW-6	41.0	0.120	0.0029	85	--	--
MW-8	41.0	0.060	0.0015	115	--	-0.06863
MW-9	41.0	0.000	0.0000	228		-0.05676
MW-10	41.0	0.000	0.0000	213		--

WELL NUMBER	Po (IOW)	P (IOW)	P/Po	DISTANCE (ft)	OVM (ppm)	A*
EXTRACTION POINT: RW-1 (DURING SPARGE PILOT TEST)						
RW-1	40.0	--	--	--	329	
MW-1	40.0	0.060	0.0015	65	--	-0.10004
MW-2	40.0	0.040	0.0010	124	--	-0.05571
MW-3	40.0	0.050	0.0013	108	--	-0.06189
MW-4	40.0	**	0.0000	14	1298	--
MW-5	40.0	0.050	0.0013	90	--	-0.07427
VW-1	40.0	0.060	0.0015	83	--	-0.07834
MW-6	40.0	0.000	0.0000	150	--	--
MW-7	40.0	0.015	0.0004	128	--	-0.06153
MW-8	40.0	0.000	0.0000	168	--	--
MW-9	40.0	0.025	0.0006	190		-0.03879

* A= ln(P/Po)/D

** Well MW-4 was under positive pressure during sparge test.

TABLE 11 - SUMMARY OF OVM OFF-GAS MEASUREMENTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

VACUUM TEST RW-1			
TIME (minutes)	**PRESSURE (iow)**	**FLOW (cfm)**	**OVM (ppm)**
2	42	196	91.2
6	42	196	112.0
20	41	198	103.0
60	41	198	89.0
120	41	198	65.0

VACUUM TEST MW-7			
TIME (minutes)	PRESSURE (iow)	FLOW (cfm)	OVM (ppm)
1	54*	165	1.0
2	40**	200	4.3
5	40**	200	3.0
10	40**	200	0.0
25	40**	200	1.7
60	40**	200	1.2

* Vacuum pulling water/moisture through system.
** System diluted at knockout tank.

TABLE 12 - SUMMARY OF VAPOR SAMPLING RESULTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

Sample Number		ST-1	ST-2	VTRW-1A	VTRW-1B	VTMW-7A	VTMW-7B
Date Collected		(19 Apr 95)	(20 Apr 95)	(20 Apr 95)	(20 Apr 95)	(20 Apr 95)	(20 Apr 95)
Time Collected		1053	1050	1205	1305	1336	1432
Compound	Units						
Ethylene	ppbC	ND	ND	ND	ND	ND	ND
Acetylene	ppbC	ND	ND	ND	ND	ND	ND
Ethane	ppbC	ND	110	ND	ND	18	ND
Propylene	ppbC	ND	52	ND	ND	ND	ND
Propane	ppbC	ND	75	57	59	ND	ND
Methyl Acetylene	ppbC	ND	ND	ND	ND	ND	ND
Isobutane	ppbC	ND	820	590	920	66	15
Isobutylene	ppbC	ND	72	59	60	ND	ND
1-Butene	ppbC	ND	ND	ND	ND	ND	ND
1,3-Butadiene	ppbC	ND	ND	ND	ND	ND	ND
n-Butane	ppbC	4300	2200	1600	2500	320	85
trans-2-Butene	ppbC	ND	ND	ND	ND	ND	ND
2,2-Dimethylpropane	ppbC	ND	ND	ND	ND	ND	ND
Ethyl Acetylene	ppbC	ND	ND	ND	ND	ND	ND
cis-2-Butene	ppbC	ND	ND	ND	58	ND	ND
Isopentane	ppbC	120000	6600	5000	7700	2300	520
1-Pentene	ppbC	ND	100	84	180	34	18
2-Methyl-1-butene	ppbC	ND	170	150	320	52	29
n-Pentane	ppbC	85000	3300	2200	3000	1300	290
Isoprene	ppbC	ND	ND	ND	ND	ND	ND
trans-2-Pentene	ppbC	ND	220	200	430	99	59
cis-2-Pentene	ppbC	ND	130	110	230	61	30
2-Methyl-2-butene	ppbC	ND	310	300	630	120	71
2,2-Dimethylbutane	ppbC	14000	950	920	1400	140	29
Cyclopentene	ppbC	ND	ND	ND	92	ND	ND
4,Methyl-1-pentene	ppbC	3400	130	140	ND	27	ND
Cyclopentane	ppbC	3400	290	230	370	140	91
2,3-Dimethylbutane	ppbC	78000	2800	2300	1500	630	150
2-Methylpentane	ppbC	290000	10000	8200	5100	1900	390
3-Methylpentane	ppbC	200000	7500	6000	3400	1200	270
1-Hexane	ppbC	11000	390	170	89	200	100
n-Hexane	ppbC	270000	9600	6600	2700	1100	270
trans-2-Hexene	ppbC	22000	940	400	220	170	89
2-Methyl-2-pentane	ppbC	19000	920	ND	240	190	120
cis-2-Hexene	ppbC	11000	470	210	120	100	55
Methylcyclopentane	ppbC	180000	6500	6300	2700	1200	620

ppbC - parts per billion as carbon
ppmC - parts per million as carbon

TABLE 12 - SUMMARY OF VAPOR SAMPLING RESULTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

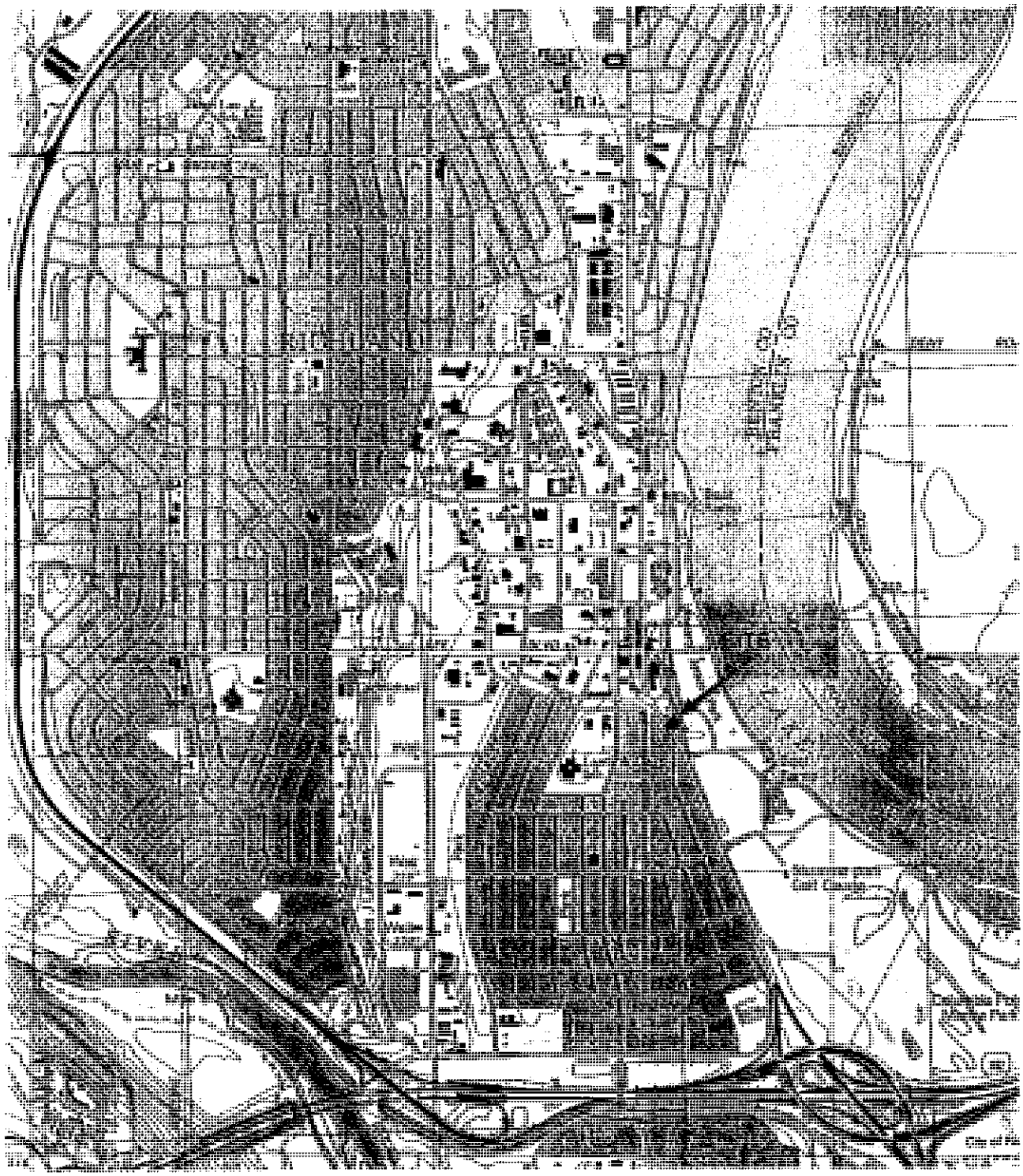
Sample Number		ST-1	ST-2	VTRW-1A	VTRW-1B	VTMW-7A	VTMW-7B
Date Collected		(19 Apr 95)	(20 Apr 95)	(20 Apr 95)	(20 Apr 95)	(20 Apr 95)	(20 Apr 95)
Time Collected		1053	1050	1205	1305	1336	1432
Compound	Units						
Benzene	ppbC	6700	1300	1300	550	220	140
Cyclohexane	ppbC	82000	350	250	1600	560	340
2-Methylhexane	ppbC	250000	20000	19000	4900	450	110
2,3-Dimethylpentane	ppbC	290000	990	630	8100	650	170
3-Methylhexane	ppbC	250000	19000	18000	6600	500	150
1-Heptane	ppbC	86000	4200	3500	ND	ND	ND
Isooctane	ppbC	620000	44000	45000	24000	950	240
n-Heptane	ppbC	220000	19000	13000	3600	330	220
Methylcyclohexane	ppbC	190000	20000	17000	6700	420	240
2,4-Dimethylhexane	ppbC	100000	13000	12000	6000	160	62
2,3,4-Trimethylpentane	ppbC	200000	28000	26000	14000	360	150
Toluene	ppbC	190000	22000	23000	15000	1100	470
2-Methylheptane	ppbC	100000	16000	5700	2700	180	78
1-Octene	ppbC	16000	2900	2000	710	16	ND
n-Octane	ppbC	91000	18000	9700	4100	93	50
Ethylbenzene	ppbC	20000	10000	4400	1600	2300	1300
m-xylene	ppbC	ND	24000	15000	13000	4900	2800
p-xylene	ppbC	32000	12000	9500	8200	3000	1700
Styrene	ppbC	ND	2100	590	900	ND	ND
o-Xylene	ppbC	2900	11000	8000	8800	2600	1500
n-Nonane	ppbC	21000	10000	4900	2500	76	37
Cumene	ppbC	4100	3400	1700	1200	160	95
Alpha Pinene	ppbC	ND	3700	1800	2300	19	ND
n-Propylbenzene	ppbC	8700	1600	960	810	480	290
m-Ethyltoluene	ppbC	21000	1600	ND	71	2000	1100
p-Ethyltoluene	ppbC	13000	41000	21000	16000	1000	590
1,3,5-Trimethylbenzene	ppbC	11000	24000	1700	1900	1200	670
o-Ethyltoluene	ppbC	11000	12000	8100	7000	940	530
Beta Pinene	ppbC	ND	1700	750	650	ND	ND
1,2,4-Trimethylbenzene	ppbC	24000	1100	1200	ND	3800	2100
n-Decane	ppbC	3300	1200	320	550	75	38
p-Cymene	ppbC	3500	15000	ND	7900	940	530
d-Limonene	ppbC	ND	940	530	400	450	ND
1,4-Diethylbenzene	ppbC	4300	3000	2700	2100	470	280
n-Butylbenzene	ppbC	2600	7800	7100	5900	800	490
Total Non Methane Hydrocarbons	ppmC	5500.0	910.0	670.0	430.0	48.0	23.0

ppbC - parts per billion as carbon
ppmC - parts per million as carbon

TABLE 13 - SUMMARY OF VACUUM TEST OFF-GAS EMISSIONS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

SAMPLE		BENZENE		TOLUENE		ETHYLBENZENE		TOTAL XYLENES		TOTAL BTEX	TPH	
NUMBER	DATE	(ppm)	(lbs/day)	(ppm)	(lbs/day)	(ppm)	(lbs/day)	(ppm)	(lbs/day)	(lbs/day)	(ppm)	(lbs/day)
ST-1	19 Apr 95	1.117	0.0627	27.143	1.7973	2.857	0.2180	4.363	0.3329	2.4109	785.714	57.7142
ST-2	20 Apr 95	0.217	0.0124	3.143	0.2124	1.429	0.1113	5.875	0.4574	0.7935	130.000	9.7440
VTRW-1A	20 Apr 95	0.217	0.0123	3.286	0.2198	0.629	0.0485	4.063	0.3132	0.5938	95.714	7.1024
VTRW-1B	20 Apr 95	0.092	0.0052	2.143	0.1434	0.229	0.0177	3.750	0.2890	0.4553	61.429	4.5583
VTRW-7A	20 Apr 95	0.037	0.0021	0.157	0.0106	0.329	0.0256	1.313	0.1022	0.1406	6.857	0.5140
VTRW-7B	20 Apr 95	0.023	0.0013	0.067	0.0045	0.186	0.0145	0.750	0.0584	0.0787	3.286	0.2463

TPH - Total Petroleum Hydrocarbons



SOURCE: USGS "RICHLAND QUADRANGLE (1992)

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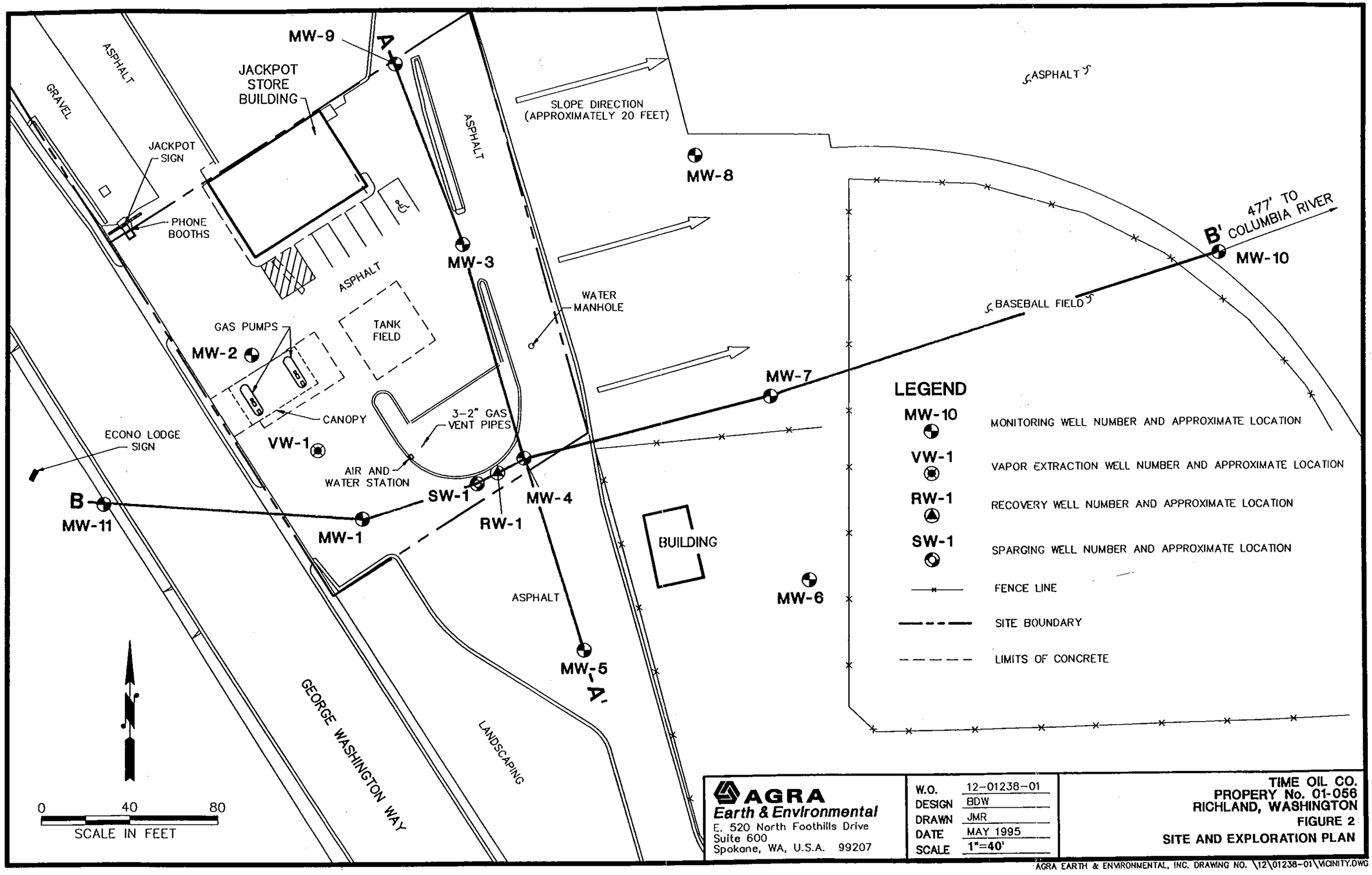
W.O.	12-1238-01
DESIGN	BDW
DRAWN	BDW
DATE	MAY 1995
SCALE	1"=2,000'

TIME OIL CO.
PROPERTY 01-056
RICHLAND, WASHINGTON
FIGURE 1
SITE VICINITY MAP



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DESIGN	BDW
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DATE	MAY 1995
SCALE	1"=40'

TIME OIL CO.
PROPERY No. 01-056
RICHLAND, WASHINGTON
FIGURE 2
SITE AND EXPLORATION PLAN

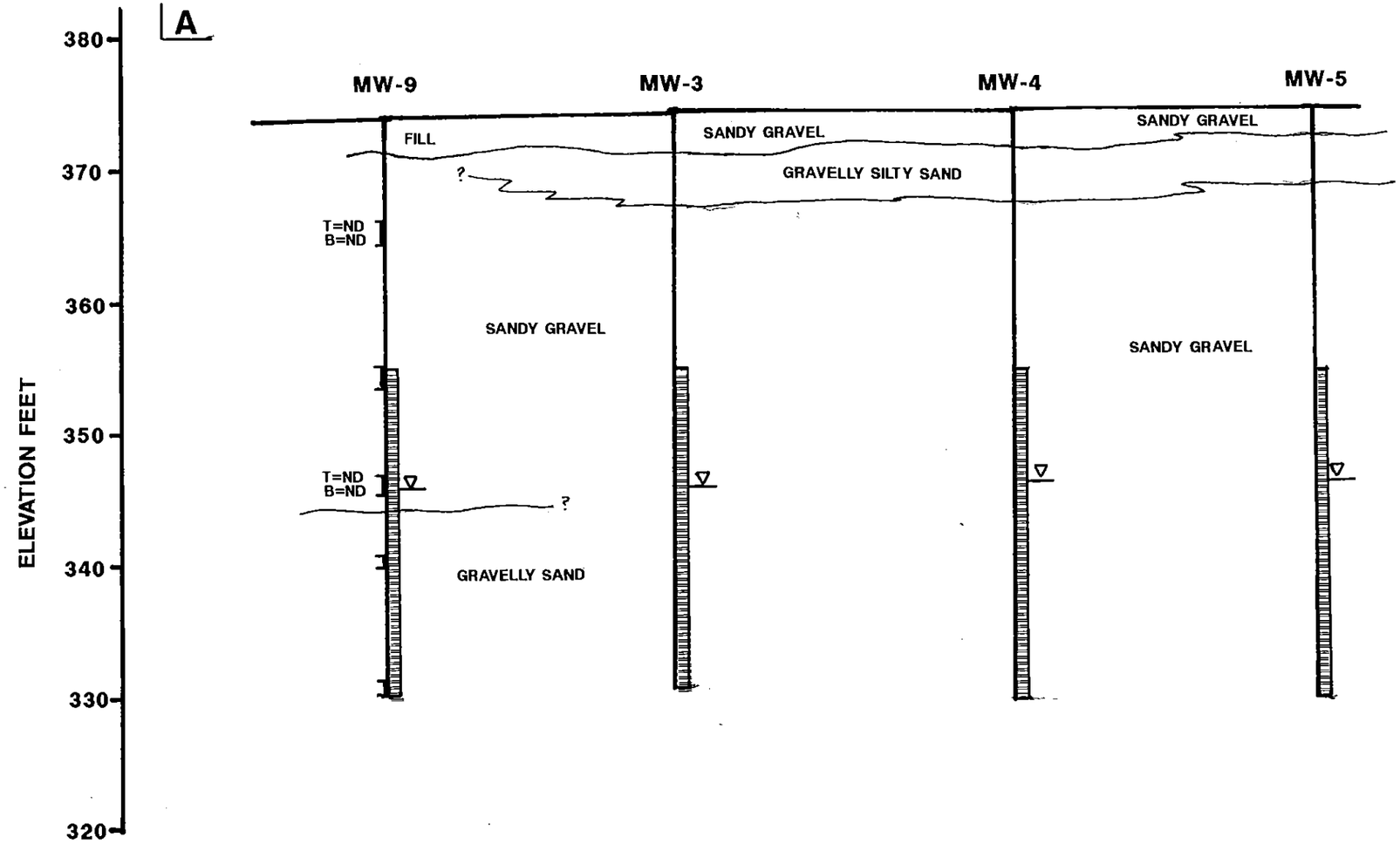
AGRA EARTH & ENVIRONMENTAL, INC. DRAWING NO. \12\01238-01\VICINITY.DWG

N

S

A

A'



LEGEND

MONITORING WELL NUMBER MW-11

T = ND SOIL TPH (G & D) CONCENTRATIONS BELOW METHOD DETECTION LIMIT

B = ND SOIL BTEX CONCENTRATIONS BELOW METHOD DETECTION LIMIT

G=2900 WTPH-G CONCENTRATION IN PPM

D=220 WTPH-D CONCENTRATION IN PPM

E=27 ETHYLBENZENE CONCENTRATION IN PPM

X=110 XYLENE CONCENTRATION IN PPM

INFERRED SOIL CONTACT

SOIL SAMPLE LOCATION

STATIC WATER LEVEL

MONITORING WELL SCREENED INTERVAL

0 40 80

SCALE IN FEET

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DESIGN	ENJS
DRAWN	ENJS
DATE	JUNE 1995
SCALE	NOTED

FIGURE 3

GENERALIZED NORTH-SOUTH GEOLOGIC CROSS-SECTION

W

E

B

B'

ELEVATION (FEET)

380

370

360

350

340

330

320

MW-11

MW-1

SW-1

MW-4

RW-1

MW-7

MW-10

GEORGE WASHINGTON WAY

SANDY GRAVEL (FILL)

GRAVELLY SILTY SAND (FILL)

GRAVEL (FILL)

GRAVELLY SAND (FILL)

SANDY GRAVEL

SANDY SILT

SILTY SAND

SANDY GRAVEL

PUBLIC BALL FIELD

SILTY GRAVELLY SAND

SILTY FINE SAND

SANDY GRAVEL

GRAVELLY SAND

GRAVELLY SAND

T=ND
B=ND

G=2900
D=220
E=27.0
X=110

LEGEND

MONITORING WELL NUMBER MW-11

T = ND SOIL TPH (G & D) CONCENTRATIONS BELOW METHOD DETECTION LIMIT

B = ND SOIL BTEX CONCENTRATIONS BELOW METHOD DETECTION LIMIT

G=2900 WTPH-G CONCENTRATION IN PPM

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X=110 XYLENE CONCENTRATION IN PPM

INFERRED SOIL CONTACT

SOIL SAMPLE LOCATION

STATIC WATER LEVEL

MONITORING WELL SCREENED INTERVAL

0 40 80

SCALE IN FEET

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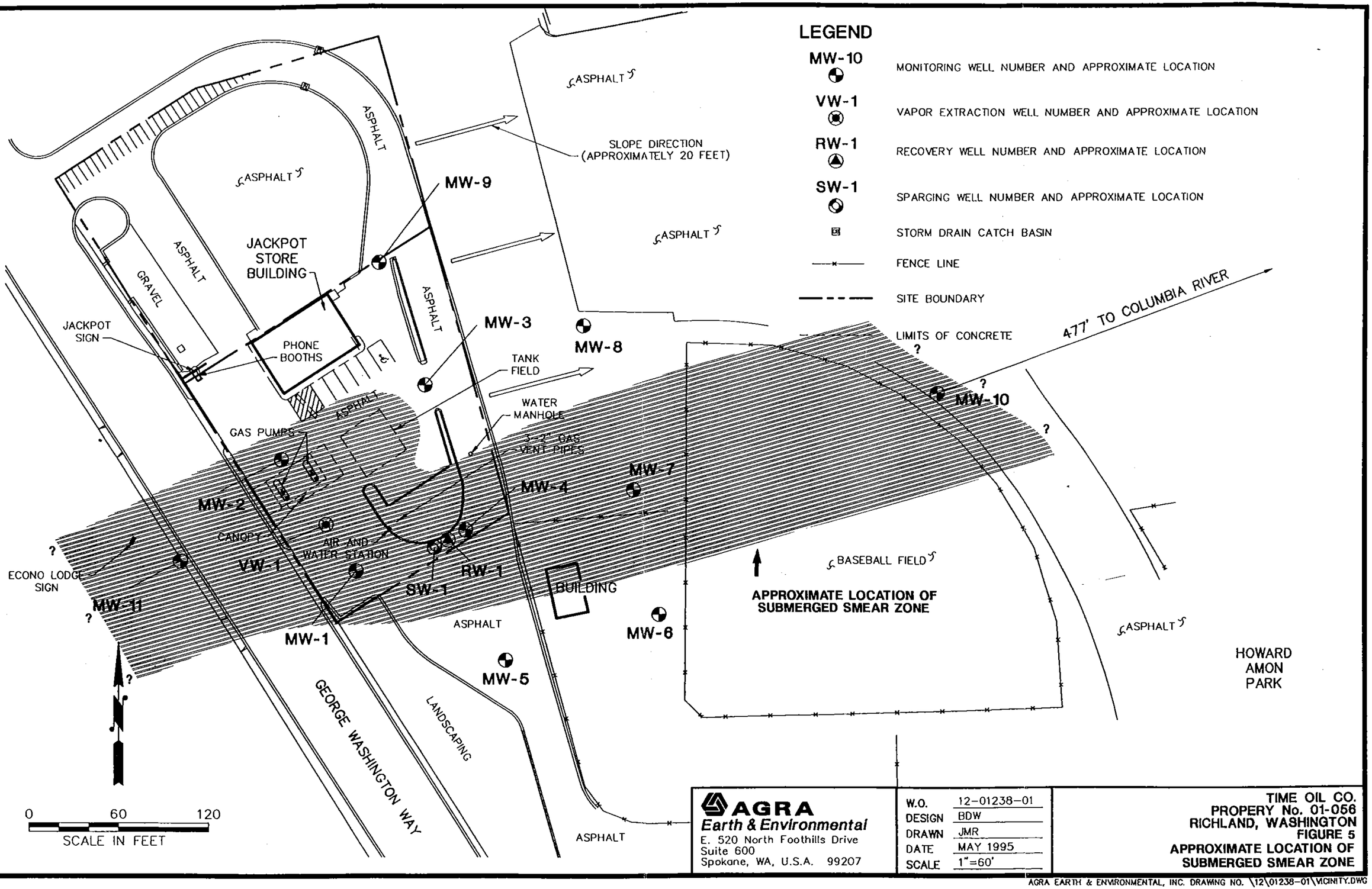
W.O.	12-1238-01
DESIGN	ENJS
DRAWN	ENJS
DATE	JUNE 1995
SCALE	NOTED

FIGURE 4

GENERALIZED EAST-WEST GEOLOGIC CROSS-SECTION



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DESIGN	BDW
DRAWN	JMR
DATE	MAY 1995
SCALE	1"=60'

TIME OIL CO.
PROPERY No. 01-056
RICHLAND, WASHINGTON
FIGURE 5
APPROXIMATE LOCATION OF SUBMERGED SMEAR ZONE

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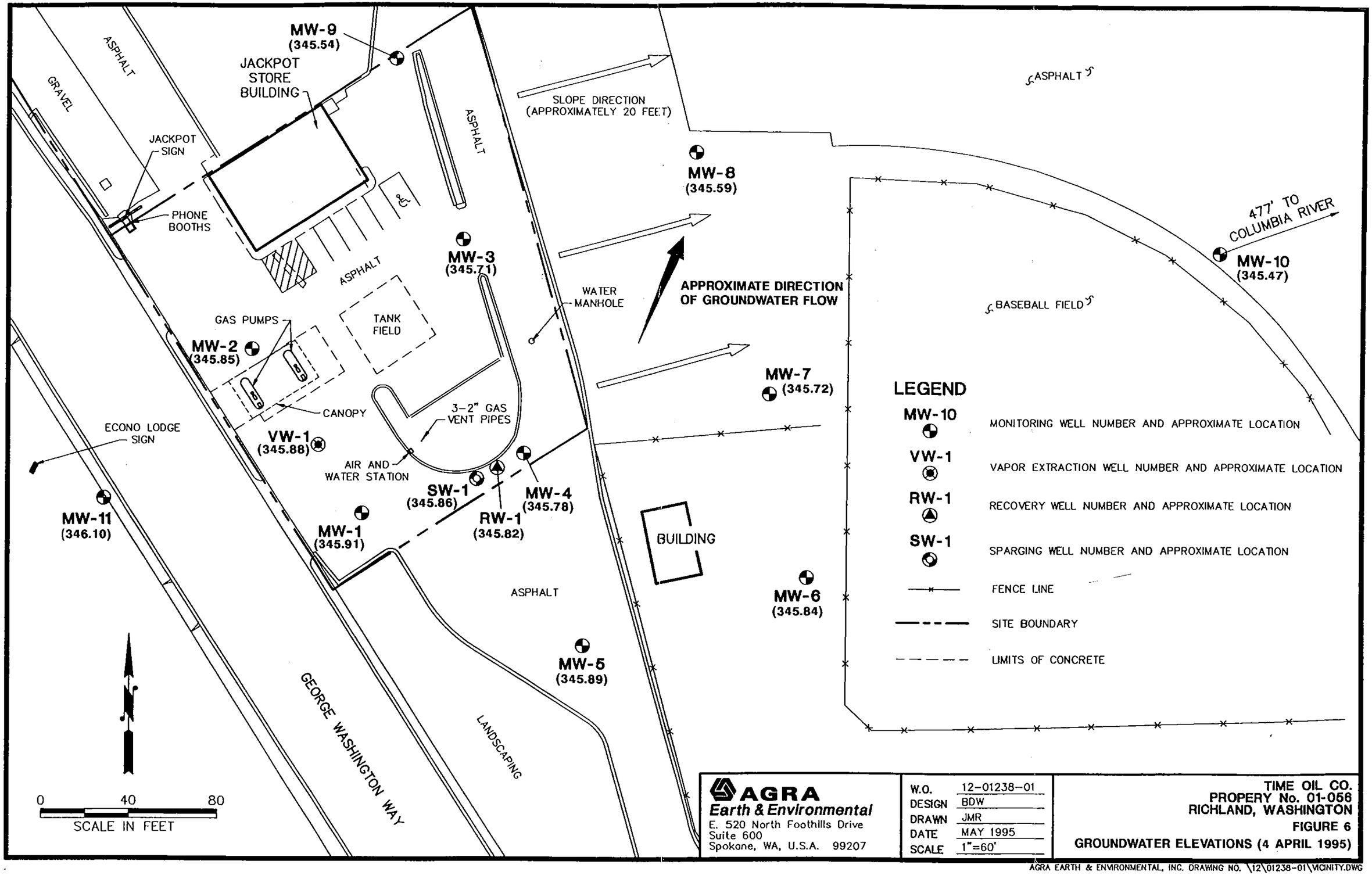

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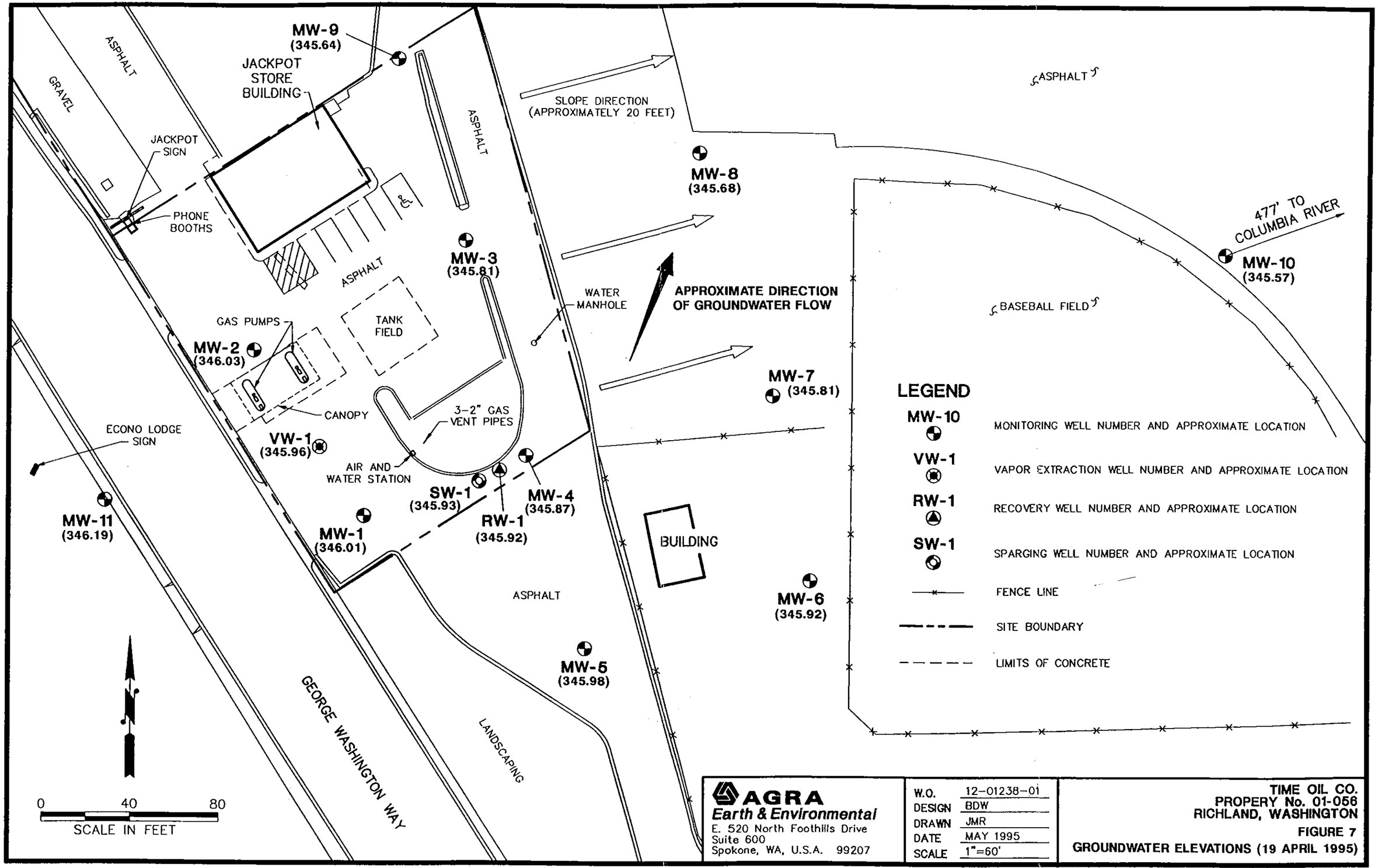
DESIGN	BDW
DRAWN	JMR
DATE	MAY 1995
SCALE	1"=60'

TIME OIL CO.
PROPERY No. 01-056
RICHLAND, WASHINGTON
FIGURE 6
GROUNDWATER ELEVATIONS (4 APRIL 1995)

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING NO. \12\01238-01\VICINITY.DWG



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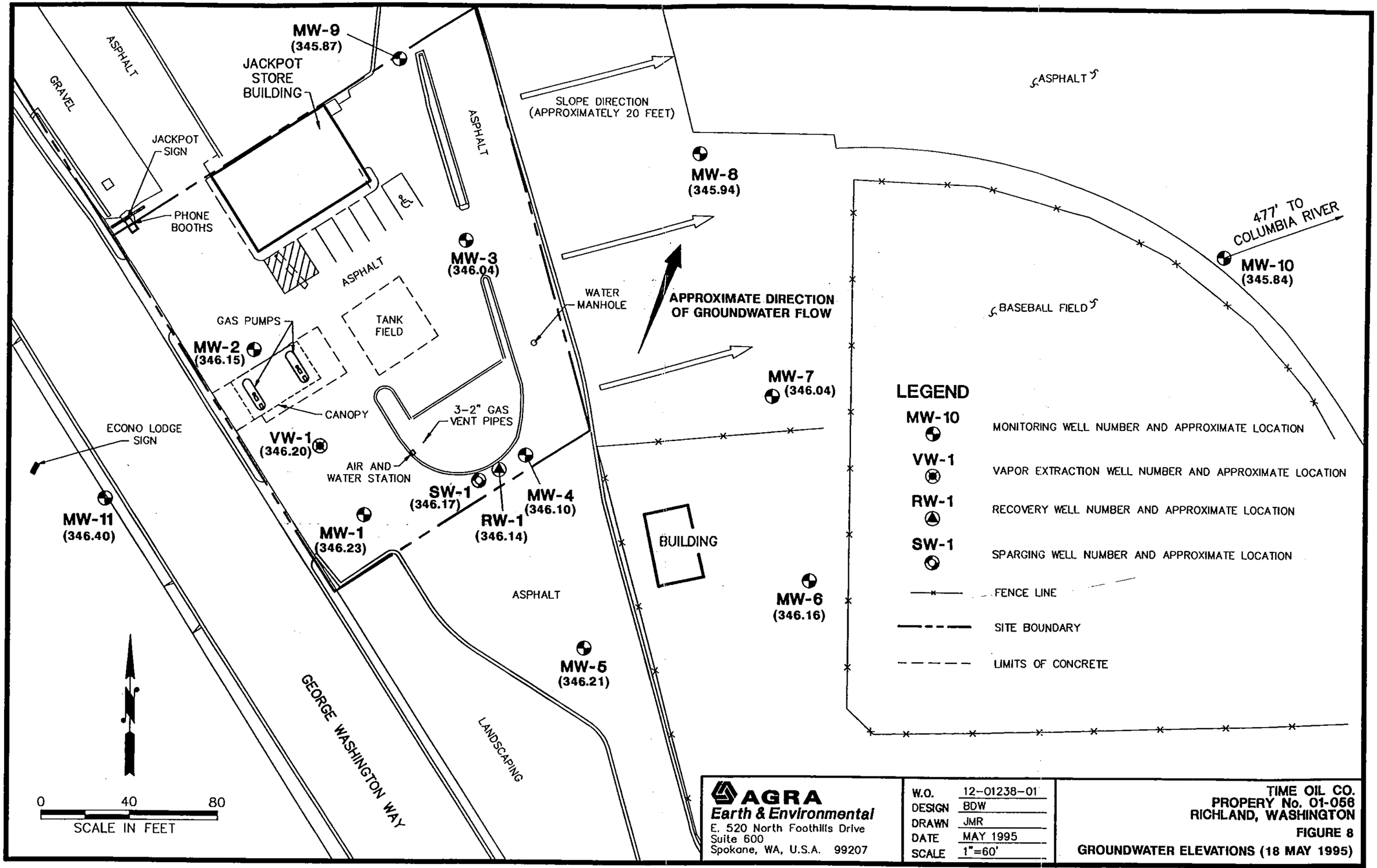
W.O.	12-01238-01
DESIGN	BDW
DRAWN	JMR
DATE	MAY 1995
SCALE	1"=60'

TIME OIL CO.
PROPERY No. 01-056
RICHLAND, WASHINGTON

FIGURE 7

GROUNDWATER ELEVATIONS (19 APRIL 1995)

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING NO. \12\01238-01\VICINITY.DWG



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W.O.	12-01238-01
DESIGN	BDW
DRAWN	JMR
DATE	MAY 1995
SCALE	1"=60'

TIME OIL CO.
PROPERY No. 01-056
RICHLAND, WASHINGTON

FIGURE 8

GROUNDWATER ELEVATIONS (18 MAY 1995)

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING NO. \12\01238-01\VICINITY.DWG

FIGURE 9
SPARGE TEST

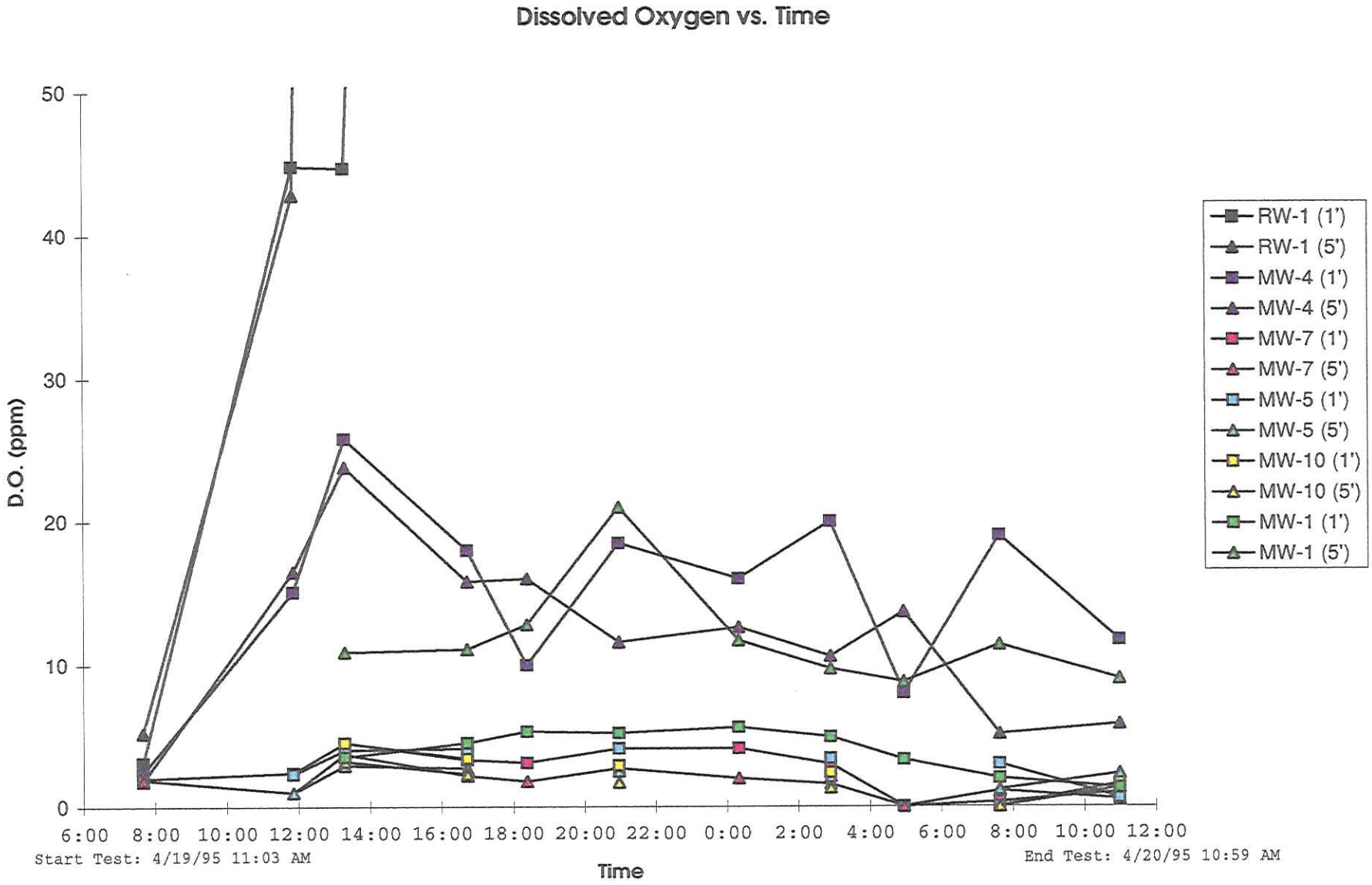


FIGURE 10
SPARGE TEST

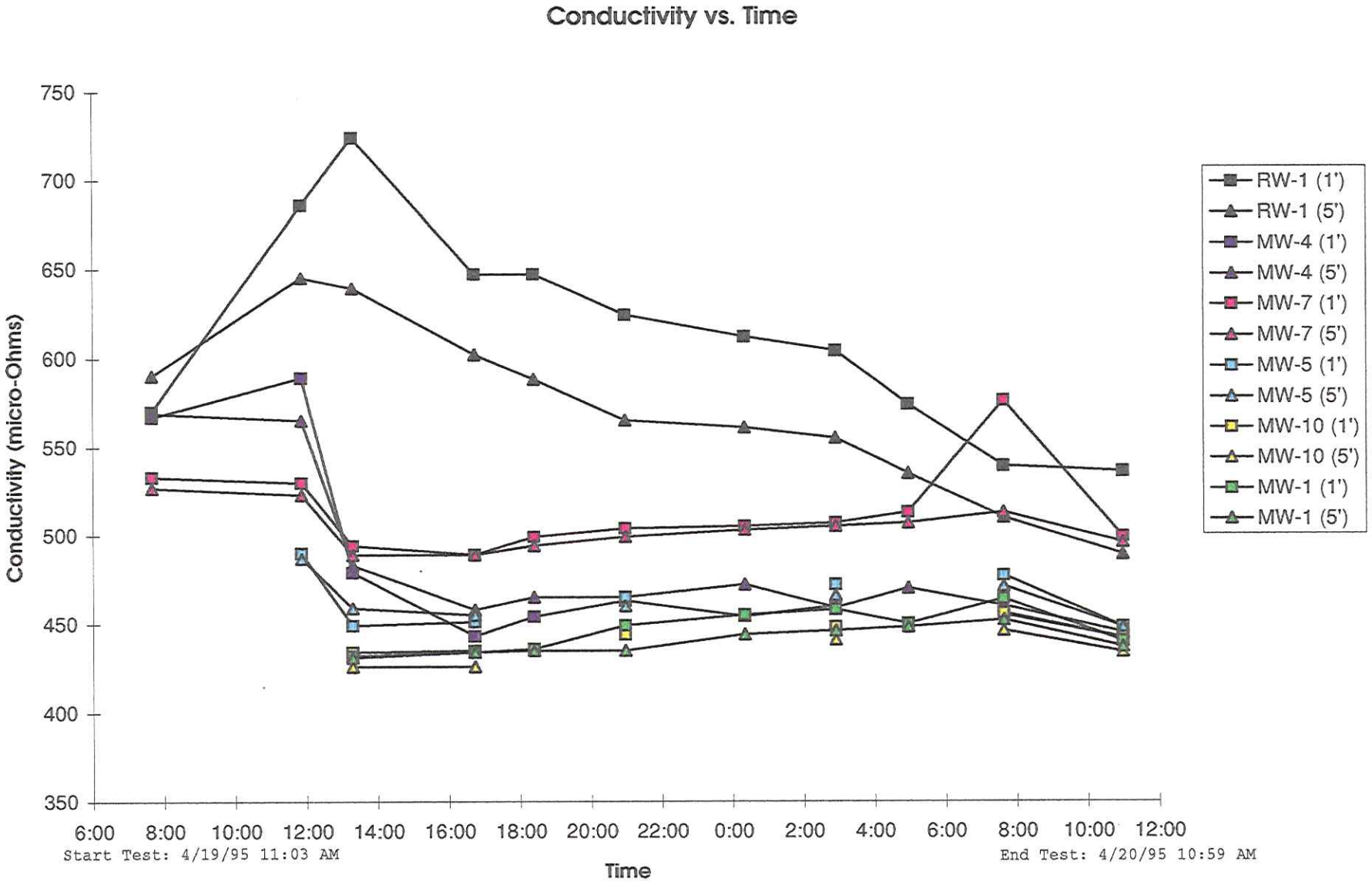


FIGURE 11
SPARGE TEST
pH vs. Time

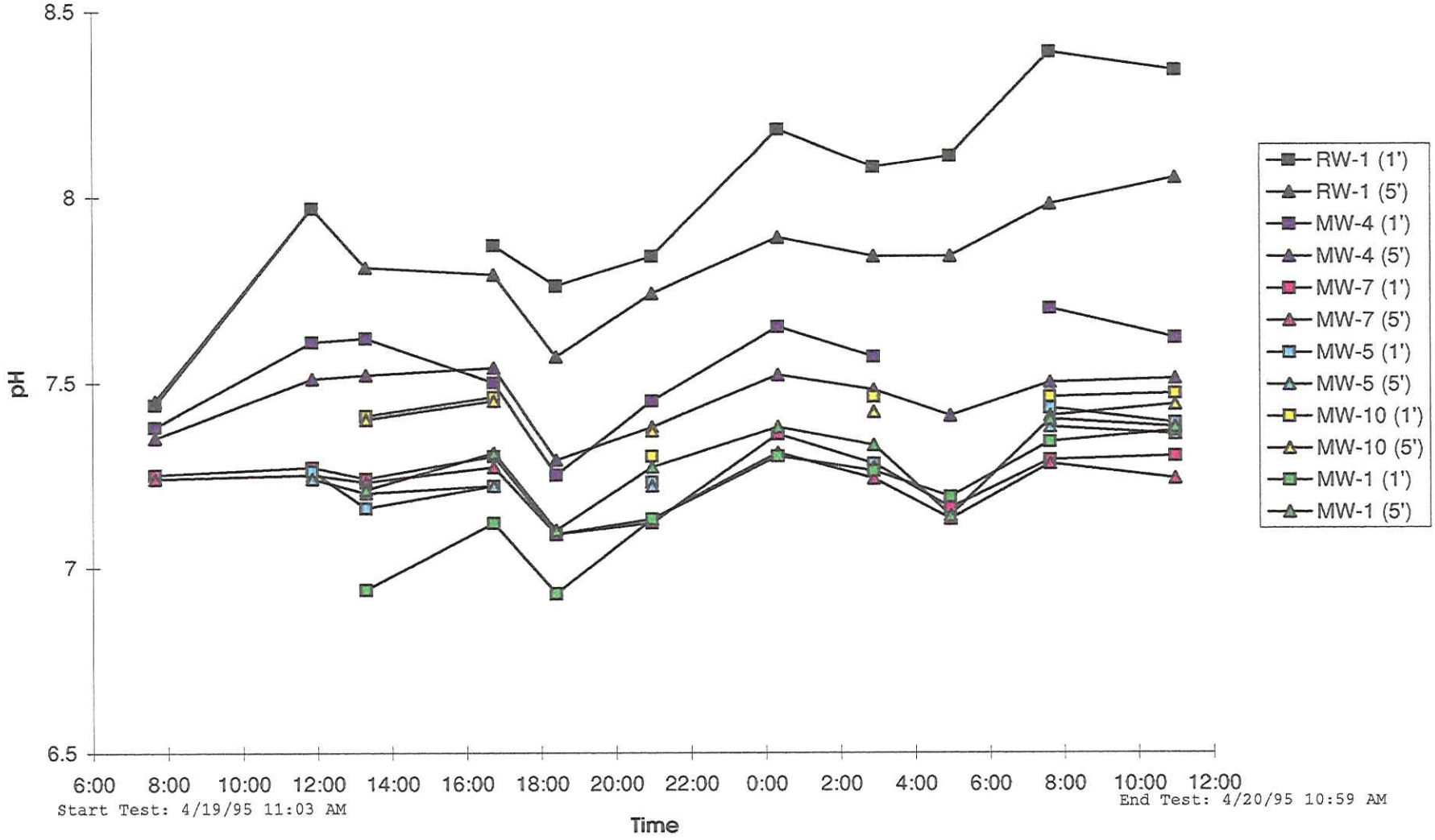


FIGURE 12: OVM CONCENTRATIONS VS. TIME
RICHLAND SPARGE TEST

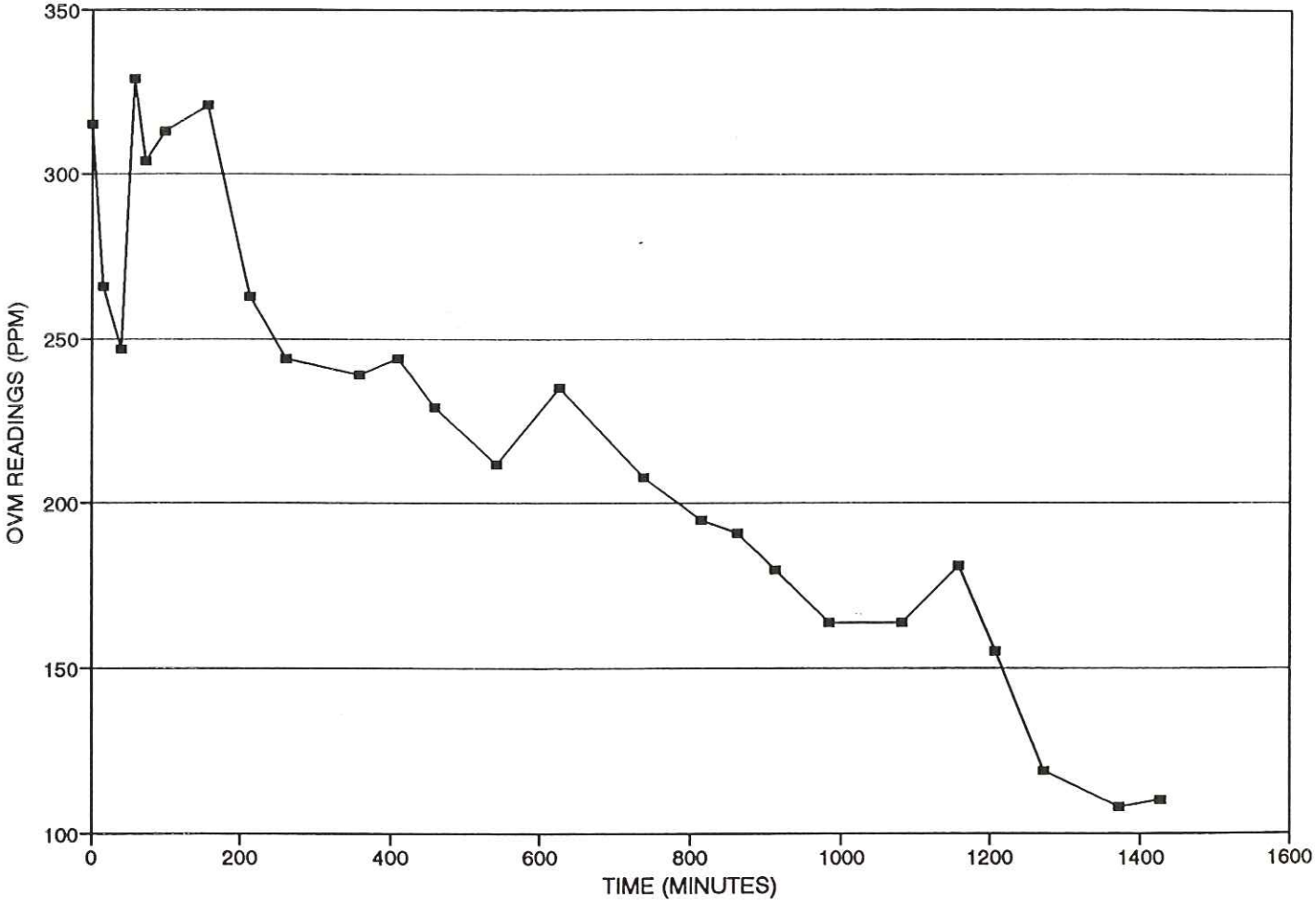


FIGURE 13
SPARGING GROUNDWATER ANALYSES: SW-1

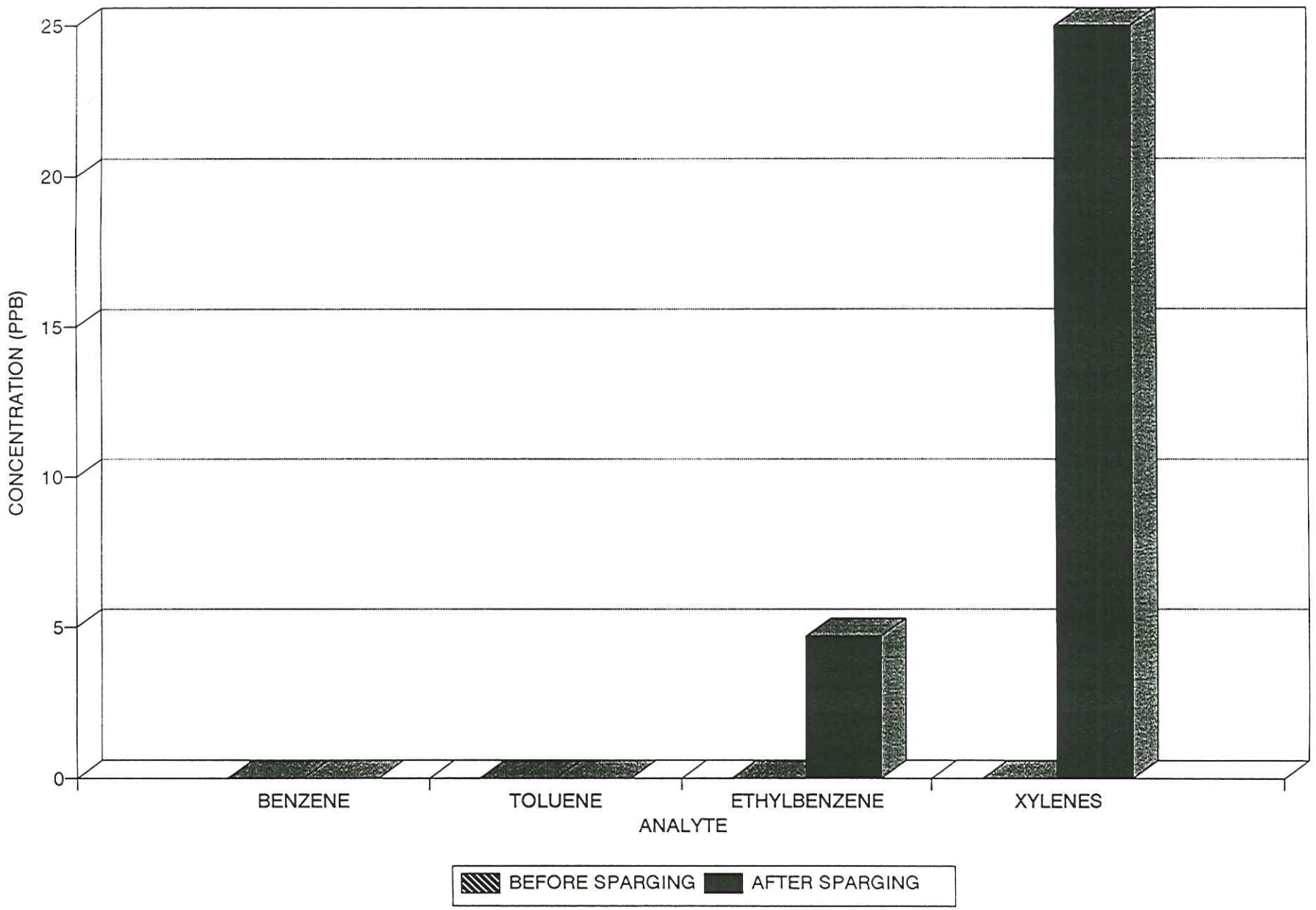


FIGURE 14
SPARGING GROUNDWATER ANALYSES: MW-4

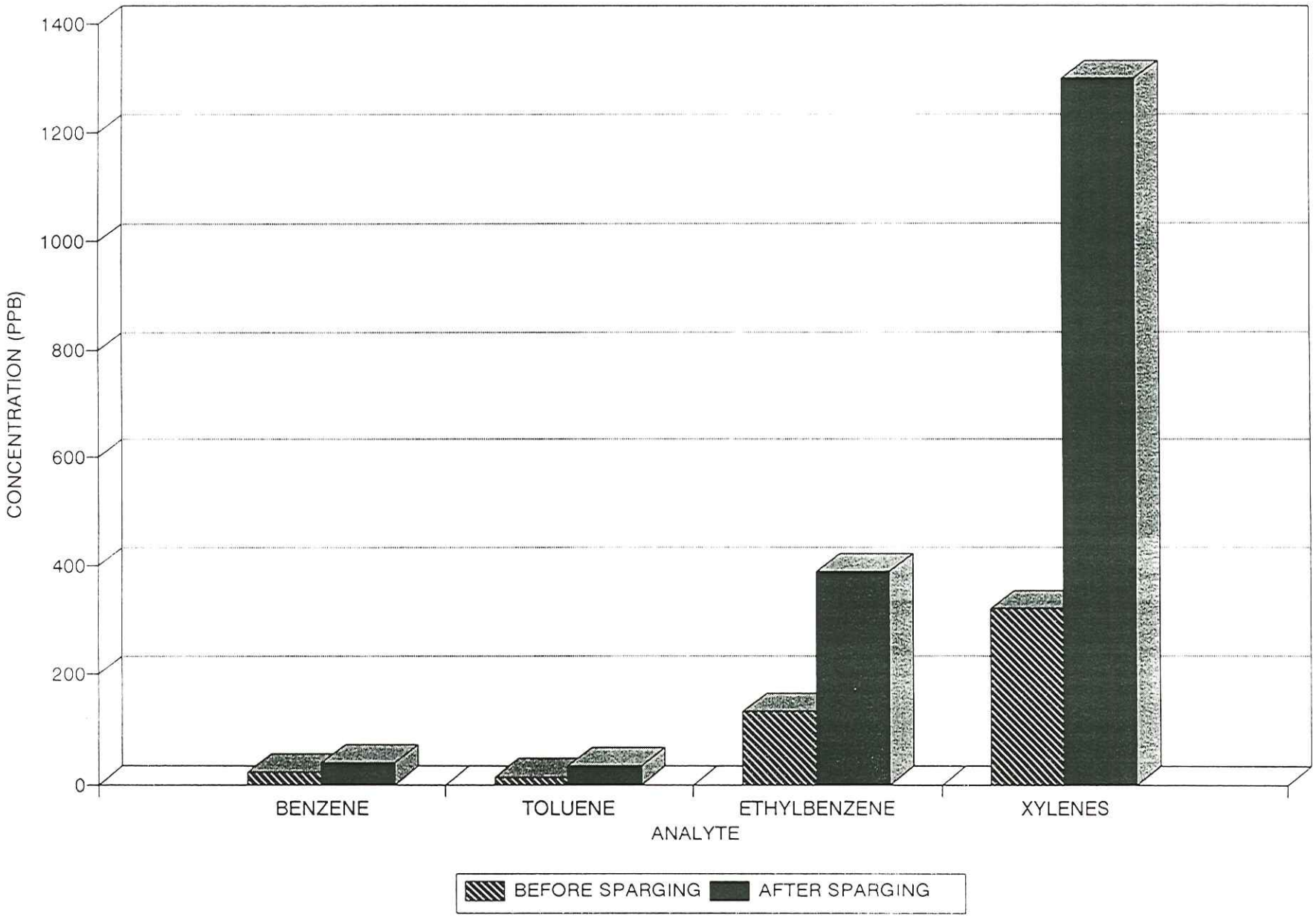


FIGURE 15
SPARGING GROUNDWATER ANALYSES: RW-1

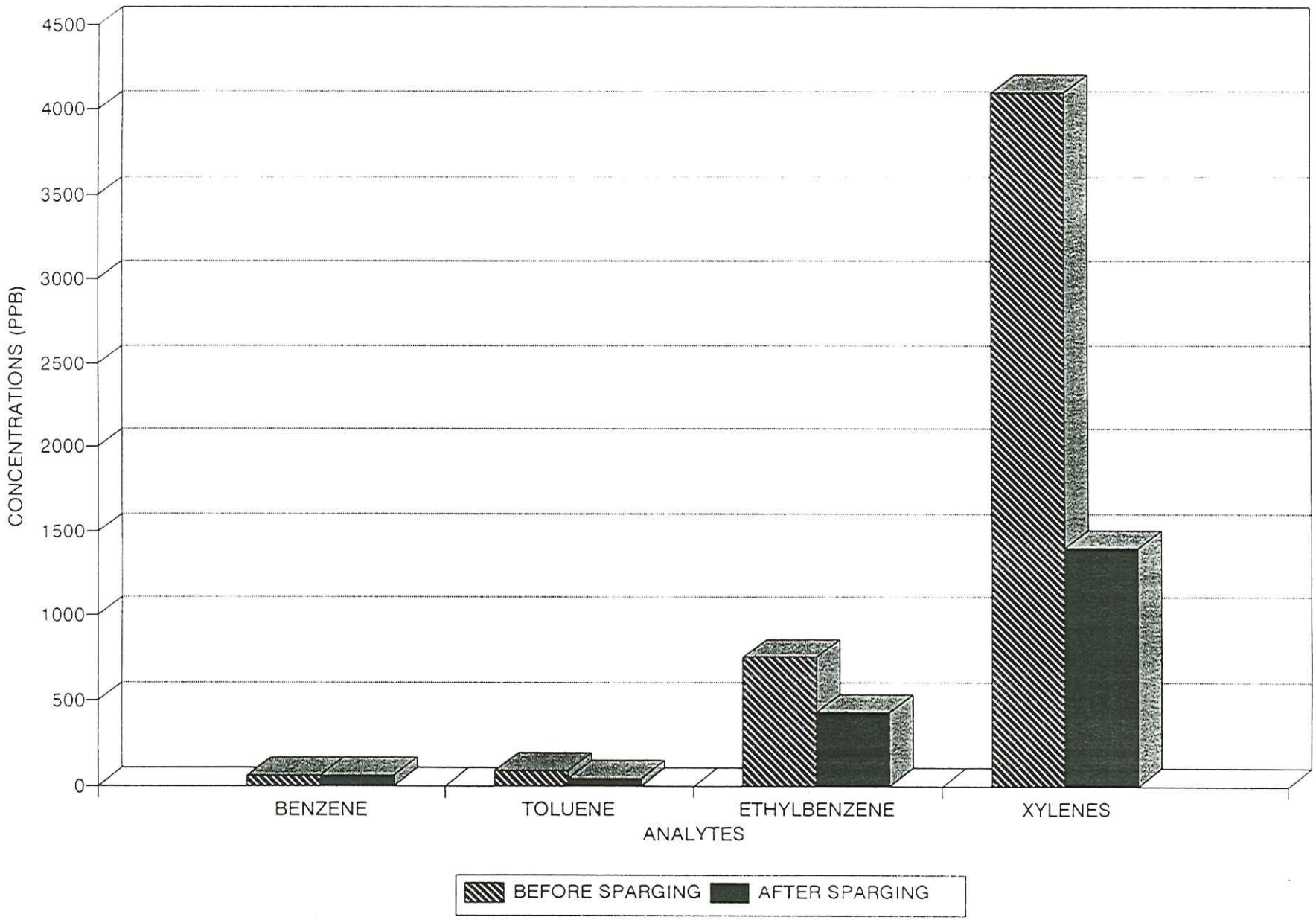


FIGURE 16

VACUUM TEST RADIUS OF INFLUENCE TEST WELL RW-1

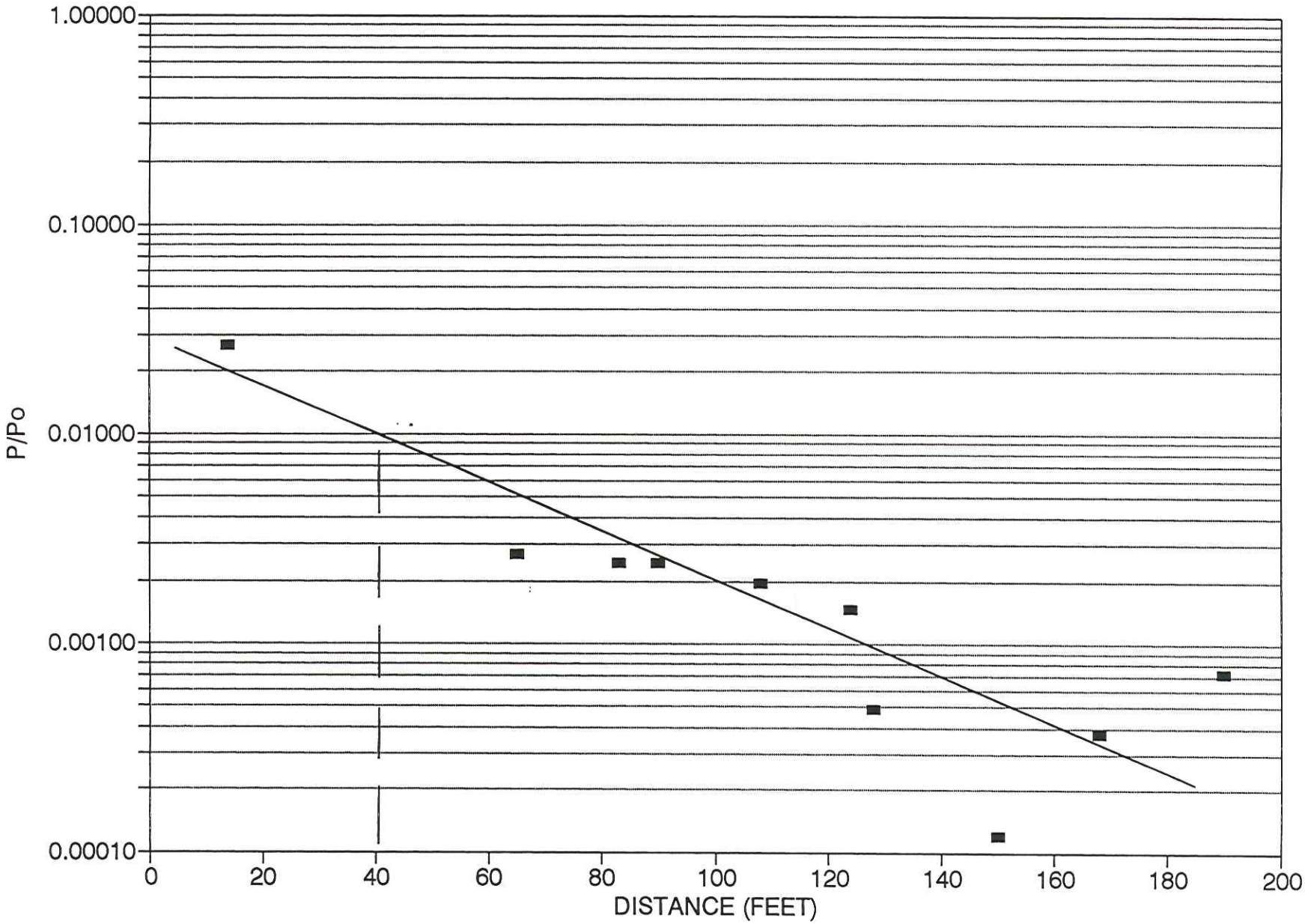
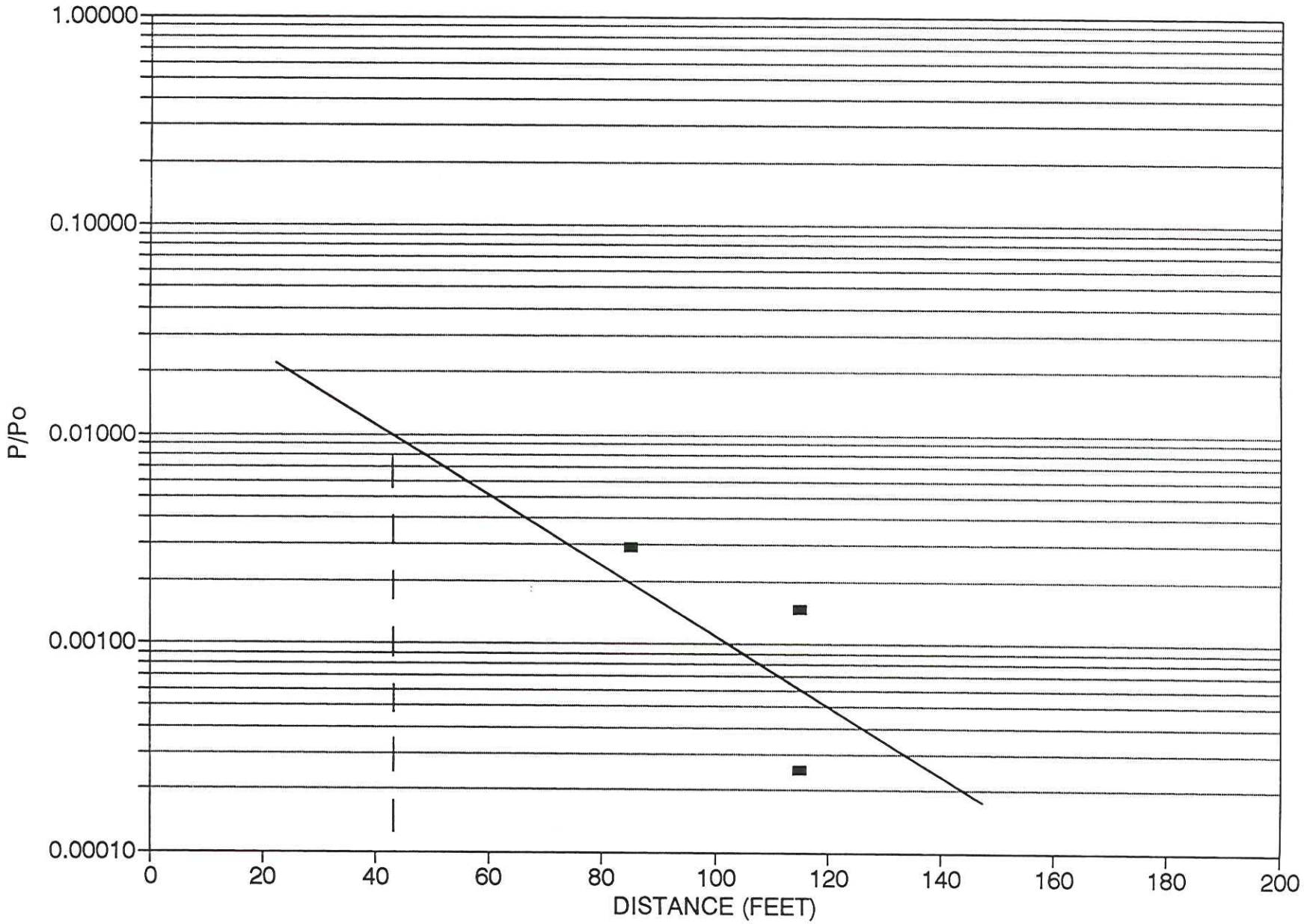
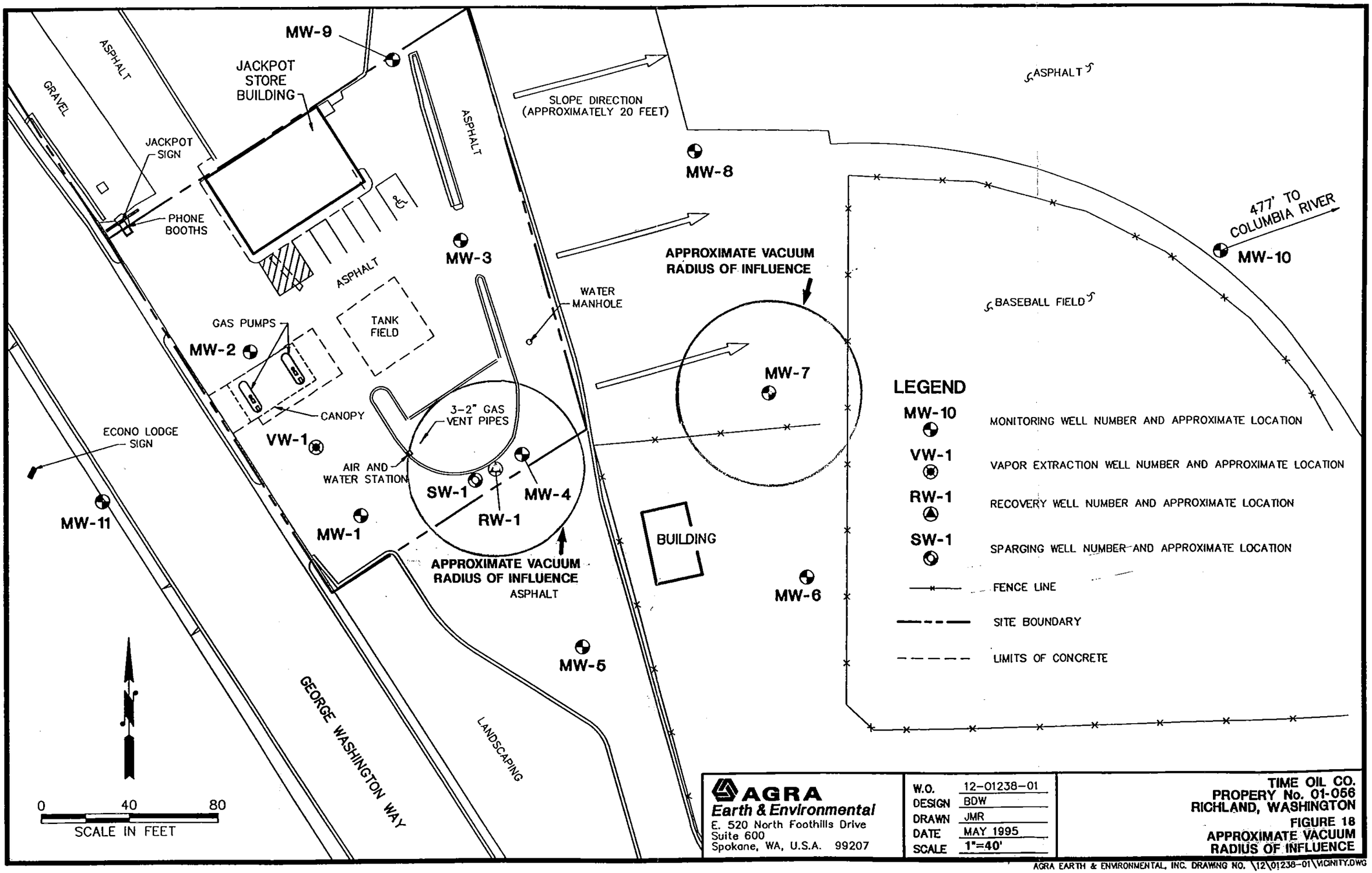


FIGURE 17

VACUUM TEST RADIUS OF INFLUENCE TEST WELL MW-7





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W.O.	12-01238-01
DESIGN	BDW
DRAWN	JMR
DATE	MAY 1995
SCALE	1"=40'

TIME OIL CO.
PROPERY No. 01-056
RICHLAND, WASHINGTON

FIGURE 18
APPROXIMATE VACUUM RADIUS OF INFLUENCE

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FIGURE 19

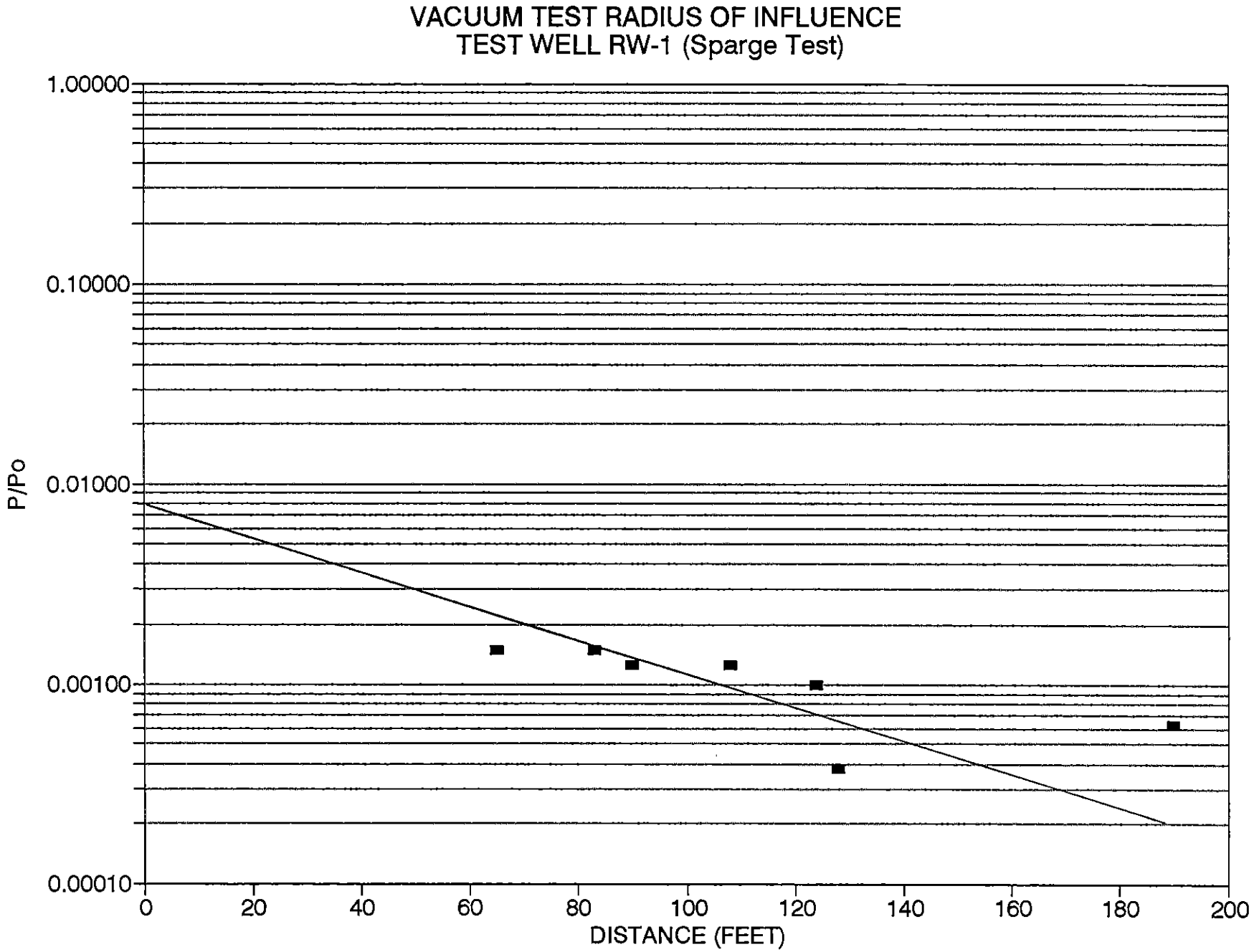
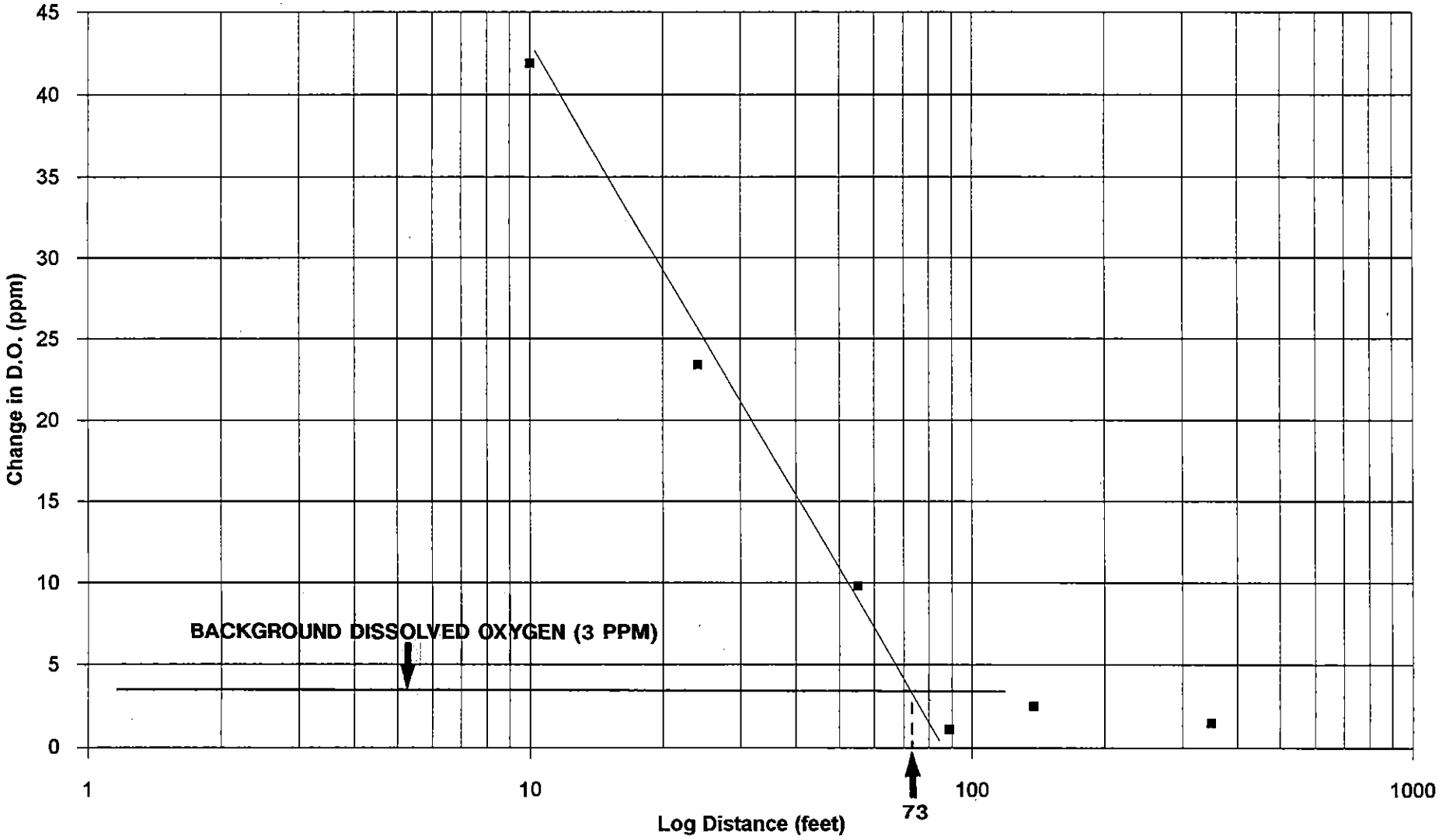

VACUUM TEST RADIUS OF INFLUENCE
TEST WELL RW-1 (Sparge Test)
1.00000
0.10000
0.01000
0.00100
0.00010
P/Po
0
20
40
60
80
100
120
140
160
180
200
DISTANCE (FEET)

FIGURE 20

Maximum Dissolved Oxygen vs. Log Distance



APPENDIX A

Subsurface Exploration
The field exploration program conducted for this study consisted of advancing seven air rotary borings to depths of 18.9 to 44.5 feet below the existing site grade. All borings were accomplished to install monitoring or vapor extraction wells. In addition, one in-situ air sparging well was installed for completion for an air sparging pilot study conducted at the subject site. The approximate locations of the explorations are illustrated on Figure 2. These locations were surveyed in by Stratton Surveying of Kennewick, Washington. Elevations of ground surface and top of PVC well casings were also surveyed by Stratton Surveying.

The borings were drilled from 20 through 25 March by Ruen Drilling, Inc. of Clark Fork, Idaho under subcontract to AGRA Earth & Environmental, Inc. All borings (MW-6 through MW-11, RW-1 and SW-1) were advanced utilizing a trick mounted Schramm drill rig with a 450 cfm air compressor. On the larger diameter deep borings completed on the elevated grade by the subject site (RW-1 and SW-1), an additional 850 cfm air compressor was connected to the Schramm drill rig for increased air capabilities). The drilling equipment for these borings consisted of a 6-inch tricone drill bit inside 6-inch threaded steel casing for MW-6 through MW-11. Equipment for RW-1 consisted of 8-inch threaded steel casing with an 8-inch tri-cone bit. SW-1 was completed utilized 10-inch welded steel casing with a 10-inch tri-cone drill bit. This drilling method utilizes a hammer mounted on the drill rig mast to drive the casing into the substrate. Soil cuttings are removed from the casing by air pressure. Vadose zone cuttings were contained in 55-gallon drums and later placed on a visqueen liner on-site. Saturated soils were contained in 55-gallon drums and stored on site. After one-month of settling, the water within the saturated soil drums was pumped and cleaned with GAC scrub units. The soil was then placed on the visqueen liner with the unsaturated soils. The borings were continuously observed and logged by an experienced geologist from our firm.

Characterization of Soils
Soil samples were obtained using the Standard Penetration Test Procedure as described in ASTM:D-1586. The testing and sampling consisted of driving a standard 2-inch outside diameter split barrel sampler a distance of 18 inches into the soil below the auger bit with a 140 pound hammer free falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded and the number of blows required to drive the sampler the final 12 inches is considered the Standard Penetration Resistance ("N") or the blow count which is represented on the boring logs in this appendix. If a total of 50 blows is recorded within a 6-inch interval, the blow count is recorded as 50 blows for the actual number of inches of penetration and is considered refusal. The blow count, or "N" value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils. The high gravel, cobble and boulder content of some fluvial and glacial soils often yields unrepresentatively high blow counts due to oversized material. The soil samples retrieved from the split-spoon sampler were classified in the field and a representative portion placed in laboratory prepared air tight glass containers.

Due to the coarse nature of the soil throughout the stratigraphic column at the subject site, cuttings were collected and logged from the air/cutting outlet on the drilling equipment when deemed necessary by the field geologist. Cuttings were utilized to aid in interpretation of the stratigraphic column.

Soil Sampling Procedures
The soil samples were recovered at each interval using procedures designed to minimize the risk of cross contamination. Prior to the drilling of the boring, the drilling equipment and sample tools were cleaned by a steam cleaner. Between each sampling attempt, the sampling tools were scrubbed with a stiff brush and a detergent solution consisting of Liquinox and warm water, and then rinsed with potable water and liberal quantities of distilled water. The samples were classified in the

field and immediately transferred to laboratory treated glass jars, and tightly sealed with a teflon-lined threaded cap. Samples were screened in the field with an organic vapor meter (OVM) and several samples were selected for laboratory analysis. Samples were stored and transported in a chilled ice chest throughout the field program. Selected soil samples were subsequently transferred to National Environmental Testing in Portland, Oregon in accordance with AGRA Earth & Environmental, Inc. chain of custody procedures.

The boring logs presented in this appendix are based on the drilling action, visual inspection of the samples secured, laboratory results, and field logs. The various types of soils are indicated, as well as the depths where soils or characteristics of the soils changed. It should be noted that these changes may have been gradual, and if the changes occurred between sample intervals, the soil contacts are interpreted. Subsurface water conditions are evaluated by observing the moisture condition of the samples, the free water on the sample rods, and in well measurements. Groundwater was encountered at depths of 27.2 to 28.5 feet below the elevated grade and 9.6 to 11.7 feet below grade in the vicinity of the park at the time of drilling. Groundwater elevations in installed monitoring wells occurred at depths of 26.86 to 28.69 feet in those wells located on the elevated grade and 8.36 to 10.95 feet below the top of casing for those wells located by the park. Groundwater elevations were measured at approximately 345 to 346 feet above mean sea level.

Field Headspace Measurements

Each soil sample was screened for the presence of volatile organic compounds to facilitate selecting an appropriate soil sample to submit for chemical analysis. This involved placing approximately 6 ounces of sampled soil directly into a zip-lock baggie. The sample was then shaken vigorously for approximately 15 seconds and a head space reading was taken after plunging the probe of the OVM detector through the foil cover. Field head space analysis was performed on each sample utilizing a Model 580B OVM. The highest digital readout value displayed by the instrument was recorded for each sample. This value indicates the total vapor concentration of volatilized organic compounds. These compounds include numerous constituents of petroleum hydrocarbons. However, the OVM is not capable of determining the species of these compounds or their concentrations in the soil samples. Consequently, it should be considered merely a rough screening tool that aides in detecting the presence of volatile soil contaminants.

When insufficient soil sample recovery occurred at the subject site, samples were generally logged and collected at the effluent point of the drilling equipment. Soil cuttings generated from the boring were continuously monitored with the field OVM and when elevated organic vapors were noted, a sample of the cuttings was secured. It should be noted that air rotary drilling methods may volatilize organic compounds in soil and OVM measurements taken at the soil/air effluent point may not be representative of the true hydrocarbon concentration of the soil being discharged at that point in time.

Groundwater Sampling

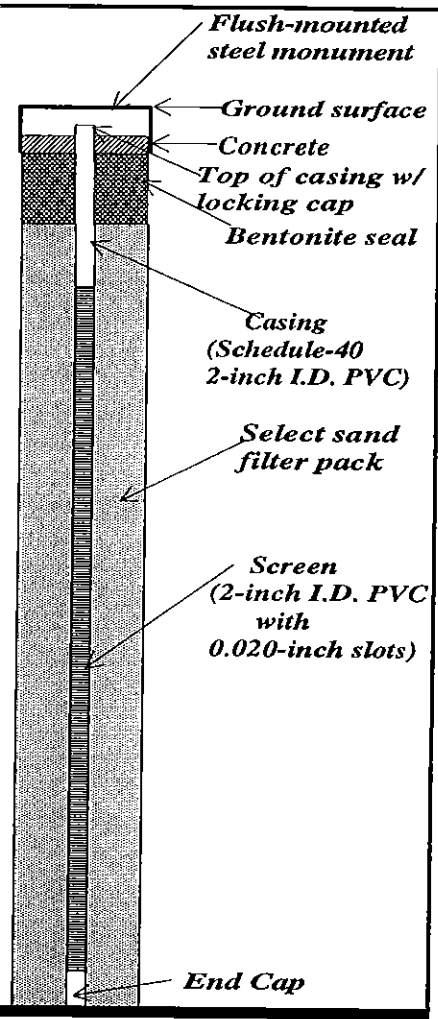
Groundwater samples were collected from site monitoring wells for analytical laboratory testing. Prior to collecting samples, fluid level measurements were obtained from each well. Monitoring wells were developed prior to sampling by surging a 2-inch stainless steel bailer in the well and removing approximately 25 gallons of groundwater in 2-inch wells and 40 to 60 gallons in 4-inch wells. The bailer was decontaminated between use in each well with Liquinox and water followed by consecutive rinses in clean potable and distilled water. After purging, samples were collected using a new disposable polyethylene bailer. Dedicated bailer cord was used at each sampling location.

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-6*

Elevation reference: City of Richland
Ground surface elevation: 354.85 Casing elevation: 354.52

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	Loose, moist, gray/brown, silty sandy GRAVEL					
5	Medium dense to dense, gray, medium to coarse sandy GRAVEL, trace cobbles		S-1	62/4	0.0	
10	Dense, saturated, grey black, sandy GRAVEL		S-2	61	0.0	ATD
	Medium dense, saturated, black grey, gravelly medium SAND		S-3	22	0.0	
15						
20	*Boring terminated at approximately 19.2 feet*					
25						
30						

AS-BUILT DESIGN



TESTING

TPH-G
BTEX
TPH-D

LEGEND

2-inch O.D. split-spoon sample (pushed)

ATD Observed groundwater level (ATD = at time of drilling)

AGRA
Earth & Environmental
E 520 North Foothills Drive, Suite 600
Spokane, Washington 99207

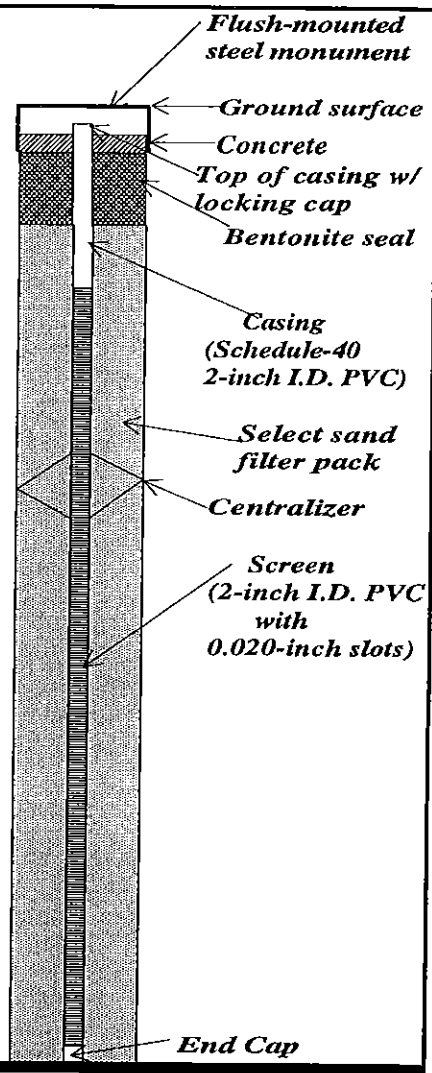
Drilling started: *21 March 1995* Drilling completed: *21 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-7*

Elevation reference: City of Richland
Ground surface elevation: 356.18 Casing elevation: 355.82

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	Loose, brown, silty gravelly SAND					
5	Very dense, dry, brown to gray-brown, coarse, gravelly SAND to sandy GRAVELwith some cobbles		S-1	81	0.0	
10	Very dense, damp, grey, sandy GRAVEL with cobbles		S-2	50/6	0.0	ATD
15	Dense, saturated, GRAVEL with hydrocarbon-like odor		S-3	43	13.7	
	Grab sample of cuttings at 15 to 16 feet Sandy gravel return with hydrocarbon-like odor				373.0	
20	*Boring terminated at approximately 20.3 feet*					
25						
30						

AS-BUILT DESIGN



TESTING

TPH-G BTEX TPH-D

TPH-G BTEX TPH-D

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

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Spokane, WA 99207

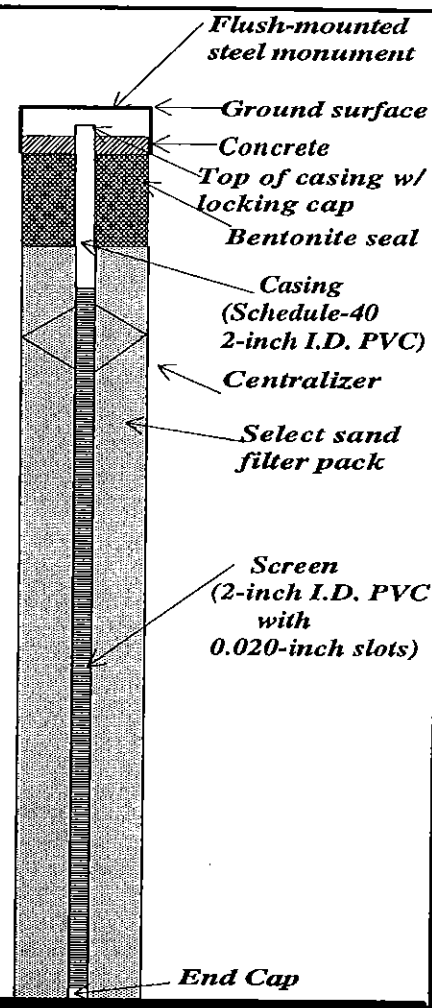
Drilling started: *21 March 1995* Drilling completed: *21 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-8*

Elevation reference: City of Richland
Ground surface elevation: 357.19 Casing elevation: 356.54

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	Loose, moist, brown, silty gravelly SAND (FILL)					
5	Very dense, dry, grayish brown, sandy coarse GRAVEL with silt		S-1	76	0.0	
10	Very dense, damp, grayish brown, gravelly medium SAND with cobbles		S-2	50/5	1.9	ATD
15	Dense, saturated, cobbles and gravel return		S-3	38	0.0	
20	*Boring terminated at approximately 19 feet*					
25						
30						

AS-BUILT DESIGN



TESTING: TPH-G, BTEX, TPH-D

LEGEND

- 2-inch O.D. split-spoon sample (pushed)
- Grab sample
- ATD = Observed groundwater level (ATD = at time of drilling)

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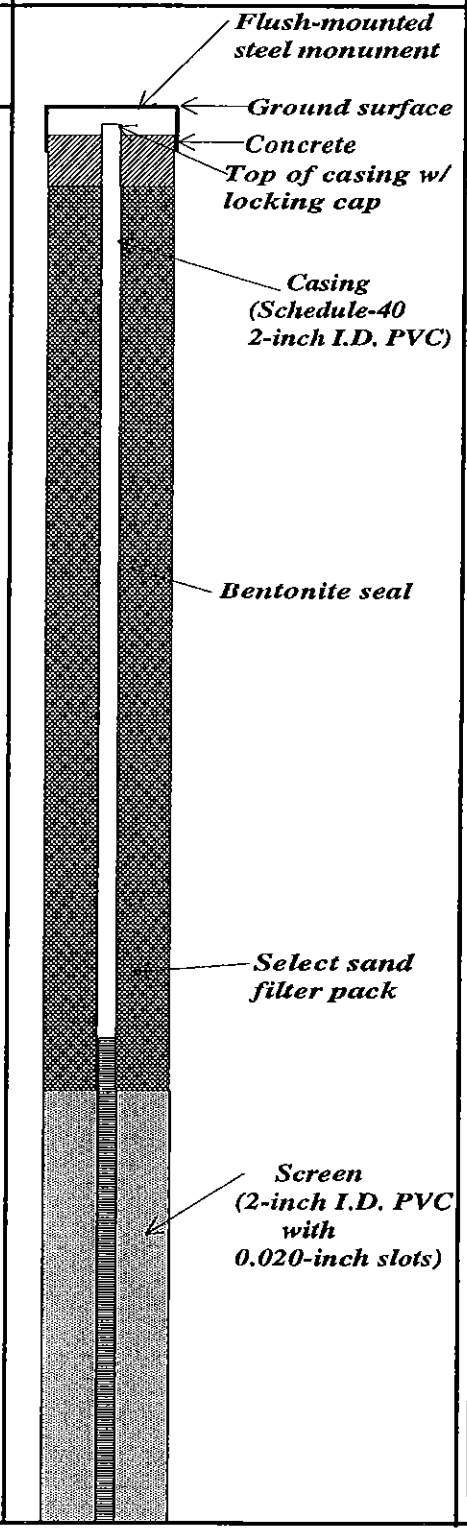
Drilling started: *21 March 1995* Drilling completed: *21 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-9*

Elevation reference: City of Richland
Ground surface elevation: 374.00 Casing elevation: 373.57

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	0-2" Asphalt					
10	Dense, dry, brown, sandy GRAVEL		S-1	16	0.0	
20	No return, minute amounts of sand with gasoline odor		S-2	50/3	29	
25	Very dense, wet, grey, coarse sandy GRAVEL		S-3	75	0.0	
30						

AS-BUILT DESIGN



TESTING

TPH-G
BTEX
TPH-D

TPH-G
BTEX
TPH-D

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

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Spokane, WA 99207

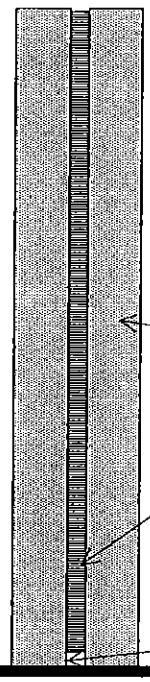
Drilling started: *22 March 1995* Drilling completed: *22 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-9*

Elevation reference: City of Richland
Ground surface elevation: 374.00 Casing elevation: 373.57

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
30						
35						
	Very dense, saturated, brown, gravelly SAND with cobbles		S-4	50/3	0.0	
40						
	Hard, dry, dark tan, silty CLAY with trace sand		S-4	47	0.0	
45	*Boring terminated at approximately 44.1 feet*					
50						
55						
60						

AS-BUILT DESIGN



TESTING

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

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Spokane, WA 99207

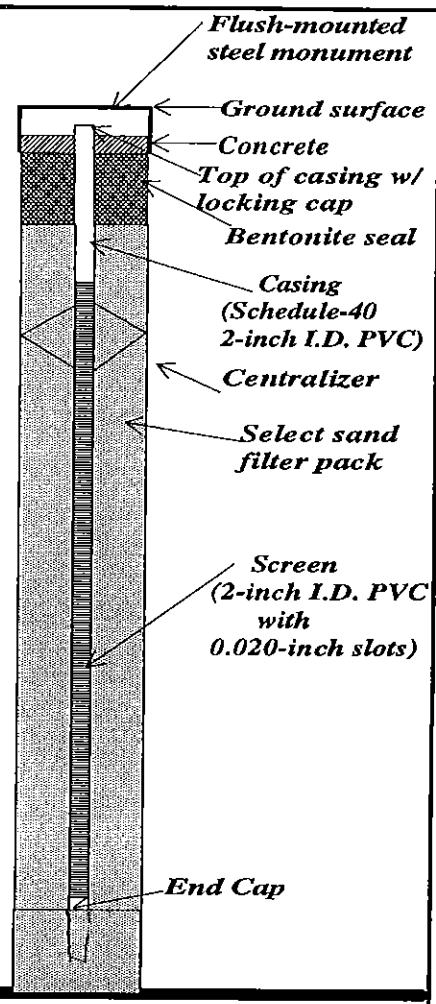
Drilling started: *22 March 1995* Drilling completed: *22 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-10*

Elevation reference: City of Richland
Ground surface elevation: 354.27 Casing elevation: 353.83

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	Asphalt					
	Brown, moist, silty fine SAND return					
5	Loose, damp, brown silty fine SAND		S-1	6	0.0	
10	Loose, saturated, brown, silty, fine SAND		S-2		0.0	ATD
15	Very dense, saturated, brown, sandy GRAVEL with some silt, slight hydrocarbon-like odor		S-3	73	76.4	
	sandy gravel return with slight hydrocarbon-like odor					
20	*Boring terminated at approximately 18.9 feet*					
25						
30						

AS-BUILT DESIGN



TESTING

- 5 ft: TPH-G, BTEX, TPH-D
- 10 ft: TPH-G, BTEX, TPH-D
- 15 ft: TPH-G, BTEX, TPH-D

LEGEND

- 2-inch O.D. split-spoon sample (pushed)
- Grab sample
- ATD: Observed groundwater level (ATD = at time of drilling)

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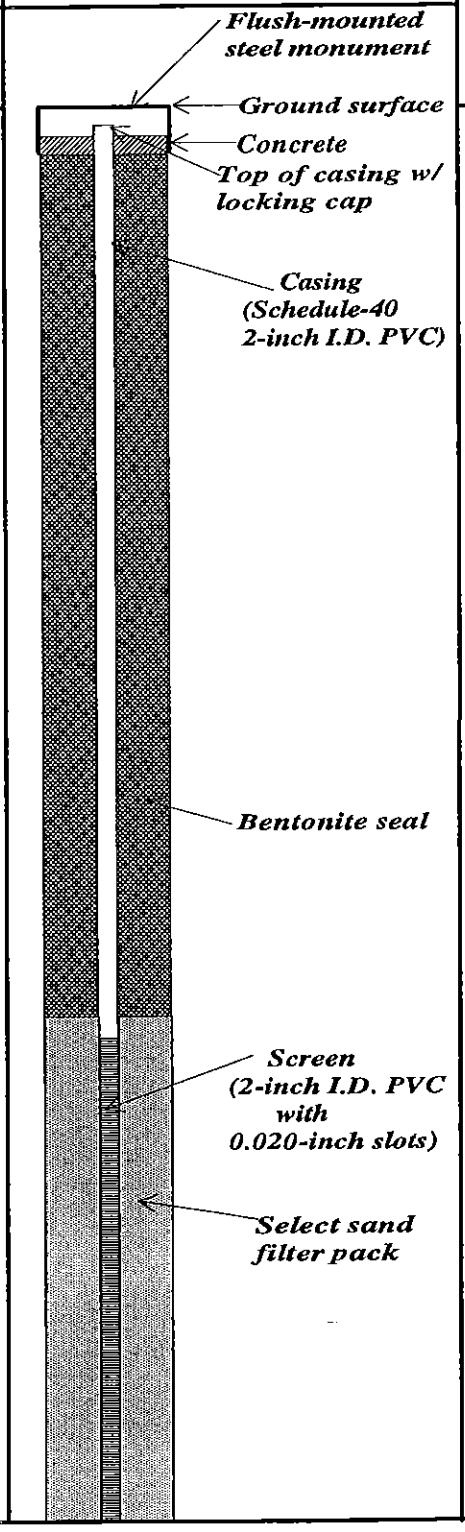
Drilling started: *21 March 1995* Drilling completed: *21 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-11*

Elevation reference: City of Richland
Ground surface elevation: 373.49 Casing elevation: 372.96

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	Sod					
	Sandy gravel return					
5						
10	Dense, dry, greyish brown GRAVEL with some sand		S-1	33	0.0	
15						
20	Very dense, damp, brown, medium sandy GRAVEL with cobbles		S-2	50/6	0.0	
25	Very dense, damp, grey, coarse GRAVEL and sand		S-3	50/3	0.0	
	Very dense, saturated, grey, coarse GRAVEL and sand		S-4	50/6	631	ATD
30						

AS-BUILT DESIGN



TESTING

TPH-G
BTEX
TPH-D

TPH-G
BTEX
TPH-D

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

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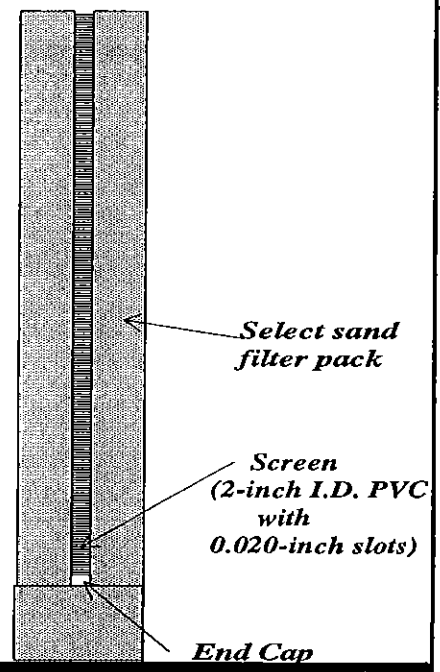
Drilling started: *22 March 1995* Drilling completed: *22 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *MW-11*

Elevation reference: City of Richland
Ground surface elevation: 373.49 Casing elevation: 372.96

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
30						
35	Medium dense, saturated, dark grey (stained) gravelly medium to coares SAND with strong hydrocarbon-like odor		S-5	20	631	
40						
45	*Boring terminated at approximately 44 feet*					
50						
55						
60						

AS-BUILT DESIGN



TESTING

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

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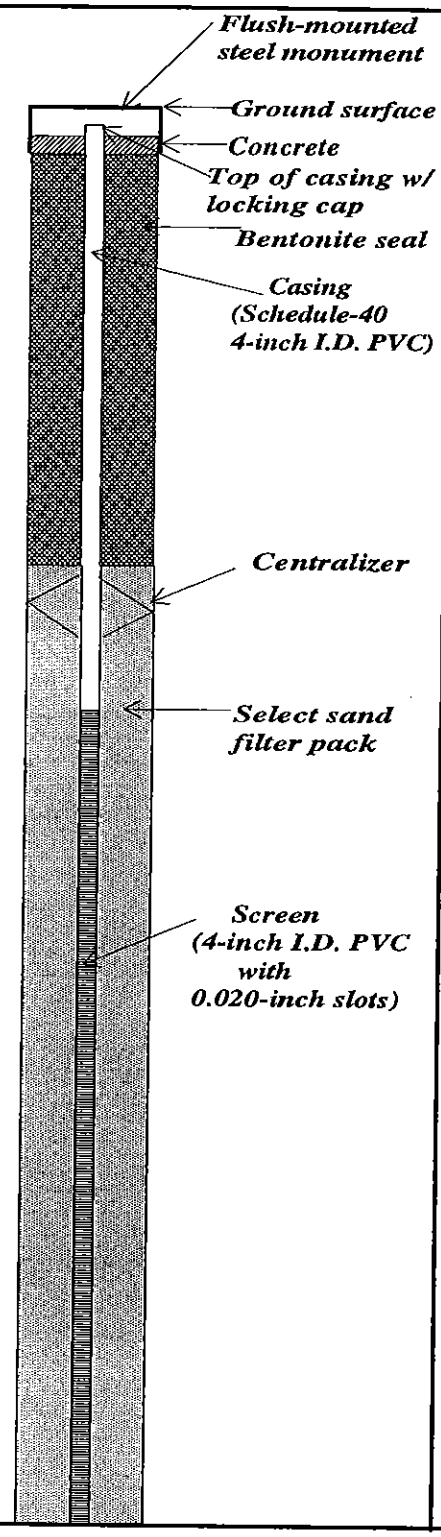
Drilling started: *22 March 1995* **Drilling completed:** *22 March 1995* **Logged by:** *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *RW-1*

Elevation reference: City of Richland
Ground surface elevation: 374.36 Casing elevation: 374.08

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	Asphalt 0-2"					
	Dark brown, silty gravelly SAND (FILL)					
	Dark brown, sandy SILT with gravel and clay					
5						
	Concrete in cuttings (FILL)					
	Brown, damp, silty SAND					
10						
15						
20	Medium dense to dense, damp, grey to black sandy GRAVEL					
25						
	No recovery		S-1	50/5	0.0	ATD
30						

AS-BUILT DESIGN



TESTING

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

AGRA
Earth & Environmental
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Spokane, WA 99207

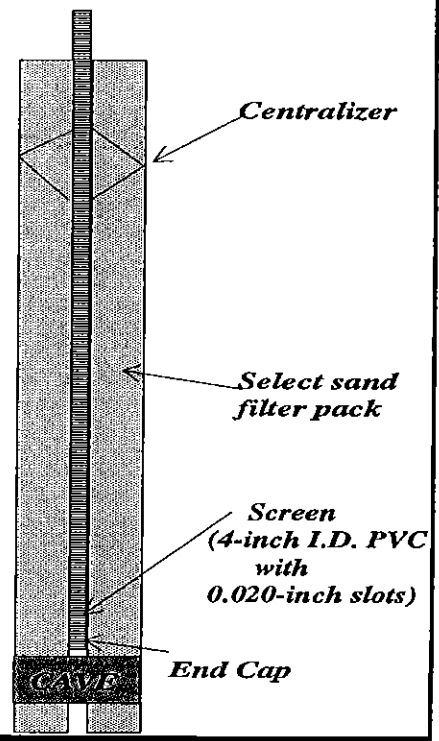
Drilling started: *23 March 1995* Drilling completed: *24 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *RW-1*

Elevation reference: City of Richland
Ground surface elevation: 374.36 Casing elevation: 374.08

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
30						
	Dense, black to dark grey, sandy GRAVEL with trace silt, staining with strong hydrocarbon-like odor		S-2	34	862	
35						
	sandy gravel return					
40						
45	*Boring terminated at approximately 44.5 feet*					
50						
55						
60						

AS-BUILT DESIGN



TESTING

TPH-G
BTEX
TPH-D

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

AGRA
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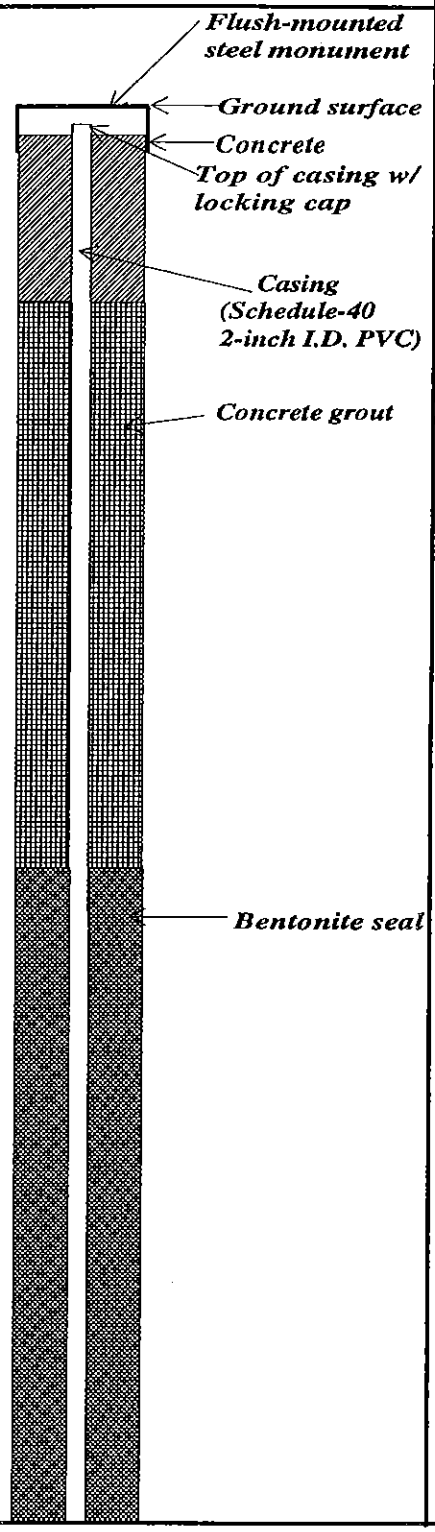
Drilling started: *23 March 1995* Drilling completed: *24 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *SW-1*

Elevation reference: City of Richland
Ground surface elevation: 374.39 Casing elevation: 374.15

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
0	Note: Well installed 12 feet south of RW-1. Refer to RW-1 for stratigraphy					
5						
10						
15						
20						
25						
30						ATD

AS-BUILT DESIGN



TESTING

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

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

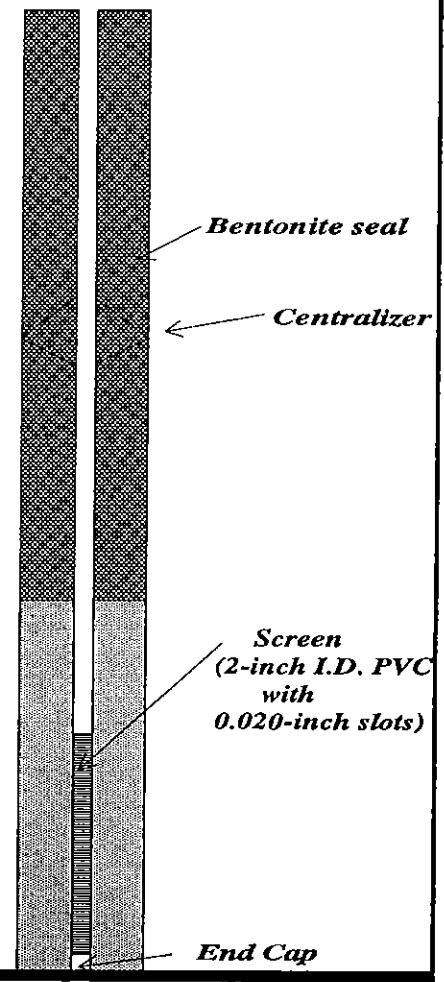
Drilling started: *24 March 1995* Drilling completed: *24 March 1995* Logged by: *ENJS*

PROJECT *Richland Jackpot* W.O. *12-1238-00* WELL NO. *SW-1*

Elevation reference: City of Richland
Ground surface elevation: 374.39 Casing elevation: 374.15

DEPTH (feet)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	BLOW COUNTS	OVM READING (ppm)	GROUND WATER
30						
35						
40						
45						
50	*Boring terminated at approximately 50.3 feet*					
55						
60						

AS-BUILT DESIGN



TESTING

LEGEND

2-inch O.D. split-spoon sample (pushed)

Grab sample

ATD Observed groundwater level (ATD = at time of drilling)

AGRA
Earth & Environmental
E. 520 North Foorhills Drive, Suite 600
Spokane, WA 99207

Drilling started: *24 March 1995* Drilling completed: *24 March 1995* Logged by: *ENJS*

APPENDIX B

Soil Analysis

WTPH-G

Surrogate recoveries for Method WTPH-G were within the acceptance range for all soil samples submitted for analytical testing. Surrogate utilized for WTPH-G analysis were aaa-Trifluorotoluene and 4-Bromofluorobenzene. Laboratory Control Samples (LCS), Laboratory Duplicate and Laboratory Blank Samples results were within the acceptance level. Spike recovery and spike duplicate recovery were also reported within the acceptance level.

BTEX

Aromatic organic hydrocarbon surrogate recoveries were within the acceptance range except for soil samples MW-7 (72%), MW-8 S-2 (70%) and MW-11 S-4 (72%). Surrogate utilized in the 8020 Method was aaa-Trifluorotoluene. Spike and spike duplicate recoveries were within the acceptance limit. Laboratory Control Samples, Laboratory Duplicate Samples and Laboratory Blank Samples were within the acceptance level.

WTPH-D

Extractable hydrocarbon surrogate recoveries were within the acceptance range. Surrogate utilized in WTPH-D analysis was o-Terphenyl. Laboratory Control Samples (LCS), Laboratory Duplicate Samples and Laboratory Blank Samples were within the acceptance levels.

NET® NATIONAL ENVIRONMENTAL TESTING, INC.

Portland Division
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Portland, OR 97224
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Fax: (503) 639-6889

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 03/31/1995
NET Account No.: 60277
NET Job Number: 95.00846

Project: Time Oil - Richland
Location: S-1258-0

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
37734	MW-7 S-1 - HOLD	SOIL	03/20/1995	03/25/1995
37735	MW-7 S-2	SOIL	03/20/1995	03/25/1995
37736	MW-7 S-3 - HOLD	SOIL	03/20/1995	03/25/1995
37737	MW-7 S-3C	SOIL	03/20/1995	03/25/1995
37738	MW-6 S-1 - HOLD	SOIL	03/21/1995	03/25/1995
37739	MW-6 S-2	SOIL	03/21/1995	03/25/1995
37740	MW-6 S-3 - HOLD	SOIL	03/21/1995	03/25/1995
37741	MW-8 S-1 - HOLD	SOIL	03/21/1995	03/25/1995
37742	MW-8 S-2	SOIL	03/21/1995	03/25/1995
37743	RW-1 S-2	SOIL	03/23/1995	03/25/1995
37744	MW-9 S-1	SOIL	03/22/1995	03/25/1995
37745	MW-9 S-3	SOIL	03/22/1995	03/25/1995
37746	MW-9 S-4 - HOLD	SOIL	03/23/1995	03/25/1995
37747	MW-9 S-5 - HOLD	SOIL	03/23/1995	03/25/1995
37748	MW-10 S-1	SOIL	03/21/1995	03/25/1995
37749	MW-10 S-2	SOIL	03/21/1995	03/25/1995
37750	MW-10 S-3	SOIL	03/21/1995	03/25/1995
37751	MW-11 S-2	SOIL	03/22/1995	03/25/1995
37752	MW-11 S-4	SOIL	03/22/1995	03/25/1995
37753	MW-11 S-5 - Broken	SOIL	03/22/1995	03/25/1995

Approved by:

Marty French
NET, INC. Division Manager

OCEAN GROUP

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

Sample Number 37735 — Sample Description: MW-7 S-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	98	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	15.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

Sample Number 37737 — Sample Description: MW-7 S-3C

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	96	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	16.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

Sample Number 37739 — Sample Description: MW-6 S-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	89	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	17.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

Sample Number 37742 — Sample Description: MW-8 S-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	91	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	16.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

Sample Number 37743 — Sample Description: RW-1 S-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	89	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	220	17.	mg/kg d	03/31/1995	E
8020 BTEX (S)						
Dilution Factor		50	-		03/28/1995	
Benzene	8020	ND	22.	mg/kg d	03/28/1995	
Toluene	8020	ND	22.	mg/kg d	03/28/1995	
Ethylbenzene	8020	27.	22.	mg/kg d	03/28/1995	
Xylenes, total	8020	110	22.	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		50	-		03/28/1995	
Gasoline	WTPH-G	2,900	220	mg/kg d	03/28/1995	

Sample Number 37744 — Sample Description: MW-9 S-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	96	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	16.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

Sample Number 37745 — Sample Description MW-9 S-3

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	91	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	16.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

Sample Number 37748 — Sample Description MW-10 S-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	84	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	18.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.4	mg/kg d	03/28/1995	
Toluene	8020	ND	0.4	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.4	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.4	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	4.	mg/kg d	03/28/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

Sample Number 37749 — Sample Description MW-10 S-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	81	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	18.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.4	mg/kg d	03/28/1995	
Toluene	8020	ND	0.4	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.4	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.4	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	4.	mg/kg d	03/28/1995	

Sample Number 37750 — Sample Description MW-10 S-3

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	93	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	16.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

Sample Number 37751 — Sample Description: MW-11 S-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	97	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	15.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

Sample Number 37752 — Sample Description: MW-11 S-4

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	92	0.01	%	03/31/1995	
WTPH-Diesel (S) PREP	WTPH-D	-	-		03/31/1995	
WTPH-Diesel (S)						
Diesel	WTPH-D	ND	16.	mg/kg d	03/31/1995	
8020 BTEX (S)						
Dilution Factor		1	-		03/28/1995	
Benzene	8020	ND	0.3	mg/kg d	03/28/1995	
Toluene	8020	ND	0.3	mg/kg d	03/28/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	03/28/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	03/28/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		03/28/1995	
Gasoline	WTPH-G	ND	3.	mg/kg d	03/28/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number 37735	**Sample Description** MW-7 S-2				
o-Terphenyl (Surr.)	WTPH-D	95	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	72	%	03/28/1995	SR
aaa-Trifluorotoluene (Surr.)	WTPH-G	78	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	127	%	03/28/1995	
Sample Number 37737	**Sample Description** MW-7 S-3C				
o-Terphenyl (Surr.)	WTPH-D	95	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	84	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	92	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	113	%	03/28/1995	
Sample Number 37739	**Sample Description** MW-6 S-2				
o-Terphenyl (Surr.)	WTPH-D	93	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	83	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	90	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	98	%	03/28/1995	
Sample Number 37742	**Sample Description** MW-8 S-2				
o-Terphenyl (Surr.)	WTPH-D	95	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	70	%	03/28/1995	SR
aaa-Trifluorotoluene (Surr.)	WTPH-G	76	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	102	%	03/28/1995	
Sample Number 37743	**Sample Description** RW-1 S-2				

te: Recovery limits for 8240, 8260, 8270, 624, 625 specified in method.
Gasoline, Diesel, HCID limits 50-150%. 8010/8020 limits 70-130%.

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number 37743	**Sample Description** RW-1 S-2				
o-Terphenyl (Surr.)	WTPH-D	105	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	80	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	90	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	115	%	03/28/1995	
Sample Number 37744	**Sample Description** MW-9 S-1				
o-Terphenyl (Surr.)	WTPH-D	96	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	88	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	96	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	105	%	03/28/1995	
Sample Number 37745	**Sample Description** MW-9 S-3				
o-Terphenyl (Surr.)	WTPH-D	95	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	80	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	88	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	93	%	03/28/1995	
Sample Number 37748	**Sample Description** MW-10 S-1				
o-Terphenyl (Surr.)	WTPH-D	91	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	88	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	96	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	118	%	03/28/1995	
Sample Number 37749	**Sample Description** MW-10 S-2				

Note: Recovery limits for 8240, 8260, 8270, 624, 625 specified in method.
Gasoline, Diesel, HCID limits 50-150%. 8010/8020 limits 70-130%.

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

03/31/1995
Job No.: 95.00846

Project Name: Time Oil - Richland
Date Received: 03/25/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
37749	MW-10 S-2				
o-Terphenyl (Surr.)	WTPH-D	93	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	76	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	82	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	110	%	03/28/1995	
Sample Number	**Sample Description**				
37750	MW-10 S-3				
o-Terphenyl (Surr.)	WTPH-D	89	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	82	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	88	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	118	%	03/28/1995	
Sample Number	**Sample Description**				
37751	MW-11 S-2				
o-Terphenyl (Surr.)	WTPH-D	109	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	80	%	03/28/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	88	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	118	%	03/28/1995	
Sample Number	**Sample Description**				
37752	MW-11 S-4				
o-Terphenyl (Surr.)	WTPH-D	95	%	03/31/1995	
aaa-Trifluorotoluene (Surr.)	8020	72	%	03/28/1995	SR
aaa-Trifluorotoluene (Surr.)	WTPH-G	77	%	03/28/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	114	%	03/28/1995	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 03/31/1995

NET Job Number: 95.00846

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
WTPH-Diesel (S)				
Diesel	794	758	95.5	03/31/1995
WTPH-Diesel (S)				
Diesel	794	755	95.1	03/31/1995
WTPH-Diesel (S)				
Diesel	794	766	96.5	03/31/1995
WTPH-Diesel (S)				
Diesel	794	763	96.1	03/31/1995
8020 BTEX (S)				
Benzene	20	18.6	93.0	03/28/1995
Toluene	20	18.2	91.0	03/28/1995
WTPH-GAS (S)				
Gasoline	700	655	93.6	03/28/1995

CCV - Continuing Calibration Verification

Note: Recovery limits for 8240, 8260, 8270, 8010, 8020, 624, 625 specified in method.
Gasoline, Diesel, 418.1, 418.1M limits 80-120%. Metals recovery limits 80-120%.

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 03/31/1995

NET Job Number: 95.00846

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Date Analyzed
WTPH-Diesel (S)				
Diesel	50	54.5	109.0	03/31/1995
WTPH-Diesel (S)				
Diesel	50	54.5	109.0	03/31/1995
8020 BTEX (S)				
Benzene	11.7	12.5	106.8	03/28/1995
Toluene	37.5	35.1	93.6	03/28/1995
8020 BTEX (S)				
Benzene	11.7	12.4	106.0	03/28/1995
Toluene	37.5	36.1	96.3	03/28/1995
WTPH-GAS (S)				
Gasoline	350	330	94.3	03/28/1995
WTPH-GAS (S)				
Gasoline	350	353	100.9	03/28/1995

LCS - Laboratory Control Standard

Note: Recovery limits for fuels 80-120%. 8010, 8020, 8240, 8260, 8270, 624, 625 specified in method.
Recovery limits for metals analyses 80-120%. 418.1 limits are 90-140%.

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 03/31/1995

Job Number: 95.00846

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
8020 BTEX (S)										
Benzene	2.2	ND	1.97	mg/kg	111.7	2.3	1.97	mg/kg	116.8	4.5
Toluene	6.2	ND	6.84	mg/kg	90.6	6.4	6.84	mg/kg	93.6	3.3
WTPH-GAS (S)										
Gasoline	62.2	ND	64.75	mg/kg	96.1	65.2	64.75	mg/kg	100.7	4.6

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

QUALITY CONTROL REPORT
BLANKS

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 03/31/1995

NET Job Number: 95.00846

Contact: Scott Sloan
Project: Time Oil - Richland
Location: S-1258-0

Analyte	Blank Analysis	MDL	Units	Date Analyzed
WTPH-Diesel (S)				
Diesel	ND	15	mg/Kg	03/31/1995
o-Terphenyl (Surr.)	99	-	%	03/31/1995
8020 BTEX (S)				
Benzene	ND	0.5	mg/Kg	03/28/1995
Toluene	ND	0.5	mg/Kg	03/28/1995
Ethylbenzene	ND	0.5	mg/Kg	03/28/1995
Xylenes, total	ND	0.5	mg/Kg	03/28/1995
aaa-Trifluorotoluene (Surr.)	70	-	%	03/28/1995
WTPH-GAS (S)				
Gasoline	ND	10	mg/Kg	03/28/1995
aaa-Trifluorotoluene (Surr.)	100	-	%	03/28/1995

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

QUALITY CONTROL REPORT
DUPLICATES

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 03/31/1995

Job Number: 95.00846

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	Original Analysis	Duplicate Analysis	Units	RPD	Date Analyzed	Flag
WTPH-Diesel (S)						
Diesel	1,800	1,900	mg/kg	6.5	03/31/1995	
WTPH-Diesel (S)						
Diesel	1,500	1,700	mg/kg	14.3	03/31/1995	
8020 BTEX (S)						
Benzene	ND	ND	mg/kg		03/28/1995	
Toluene	ND	ND	mg/kg		03/28/1995	
8020 BTEX (S)						
Benzene	ND	ND	mg/kg		03/28/1995	
Toluene	ND	ND	mg/kg		03/28/1995	
WTPH-GAS (S)						
Gasoline	ND	ND	mg/kg		03/28/1995	
WTPH-GAS (S)						
Gasoline	ND	ND	mg/kg		03/28/1995	

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

Explanation of Data Flags

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	The blank exhibited a positive result greater than the reporting limit for this compound.
C	The sample appears to contain a lighter hydrocarbon than gasoline.
D	The sample appears to extend to a heavier hydrocarbon range than gasoline.
E	The sample appears to extend to a lighter hydrocarbon range than diesel.
F	The sample appears to extend to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component comtamination.
H	The gasoline elution pattern for the sample is not typical.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
M	MS and/or MSD percent recovery exceeds control limits.
MR	The MS/MSD RPD is greater than 20%. The sample was re-extracted and re-analyzed with similar results. This is due to a matrix interference, likely a non-homogeneity of the sample.
P	A post digestion spike was analyzed, and recoveries are within control limits.
Q	Detection limits elevated due to sample matrix.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
W	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.

00289

AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

95.00846

CHAIN OF CUSTODY

PROJECT: RICHLAND JACKPOT	PROJECT No.: S-1258-0
CLIENT: TIME OIL CO.	PHONE No.:
PROJECT MANAGER: BRUCE WILLIAMS	PHONE No.: 509-325-0104
SAMPLER'S NAME (please print): GENE St. Godard	PHONE No.:
SAMPLER'S SIGNATURE: Gene M St Godard	

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP				HOLD
1. MW-7 S-1	3/20/95	13:20	S		1																				X
2. MW-7 S-2	3/20/95	13:45	S		1				X		X														
3. MW-7 S-3	3/20/95	14:15	S		1																				X
4. MW-7S-3C	3/20/95	14:40	S		1				X		X														
5. MW-6 S-1	3/21/95	11:00	S		1																				X
6. MW-6 S-2	3/21/95	11:25	S		1				X		X														
7. MW-6 S-3	3/21/95	11:45	S		1																				X
8. MW-8 S-1	3/21/95	7:40	S		1																				X
9. MW-8 S-2	3/21/95	8:10	S		1				X		X														
10. RW-1 S-2	3/23/95	16:45	S		1				X		X														

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

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

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Eric J Poli AGRA	3/24/95	3:15	1. Power / Fedex	3/24	1515
2.			2.		
3.			3.		

PAGE 1 OF _____

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DISTRIBUTION: White, Yellow - Laboratory, Pink - Originator

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AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

95.00846

CHAIN OF CUSTODY

PROJECT	PROJECT No.
Richland Jackpot	S-1258-0
CLIENT	PHONE No.
Time Oil Co.	
PROJECT MANAGER	PHONE No.
Bruce Williams	509-325-0104
SAMPLER'S NAME (please print)	PHONE No.
Gene St. Godard	
SAMPLER'S SIGNATURE	
Gene St. Godard	

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

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP				HOLD
1. MW-9 S-1	3/22/95	16:40	S		1				X		X														
2. MW-9 S-3	3/22/95	17:45	S		1				X		X														
3. MW-9 S-4	3/23/95	8:20	S		1																				X
4. MW-9 S-5	3/23/95	9:00	S		1																				X
5. MW-10 S-1	3/21/95	15:05	S		1				X		X														
6. MW-10 S-2	3/21/95	15:20	S		1				X		X														
7. MW-10 S-3	3/21/95	15:45	S		1				X		X														
8. MW-11 S-2	3/22/95	10:30	S		1				X		X														
9. MW-11 S-4	3/22/95	11:25	S		1				X		X														
10. MW-11 S-5	3/22/95	11:50	S		1				X		X						X							Broken	

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

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Eric J Poli AERA	3/24/95	3:15	1. Pam Power / Fedex	3/24	1515
2.			2.		
3.			3.		

PAGE 2 OF _____

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APPENDIX C

Groundwater Analysis - 1 February 1995

WTPH-G

Surrogate recoveries for Method WTPH-G were within the acceptance range for all groundwater samples submitted for analytical testing on 1 February 1995. Surrogate utilized for WTPH-G analysis was aaa-Trifluorotoluene. Laboratory Control Samples (LCS), Duplicate Samples and Laboratory Blank Samples results were within the acceptance level. Spike recovery and spike duplicate recovery were also reported within the acceptance level. AEE duplicate sample was within 100% of the split sample.

BTEX

Aromatic organic hydrocarbon surrogate, spike and spike duplicate recoveries were within the acceptance limit. Laboratory Control Samples, Duplicate Samples and Laboratory Blank Samples were within the acceptance level. Surrogate utilized in the 8020 analysis was aaa-Trifluorotoluene. AEE's duplicate sample submitted for analyses was also reported within the QA/QC allowable limits with benzene 74%, toluene 100%, ethylbenzene 100% and xylenes 90% with the duplicate sample consistently exhibiting higher analyte values.

WTPH-D Extended

Surrogate recoveries for Method WTPH-D Extended were within the acceptance range for all groundwater samples submitted. Surrogate utilized in Method WTPH-D Extended was 0-Terphenyl. Laboratory Control Samples, Duplicate Samples and Laboratory Blank Samples were within the acceptance levels. AEE's duplicate sample was within 85% for diesel range hydrocarbons and 100% for heavy oil range hydrocarbons.

EPA Methods 8260 (TCE and PCE)

Surrogate recoveries were within the acceptance level. Surrogates utilized in the 8260 Method were 1,2-Dichloroethane-d4, Toluene-d8 and Bromofluorobenzene. Laboratory Control Samples and Laboratory Blank Samples were run for all remaining analytes. All QA/QC analyses were within the acceptable limits.

Laboratory Testing Procedures

Soil samples were selected from each boring for analytical testing for a variety of analytes commonly associated with petroleum hydrocarbon fuels and oils. All analyses were performed by National Environmental Testing, Inc. of Portland, Oregon, under contract to Time Oil Co.. A brief description of each laboratory tests conducted is given below.

Gasoline Range Petroleum Hydrocarbons (WTPH-G)

The WTPH-G adapts EPA SW 846 Methods 5030 and 8020 to perform the analysis for gasoline in soils. The method involves extracting the soil samples with methanol, combining a portion of the extract with reagent water and analysis utilizing a purge/trap concentrator equipped gas chromatograph with FID detection. The reporting limit for gasoline is 1.0 parts per million (ppm) for soil and 0.001 ppm for groundwater. This method along with the prescribed detector will allow simultaneous determination of total gasoline with the listed target analytes (benzene, toluene, ethylbenzene and xylenes).

Benzene, Toluene, Ethylbenzene, and Xylene (BTEX)

Analytes are extracted from soil samples by mixing the sample in a solution of methanol. The sample and extracting solution are thoroughly mixed utilizing a mechanical shaker or sonicator. The extract is separated from the sample by filtration and analyzed utilizing a gas chromatograph coupled with a photoionization detector (PID). The PID is very specific for analysis of aromatic hydrocarbons.

Analytes are extracted from water samples using a purge-and-trap technique. The sample is held in a hollow "sparge" tube. A purified, inert gas (helium) is bubbled through the sample which efficiently extracts the purgeable organic analytes from the aqueous phase to the vapor. The gaseous mixture is then passed through a sorbent trap where the analytes are collected. After the extraction is complete, the trap is backflushed and heated which effectively desorbs the purgeable analytes from the trap and onto the gas chromatograph column.

Diesel Range Petroleum Hydrocarbons (WTPH-D)

The WTPH-D method covers the analysis for diesel in soils and groundwater (analogous to EPA Method 8015 Modified). The method involves extracting the soil samples with methylene chloride, filtering the extract through sodium sulfate and injection of a portion into a gas chromatograph equipped with a flame ionization detector (FID). The lower reporting limit is 10 ppm for soil and 0.25 ppm for groundwater.

Total Petroleum Hydrocarbons (WTPH-418.1)

Analytes are extracted from the sample by mixing the sample with a freon solution. The sample and extracting solution are thoroughly mixed utilizing a mechanical shaker or sonicator. The extract is then separated from the sample and analyzed by infrared spectrophotometry (IR). The freon extracting solution is used for both soil and water analyses. Method 418.1 allows detection of a wide variety of petroleum hydrocarbons. However, Method 418.1 is susceptible to interference by non-petroleum hydrocarbons and cannot distinguish between fuel types.

NATIONAL ENVIRONMENTAL TESTING, INC.

Portland Division
17400 SW Upper Boones Ferry Rd.
Suite #260
Portland, OR 97224
Tel: (503) 624-5449
Fax: (503) 639-6889

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 02/09/1995
NET Account No.: 60277
NET Job Number: 95.00301

Project: Time Oil - Richland, WA #01-052
Location: 12-1238-01

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
35580	MW-1	GROUND WATER	02/01/1995	02/03/1995
35581	MW-2	GROUND WATER	02/01/1995	02/03/1995
35582	MW-3	GROUND WATER	02/01/1995	02/03/1995
35583	MW-4	GROUND WATER	02/01/1995	02/03/1995
35584	MW-5	GROUND WATER	02/01/1995	02/03/1995
35585	VW-1	GROUND WATER	02/01/1995	02/03/1995
35586	MW-16	GROUND WATER	02/01/1995	02/03/1995

Approved by:

Marty French
NET, INC. Division Manager

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ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

02/09/1995
Job No.: 95.00301

Project Name: Time Oil - Richland, WA #01-052
Date Received: 02/03/1995

Sample Number 35580 — Sample Description MW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
LOW LEVEL VOLATILES - 8260 (W)						
Dilution Factor	8260	10			02/06/1995	
Trichloroethene	8260	ND	10.	ug/L	02/06/1995	
Tetrachloroethene	8260	ND	10.	ug/L	02/06/1995	
BTEX (W)						
Dilution Factor		25	-		02/03/1995	
Benzene	8020	39	10	ug/L	02/03/1995	
Toluene	8020	890	10	ug/L	02/03/1995	
Ethylbenzene	8020	430	10	ug/L	02/03/1995	
Xylenes	8020	3700	10	ug/L	02/03/1995	
WTPH-GAS (W)						
Dilution Factor		25	-		02/03/1995	
TPH-Gas	WTPH-G	30000	1,200	ug/L	02/03/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		02/07/1995	
WTPH - Diesel/MO (W)						
Dilution Factor		1			02/08/1995	
Diesel	WTPH-D	1,800	250	ug/L	02/08/1995	E
Heavy Oils	WTPH-D	ND	750	ug/L	02/08/1995	

Sample Number 35581 — Sample Description MW-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
LOW LEVEL VOLATILES - 8260 (W)						
Dilution Factor	8260	10			02/06/1995	
Trichloroethene	8260	ND	10.	ug/L	02/06/1995	
Tetrachloroethene	8260	ND	10.	ug/L	02/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

02/09/1995
Job No.: 95.00301

Project Name: Time Oil - Richland, WA #01-052
Date Received: 02/03/1995

Sample Number: 35581
Sample Description: MW-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		25	-		02/03/1995	
Benzene	8020	ND	10	ug/L	02/03/1995	
Toluene	8020	370	10	ug/L	02/03/1995	
Ethylbenzene	8020	250	10	ug/L	02/03/1995	
Xylenes	8020	2600	10	ug/L	02/03/1995	
WTPH-GAS (W)						
Dilution Factor		25	-		02/03/1995	
TPH-Gas	WTPH-G	15000	1,200	ug/L	02/03/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		02/07/1995	
WTPH - Diesel/MO (W)						
Dilution Factor		1			02/08/1995	
Diesel	WTPH-D	330	250	ug/L	02/08/1995	E
Heavy Oils	WTPH-D	ND	750	ug/L	02/08/1995	

Sample Number: 35582
Sample Description: MW-3

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		1	-		02/03/1995	
Benzene	8020	1.8	0.5	ug/L	02/03/1995	
Toluene	8020	ND	0.5	ug/L	02/03/1995	
Ethylbenzene	8020	2.0	0.5	ug/L	02/03/1995	
Xylenes	8020	ND	0.5	ug/L	02/03/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		02/03/1995	
TPH-Gas	WTPH-G	110	50	ug/L	02/03/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		02/07/1995	
WTPH - Diesel/MO (W)						
Dilution Factor		1			02/08/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

02/09/1995
Job No.: 95.00301

Project Name: Time Oil - Richland, WA #01-052
Date Received: 02/03/1995

Sample Number 35582 — Sample Description MW-3

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Diesel	WTPH-D	ND	250	ug/L	02/08/1995	
Heavy Oils	WTPH-D	ND	750	ug/L	02/08/1995	

Sample Number 35583 — Sample Description MW-4

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		25	-		02/03/1995	
Benzene	8020	38	10	ug/L	02/03/1995	
Toluene	8020	28	10	ug/L	02/03/1995	
Ethylbenzene	8020	300	10	ug/L	02/03/1995	
Xylenes	8020	660	10	ug/L	02/03/1995	
WTPH-GAS (W)						
Dilution Factor		25	-		02/03/1995	
TPH-Gas	WTPH-G	10000	1,200	ug/L	02/03/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		02/07/1995	
WTPH - Diesel/HO (W)						
Dilution Factor		1			02/08/1995	
Diesel	WTPH-D	610	250	ug/L	02/08/1995	E
Heavy Oils	WTPH-D	ND	750	ug/L	02/08/1995	

Sample Number 35584 — Sample Description MW-5

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
LOW LEVEL VOLATILES - 8260 (W)						
Dilution Factor	8260	1			02/06/1995	
Trichloroethene	8260	1.4	1.0	ug/L	02/06/1995	
Tetrachloroethene	8260	ND	1.0	ug/L	02/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

02/09/1995
Job No.: 95.00301

Project Name: Time Oil - Richland, WA #01-052
Date Received: 02/03/1995

Sample Number 35584 — Sample Description MW-5

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		1	-		02/06/1995	
Benzene	8020	ND	0.5	ug/L	02/06/1995	
Toluene	8020	ND	0.5	ug/L	02/06/1995	
Ethylbenzene	8020	ND	0.5	ug/L	02/06/1995	
Xylenes	8020	ND	0.5	ug/L	02/06/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		02/06/1995	
TPH-Gas	WTPH-G	ND	50	ug/L	02/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		02/07/1995	
WTPH - Diesel/HO (W)						
Dilution Factor		1			02/08/1995	
Diesel	WTPH-D	ND	250	ug/L	02/08/1995	
Heavy Oils	WTPH-D	ND	750	ug/L	02/08/1995	

Sample Number 35585 — Sample Description VW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
LOW LEVEL VOLATILES - 8260 (W)						
Dilution Factor	8260	1			02/06/1995	
Trichloroethene	8260	ND	1.0	ug/L	02/06/1995	
Tetrachloroethene	8260	ND	1.0	ug/L	02/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

02/09/1995
Job No.: 95.00301

Project Name: Time Oil - Richland, WA #01-052
Date Received: 02/03/1995

Sample Number: 35585
Sample Description: VW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		10	-		02/06/1995	
Benzene	8020	15	5.	ug/L	02/06/1995	
Toluene	8020	13	5.	ug/L	02/06/1995	
Ethylbenzene	8020	400	5.	ug/L	02/06/1995	
Xylenes	8020	1500	5.	ug/L	02/06/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		02/06/1995	
TPH-Gas	WTPH-G	16000	500	ug/L	02/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		02/07/1995	
WTPH - Diesel/HO (W)						
Dilution Factor		1			02/08/1995	
Diesel	WTPH-D	970	250	ug/L	02/08/1995	E
Heavy Oils	WTPH-D	ND	750	ug/L	02/08/1995	

Sample Number: 35586
Sample Description: MW-16

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		10	-		02/06/1995	
Benzene	8020	28	5.	ug/L	02/06/1995	
Toluene	8020	28	5.	ug/L	02/06/1995	
Ethylbenzene	8020	280	5.	ug/L	02/06/1995	
Xylenes	8020	600	5.	ug/L	02/06/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		02/06/1995	
TPH-Gas	WTPH-G	10000	500	ug/L	02/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		02/07/1995	
WTPH - Diesel/HO (W)						
Dilution Factor		1			02/08/1995	
Diesel	WTPH-D	520	250	ug/L	02/08/1995	E
Heavy Oils	WTPH-D	ND	750	ug/L	02/08/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

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SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

02/09/1995
Job No.: 95.00301

Project Name: Time Oil - Richland, WA #01-052
Date Received: 02/03/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
35580	MW-1				
1,2-Dichloroethane-d4	8260	86	%	02/06/1995	
Toluene-d8	8260	101	%	02/06/1995	
Bromofluorobenzene	8260	99	%	02/06/1995	
aaa-Trifluorotoluene (Surr.)	8020	101	%	02/03/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	96	%	02/03/1995	
o-Terphenyl (Surr.)		75	%	02/08/1995	
Sample Number	**Sample Description**				
35581	MW-2				
1,2-Dichloroethane-d4	8260	84	%	02/06/1995	
Toluene-d8	8260	102	%	02/06/1995	
Bromofluorobenzene	8260	98	%	02/06/1995	
aaa-Trifluorotoluene (Surr.)	8020	101	%	02/03/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	98	%	02/03/1995	
o-Terphenyl (Surr.)		73	%	02/08/1995	
Sample Number	**Sample Description**				
35582	MW-3				
aaa-Trifluorotoluene (Surr.)	8020	96	%	02/03/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	92	%	02/03/1995	
o-Terphenyl (Surr.)		79	%	02/08/1995	
Sample Number	**Sample Description**				
35583	MW-4				
aaa-Trifluorotoluene (Surr.)	8020	103	%	02/03/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	99	%	02/03/1995	
o-Terphenyl (Surr.)		83	%	02/08/1995	
Sample Number	**Sample Description**				
35584	MW-5				

Gasoline, Diesel, HCID limits 50-150%. 8010/8020 limits 70-130%.

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SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

02/09/1995
Job No.: 95.00301

Page: 8

Project Name: Time Oil - Richland, WA #01-052
Date Received: 02/03/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number 35584	**Sample Description** MW-5				
1,2-Dichloroethane-d4	8260	83	%	02/06/1995	
Toluene-d8	8260	100	%	02/06/1995	
Bromofluorobenzene	8260	93	%	02/06/1995	
aaa-Trifluorotoluene (Surr.)	8020	96	%	02/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	97	%	02/06/1995	
o-Terphenyl (Surr.)		87	%	02/08/1995	
Sample Number 35585	**Sample Description** VW-1				
1,2-Dichloroethane-d4	8260	81	%	02/06/1995	
Toluene-d8	8260	102	%	02/06/1995	
Bromofluorobenzene	8260	97	%	02/06/1995	
aaa-Trifluorotoluene (Surr.)	8020	100	%	02/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	98	%	02/06/1995	
o-Terphenyl (Surr.)		79	%	02/08/1995	
Sample Number 35586	**Sample Description** MW-16				
aaa-Trifluorotoluene (Surr.)	8020	99	%	02/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	99	%	02/06/1995	
o-Terphenyl (Surr.)		51	%	02/08/1995	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 02/09/1995

NET Job Number: 95.00301

Contact: Scott Sloan
Project: Time Oil - Richland, WA #01-052

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
LOW LEVEL VOLATILES - 8260 (W)				
1,1-Dichloroethene	50	51.2	102.4	02/06/1995
Benzene	50	52.4	104.8	02/06/1995
Trichloroethene	50	52.3	104.6	02/06/1995
Toluene	50	54.3	108.6	02/06/1995
Chlorobenzene	50	52.1	104.2	02/06/1995
BTEX (W)				
Benzene	20	19.6	98.0	02/03/1995
Toluene	20	19.2	96.0	02/03/1995
BTEX (W)				
Benzene	20	19.9	99.5	02/06/1995
Toluene	20	19.4	97.0	02/06/1995
WTPH-GAS (W)				
TPH-Gas	700	705	100.7	02/03/1995
WTPH-GAS (W)				
TPH-Gas	700	699	99.9	02/06/1995
WTPH - Diesel/HO (W)				
Diesel	871	836	96.0	02/08/1995
Heavy Oils	100	-		02/08/1995
WTPH - Diesel/HO (W)				
Diesel	871	945	108.5	02/08/1995
Heavy Oils	100	-		02/08/1995
WTPH - Diesel/HO (W)				
Diesel	871	842	96.7	02/08/1995
Heavy Oils	100	-		02/08/1995
WTPH - Diesel/HO (W)				
Diesel	871	837	96.1	02/08/1995
Heavy Oils	100	-		02/08/1995

CCV - Continuing Calibration Verification

Note: Recovery limits for 8240, 8260, 8270, 8010, 8020, 624, 625 specified in method. Gssoline, Diesel, 418.1, 418.1M limits 80-120%. Metals recovery limits 80-120%.

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QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 02/09/1995

NET Job Number: 95.00301

Contact: Scott Sloan
Project: Time Oil - Richland, WA #01-052

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Date Analyzed
LOW LEVEL VOLATILES - 8260 (W)				
1,1-Dichloroethene	50	50.9	101.8	02/06/1995
Benzene	50	52.8	105.6	02/06/1995
Trichloroethene	50	51.8	103.6	02/06/1995
Toluene	50	54.1	108.2	02/06/1995
Chlorobenzene	50	50.8	101.6	02/06/1995
BTEX (W)				
Benzene	11.7	12.0	102.6	02/03/1995
Toluene	37.5	38.3	102.1	02/03/1995
BTEX (W)				
Benzene	11.7	11.6	99.1	02/03/1995
Toluene	37.5	37.0	98.7	02/03/1995
BTEX (W)				
Benzene	11.7	11.4	97.4	02/06/1995
Toluene	37.5	36.0	96.0	02/06/1995
WTPH-GAS (W)				
TPH-Gas	350	321	91.7	02/03/1995
WTPH-GAS (W)				
TPH-Gas	350	309	88.3	02/03/1995
WTPH-GAS (W)				
TPH-Gas	350	315	90.0	02/06/1995
WTPH-GAS (W)				
TPH-Gas	350	301	86.0	02/06/1995
WTPH - Diesel/HO (W)				
Diesel	3,000	2,800	93.3	02/06/1995
WTPH - Diesel/HO (W)				
Diesel	3,000	2,500	83.3	02/06/1995

LCS - Laboratory Control Standard

Note: Recovery limits for fuels 80-120%. 8010, 8020, 8240, 8260, 8270, 624, 625 specified in method.
Recovery limits for metals analyses 80-120%. 418.1 limits are 90-140%.

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QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 02/09/1995

Job Number: 95.00301

Contact: Scott Sloan
Project: Time Oil - Richland, WA #01-052

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
LOW LEVEL VOLATILES - 8260										
1,1-Dichloroethene	49	ND	50	ug/L	98.0	52	50	ug/L	104.0	5.8
Benzene	52	ND	50	ug/L	104.0	54	50	ug/L	108.0	3.8
Trichloroethene	51	ND	50	ug/L	102.0	53	50	ug/L	106.0	3.8
Toluene	54	ND	50	ug/L	108.0	55	50	ug/L	110.0	1.8
Chlorobenzene	50	ND	50	ug/L	100.0	52	50	ug/L	104.0	3.9
BTEX (W)										
Benzene	1146	ND	1170	ug/L	97.9	1166	1170	ug/L	99.7	1.8
Toluene	3616	ND	3750	ug/L	96.4	3690	3750	ug/L	98.4	2.1
BTEX (W)										
Benzene	1124	ND	1170	ug/L	96.1	1149	1170	ug/L	98.2	2.2
Toluene	3599	ND	3750	ug/L	96.0	3635	3750	ug/L	96.9	0.9
WTPH-GAS (W)										
TPH-Gas	30600	ND	35000	ug/L	87.4	31400	35000	ug/L	89.7	2.6

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

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QUALITY CONTROL REPORT
BLANKS

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 02/09/1995

NET Job Number: 95.00301

Contact: Scott Sloan
Project: Time Oil - Richland, WA #01-052
Location: 12-1238-01

Analyte	Blank Analysis	MDL	Units	Date Analyzed
LOW LEVEL VOLATILES - 8260 (W)				
Trichloroethene	ND	1.0	ug/L	02/06/1995
Tetrachloroethene	ND	1.0	ug/L	02/06/1995
1,2-Dichloroethane-d4	93		%	02/06/1995
Toluene-d8	101		%	02/06/1995
Bromofluorobenzene	98		%	02/06/1995
BTEX (W)				
Benzene	ND	0.5	ug/L	02/03/1995
Toluene	ND	0.5	ug/L	02/03/1995
Ethylbenzene	ND	0.5	ug/L	02/03/1995
Xylenes	ND	0.5	ug/L	02/03/1995
aaa-Trifluorotoluene (Surr.)	99	-	%	02/03/1995
BTEX (W)				
Benzene	ND	0.5	ug/L	02/06/1995
Toluene	ND	0.5	ug/L	02/06/1995
Ethylbenzene	ND	0.5	ug/L	02/06/1995
Xylenes	ND	0.5	ug/L	02/06/1995
aaa-Trifluorotoluene (Surr.)	97	-	%	02/06/1995
WTPH-GAS (W)				
TPH-Gas	ND	50	ug/L	02/03/1995
aaa-Trifluorotoluene (Surr.)	99	-	%	02/03/1995
WTPH-GAS (W)				
TPH-Gas	ND	50	ug/L	02/06/1995
aaa-Trifluorotoluene (Surr.)	94	-	%	02/06/1995
WTPH - Diesel/HO (W)				
Diesel	ND	250	ug/L	02/06/1995
o-Terphenyl (Surr.)	81	-	%	02/06/1995
WTPH - Diesel/HO (W)				
Diesel	ND	20	ug/L	02/08/1995
Heavy Oils	ND	750	ug/L	02/08/1995
o-Terphenyl (Surr.)	96		%	02/08/1995

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

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QUALITY CONTROL REPORT
DUPLICATES

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 02/09/1995

Job Number: 95.00301

Contact: Scott Sloan
Project: Time Oil - Richland, WA #01-052

Analyte	Original Analysis	Duplicate Analysis	Units	RPD	Date Analyzed	Flag
WTPH - Diesel/HO (W)						
Diesel	500	600	ug/L	18.2	02/06/1995	
WTPH - Diesel/HO (W)						
Diesel	ND	ND	ug/L		02/06/1995	
Heavy Oils	ND	ND	ug/L		02/06/1995	

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

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Explanation of Data Flags

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	The blank exhibited a positive result greater than the reporting limit for this compound.
C	The sample appears to contain a lighter hydrocarbon than gasoline.
D	The sample appears to extend to a heavier hydrocarbon range than gasoline.
E	The sample appears to extend to a lighter hydrocarbon range than diesel.
F	The sample appears to extend to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component contamination.
H	The gasoline elution pattern for the sample is not typical.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
M	MS and/or MSD percent recovery exceeds control limits.
MR	The MS/MSD RPD is greater than 20%. The sample was re-extracted and re-analyzed with similar results. This is due to a matrix interference, likely a non-homogeneity of the sample.
P	A post digestion spike was analyzed, and recoveries are within control limits.
Q	Detection limits elevated due to sample matrix.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
W	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.

00262

AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

CHAIN OF CUSTODY

PROJECT: Time Oil - Richland	PROJECT No.: 12-1238-01
CLIENT: Time Oil - Scott Sloan	PHONE No.: (509) 325-0104
PROJECT MANAGER: Bruce Williams	PHONE No.:
SAMPLER'S NAME (please print): Bruce Williams	PHONE No.:
SAMPLER'S SIGNATURE: Bruce Williams	

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

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS 1-Liter	CONTAINERS 40ml	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	TCE / PCE			
1. MW-1	2/1/95	1300	W	HCL	2				X		X											X			
2. MW-2		1230			1				X		X											X			
3. MW-3		1310			2				X		X														
4. MW-4		1400			2				X		X														
5. MW-5		1215			2	6			X		X											X			
6. VW-1		1130 ~~1220~~			1	6			X		X											X			
7. MW-16	↓	~~1300~~ 1415	↓		2				X		X														
8.																									
9.																									
10.																									

SAMPLE RECEIPT	LABORATORY: NET	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR ☐ 24 HOUR ☒ 1 WEEK (Standard) ☐ 2 WEEK (standard) ☐ OTHER _____	
CONDITION OF CONTAINERS	CARRIER		
CONDITION OF SEALS	DOT DESIGNATION		

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Bruce Williams	2/2/95	1330	1.		
2. Fed-Ex	2-2	~~1500~~ 1550	2.		
3.			3.		

PAGE _____ OF _____

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

DISTRIBUTION: White, Yellow - Laboratory, Pink - Originator

APPENDIX D

Groundwater Analysis - 4 April 1995

WTPH-G

Surrogate recoveries for Method WTPH-G were within the acceptance range for all groundwater samples submitted for analytical testing. Surrogate utilized for Method WTPH-G was aaa-Trifluorotoluene. Laboratory Control Samples (LCS), Duplicate Samples and Laboratory Blank Samples results were within the acceptance level. Spike recovery and spike duplicate recovery were also reported within the acceptance level. AEE's duplicate samples were within 68% for MW-13. No detectable WTPH-G concentrations were found in AEE's rinsate sample (MW-12).

BTEX

Aromatic organic hydrocarbon surrogate, spike and spike duplicate recoveries were within the acceptance limit. Surrogate utilized in the 8020 analysis was aaa-Trifluorotoluene. Laboratory Control Samples, Duplicate Samples and Laboratory Blank Samples were within the acceptance level. AEE's duplicate sample submitted for analyses was also reported within the allowable QA/QC limits. Rinsate sample MW-12 was non-detectable for all analytes. Duplicate sample MW-13 exhibited acceptable limits of benzene (87%), toluene (78%), ethylbenzene (86%) and xylenes (79%) with the duplicate sample consistently higher for all analytes.

WTPH-D Extended

Surrogate recoveries for Method WTPH-D were within the acceptance range for all groundwater samples submitted. Surrogate utilized in Method WTPH-D Extended was 0-Terphenyl. Laboratory Control Samples, Duplicate Samples and Laboratory Blank Samples were within the acceptance level. AEE's duplicate sample was within 100% for diesel range hydrocarbons in sample MW-13. Rinsate sample MW-12 was not analyzed for diesel compounds.

EPA Methods 8260 (TCE and PCE)

Surrogate recoveries were within the acceptance level. Surrogates utilized in the 8260 Method were 1,2-Dichloroethane-d4, Toluene-d8 and Bromofluorobenzene. Laboratory Control Samples and Laboratory Blank Samples were run for all remaining analytes. All QA/QC analyses were within the acceptable limits. AEE's duplicate sample MW-13 was within 100%. No detectable levels of TCE and PCE were found in AEE's rinsate sample.

NATIONAL ENVIRONMENTAL TESTING, INC.

Portland Division
17400 SW Upper Boones Ferry Rd.
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Portland, OR 97224
Tel: (503) 624-5449
Fax: (503) 639-6889

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/11/1995
NET Account No.: 60277
NET Job Number: 95.00963

Project: Time Oil - Richland
Location: 12-1238

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
38189	MW-1	GROUND WATER	04/04/1995	04/06/1995
38190	MW-2	GROUND WATER	04/04/1995	04/06/1995
38191	MW-3	GROUND WATER	04/03/1995	04/06/1995
38192	MW-4	GROUND WATER	04/03/1995	04/06/1995
38193	MW-5	GROUND WATER	04/03/1995	04/06/1995
38194	MW-6	GROUND WATER	04/03/1995	04/06/1995
38195	MW-7	GROUND WATER	04/03/1995	04/06/1995
38196	MW-8	GROUND WATER	04/03/1995	04/06/1995
38197	MW-9	GROUND WATER	04/03/1995	04/06/1995
38198	MW-10	GROUND WATER	04/03/1995	04/06/1995
38199	MW-11	GROUND WATER	04/04/1995	04/06/1995
38200	MW-12	GROUND WATER	04/03/1995	04/06/1995
38201	MW-13	GROUND WATER	04/04/1995	04/06/1995
38202	SW-1	GROUND WATER	04/03/1995	04/06/1995
38203	RW-1	GROUND WATER	04/04/1995	04/06/1995

NOTE: Several of the diesel results below are flagged with an E flag. This means that the diesel patterns were not typical of diesel, and appeared to be lighter than standard diesel. Many of the samples seemed to look like kerosene or mineral spirits.

Approved by:

Marty French
NET, INC. Division Manager

OCEAN GROUP

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38189 — Sample Description: MW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	5			04/07/1995	
Trichloroethene	8260	ND	5.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	5.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		10	-		04/06/1995	
Benzene	8020	53	5.	ug/L	04/06/1995	
Toluene	8020	850	5.	ug/L	04/06/1995	
Ethylbenzene	8020	430	5.	ug/L	04/06/1995	
Xylenes	8020	3000	5.	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/06/1995	
TPH-Gas	WTPH-G	26000	500	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	1,300	250	ug/L	04/10/1995	E

Sample Number 38190 — Sample Description: MW-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	5			04/07/1995	
Trichloroethene	8260	ND	5.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	5.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	12	0.5	ug/L	04/06/1995	
Toluene	8020	390	5.0	ug/L	04/06/1995	
Ethylbenzene	8020	260	5.0	ug/L	04/06/1995	
Xylenes	8020	2800	5.0	ug/L	04/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38190 — Sample Description MW-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
WTPH-GAS (W)						
Dilution Factor		10	-		04/06/1995	
TPH-Gas	WTPH-G	14000	500	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	720	250	ug/L	04/10/1995	E

Sample Number 38191 — Sample Description MW-3

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	1.2	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	6.7	0.5	ug/L	04/06/1995	
Toluene	8020	2.9	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	30	0.5	ug/L	04/06/1995	
Xylenes	8020	4.4	0.5	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		04/06/1995	
TPH-Gas	WTPH-G	780	50	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	ND	250	ug/L	04/10/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number: 38192
Sample Description: MW-4

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	5			04/07/1995	
Trichloroethene	8260	ND	5.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	5.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	42	0.5	ug/L	04/06/1995	
Toluene	8020	77	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	560	5.0	ug/L	04/06/1995	
Xylenes	8020	2400	5.0	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/06/1995	
TPH-Gas	WTPH-G	25000	500	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	1,100	250	ug/L	04/10/1995	E

Sample Number: 38193
Sample Description: MW-5

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	ND	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	ND	0.5	ug/L	04/06/1995	
Toluene	8020	ND	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	ND	0.5	ug/L	04/06/1995	
Xylenes	8020	ND	0.5	ug/L	04/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38193 — Sample Description MW-5

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
WTPH-GAS (W)						
Dilution Factor		1	-		04/06/1995	
TPH-Gas	WTPH-G	ND	50	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	ND	250	ug/L	04/10/1995	

Sample Number 38194 — Sample Description MW-6

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	ND	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	2.5	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	ND	0.5	ug/L	04/06/1995	
Toluene	8020	0.63	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	ND	0.5	ug/L	04/06/1995	
Xylenes	8020	0.95	0.5	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		04/06/1995	
TPH-Gas	WTPH-G	ND	50	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	ND	250	ug/L	04/10/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38195 — Sample Description: MW-7

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	5			04/07/1995	
Trichloroethene	8260	ND	5.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	5.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		10	-		04/06/1995	
Benzene	8020	72	5.	ug/L	04/06/1995	
Toluene	8020	470	5.	ug/L	04/06/1995	
Ethylbenzene	8020	1400	5.	ug/L	04/06/1995	
Xylenes	8020	6400	5.	ug/L	04/06/1995	J
WTPH-GAS (W)						
Dilution Factor		10	-		04/06/1995	
TPH-Gas	WTPH-G	36000	500	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	2,000	250	ug/L	04/10/1995	R

Sample Number 38196 — Sample Description: MW-8

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	ND	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	2.7	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	ND	0.5	ug/L	04/06/1995	
Toluene	8020	ND	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	ND	0.5	ug/L	04/06/1995	
Xylenes	8020	ND	0.5	ug/L	04/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
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04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38196 — Sample Description MW-8

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
WTPH-GAS (W)						
Dilution Factor		1	-		04/06/1995	
TPH-Gas	WTPH-G	ND	50	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	ND	250	ug/L	04/10/1995	

Sample Number 38197 — Sample Description MW-9

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	ND	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	3.7	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	ND	0.5	ug/L	04/06/1995	
Toluene	8020	ND	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	ND	0.5	ug/L	04/06/1995	
Xylenes	8020	ND	0.5	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		04/06/1995	
TPH-Gas	WTPH-G	ND	50	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	ND	250	ug/L	04/10/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

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04/11/1995
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Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38198 — Sample Description: MW-10

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	5			04/07/1995	
Trichloroethene	8260	ND	5.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	5.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		10	-		04/06/1995	
Benzene	8020	57	5.	ug/L	04/06/1995	
Toluene	8020	34	5.	ug/L	04/06/1995	
Ethylbenzene	8020	620	5.	ug/L	04/06/1995	
Xylenes	8020	1500	5.	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/06/1995	
TPH-Gas	WTPH-G	20000	500	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	660	250	ug/L	04/10/1995	E

Sample Number 38199 — Sample Description: MW-11

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	ND	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	2.5	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	ND	0.5	ug/L	04/06/1995	
Toluene	8020	2.4	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	4.4	0.5	ug/L	04/06/1995	
Xylenes	8020	15	0.5	ug/L	04/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

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Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number	Sample Description
38199	MW-11

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
WTPH-GAS (W)						
Dilution Factor		10	-		04/06/1995	
TPH-Gas	WTPH-G	7400	500	ug/L	04/06/1995	

Sample Number	Sample Description
38200	MW-12

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	ND	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	ND	0.5	ug/L	04/06/1995	
Toluene	8020	ND	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	ND	0.5	ug/L	04/06/1995	
Xylenes	8020	ND	0.5	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		04/06/1995	
TPH-Gas	WTPH-G	ND	50	ug/L	04/06/1995	

Sample Number	Sample Description
38201	MW-13

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	5			04/07/1995	
Trichloroethene	8260	ND	5.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	5.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		100	-		04/06/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
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04/11/1995
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Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38201 — Sample Description: MW-13

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Benzene	8020	55	50	ug/L	04/06/1995	
Toluene	8020	180	50	ug/L	04/06/1995	
Ethylbenzene	8020	1400	50	ug/L	04/06/1995	
Xylenes	8020	7700	50	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		100	-		04/06/1995	
TPH-Gas	WTPH-G	65000	5,000	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	2,700	250	ug/L	04/10/1995	E

Sample Number 38202 — Sample Description: SW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	1			04/07/1995	
Trichloroethene	8260	ND	1.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	1.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		1	-		04/06/1995	
Benzene	8020	ND	0.5	ug/L	04/06/1995	
Toluene	8020	ND	0.5	ug/L	04/06/1995	
Ethylbenzene	8020	0.82	0.5	ug/L	04/06/1995	
Xylenes	8020	11	0.5	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		04/06/1995	
TPH-Gas	WTPH-G	710	50	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

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04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

Sample Number 38202 — Sample Description SW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Diesel	WTPH-D	ND	250	ug/L	04/10/1995	

Sample Number 38203 — Sample Description RW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
HALOGENATED ORGANICS GC/MS (W)						
Dilution Factor	8260	5			04/07/1995	
Trichloroethene	8260	ND	5.0	ug/L	04/07/1995	
Tetrachloroethene	8260	ND	5.0	ug/L	04/07/1995	
BTEX (W)						
Dilution Factor		10	-		04/06/1995	
Benzene	8020	48	5.	ug/L	04/06/1995	
Toluene	8020	140	5.	ug/L	04/06/1995	
Ethylbenzene	8020	1200	5.	ug/L	04/06/1995	
Xylenes	8020	6100	5.	ug/L	04/06/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/06/1995	
TPH-Gas	WTPH-G	44000	500	ug/L	04/06/1995	
WTPH-Diesel (W) PREP	WTPH-D	-	-		04/07/1995	
WTPH-Diesel (W)						
Dilution Factor		-	-		04/10/1995	
Diesel	WTPH-D	2,700	250	ug/L	04/10/1995	E

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/11/1995
Job No.: 95.00963

Project Name: Time Oil - Richland
Date Received: 04/06/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number 38189	**Sample Description** MW-1				
1,2-DCA-d4 (Surr.)	8260	93	%	04/07/1995	
Toluene-d8 (Surr)	8260	98	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	97	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	103	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	104	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	75	%	04/10/1995	
Sample Number 38190	**Sample Description** MW-2				
1,2-DCA-d4 (Surr.)	8260	92	%	04/07/1995	
Toluene-d8 (Surr)	8260	98	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	96	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	112	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	115	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	93	%	04/10/1995	
Sample Number 38191	**Sample Description** MW-3				
1,2-DCA-d4 (Surr.)	8260	98	%	04/07/1995	
Toluene-d8 (Surr)	8260	103	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	101	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	99	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	99	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	80	%	04/10/1995	
Sample Number 38192	**Sample Description** MW-4				
1,2-DCA-d4 (Surr.)	8260	90	%	04/07/1995	
Toluene-d8 (Surr)	8260	98	%	04/07/1995	

Note: Recovery limits for 8240, 8260, 8270, 624, 625 specified in method.
Gasoline, Diesel, HCID limits 50-150%. 8010/8020 limits 70-130%.

SURROGATE REPORT

Scott Sloan
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04/11/1995
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Project Name: Time Oil - Richland
Date Received: 04/06/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number 38192	**Sample Description** MW-4				
Bromofluorobenzene (Surr)	8260	96	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	132	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	84	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	83	%	04/10/1995	
Sample Number 38193	**Sample Description** MW-5				
1,2-DCA-d4 (Surr.)	8260	99	%	04/07/1995	
Toluene-d8 (Surr)	8260	100	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	100	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	100	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	102	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	89	%	04/10/1995	
Sample Number 38194	**Sample Description** MW-6				
1,2-DCA-d4 (Surr.)	8260	91	%	04/07/1995	
Toluene-d8 (Surr)	8260	98	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	97	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	100	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	101	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	81	%	04/10/1995	
Sample Number 38195	**Sample Description** MW-7				
1,2-DCA-d4 (Surr.)	8260	89	%	04/07/1995	
Toluene-d8 (Surr)	8260	98	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	95	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	107	%	04/06/1995	

Note: Recovery limits for 8240, 8260, 8270, 624, 625 specified in method.
Gasoline, Diesel, HCID limits 50-150%. 8010/8020 limits 70-130%.

SURROGATE REPORT

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SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number 38195	**Sample Description** MW-7				
aaa-Trifluorotoluene (Surr.)	WTPH-G	107	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	82	%	04/10/1995	
Sample Number 38196	**Sample Description** MW-8				
1,2-DCA-d4 (Surr.)	8260	97	%	04/07/1995	
Toluene-d8 (Surr)	8260	100	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	99	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	100	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	103	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	75	%	04/10/1995	
Sample Number 38197	**Sample Description** MW-9				
1,2-DCA-d4 (Surr.)	8260	100	%	04/07/1995	
Toluene-d8 (Surr)	8260	100	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	99	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	98	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	102	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	75	%	04/10/1995	
Sample Number 38198	**Sample Description** MW-10				
1,2-DCA-d4 (Surr.)	8260	93	%	04/07/1995	
Toluene-d8 (Surr)	8260	99	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	96	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	111	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	111	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	69	%	04/10/1995	

SURROGATE REPORT

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04/11/1995
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Project Name: Time Oil - Richland
Date Received: 04/06/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number 38199	**Sample Description** MW-11				
1,2-DCA-d4 (Surr.)	8260	102	%	04/07/1995	
Toluene-d8 (Surr)	8260	107	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	101	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	123	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	104	%	04/06/1995	
Sample Number 38200	**Sample Description** MW-12				
1,2-DCA-d4 (Surr.)	8260	97	%	04/07/1995	
Toluene-d8 (Surr)	8260	101	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	100	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	96	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	100	%	04/06/1995	
Sample Number 38201	**Sample Description** MW-13				
1,2-DCA-d4 (Surr.)	8260	92	%	04/07/1995	
Toluene-d8 (Surr)	8260	99	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	95	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	104	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	104	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	87	%	04/10/1995	
Sample Number 38202	**Sample Description** SW-1				
1,2-DCA-d4 (Surr.)	8260	93	%	04/07/1995	
Toluene-d8 (Surr)	8260	99	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	98	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	92	%	04/06/1995	

Note: Recovery limits for 8240, 8260, 8270, 624, 625 specified in method.
Gasoline, Diesel, HCID limits 50-150%. 8010/8020 limits 70-130%.

SURROGATE REPORT

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Project Name: Time Oil - Richland
Date Received: 04/06/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
38202	SW-1				
aaa-Trifluorotoluene (Surr.)	WTPH-G	93	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	75	%	04/10/1995	
Sample Number	**Sample Description**				
38203	RW-1				
1,2-DCA-d4 (Surr.)	8260	87	%	04/07/1995	
Toluene-d8 (Surr)	8260	99	%	04/07/1995	
Bromofluorobenzene (Surr)	8260	97	%	04/07/1995	
aaa-Trifluorotoluene (Surr.)	8020	112	%	04/06/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	111	%	04/06/1995	
o-Terphenyl (Surr.)	WTPH-D	81	%	04/10/1995	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/11/1995

NET Job Number: 95.00963

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
HALOGENATED ORGANICS GC/MS (W)				
Trichloroethene	50	51.2	102.4	04/07/1995
BTEX (W)				
Benzene	20	20.7	103.5	04/06/1995
Toluene	20	20.4	102.0	04/06/1995
WTPH-GAS (W)				
TPH-Gas	700	667	95.3	04/06/1995
WTPH-Diesel (W)				
Diesel	794	856	107.8	04/10/1995
WTPH-Diesel (W)				
Diesel	794	851	107.2	04/10/1995
WTPH-Diesel (W)				
Diesel	794	895	112.7	04/10/1995
WTPH-Diesel (W)				
Diesel	794	829	104.4	04/10/1995
WTPH-Diesel (W)				
Diesel	794	856	107.8	04/10/1995
WTPH-Diesel (W)				
Diesel	794	851	107.2	04/10/1995
WTPH-Diesel (W)				
Diesel	794	895	112.7	04/10/1995
WTPH-Diesel (W)				
Diesel	794	829	104.4	04/10/1995

CCV - Continuing Calibration Verification

Note: Recovery limits for 8240, 8260, 8270, 8010, 8020, 624, 625 specified in method.
Gasoline, Diesel, 418.1, 418.1M limits 80-120%. Metals recovery limits 80-120%.

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/11/1995

NET Job Number: 95.00963

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Date Analyzed
HALOGENATED ORGANICS GC/MS (W)				
Trichloroethene	50	48.9	97.8	04/07/1995
BTEX (W)				
Benzene	12.7	12.9	101.6	04/06/1995
Toluene	38.4	40.0	104.2	04/06/1995
BTEX (W)				
Benzene	12.7	12.9	101.6	04/06/1995
Toluene	38.4	39.5	102.9	04/06/1995
WTPH-GAS (W)				
TPH-Gas	350	399	114.0	04/06/1995
WTPH-GAS (W)				
TPH-Gas	350	380	108.6	04/06/1995
WTPH-Diesel (W)				
Diesel	2,480	2,960	119.4	04/04/1995
WTPH-Diesel (W)				
Diesel	2,480	2,330	94.0	04/04/1995

LCS - Laboratory Control Standard

Note: Recovery limits for fuels 80-120%. 8010, 8020, 8240, 8260, 8270, 624, 625 specified in method. Recovery limits for metals analyses 80-120%. 418.1 limits are 90-140%.

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/11/1995

Job Number: 95.00963

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
HALOGENATED ORGANICS GC/MS										
Trichloroethene	53	ND	50	ug/L	106.0	52	50	ug/L	104.0	1.9
BTEX (W)										
Benzene	1277	6.7	1270	ug/L	100.0	1303	1270	ug/L	102.1	2.1
Toluene	3848	2.9	3840	ug/L	100.1	3991	3840	ug/L	103.9	3.7

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

QUALITY CONTROL REPORT
BLANKS

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/11/1995

NET Job Number: 95.00963

Contact: Scott Sloan
Project: Time Oil - Richland
Location: 12-1238

Analyte	Blank Analysis	MDL	Units	Date Analyzed
HALOGENATED ORGANICS GC/MS (W)				
Trichloroethene	ND	1.0	ug/L	04/07/1995
Tetrachloroethene	ND	1.0	ug/L	04/07/1995
1,2-DCA-d4 (Surr.)	100		%	04/07/1995
Toluene-d8 (Surr)	100		%	04/07/1995
Bromofluorobenzene (Surr)	99		%	04/07/1995
BTEX (W)				
Benzene	ND	0.5	ug/L	04/06/1995
Toluene	ND	0.5	ug/L	04/06/1995
Ethylbenzene	ND	0.5	ug/L	04/06/1995
Xylenes	ND	0.5	ug/L	04/06/1995
aaa-Trifluorotoluene (Surr.)	101	-	%	04/06/1995
WTPH-GAS (W)				
TPH-Gas	ND	50	ug/L	04/06/1995
aaa-Trifluorotoluene (Surr.)	100	-	%	04/06/1995
WTPH-Diesel (W)				
Diesel	ND	250	ug/L	04/10/1995
o-Terphenyl (Surr.)	75	-	%	04/10/1995
WTPH-Diesel (W)				
Diesel	ND	50	ug/L	04/04/1995
o-Terphenyl (Surr.)	87		%	04/04/1995
WTPH-Diesel (W)				
Diesel	ND	250	ug/L	04/10/1995
o-Terphenyl (Surr.)	74	-	%	04/10/1995

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

QUALITY CONTROL REPORT
DUPLICATES

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/11/1995

Job Number: 95.00963

Contact: Scott Sloan
Project: Time Oil - Richland

Analyte	Original Analysis	Duplicate Analysis	Units	RPD	Date Analyzed	Flag
WTPH-Diesel (W)						
Diesel	270	310	ug/L	13.8	03/30/1995	B1
WTPH-Diesel (W)						
Diesel	1,500	1,400	ug/L	6.9	03/30/1995	
WTPH-Diesel (W)						
Diesel	ND	ND	ug/L		04/10/1995	
WTPH-Diesel (W)						
Diesel	ND	ND	ug/L		04/04/1995	

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

Explanation of Data Flags

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	The blank exhibited a positive result greater than the reporting limit for this compound.
C	The sample appears to contain a lighter hydrocarbon than gasoline.
D	The sample appears to extend to a heavier hydrocarbon range than gasoline.
E	The sample appears to extend to a lighter hydrocarbon range than diesel.
F	The sample appears to extend to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component comtamination.
H	The gasoline elution pattern for the sample is not typical.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
M	MS and/or MSD percent recovery exceeds control limits.
MR	The MS/MSD RPD is greater than 20%. The sample was re-extracted and re-analyzed with similar results. This is due to a matrix interference, likely a non-homogeneity of the sample.
P	A post digestion spike was analyzed, and recoveries are within control limits.
Q	Detection limits elevated due to sample matrix.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
W	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.

AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

00105

CHAIN OF CUSTODY

PROJECT: Time Oil - Richland	PROJECT No.: 12-1238
CLIENT: Scott Sloan - Time Oil	PHONE No.: 206 286-6457
PROJECT MANAGER: Bruce Williams	PHONE No.: 509 325-0104
SAMPLER'S NAME (please print): Bruce Williams / Scot Orardick	PHONE No.:
SAMPLER'S SIGNATURE:	

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

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS VOA	CONTAINERS 1-Liter
1. MW-11	4-4-95	0805	W	HCl-40ml	3	
2. MW-12	4-3-95	1400			3	
3. MW-13	4-4-95	1000			1	1
4. SW-1	4-3-95	1525			3	1
5. RW-1	4-4-95	0950			2	1
6.						
7.						
8.						
9.						
10.						

BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	TCE/PCE by EPA 8010			
		X																
		X													X			
		X		X											X			
		X		X											X			
		X		X											X			
															X			

SAMPLE RECEIPT	LABORATORY: NET	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	TCE/PCE Detection limits must be less than 5 ppb
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR X 1 WEEK (Std) ☐ 2 WEEK (standard)	cooler 8°C
CONDITION OF SEALS	DOT DESIGNATION	☐ OTHER	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1.	4-5-95	1500	1.		
2. Fed Exp	11	1538	2. Cindy Richardson	4/6/95	10:00
3.			3.		

PAGE 2 OF 2

AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

00106

CHAIN OF CUSTODY

PROJECT: Time Oil - Richland	PROJECT No.: 12-1238
CLIENT: Sloan Sloan - Time Oil	PHONE No.: 206 286-6457
PROJECT MANAGER: Bruce Williams	PHONE No.: 509 325-0104
SAMPLER'S NAME (please print): Bruce Williams/Scot Overdeck	PHONE No.:
SAMPLER'S SIGNATURE:	

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

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS VOA No.	CONTAINERS 1-QT. VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	TCE/PCE by EPA 8010
1. MW-1	4-4-95	1030	W	HCl-40ml	3	1			X		X											X
2. MW-2	4-4-95	1100			4	1			X		X											X
3. MW-3	4-3-95	1120			2	1			X		X											X
4. MW-4	4-3-95	1530			3	1			X		X											X
5. MW-5	4-3-95	1140			3	1			X		X											X
6. MW-6	4-3-95	1240			2	1			X		X											X
7. MW-7	4-3-95	1320			4	1			X		X											X
8. MW-8	4-3-95	1230			3	1			X		X											X
9. MW-9	4-3-95	1000			3	1			X		X											X
10. MW-10	4-3-95	1325			2	1			X		X											X

SAMPLE RECEIPT	LABORATORY: NET	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR ☐ 24 HOUR ☒ 1 WEEK (Std.) ☐ 2 WEEK (standard) ☐ OTHER _____	Detection limits for PCE/TCE must be less than 5 ppb.
CONDITION OF CONTAINERS	CARRIER		
CONDITION OF SEALS	DOT DESIGNATION		

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Bruce Williams	4-5-95	1500	1.		
2. Fed Exp	4-5-95	1530	2. Cindy Richardson	4/6/95	10:00
3.			3.		

00121-90C

PAGE 1 OF 2

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DISTRIBUTION: White, Yellow - Laboratory, Pink - Originator

APPENDIX E

NATIONAL ENVIRONMENTAL TESTING, INC.

Portland Division
17400 SW Upper Boones Ferry Rd.
Suite #260
Portland, OR 97224
Tel: (503) 624-5449
Fax: (503) 639-6889

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995
NET Account No.: 60277
NET Job Number: 95.01089

Project: Time Oil - Richland JP
Location: 5-1238-2

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
38623	SW-1 (4/19/95)	GROUND WATER	04/19/1995	04/21/1995
38624	RW-1 (4/19/95)	GROUND WATER	04/19/1995	04/21/1995
38625	MW-4 (4/19/95)	GROUND WATER	04/19/1995	04/21/1995
38626	MW-7 (4/19/95)	GROUND WATER	04/19/1995	04/21/1995
38627	SW-1 (4/20/95)	GROUND WATER	04/20/1995	04/21/1995
38628	RW-1 (4/20/95)	GROUND WATER	04/20/1995	04/21/1995
38629	MW-4 (4/20/95)	GROUND WATER	04/20/1995	04/21/1995
38630	MW-7 (4/20/95)	GROUND WATER	04/20/1995	04/21/1995
38631	MW-7VT (4/20/95)	GROUND WATER	04/20/1995	04/21/1995
38640	MW-4 (4/20/95) TOTAL	GROUND WATER	04/20/1995	04/21/1995

Approved by:

Marty French
NET, INC. Division Manager

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

Sample Number 38623 — Sample Description: SW-1 (4/19/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic Diss, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, diss ICP	6010	51	0.05	mg/L	04/26/1995	
Chromium, diss. ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, diss. ICP	6010	0.012	0.01	mg/L	04/26/1995	
Lead, Dissolved, ICP	6010	ND	0.005	mg/L	04/26/1995	
Magnesium, diss. ICP	6010	15	0.05	mg/L	04/26/1995	
Manganese, diss. ICP	6010	0.240	0.005	mg/L	04/26/1995	
Zinc, diss. ICP	6010	0.024	0.005	mg/L	04/26/1995	
BTEX (W)						
Dilution Factor		1	-		04/21/1995	
Benzene	8020	ND	0.5	ug/L	04/21/1995	
Toluene	8020	ND	0.5	ug/L	04/21/1995	
Ethylbenzene	8020	ND	0.5	ug/L	04/21/1995	
Xylenes	8020	ND	0.5	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		04/21/1995	
TPH-Gas	WTPH-G	ND	50	ug/L	04/21/1995	

Sample Number 38624 — Sample Description: RW-1 (4/19/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic Diss, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, diss ICP	6010	55	0.05	mg/L	04/26/1995	
Chromium, diss. ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, diss. ICP	6010	0.089	0.01	mg/L	04/26/1995	
Lead, Dissolved, ICP	6010	ND	0.005	mg/L	04/26/1995	
Magnesium, diss. ICP	6010	20	0.05	mg/L	04/26/1995	
Manganese, diss. ICP	6010	0.560	0.005	mg/L	04/26/1995	
Zinc, diss. ICP	6010	0.050	0.005	mg/L	04/26/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

Sample Number 38624 — Sample Description: RW-1 (4/19/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		25	-		04/21/1995	
Benzene	8020	55	10	ug/L	04/21/1995	
Toluene	8020	86	10	ug/L	04/21/1995	
Ethylbenzene	8020	760	10	ug/L	04/21/1995	
Xylenes	8020	4100	10	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		25	-		04/21/1995	
TPH-Gas	WTPH-G	38000	1,200	ug/L	04/21/1995	

Sample Number 38625 — Sample Description: MW-4 (4/19/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, ICP	6010	64	0.05	mg/L	04/26/1995	
Chromium, ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, ICP	6010	3.20	0.01	mg/L	04/26/1995	
Lead, ICP	6010	ND	0.005	mg/L	04/26/1995	
Magnesium, ICP	6010	26	0.05	mg/L	04/26/1995	
Manganese, ICP	6010	0.550	0.005	mg/L	04/26/1995	
Zinc, ICP	6010	0.014	0.005	mg/L	04/26/1995	
BTEX (W)						
Dilution Factor		10	-		04/21/1995	
Benzene	8020	22	5.	ug/L	04/21/1995	
Toluene	8020	13	5.	ug/L	04/21/1995	
Ethylbenzene	8020	130	5.	ug/L	04/21/1995	
Xylenes	8020	320	5.	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/21/1995	
TPH-Gas	WTPH-G	7600	500	ug/L	04/21/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

Sample Number	Sample Description
38626	MW-7 (4/19/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic Diss, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, diss ICP	6010	54	0.05	mg/L	04/26/1995	
Chromium, diss. ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, diss. ICP	6010	0.098	0.01	mg/L	04/26/1995	
Lead, Dissolved, ICP	6010	ND	0.005	mg/L	04/26/1995	
Magnesium, diss. ICP	6010	18	0.05	mg/L	04/26/1995	
Manganese, diss. ICP	6010	0.880	0.005	mg/L	04/26/1995	
Zinc, diss. ICP	6010	0.027	0.005	mg/L	04/26/1995	
BTEX (W)						
Dilution Factor		10	-		04/21/1995	
Benzene	8020	88	5.	ug/L	04/21/1995	
Toluene	8020	690	5.	ug/L	04/21/1995	
Ethylbenzene	8020	1900	5.	ug/L	04/21/1995	
Xylenes	8020	8100	5.	ug/L	04/21/1995	J
WTPH-GAS (W)						
Dilution Factor		10	-		04/21/1995	
TPH-Gas	WTPH-G	37000	500	ug/L	04/21/1995	

Sample Number	Sample Description
38627	SW-1 (4/20/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic Diss, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, diss ICP	6010	66	0.05	mg/L	04/26/1995	
Chromium, diss. ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, diss. ICP	6010	0.013	0.01	mg/L	04/26/1995	
Lead, Dissolved, ICP	6010	ND	0.005	mg/L	04/26/1995	
Magnesium, diss. ICP	6010	24	0.05	mg/L	04/26/1995	
Manganese, diss. ICP	6010	0.440	0.005	mg/L	04/26/1995	
Zinc, diss. ICP	6010	0.024	0.005	mg/L	04/26/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

Sample Number 38627 — Sample Description: SW-1 (4/20/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		1	-		04/21/1995	
Benzene	8020	ND	0.5	ug/L	04/21/1995	
Toluene	8020	ND	0.5	ug/L	04/21/1995	
Ethylbenzene	8020	4.7	0.5	ug/L	04/21/1995	
Xylenes	8020	25	0.5	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		1	-		04/21/1995	
TPH-Gas	WTPH-G	580	50	ug/L	04/21/1995	

Sample Number 38628 — Sample Description: RW-1 (4/20/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	--			04/25/1995	
Arsenic Diss, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, diss ICP	6010	46	0.05	mg/L	04/26/1995	
Chromium, diss. ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, diss. ICP	6010	0.019	0.01	mg/L	04/26/1995	
Lead, Dissolved, ICP	6010	0.008	0.005	mg/L	04/26/1995	
Magnesium, diss. ICP	6010	18	0.05	mg/L	04/26/1995	
Manganese, diss. ICP	6010	0.460	0.005	mg/L	04/26/1995	
Zinc, diss. ICP	6010	0.046	0.005	mg/L	04/26/1995	
BTEX (W)						
Dilution Factor		10	-		04/21/1995	
Benzene	8020	59	5.	ug/L	04/21/1995	
Toluene	8020	43	5.	ug/L	04/21/1995	
Ethylbenzene	8020	430	5.	ug/L	04/21/1995	
Xylenes	8020	1400	5.	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/21/1995	
TPH-Gas	WTPH-G	24000	500	ug/L	04/21/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

Sample Number 38629 — Sample Description: MW-4 (4/20/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic Diss, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, diss ICP	6010	46	0.05	mg/L	04/26/1995	
Chromium, diss. ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, diss. ICP	6010	0.020	0.01	mg/L	04/26/1995	
Lead, Dissolved, ICP	6010	ND	0.005	mg/L	04/26/1995	
Magnesium, diss. ICP	6010	16	0.05	mg/L	04/26/1995	
Manganese, diss. ICP	6010	0.280	0.005	mg/L	04/26/1995	
Zinc, diss. ICP	6010	0.026	0.005	mg/L	04/26/1995	
BTEX (W)						
Dilution Factor		10	-		04/21/1995	
Benzene	8020	37	5.	ug/L	04/21/1995	
Toluene	8020	33	5.	ug/L	04/21/1995	
Ethylbenzene	8020	390	5.	ug/L	04/21/1995	
Xylenes	8020	1300	5.	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/21/1995	
TPH-Gas	WTPH-G	21000	500	ug/L	04/21/1995	

Sample Number 38630 — Sample Description: MW-7 (4/20/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic Diss, ICP	6010	ND	0.005	mg/L	04/26/1995	
Calcium, diss ICP	6010	53	0.05	mg/L	04/26/1995	
Chromium, diss. ICP	6010	ND	0.005	mg/L	04/26/1995	
Iron, diss. ICP	6010	0.030	0.01	mg/L	04/26/1995	
Lead, Dissolved, ICP	6010	ND	0.005	mg/L	04/26/1995	
Magnesium, diss. ICP	6010	17	0.05	mg/L	04/26/1995	
Manganese, diss. ICP	6010	0.880	0.005	mg/L	04/26/1995	
Zinc, diss. ICP	6010	0.028	0.005	mg/L	04/26/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

Sample Number	Sample Description
38630	MW-7 (4/20/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		10	-		04/21/1995	
Benzene	8020	96	5.	ug/L	04/21/1995	
Toluene	8020	660	5.	ug/L	04/21/1995	
Ethylbenzene	8020	1800	5.	ug/L	04/21/1995	
Xylenes	8020	7900	5.	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/21/1995	
TPH-Gas	WTPH-G	36000	500	ug/L	04/21/1995	

Sample Number	Sample Description
38631	MW-7VT (4/20/95)

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor		10	-		04/21/1995	
Benzene	8020	68	5.	ug/L	04/21/1995	
Toluene	8020	550	5.	ug/L	04/21/1995	
Ethylbenzene	8020	1300	5.	ug/L	04/21/1995	
Xylenes	8020	7500	5.	ug/L	04/21/1995	
WTPH-GAS (W)						
Dilution Factor		10	-		04/21/1995	
TPH-Gas	WTPH-G	33000	500	ug/L	04/21/1995	

Sample Number	Sample Description
38640	MW-4 (4/20/95) TOTAL

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
ICP/AA Digestion - Water	ICP	-			04/25/1995	
Arsenic, ICP	6010	ND	0.005	mg/L	04/25/1995	
Calcium, ICP	6010	44	0.05	mg/L	04/25/1995	
Chromium, ICP	6010	ND	0.005	mg/L	04/25/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

Sample Number	Sample Description
38640	MW-4 (4/20/95) TOTAL

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Iron, ICP	6010	0.150	0.01	mg/L	04/25/1995	
Lead, ICP	6010	ND	0.005	mg/L	04/25/1995	
Magnesium, ICP	6010	15	0.05	mg/L	04/25/1995	
Manganese, ICP	6010	0.280	0.005	mg/L	04/25/1995	
Zinc, ICP	6010	ND	0.005	mg/L	04/25/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
38623	SW-1 (4/19/95)				
aaa-Trifluorotoluene (Surr.)	8020	104	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	98	%	04/21/1995	
Sample Number	**Sample Description**				
38624	RW-1 (4/19/95)				
aaa-Trifluorotoluene (Surr.)	8020	103	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	98	%	04/21/1995	
Sample Number	**Sample Description**				
38625	MW-4 (4/19/95)				
aaa-Trifluorotoluene (Surr.)	8020	102	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	97	%	04/21/1995	
Sample Number	**Sample Description**				
38626	MW-7 (4/19/95)				
aaa-Trifluorotoluene (Surr.)	8020	118	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	109	%	04/21/1995	
Sample Number	**Sample Description**				
38627	SW-1 (4/20/95)				
aaa-Trifluorotoluene (Surr.)	8020	102	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	96	%	04/21/1995	
Sample Number	**Sample Description**				
38628	RW-1 (4/20/95)				
aaa-Trifluorotoluene (Surr.)	8020	102	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	95	%	04/21/1995	

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

04/26/1995
Job No.: 95.01089

Project Name: Time Oil - Richland JP
Date Received: 04/21/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
38629	MW-4 (4/20/95)				
aaa-Trifluorotoluene (Surr.)	8020	97	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	104	%	04/21/1995	
Sample Number	**Sample Description**				
38630	MW-7 (4/20/95)				
aaa-Trifluorotoluene (Surr.)	8020	96	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	109	%	04/21/1995	
Sample Number	**Sample Description**				
38631	MW-7VT (4/20/95)				
aaa-Trifluorotoluene (Surr.)	8020	120	%	04/21/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	103	%	04/21/1995	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

NET Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
Arsenic, ICP	0.500	0.480	96.0	04/25/1995
Arsenic, ICP	0.500	0.490	98.0	04/26/1995
Calcium, ICP	25.0	24.0	96.0	04/25/1995
Calcium, ICP	25.0	24.0	96.0	04/26/1995
Chromium, diss. ICP	0.500	0.500	100.0	04/26/1995
Chromium, ICP	0.500	0.490	98.0	04/25/1995
Iron, diss. ICP	0.500	0.520	104.0	04/26/1995
Iron, ICP	0.500	0.500	100.0	04/25/1995
Lead, Dissolved, ICP	0.500	0.500	100.0	04/26/1995
Lead, ICP	0.500	0.490	98.0	04/25/1995
Magnesium, ICP	25.0	25.0	100.0	04/25/1995
Magnesium, ICP	25.0	26.0	104.0	04/26/1995
Manganese, diss. ICP	0.500	0.500	100.0	04/26/1995
Manganese, ICP	0.500	0.490	98.0	04/25/1995
Zinc, ICP	0.500	0.500	100.0	04/25/1995
Zinc, ICP	0.500	0.500	100.0	04/26/1995
BTEX (W)				
Benzene	20	20.6	103.0	04/21/1995
Toluene	20	20.5	102.5	04/21/1995
WTPH-GAS (W)				
TPH-Gas	700	717	102.4	04/21/1995

CCV - Continuing Calibration Verification

Note: Recovery limits for 8240, 8260, 8270, 8010, 8020, 624, 625 specified in method. Gasoline, Diesel, 418.1, 418.1M limits 80-120%. Metals recovery limits 80-120%.

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

NET Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Date Analyzed
Arsenic, ICP	0.500	0.500	100.0	04/25/1995
Arsenic, ICP	0.500	0.500	100.0	04/25/1995
Arsenic Diss, ICP	0.500	0.490	98.0	04/26/1995
Calcium, ICP	5.00	4.80	96.0	04/25/1995
Calcium, ICP	5.00	4.90	98.0	04/25/1995
Calcium, diss ICP	5.00	4.90	98.0	04/26/1995
Chromium, diss. ICP	0.500	0.510	102.0	04/25/1995
Chromium, diss. ICP	0.500	0.500	100.0	04/26/1995
Chromium, ICP	0.500	0.510	102.0	04/25/1995
Iron, diss. ICP	2.00	2.10	105.0	04/25/1995
Iron, diss. ICP	2.00	2.10	105.0	04/26/1995
Iron, ICP	2.00	2.00	100.0	04/25/1995
Lead, Dissolved, ICP	0.500	0.490	98.0	04/25/1995
Lead, Dissolved, ICP	0.500	0.470	94.0	04/26/1995
Lead, ICP	0.500	0.500	100.0	04/25/1995
Magnesium, ICP	5.00	4.80	96.0	04/25/1995
Magnesium, ICP	5.00	5.00	100.0	04/25/1995
Magnesium, diss. ICP	5.00	5.00	100.0	04/26/1995
Manganese, diss. ICP	0.500	0.500	100.0	04/25/1995
Manganese, diss. ICP	0.500	0.500	100.0	04/26/1995
Manganese, ICP	0.500	0.500	100.0	04/25/1995
Zinc, ICP	0.500	0.500	100.0	04/25/1995
Zinc, ICP	0.500	0.500	100.0	04/25/1995
Zinc, diss. ICP	0.500	0.490	98.0	04/26/1995
BTEX (W)				
Benzene	12.7	13.2	103.9	04/21/1995
Toluene	38.4	41.5	108.1	04/21/1995
BTEX (W)				
Benzene	12.7	13.1	103.1	04/21/1995
Toluene	38.4	41.1	107.0	04/21/1995

LCS - Laboratory Control Standard

Note: Recovery limits for fuels 80-120%. 8010, 8020, 8240, 8260, 8270, 624, 625 specified in method.
Recovery limits for metals analyses 80-120%. 418.1 limits are 90-140%.

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

NET Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Date Analyzed
WTPH-GAS (W)				
TPH-Gas	350	360	102.9	04/21/1995
WTPH-GAS (W)				
TPH-Gas	350	350	100.0	04/21/1995

LCS - Laboratory Control Standard

Note: Recovery limits for fuels 80-120%. 8010, 8020, 8240, 8260, 8270, 624, 625 specified in method.
Recovery limits for metals analyses 80-120%. 418.1 limits are 90-140%.

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
Arsenic, ICP	0.510	ND	0.500	mg/L	102.0	0.510	0.500	mg/L	102.0	0.0
Arsenic, ICP	0.520	ND	0.500	mg/L	104.0	0.520	0.500	mg/L	104.0	0.0
Arsenic, ICP	0.530	ND	0.500	mg/L	106.0	0.540	0.500	mg/L	108.0	1.9
Arsenic, ICP	0.500	ND	0.500	mg/L	100.0	0.500	0.500	mg/L	100.0	0.0
Arsenic Diss, ICP	0.500	ND	0.500	mg/L	100.0	0.510	0.500	mg/L	102.0	2.0
Arsenic Diss, ICP	0.510	ND	0.500	mg/L	102.0	0.510	0.500	mg/L	102.0	0.0
Calcium, ICP	15	10	5.00	mg/L	100.0	15	5.00	mg/L	100.0	0.0
Calcium, ICP	Dil.	44	5.00	mg/L		Dil.	5.00	mg/L		
Calcium, ICP	Dil.	120	5.00	mg/L		Dil.	5.00	mg/L		
Calcium, ICP	6.60	1.70	5.00	mg/L	98.0	6.70	5.00	mg/L	100.0	1.9
Calcium, diss ICP	Dil.	43	5.00	mg/L		Dil.	5.00	mg/L		
Calcium, diss ICP	22.6	17.4	5.00	mg/L	104.0	22.4	5.00	mg/L	100.0	3.9
Chromium, diss. ICP	0.500	ND	0.500	mg/L	100.0	0.500	0.500	mg/L	100.0	0.0
Chromium, diss. ICP	0.510	ND	0.500	mg/L	102.0	0.510	0.500	mg/L	102.0	0.0
Chromium, diss. ICP	0.490	0.009	0.500	mg/L	96.2	0.490	0.500	mg/L	96.2	0.0
Chromium, diss. ICP	0.490	ND	0.500	mg/L	98.0	0.490	0.500	mg/L	98.0	0.0
Chromium, ICP	0.520	ND	0.500	mg/L	104.0	0.510	0.500	mg/L	102.0	1.9
Chromium, ICP	0.510	ND	0.500	mg/L	102.0	0.510	0.500	mg/L	102.0	0.0
Iron, diss. ICP	Dil.	35	2.00	mg/L		Dil.	2.00	mg/L		
Iron, diss. ICP	2.20	0.150	2.00	mg/L	102.5	2.20	2.00	mg/L	102.5	0.0
Iron, diss. ICP	Dil.	11	2.00	mg/L		Dil.	2.00	mg/L		
Iron, diss. ICP	2.50	0.470	2.00	mg/L	101.5	2.50	2.00	mg/L	101.5	0.0

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
Iron, ICP	2.40	0.380	2.00	mg/L	101.0	2.50	2.00	mg/L	106.0	4.8
Iron, ICP	2.20	0.150	2.00	mg/L	102.5	2.20	2.00	mg/L	102.5	0.0
Lead, Dissolved, ICP	0.480	ND	0.500	mg/L	96.0	0.490	0.500	mg/L	98.0	2.1
Lead, Dissolved, ICP	2.30	1.80	0.500	mg/L	100.0	2.30	0.500	mg/L	100.0	0.0
Lead, Dissolved, ICP	0.470	ND	0.500	mg/L	94.0	0.460	0.500	mg/L	92.0	2.2
Lead, Dissolved, ICP	0.470	ND	0.500	mg/L	94.0	0.460	0.500	mg/L	92.0	2.2
Lead, ICP	0.490	ND	0.500	mg/L	98.0	0.490	0.500	mg/L	98.0	0.0
Lead, ICP	0.500	0.007	0.500	mg/L	98.6	0.500	0.500	mg/L	98.6	0.0
Magnesium, ICP	8.10	3.10	5.00	mg/L	100.0	8.00	5.00	mg/L	98.0	1.9
Magnesium, ICP	20	15	5.00	mg/L	100.0	20	5.00	mg/L	100.0	0.0
Magnesium, ICP	9.90	5.10	5.00	mg/L	96.0	9.80	5.00	mg/L	94.0	2.1
Magnesium, ICP	5.60	0.69	5.00	mg/L	98.2	5.70	5.00	mg/L	100.2	1.9
Magnesium, diss. ICP	20.4	16.3	5.00	mg/L	82.0	20.9	5.00	mg/L	92.0	11.5
Magnesium, diss. ICP	8.60	3.80	5.00	mg/L	96.0	8.60	5.00	mg/L	96.0	0.0
Manganese, diss. ICP	1.40	0.930	0.500	mg/L	94.0	1.40	0.500	mg/L	94.0	0.0
Manganese, diss. ICP	0.510	0.007	0.500	mg/L	100.6	0.510	0.500	mg/L	100.6	0.0
Manganese, diss. ICP	1.50	1.00	0.500	mg/L	100.0	1.50	0.500	mg/L	100.0	0.0
Manganese, diss. ICP	0.500	0.025	0.500	mg/L	95.0	0.510	0.500	mg/L	97.0	2.1
Manganese, ICP	0.520	0.014	0.500	mg/L	101.2	0.520	0.500	mg/L	101.2	0.0
Manganese, ICP	0.790	0.280	0.500	mg/L	102.0	0.780	0.500	mg/L	100.0	2.0
Zinc, ICP	0.510	ND	0.500	mg/L	102.0	0.510	0.500	mg/L	102.0	0.0
Zinc, ICP	0.860	0.360	0.500	mg/L	100.0	0.850	0.500	mg/L	98.0	1.9

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD	
Zinc, ICP	Dil.	7.60	0.500	mg/L		Dil.	0.500	mg/L			
Zinc, ICP	0.720	0.016	0.500	mg/L	140.8	0.730	0.500	mg/L	142.8	1.4	M,P
Zinc, diss. ICP	0.790	0.300	0.500	mg/L	98.0	0.790	0.500	mg/L	98.0	0.0	
Zinc, diss. ICP	0.690	0.170	0.500	mg/L	104.0	0.680	0.500	mg/L	102.0	1.9	
BTEX (W)											
Benzene	1287	ND	1270	ug/L	101.3	1329	1270	ug/L	104.6	3.2	
Toluene	3968	ND	3840	ug/L	103.3	4058	3840	ug/L	105.7	2.3	

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

QUALITY CONTROL REPORT
BLANKS

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

NET Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP
Location: 5-1238-2

Analyte	Blank Analysis	MDL	Units	Date Analyzed
Arsenic, ICP	ND	0.005	mg/L	04/25/1995
Arsenic, ICP	ND	0.005	mg/L	04/25/1995
Arsenic Diss, ICP	ND	0.005	mg/L	04/26/1995
Calcium, ICP	ND	0.05	mg/L	04/25/1995
Calcium, ICP	ND	0.05	mg/L	04/25/1995
Calcium, diss ICP	ND	0.05	mg/L	04/26/1995
Chromium, diss. ICP	ND	0.005	mg/L	04/25/1995
Chromium, diss. ICP	ND	0.005	mg/L	04/26/1995
Chromium, ICP	ND	0.005	mg/L	04/25/1995
Iron, diss. ICP	ND	0.01	mg/L	04/25/1995
Iron, diss. ICP	ND	0.01	mg/L	04/26/1995
Iron, ICP	ND	0.01	mg/L	04/25/1995
Lead, Dissolved, ICP	ND	0.005	mg/L	04/25/1995
Lead, Dissolved, ICP	ND	0.005	mg/L	04/26/1995
Lead, ICP	ND	0.005	mg/L	04/25/1995
Magnesium, ICP	ND	0.05	mg/L	04/25/1995
Magnesium, ICP	ND	0.05	mg/L	04/25/1995
Magnesium, diss. ICP	ND	0.05	mg/L	04/26/1995
Manganese, diss. ICP	ND	0.005	mg/L	04/25/1995
Manganese, diss. ICP	ND	0.005	mg/L	04/26/1995
Manganese, ICP	ND	0.005	mg/L	04/25/1995
Zinc, ICP	ND	0.005	mg/L	04/25/1995
Zinc, ICP	ND	0.005	mg/L	04/25/1995
Zinc, diss. ICP	ND	0.005	mg/L	04/26/1995
BTEX (W)				
Benzene	ND	0.5	ug/L	04/21/1995

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

QUALITY CONTROL REPORT
BLANKS

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 04/26/1995

NET Job Number: 95.01089

Contact: Scott Sloan
Project: Time Oil - Richland JP
Location: 5-1238-2

Analyte	Blank Analysis	MDL	Units	Date Analyzed
Toluene	ND	0.5	ug/L	04/21/1995
Ethylbenzene	ND	0.5	ug/L	04/21/1995
Xylenes	ND	0.5	ug/L	04/21/1995
aaa-Trifluorotoluene (Surr.)	100	-	%	04/21/1995
WTPH-GAS (W)				
TPH-Gas	ND	50	ug/L	04/21/1995
aaa-Trifluorotoluene (Surr.)	99	-	%	04/21/1995

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

Explanation of Data Flags

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	The blank exhibited a positive result greater than the reporting limit for this compound.
C	The sample appears to contain a lighter hydrocarbon than gasoline.
D	The sample appears to extend to a heavier hydrocarbon range than gasoline.
E	The sample appears to extend to a lighter hydrocarbon range than diesel.
F	The sample appears to extend to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component contamination.
H	The gasoline elution pattern for the sample is not typical.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
M	MS and/or MSD percent recovery exceeds control limits.
MR	The MS/MSD RPD is greater than 20%. The sample was re-extracted and re-analyzed with similar results. This is due to a matrix interference, likely a non-homogeneity of the sample.
P	A post digestion spike was analyzed, and recoveries are within control limits.
Q	Detection limits elevated due to sample matrix.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
W	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.

Data File = I:\AP21D21.PTS Printed on 04-24-1995 at 15:38:41
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Full Range: 500 K-Counts

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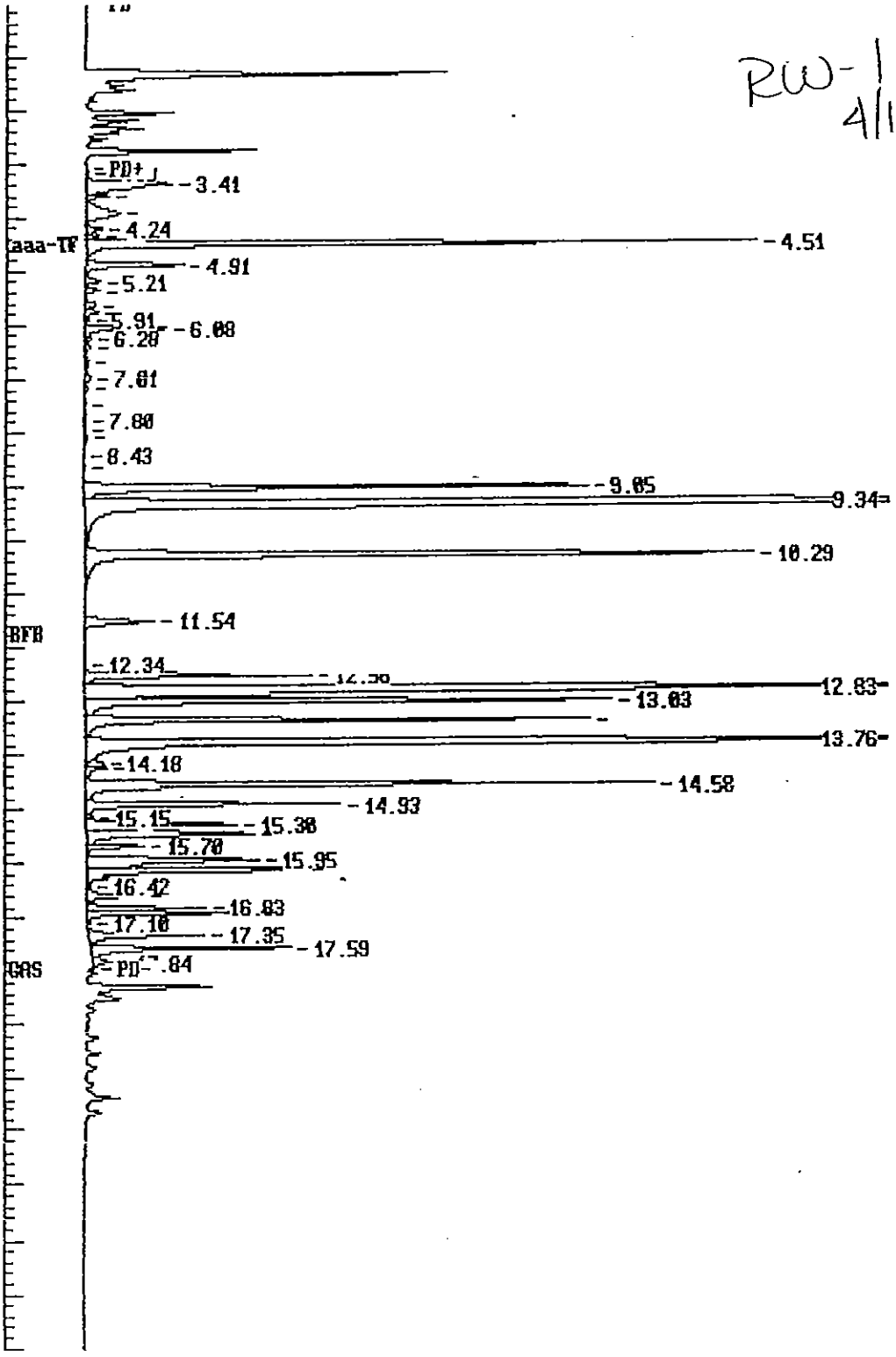
4/19/95



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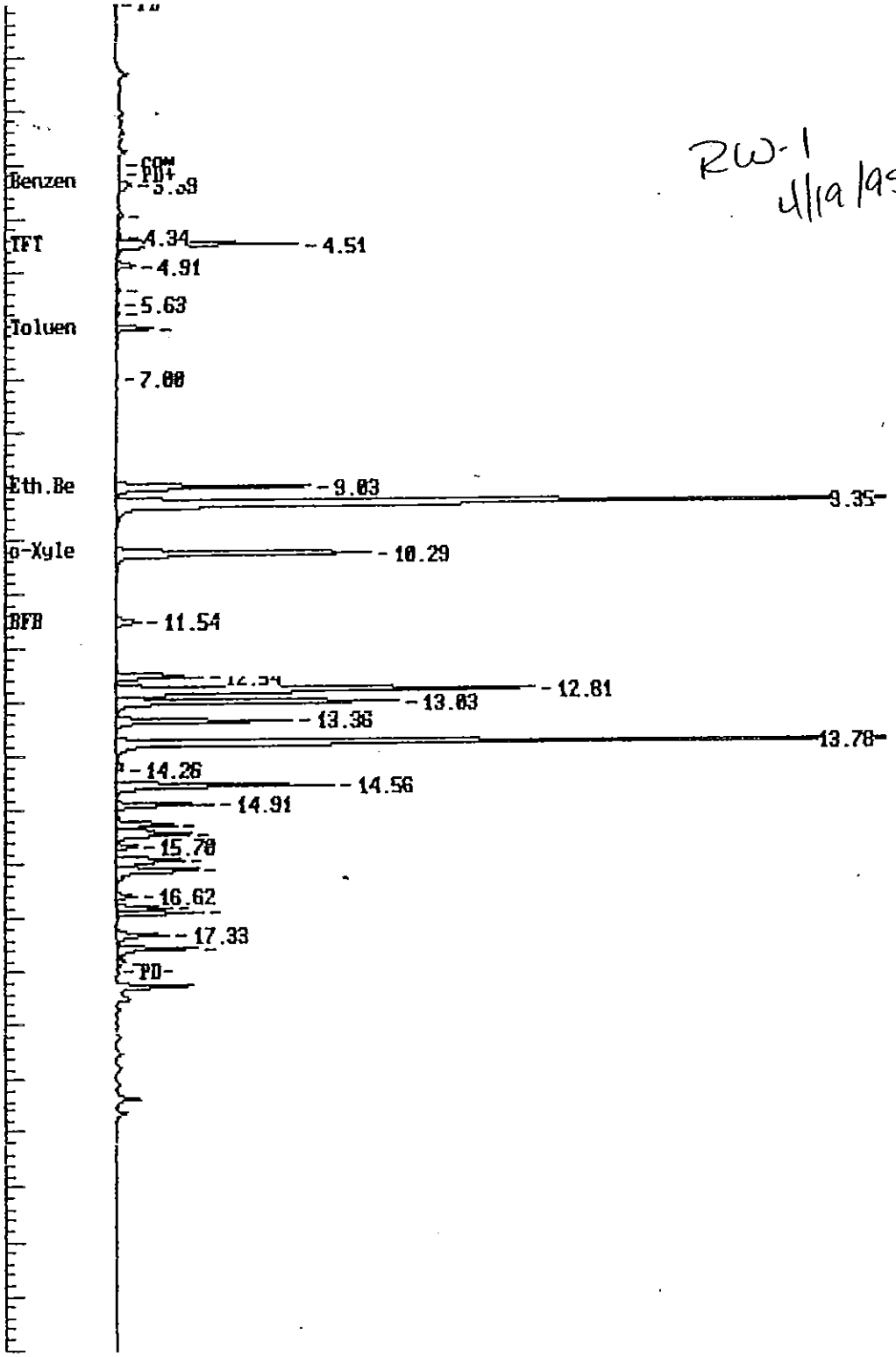

RW-1
4/19/95

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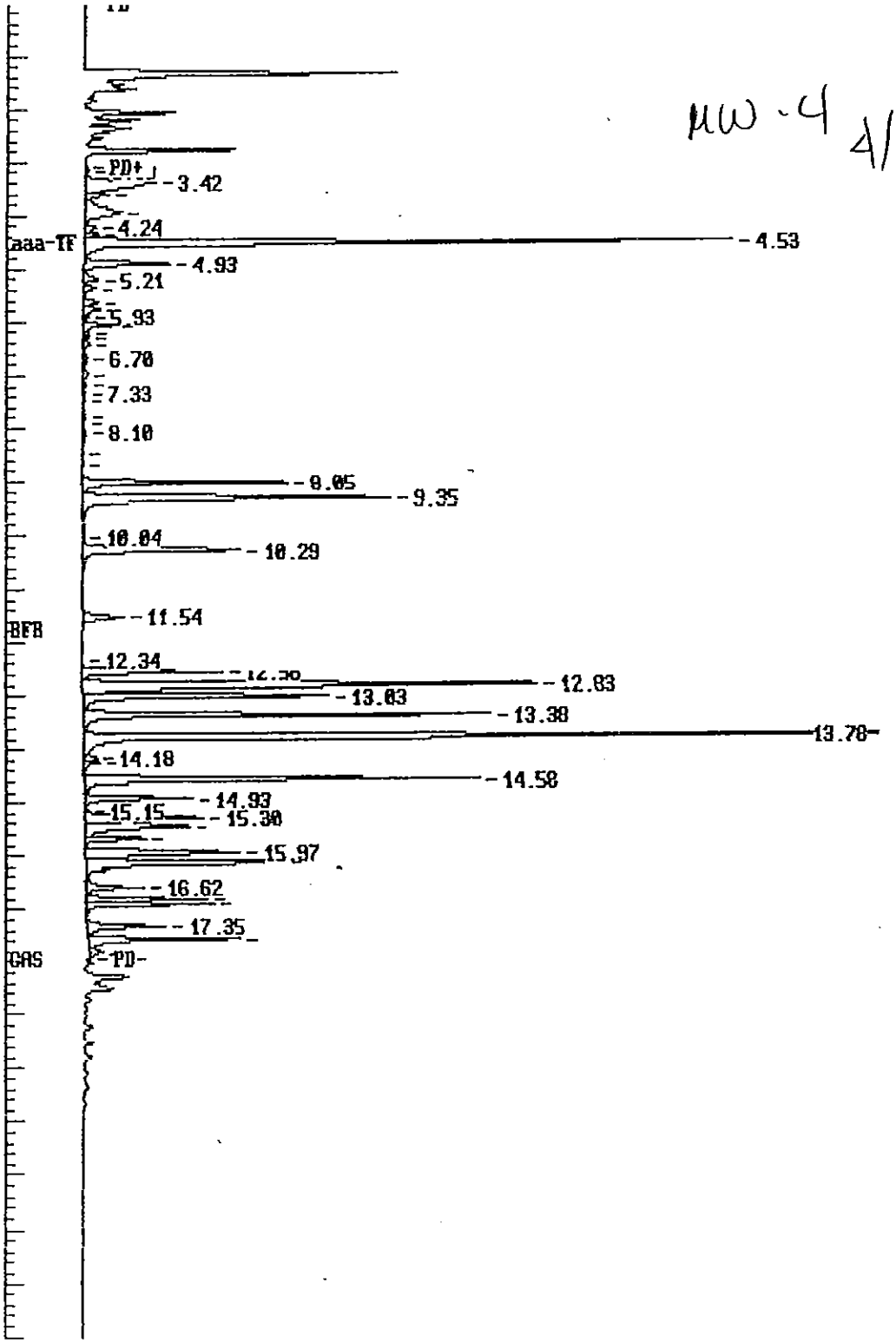
MW-4 4/19/95



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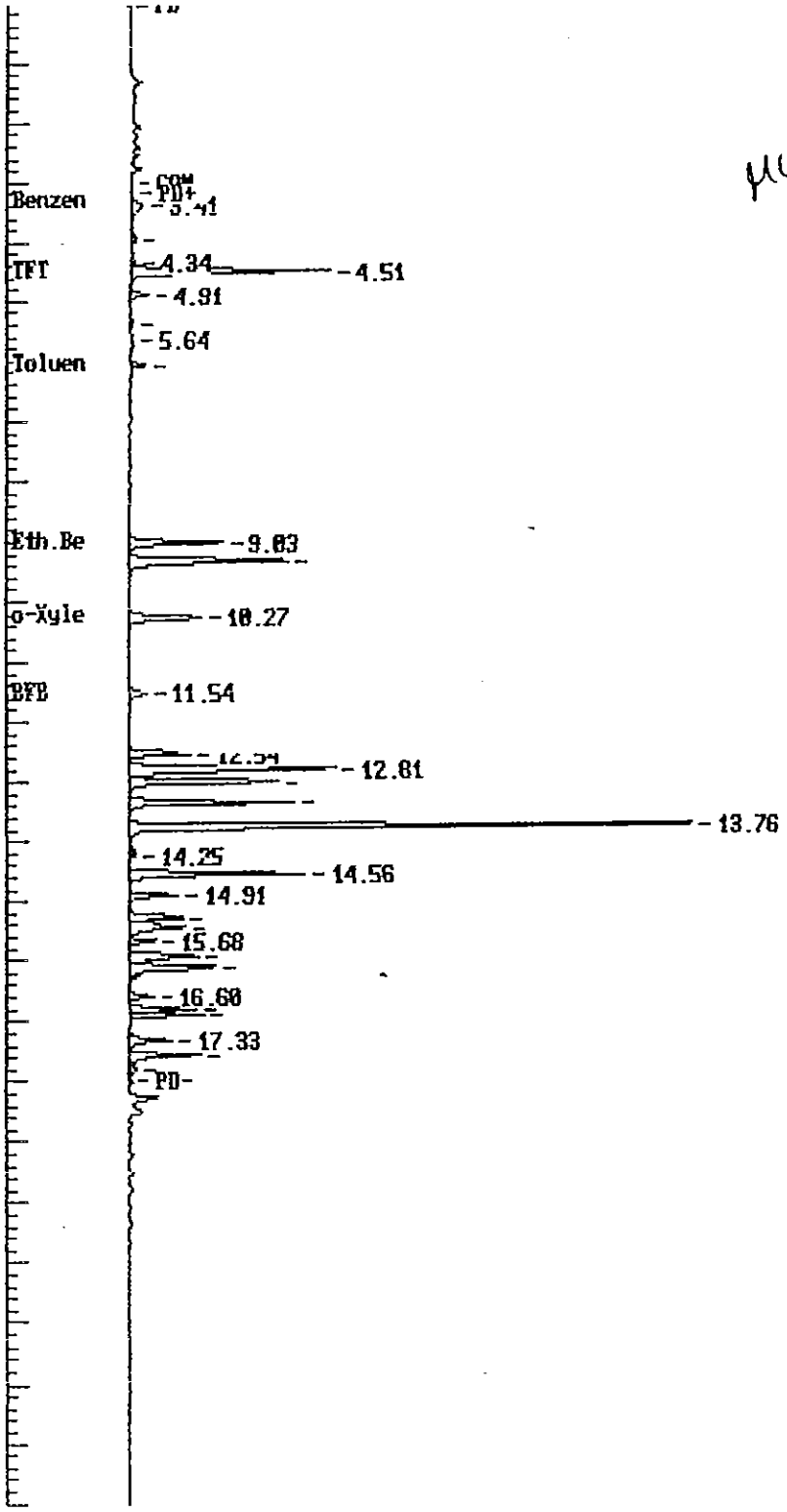

MW-4
4/19/95

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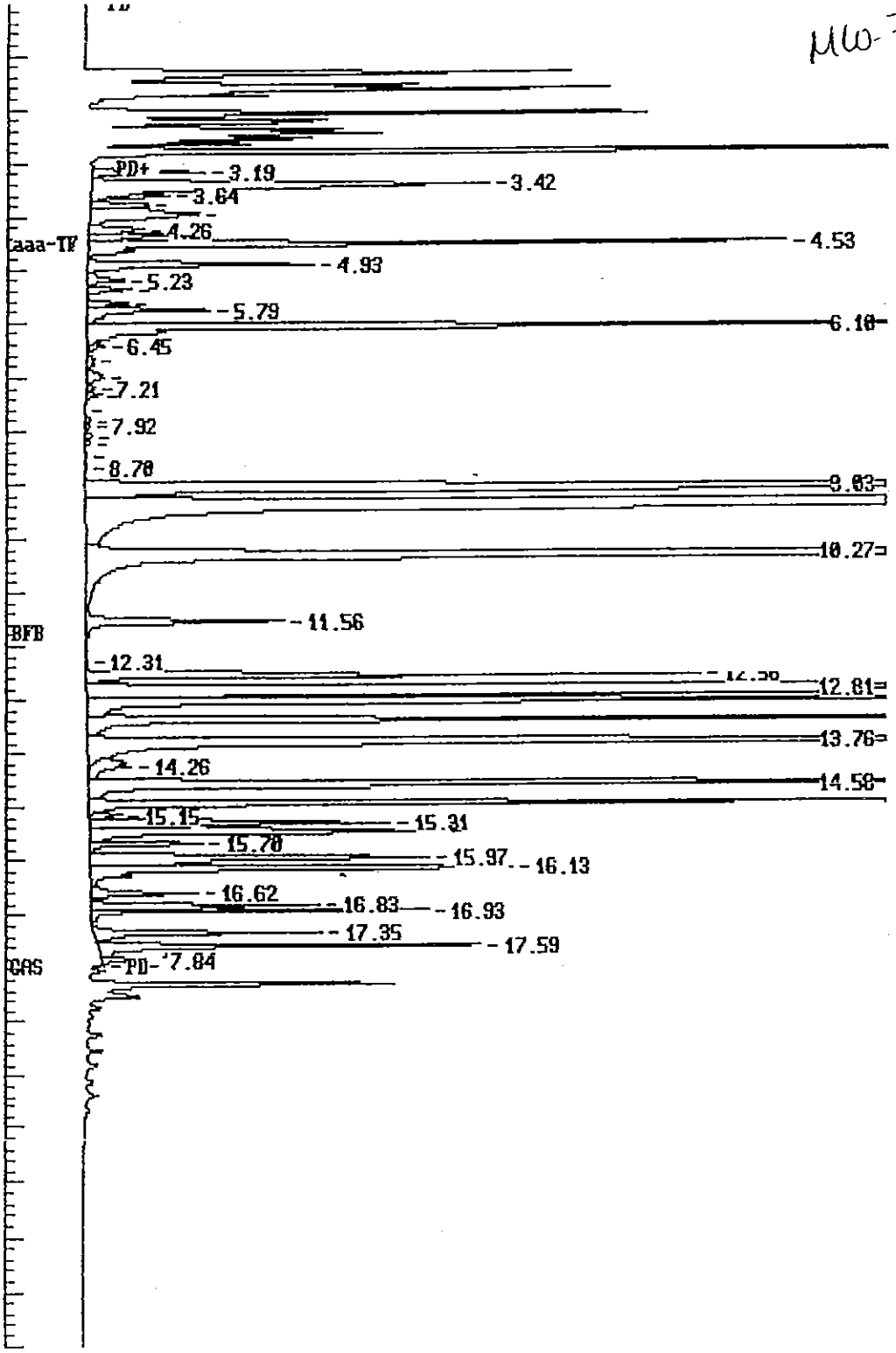
ull Range: 500 K-Counts

MW-7 4/19/95



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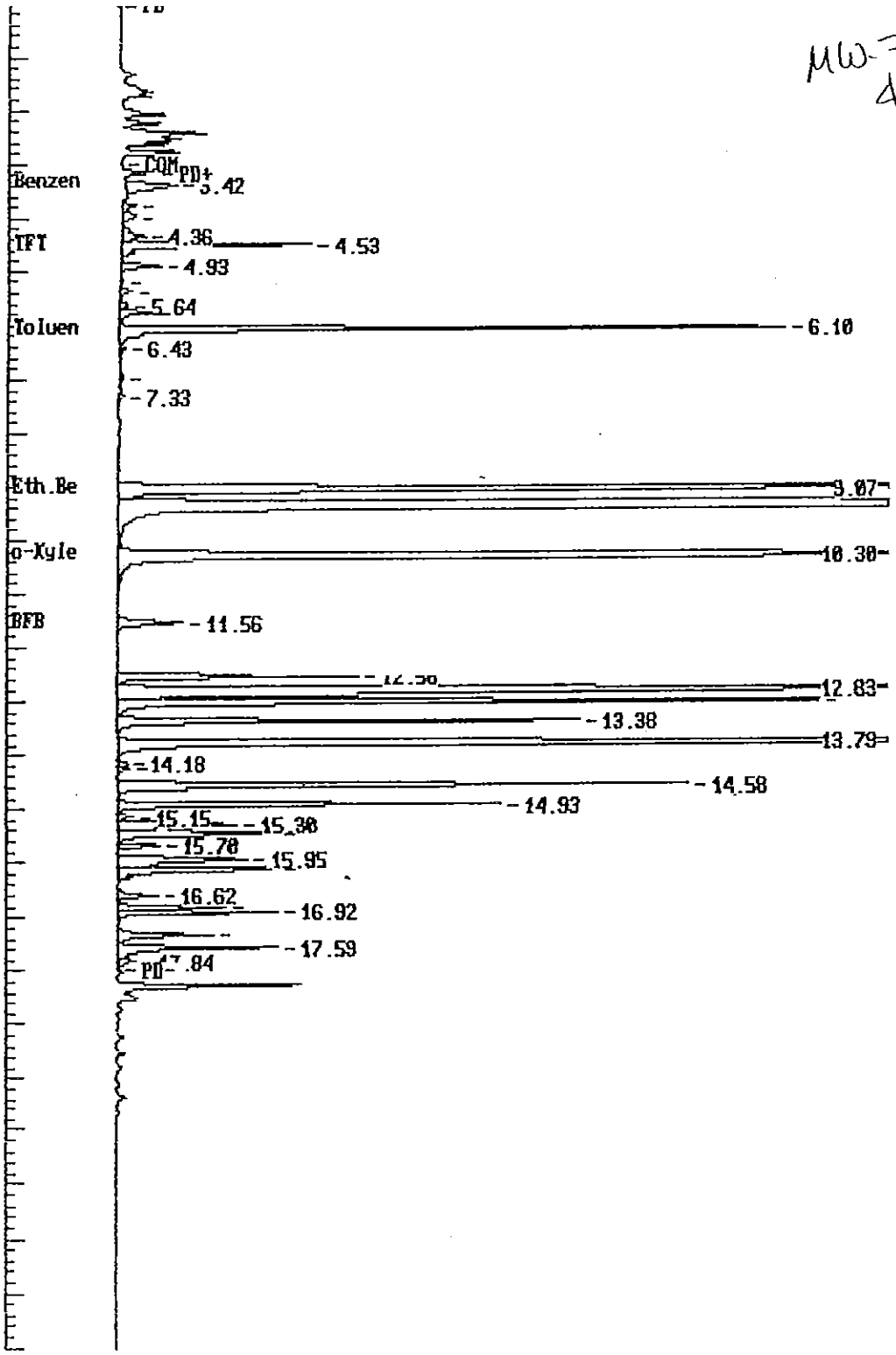
MW-7
4/19/95



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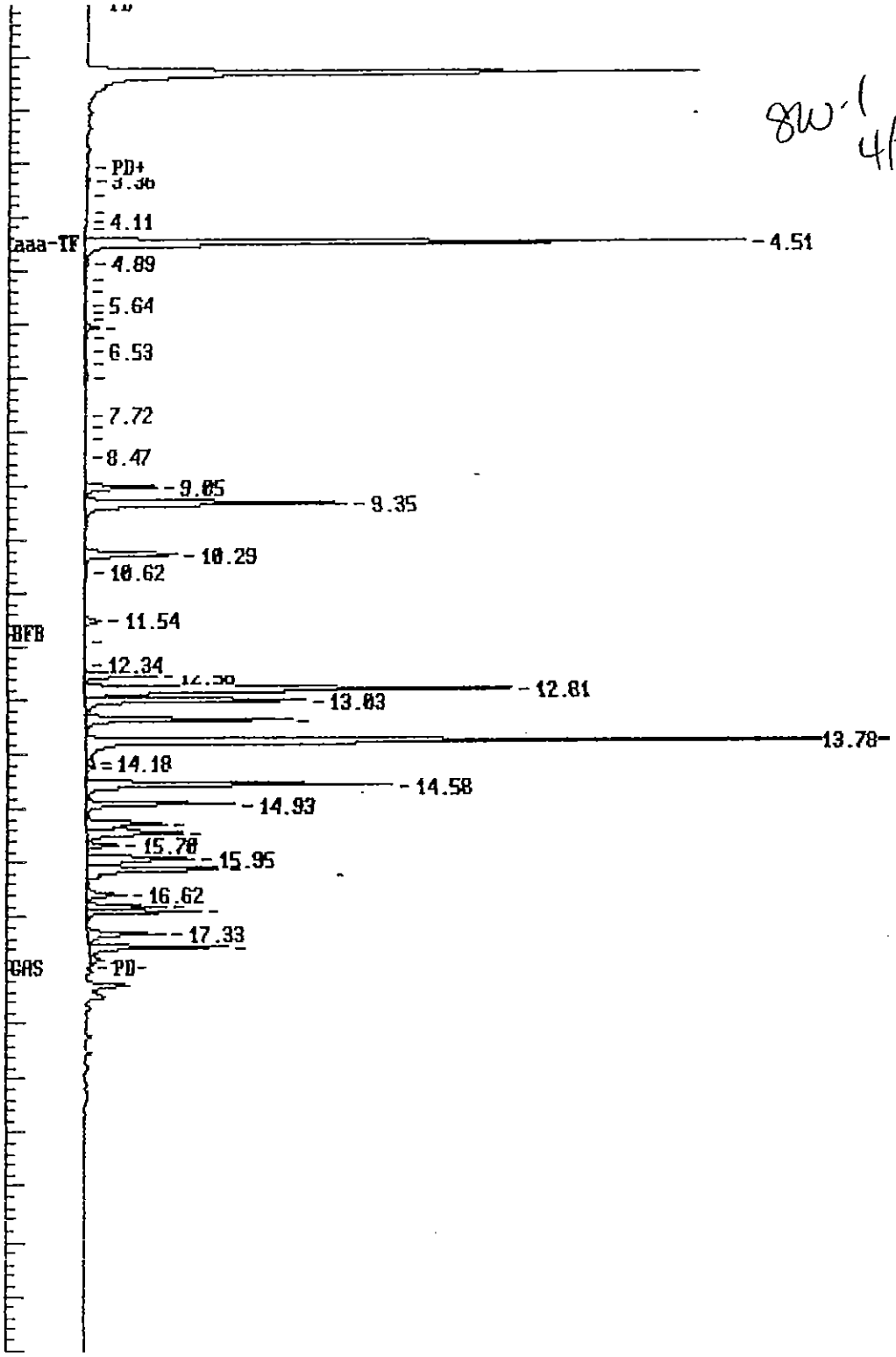

SW.1 4/20/95

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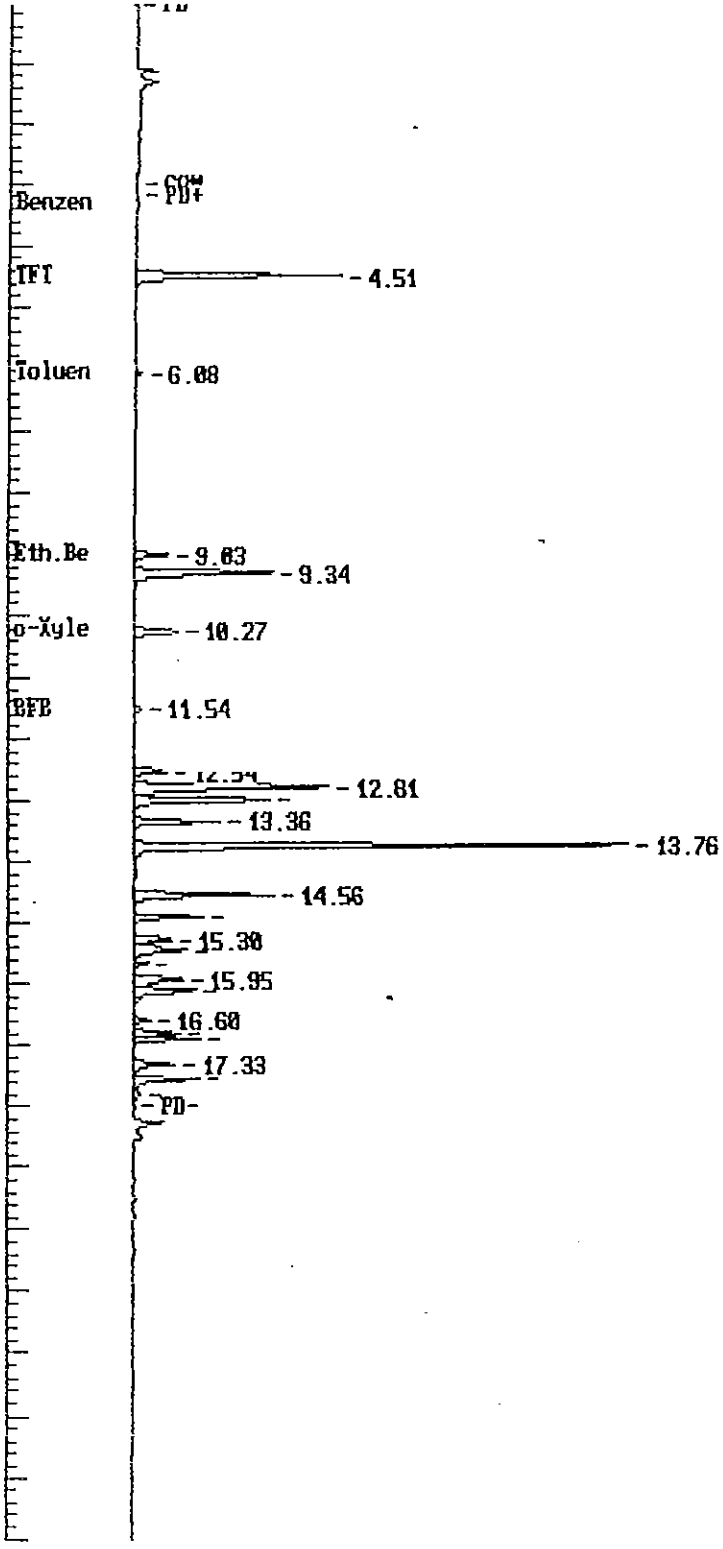

SW 1
4/20/95

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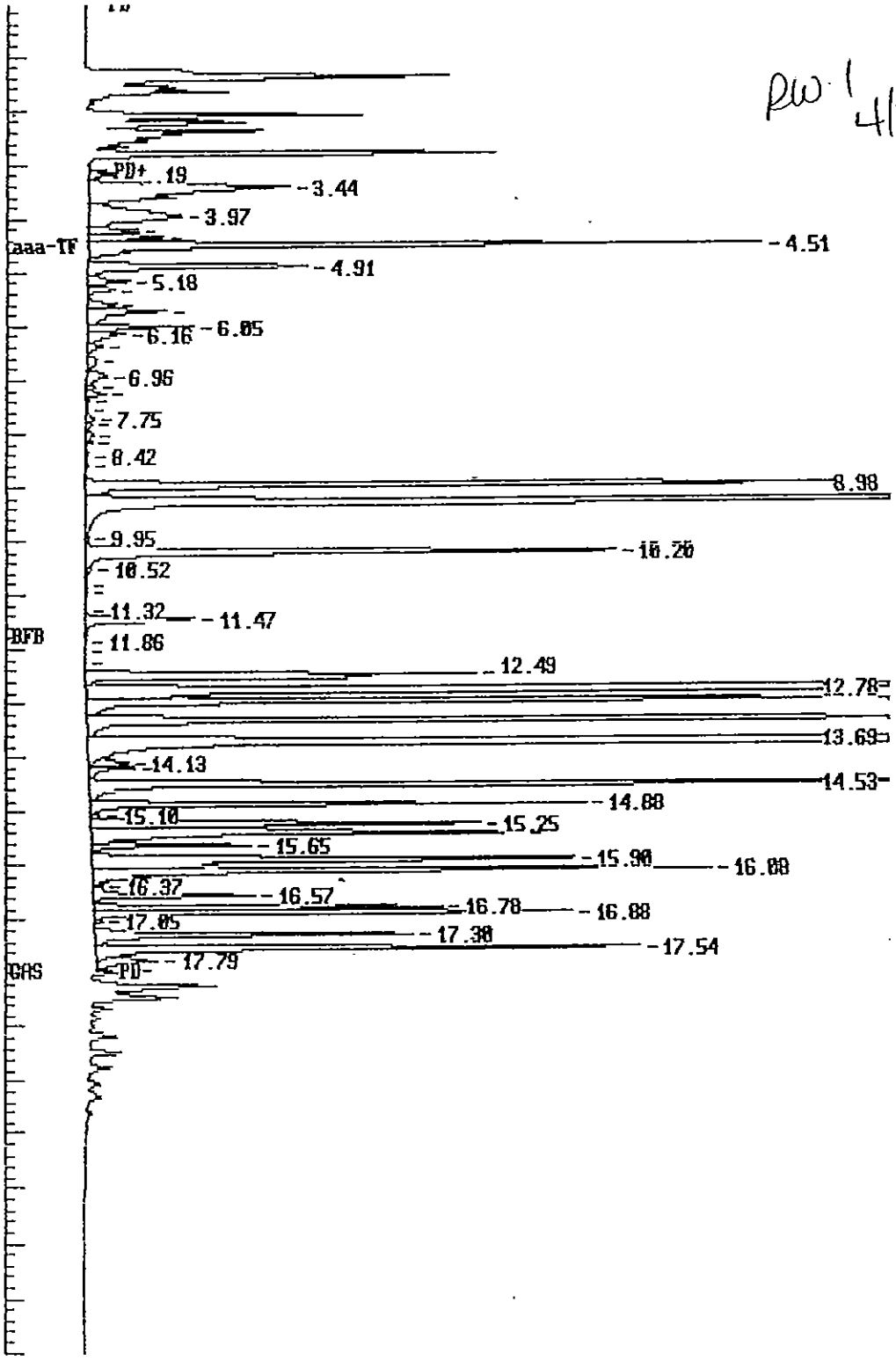
PW 1 4/20/95



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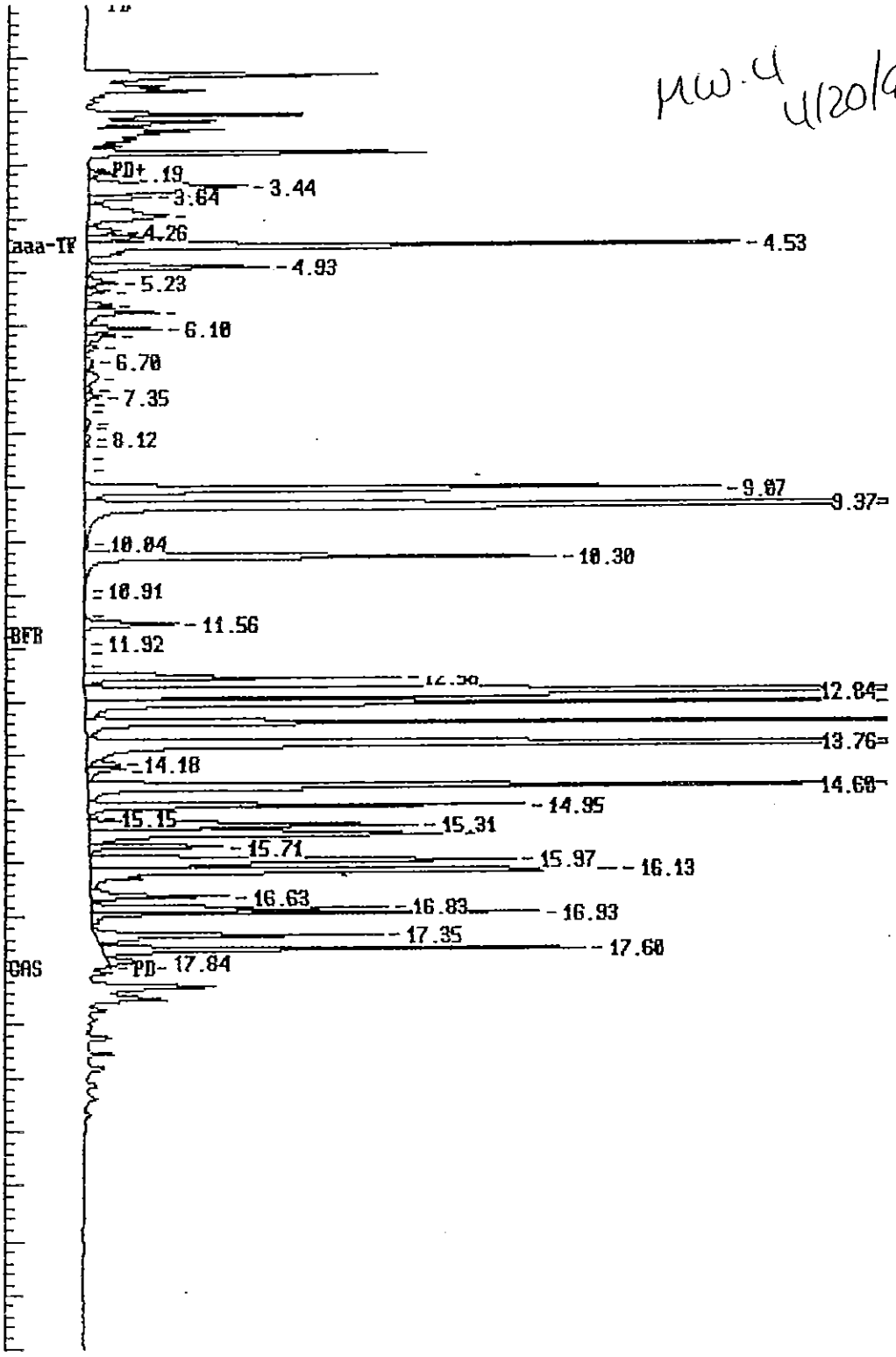
MW-4 4/20/95



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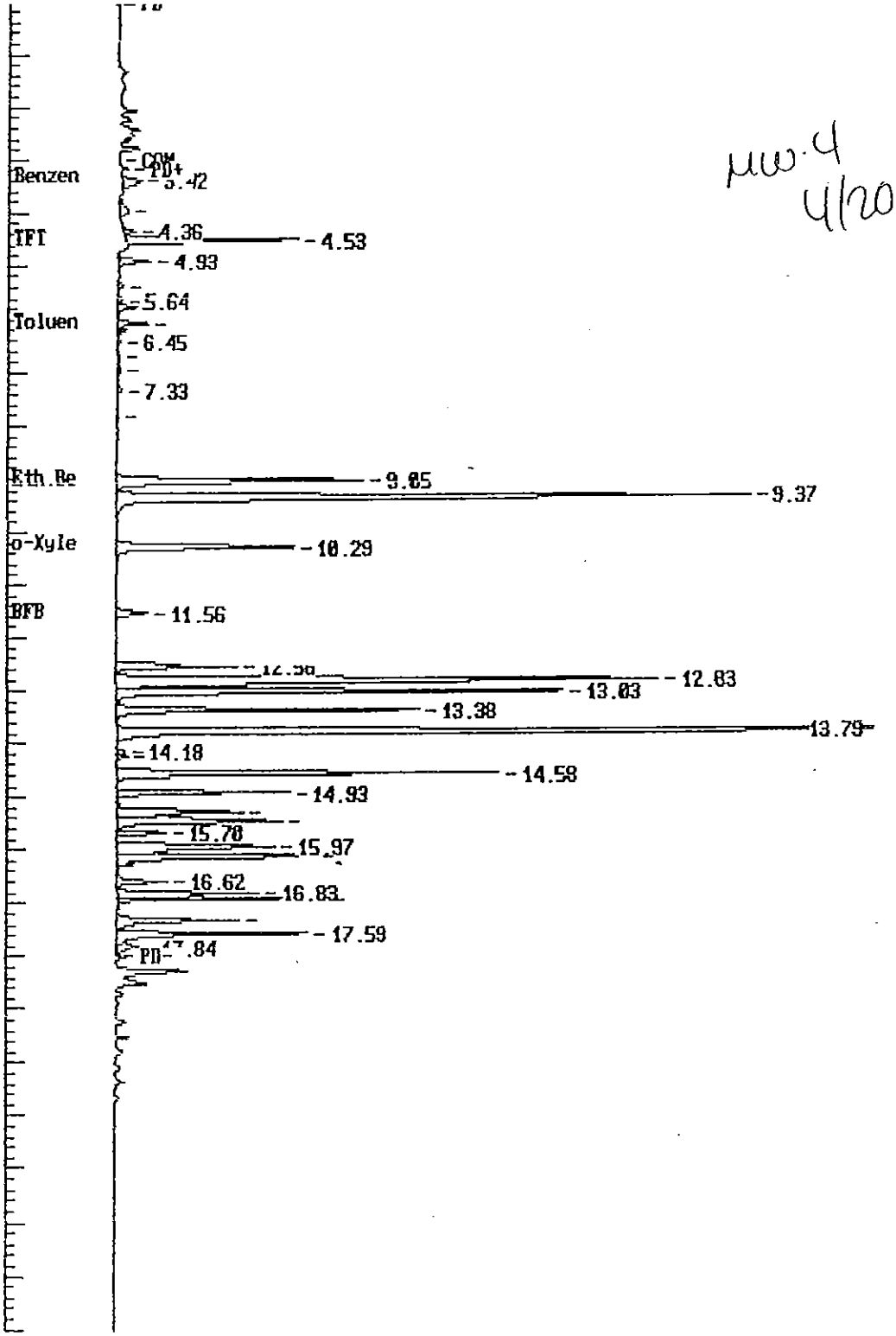

MW-4
4/20/95

)ata File = I:\AP21D29.PTS Printed on 04-24-1995 at 15:47:52
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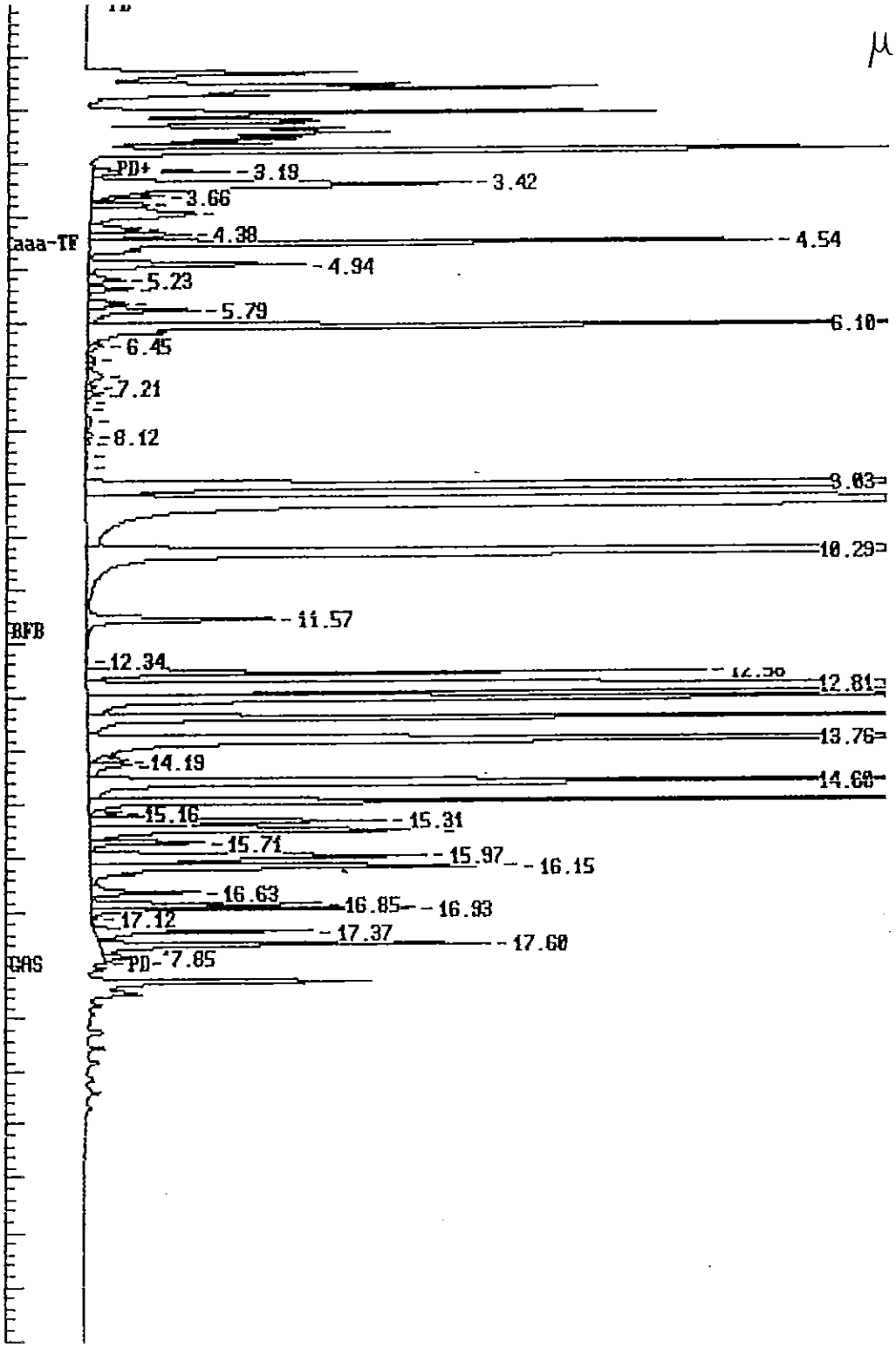
ull Range: 500 K-Counts

MW 7
4/20/95



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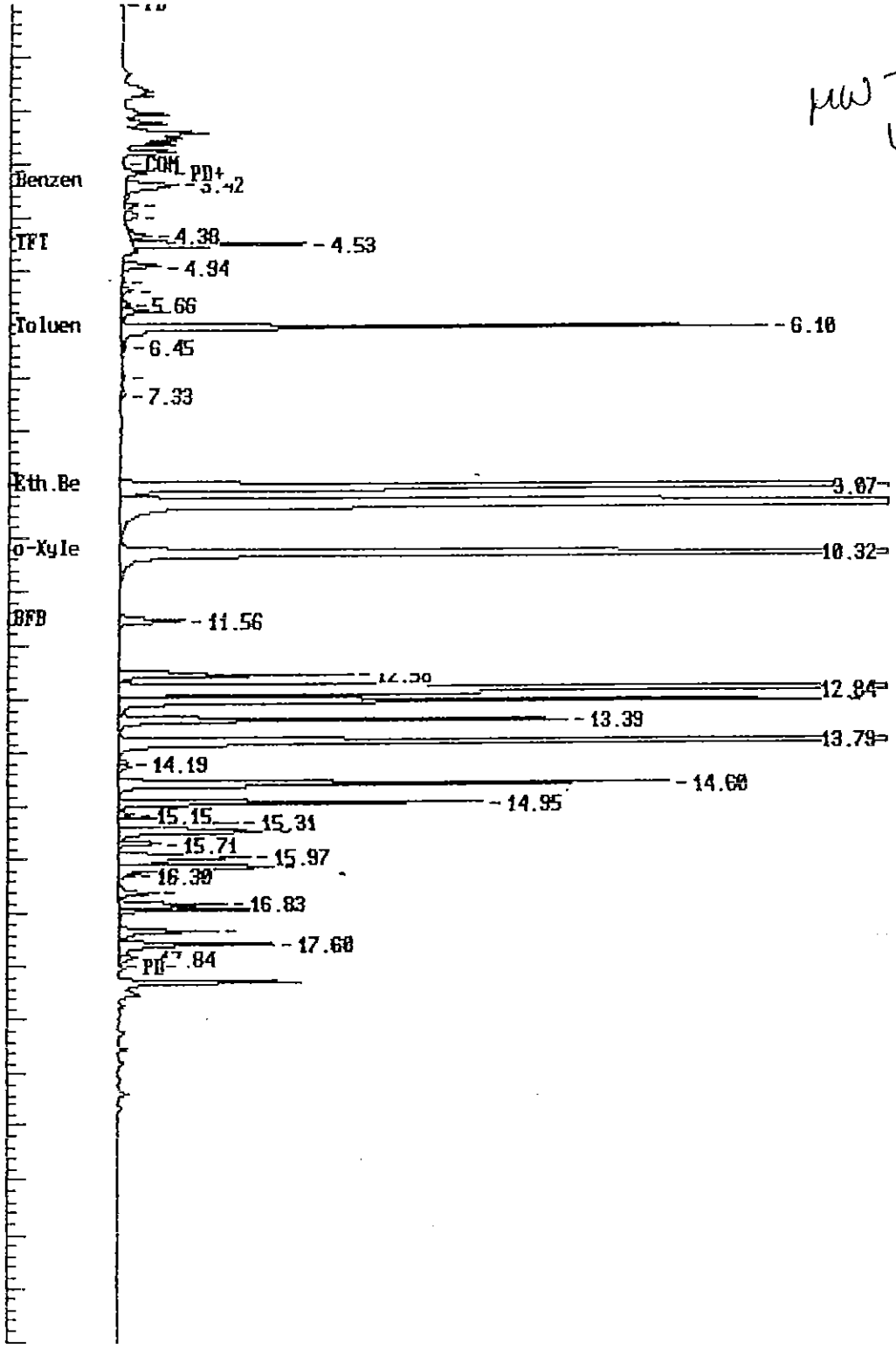

MW 7
4/20/95

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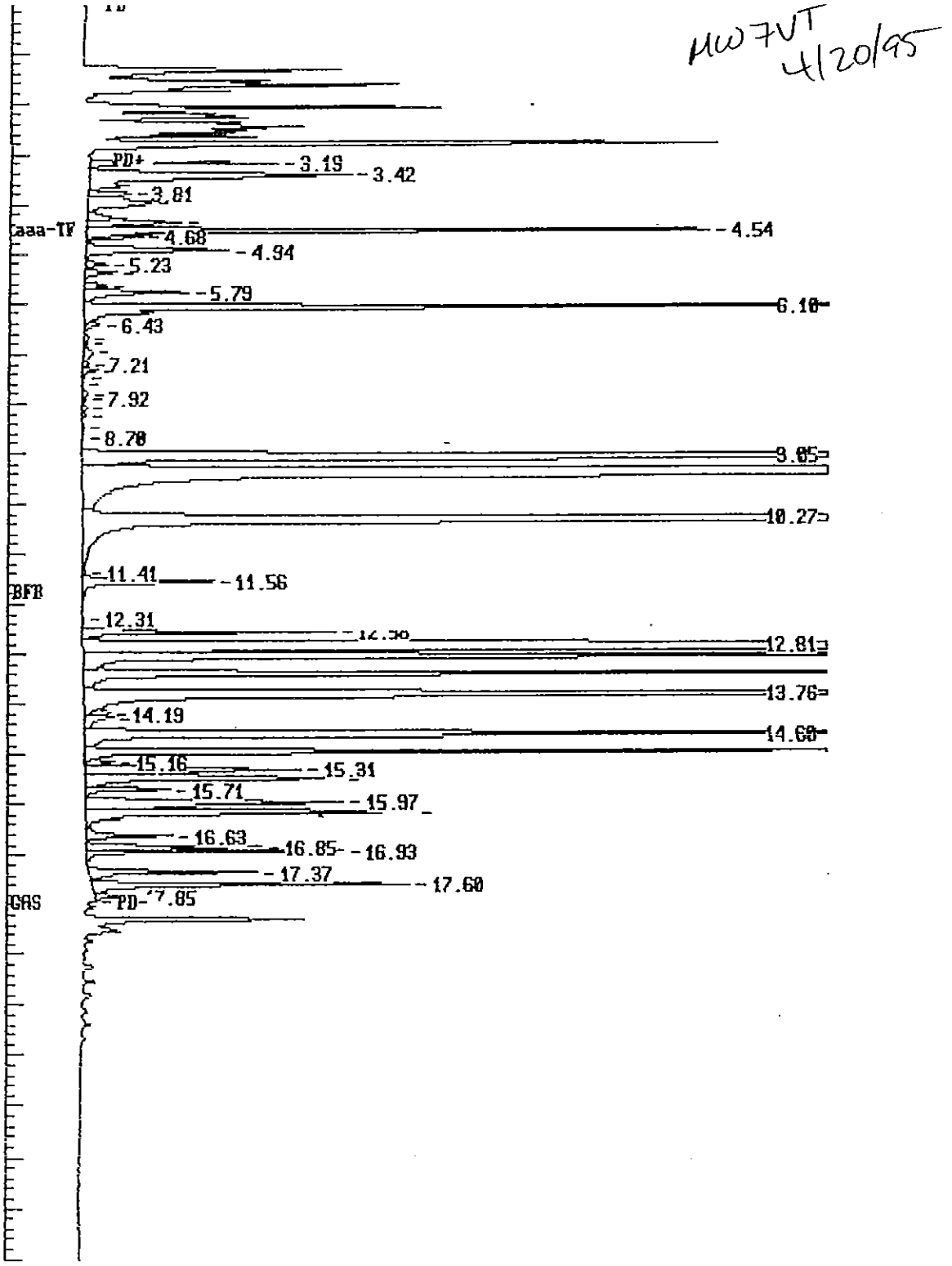
MW7VT 4/20/95



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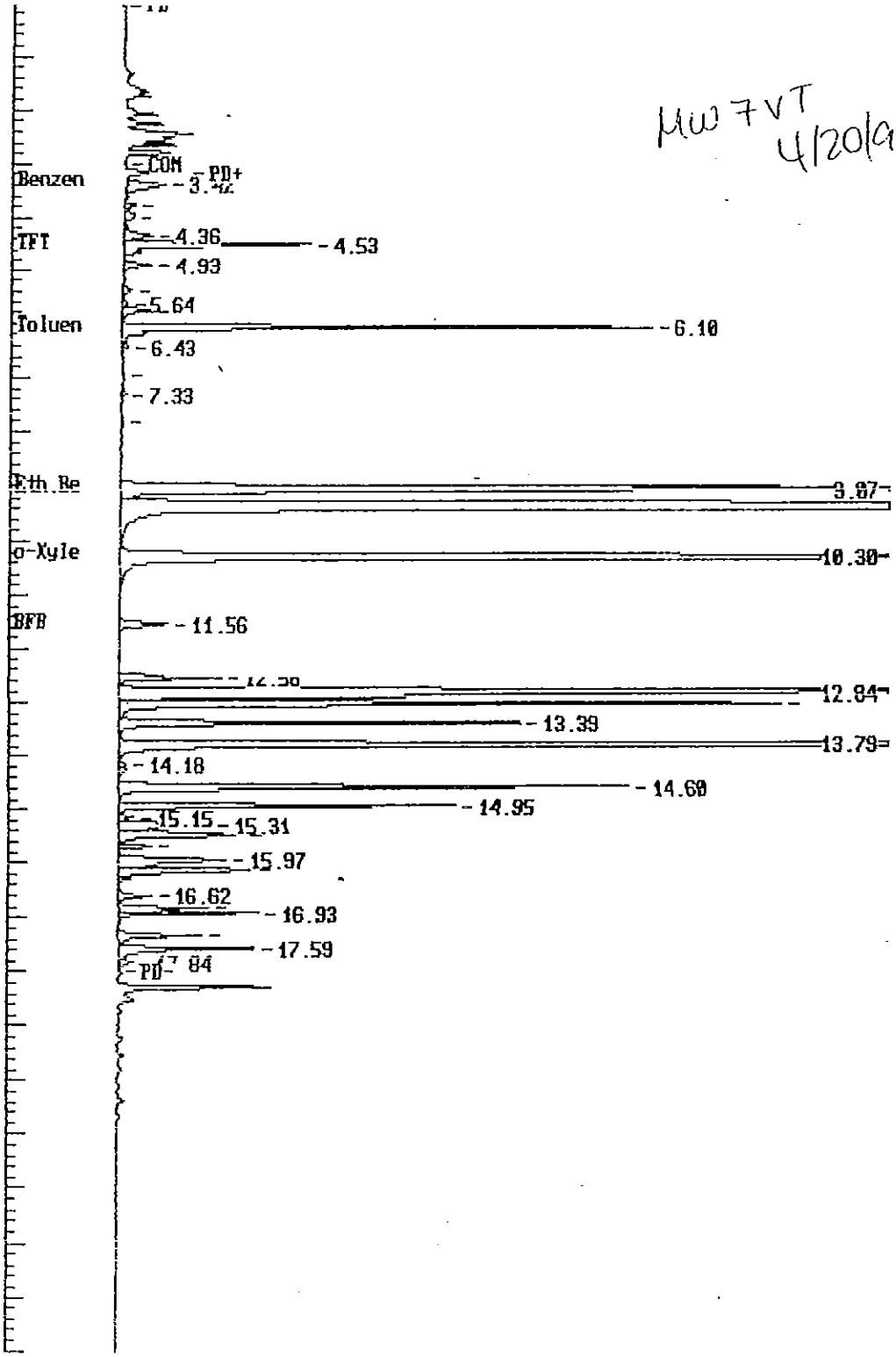


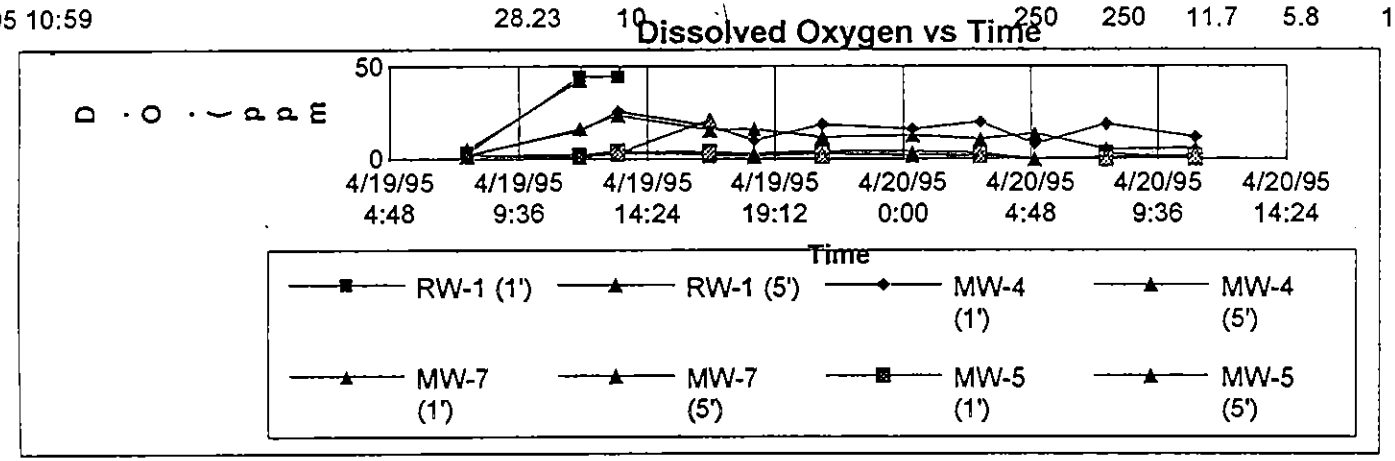
APPENDIX F

Time Oil, Richand Washington
AEE Job Number 12-01238-02
Time scale adjusted to reflect sampling time

Time	Sparging Flow (cfm)	Sparging Pressure (psi)	Dept to Water Depth to Water (FEET) RW-1	MW-4	MW-7	MW-5	MW-10	MW-1	Dissolved Oxygen (PPM) RW-1 1 foot	RW-1 5 foot	MW-4 1 foot	MW-4 5 foot	MW-7 1 foot	MW-7 5 foot	MW-5 1 foot	MW-5 5 foot	MW-10 1 foot	MW-10 5 foot
4/19/95 7:40	0	0	28.16	28.23	10.01	28.19			3.1	5.2	2.4	1.8	2	1.9				
4/19/95 11:03		10																
4/19/95 11:04	40	10																
4/19/95 11:06	30	10																
4/19/95 11:19	25	10																
4/19/95 11:43	22	10																
4/19/95 11:52		10	28.56	28.25	10.01				44.8	42.8	15.1	16.5	2.4	1	2.3	1		
4/19/95 12:14	27	10																
4/19/95 12:42	27	10																
4/19/95 13:18	27	10							44.7	250	25.8	23.8	4.5	3.7	4	2.9	4.5	3.2
4/19/95 13:40	27	10																
4/19/95 14:36	27	10																
4/19/95 15:23	27	10																
4/19/95 16:44		10							250	250	18	15.8	3.3	2.2	4.1	2.7	3.4	21.3
4/19/95 17:02	27	10																
4/19/95 17:52	27	10																
4/19/95 18:24		10							250	250	10	16	3.1	1.8				
4/19/95 18:42	27	10																
4/19/95 20:06	27	10																
4/19/95 20:58		10							250	250	18.5	11.6	4.1	2.7	4.1	2.5	2.9	1.7
4/19/95 21:29	27	10																
4/19/95 23:21	27	10																
4/20/95 0:20		10	28.45	28.2	10				250	250	16	12.6	4.1	2				
4/20/95 0:38	27	10																
4/20/95 1:25	26	10																
4/20/95 2:15	26	10																
4/20/95 2:54		10							250	250	20	10.6	3	1.6	3.4	2.1	2.4	1.3
4/20/95 3:27	26	10																
4/20/95 4:57									250	250	8	13.7	0	0				
4/20/95 5:05	27																	

4/20/95 6:20	26															
4/20/95 7:10	26															
4/20/95 7:38							250	250	19	5.1	0.3	1.1	3	1.2	0	0
4/20/95 8:15	26															
4/20/95 9:55	27															
4/20/95 10:59			28.23	10			250	250	11.7	5.8	1	0.5	0.6	2.3	1.6	1.3

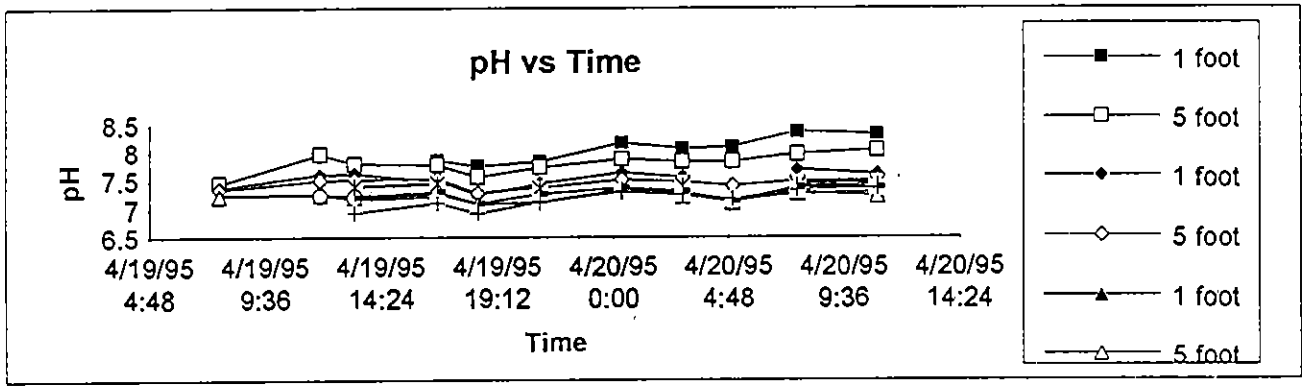
Time	Sparging Flow (cfm)	Sparging Pressure (psi)	Dept to Water Depth to Water (FEET)						Dissolved Oxygen (PPM)									
									RW-1		MW-4		MW-7		MW-5		MW-10	
			RW-1	MW-4	MW-7	MW-5	MW-10	MW-1	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot
4/19/95 7:40	0	0	28.16	28.23	10.01	28.19			3.1	5.2	2.4	1.8	2	1.9				
4/19/95 11:52		10	28.56	28.25	10.01				44.8	42.8	15.1	16.5	2.4	1	2.3	1		
4/19/95 13:18	27	10							44.7	250	25.8	23.8	4.5	3.7	4	2.9	4.5	3.2
4/19/95 16:44		10							250	250	18	15.8	3.3	2.2	4.1	2.7	3.4	21.3
4/19/95 18:24		10							250	250	10	16	3.1	1.8				
4/19/95 20:58		10							250	250	18.5	11.6	4.1	2.7	4.1	2.5	2.9	1.7
4/20/95 0:20		10	28.45	28.2	10				250	250	16	12.6	4.1	2				
4/20/95 2:54		10							250	250	20	10.6	3	1.6	3.4	2.1	2.4	1.3
4/20/95 4:57									250	250	8	13.7	0	0				
4/20/95 7:38									250	250	19	5.1	0.3	1.1	3	1.2	0	0
4/20/95 10:59				28.23	10				250	250	11.7	5.8	1	0.5	0.6	2.3	1.6	1.3

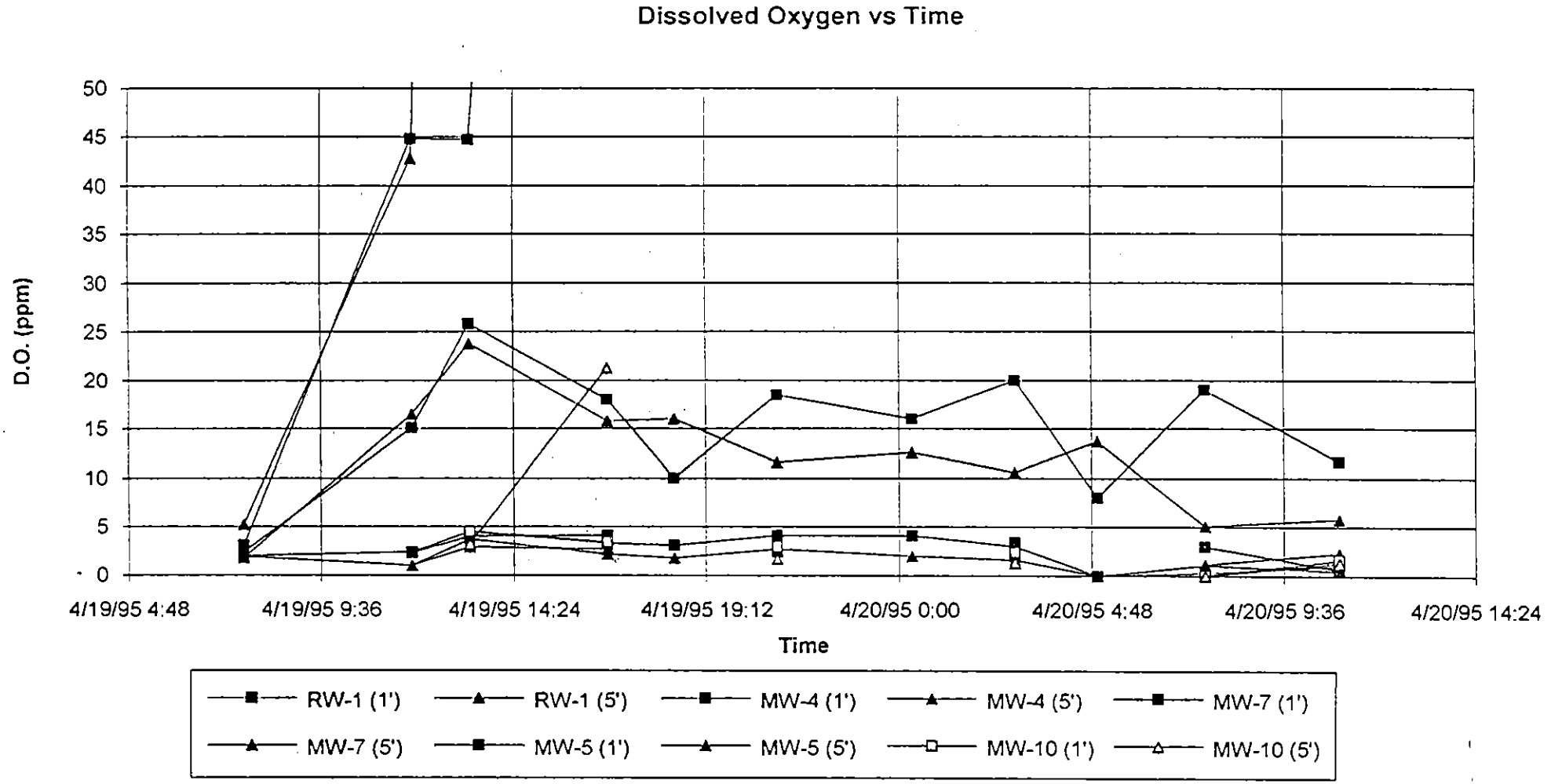


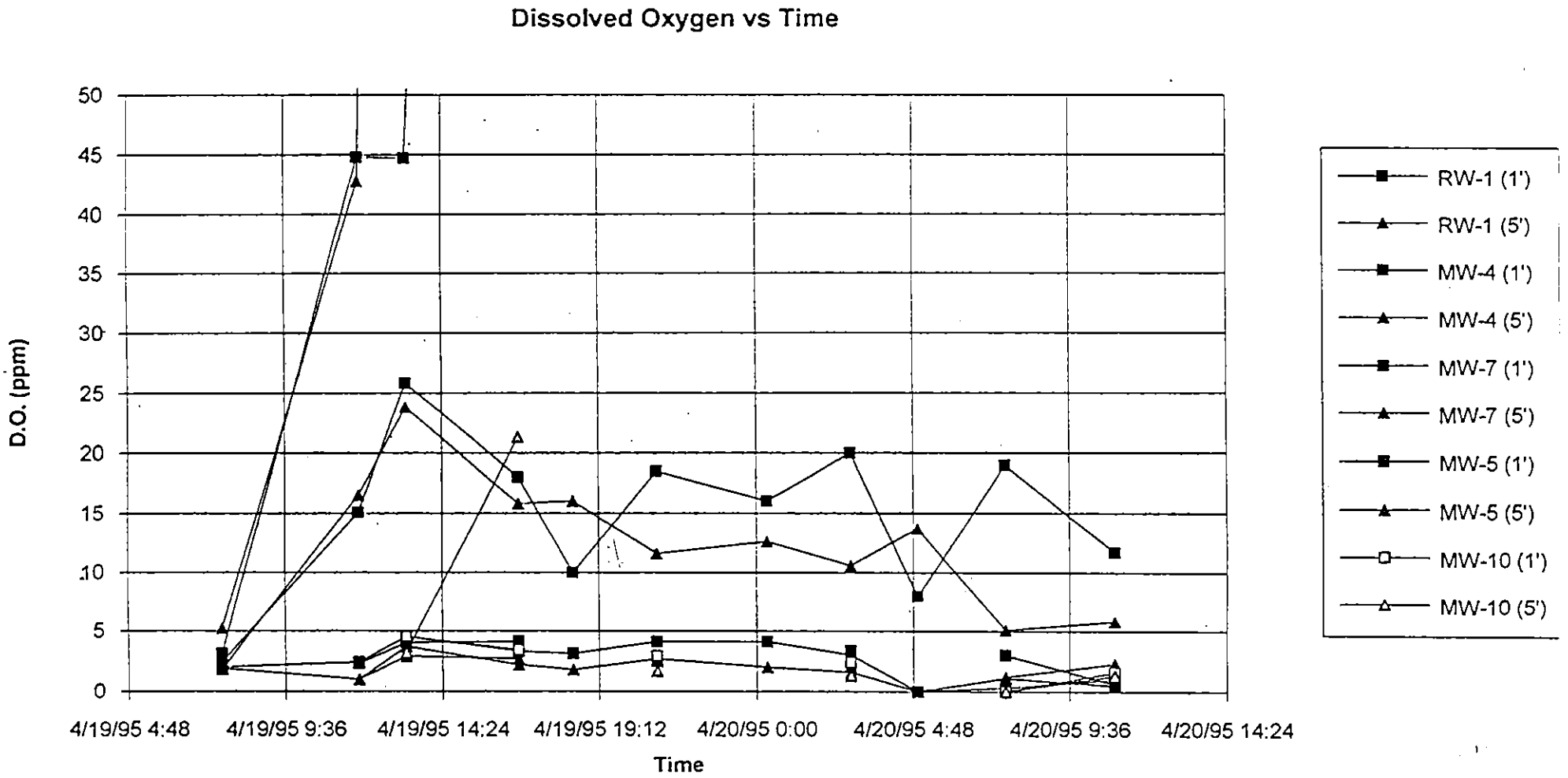
)				pH													
MW-10		MW-1		RW-1		MW-4		MW-7		MW-5		MW-10		MW-1		OVM	Flow	Notes
1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	(PPM)	(cfm)	
				7.44	7.45	7.38	7.35	7.25	7.24							0	0	Prior to Start
																		System ON
																315	40	
																266	40	
																247	40	
				7.97	7.97	7.61	7.51	7.27	7.25	7.26	7.24							
																304	40	
																313	40	
434	426	432	431		7.81	7.62	7.52	7.24	7.23	7.16	7.2	7.41	7.4	6.94	7.21			
																321	40	
																263	40	
																244	39	
435	426	434	434	7.87	7.79	7.5	7.54	7.3	7.27	7.22	7.22	7.46	7.45	7.12	7.31			
		436	435	7.76	7.57	7.25	7.29	7.09	7.09					6.93	7.1			
																229	40	
																212	40	
444	435	449	435	7.84	7.74	7.45	7.38	7.12	7.13	7.23	7.22	7.3	7.37	7.13	7.27			
																235	40	
																208	40	
		455	444	8.18	7.89	7.65	7.52	7.36	7.31					7.3	7.38			
																195	40	
																191	40	
																180	40	
448	441	458	446	8.08	7.84	7.57	7.48	7.28	7.24	7.28	7.27	7.46	7.42	7.26	7.33			
																164	40	
		450	448	8.11	7.84		7.41	7.16	7.13					7.19	7.14			
																169	40	

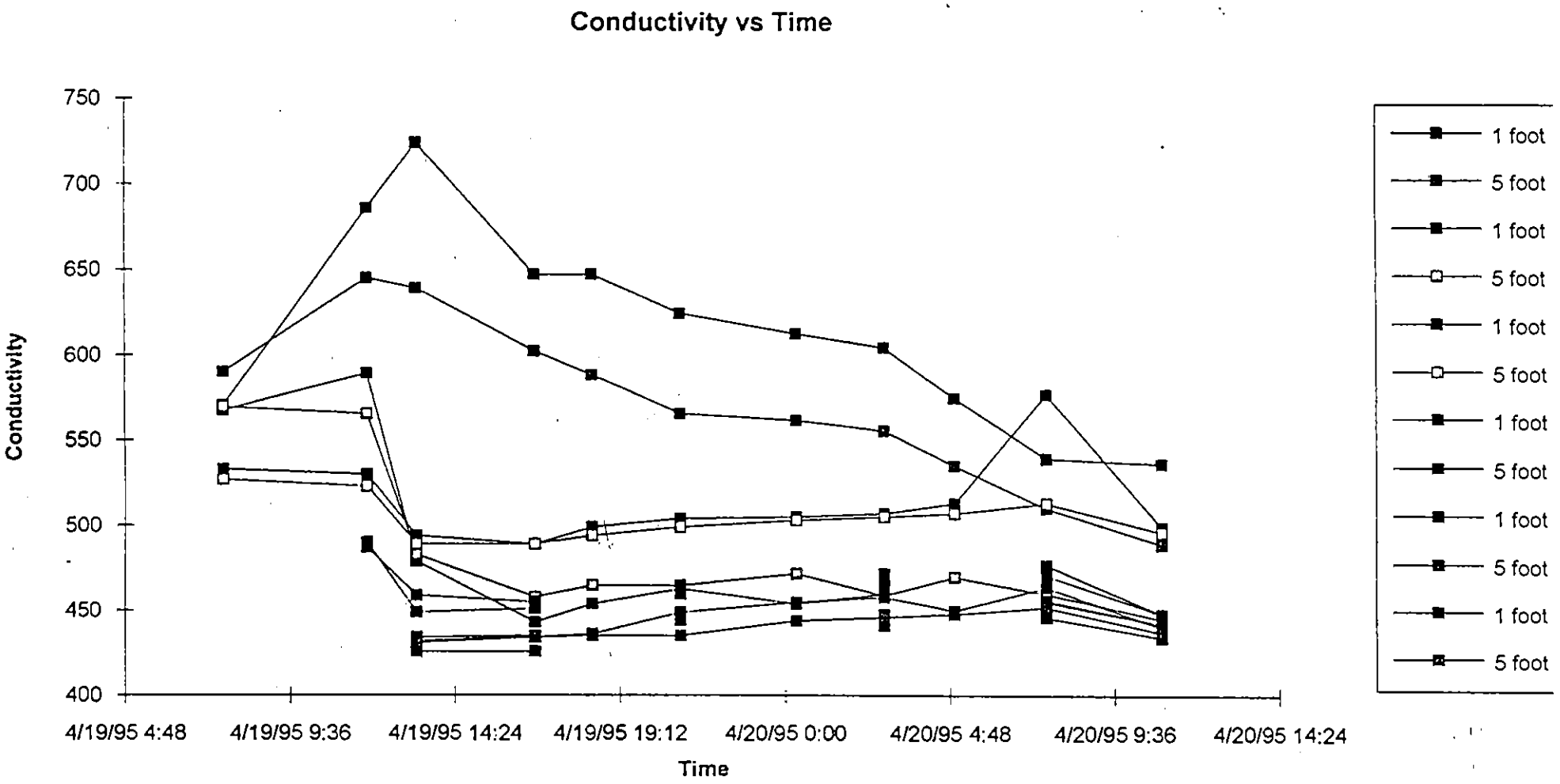
																181	40
																155	40
456	446	464	452	8.39	7.98	7.7	7.5	7.29	7.28	7.43	7.38	7.46	7.41	7.34	7.4		
																119	40
																108	40
442	434	440	437	8.34	8.05	7.62	7.51	7.3	7.24	7.39	7.36	7.47	7.44	7.37	7.38		

)				pH												OVM	Flow	
MW-10		MW-1		RW-1		MW-4		MW-7		MW-5		MW-10		MW-1		(PPM)	(cfm)	Notes
1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot	1 foot	5 foot			
				7.44	7.45	7.38	7.35	7.25	7.24							0	0	Prior to Start
				7.97	7.97	7.61	7.51	7.27	7.25	7.26	7.24							
434	426	432	431		7.81	7.62	7.52	7.24	7.23	7.16	7.2	7.41	7.4	6.94	7.21			
435	426	434	434	7.87	7.79	7.5	7.54	7.3	7.27	7.22	7.22	7.46	7.45	7.12	7.31			
		436	435	7.76	7.57	7.25	7.29	7.09	7.09					6.93	7.1			
444	435	449	435	7.84	7.74	7.45	7.38	7.12	7.13	7.23	7.22	7.3	7.37	7.13	7.27			
		455	444	8.18	7.89	7.65	7.52	7.36	7.31					7.3	7.38			
448	441	458	446	8.08	7.84	7.57	7.48	7.28	7.24	7.28	7.27	7.46	7.42	7.26	7.33			
		450	448	8.11	7.84		7.41	7.16	7.13					7.19	7.14			
456	446	464	452	8.39	7.98	7.7	7.5	7.29	7.28	7.43	7.38	7.46	7.41	7.34	7.4			
442	434	440	437	8.34	8.05	7.62	7.51	7.3	7.24	7.39	7.36	7.47	7.44	7.37	7.38			




Dissolved Oxygen vs Time
D.O. (ppm)
50
45
40
35
30
25
20
15
10
5
0
4/19/95 4:48
4/19/95 9:36
4/19/95 14:24
4/19/95 19:12
4/20/95 0:00
4/20/95 4:48
4/20/95 9:36
4/20/95 14:24
Time
RW-1 (1')
RW-1 (5')
MW-4 (1')
MW-4 (5')
MW-7 (1')
MW-7 (5')
MW-5 (1')
MW-5 (5')
MW-10 (1')
MW-10 (5')


Dissolved Oxygen vs Time
D.O. (ppm)
50
45
40
35
30
25
20
15
10
5
0
4/19/95 4:48
4/19/95 9:36
4/19/95 14:24
4/19/95 19:12
4/20/95 0:00
4/20/95 4:48
4/20/95 9:36
4/20/95 14:24
Time
RW-1 (1')
RW-1 (5')
MW-4 (1')
MW-4 (5')
MW-7 (1')
MW-7 (5')
MW-5 (1')
MW-5 (5')
MW-10 (1')
MW-10 (5')


Conductivity vs Time
Conductivity
750
700
650
600
550
500
450
400
4/19/95 4:48
4/19/95 9:36
4/19/95 14:24
4/19/95 19:12
4/20/95 0:00
4/20/95 4:48
4/20/95 9:36
4/20/95 14:24
Time
1 foot
5 foot
1 foot
5 foot
1 foot
5 foot
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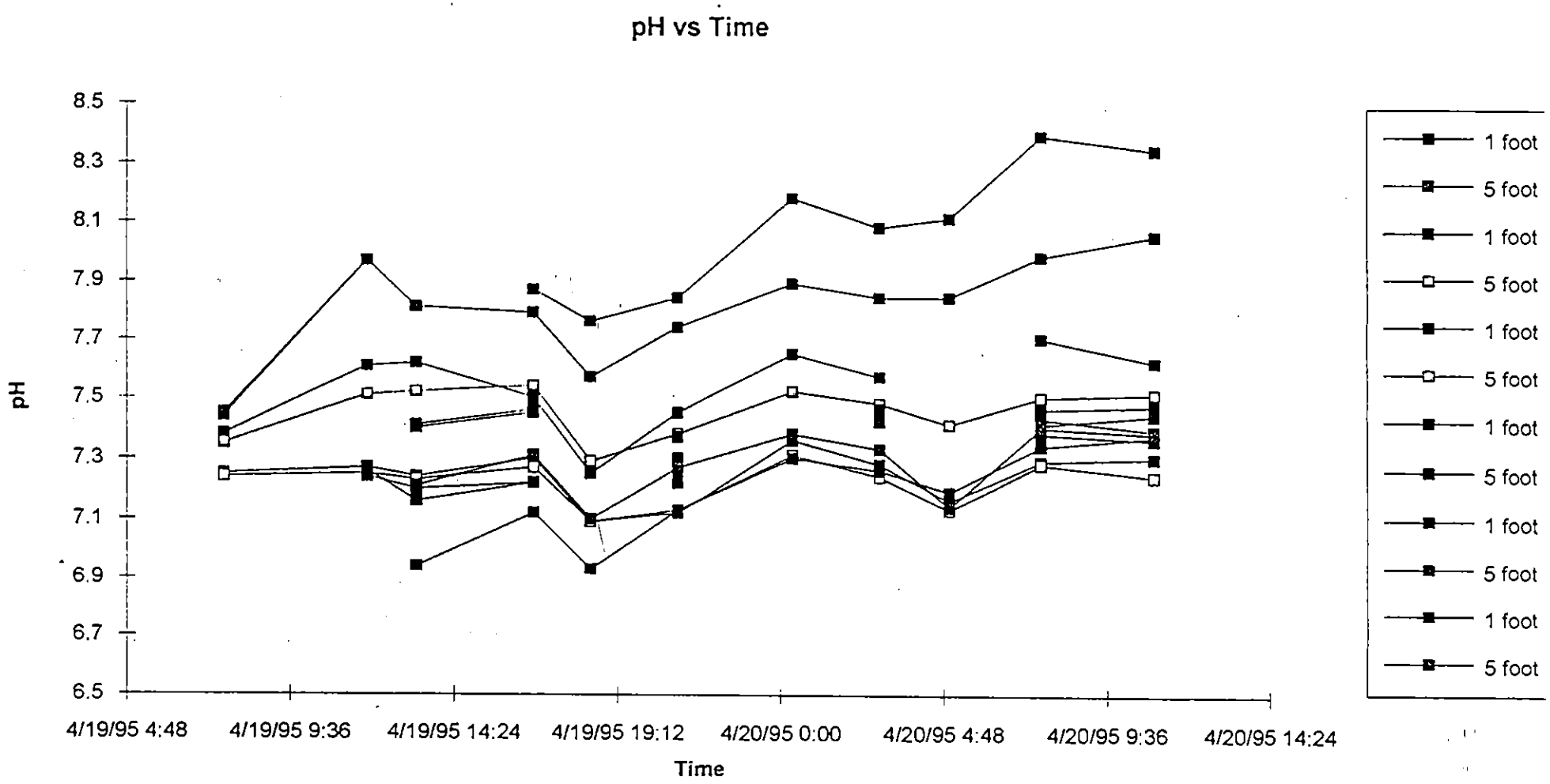
pH vs Time
8.5
8.3
8.1
7.9
7.7
7.5
7.3
7.1
6.9
6.7
6.5
pH
4/19/95 4:48
4/19/95 9:36
4/19/95 14:24
4/19/95 19:12
4/20/95 0:00
4/20/95 4:48
4/20/95 9:36
4/20/95 14:24
Time
1 foot
5 foot
1 foot
5 foot
1 foot
5 foot
1 foot
5 foot
1 foot
5 foot
1 foot
5 foot

Time Oil CO., Jackpot Foodmart
Richland, Washington
Soil Vapor Extraction Feasibility Test
4/20/1995

Site Characteristics:

Soil Type: Cobbles and Sand

Test Data:

Well Type	Well #	Dist. to Extr. Well (feet)	Max. Vac (in. H20)
Extr. Well	RW-1	0	
Mon. Well	MW-1	65	0.11
Mon. Well	MW-2	124	0.06
Mon. Well	MW-3	108	0.08
Mon. Well	MW-4	14	1.17
Mon. Well	MW-5	90	0.1
Mon. Well	VW-1	83	0.1
Mon. Well	MW-6	150	0.01
Mon. Well	MW-7	128	0.02
Mon. Well	MW-8	168	0.015
Mon. Well	MW-9	190	0.03

Well Type	Well #	Dist. to Extr. Well (feet)	Max. Vac (in. H20)
Extr. Well	MW-7	0	
Mon. Well	MW-3	155	0
Mon. Well	MW-4	115	0.01
Mon. Well	MW-5	140	0
Mon. Well	MW-6	85	0.12
Mon. Well	MW-8	115	0.06
Mon. Well	MW-9	228	0
Mon. Well	MW-10	213	0

SVE Test: Extraction Well, RW-1

Time (min.)	Extr. Well Flow Rate (cfm)	Extr. Well RW-1 (in. H2O)	Extr. Well RW-1 OVM	MW-1 (in. H2O)	MW-2 (in. H2O)	MW-3 (in. H2O)	MW-4 (in. H2O)	MW-5 (in. H2O)	VW-1 (in. H2O)	MW-6 (in. H2O)	MW-7 (in. H2O)	MW-8 (in. H2O)	MW-9 (in. H2O)
2		42	91.2										
4		42	112										
15		41		0.11	0.06	0.08	1.1	0.1	0.1	0.005	0.02	0.015	0.03
20		41	103										
60		41	89										
65		41		0.105	0.06	0.06	1.17	0.095	0.1	0.005	0.01	0.01	0.03
115		41	65										
120		41		0.1	0.06	0.07	1.17	0.1	0.1	0.01	0.015	0.01	0.03

Extraction Well, MW-7

Time (minutes)	Extr. Well Flow Rate (cfm)	Extr. Well Vac. (in. H2O)	Extr. Well Vac. OVM	MW-3 (in. H2O)	MW-4 (in. H2O)	MW-5 (in. H2O)	MW-6 (in. H2O)	MW-8 (in. H2O)	MW-9 (in. H2O)	MW-10 (in. H2O)
2		40	4.3							
5		40	3							
10		40	0							
25		40	1.7	0	0.01	0	0.12	0.06	0	0
55		40	1.2							
60		41	65	0	0.01	0	0.11	0.05	0	0

APPENDIX G

Performance Analytical Inc.
Air Quality Laboratory

LABORATORY REPORT

Client:	AGRA E & E	Date of Report:	05/24/95
Address:	E 520 North Foothills Drive, Suite 600	Date Received:	04/26/95
	Spokane, WA 99207	PAI Project No:	P95-8137
Contact:	Mr. Bruce Williams	Purchase Order:	Verbal

Client Project ID: Richland Jackpot #S-1238-2

Six (6) Stainless Steel Summa Canisters labeled:

"ST-1"	"ST-2"	"VTRW-1A"
"VTRW-1B"	"VTMW-7A"	"VTMW-7B"

The samples were received at the laboratory under chain of custody on April 26, 1995. The samples were received intact. The dates of analysis are indicated on the attached data sheets.

Speciated Hydrocarbon Analysis

The samples were analyzed for Speciated Hydrocarbons using a gas chromatograph equipped with a flame ionization detector. The analyses were performed using the protocol outlined in the Technical Assistance Document for Sampling and Analysis of Ozone Precursors, EPA 600/8-91-215, U.S. Environmental Protection Agency, Research Triangle Park, NC, October, 1991.

The results of analyses are included on the attached data sheets.

Data Release Authorization:

Ku-Jih Chen
Principal Chemist

Reviewed and Approved:

Christopher Casteel
Manager of Technical Operations

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : N/A
PAI Sample ID : PAI Method Blank

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/9/95
Volume(s) Analyzed : 250.0 (ml)

Pi 1 = 0.0 Pf 1 = 0.0

D.F. = 1.00

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	10
00074-86-2	Acetylene	ND	10
00074-84-0	Ethane	ND	10
00115-07-1	Propylene	ND	10
00074-98-6	Propane	ND	10
00074-99-7	Methylacetylene	ND	10
00075-28-5	Isobutane	ND	10
00115-11-7	Isobutylene	ND	10
00106-98-9	1-Butene	ND	10
00106-99-0	1,3-Butadiene	ND	10
00106-97-8	n-Butane	ND	10
00624-64-6	trans-2-Butene	ND	10
00463-82-1	2,2-Dimethylpropane	ND	10
00107-00-6	Ethylacetylene	ND	10
00590-18-1	cis-2-Butene	ND	10
00078-78-4	Isopentane	ND	10
00109-67-1	1-Pentene	ND	10
00563-46-2	2-Methyl-1-butene	ND	10
00109-66-0	n-Pentane	ND	10
00078-79-5	Isoprene	ND	10
00646-04-8	trans-2-Pentene	ND	10
00627-20-3	cis-2-Pentene	ND	10
00513-35-9	2-Methyl-2-butene	ND	10

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : N/A
PAI Sample ID : PAI Method Blank

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/9/95
Volume(s) Analyzed : 250.0 (ml)

Pi 1 = 0.0 Pf 1 = 0.0

D.F. = 1.00

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	ND	10
00142-29-0	Cyclopentene	ND	10
00691-37-2	4-Methyl-1-pentene	ND	10
00287-92-3	Cyclopentane	ND	10
00079-29-8	2,3-Dimethylbutane	ND	10
00107-83-5	2-Methylpentane	ND	10
00096-14-0	3-Methylpentane	ND	10
00592-41-6	1-Hexene	ND	10
00110-54-3	n-Hexane	ND	10
04050-45-7	trans-2-Hexene	ND	10
00625-27-4	2-Methyl-2-pentene	ND	10
07688-21-3	cis-2-Hexene	ND	10
00096-37-7	Methylcyclopentane	ND	10
00071-43-2	Benzene	ND	10
00110-82-7	Cyclohexane	ND	10
00591-76-4	2-Methylhexane	ND	10
00565-59-3	2,3-Dimethylpentane	ND	10
00589-34-4	3-Methylhexane	ND	10
00592-76-7	1-Heptene	ND	10
00540-84-1	Isooctane	ND	10
00142-82-5	n-Heptane	ND	10
00108-87-2	Methylcyclohexane	ND	10
00589-43-5	2,4-Dimethylhexane	ND	10
00565-75-3	2,3,4-Trimethylpentane	ND	10

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Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : N/A
PAI Sample ID : PAI Method Blank

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/9/95
Volume(s) Analyzed : 250.0 (ml)

Pi 1 = 0.0 Pf 1 = 0.0

D.F. = 1.00

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	ND	10
00592-27-8	2-Methylheptane	ND	10
00111-60-0	1-Octene	ND	10
00111-65-9	n-Octane	ND	10
00100-41-4	Ethylbenzene	ND	10
00108-38-3	m-Xylene	ND	10
00106-42-3	p-Xylene	ND	10
00100-42-5	Styrene	ND	10
00095-47-6	o-Xylene	ND	10
00111-84-2	n-Nonane	ND	10
00098-82-8	Cumene	ND	10
07785-70-8	a-Pinene	ND	10
00103-65-1	n-Propylbenzene	ND	10
00620-14-4	m-Ethyltoluene	ND	10
00622-96-8	p-Ethyltoluene	ND	10
00108-67-8	1,3,5-Trimethylbenzene	ND	10
00611-14-3	o-Ethyltoluene	ND	10
18172-67-3	b-Pinene	ND	10
00095-63-6	1,2,4-Trimethylbenzene	ND	10
00124-18-5	n-Decane	ND	10
00099-87-6	p-Cymene	ND	10
05989-27-5	d-Limonene	ND	10
00105-05-5	1,4-Diethylbenzene	13	10
00104-51-8	n-Butylbenzene	ND	10

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : N/A
PAI Sample ID : PAI Method Blank

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/11/95
Volume(s) Analyzed : 250.0 (ml)

Pi 1 = 0.0 Pf 1 = 0.0

D.F. = 1.00

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	10
00074-86-2	Acetylene	ND	10
00074-84-0	Ethane	ND	10
00115-07-1	Propylene	ND	10
00074-98-6	Propane	ND	10
00074-99-7	Methylacetylene	ND	10
00075-28-5	Isobutane	ND	10
00115-11-7	Isobutylene	ND	10
00106-98-9	1-Butene	ND	10
00106-99-0	1,3-Butadiene	ND	10
00106-97-8	n-Butane	ND	10
00624-64-6	trans-2-Butene	ND	10
00463-82-1	2,2-Dimethylpropane	ND	10
00107-00-6	Ethylacetylene	ND	10
00590-18-1	cis-2-Butene	ND	10
00078-78-4	Isopentane	ND	10
00109-67-1	1-Pentene	ND	10
00563-46-2	2-Methyl-1-butene	ND	10
00109-66-0	n-Pentane	ND	10
00078-79-5	Isoprene	ND	10
00646-04-8	trans-2-Pentene	ND	10
00627-20-3	cis-2-Pentene	ND	10
00513-35-9	2-Methyl-2-butene	ND	10

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ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : N/A
PAI Sample ID : PAI Method Blank

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/11/95
Volume(s) Analyzed : 250.0 (ml)

Pi 1 = 0.0 Pf 1 = 0.0

D.F. = 1.00

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	ND	10
00142-29-0	Cyclopentene	ND	10
00691-37-2	4-Methyl-1-pentene	ND	10
00287-92-3	Cyclopentane	ND	10
00079-29-8	2,3-Dimethylbutane	ND	10
00107-83-5	2-Methylpentane	ND	10
00096-14-0	3-Methylpentane	ND	10
00592-41-6	1-Hexene	ND	10
00110-54-3	n-Hexane	ND	10
04050-45-7	trans-2-Hexene	ND	10
00625-27-4	2-Methyl-2-pentene	ND	10
07688-21-3	cis-2-Hexene	ND	10
00096-37-7	Methylcyclopentane	ND	10
00071-43-2	Benzene	ND	10
00110-82-7	Cyclohexane	ND	10
00591-76-4	2-Methylhexane	ND	10
00565-59-3	2,3-Dimethylpentane	ND	10
00589-34-4	3-Methylhexane	ND	10
00592-76-7	1-Heptene	ND	10
00540-84-1	Isooctane	ND	10
00142-82-5	n-Heptane	ND	10
00108-87-2	Methylcyclohexane	ND	10
00589-43-5	2,4-Dimethylhexane	ND	10
00565-75-3	2,3,4-Trimethylpentane	ND	10

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : N/A
PAI Sample ID : PAI Method Blank

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : N/A
Date Received : N/A
Date Analyzed : 5/11/95
Volume(s) Analyzed : 250.0 (ml)

Pi 1 = 0.0 Pf 1 = 0.0

D.F. = 1.00

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	ND	10
00592-27-8	2-Methylheptane	ND	10
00111-60-0	1-Octene	ND	10
00111-65-9	n-Octane	ND	10
00100-41-4	Ethylbenzene	ND	10
00108-38-3	m-Xylene	ND	10
00106-42-3	p-Xylene	ND	10
00100-42-5	Styrene	ND	10
00095-47-6	o-Xylene	ND	10
00111-84-2	n-Nonane	ND	10
00098-82-8	Cumene	ND	10
07785-70-8	a-Pinene	ND	10
00103-65-1	n-Propylbenzene	ND	10
00620-14-4	m-Ethyltoluene	ND	10
00622-96-8	p-Ethyltoluene	ND	10
00108-67-8	1,3,5-Trimethylbenzene	ND	10
00611-14-3	o-Ethyltoluene	ND	10
18172-67-3	b-Pinene	ND	10
00095-63-6	1,2,4-Trimethylbenzene	ND	10
00124-18-5	n-Decane	ND	10
00099-87-6	p-Cymene	ND	10
05989-27-5	d-Limonene	ND	10
00105-05-5	1,4-Diethylbenzene	ND	10
00104-51-8	n-Butylbenzene	ND	10

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : ST-1
PAI Sample ID : 9502114

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/19/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 1.0 (ml)

Pi 1 = 0.4 Pf 1 = 3.0

D.F. = 1.17

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	2,500
00074-86-2	Acetylene	ND	2,500
00074-84-0	Ethane	ND	2,500
00115-07-1	Propylene	ND	2,500
00074-98-6	Propane	ND	2,500
00074-99-7	Methylacetylene	ND	2,500
00075-28-5	Isobutane	ND	2,500
00115-11-7	Isobutylene	ND	2,500
00106-98-9	1-Butene	ND	2,500
00106-99-0	1,3-Butadiene	ND	2,500
00106-97-8	n-Butane	4,300	2,500
00624-64-6	trans-2-Butene	ND	2,500
00463-82-1	2,2-Dimethylpropane	ND	2,500
00107-00-6	Ethylacetylene	ND	2,500
00590-18-1	cis-2-Butene	ND	2,500
00078-78-4	Isopentane	120,000	2,500
00109-67-1	1-Pentene	ND	2,500
00563-46-2	2-Methyl-1-butene	ND	2,500
00109-66-0	n-Pentane	85,000	2,500
00078-79-5	Isoprene	ND	2,500
00646-04-8	trans-2-Pentene	ND	2,500
00627-20-3	cis-2-Pentene	ND	2,500
00513-35-9	2-Methyl-2-butene	ND	2,500

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : ST-1
PAI Sample ID : 9502114

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/19/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 1.0 (ml)

Pi 1 = 0.4 Pf 1 = 3.0

D.F. = 1.17

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	14,000	2,500
00142-29-0	Cyclopentene	ND	2,500
00691-37-2	4-Methyl-1-pentene	3,400	2,500
00287-92-3	Cyclopentane	3,400	2,500
00079-29-8	2,3-Dimethylbutane	78,000	2,500
00107-83-5	2-Methylpentane	290,000	2,500
00096-14-0	3-Methylpentane	200,000	2,500
00592-41-6	1-Hexene	11,000	2,500
00110-54-3	n-Hexane	270,000	2,500
04050-45-7	trans-2-Hexene	22,000	2,500
00625-27-4	2-Methyl-2-pentene	19,000	2,500
07688-21-3	cis-2-Hexene	11,000	2,500
00096-37-7	Methylcyclopentane	180,000	2,500
00071-43-2	Benzene	6,700	2,500
00110-82-7	Cyclohexane	82,000	2,500
00591-76-4	2-Methylhexane	250,000	2,500
00565-59-3	2,3-Dimethylpentane	290,000	2,500
00589-34-4	3-Methylhexane	250,000	2,500
00592-76-7	1-Heptene	86,000	2,500
00540-84-1	Isooctane	620,000	2,500
00142-82-5	n-Heptane	220,000	2,500
00108-87-2	Methylcyclohexane	190,000	2,500
00589-43-5	2,4-Dimethylhexane	100,000	2,500
00565-75-3	2,3,4-Trimethylpentane	200,000	2,500

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : ST-1
PAI Sample ID : 9502114

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/19/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 1.0 (ml)

Pi 1 = 0.4 Pf 1 = 3.0

D.F. = 1.17

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	190,000	2,500
00592-27-8	2-Methylheptane	100,000	2,500
00111-60-0	1-Octene	16,000	2,500
00111-65-9	n-Octane	91,000	2,500
00100-41-4	Ethylbenzene	20,000	2,500
00108-38-3	m-Xylene	ND	2,500
00106-42-3	p-Xylene	32,000	2,500
00100-42-5	Styrene	ND	2,500
00095-47-6	o-Xylene	2,900	2,500
00111-84-2	n-Nonane	21,000	2,500
00098-82-8	Cumene	4,100	2,500
07785-70-8	a-Pinene	ND	2,500
00103-65-1	n-Propylbenzene	8,700	2,500
00620-14-4	m-Ethyltoluene	21,000	2,500
00622-96-8	p-Ethyltoluene	13,000	2,500
00108-67-8	1,3,5-Trimethylbenzene	11,000	2,500
00611-14-3	o-Ethyltoluene	11,000	2,500
18172-67-3	b-Pinene	ND	2,500
00095-63-6	1,2,4-Trimethylbenzene	24,000	2,500
00124-18-5	n-Decane	3,300	2,500
00099-87-6	p-Cymene	3,500	2,500
05989-27-5	d-Limonene	ND	2,500
00105-05-5	1,4-Diethylbenzene	4,300	2,500
00104-51-8	n-Butylbenzene	2,600	2,500

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : ST-2
PAI Sample ID : 9502115

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.1 Pf 1 = 3.1

D.F. = 1.20

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	50
00074-86-2	Acetylene	ND	50
00074-84-0	Ethane	110	50
00115-07-1	Propylene	52	50
00074-98-6	Propane	75	50
00074-99-7	Methylacetylene	ND	50
00075-28-5	Isobutane	820	50
00115-11-7	Isobutylene	72	50
00106-98-9	1-Butene	ND	50
00106-99-0	1,3-Butadiene	ND	50
00106-97-8	n-Butane	2,200	50
00624-64-6	trans-2-Butene	ND	50
00463-82-1	2,2-Dimethylpropane	ND	50
00107-00-6	Ethylacetylene	ND	50
00590-18-1	cis-2-Butene	ND	50
00078-78-4	Isopentane	6,600	50
00109-67-1	1-Pentene	100	50
00563-46-2	2-Methyl-1-butene	170	50
00109-66-0	n-Pentane	3,300	50
00078-79-5	Isoprene	ND	50
00646-04-8	trans-2-Pentene	220	50
00627-20-3	cis-2-Pentene	130	50
00513-35-9	2-Methyl-2-butene	310	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : ST-2
PAI Sample ID : 9502115

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.1 Pf 1 = 3.1

D.F. = 1.20

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	950	50
00142-29-0	Cyclopentene	ND	50
00691-37-2	4-Methyl-1-pentene	130	50
00287-92-3	Cyclopentane	290	50
00079-29-8	2,3-Dimethylbutane	2,800	50
00107-83-5	2-Methylpentane	10,000	50
00096-14-0	3-Methylpentane	7,500	50
00592-41-6	1-Hexene	390	50
00110-54-3	n-Hexane	9,600	50
04050-45-7	trans-2-Hexene	940	50
00625-27-4	2-Methyl-2-pentene	920	50
07688-21-3	cis-2-Hexene	470	50
00096-37-7	Methylcyclopentane	6,500	50
00071-43-2	Benzene	1,300	50
00110-82-7	Cyclohexane	350	50
00591-76-4	2-Methylhexane	20,000	50
00565-59-3	2,3-Dimethylpentane	990	50
00589-34-4	3-Methylhexane	19,000	50
00592-76-7	1-Heptene	4,200	50
00540-84-1	Isooctane	44,000	50
00142-82-5	n-Heptane	19,000	50
00108-87-2	Methylcyclohexane	20,000	50
00589-43-5	2,4-Dimethylhexane	13,000	50
00565-75-3	2,3,4-Trimethylpentane	28,000	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : ST-2
PAI Sample ID : 9502115

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.1 Pf 1 = 3.1

D.F. = 1.20

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	22,000	50
00592-27-8	2-Methylheptane	16,000	50
00111-60-0	1-Octene	2,900	50
00111-65-9	n-Octane	18,000	50
00100-41-4	Ethylbenzene	10,000	50
00108-38-3	m-Xylene	24,000	50
00106-42-3	p-Xylene	12,000	50
00100-42-5	Styrene	2,100	50
00095-47-6	o-Xylene	11,000	50
00111-84-2	n-Nonane	10,000	50
00098-82-8	Cumene	3,400	50
07785-70-8	a-Pinene	3,700	50
00103-65-1	n-Propylbenzene	1,600	50
00620-14-4	m-Ethyltoluene	1,600	50
00622-96-8	p-Ethyltoluene	41,000	50
00108-67-8	1,3,5-Trimethylbenzene	24,000	50
00611-14-3	o-Ethyltoluene	12,000	50
18172-67-3	b-Pinene	1,700	50
00095-63-6	1,2,4-Trimethylbenzene	1,100	50
00124-18-5	n-Decane	1,200	50
00099-87-6	p-Cymene	15,000	50
05989-27-5	d-Limonene	940	50
00105-05-5	1,4-Diethylbenzene	3,000	50
00104-51-8	n-Butylbenzene	7,800	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1A
PAI Sample ID : 9502116

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.3 Pf 1 = 3.1

D.F. = 1.19

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	50
00074-86-2	Acetylene	ND	50
00074-84-0	Ethane	ND	50
00115-07-1	Propylene	ND	50
00074-98-6	Propane	57	50
00074-99-7	Methylacetylene	ND	50
00075-28-5	Isobutane	590	50
00115-11-7	Isobutylene	59	50
00106-98-9	1-Butene	ND	50
00106-99-0	1,3-Butadiene	ND	50
00106-97-8	n-Butane	1,600	50
00624-64-6	trans-2-Butene	ND	50
00463-82-1	2,2-Dimethylpropane	ND	50
00107-00-6	Ethylacetylene	ND	50
00590-18-1	cis-2-Butene	ND	50
00078-78-4	Isopentane	5,000	50
00109-67-1	1-Pentene	84	50
00563-46-2	2-Methyl-1-butene	150	50
00109-66-0	n-Pentane	2,200	50
00078-79-5	Isoprene	ND	50
00646-04-8	trans-2-Pentene	200	50
00627-20-3	cis-2-Pentene	110	50
00513-35-9	2-Methyl-2-butene	300	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1A
PAI Sample ID : 9502116

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.3 Pf 1 = 3.1

D.F. = 1.19

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	920	50
00142-29-0	Cyclopentene	ND	50
00691-37-2	4-Methyl-1-pentene	140	50
00287-92-3	Cyclopentane	230	50
00079-29-8	2,3-Dimethylbutane	2,300	50
00107-83-5	2-Methylpentane	8,200	50
00096-14-0	3-Methylpentane	6,000	50
00592-41-6	1-Hexene	170	50
00110-54-3	n-Hexane	6,600	50
04050-45-7	trans-2-Hexene	400	50
00625-27-4	2-Methyl-2-pentene	ND	50
07688-21-3	cis-2-Hexene	210	50
00096-37-7	Methylcyclopentane	6,300	50
00071-43-2	Benzene	1,300	50
00110-82-7	Cyclohexane	250	50
00591-76-4	2-Methylhexane	19,000	50
00565-59-3	2,3-Dimethylpentane	630	50
00589-34-4	3-Methylhexane	18,000	50
00592-76-7	1-Heptene	3,500	50
00540-84-1	Isooctane	45,000	50
00142-82-5	n-Heptane	13,000	50
00108-87-2	Methylcyclohexane	17,000	50
00589-43-5	2,4-Dimethylhexane	12,000	50
00565-75-3	2,3,4-Trimethylpentane	26,000	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1A
PAI Sample ID : 9502116

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.3 Pf 1 = 3.1

D.F. = 1.19

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	23,000	50
00592-27-8	2-Methylheptane	5,700	50
00111-60-0	1-Octene	2,000	50
00111-65-9	n-Octane	9,700	50
00100-41-4	Ethylbenzene	4,400	50
00108-38-3	m-Xylene	15,000	50
00106-42-3	p-Xylene	9,500	50
00100-42-5	Styrene	590	50
00095-47-6	o-Xylene	8,000	50
00111-84-2	n-Nonane	4,900	50
00098-82-8	Cumene	1,700	50
07785-70-8	a-Pinene	1,800	50
00103-65-1	n-Propylbenzene	960	50
00620-14-4	m-Ethyltoluene	ND	50
00622-96-8	p-Ethyltoluene	21,000	50
00108-67-8	1,3,5-Trimethylbenzene	1,700	50
00611-14-3	o-Ethyltoluene	8,100	50
18172-67-3	b-Pinene	750	50
00095-63-6	1,2,4-Trimethylbenzene	1,200	50
00124-18-5	n-Decane	320	50
00099-87-6	p-Cymene	ND	50
05989-27-5	d-Limonene	530	50
00105-05-5	1,4-Diethylbenzene	2,700	50
00104-51-8	n-Butylbenzene	7,100	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1B
PAI Sample ID : 9502117

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.2 Pf 1 = 2.9

D.F. = 1.18

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	50
00074-86-2	Acetylene	ND	50
00074-84-0	Ethane	ND	50
00115-07-1	Propylene	ND	50
00074-98-6	Propane	59	50
00074-99-7	Methylacetylene	ND	50
00075-28-5	Isobutane	920	50
00115-11-7	Isobutylene	60	50
00106-98-9	1-Butene	ND	50
00106-99-0	1,3-Butadiene	ND	50
00106-97-8	n-Butane	2,500	50
00624-64-6	trans-2-Butene	ND	50
00463-82-1	2,2-Dimethylpropane	ND	50
00107-00-6	Ethylacetylene	ND	50
00590-18-1	cis-2-Butene	58	50
00078-78-4	Isopentane	7,700	50
00109-67-1	1-Pentene	180	50
00563-46-2	2-Methyl-1-butene	320	50
00109-66-0	n-Pentane	3,000	50
00078-79-5	Isoprene	ND	50
00646-04-8	trans-2-Pentene	430	50
00627-20-3	cis-2-Pentene	230	50
00513-35-9	2-Methyl-2-butene	630	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1B
PAI Sample ID : 9502117

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.2 Pf 1 = 2.9

D.F. = 1.18

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	1,400	50
00142-29-0	Cyclopentene	92	50
00691-37-2	4-Methyl-1-pentene	ND	50
00287-92-3	Cyclopentane	370	50
00079-29-8	2,3-Dimethylbutane	1,500	50
00107-83-5	2-Methylpentane	5,100	50
00096-14-0	3-Methylpentane	3,400	50
00592-41-6	1-Hexene	89	50
00110-54-3	n-Hexane	2,700	50
04050-45-7	trans-2-Hexene	220	50
00625-27-4	2-Methyl-2-pentene	240	50
07688-21-3	cis-2-Hexene	120	50
00096-37-7	Methylcyclopentane	2,700	50
00071-43-2	Benzene	550	50
00110-82-7	Cyclohexane	1,600	50
00591-76-4	2-Methylhexane	4,900	50
00565-59-3	2,3-Dimethylpentane	8,100	50
00589-34-4	3-Methylhexane	6,600	50
00592-76-7	1-Heptene	ND	50
00540-84-1	Isooctane	24,000	50
00142-82-5	n-Heptane	3,600	50
00108-87-2	Methylcyclohexane	6,700	50
00589-43-5	2,4-Dimethylhexane	6,000	50
00565-75-3	2,3,4-Trimethylpentane	14,000	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1B
PAI Sample ID : 9502117

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.2 Pf 1 = 2.9

D.F. = 1.18

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	15,000	50
00592-27-8	2-Methylheptane	2,700	50
00111-60-0	1-Octene	710	50
00111-65-9	n-Octane	4,100	50
00100-41-4	Ethylbenzene	1,600	50
00108-38-3	m-Xylene	13,000	50
00106-42-3	p-Xylene	8,200	50
00100-42-5	Styrene	900	50
00095-47-6	o-Xylene	8,800	50
00111-84-2	n-Nonane	2,500	50
00098-82-8	Cumene	1,200	50
07785-70-8	a-Pinene	2,300	50
00103-65-1	n-Propylbenzene	810	50
00620-14-4	m-Ethyltoluene	71	50
00622-96-8	p-Ethyltoluene	16,000	50
00108-67-8	1,3,5-Trimethylbenzene	1,900	50
00611-14-3	o-Ethyltoluene	7,000	50
18172-67-3	b-Pinene	650	50
00095-63-6	1,2,4-Trimethylbenzene	ND	50
00124-18-5	n-Decane	550	50
00099-87-6	p-Cymene	7,900	50
05989-27-5	d-Limonene	400	50
00105-05-5	1,4-Diethylbenzene	2,100	50
00104-51-8	n-Butylbenzene	5,900	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1B
PAI Sample ID : 9502117 (Laboratory Duplicate)

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.2 Pf 1 = 2.9

D.F. = 1.18

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	50
00074-86-2	Acetylene	ND	50
00074-84-0	Ethane	ND	50
00115-07-1	Propylene	ND	50
00074-98-6	Propane	55	50
00074-99-7	Methylacetylene	ND	50
00075-28-5	Isobutane	850	50
00115-11-7	Isobutylene	56	50
00106-98-9	1-Butene	ND	50
00106-99-0	1,3-Butadiene	ND	50
00106-97-8	n-Butane	2,300	50
00624-64-6	trans-2-Butene	ND	50
00463-82-1	2,2-Dimethylpropane	ND	50
00107-00-6	Ethylacetylene	ND	50
00590-18-1	cis-2-Butene	54	50
00078-78-4	Isopentane	7,000	50
00109-67-1	1-Pentene	160	50
00563-46-2	2-Methyl-1-butene	290	50
00109-66-0	n-Pentane	2,700	50
00078-79-5	Isoprene	ND	50
00646-04-8	trans-2-Pentene	390	50
00627-20-3	cis-2-Pentene	200	50
00513-35-9	2-Methyl-2-butene	570	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1B
PAI Sample ID : 9502117 (Laboratory Duplicate)

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.2 Pf 1 = 2.9

D.F. = 1.18

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	1,300	50
00142-29-0	Cyclopentene	84	50
00691-37-2	4-Methyl-1-pentene	ND	50
00287-92-3	Cyclopentane	350	50
00079-29-8	2,3-Dimethylbutane	1,500	50
00107-83-5	2-Methylpentane	4,800	50
00096-14-0	3-Methylpentane	3,200	50
00592-41-6	1-Hexene	97	50
00110-54-3	n-Hexane	2,400	50
04050-45-7	trans-2-Hexene	220	50
00625-27-4	2-Methyl-2-pentene	260	50
07688-21-3	cis-2-Hexene	110	50
00096-37-7	Methylcyclopentane	2,400	50
00071-43-2	Benzene	470	50
00110-82-7	Cyclohexane	1,500	50
00591-76-4	2-Methylhexane	4,200	50
00565-59-3	2,3-Dimethylpentane	7,300	50
00589-34-4	3-Methylhexane	5,900	50
00592-76-7	1-Heptene	ND	50
00540-84-1	Isooctane	22,000	50
00142-82-5	n-Heptane	3,200	50
00108-87-2	Methylcyclohexane	6,100	50
00589-43-5	2,4-Dimethylhexane	5,500	50
00565-75-3	2,3,4-Trimethylpentane	13,000	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTRW-1B
PAI Sample ID : 9502117 (Laboratory Duplicate)

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/9/95
Volume(s) Analyzed : 50.0 (ml)

Pi 1 = 0.2 Pf 1 = 2.9

D.F. = 1.18

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	14,000	50
00592-27-8	2-Methylheptane	4,100	50
00111-60-0	1-Octene	870	50
00111-65-9	n-Octane	3,600	50
00100-41-4	Ethylbenzene	1,700	50
00108-38-3	m-Xylene	11,000	50
00106-42-3	p-Xylene	7,400	50
00100-42-5	Styrene	490	50
00095-47-6	o-Xylene	7,100	50
00111-84-2	n-Nonane	2,300	50
00098-82-8	Cumene	1,100	50
07785-70-8	a-Pinene	2,100	50
00103-65-1	n-Propylbenzene	740	50
00620-14-4	m-Ethyltoluene	110	50
00622-96-8	p-Ethyltoluene	15,000	50
00108-67-8	1,3,5-Trimethylbenzene	1,800	50
00611-14-3	o-Ethyltoluene	6,400	50
18172-67-3	b-Pinene	590	50
00095-63-6	1,2,4-Trimethylbenzene	ND	50
00124-18-5	n-Decane	490	50
00099-87-6	p-Cymene	7,300	50
05989-27-5	d-Limonene	350	50
00105-05-5	1,4-Diethylbenzene	2,000	50
00104-51-8	n-Butylbenzene	5,400	50

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTMW-7A
PAI Sample ID : 9502118

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/11/95
Volume(s) Analyzed : 200.0 (ml)

Pi 1 = 0.3 Pf 1 = 3.1

D.F. = 1.19

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	13
00074-86-2	Acetylene	ND	13
00074-84-0	Ethane	18	13
00115-07-1	Propylene	ND	13
00074-98-6	Propane	ND	13
00074-99-7	Methylacetylene	ND	13
00075-28-5	Isobutane	66	13
00115-11-7	Isobutylene	ND	13
00106-98-9	1-Butene	ND	13
00106-99-0	1,3-Butadiene	ND	13
00106-97-8	n-Butane	320	13
00624-64-6	trans-2-Butene	ND	13
00463-82-1	2,2-Dimethylpropane	ND	13
00107-00-6	Ethylacetylene	ND	13
00590-18-1	cis-2-Butene	ND	13
00078-78-4	Isopentane	2,300	13
00109-67-1	1-Pentene	34	13
00563-46-2	2-Methyl-1-butene	52	13
00109-66-0	n-Pentane	1,300	13
00078-79-5	Isoprene	ND	13
00646-04-8	trans-2-Pentene	99	13
00627-20-3	cis-2-Pentene	61	13
00513-35-9	2-Methyl-2-butene	120	13

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTMW-7A
PAI Sample ID : 9502118

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/11/95
Volume(s) Analyzed : 200.0 (ml)

Pi 1 = 0.3 Pf 1 = 3.1

D.F. = 1.19

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	140	13
00142-29-0	Cyclopentene	ND	13
00691-37-2	4-Methyl-1-pentene	27	13
00287-92-3	Cyclopentane	140	13
00079-29-8	2,3-Dimethylbutane	630	13
00107-83-5	2-Methylpentane	1,900	13
00096-14-0	3-Methylpentane	1,200	13
00592-41-6	1-Hexene	200	13
00110-54-3	n-Hexane	1,100	13
04050-45-7	trans-2-Hexene	170	13
00625-27-4	2-Methyl-2-pentene	190	13
07688-21-3	cis-2-Hexene	100	13
00096-37-7	Methylcyclopentane	1,200	13
00071-43-2	Benzene	220	13
00110-82-7	Cyclohexane	560	13
00591-76-4	2-Methylhexane	450	13
00565-59-3	2,3-Dimethylpentane	650	13
00589-34-4	3-Methylhexane	500	13
00592-76-7	1-Heptene	ND	13
00540-84-1	Isooctane	950	13
00142-82-5	n-Heptane	330	13
00108-87-2	Methylcyclohexane	420	13
00589-43-5	2,4-Dimethylhexane	160	13
00565-75-3	2,3,4-Trimethylpentane	360	13

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTMW-7A
PAI Sample ID : 9502118

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/11/95
Volume(s) Analyzed : 200.0 (ml)

Pi 1 = 0.3 Pf 1 = 3.1

D.F. = 1.19

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	1,100	13
00592-27-8	2-Methylheptane	180	13
00111-60-0	1-Octene	16	13
00111-65-9	n-Octane	93	13
00100-41-4	Ethylbenzene	2,300	13
00108-38-3	m-Xylene	4,900	13
00106-42-3	p-Xylene	3,000	13
00100-42-5	Styrene	ND	13
00095-47-6	o-Xylene	2,600	13
00111-84-2	n-Nonane	76	13
00098-82-8	Cumene	160	13
07785-70-8	a-Pinene	19	13
00103-65-1	n-Propylbenzene	480	13
00620-14-4	m-Ethyltoluene	2,000	13
00622-96-8	p-Ethyltoluene	1,000	13
00108-67-8	1,3,5-Trimethylbenzene	1,200	13
00611-14-3	o-Ethyltoluene	940	13
18172-67-3	b-Pinene	ND	13
00095-63-6	1,2,4-Trimethylbenzene	3,800	13
00124-18-5	n-Decane	75	13
00099-87-6	p-Cymene	940	13
05989-27-5	d-Limonene	450	13
00105-05-5	1,4-Diethylbenzene	470	13
00104-51-8	n-Butylbenzene	800	13

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTMW-7B
PAI Sample ID : 9502119

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/11/95
Volume(s) Analyzed : 200.0 (ml)

Pi 1 = 0.1 Pf 1 = 3.2

D.F. = 1.21

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00074-85-1	Ethylene	ND	13
00074-86-2	Acetylene	ND	13
00074-84-0	Ethane	ND	13
00115-07-1	Propylene	ND	13
00074-98-6	Propane	ND	13
00074-99-7	Methylacetylene	ND	13
00075-28-5	Isobutane	15	13
00115-11-7	Isobutylene	ND	13
00106-98-9	1-Butene	ND	13
00106-99-0	1,3-Butadiene	ND	13
00106-97-8	n-Butane	85	13
00624-64-6	trans-2-Butene	ND	13
00463-82-1	2,2-Dimethylpropane	ND	13
00107-00-6	Ethylacetylene	ND	13
00590-18-1	cis-2-Butene	ND	13
00078-78-4	Isopentane	520	13
00109-67-1	1-Pentene	18	13
00563-46-2	2-Methyl-1-butene	29	13
00109-66-0	n-Pentane	290	13
00078-79-5	Isoprene	ND	13
00646-04-8	trans-2-Pentene	59	13
00627-20-3	cis-2-Pentene	30	13
00513-35-9	2-Methyl-2-butene	71	13

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTMW-7B
PAI Sample ID : 9502119

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/11/95
Volume(s) Analyzed : 200.0 (ml)

Pi 1 = 0.1 Pf 1 = 3.2

D.F. = 1.21

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00075-83-2	2,2-Dimethylbutane	29	13
00142-29-0	Cyclopentene	ND	13
00691-37-2	4-Methyl-1-pentene	ND	13
00287-92-3	Cyclopentane	91	13
00079-29-8	2,3-Dimethylbutane	150	13
00107-83-5	2-Methylpentane	390	13
00096-14-0	3-Methylpentane	270	13
00592-41-6	1-Hexene	100	13
00110-54-3	n-Hexane	270	13
04050-45-7	trans-2-Hexene	89	13
00625-27-4	2-Methyl-2-pentene	120	13
07688-21-3	cis-2-Hexene	55	13
00096-37-7	Methylcyclopentane	620	13
00071-43-2	Benzene	140	13
00110-82-7	Cyclohexane	340	13
00591-76-4	2-Methylhexane	110	13
00565-59-3	2,3-Dimethylpentane	170	13
00589-34-4	3-Methylhexane	150	13
00592-76-7	1-Heptene	ND	13
00540-84-1	Isooctane	240	13
00142-82-5	n-Heptane	220	13
00108-87-2	Methylcyclohexane	240	13
00589-43-5	2,4-Dimethylhexane	62	13
00565-75-3	2,3,4-Trimethylpentane	150	13

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client : AGRA E & E

Client Sample ID : VTMW-7B
PAI Sample ID : 9502119

Test Code : Analysis For Ozone Precursors
Analyst : W. Henton/K. Chen
Instrument : HP GC 5890A/FID/Tekmar 5010
Matrix : Summa Canister

Date Sampled : 4/20/95
Date Received : 4/26/95
Date Analyzed : 5/11/95
Volume(s) Analyzed : 200.0 (ml)

Pi 1 = 0.1 Pf 1 = 3.2

D.F. = 1.21

CAS #	COMPOUND	RESULT ppbC	REPORTING LIMIT ppbC
00108-88-3	Toluene	470	13
00592-27-8	2-Methylheptane	78	13
00111-60-0	1-Octene	ND	13
00111-65-9	n-Octane	50	13
00100-41-4	Ethylbenzene	1,300	13
00108-38-3	m-Xylene	2,800	13
00106-42-3	p-Xylene	1,700	13
00100-42-5	Styrene	ND	13
00095-47-6	o-Xylene	1,500	13
00111-84-2	n-Nonane	37	13
00098-82-8	Cumene	95	13
07785-70-8	a-Pinene	ND	13
00103-65-1	n-Propylbenzene	290	13
00620-14-4	m-Ethyltoluene	1,100	13
00622-96-8	p-Ethyltoluene	590	13
00108-67-8	1,3,5-Trimethylbenzene	670	13
00611-14-3	o-Ethyltoluene	530	13
18172-67-3	b-Pinene	ND	13
00095-63-6	1,2,4-Trimethylbenzene	2,100	13
00124-18-5	n-Decane	38	13
00099-87-6	p-Cymene	530	13
05989-27-5	d-Limonene	ND	13
00105-05-5	1,4-Diethylbenzene	280	13
00104-51-8	n-Butylbenzene	490	13

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF NON-METHANE HYDROCARBONS ANALYSIS

Client: AGRA E & E

Client Project ID: #S-1238-2
PAI Project ID: #P958137

Test Code: GC/FID
Instrument ID: HP 5890A/FID #3
Analyst: W. Henton/K. Chen
Matrix: Summa Canisters

Date Sampled: 4/19-20/95
Date Received: 4/26/95
Date Analyzed: 5/9/95 & 5/11/95
Volume(s) Analyzed: 250.0 (ml)
200.0 (ml)
50.0 (ml)
1.0 (ml)

Client Sample ID	PAI Sample ID	D.F.	Total Non-Methane Hydrocarbons ppbC
ST-1	9502114	1.17	5,500,000
ST-2	9502115	1.20	910,000
VTRW-1A	9502116	1.19	670,000
VTRW-1B	9502117	1.18	430,000
VTRW-1B	Lab Duplicate	1.18	390,000
VTMW-7A	9502118	1.19	48,000
VTMW-7B	9502119	1.21	23,000
N/A (5/9/95)	Method Blank	1.00	ND
N/A (5/11/95)	Method Blank	1.00	ND

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RT

Date : 5/23/95

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00292

P958137

AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

CHAIN OF CUSTODY

PROJECT: RICHLAND ~~[illegible]~~ JACKPOT	PROJECT No.: S-1238-2
CLIENT: Time Oil Co.	PHONE No.
PROJECT MANAGER: Bruce Williams	PHONE No.: 509 325 0104
SAMPLER'S NAME (please print): Gene St. Godard	PHONE No.: 509 325 0104
SAMPLER'S SIGNATURE: Gene St Godard	

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

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	TO-14 (Ozone Precursors and TNMHC)				
1. ST-1	4/19/95	10:53	A	9502114	1																	X				98
2. ST-2	4/20/95	10:50	A	9502115	1																	X				199
3. VTRW-1A	4/20/95	12:05	A	9502116	1																	X				200
4. VTRW-1B	"	13:05	A	9502117	1																	X				3
5. VTMW-7A	"	13:36	A	9502118	1																	X				75
6. VTMW-7B	↓	14:32	A	9502119	1																	X				1
7.																										
8.																										
9.																										
10.																										

SAMPLE RECEIPT	LABORATORY	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	ST-1 → #00098, ST-2 → #00199, VTRW-1A → #00200, VTRW-1B → #00003, VTMW-7A → #00075, VTMW-7B → #00001
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	
		☐ 2 WEEK (standard)	
		☐ OTHER ____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Gene St Godard	4/24/95	11:22	1. Bruce Quarles OPS	4-25-95	1120
2.			2. Robert D. Lee	4-26-95	9:00 AM
3.			3.		

PAGE 1 OF 1

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

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APPENDIX H

NORTH CREEK ANALYTICAL

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AGRA E. & E. - Spokane	Project Name:	Richland JP	
539 W. Sharp Suite D	Client Project #:	S1238-02	
Spokane , WA 99201			Received: Apr 18, 1995
Attention: Gene St. Godard	NCA Project #:	S504053	Reported: Apr 19, 1995

PROJECT SUMMARY PAGE

Laboratory Sample Number	Sample Description	Sample Matrix	Date Sampled
S504053-01	DISCHARGE	Water	4/18/95

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

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

NORTH CREEK ANALYTICAL

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AGRA E. & E. - Spokane	Client Project ID:	Richland JP	Sampled:	Apr 18, 1995
539 W. Sharp Suite D	Sample Matrix:	Water	Received:	Apr 18, 1995
Spokane , WA 99201	Analysis Method:	WTPH-G	Analyzed:	Apr 18, 1995
Attention: Gene St. Godard	First Sample #:	S504053-01	Reported:	Apr 19, 1995

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result µg/L (ppb)	Surrogate Recovery %
S504053-01	DISCHARGE	N.D.	68
BLK50418A	Method Blank	N.D.	77

Reporting Limit:	50

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

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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AGRA E. & E. - Spokane	Client Project ID:	Richland JP	Sampled:	Apr 18, 1995
539 W. Sharp Suite D	Sample Matrix:	Water	Received:	Apr 18, 1995
Spokane , WA 99201	Analysis Method:	EPA 8020	Analyzed:	Apr 18, 1995
Attention: Gene St. Godard	First Sample #:	S504053-01	Reported:	Apr 19, 1995

BTEX DISTINCTION

Sample Number	Sample Description	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)	Surrogate Recovery %
S504053-01	DISCHARGE	N.D.	N.D.	N.D.	N.D.	71
BLK50418A	Method Blank	N.D.	N.D.	N.D.	N.D.	78
Reporting Limits:		**0.50**	**0.50**	**0.50**	**1.0**	

4-Bromofluorobenzene surrogate recovery control limits are 55 - 144 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armanto
Laboratory Manager

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AGRA E. & E. - Spokane	Client Project ID:	Richland JP	Sampled:	Apr 18, 1995
539 W. Sharp Suite D	Sample Matrix:	Water	Received:	Apr 18, 1995
Spokane , WA 99201	Analysis Method:	WTPH-D	Extracted:	Apr 19, 1995
Attention: Gene St. Godard	First Sample #:	S504053-01	Analyzed:	Apr 19, 23, 1995
			Reported:	Apr 19, 26, 1995

TOTAL PETROLEUM HYDROCARBONS-DIESEL RANGE

Sample Number	Sample Description	Sample Result mg/L (ppm)	Surrogate Recovery %
S504053-01	DISCHARGE	N.D.	86
BLK50419A	Method Blank	N.D.	92

Reporting Limit:	**0.50**

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

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

504053.AES <4>

NORTH CREEK ANALYTICAL

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AGRA E. & E. - Spokane	Client Project ID:	Richland JP	Sampled:	Apr 18, 1995
539 W. Sharp Suite D	Sample Descript:	DISCHARGE	Received:	Apr 18, 1995
Spokane , WA 99201			Analyzed:	Apr 19, 1995
Attention: Gene St. Godard	Sample Number:	S504053-01	Reported:	Apr 19, 1995

LABORATORY ANALYSIS

Analyte	Reporting Limit	Sample Results
Corrosivity:		
pH	N.A.	6.10

Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

504053.AES <5>

NORTH CREEK ANALYTICAL

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East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

AGRA E. & E. - Spokane	Client Project ID: Richland JP	Analyst: G. Holte
539 W. Sharp Suite D	Sample Matrix: Water	
Spokane , WA 99201	Analysis Method: WTPH-G	
Attention: Gene St. Godard	Units: µg/L (ppb)	Analyzed: Apr 18, 1995
		Reported: Apr 19, 1995

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Gasoline

Spike Conc. Added:	2000
Spike Result:	1921
% Recovery:	96.1
Upper Control Limit %:	114
Lower Control Limit %:	55

PRECISION ASSESSMENT
Sample Duplicate

Gasoline Range Organics

Sample Number:	S504027-09
Original Result:	N.D.
Duplicate Result:	N.D.
Relative % Difference	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Detection Limit.
Maximum RPD:	38

NORTH CREEK ANALYTICAL Inc.

Scott L. Armond
Laboratory Manager

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

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

NORTH CREEK ANALYTICAL

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

AGRA E. & E. - Spokane	Client Project ID: Richland JP	Analyst:	G. Holte
539 W. Sharp Suite D	Sample Matrix: Water		
Spokane , WA 99201	Analysis Method: EPA 8020		
Attention: Gene St. Godard	Units: µg/L (ppb)	Analyzed:	Apr 18, 1995
	QC Sample #: S504027-09	Reported:	Apr 19, 1995

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Result:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10.0	10.0	10.0	30.0
Spike Result:	9.18	9.19	90.3	27.3
Spike % Recovery:	92%	92%	903%	91%
Spike Dup. Result:	9.36	9.26	9.32	28.2
Spike Duplicate % Recovery:	94%	93%	93%	94%
Upper Control Limit %:	138	121	126	130
Lower Control Limit %:	57	78	83	77
Relative % Difference:	1.9%	0.8%	162.6%	3.2%
Maximum RPD:	9.0	9.0	13	20

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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

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

NORTH CREEK ANALYTICAL

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East 11115 Montgomery, Suite B • Spokane, WA 99206-4776 (509) 924-9200 • FAX 924-9290
9405 S.W. Nimbus Avenue • Beaverton, OR 97008-7132 (503) 643-9200 • FAX 644-2202

AGRA E. & E. - Spokane
539 W. Sharp Suite D
Spokane , WA 99201
Attention: Gene St. Godard

Client Project ID: Richland JP
Sample Matrix: Water
Analysis Method: WTPH-D
Units: mg/L (ppm)

Analyst: D. Risk

Extracted: Apr 19, 1995
Analyzed: Apr 19, 23, 1995
Reported: Apr 19, 26, 1995

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Diesel

Spike Conc. Added:	5.00
Spike Result:	5.03
% Recovery:	101
Upper Control Limit %:	119
Lower Control Limit %:	74

PRECISION ASSESSMENT
Sample Duplicate

Diesel Range Organics

Sample Number:	S504053-01
Original Result:	N.D.
Duplicate Result:	N.D.
Relative % Difference	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Detection Limit.
Maximum RPD:	44

NORTH CREEK ANALYTICAL Inc.

Scott L. Armand
Laboratory Manager

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

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

00134

AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

CHAIN OF CUSTODY

PROJECT: RICHLAND JP	PROJECT No.: 5-1238-02
CLIENT:	PHONE No.:
PROJECT MANAGER: Bruce Williams	PHONE No.: 509 3250104
SAMPLER'S NAME (please print): Gene Stoddard	PHONE No.:
SAMPLER'S SIGNATURE: Gene Stoddard	

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

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 606 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP	pH			
1. DISCHARGE	4/18	1600	W	5	4				X		X											X	5504053-01		
2.																									
3.																									
4.																									
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

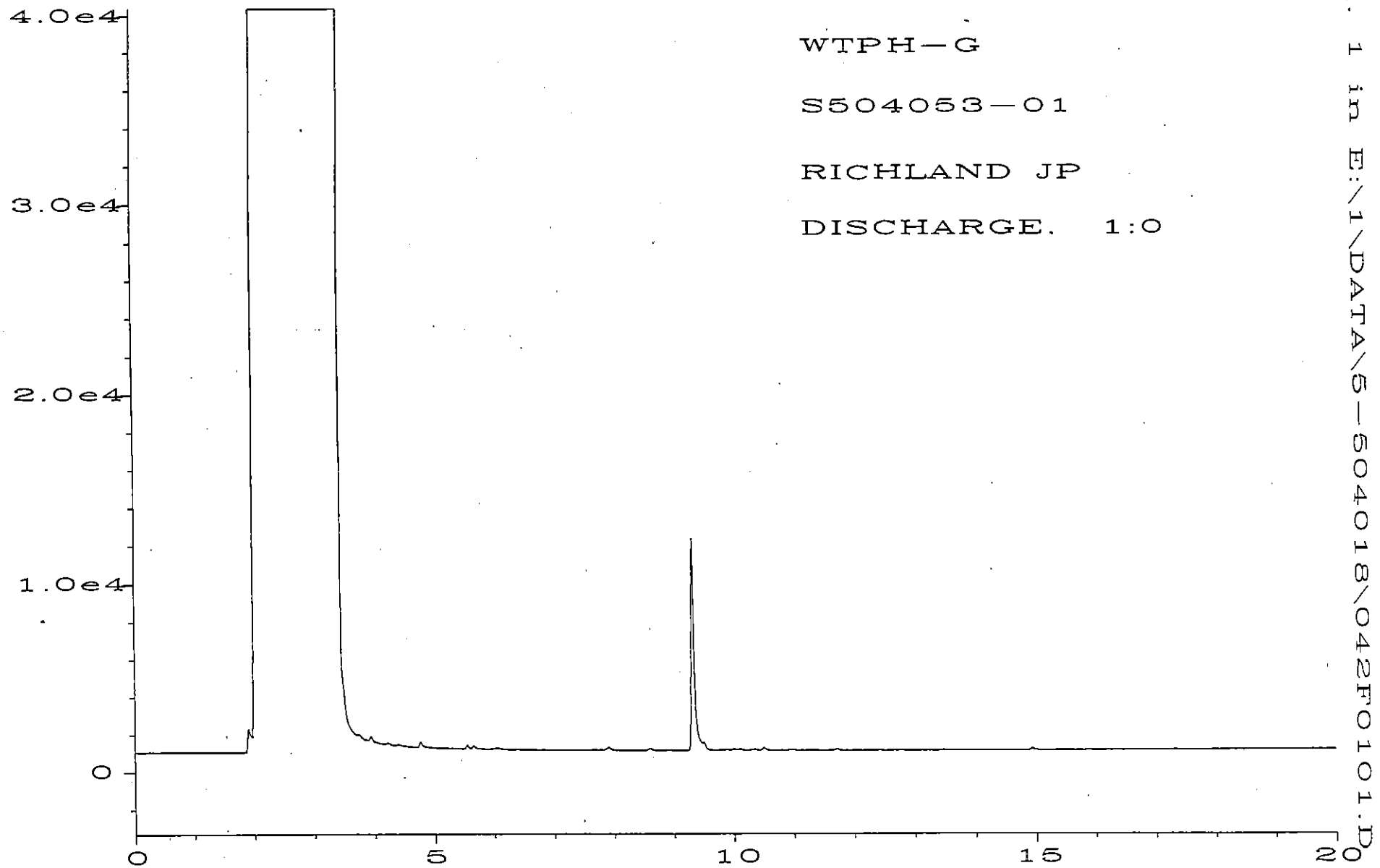
SAMPLE RECEIPT	LABORATORY	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☒ 8 HOUR	RUSH
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
CONDITION OF SEALS	DOT DESIGNATION	☐ 1 WEEK	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Gene Stoddard	4/18/95	17:00	1. Scott 2nd	4-18-95	2130
2.			2.		
3.			3.		

PAGE 1 OF 1

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

DISTRIBUTION: White, Yellow - Laboratory, Pink - Originator


WTPH-G
S504053-01
RICHLAND JP
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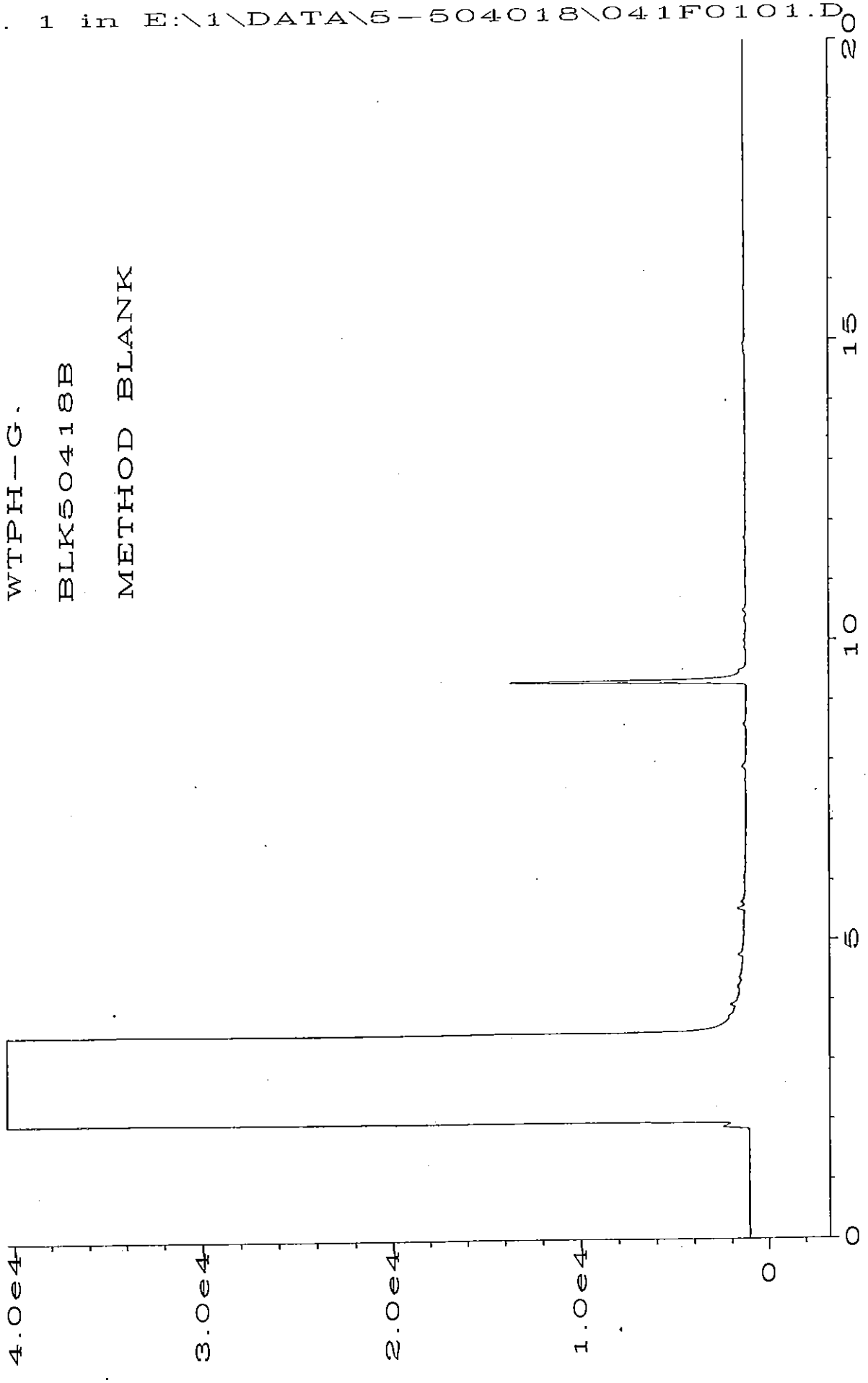
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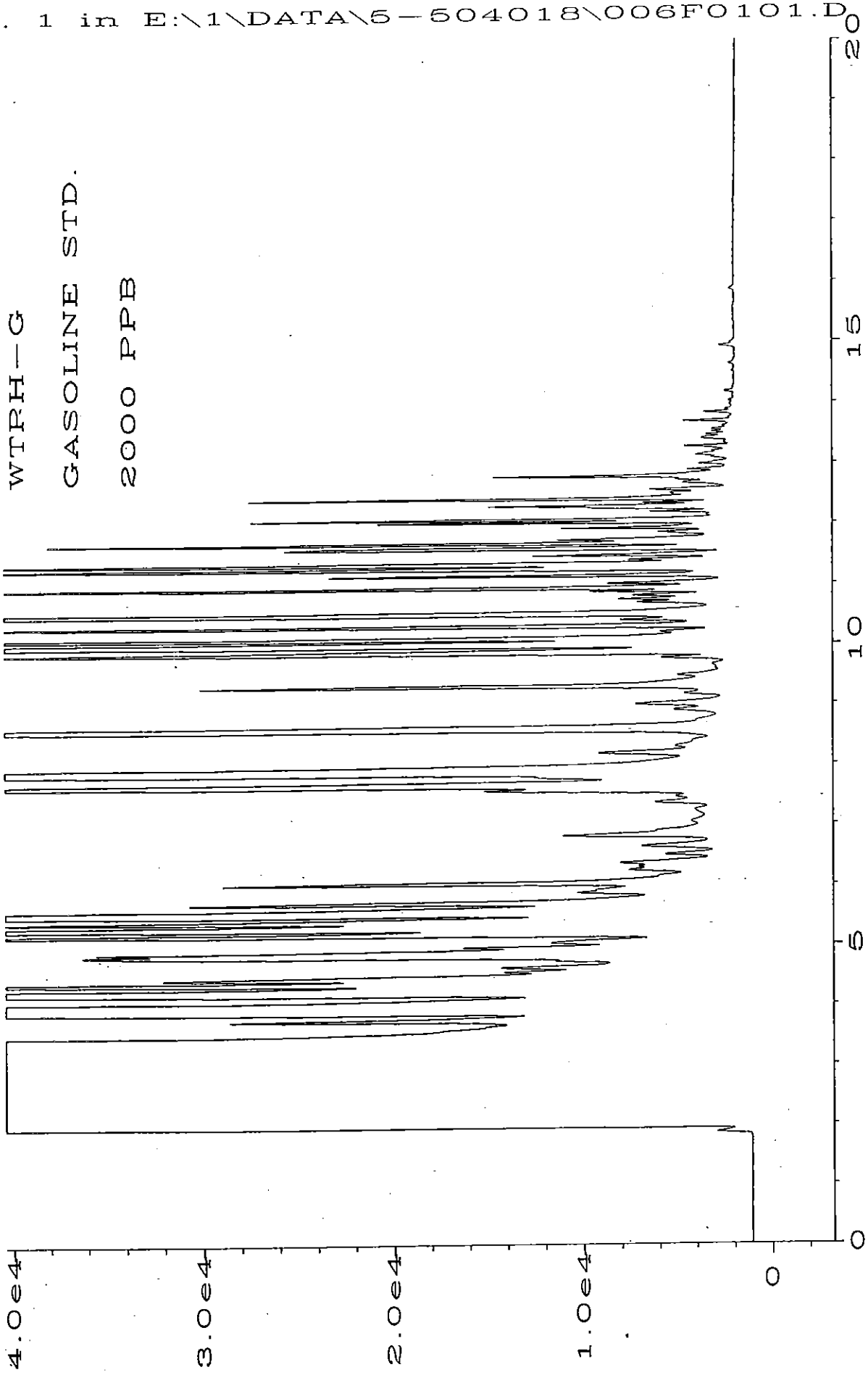

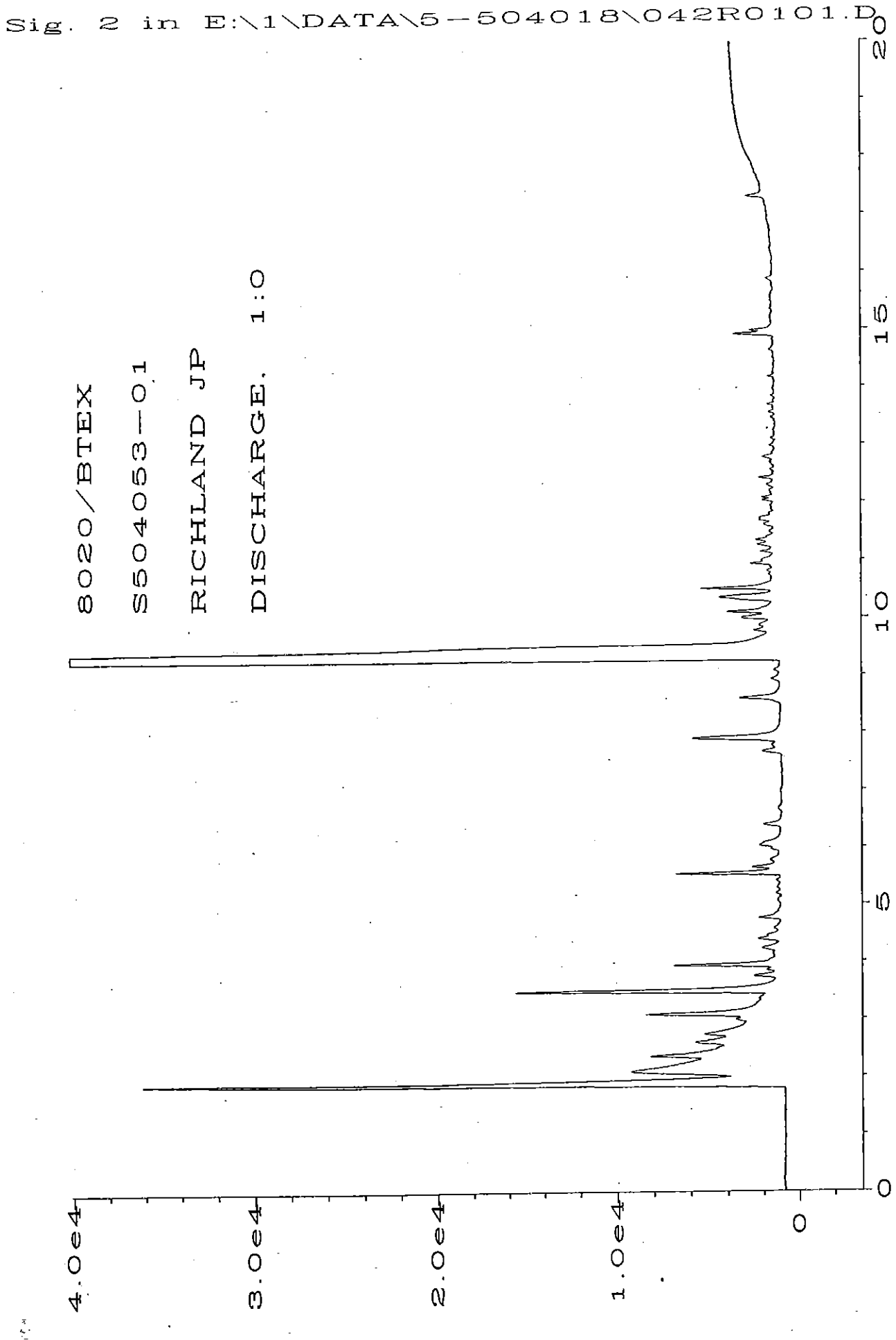
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S504053-01
RICHLAND JP
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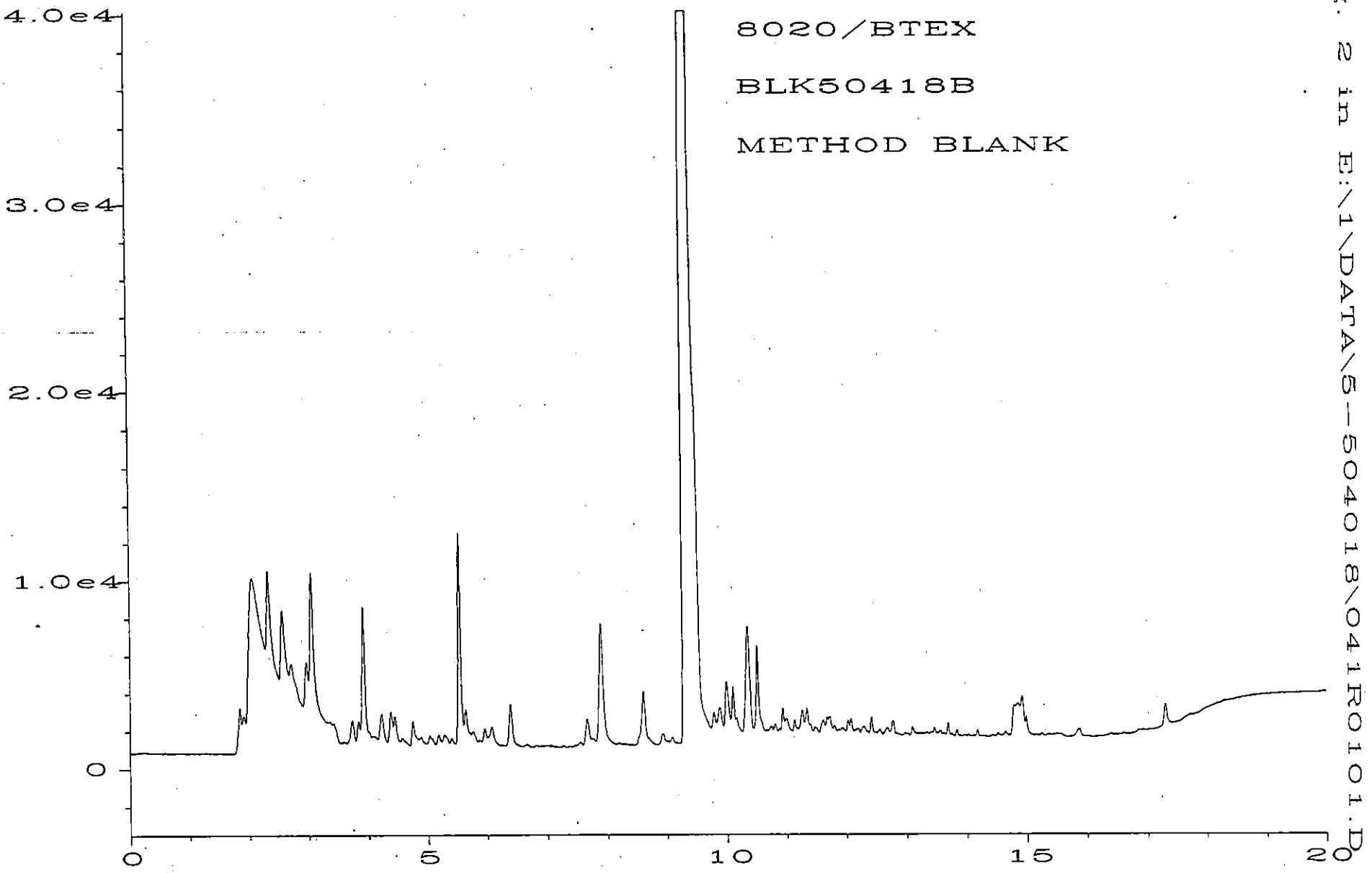
1.0e4
0
0
5
10
15
20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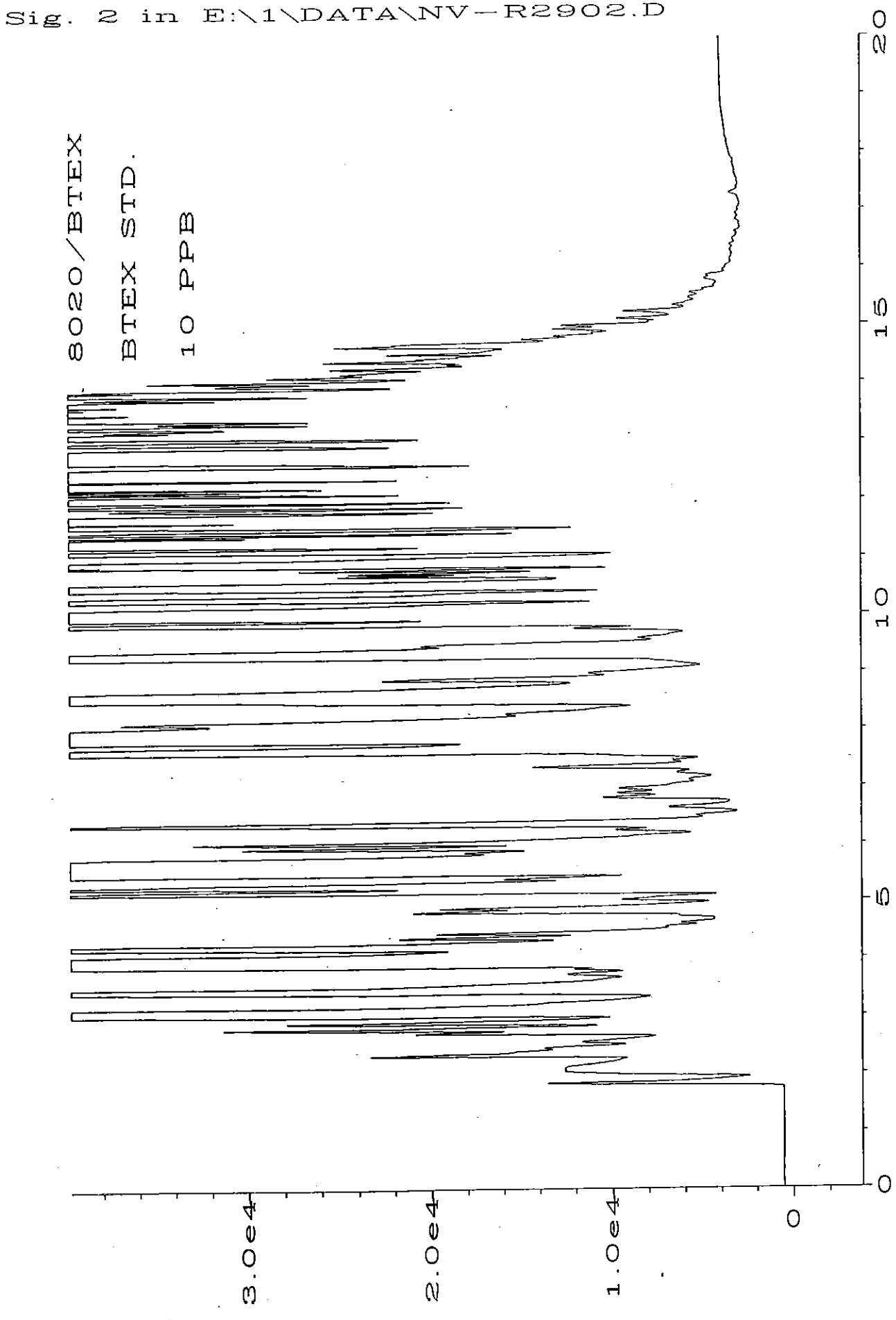
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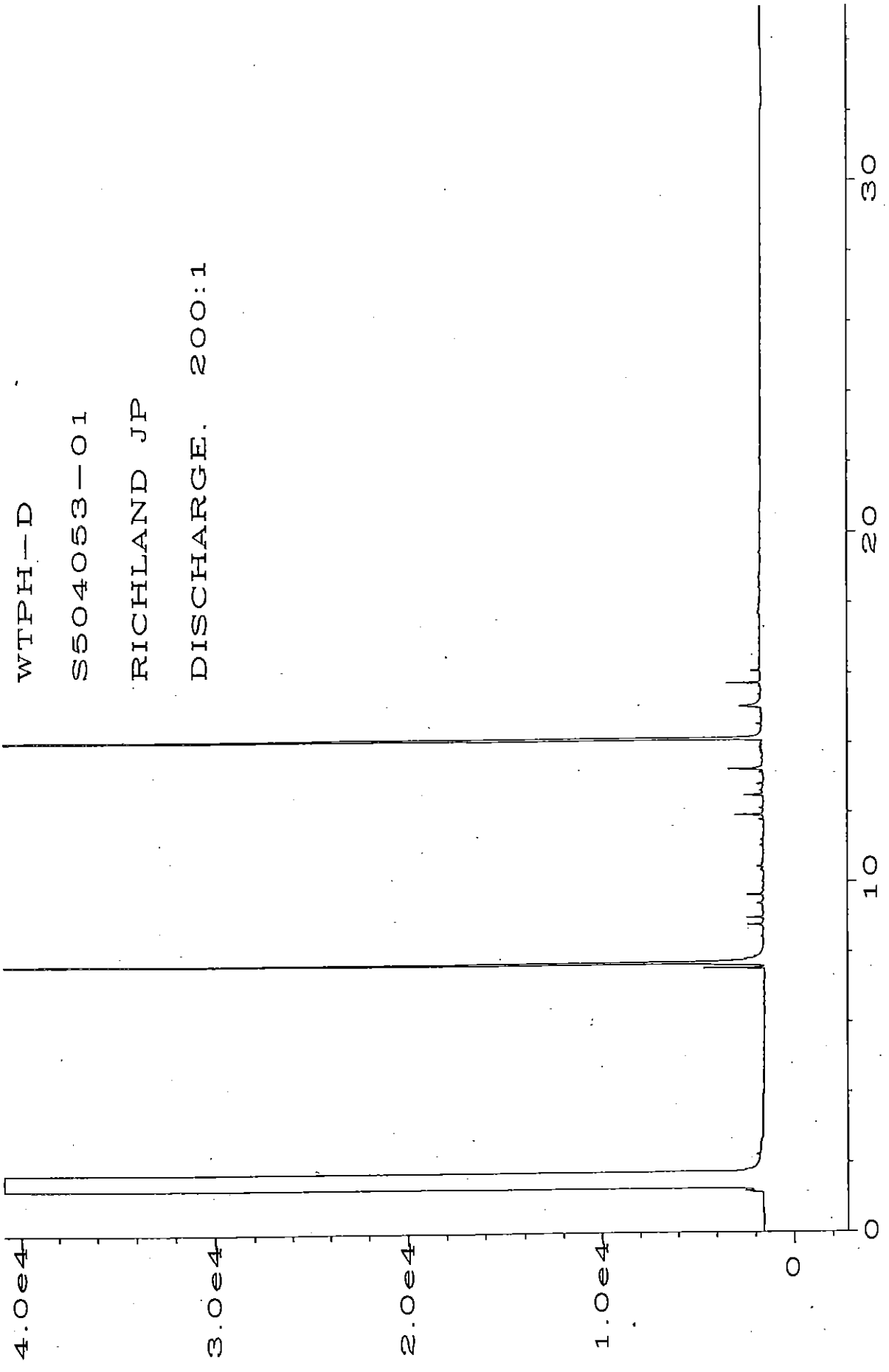

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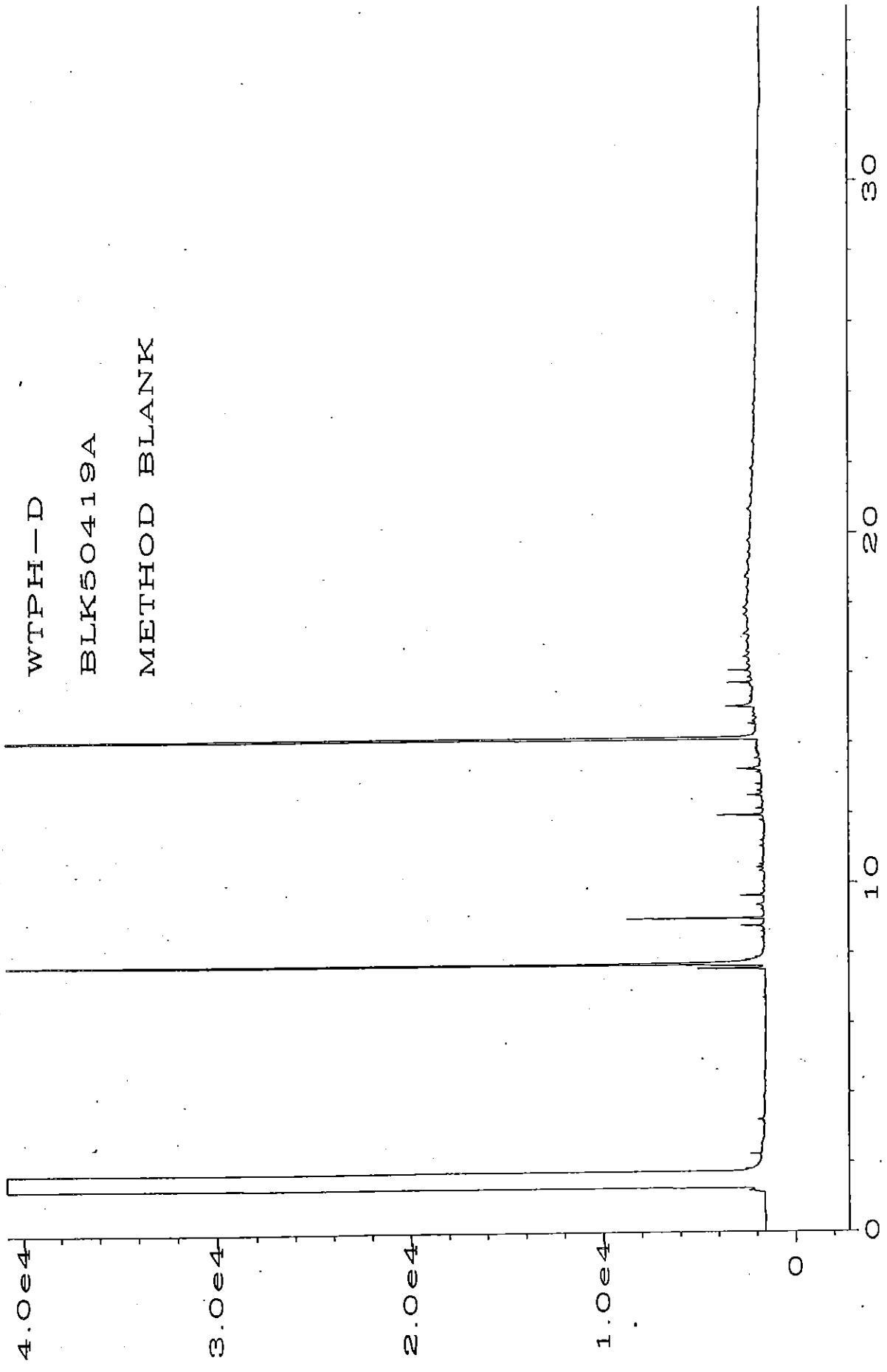

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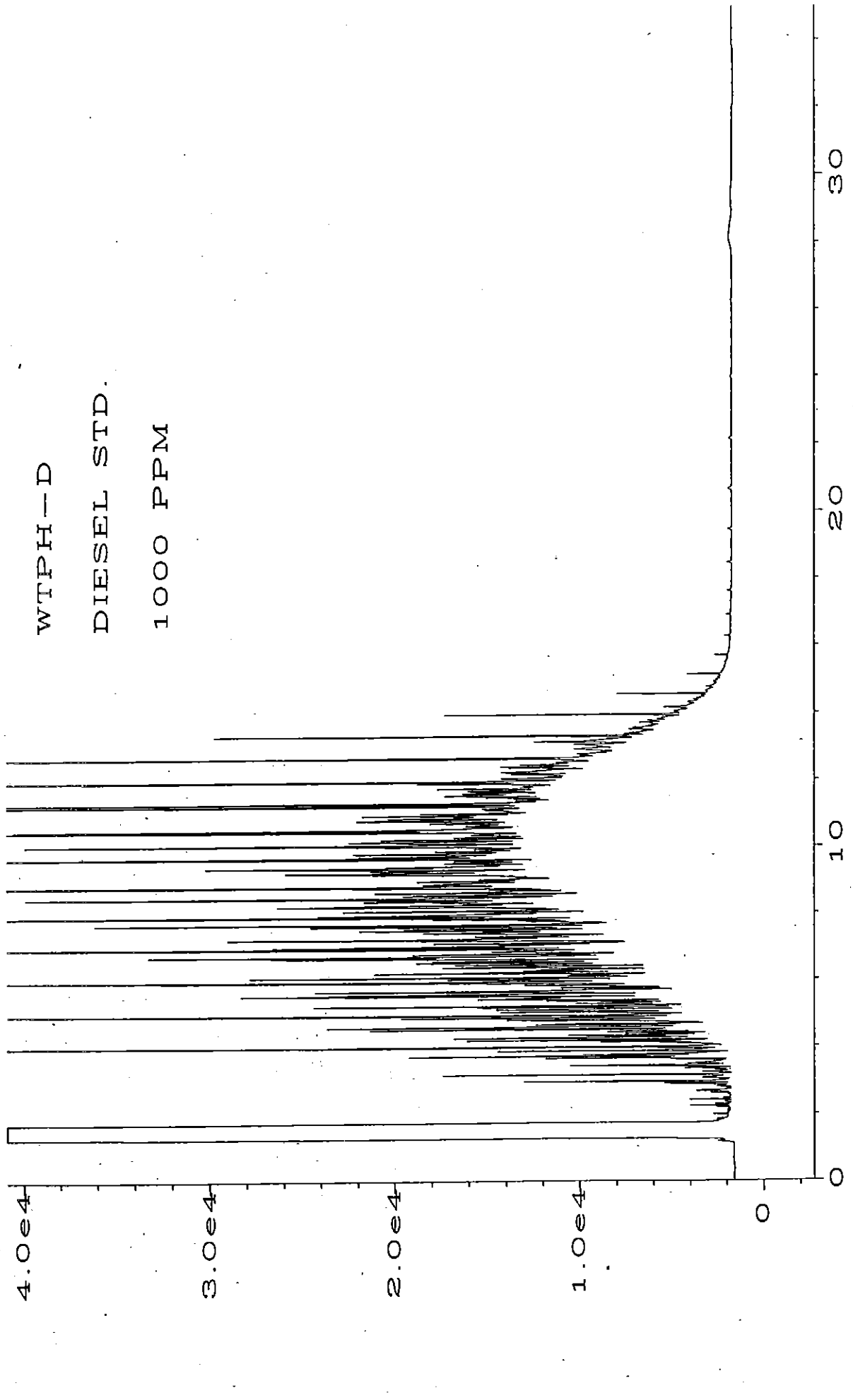


AGRA
Earth & Environmental

25 August 1995

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

Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199-1233

Attention: Mr. Scott Sloan

Subject: AEE Project No. 12-01238-00
Groundwater Monitoring and Status Report
Richland Jackpot Foodmart (Time Oil Co. Property 01-056)
500 George Washington Way
Richland, Washington

Dear Mr. Sloan:

This letter presents results of our July 1995 groundwater sampling event and analytical testing at the subject site. During this quarterly sampling event, conducted on 11 and 12 July 1995, a representative from AGRA Earth & Environmental, Inc. (AEE) measured fluid levels and collected groundwater samples from existing on-site monitoring wells for analytical testing. The results of our findings are presented in the following letter report. This report has been prepared for Time Oil Co. under our contract dated 28 December 1994.

Introduction

The site is an operating retail service station and Foodmart located at 500 George Washington Way in Richland, Washington (Figure 1 - Vicinity Map). Approximate locations of the existing eleven groundwater monitoring wells, one vapor extraction well, one groundwater extraction well, and one sparge well are shown on Figure 2. These wells were installed during the initial subsurface petroleum hydrocarbon evaluation in 1993 by Environmental Science & Engineering, Inc. and by AEE during a subsequent site assessment and remedial investigation in 1995.

The site is located in a primarily commercial area, with some residences in the vicinity along George Washington Way to the south of the site. The Columbia River is located approximately 800 feet east-northeast of the site. Site features include one retail building, three underground storage tanks (USTs), and two pump islands.

Site Conditions

Groundwater was encountered at depths ranging from 7.77 to 28.08 feet below the top of casing. Based upon the well head survey data and groundwater measurements on 11 July 1995, an approximate groundwater gradient of 0.0013 ft/ft (0.13 feet vertical fall in 100 feet horizontal) was calculated. Groundwater flow is interpreted to be towards the north-northeast (approximate compass direction 38 degrees). Groundwater elevations, as measured in the fourteen site wells on 11 July 1995, are presented on Figure 2. Groundwater elevations for all AEE site visits, including a 3 August 1995 visit, are summarized in Table 1. Groundwater elevations have increased slightly from 0.22 to 0.29 feet in the site wells between May and July 1995 monitoring events.

Based upon the well head survey data and groundwater measurements on 3 August 1995, an approximate groundwater gradient of 0.0012 ft/ft (0.12 feet vertical fall in 100 feet horizontal) was calculated. Groundwater flow is interpreted to be towards the north-northeast (approximate compass

direction 35 degrees). Groundwater elevations have decreased slightly from 0.23 to 0.29 feet in the site wells since July 1995 monitoring event. No measurable liquid phase hydrocarbon (LPH) was observed in any of the site monitoring wells during either the July or August monitoring event.

Groundwater Quality

Groundwater samples were collected from site monitoring wells for analytical laboratory testing. Monitoring wells at the site consist of two four-inch diameter monitoring wells (MW-1 and MW-2), nine two-inch diameter monitoring wells (MW-3 through MW-11), one two-inch diameter sparge well (SW-1), and one four-inch diameter groundwater/vapor extraction well (RW-1). Prior to collecting samples, fluid level measurements were obtained from each well.

After measuring, all wells were purged utilizing a dedicated polyethylene bailer and dedicated bailer cord. Once purged of at least three water column volumes (or if the well bailed dry), groundwater samples were collected using a new polyethylene bailer for each monitoring well.

One groundwater sample was collected from each well and placed in three laboratory prepared glass sample vials (40-ml VOA's) preserved with hydrochloric acid (HCL) and stored in a chilled cooler during shipping to National Environmental Testing of Portland, Oregon for analytical testing. During transportation, AEE chain-of-custody procedures were maintained in order to document sample integrity. Each sample was analyzed for the volatile aromatic hydrocarbons benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8020 and for gasoline range petroleum hydrocarbons (GRPH) by Washington State Department of Ecology (Ecology) Method WTPH-G.

Laboratory analysis indicated groundwater samples from MW-1, MW-2, MW-4, MW-7, MW-10, MW-11, and RW-1 contained concentrations of GRPH and/or BTEX in excess of the cleanup levels (groundwater cleanup criteria) set forth in Method A of Model Toxics Control Act (MTCA). Samples collected from MW-3 and SW-1 contained detectable concentrations of GRPH and/or BTEX, however none of the constituents exceeded the groundwater cleanup criteria. None of the other samples collected (MW-3, MW-5, MW-8, and MW-9) contained levels of GRPH or BTEX above the groundwater cleanup criteria. Laboratory test certificates are presented in Appendix A. Analytical test results for all sampling events, MTCA Method A cleanup levels and laboratory method detection limits are summarized in Table 2.

Quality Assurance/Quality Control (QA/QC)

Laboratory performed QA/QC procedures indicated that all samples were within acceptable recovery limits submitted for analytical testing. A summary of the QA/QC results and procedures is presented in Appendix A.

CONCLUSIONS

Gasoline range petroleum hydrocarbons and BTEX in groundwater were detected at concentrations above groundwater cleanup criteria in the samples collected from wells MW-1, MW-2, MW-4, MW-7, MW-10, MW-11, and RW-1. None of the groundwater samples collected from other wells contained concentrations of GRPH or BTEX above the groundwater cleanup criteria.

Groundwater elevations in site monitoring wells measured during this sampling event range 346.06 to 346.50 feet above mean sea level (MSL), and indicate a groundwater flow direction to the north-northeast at an approximate hydraulic gradient of 0.0013 ft/ft. The next scheduled sampling event will be in October 1995.

We appreciate being of continued service to Time Oil Co. If you have any questions regarding this report, please do not hesitate to call us at your earliest convenience.

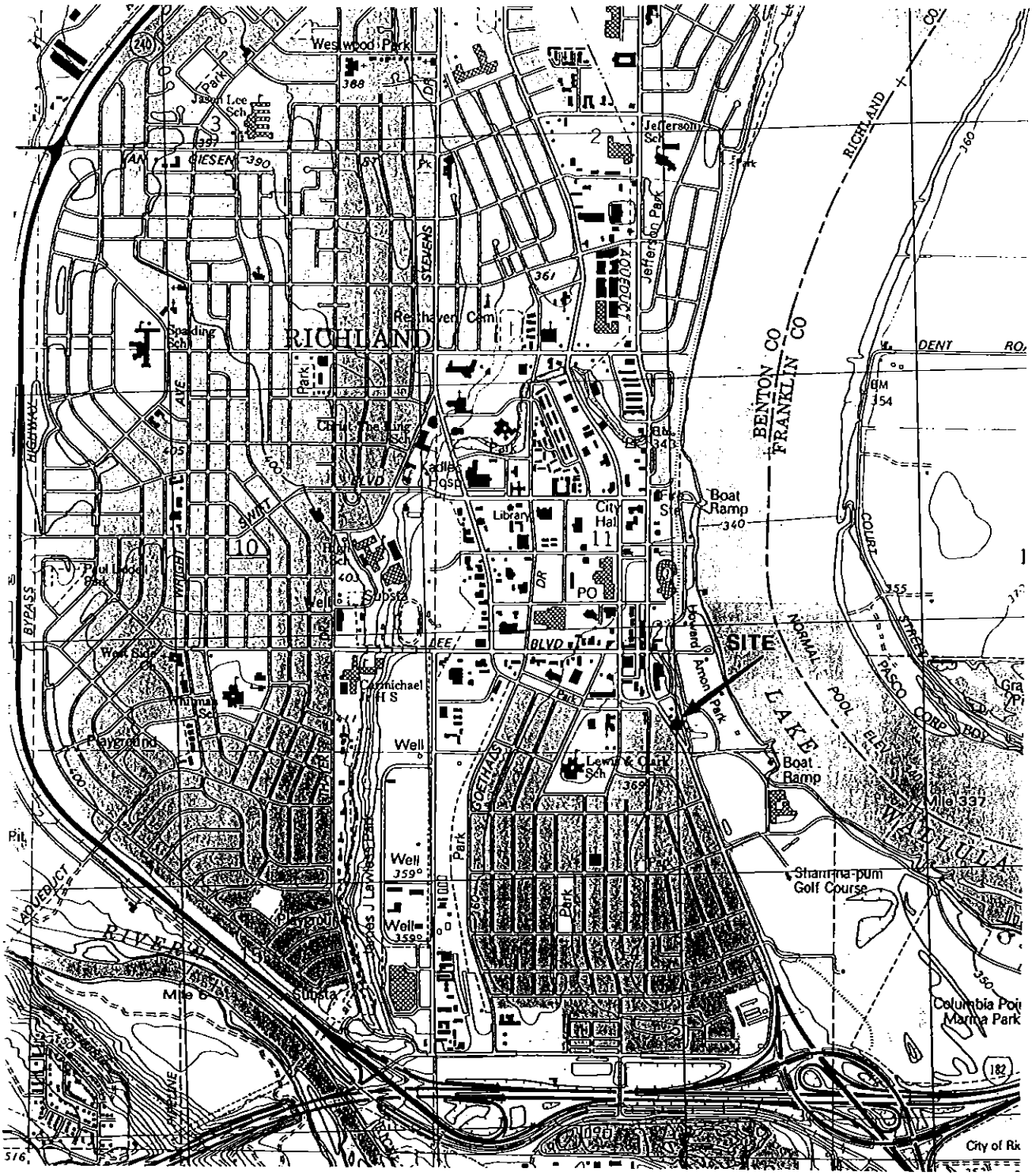
Respectfully submitted,
AGRA Earth & Environmental, Inc.

Bruce D. Williams
Senior Project Scientist

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

Enclosures:

Figure 1:	Vicinity Map
Figure 2:	Site and Exploration Plan
Table 1:	Summary of Fluid Level Measurements
Table 2:	Summary of Analytical Laboratory Test Results
Appendix A:	Laboratory Certificates

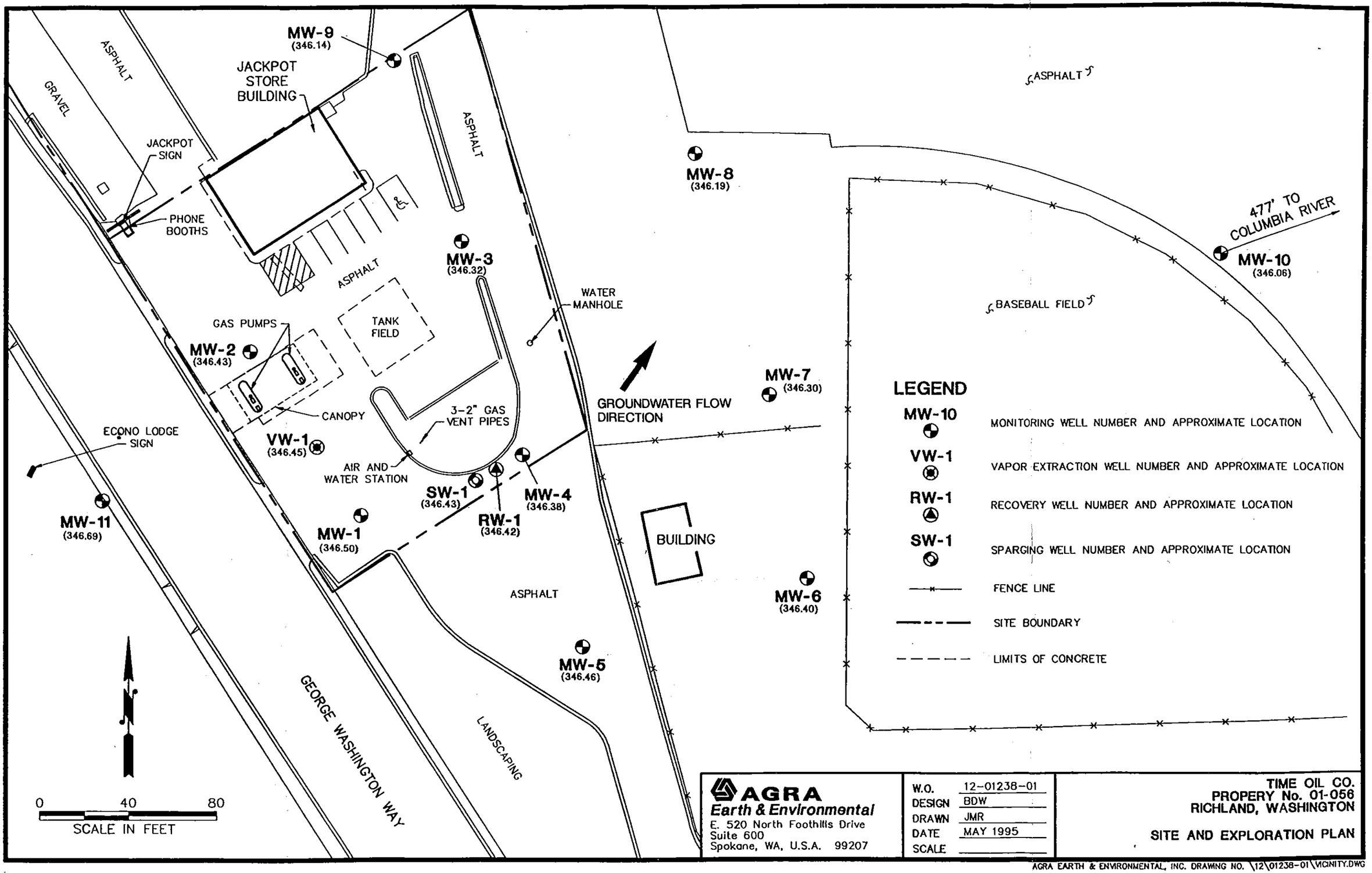


SOURCE: USGS "RICHLAND QUADRANGLE (1992)

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

W.O.	12-1238-01
DESIGN	BDW
DRAWN	BDW
DATE	MAY 1995
SCALE	1"=2,000'

TIME OIL CO.
PROPERTY 01-056
RICHLAND, WASHINGTON
FIGURE 1
SITE VICINITY MAP



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

W.O.	12-01238-01
DESIGN	BDW
DRAWN	JMR
DATE	MAY 1995
SCALE	

TIME OIL CO.
PROPERY No. 01-056
RICHLAND, WASHINGTON

SITE AND EXPLORATION PLAN

AGRA EARTH & ENVIRONMENTAL, INC. DRAWING NO. \12\01238-01\VICINITY.DWG

TABLE 1 - SUMMARY OF FLUID LEVEL MEASUREMENTS

RICHLAND JACKPOT (PROPERTY 01-056)

500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	DATE MEASURED	CASING ELEVATION (feet)	DEPTH TO PRODUCT (feet)	DEPTH TO GROUNDWATER (feet)	GROUNDWATER ELEVATION (feet)	ELEVATION DIFFERENCE (feet)
MW-1	1 Feb 95	371.15	0.00	28.16	342.99	--
MW-2	1 Feb 95	371.23	0.00	28.13	343.10	--
MW-3	1 Feb 95	370.66	0.00	28.88	341.78	--
MW-4	1 Feb 95	370.95	0.00	28.50	342.45	--
MW-5	1 Feb 95	370.87	0.00	28.51	342.36	--
VW-1	1 Feb 95	370.97	0.00	28.40	342.57	--
MW-1	4 Apr 95	373.88	0.00	27.97	345.91	2.92
MW-2	4 Apr 95	373.80	0.00	27.95	345.85	2.75
MW-3	4 Apr 95	374.40	0.00	28.69	345.71	3.93
MW-4	4 Apr 95	374.10	0.00	28.32	345.78	3.33
MW-5	4 Apr 95	374.17	0.00	28.28	345.89	3.53
MW-6	4 Apr 95	354.52	0.00	8.68	345.84	--
MW-7	4 Apr 95	355.82	0.00	10.10	345.72	--
MW-8	4 Apr 95	356.54	0.00	10.95	345.59	--
MW-9	4 Apr 95	373.57	0.00	28.03	345.54	--
MW-10	4 Apr 95	353.83	0.00	8.36	345.47	--
MW-11	4 Apr 95	372.96	0.00	26.86	346.10	--
VW-1	4 Apr 95	374.06	0.00	28.18	345.88	3.31
RW-1	4 Apr 95	374.08	0.00	28.26	345.82	--
SW-1	4 Apr 95	374.15	0.00	28.29	345.86	--
MW-1	19 Apr 95	373.88	0.00	27.87	346.01	0.10
MW-2	19 Apr 95	373.80	0.00	27.77	346.03	0.18
MW-3	19 Apr 95	374.40	0.00	28.59	345.81	0.10
MW-4	19 Apr 95	374.10	0.00	28.23	345.87	0.09
MW-5	19 Apr 95	374.17	0.00	28.19	345.98	0.09
MW-6	19 Apr 95	354.52	0.00	8.60	345.92	0.08
MW-7	19 Apr 95	355.82	0.00	10.01	345.81	0.09
MW-8	19 Apr 95	356.54	0.00	10.86	345.68	0.09
MW-9	19 Apr 95	373.57	0.00	27.93	345.64	0.10
MW-10	19 Apr 95	353.83	0.00	8.26	345.57	0.10
MW-11	19 Apr 95	372.96	0.00	26.77	346.19	0.09
VW-1	19 Apr 95	374.06	0.00	28.10	345.96	0.08
RW-1	19 Apr 95	374.08	0.00	28.16	345.92	0.10
SW-1	19 Apr 95	374.15	0.00	28.22	345.93	0.07

All measurements listed in feet.

All elevations based upon City of Richland datum. Benchmark is located at the intersection of George Washington Way and Lee Boulevard (Elevation 372.49).

Site was resurveyed by Bob Stratton Surveyors on 4 April 1995.

ELEVATION DIFFERENCE - Indicates change in groundwater elevation from previous measurement.

TABLE 1 - SUMMARY OF FLUID LEVEL MEASUREMENTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	DATE MEASURED	CASING ELEVATION (feet)	DEPTH TO PRODUCT (feet)	DEPTH TO GROUNDWATER (feet)	GROUNDWATER ELEVATION (feet)	ELEVATION DIFFERENCE (feet)
MW-1	18 May 95	373.88	0.00	27.65	346.23	0.22
MW-2	18 May 95	373.80	0.00	27.65	346.15	0.12
MW-3	18 May 95	374.40	0.00	28.36	346.04	0.23
MW-4	18 May 95	374.10	0.00	28.00	346.10	0.23
MW-5	18 May 95	374.17	0.00	27.96	346.21	0.23
MW-6	18 May 95	354.52	0.00	8.36	346.16	0.24
MW-7	18 May 95	355.82	0.00	9.78	346.04	0.23
MW-8	18 May 95	356.54	0.00	10.60	345.94	0.26
MW-9	18 May 95	373.57	0.00	27.70	345.87	0.23
MW-10	18 May 95	353.83	0.00	7.99	345.84	0.27
MW-11	18 May 95	372.96	0.00	26.56	346.40	0.21
VW-1	18 May 95	374.06	0.00	27.86	346.20	0.24
RW-1	18 May 95	374.08	0.00	27.94	346.14	0.22
SW-1	18 May 95	374.15	0.00	27.98	346.17	0.24
MW-1	11 July 95	373.88	0.00	27.38	346.50	0.27
MW-2	11 July 95	373.80	0.00	27.37	346.43	0.28
MW-3	11 July 95	374.40	0.00	28.08	346.32	0.28
MW-4	11 July 95	374.10	0.00	27.72	346.38	0.28
MW-5	11 July 95	374.17	0.00	27.71	346.46	0.25
MW-6	11 July 95	354.52	0.00	8.12	346.40	0.24
MW-7	11 July 95	355.82	0.00	9.52	346.30	0.26
MW-8	11 July 95	356.54	0.00	10.35	346.19	0.25
MW-9	11 July 95	373.57	0.00	27.43	346.14	0.27
MW-10	11 July 95	353.83	0.00	7.77	346.06	0.22
MW-11	11 July 95	372.96	0.00	26.27	346.69	0.29
VW-1	11 July 95	374.06	0.00	27.61	346.45	0.25
RW-1	11 July 95	374.08	0.00	27.66	346.42	0.28
SW-1	11 July 95	374.15	0.00	27.72	346.43	0.26

All measurements listed in feet.
All elevations based upon City of Richland datum. Benchmark is located at the intersection of George Washington Way and Lee Boulevard (Elevation 372.49).
Site was resurveyed by Bob Stratton Surveyors on 4 April 1995.
ELEVATION DIFFERENCE - Indicates change in groundwater elevation from previous measurement.

TABLE 1 - SUMMARY OF FLUID LEVEL MEASUREMENTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	DATE MEASURED	CASING ELEVATION (feet)	DEPTH TO PRODUCT (feet)	DEPTH TO GROUNDWATER (feet)	GROUNDWATER ELEVATION (feet)	ELEVATION DIFFERENCE (feet)
MW-1	3 August 95	373.88	0.00	27.65	346.23	-0.27
MW-2	3 August 95	373.80	0.00	27.65	346.15	-0.28
MW-3	3 August 95	374.40	0.00	28.37	346.03	-0.29
MW-4	3 August 95	374.10	0.00	28.00	346.10	-0.28
MW-5	3 August 95	374.17	0.00	27.98	346.19	-0.27
MW-6	3 August 95	354.52	0.00	8.35	346.17	-0.23
MW-7	3 August 95	355.82	0.00	9.77	346.05	-0.25
MW-8	3 August 95	356.54	0.00	10.58	345.96	-0.23
MW-9	3 August 95	373.57	0.00	27.72	345.85	-0.29
MW-10	3 August 95	353.83	0.00	8.02	345.81	-0.25
MW-11	3 August 95	372.96	0.00	26.55	346.41	-0.28
VW-1	3 August 95	374.06	0.00	27.86	346.20	-0.25
RW-1	3 August 95	374.08	0.00	27.94	346.14	-0.28
SW-1	3 August 95	374.15	0.00	27.99	346.16	-0.27

All measurements listed in feet.
All elevations based upon City of Richland datum. Benchmark is located at the intersection of George Washington Way and Lee Boulevard (Elevation 372.49).
Site was resurveyed by Bob Stratton Surveyors on 4 April 1995.
ELEVATION DIFFERENCE - Indicates change in groundwater elevation from previous measurement.

TABLE 2 - SUMMARY OF GROUNDWATER SAMPLING RESULTS
RICHLAND JACKPOT (PROPERTY 01-056)
500 GEORGE WASHINGTON WAY, RICHLAND, WASHINGTON

WELL NUMBER	DATE SAMPLED	GRPH (ppb)	DRPH (ppb)	HORPH (ppb)	BENZENE (ppb)	TOLUENE (ppb)	ETHYLBENZENE (ppb)	XYLENES (ppb)	TCE (ppb)	PCE (ppb)
MW-1	1 Feb 95	30000	1800	<750	39	690	430	3700	<1.0	<1.0
MW-2	1 Feb 95	15000	330	<750	<10	370	250	2600	1.2	1.6
MW-3	1 Feb 95	110	<250	<750	1.8	<0.5	2.0	<0.5	NT	NT
MW-4	1 Feb 95	10000	610	<750	38	28	300	660	NT	NT
MW-5	1 Feb 95	<50	<250	<750	<0.5	<0.5	<0.5	<0.5	1.4	<1.0
VW-1	1 Feb 95	16000	970	<750	15	13	400	1500	<1.0	<1.0
MW-1	4 Apr 95	26000	1300	NT	53	850	430	3000	<5.0	<5.0
MW-2	4 Apr 95	14000	720	NT	12	390	260	2800	<5.0	<5.0
MW-3	3 Apr 95	780	<250	NT	6.7	2.9	30	4.4	1.2	<1.0
MW-4	3 Apr 95	25000	1100	NT	42	77	560	2400	<5.0	<5.0
MW-5	3 Apr 95	<50	<250	NT	<0.5	<0.5	<0.5	<0.5	<5.0	<5.0
MW-6	3 Apr 95	<50	<250	NT	<0.5	0.63	<0.5	0.95	<1.0	2.5
MW-7	3 Apr 95	36000	2000	NT	72	470	1400	6400	<5.0	<5.0
MW-8	3 Apr 95	<50	<250	NT	<0.5	<0.5	<0.5	<0.5	<1.0	2.7
MW-9	3 Apr 95	<50	<250	NT	<0.5	<0.5	<0.5	<0.5	<1.0	3.7
MW-10	3 Apr 95	20000	660	NT	57	34	620	1500	<5.0	<5.0
MW-11	4 Apr 95	7400	NT	NT	<0.5	2.4	4.4	15	<1.0	2.5
RW-1	4 Apr 95	44000	2700	NT	48	140	1200	6100	<5.0	<5.0
SW-1	4 Apr 95	710	<250	NT	<0.5	<0.5	0.82	11	<1.0	<1.0
MW-1	12 July 95	17000	NT	NT	31	480	300	2000	NT	NT
MW-2	12 July 95	9100	NT	NT	<10	230	190	1700	NT	NT
MW-3	11 July 95	550	NT	NT	3.4	6.3	22	0.51	NT	NT
MW-4	11 July 95	15000	NT	NT	<5.0	20	400	1600	NT	NT
MW-5	11 July 95	<50	NT	NT	<0.5	<0.5	<0.5	<0.5	NT	NT
MW-6	11 July 95	<50	NT	NT	<0.5	<0.5	<0.5	<0.5	NT	NT
MW-7	11 July 95	31000	NT	NT	35	82	<10	5300	NT	NT
MW-8	11 July 95	<50	NT	NT	<0.5	<0.5	<0.5	<0.5	NT	NT
MW-9	11 July 95	<50	NT	NT	<0.5	<0.5	<0.5	<0.5	NT	NT
MW-10	11 July 95	16000	NT	NT	86	16	510	950	NT	NT
MW-11	12 July 95	1600	NT	NT	11	2.2	1.8	1.4	NT	NT
RW-1	12 July 95	31000	NT	NT	33	24	420	2700	NT	NT
SW-1	11 July 95	280	NT	NT	1.8	<0.5	16	1.1	NT	NT
GW Cleanup Criteria		1000	1000	1000	5.0	40.0	30.0	20.0	5.0	5.0

GRPH	Gasoline range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-G.
DRPH	Diesel range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-D.
HORPH	Heavy oils range petroleum hydrocarbons, as analyzed by Ecology Method WTPH-D-Extended.
TCE	Trichloroethene as analyzed by EPA Method 8260.
PCE	Tetrachloroethene as analyzed by EPA Method 8260.
BTEX	Benzene, toluene, ethylbenzene, and total xylenes as analyzed by EPA Method 8020.
ppb	Parts per billion, or micrograms per liter (ug/L).
BOLDED	Indicates sample result equals or exceeds groundwater cleanup criteria.
	GW (Groundwater) cleanup criteria are levels promulgated in WAC 173-340-720 (MTCA).
NT	Not tested this date.

APPENDIX A

QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This appendix presents AEE's review of analytical laboratory QA/QC data and includes the analytical laboratory certificates. In general, all QA/QC results are acceptable and meet AEE criteria.

Ecology Method WTPH-G

Surrogate recoveries for Method WTPH-G ranged from 96% to 102%, within the acceptance limits of 80% to 120% for most groundwater samples submitted for analytical testing. Continuing calibration curves (CCV) and laboratory control spikes (LCS) ranges from 99.7% to 107%, which were within the acceptance range of 80% to 120%. The matrix spike and matrix spike duplicate (MS/MSD) was 20% (however the matrix spike samples may not be samples from this sample set). The relative percent difference (RFD) was also not calculated correctly for these samples. Results of the laboratory blank were all non detectable.

EPA Method 8020 (BTEX)

Surrogate recoveries for Method 8020 were within the recovery limits of 80% to 120% for all groundwater samples submitted for analytical testing. Recoveries from the July 1995 sampling event ranged from 94% to 106%. Continuing calibration curves (CCV) and laboratory control spikes (LCS) range from 99.7% to 107.1%, which were within the acceptance range from 80% to 120%. Matrix spikes and matrix spike duplicates (MS/MSD) ranged from 87.1% to 98.6%, which were within the acceptance range of 80% to 120%. The relative percent difference (RPD) ranged from 4.5% to 6.7%, which were less than the maximum acceptance value of 20%. Results of the laboratory blank were non detectable.

Duplicate Samples

One duplicate sample was collected during of the sampling event. Results of all duplicate results as compared to results of the initial sample (where above laboratory detection limits) were within the maximum acceptable difference of 50%.

NATIONAL ENVIRONMENTAL TESTING, INC.

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Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 07/21/1995
NET Account No.: 60277
NET Job Number: 95.02157

Project: Time Oil - Richland, WA
Location: 12-1238

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
43434	MW-1	GROUND WATER	07/12/1995	07/15/1995
43435	MW-2	GROUND WATER	07/12/1995	07/15/1995
43436	MW-3	GROUND WATER	07/11/1995	07/15/1995
43437	MW-4	GROUND WATER	07/11/1995	07/15/1995
43438	MW-5	GROUND WATER	07/11/1995	07/15/1995
43439	MW-6	GROUND WATER	07/11/1995	07/15/1995
43440	MW-7	GROUND WATER	07/11/1995	07/15/1995
43441	MW-8	GROUND WATER	07/11/1995	07/15/1995
43442	MW-9	GROUND WATER	07/11/1995	07/15/1995
43443	MW-10	GROUND WATER	07/11/1995	07/15/1995
43444	MW-11	GROUND WATER	07/12/1995	07/15/1995
43445	SW-1	GROUND WATER	07/11/1995	07/15/1995
43446	RW-1	GROUND WATER	07/12/1995	07/15/1995
43447	MW-99	GROUND WATER	07/11/1995	07/15/1995

Approved by:

Tabatha Brochu
NET, INC. Project Manager

OCEAN GROUP

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

Sample Number: 43434 — Sample Description: MW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		25			07/18/1995	
Benzene	8020	31	10	ug/L	07/18/1995	
Toluene	8020	480	10	ug/L	07/18/1995	
Ethyl Benzene	8020	300	10	ug/L	07/18/1995	
Xylenes, total	8020	2000	10	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	17000	1,200	ug/L	07/18/1995	

Sample Number: 43435 — Sample Description: MW-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		25			07/18/1995	
Benzene	8020	ND	10	ug/L	07/18/1995	
Toluene	8020	230	10	ug/L	07/18/1995	
Ethyl Benzene	8020	190	10	ug/L	07/18/1995	
Xylenes, total	8020	1700	10	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	9100	1,200	ug/L	07/18/1995	

Sample Number: 43436 — Sample Description: MW-3

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/18/1995	
Benzene	8020	3.4	0.5	ug/L	07/18/1995	
Toluene	8020	6.3	0.5	ug/L	07/18/1995	
Ethyl Benzene	8020	22	0.5	ug/L	07/18/1995	
Xylenes, total	8020	0.51	0.5	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	550	50	ug/L	07/18/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
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07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

Sample Number 43437 — Sample Description MW-4

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		10			07/18/1995	
Benzene	8020	ND	5.	ug/L	07/18/1995	
Toluene	8020	20	5.	ug/L	07/18/1995	
Ethyl Benzene	8020	400	5.	ug/L	07/18/1995	
Xylenes, total	8020	1600	5.	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	15000	500	ug/L	07/18/1995	

Sample Number 43438 — Sample Description MW-5

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/18/1995	
Benzene	8020	ND	0.5	ug/L	07/18/1995	
Toluene	8020	ND	0.5	ug/L	07/18/1995	
Ethyl Benzene	8020	ND	0.5	ug/L	07/18/1995	
Xylenes, total	8020	ND	0.5	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	ND	50	ug/L	07/18/1995	

Sample Number 43439 — Sample Description MW-6

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/18/1995	
Benzene	8020	ND	0.5	ug/L	07/18/1995	
Toluene	8020	ND	0.5	ug/L	07/18/1995	
Ethyl Benzene	8020	ND	0.5	ug/L	07/18/1995	
Xylenes, total	8020	ND	0.5	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	ND	50	ug/L	07/18/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

Sample Number 43440 — Sample Description MW-7

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		25			07/18/1995	
Benzene	8020	35	10	ug/L	07/18/1995	
Toluene	8020	82	10	ug/L	07/18/1995	
Ethyl Benzene	8020	ND	10	ug/L	07/18/1995	
Xylenes, total	8020	5300	10	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	31000	1,200	ug/L	07/18/1995	

Sample Number 43441 — Sample Description MW-8

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/18/1995	
Benzene	8020	ND	0.5	ug/L	07/18/1995	
Toluene	8020	ND	0.5	ug/L	07/18/1995	
Ethyl Benzene	8020	ND	0.5	ug/L	07/18/1995	
Xylenes, total	8020	ND	0.5	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	ND	50	ug/L	07/18/1995	

Sample Number 43442 — Sample Description MW-9

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/18/1995	
Benzene	8020	ND	0.5	ug/L	07/18/1995	
Toluene	8020	ND	0.5	ug/L	07/18/1995	
Ethyl Benzene	8020	ND	0.5	ug/L	07/18/1995	
Xylenes, total	8020	ND	0.5	ug/L	07/18/1995	
WTPH-Gasoline	WTPH-G	ND	50	ug/L	07/18/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

Sample Number 43443 — Sample Description: MW-10

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		10			07/19/1995	
Benzene	8020	86	5.	ug/L	07/19/1995	
Toluene	8020	16	5.	ug/L	07/19/1995	
Ethyl Benzene	8020	510	5.	ug/L	07/19/1995	
Xylenes, total	8020	950	5.	ug/L	07/19/1995	
WTPH-Gasoline	WTPH-G	16000	500	ug/L	07/19/1995	

Sample Number 43444 — Sample Description: MW-11

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/19/1995	
Benzene	8020	11	0.5	ug/L	07/19/1995	
Toluene	8020	2.2	0.5	ug/L	07/19/1995	
Ethyl Benzene	8020	1.8	0.5	ug/L	07/19/1995	
Xylenes, total	8020	1.4	0.5	ug/L	07/19/1995	
WTPH-Gasoline	WTPH-G	1600	50	ug/L	07/19/1995	

Sample Number 43445 — Sample Description: SW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/19/1995	
Benzene	8020	1.8	0.5	ug/L	07/19/1995	
Toluene	8020	ND	0.5	ug/L	07/19/1995	
Ethyl Benzene	8020	16	0.5	ug/L	07/19/1995	
Xylenes, total	8020	1.1	0.5	ug/L	07/19/1995	
WTPH-Gasoline	WTPH-G	280	50	ug/L	07/19/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

Sample Number 43446 — Sample Description: RW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		25			07/19/1995	
Benzene	8020	33	10	ug/L	07/19/1995	
Toluene	8020	24	10	ug/L	07/19/1995	
Ethyl Benzene	8020	420	10	ug/L	07/19/1995	
Xylenes, total	8020	2700	10	ug/L	07/19/1995	
WTPH-Gasoline	WTPH-G	31000	1,200	ug/L	07/19/1995	

Sample Number 43447 — Sample Description: MW-99

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			07/19/1995	
Benzene	8020	ND	0.5	ug/L	07/19/1995	
Toluene	8020	ND	0.5	ug/L	07/19/1995	
Ethyl Benzene	8020	ND	0.5	ug/L	07/19/1995	
Xylenes, total	8020	ND	0.5	ug/L	07/19/1995	
WTPH-Gasoline	WTPH-G	ND	50	ug/L	07/19/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
43434	MW-1				
aaa-TFT (BTEX-Surr.)	8020	99	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	100	%	07/18/1995	
Sample Number	**Sample Description**				
43435	MW-2				
aaa-TFT (BTEX-Surr.)	8020	99	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	98	%	07/18/1995	
Sample Number	**Sample Description**				
43436	MW-3				
aaa-TFT (BTEX-Surr.)	8020	102	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	99	%	07/18/1995	
Sample Number	**Sample Description**				
43437	MW-4				
aaa-TFT (BTEX-Surr.)	8020	106	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	102	%	07/18/1995	
Sample Number	**Sample Description**				
43438	MW-5				
aaa-TFT (BTEX-Surr.)	8020	100	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	98	%	07/18/1995	
Sample Number	**Sample Description**				
43439	MW-6				
aaa-TFT (BTEX-Surr.)	8020	104	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	102	%	07/18/1995	

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
43440	MW-7				
aaa-TFT (BTEX-Surr.)	8020	105	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	102	%	07/18/1995	
Sample Number	**Sample Description**				
43441	MW-8				
aaa-TFT (BTEX-Surr.)	8020	97	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	96	%	07/18/1995	
Sample Number	**Sample Description**				
43442	MW-9				
aaa-TFT (BTEX-Surr.)	8020	102	%	07/18/1995	
aaa-TFT (Gas Surr.)	WTPH-G	101	%	07/18/1995	
Sample Number	**Sample Description**				
43443	MW-10				
aaa-TFT (BTEX-Surr.)	8020	101	%	07/19/1995	
aaa-TFT (Gas Surr.)	WTPH-G	105	%	07/19/1995	
Sample Number	**Sample Description**				
43444	MW-11				
aaa-TFT (BTEX-Surr.)	8020	94	%	07/19/1995	
aaa-TFT (Gas Surr.)	WTPH-G	96	%	07/19/1995	
Sample Number	**Sample Description**				
43445	SW-1				
aaa-TFT (BTEX-Surr.)	8020	94	%	07/19/1995	
aaa-TFT (Gas Surr.)	WTPH-G	99	%	07/19/1995	

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

07/21/1995
Job No.: 95.02157

Project Name: Time Oil - Richland, WA
Date Received: 07/15/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
43446	RW-1				
aaa-TFT (BTEX-Surr.)	8020	94	%	07/19/1995	
aaa-TFT (Gas Surr.)	WTPH-G	96	%	07/19/1995	
Sample Number	**Sample Description**				
43447	MW-99				
aaa-TFT (BTEX-Surr.)	8020	94	%	07/19/1995	
aaa-TFT (Gas Surr.)	WTPH-G	96	%	07/19/1995	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 07/21/1995

NET Job Number: 95.02157

Contact: Scott Sloan
Project: Time Oil - Richland, WA

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
BTEX/WTPH-Gasoline (W)				
WTPH-Gasoline	700	750	107.1	07/18/1995
BTEX/WTPH-Gasoline (W)				
WTPH-Gasoline	700	738	105.4	07/19/1995

CCV - Continuing Calibration Verification

Note: Recovery limits for 8240, 8260, 8270, 8010, 8020, 624, 625 specified in method. Gasoline, Diesel, 418.1, 418.1M limits 80-120%. Metals recovery limits 80-120%.

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 07/21/1995

NET Job Number: 95.02157

Contact: Scott Sloan
Project: Time Oil - Richland, WA

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Date Analyzed
BTEX/WTPH-Gasoline (W)				
WTPH-Gasoline	350	365	104.3	07/18/1995
BTEX/WTPH-Gasoline (W)				
WTPH-Gasoline	700	738	105.4	07/18/1995
BTEX/WTPH-Gasoline (W)				
WTPH-Gasoline	350	349	99.7	07/19/1995
BTEX/WTPH-Gasoline (W)				
WTPH-Gasoline	350	372	106.3	07/19/1995

LCS - Laboratory Control Standard

Note: Recovery limits for fuels 80-120%. 8010, 8020, 8240, 8260, 8270, 624, 625 specified in method. Recovery limits for metals analyses 80-120%. 418.1 limits are 90-140%.

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 07/21/1995

Job Number: 95.02157

Contact: Scott Sloan
Project: Time Oil - Richland, WA

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
BTEX/WTPH-Gasoline (W)										
WTPH-Gasoline	0.0	-	0.0	ug/L	0	350	350	ug/L		200.00
BTEX/WTPH-Gasoline (W)										
Benzene	1108	1.8	1270	ug/L	87.1	1159	1270	ug/L	91.1	4.5
Toluene	3541	ND	3840	ug/L	92.2	3786	3840	ug/L	98.6	6.7
WTPH-Gasoline	0.0	280	0.0	ug/L	0	350	350	ug/L	20.0	200.0

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

QUALITY CONTROL REPORT
BLANKS

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 07/21/1995

NET Job Number: 95.02157

Contact: Scott Sloan
Project: Time Oil - Richland, WA
Location: 12-1238

Analyte	Blank Analysis	MDL	Units	Date Analyzed
BTEX/WTPH-Gasoline (W)				
Dilution Factor	1			07/18/1995
Benzene	ND	0.5	ug/L	07/18/1995
Toluene	ND	0.5	ug/L	07/18/1995
Ethyl Benzene	ND	0.5	ug/L	07/18/1995
Xylenes, total	ND	0.5	ug/L	07/18/1995
WTPH-Gasoline	ND	50	ug/L	07/18/1995
aaa-TFT (Gas Surr.)	104		%	07/18/1995
aaa-TFT (BTEX-Surr.)	96		%	07/18/1995
BTEX/WTPH-Gasoline (W)				
Dilution Factor	1			07/19/1995
Benzene	ND	0.5	ug/L	07/19/1995
Toluene	ND	0.5	ug/L	07/19/1995
Ethyl Benzene	ND	0.5	ug/L	07/19/1995
Xylenes, total	ND	0.5	ug/L	07/19/1995
WTPH-Gasoline	ND	50	ug/L	07/19/1995
aaa-TFT (Gas Surr.)	103		%	07/19/1995
aaa-TFT (BTEX-Surr.)	101		%	07/19/1995

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	The blank exhibited a positive result greater than the reporting limit for this compound.
C	The sample appears to contain a lighter hydrocarbon than gasoline.
D	The sample appears to extend to a heavier hydrocarbon range than gasoline.
E	The sample appears to extend to a lighter hydrocarbon range than diesel.
F	The sample appears to extend to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component comtamination.
H	The gasoline elution pattern for the sample is not typical.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
M	MS and/or MSD percent recovery exceeds control limits.
MR	The MS/MSD RPD is greater than 20%. The sample was re-extracted and re-analyzed with similar results. This is due to a matrix interference, likely a non-homogeneity of the sample.
P	A post digestion spike was analyzed, and recoveries are within control limits.
Q	Detection limits elevated due to sample matrix.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
W	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.
Y	The result for this parameter was greater than the TCLP regulatory limit.
Z	The pattern seen for the parameter being analyzed is not typical.

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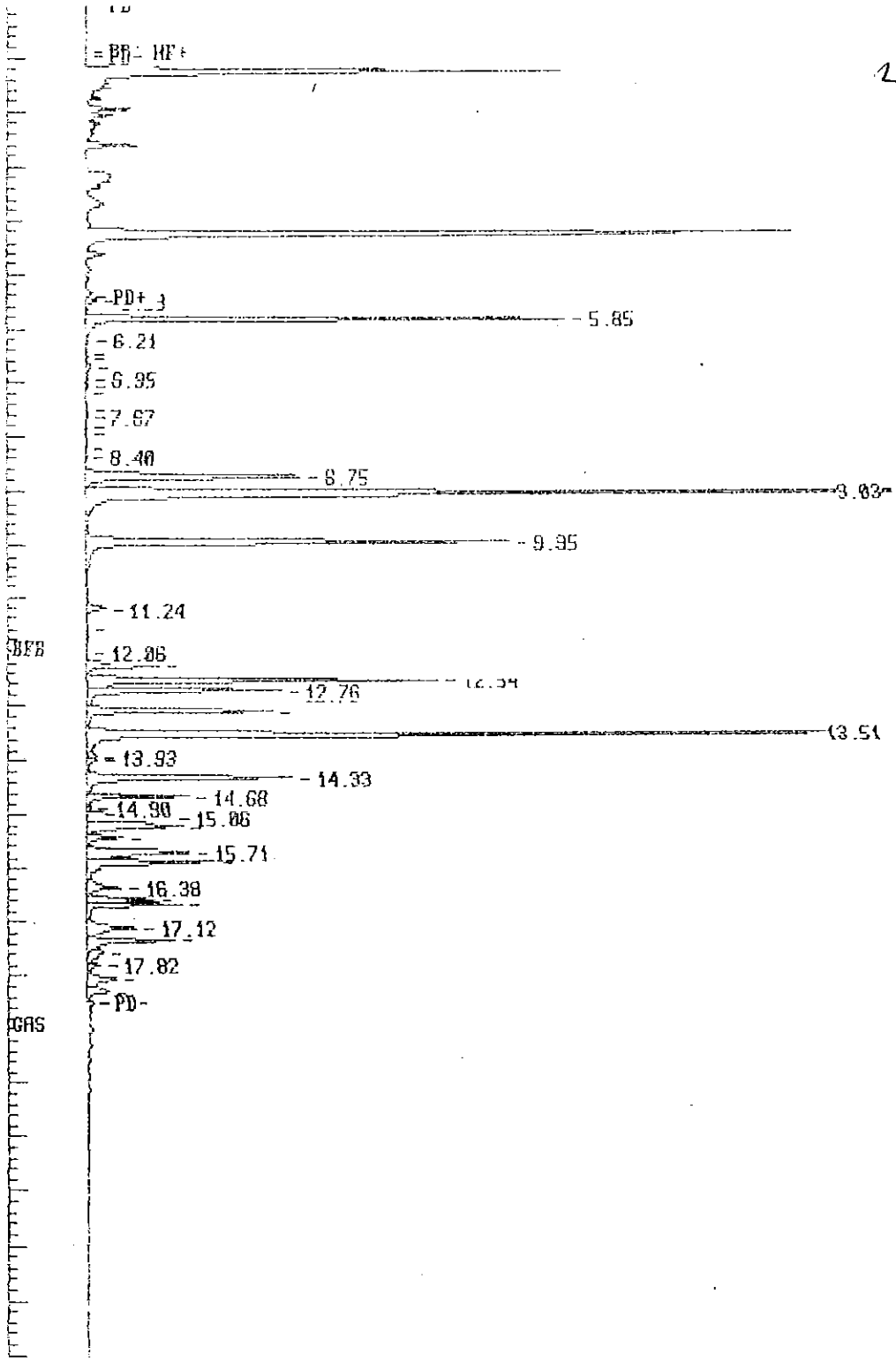
43434
MW1



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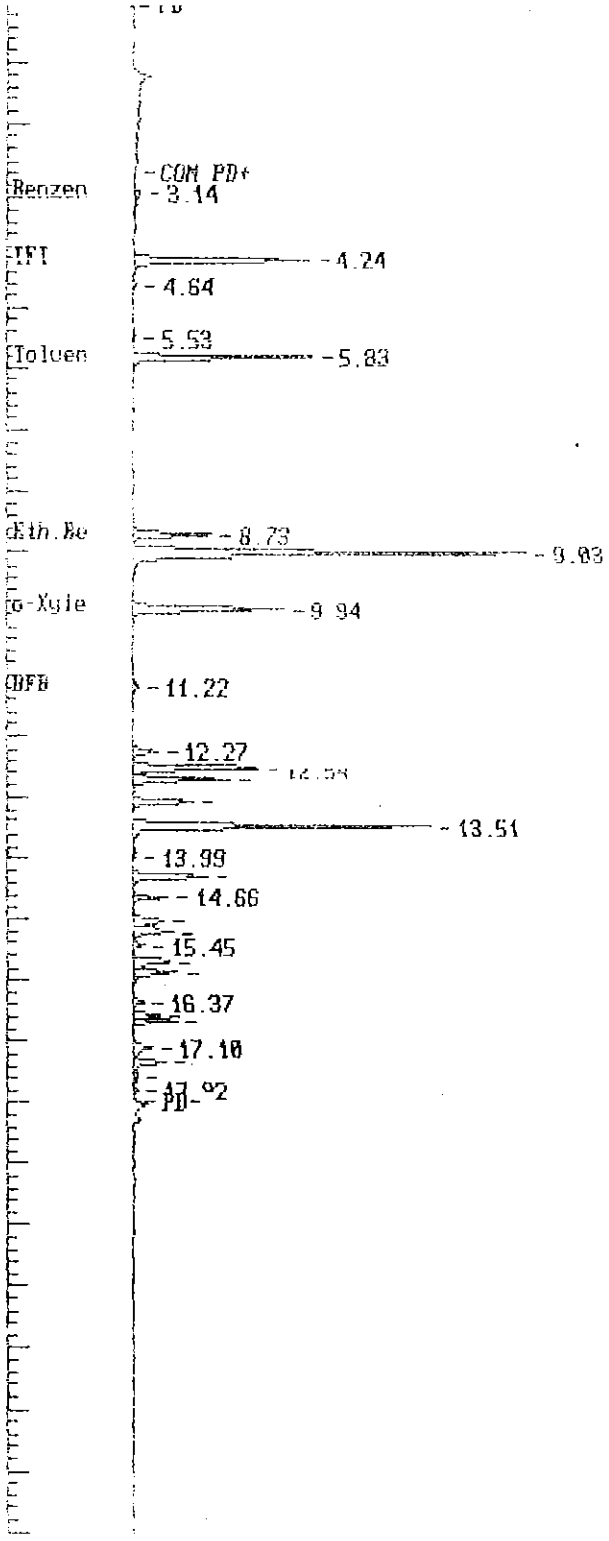
43434
MW 1



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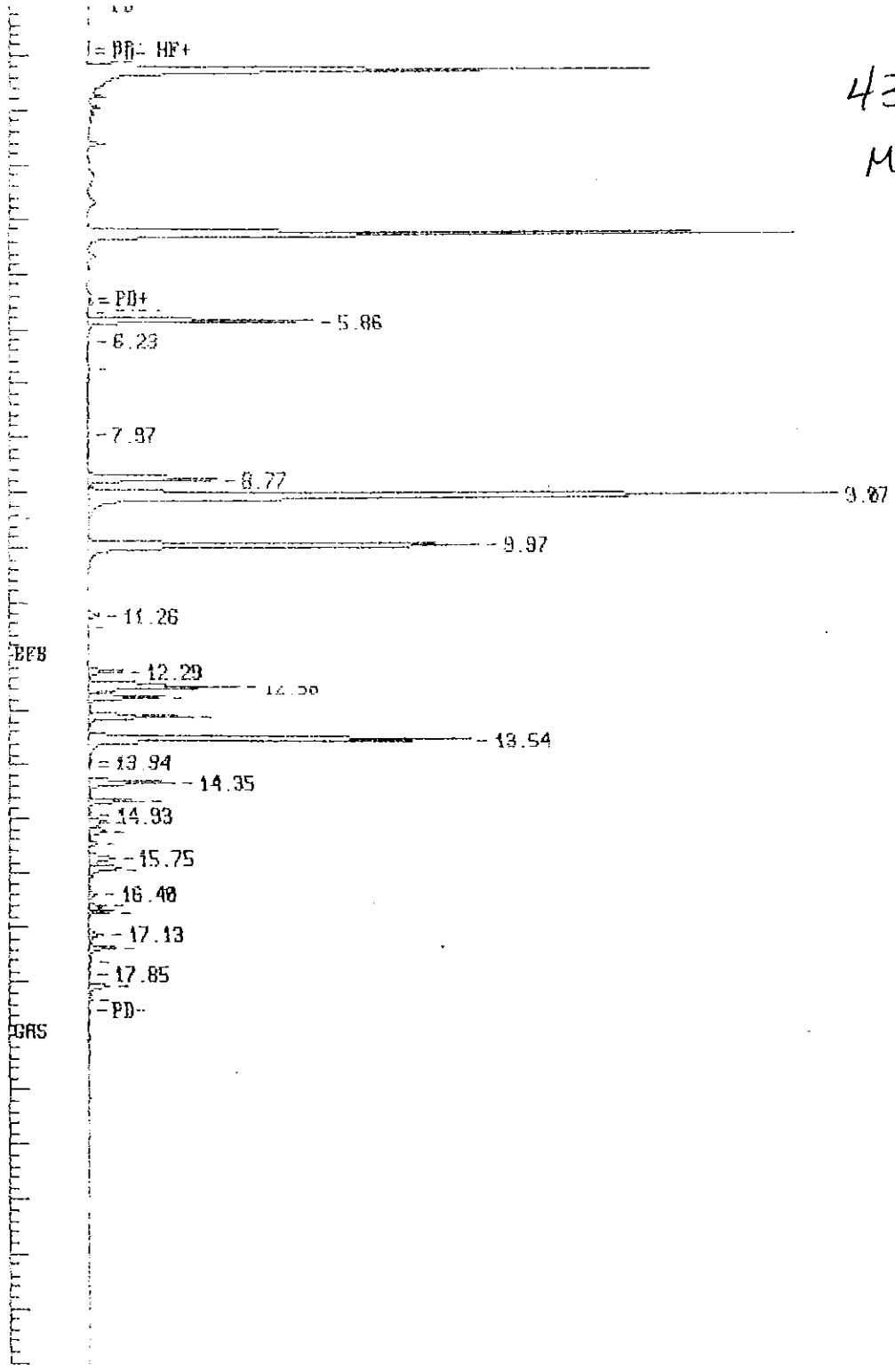
43435
MW 2



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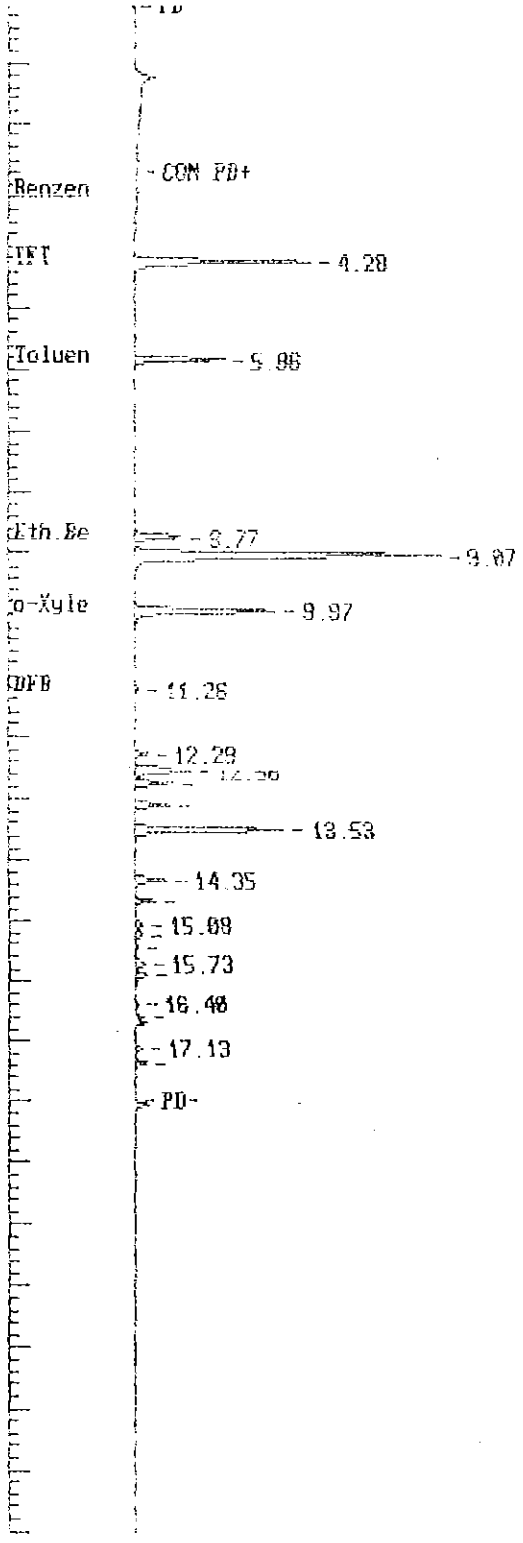
MW2



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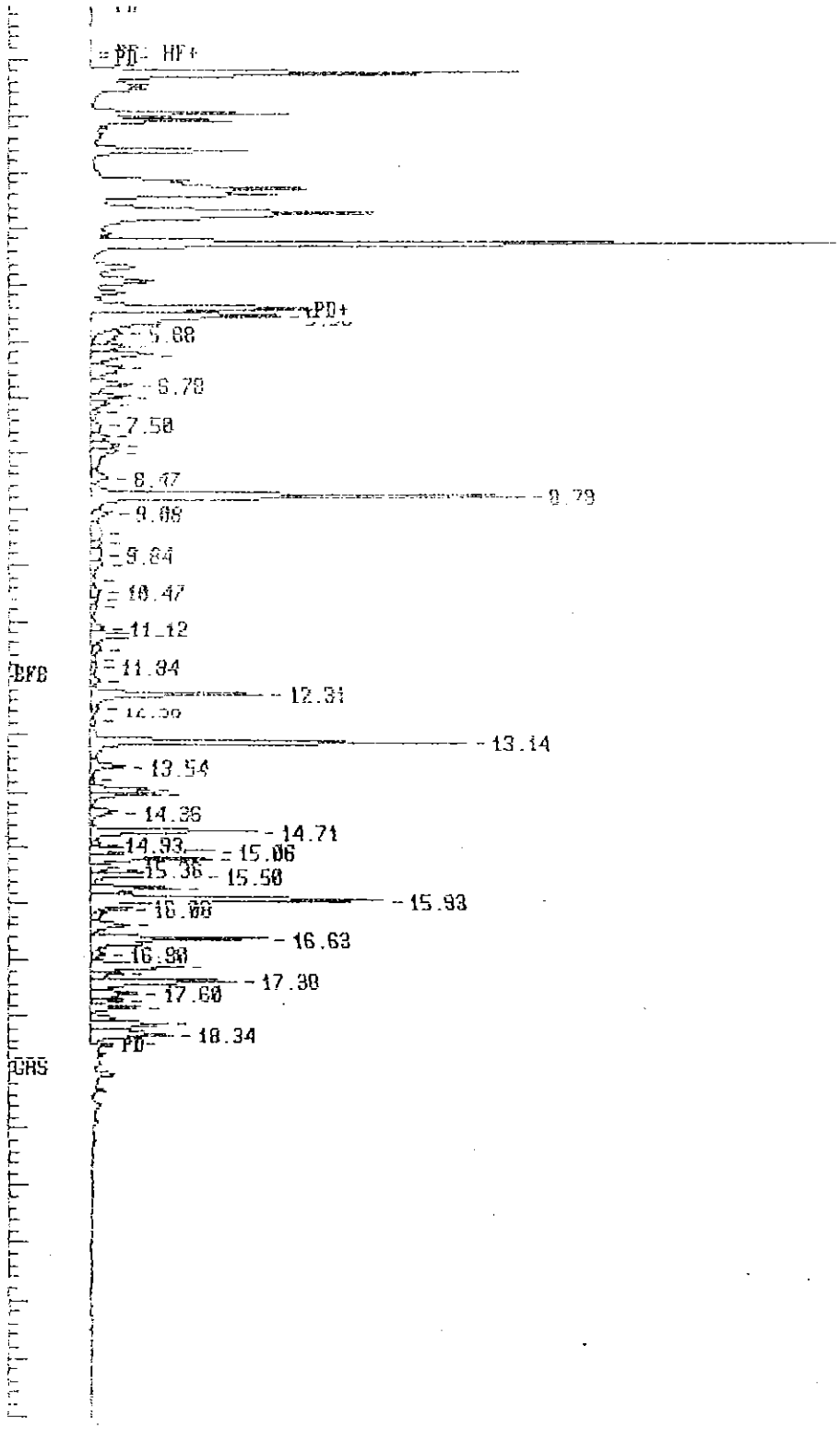
Full Range: 500 K-Counts

43436
MW 3



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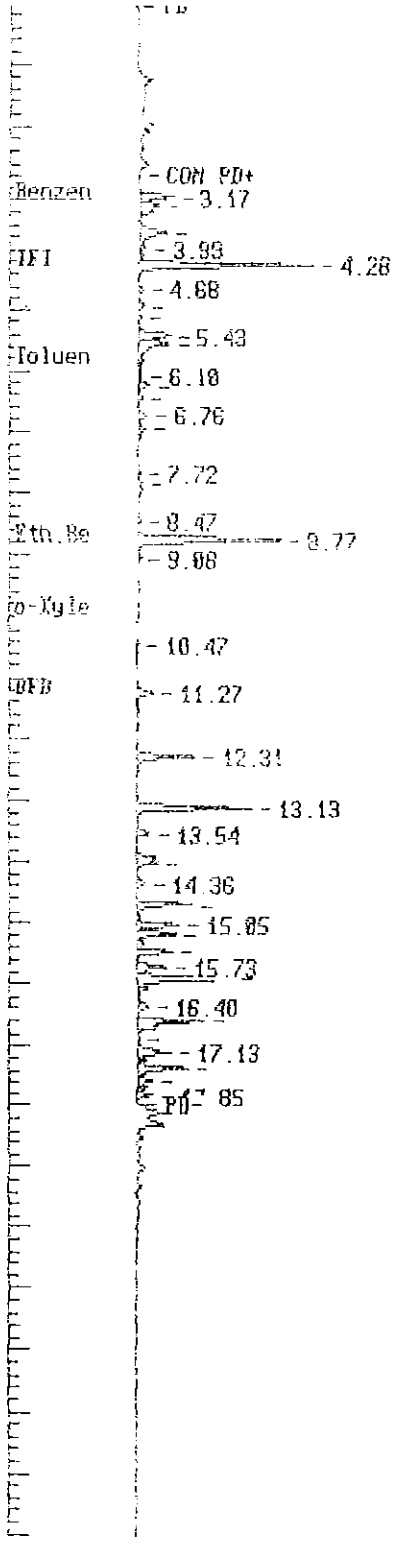
43436
MW-3



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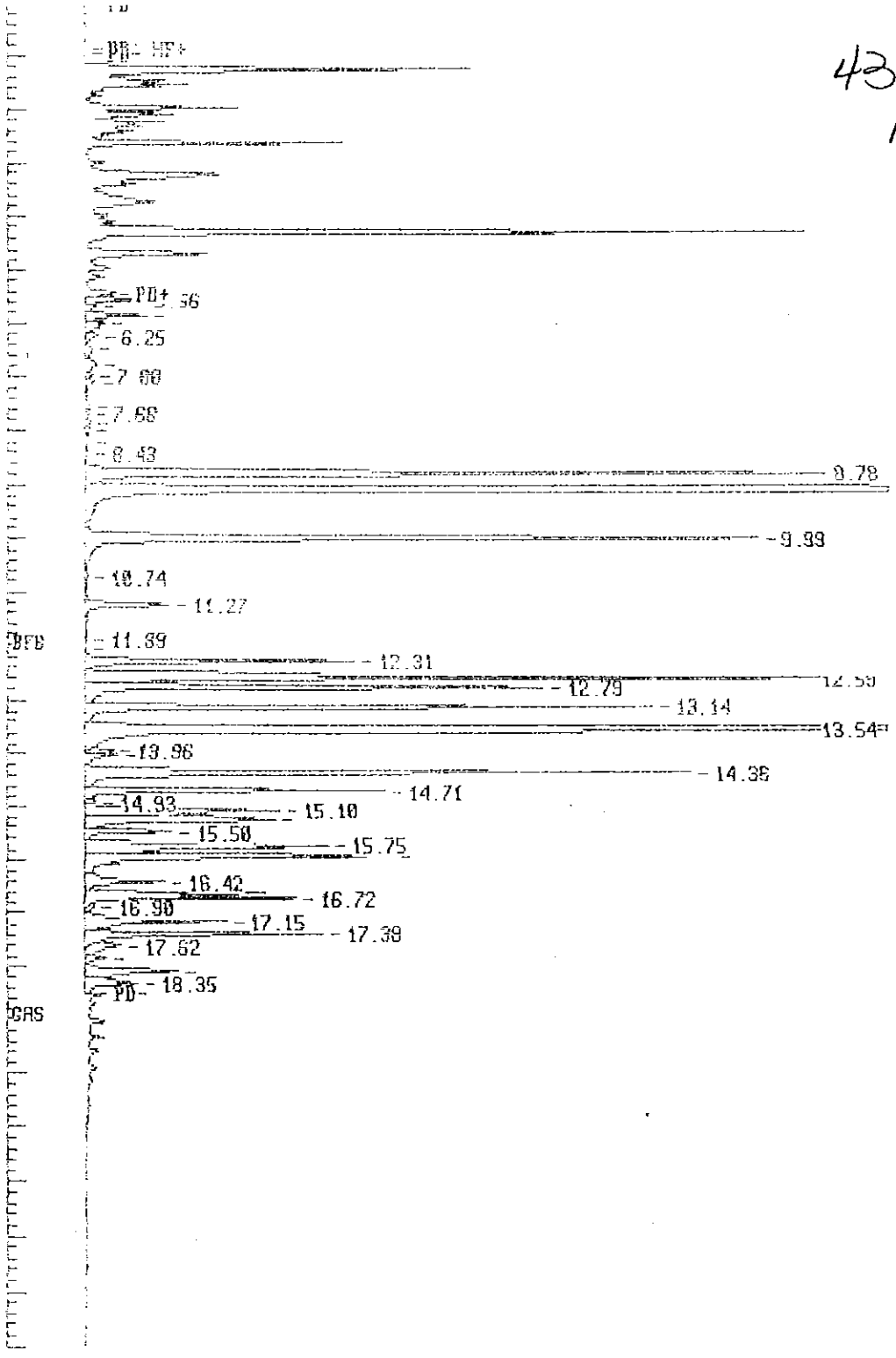
43437
MW4



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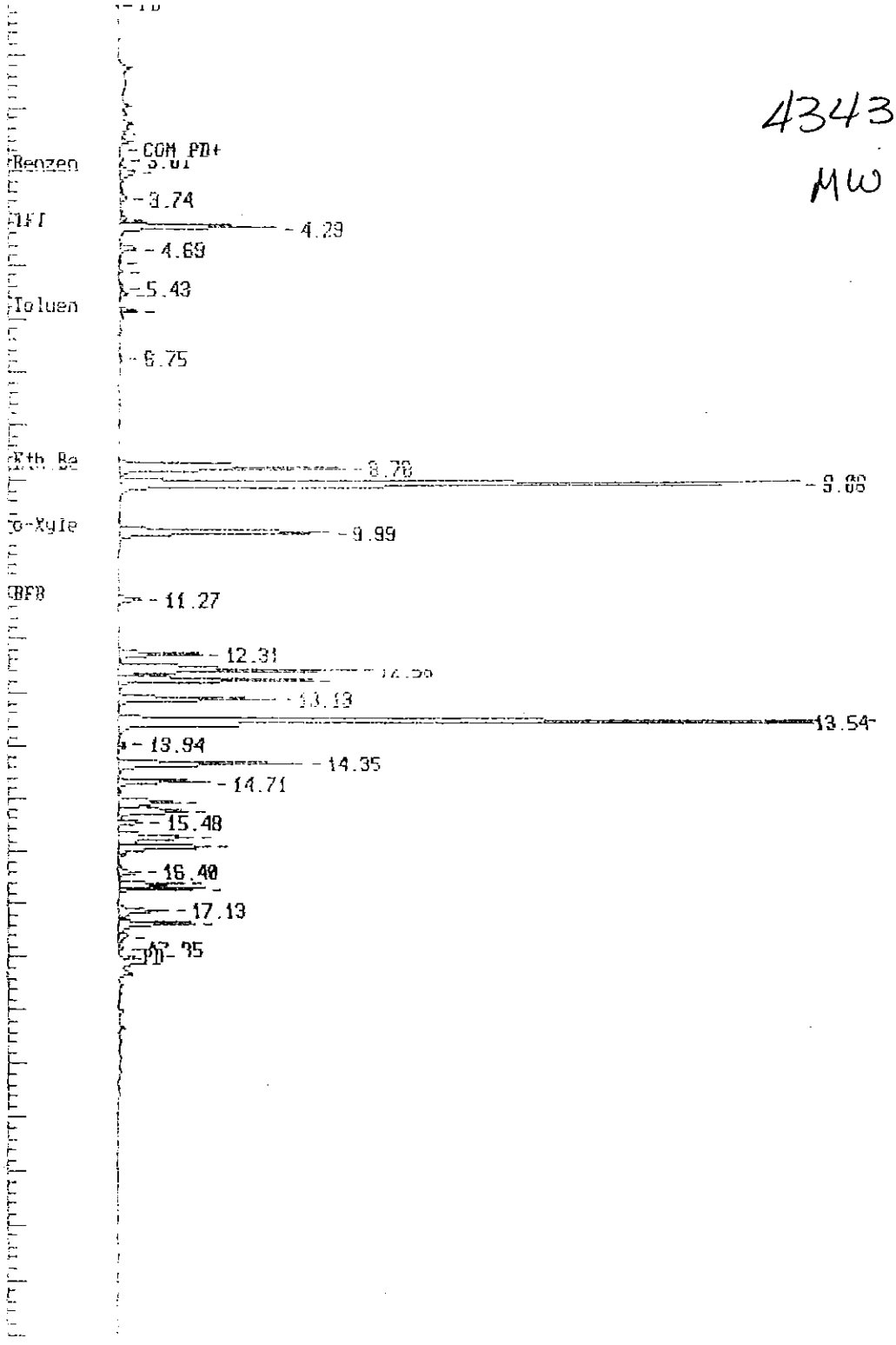
43437
MW 4



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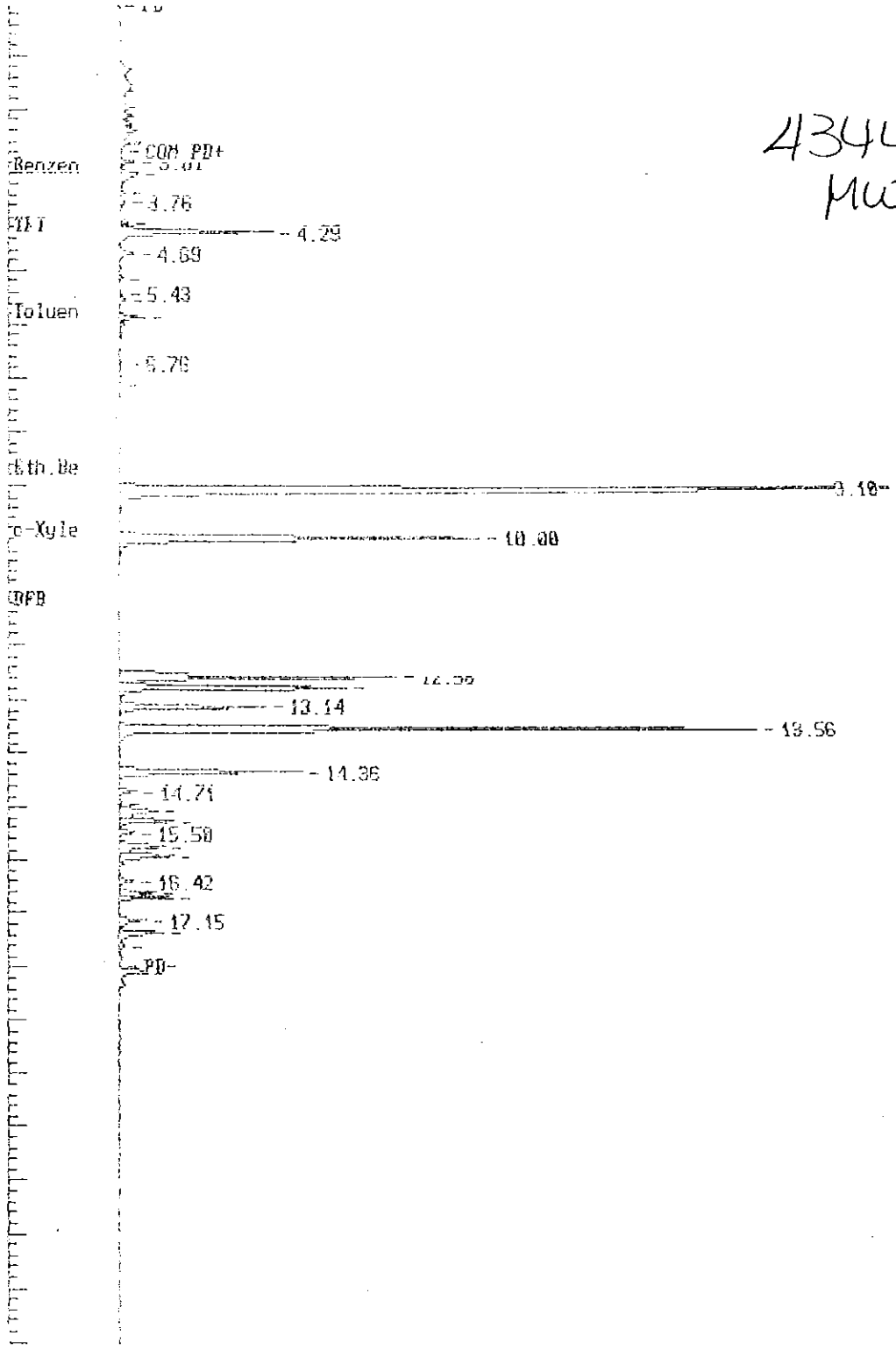
Full Height 100 % Full Scale

43440
MW-7



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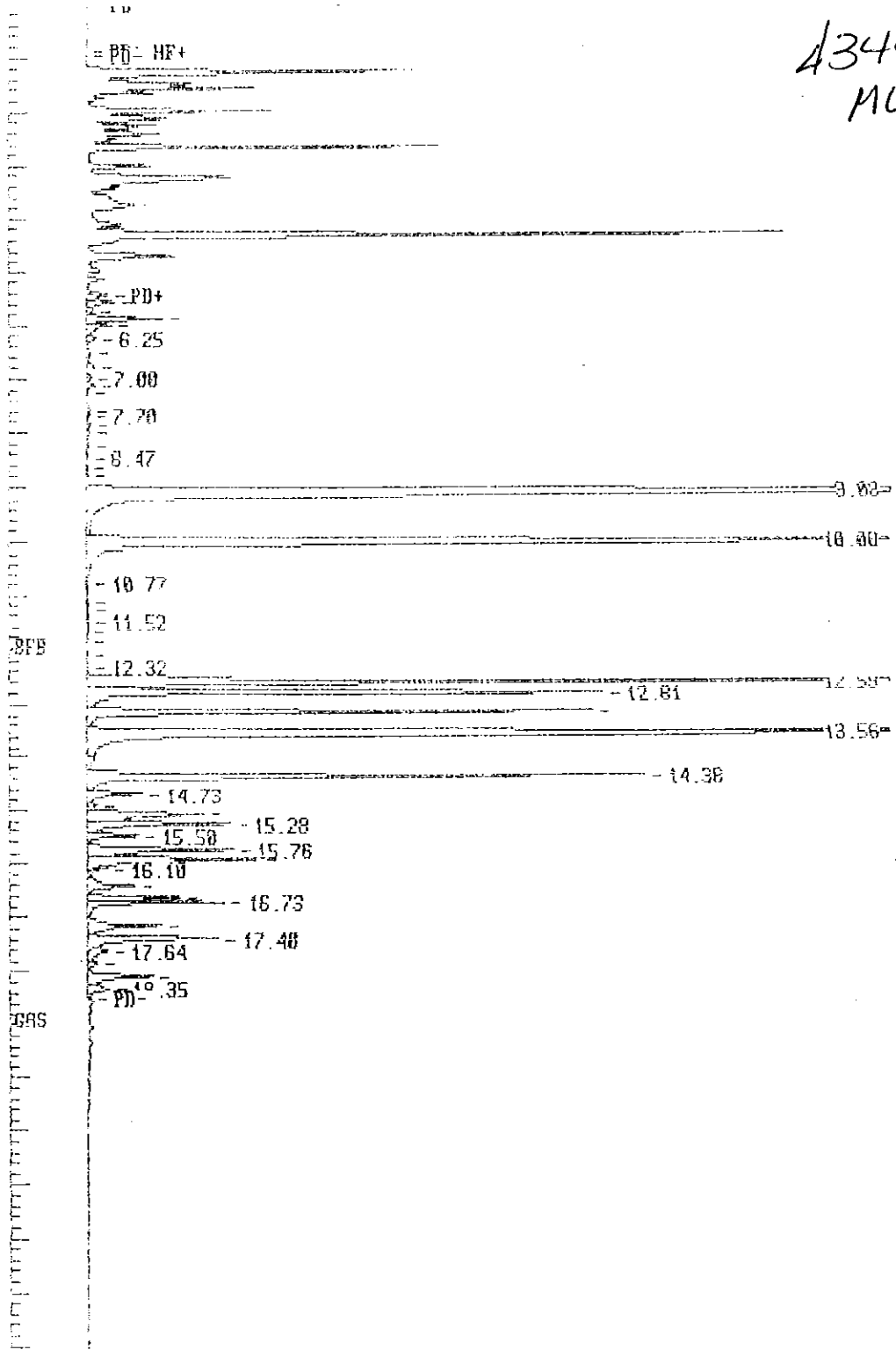
Full Range: 500 K-Counts

43440
MW-7



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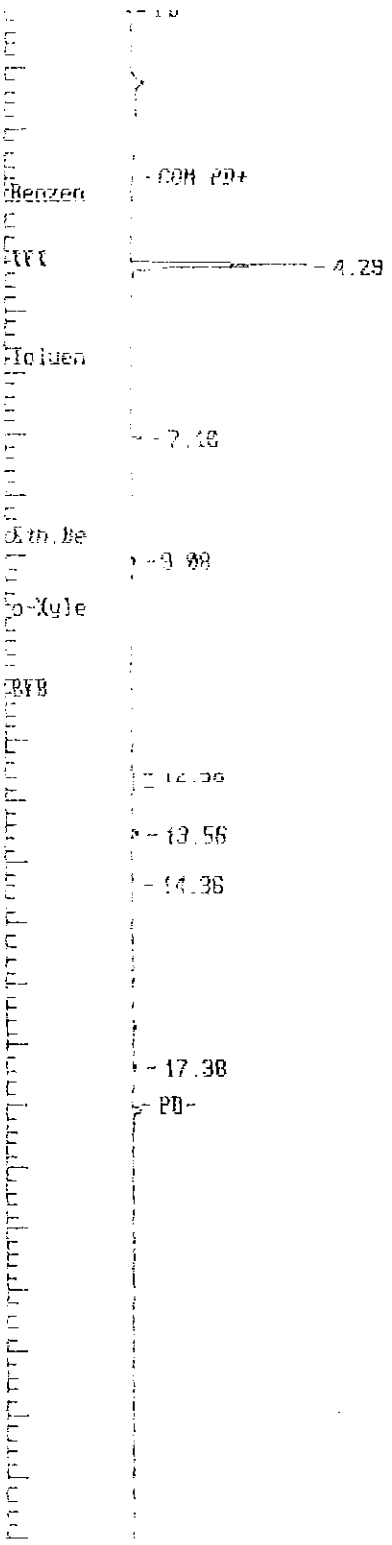
Full Range: 100 K Counts



43441

MW-8

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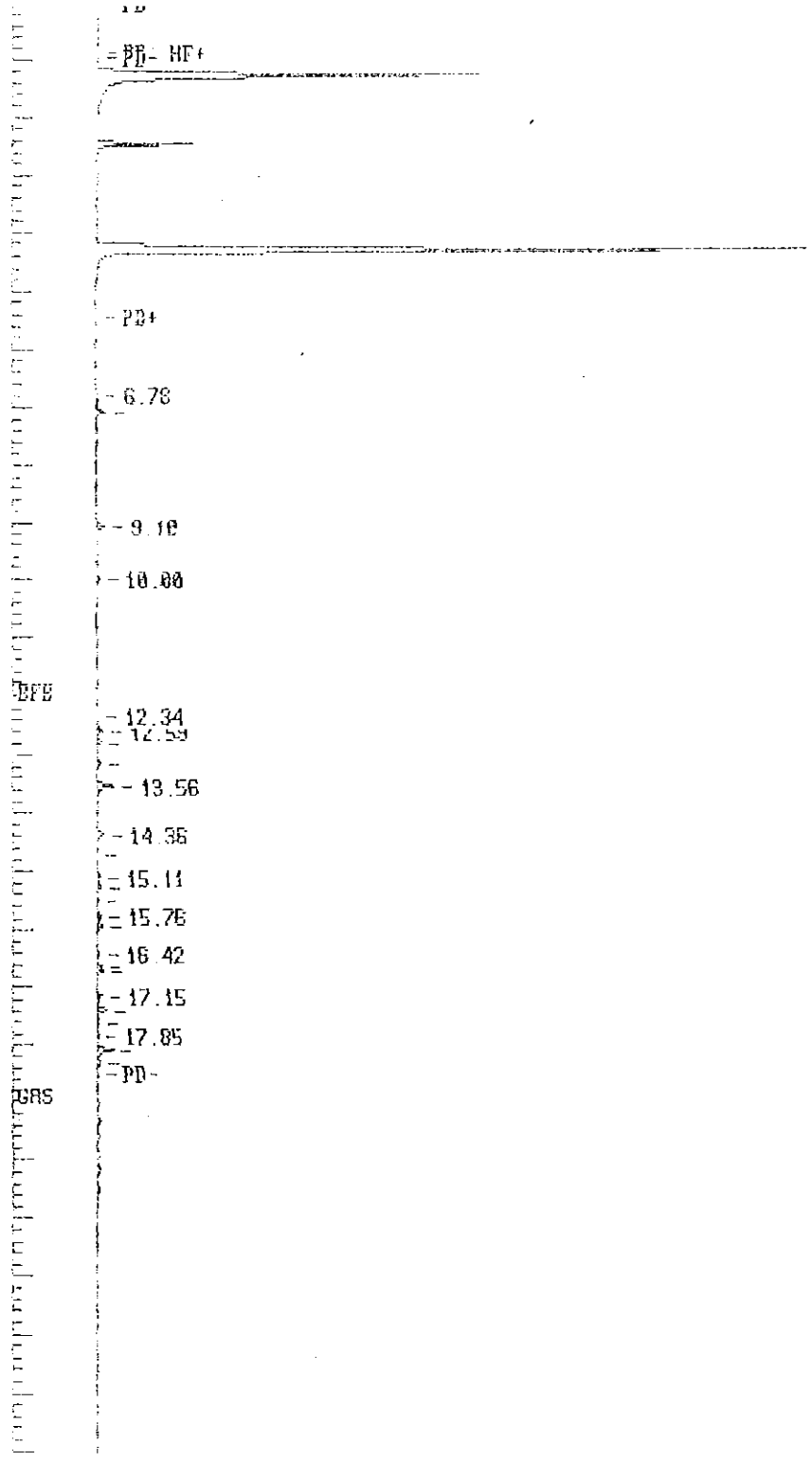
43441
MW8



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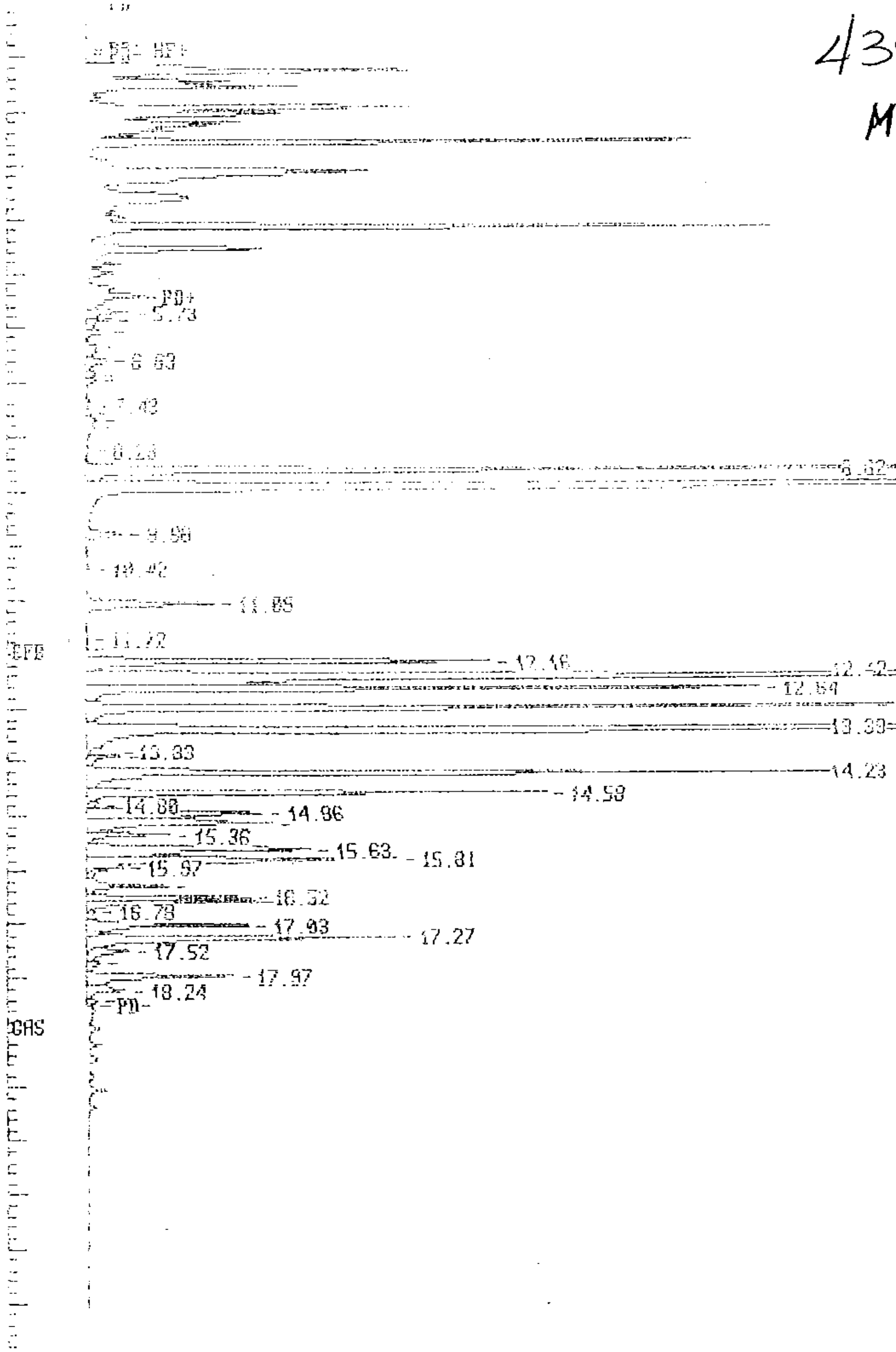
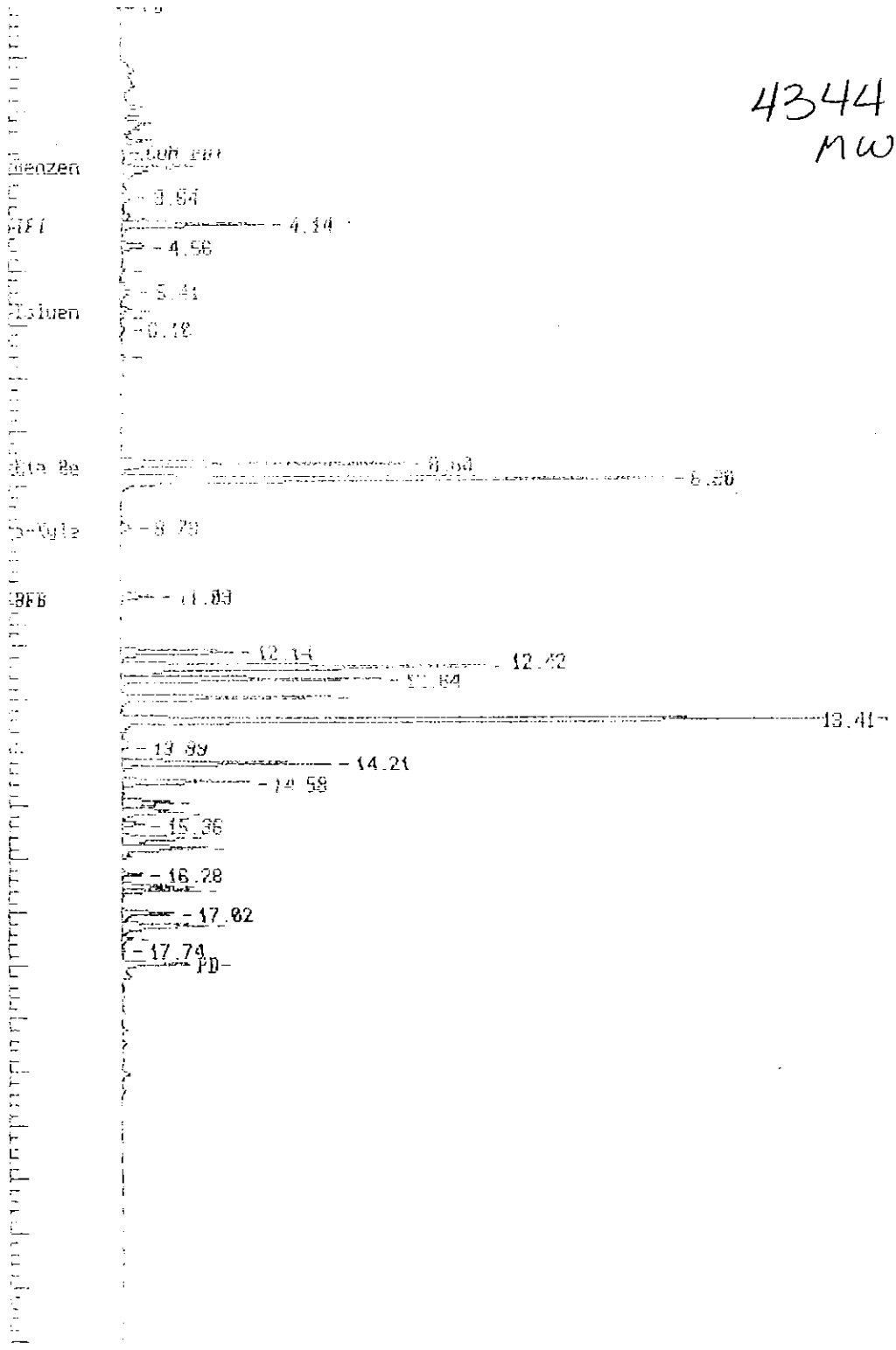
MW10



43443
MW 10



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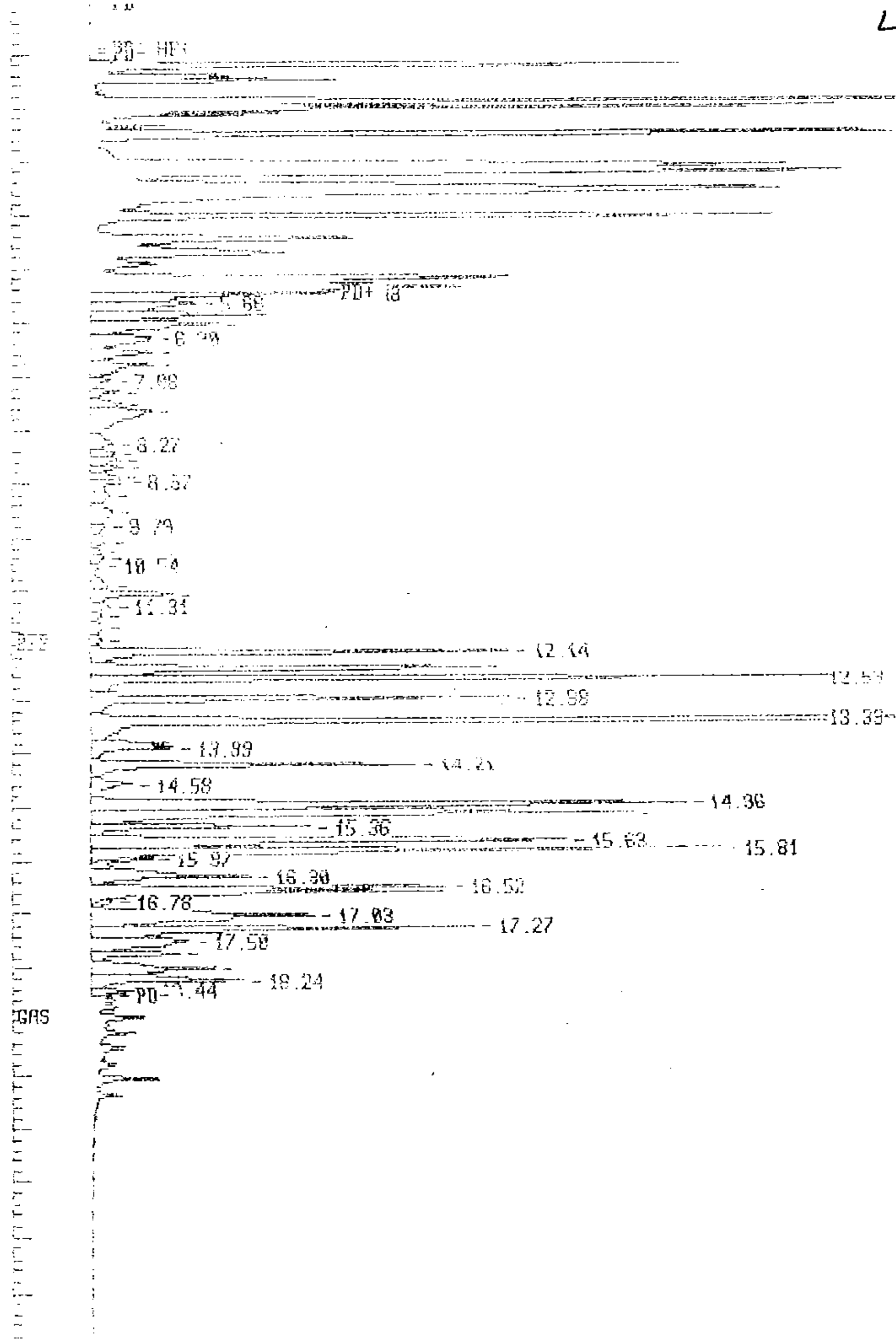
MW 11



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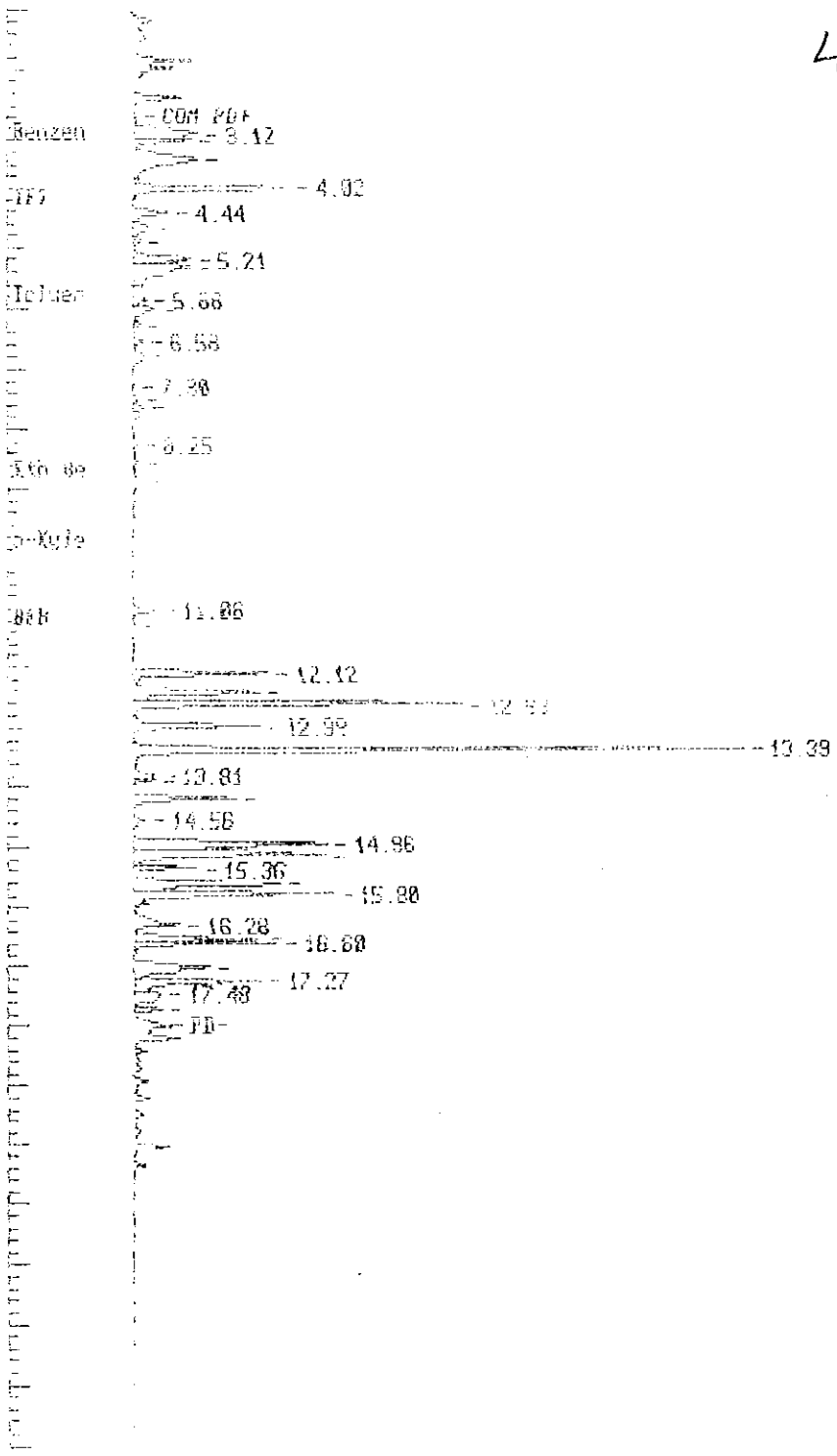
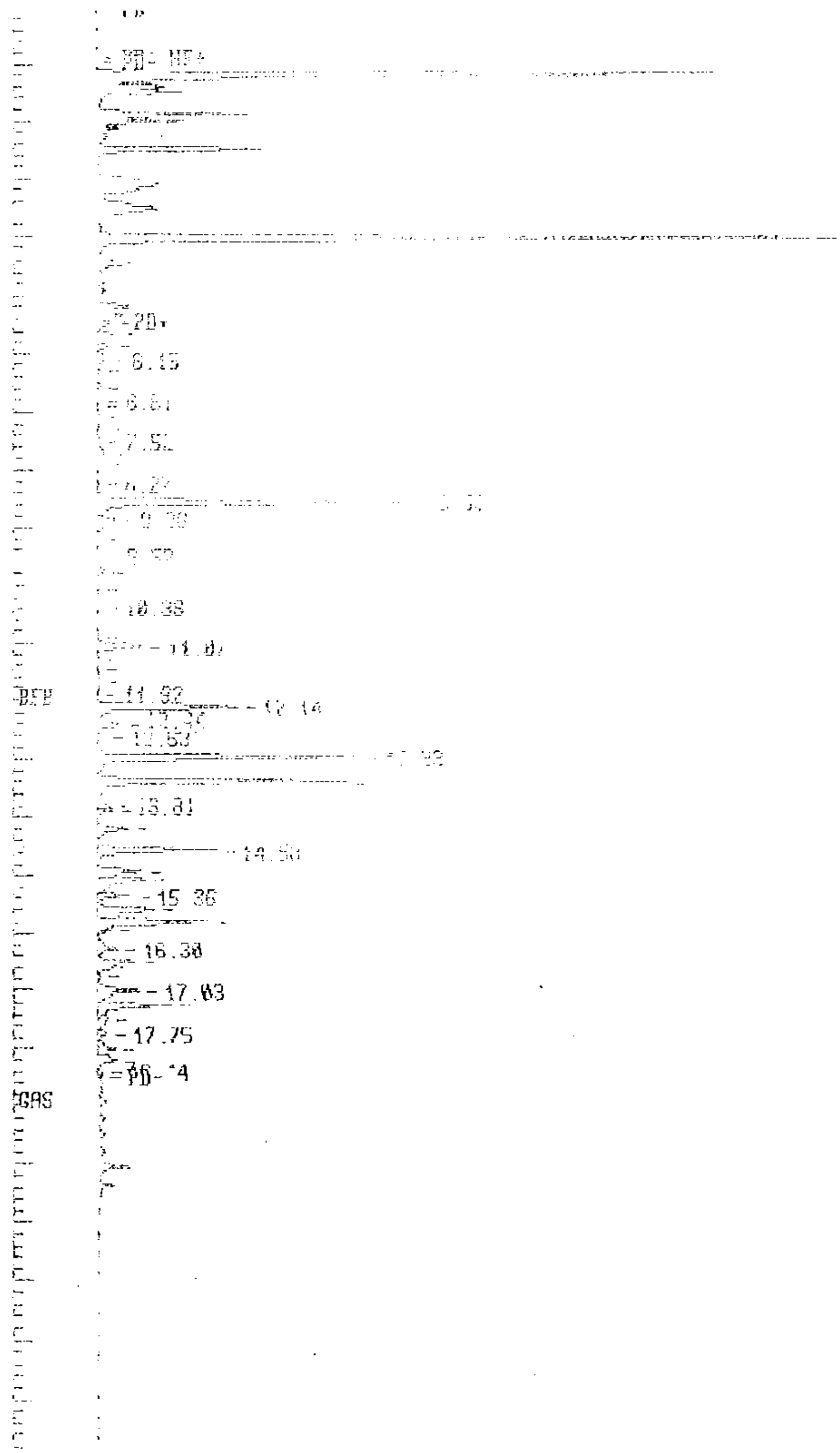
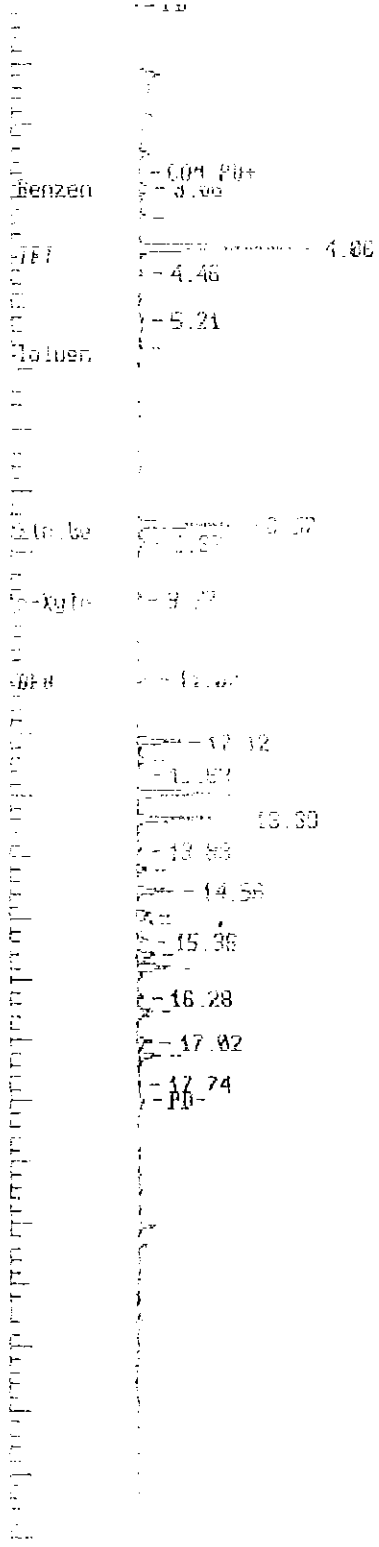
MW11


Benzen
Toluen
Xylen
3.12
4.02
4.44
5.21
5.68
6.58
7.38
8.25
11.06
12.12
12.99
13.39
13.81
14.56
14.96
15.36
15.80
16.28
16.60
17.27
17.48

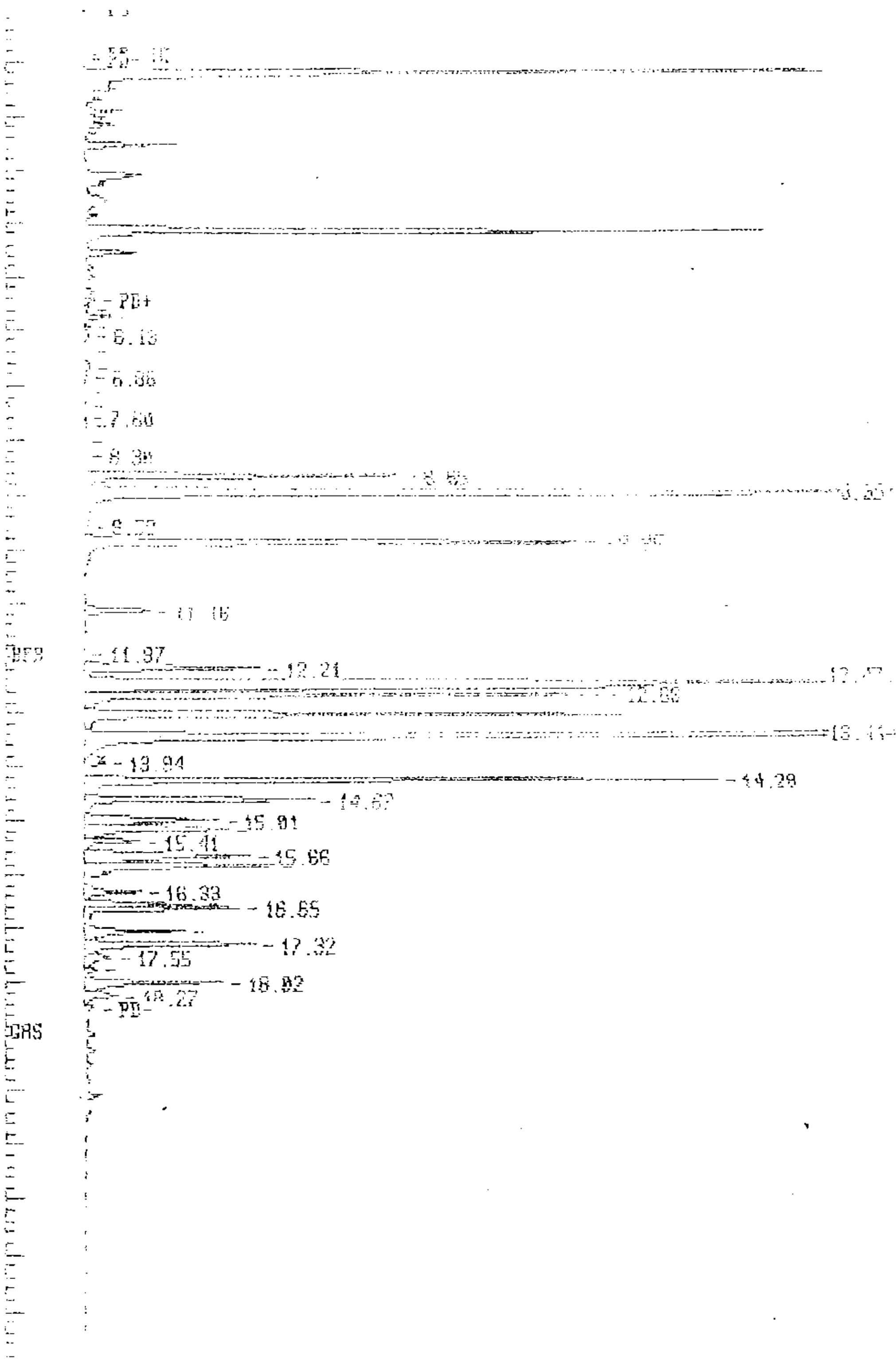
43445
~~Alw~~ SW 1



43445
SW-1

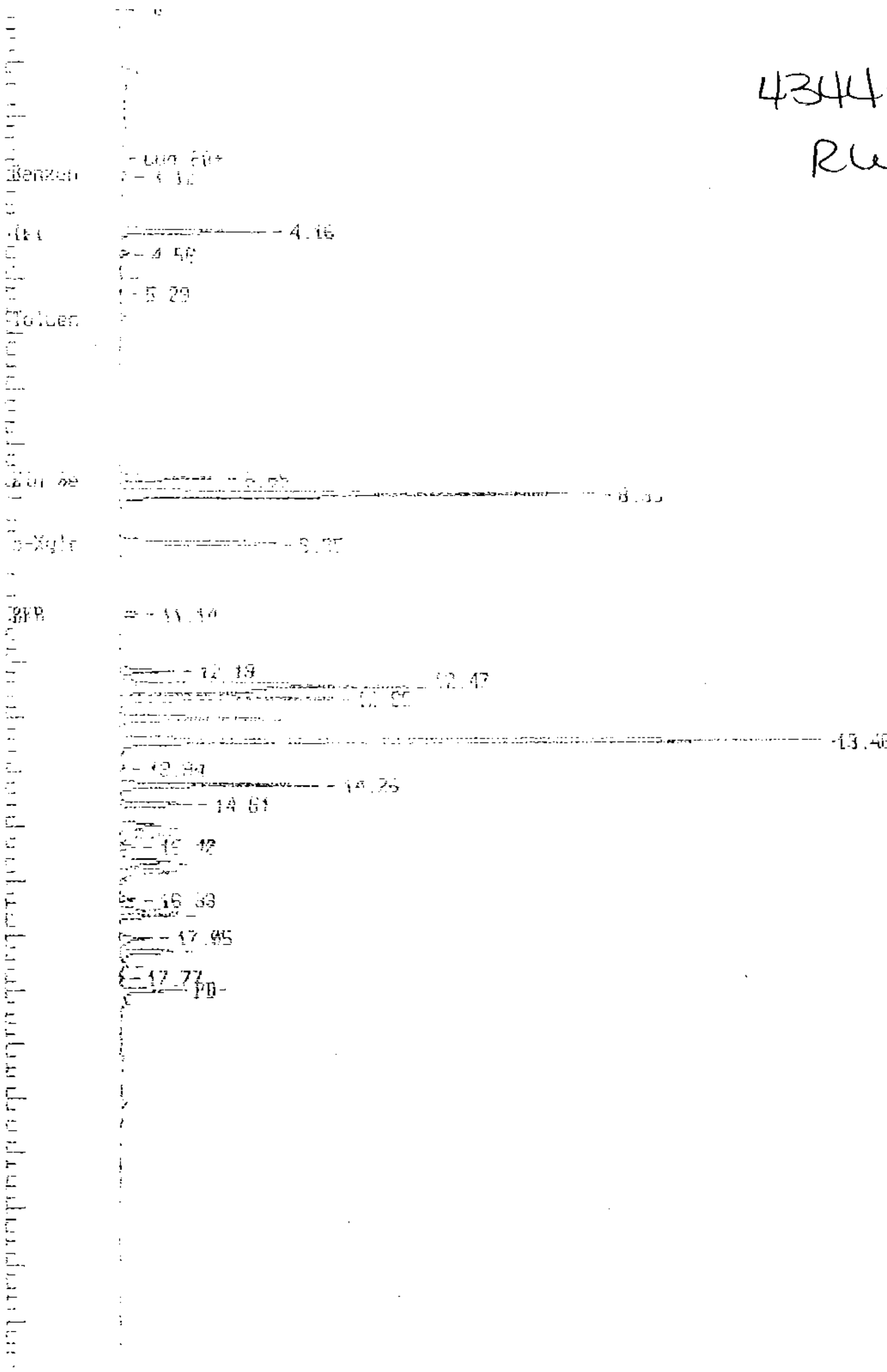


43446
RW1



PB+
6.13
6.86
7.60
8.30
8.72
11.16
BFB
11.87
12.21
12.80
13.94
14.28
14.67
15.01
15.41
15.66
16.33
16.65
17.32
17.55
18.02
PB
18.27
DAS

43446
RW1



AGRA
Earth & Environmental
539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

95.02157

00120

CHAIN OF CUSTODY

PROJECT: Richland Jackpot	PROJECT No.: 12-1238
CLIENT: TIME OIL	PHONE No.:
PROJECT MANAGER: BRUCE WILLIAMS	PHONE No.: 509-482-0104
SAMPLER'S NAME (please print): ERIC J POLZIN	PHONE No.:
SAMPLER'S SIGNATURE: Eric J Polzin	

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP				
1. MW-1	7/12/95	1255	W	HCl	3	40ml			X																
2. MW-2	7/12/95	1110							X																
3. MW-3	7/11/95	2045							X																
4. MW-4	7/11/95	2003							X																
5. MW-5		1745							X																
6. MW-6		1540							X																
7. MW-7		1500							X																
8. MW-8		1607							X																
9. MW-9		1703							X																
10. MW-10		1430							X																

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

SAMPLE RECEIPT	LABORATORY: NET	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
CONDITION OF SEALS	DOT DESIGNATION	☒ 1 WEEK STD	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Eric J Polzin / AGRA	7/13/95	901	1. Darren / Fedex	7/13	901
2.			2. Cindy Richardson	7/15/95	11:00
3.			3.		

PAGE 1 OF 2

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

DISTRIBUTION: White - Yellow - Laboratory Pink - Originator

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539 W Sharp Avenue, Suite D
Spokane, Washington 99201-2422
Tel (509) 325-0104 Fax (509) 325-0212

95.02157

00119

CHAIN OF CUSTODY

PROJECT: Richland Jackpot	PROJECT No. 12-1238
CLIENT: Time Oil	PHONE No.
PROJECT MANAGER: BRUCE WILLIAMS	PHONE No. 482-0104
SAMPLER'S NAME (please print): ERIC J. POLZIN	PHONE No.
SAMPLER'S SIGNATURE: Eric J Polzin	

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

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH 418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP				
1. MW-11	7/12/95	1000	W	HCL	3	40ml			X																
2. SW-1	7/11/95	1855	|	|	|	|			X																
3. RW-1	7/12/95	1350	|	|	|	|			X																
4. MW-99	7/11/95	1750	|	|	|	|			X																
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									

SAMPLE RECEIPT	LABORATORY NET	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
		☒ 1 WEEK 5D	
CONDITION OF SEALS	DOT DESIGNATION	☐ 2 WEEK (standard)	
		☐ OTHER ________	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1. Eric J Polzin / AGRA	7/13/95	901	1. [signature] / FedEx	7/13	901
2.			2. Cindy Richardson	7/15/95	11:00
3.			3.		

PAGE 2 OF 2

AGRA
Earth & Environmental

17 August 1995

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

Time Oil Company
2737 West Commodore Way
Seattle, Washington 98199-1233

Attention: Mr. Scott Sloan

Regarding: Results of Bank/Seep Sampling on Columbia River
Near Time Oil Property 01-056, Richland, Washington

Dear Mr. Sloan:

AGRA Earth and Environmental, Inc. (AEE) is pleased to submit this letter report presenting results of the bank and seep sampling event conducted along the Columbia River in the vicinity of the subject site (Figure 1 - Site Location Map). The purpose of this sampling event, performed on 3 August 1995 in Howard Amon Park, was to evaluate soil and groundwater conditions with respect to petroleum hydrocarbon impact along the west bank of the Columbia River.

Sampling Procedures
Sampling locations along the river were selected based upon an estimated projection of the down-gradient extent of the submerged hydrocarbon smear zone in soil, which extends to the northwest roughly in a line from monitoring well MW-1 to MW-10. Although recent water level measurements indicate groundwater flow is currently towards the northeast, during the time of the petroleum release at the subject site, groundwater flow was towards the east. Therefore, sampling locations were based upon the down-gradient direction of the plume at the time of the release. Sampling locations are presented in Figure 2.

Five soil samples and two seep samples were collected along the bank of the Columbia River. Each soil sample was collected from a point approximately one foot above the river elevation and less than five feet from the river edge. The bank along the river in this area drops approximately one to two feet in a nearly vertical direction from a grassy park area to the river shore. Soil samples were collected by first removing surficial soil from the bank using a decontaminated stainless steel trowel, then placing soil into two laboratory prepared 8-ounce sample jars. Seep samples were collected by excavating a small hole adjacent to the seep, allowing water to enter the hole, lowering a 40-milliliter unpreserved sample bottle beneath the water surface, opening the cap, allowing the water to fill the bottle, sealing the cap while underwater, then decanting the water into a 40-milliliter sample bottle preserved with hydrochloric acid.

Each sample was placed into an iced cooler, which was transported under AEE chain-of-custody procedures to National Environmental Testing (NET) laboratories of Portland, Oregon. All seven samples was analyzed for gasoline range petroleum hydrocarbons (GRPH) by Washington State Department of Ecology Method WTPH-G and the aromatic hydrocarbons benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8020.

Sampling Results

None of the five soil samples contained detectable concentrations of GRPH or BTEX compounds. Laboratory detection limits for GRPH ranged from 3 to 4 mg/kg or parts per million; laboratory detection limits for the BTEX compounds ranged from 0.3 to 0.4 mg/kg.

Neither of the two seep samples contained detectable concentrations of GRPH, benzene, ethylbenzene, or total xylenes. Sample SEEP-01 contained 0.66 ug/L or parts per billion of toluene, which is less than the cleanup level of 40.0 ug/L. Sample SEEP-02 did not contain detectable concentrations of any target analytes. Laboratory detection limits for GRPH were 50 ug/L; laboratory detection limits for the BTEX compounds were 0.5 ug/L.

Analytical results are summarized in Table 1; laboratory certificates are included in Appendix A.

Conclusions

Analytical results of the bank and seep sampling indicate minimal petroleum hydrocarbon impact along the west bank of the Columbia River in the vicinity of the site. In our opinion, the toluene result observed in the sample collected from SEEP-01 could possibly be a result of gasoline from boat motors (this portion of the Columbia River is heavily used for commercial and recreational boating), which could have been washed onto the beach at this location.

Although the results of this sampling event can be utilized to provide baseline risk assessment data for users of Howard Amon Park and the Columbia River, they should not be used alone to identify the down-gradient extent of petroleum hydrocarbons emanating from the subject site. Based upon the fluctuating hydrogeological characteristics observed at the site to date, the smear zone soils could be found at different depths or locations from those sampled during this event.

We appreciate being of continued service to Time Oil Co. If you have any questions regarding the contents of this letter, please do not hesitate to call us at your earliest convenience.

Respectfully submitted,
AGRA Earth and Environmental, Inc.

Bruce Williams
Senior Project Scientist

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

Enclosures
Figure 1 - Site Location Map
Figure 2 - Sampling Locations
Table 1 - Summary of Bank/Seep Sample Results
Appendix A - Analytical Laboratory Certificates

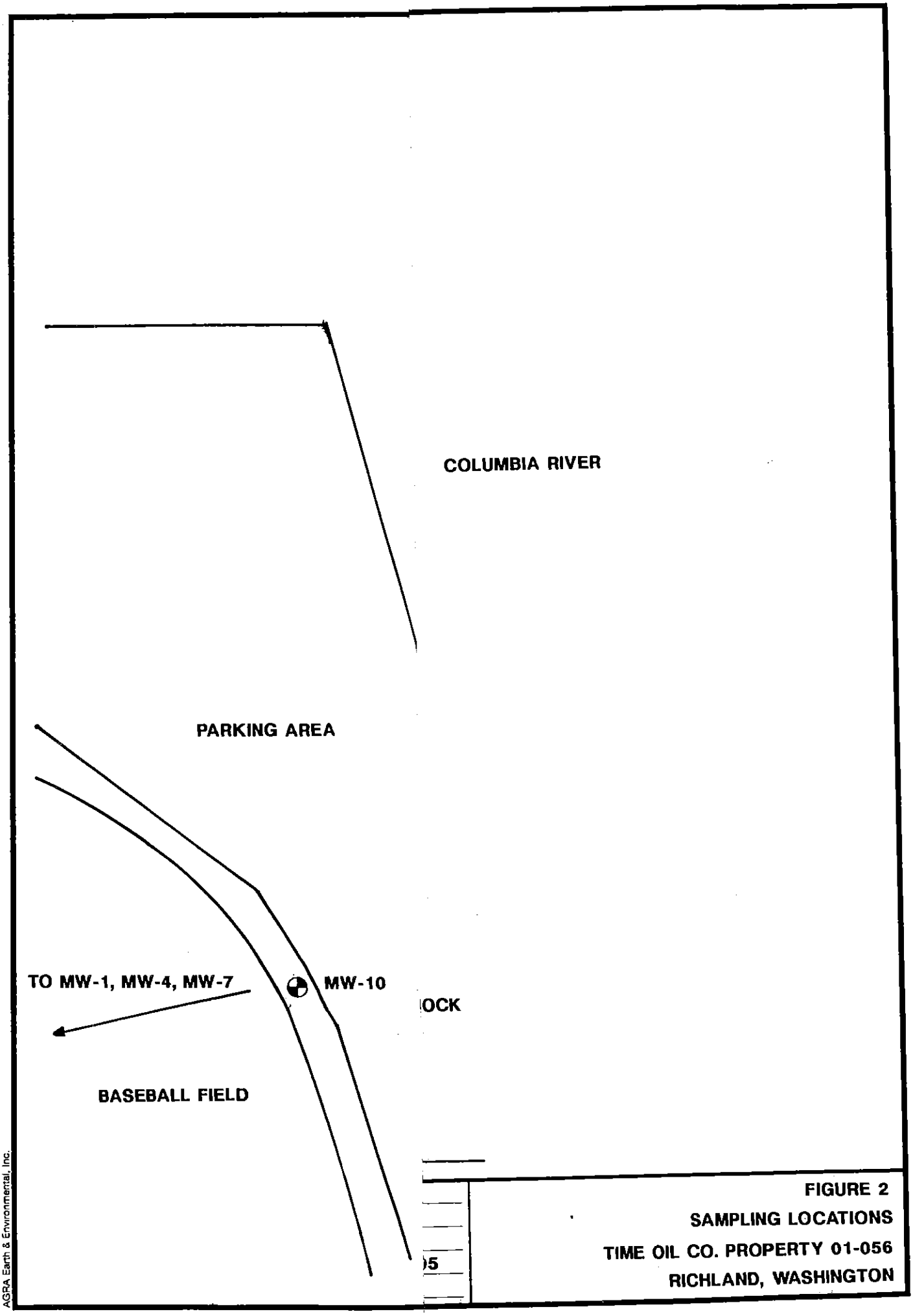
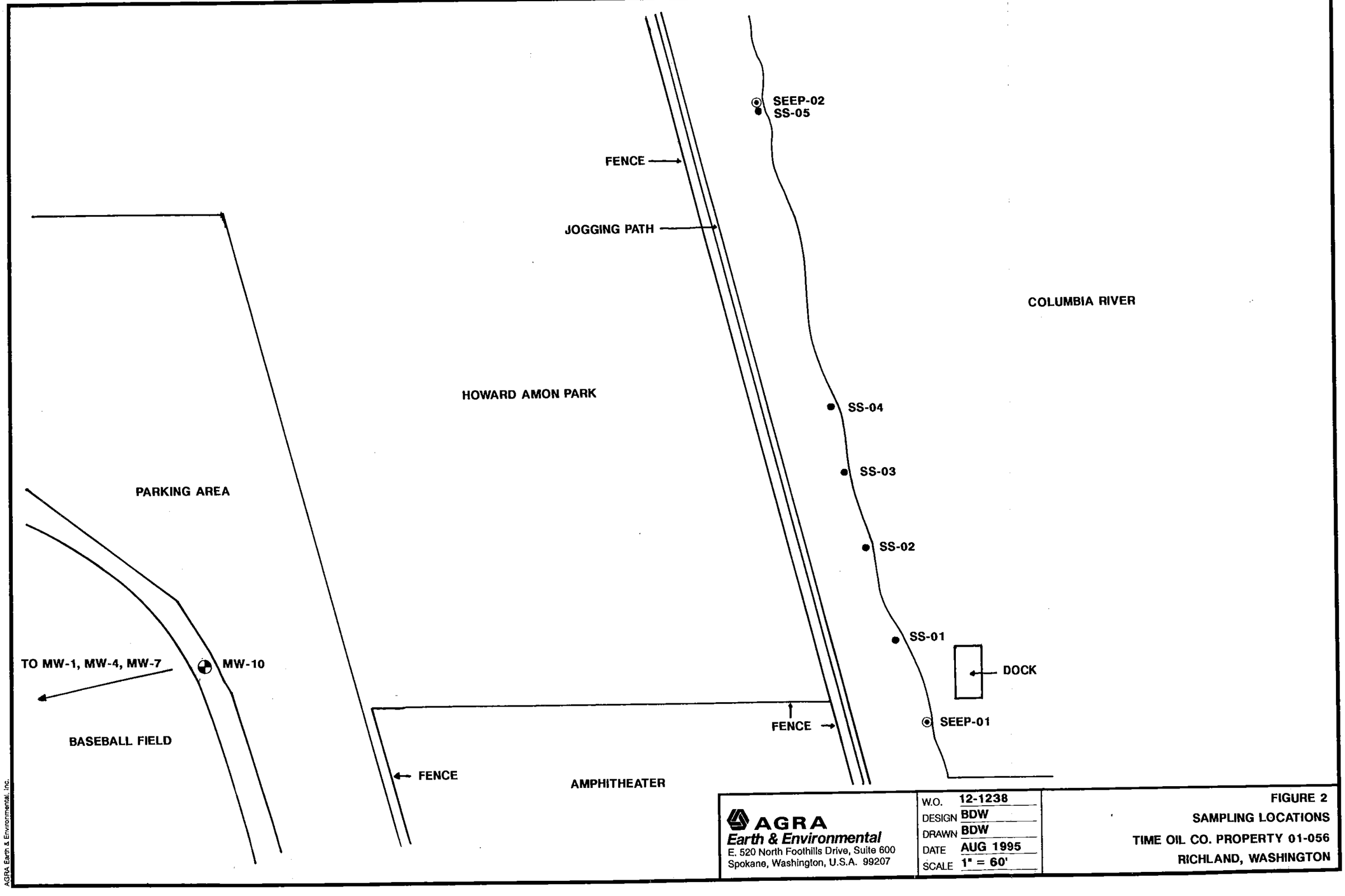


FIGURE 2
SAMPLING LOCATIONS
TIME OIL CO. PROPERTY 01-056
RICHLAND, WASHINGTON

AGRA Earth & Environmental, Inc.

TABLE 1 SUMMARY OF BANK/SEEP SAMPLING
TIME OIL PROPERTY 01-056
RICHLAND, WASHINGTON

SAMPLE NUMBER	DATE COLLECTED	UNITS	GRPH	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES
SS-01	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SS-02	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SS-03	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SS-04	3 AUG 95	mg/kg	<3	<0.3	<0.3	<0.3	<0.3
SS-05	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SEEP-01	3 AUG 95	ug/L	<50	<0.5	0.66	<0.5	<0.5
SEEP-02	3 AUG 95	ug/L	<50	<0.5	<0.5	<0.5	<0.5



AGRA Earth & Environmental, Inc.

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

W.O.	12-1238
DESIGN	BDW
DRAWN	BDW
DATE	AUG 1995
SCALE	1" = 60'

FIGURE 2
SAMPLING LOCATIONS
TIME OIL CO. PROPERTY 01-056
RICHLAND, WASHINGTON

TABLE 1 SUMMARY OF BANK/SEEP SAMPLING
TIME OIL PROPERTY 01-056
RICHLAND, WASHINGTON

SAMPLE NUMBER	DATE COLLECTED	UNITS	GRPH	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES
SS-01	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SS-02	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SS-03	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SS-04	3 AUG 95	mg/kg	<3	<0.3	<0.3	<0.3	<0.3
SS-05	3 AUG 95	mg/kg	<4	<0.4	<0.4	<0.4	<0.4
SEEP-01	3 AUG 95	ug/L	<50	<0.5	0.66	<0.5	<0.5
SEEP-02	3 AUG 95	ug/L	<50	<0.5	<0.5	<0.5	<0.5

NATIONAL ENVIRONMENTAL TESTING, INC.

Portland Division
17400 SW Upper Boones Ferry Rd.
Suite #260
Portland, OR 97224
Tel: (503) 624-5449
Fax: (503) 639-6889

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 08/10/1995
NET Account No.: 60277
NET Job Number: 95.02481

Project: 12-1238-03
Location: Time Oil- Richland, WA

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
44568	SS-01	SOIL	08/03/1995	08/04/1995
44569	SS-02	SOIL	08/03/1995	08/04/1995
44570	SS-03	SOIL	08/03/1995	08/04/1995
44571	SS-04	SOIL	08/03/1995	08/04/1995
44572	SS-05	SOIL	08/03/1995	08/04/1995
44573	SEEP-01	GROUND WATER	08/03/1995	08/04/1995
44574	SEEP-02	GROUND WATER	08/03/1995	08/04/1995

Approved by:

Tabatha Brochu
NET, INC. Project Manager

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

08/10/1995
Job No.: 95.02481

Project Name: 12-1238-03
Date Received: 08/04/1995

Sample Number 44568 — Sample Description SS-01

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	82	0.01	%	08/08/1995	
8020 BTEX (S)						
Dilution Factor		1	-		08/08/1995	
Benzene	8020	ND	0.4	mg/kg d	08/08/1995	
Toluene	8020	ND	0.4	mg/kg d	08/08/1995	
Ethylbenzene	8020	ND	0.4	mg/kg d	08/08/1995	
Xylenes, total	8020	ND	0.4	mg/kg d	08/08/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		08/08/1995	
Gasoline	WTPH-G	ND	4.	mg/kg d	08/08/1995	

Sample Number 44569 — Sample Description SS-02

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	80	0.01	%	08/08/1995	
8020 BTEX (S)						
Dilution Factor		1	-		08/08/1995	
Benzene	8020	ND	0.4	mg/kg d	08/08/1995	
Toluene	8020	ND	0.4	mg/kg d	08/08/1995	
Ethylbenzene	8020	ND	0.4	mg/kg d	08/08/1995	
Xylenes, total	8020	ND	0.4	mg/kg d	08/08/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		08/08/1995	
Gasoline	WTPH-G	ND	4.	mg/kg d	08/08/1995	

Sample Number 44570 — Sample Description SS-03

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	82	0.01	%	08/08/1995	
8020 BTEX (S)						

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

08/10/1995
Job No.: 95.02481

Project Name: 12-1238-03
Date Received: 08/04/1995

Sample Number 44570 — Sample Description SS-03

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Dilution Factor		1	-		08/08/1995	
Benzene	8020	ND	0.4	mg/kg d	08/08/1995	
Toluene	8020	ND	0.4	mg/kg d	08/08/1995	
Ethylbenzene	8020	ND	0.4	mg/kg d	08/08/1995	
Xylenes, total	8020	ND	0.4	mg/kg d	08/08/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		08/08/1995	
Gasoline	WTPH-G	ND	4.	mg/kg d	08/08/1995	

Sample Number 44571 — Sample Description SS-04

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	87	0.01	%	08/08/1995	
8020 BTEX (S)						
Dilution Factor		1	-		08/08/1995	
Benzene	8020	ND	0.3	mg/kg d	08/08/1995	
Toluene	8020	ND	0.3	mg/kg d	08/08/1995	
Ethylbenzene	8020	ND	0.3	mg/kg d	08/08/1995	
Xylenes, total	8020	ND	0.3	mg/kg d	08/08/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		08/08/1995	
Gasoline	WTPH-G	ND	3	mg/kg d	08/08/1995	

Sample Number 44572 — Sample Description SS-05

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Solids, Total	160.3	81	0.01	%	08/08/1995	
8020 BTEX (S)						
Dilution Factor		1	-		08/08/1995	
Benzene	8020	ND	0.4	mg/kg d	08/08/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

08/10/1995
Job No.: 95.02481

Project Name: 12-1238-03
Date Received: 08/04/1995

Sample Number 44572 — Sample Description SS-05

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
Toluene	8020	ND	0.4	mg/kg d	08/08/1995	
Ethylbenzene	8020	ND	0.4	mg/kg d	08/08/1995	
Xylenes, total	8020	ND	0.4	mg/kg d	08/08/1995	
WTPH-GAS (S)						
Dilution Factor		1	-		08/08/1995	
Gasoline	WTPH-G	ND	4.	mg/kg d	08/08/1995	

Sample Number 44573 — Sample Description SEEP-01

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			08/09/1995	
Benzene	8020	ND	0.5	ug/L	08/09/1995	
Toluene	8020	0.66	0.5	ug/L	08/09/1995	
Ethyl Benzene	8020	ND	0.5	ug/L	08/09/1995	
Xylenes, total	8020	ND	0.5	ug/L	08/09/1995	
WTPH-Gasoline	WTPH-G	ND	50	ug/L	08/09/1995	

Sample Number 44574 — Sample Description SEEP-02

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX/WTPH-Gasoline (W)						
Dilution Factor		1			08/09/1995	
Benzene	8020	ND	0.5	ug/L	08/09/1995	
Toluene	8020	ND	0.5	ug/L	08/09/1995	
Ethyl Benzene	8020	ND	0.5	ug/L	08/09/1995	
Xylenes, total	8020	ND	0.5	ug/L	08/09/1995	
WTPH-Gasoline	WTPH-G	ND	50	ug/L	08/09/1995	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

08/10/1995
Job No.: 95.02481

Project Name: 12-1238-03
Date Received: 08/04/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
44568	SS-01				
aaa-Trifluorotoluene (Surr.)	8020	131	%	08/08/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	127	%	08/08/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	88	%	08/08/1995	
Sample Number	**Sample Description**				
44569	SS-02				
aaa-Trifluorotoluene (Surr.)	8020	102	%	08/08/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	100	%	08/08/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	98	%	08/08/1995	
Sample Number	**Sample Description**				
44570	SS-03				
aaa-Trifluorotoluene (Surr.)	8020	96	%	08/08/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	94	%	08/08/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	94	%	08/08/1995	
Sample Number	**Sample Description**				
44571	SS-04				
aaa-Trifluorotoluene (Surr.)	8020	107	%	08/08/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	105	%	08/08/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	94	%	08/08/1995	
Sample Number	**Sample Description**				
44572	SS-05				
aaa-Trifluorotoluene (Surr.)	8020	126	%	08/08/1995	
aaa-Trifluorotoluene (Surr.)	WTPH-G	124	%	08/08/1995	
4-Bromofluorobenzene (Surr.)	WTPH-G	97	%	08/08/1995	
Sample Number	**Sample Description**				
44573	SEEP-01				

SURROGATE REPORT

Scott Sloan
Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

08/10/1995
Job No.: 95.02481

Project Name: 12-1238-03
Date Received: 08/04/1995

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	Sample Description				
44573	SEEP-01				
aaa-TFT (BTEX-Surr.)	8020	101	%	08/09/1995	
aaa-TFT (Gas Surr.)	WTPH-G	98	%	08/09/1995	
Sample Number	Sample Description				
44574	SEEP-02				
aaa-TFT (BTEX-Surr.)	8020	120	%	08/09/1995	
aaa-TFT (Gas Surr.)	WTPH-G	119	%	08/09/1995	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 08/10/1995

NET Job Number: 95.02481

Contact: Scott Sloan
Project: 12-1238-03

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
BTEX/WTPH-Gasoline (W)				
Benzene	20.0	21.0	105.0	08/09/1995
Toluene	20.0	20.9	104.5	08/09/1995
WTPH-Gasoline	700	724	103.4	08/09/1995
8020 BTEX (S)				
Benzene	20	21.8	109.0	08/08/1995
Toluene	20	21.7	108.5	08/08/1995
WTPH-GAS (S)				
Gasoline	700	728	104.0	08/08/1995

CCV - Continuing Calibration Verification

Note: Recovery limits for 8240, 8260, 8270, 8010, 8020, 624, 625 specified in method. Gasoline, Diesel, 418.1, 418.1M limits 80-120%. Metals recovery limits 80-120%.

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 08/10/1995

NET Job Number: 95.02481

Contact: Scott Sloan
Project: 12-1238-03

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Date Analyzed
BTEX/WTPH-Gasoline (W)				
Benzene	12.7	10.6	83.5	08/09/1995
Toluene	38.4	36.6	95.3	08/09/1995
WTPH-Gasoline	350	364	104.0	08/09/1995
BTEX/WTPH-Gasoline (W)				
Benzene	12.7	10.3	81.1	08/09/1995
Toluene	38.4	35.5	92.4	08/09/1995
WTPH-Gasoline	350	356	101.7	08/09/1995
8020 BTEX (S)				
Benzene	12.7	12.5	98.4	08/08/1995
Toluene	38.4	41.1	107.0	08/08/1995
WTPH-GAS (S)				
Gasoline	350	380	108.6	08/08/1995

LCS - Laboratory Control Standard

Note: Recovery limits for fuels 80-120%. 8010, 8020, 8240, 8260, 8270, 624, 625 specified in method. Recovery limits for metals analyses 80-120%. 418.1 limits are 90-140%.

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 08/10/1995

Job Number: 95.02481

Contact: Scott Sloan
Project: 12-1238-03

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
BTEX/WTPH-Gasoline (W)										
Benzene	1117	ND	1270	ug/L	88.0	1167	1270	ug/L	91.9	4.3
Toluene	3787	ND	3840	ug/L	98.6	3931	3840	ug/L	102.4	3.7
8020 BTEX (S)										
Benzene	2.2	ND	2.4	mg/kg	92.4	2.2	2.4	mg/kg	91.4	1.1
Toluene	7.4	ND	8.3	mg/kg	88.6	7.5	8.3	mg/kg	89.5	1.0
WTPH-GAS (S)										
Gasoline	74.	ND	79.	mg/kg	93.7	76.	79.	mg/kg	96.5	2.9

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil.= Diluted Out

QUALITY CONTROL REPORT
BLANKS

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 08/10/1995

NET Job Number: 95.02481

Contact: Scott Sloan
Project: 12-1238-03
Location: Time Oil- Richland, WA

Analyte	Blank Analysis	MDL	Units	Date Analyzed
BTEX/WTPH-Gasoline (W)				
Dilution Factor	1			08/09/1995
Benzene	ND	0.5	ug/L	08/09/1995
Toluene	ND	0.5	ug/L	08/09/1995
Ethyl Benzene	ND	0.5	ug/L	08/09/1995
Xylenes, total	ND	0.5	ug/L	08/09/1995
WTPH-Gasoline	ND	50	ug/L	08/09/1995
aaa-TFT (Gas Surr.)	117		%	08/09/1995
aaa-TFT (BTEX-Surr.)	117		%	08/09/1995
8020 BTEX (S)				
Benzene	ND	0.5	mg/Kg	08/08/1995
Toluene	ND	0.5	mg/Kg	08/08/1995
Ethylbenzene	ND	0.5	mg/Kg	08/08/1995
Xylenes, total	ND	0.5	mg/Kg	08/08/1995
aaa-Trifluorotoluene (Surr.)	138	-	%	08/08/1995
WTPH-GAS (S)				
Gasoline	ND	10	mg/Kg	08/08/1995
aaa-Trifluorotoluene (Surr.)	140	-	%	08/08/1995

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.

QUALITY CONTROL REPORT
DUPLICATES

Time Oil Company
2737 W. Commodore Way
Seattle, WA 98199-1233

Date: 08/10/1995

Job Number: 95.02481

Contact: Scott Sloan
Project: 12-1238-03

Analyte	Original Analysis	Duplicate Analysis	Units	RPD	Date Analyzed	Flag
8020 BTEX (S)						
Benzene	ND	ND	mg/kg		08/08/1995	
Toluene	ND	ND	mg/kg		08/08/1995	
WTPH-GAS (S)						
Gasoline	ND	ND	mg/kg		08/08/1995	

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	The blank exhibited a positive result greater than the reporting limit for this compound.
C	The sample appears to contain a lighter hydrocarbon than gasoline.
D	The sample appears to extend to a heavier hydrocarbon range than gasoline.
E	The sample appears to extend to a lighter hydrocarbon range than diesel.
F	The sample appears to extend to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component comtamination.
H	The gasoline elution pattern for the sample is not typical.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
M	MS and/or MSD percent recovery exceeds control limits.
MR	The MS/MSD RPD is greater than 20%. The sample was re-extracted and re-analyzed with similar results. This is due to a matrix interference, likely a non-homogeneity of the sample.
P	A post digestion spike was analyzed, and recoveries are within control limits.
Q	Detection limits elevated due to sample matrix.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
W	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.
Y	The result for this parameter was greater than the TCLP regulatory limit.
Z	The pattern seen for the parameter being analyzed is not typical.

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

02387

CHAIN OF CUSTODY

PROJECT	PROJECT No.
Time - Richland	12-1238-03
CLIENT	PHONE No.
AGRA	(509) 482-0104
PROJECT MANAGER	PHONE No.
Bruce Williams	
SAMPLER'S NAME (please print)	PHONE No.
Bruce Williams	
SAMPLER'S SIGNATURE	

SAMPLE I.D.	DATE	TIME	MATRIX	PRESERVATIVE	CONTAINERS No.	CONTAINERS VOL.	BTEX by EPA 602 / 8020	WTPH-G	BTEX / WTPH-G	WTPH-HCID	WTPH-D / WTPH-D EXTENDED	TPH by EPA 8015 MODIFIED	WTPH-418.1 MODIFIED	TPH by EPA 418.1	GC / MS EPA 624 / 8240 or EPA 8260 Volatiles	GC / MS EPA 625 / 8270 Semi-volatiles	VOCs EPA 601 / 8010 or EPA 602 / 8020	PCBs EPA 608 / 8080	LEAD EPA 6010 / EPA 7421 Total / Dissolved	TOTAL METALS	TCLP
1. SS-01	8/3/95	0955	S	—	2	8oz			X												
2. SS-02		0920	S	—					X												
3. SS-03		0930	S	—					X												
4. SS-04		0940	S	—					X												
5. SS-05		0945	S	—					X												
6. SEEP-01		1005	W	HCl	3	40ml			X												
7. SEEP-02		1015	W	HCl					X												
8.																					
9.																					
10.																					

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

SAMPLE RECEIPT	LABORATORY NET	TURNAROUND TIME	SPECIAL INSTRUCTIONS / ADDITIONAL COMMENTS
TOTAL # CONTAINERS	SHIPPING I.D. / AIRBILL #	☐ 8 HOUR	Water samples to contain debris. Please pre-filter if possible
CONDITION OF CONTAINERS	CARRIER	☐ 24 HOUR	
CONDITION OF SEALS	DOT DESIGNATION	☒ WEEK	
		☐ 2 WEEK (standard)	
		☐ OTHER _____	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
1.	8/3/95	1200	1. / NET	8/4/95	0940
2.			2.		
3.			3.		

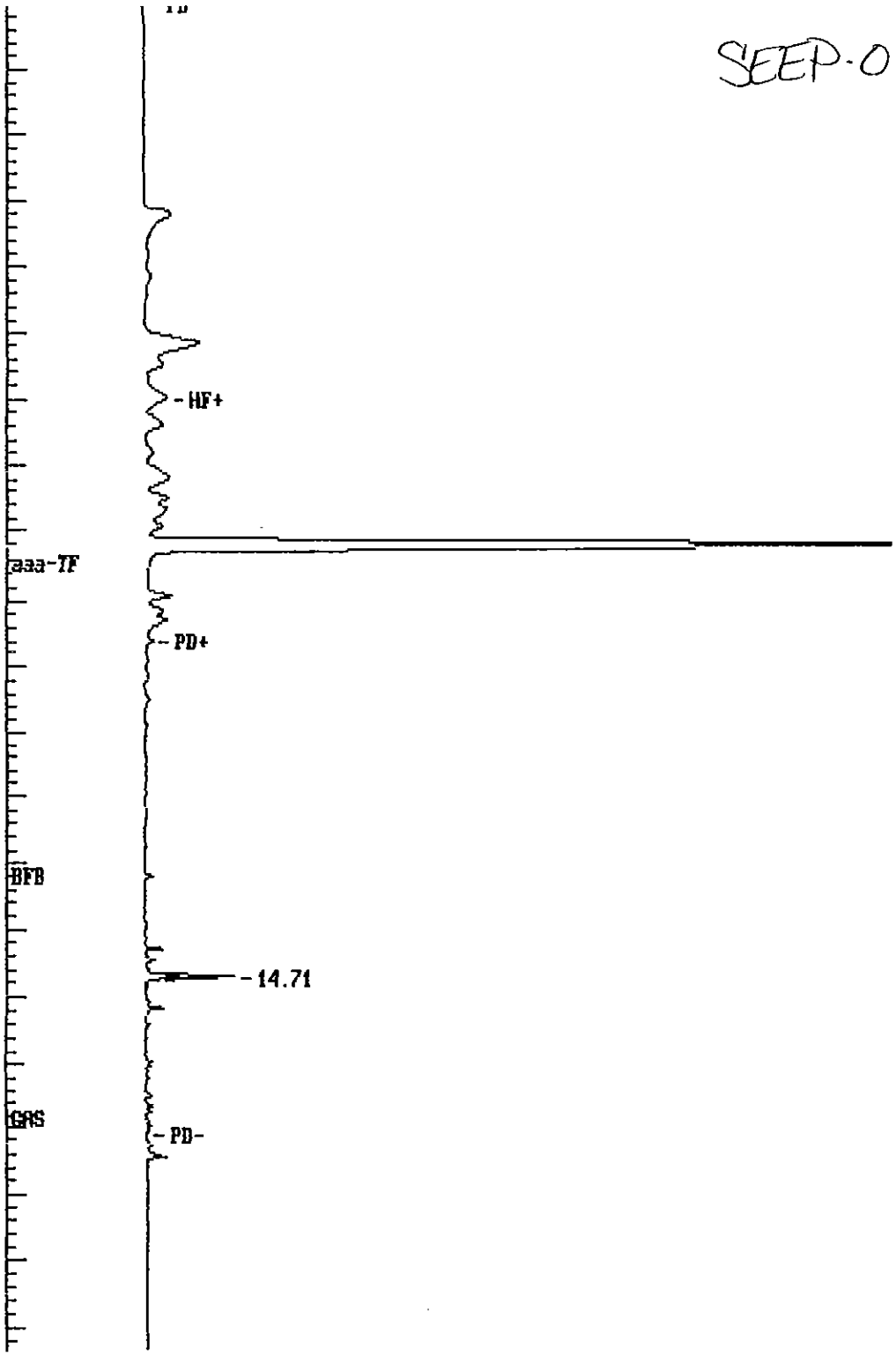
PAGE _____ OF _____

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

DISTRIBUTION: White, Yellow - Laboratory, Pink - Originator

Data File = I:\AU09F26.PTS Printed on 08-10-1995 at 14:04:44
Start time: 0.00 min. Stop time: 20.30 min. Offset: 0 cts
Full Range: 90 K-Counts

SEEP-01



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Start time: 0.00 min. Stop time: 19.00 min. Offset: -5 K-cts
Full Range: 90 K-Counts

SEEP-01