AGI
TECHNOLOGIES

Contamination Assessment
Russell's Landing
Orcas, Washington

November 11, 1994

Prepared For :

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AGI Project No. 15,676.001

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TECHNOLOGIES

A Report Prepared For :

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CONTAMINATION ASSESSMENT
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ORCAS, WASHINGTON

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1.0 INTRODUCTION

1.1 GENERAL

This report presents AGI Technologies' (AGI), formerly Applied Geotechnology Inc., contamination assessment for Russell's Landing (the site) located in Orcas, Washington. AGI was retained by the site owner, Ms. Margaret Russell, to plan, monitor, and document independent remedial action associated with cleanup of petroleum hydrocarbon contamination at the site. This contamination assessment report describes AGI's understanding of site contamination, cleanup activities performed, and AGI's conclusions and recommendations with regard to protection of environmental quality following cleanup activities completed in October 1994.

Post-cleanup field inspections and sampling were conducted for any remaining contaminated upland soils. Laboratory results of these investigations are reported in **Appendices A and E.** AGI also conducted sampling and analysis of marine sediments in the tidelands area. The results of the marine sediment investigation are reported in **Appendix D.**

1.2 PURPOSE AND SCOPE

1.2.1 Purpose

The purpose of this contamination assessment is to document the independent remedial action and support application to the Washington Department of Ecology (Ecology) for a letter acknowledging that no further action is required at the site under the Model Toxics Control Act (MTCA) RCW 70.1050 and Cleanup Regulations, Chapter 173-340-700 Washington Administrative Code (WAC).

1.2.2 Scope

AGI's scope of services for contamination assessment included the following tasks:

- Coordinate cleanup activity plans with Ecology, the site owner, and cleanup contractors.
- Observe contaminated soil excavation and collect soil samples for chemical analysis.
- Submit selected soil samples for chemical analysis to document that contamination was adequately removed, or to characterize contamination.
- Submit marine sediment samples for bioassay testing and document results.
- Provide guidance for treatment of excavated contaminated soil.
- Prepare this contamination assessment report, including a sediment sampling and analysis report (**Appendix D**).

1.3 REGULATORY GUIDANCE

AGI referenced Ecology's March 9, 1994 *Guidance on Preparing Independent Remedial Action Reports Under the Model Toxics Control Act, Chapter 70.105D RCW* (guidance document). The guidance document lists information which is required for all independent remedial action reports. An index of the required information with cross references to applicable sections of this report is provided on **Table 1**.

2.0 BACKGROUND

2.1 SITE DESCRIPTION

2.1.1 *Location*

The approximately 1-1/3-acre site is located on Orcas Island at the approximate location indicated on **Figure 1.** More specifically, the site is on the City of Orcas waterfront immediately west of the Washington State Ferry dock. The site location and layout with respect to the ferry dock is shown in greater detail on **Figure 2.** Site specific information requested in the independent remedial action reports guidance document is presented below.

- Site Name: Russell's Landing
- Street Address: #1 Waterfront Street Orcas, Washington 98275 San Juan County
- Phone Number: (206) 376-4389

2.1.2 *Site Features*

The site is rectangular in shape as indicated on **Figure 2.** Horseshoe Highway borders the site on the north, and Harney Channel of the Puget Sound borders it on the south. The ground surface slopes sharply down from Horseshoe Highway and flattens out into a bench of fill above the water level, which extends the length of the site along the waterfront, as indicated on **Figure 2.** The elevation of the site ranges from approximately 10 to 35 feet above mean sea level.

An office building and store are located on the east end of the site, a wood dock extends seaward from the center, and an aboveground tank farm is on the west end. A truck rack area with fuel transfer pumps is located approximately at the center of the site. Aboveground fuel piping extends from the pumps and truck rack to the tanks. A concrete-paved driveway extends from the northeast corner to the wood dock.

A gravel parking lot is located near the northwest corner, uphill of the tanks. An electrical utility vault is located immediately southeast of the parking lot and is served by a buried electrical power cable from Shaw Island, located across Harney Channel to the south. The cable is a major electrical service link for Orcas Island. The cable traverses the southern perimeter of the parking lot, and is buried at a depth of approximately 36 inches.

The buildings are wood-frame structures which extend out over the water from the bench. The buildings are primarily supported on pile foundations, but are partially supported by shallow foundations where the buildings meet the bench. The ground surface under the buildings is covered by 5-foot-thick rip-rap layer and slopes down to the water under the buildings.

The wood dock is also primarily supported on pile foundations, although a concrete bulkhead provides support where the dock meets the bench. A concrete bulkhead retaining wall extends from the west side of the dock to 8 feet from the west side of the office building, and retains soil which forms the bench. A small storage building adjoins the dock immediately to the west.

The aboveground tank farm includes six upright cylindrical fuel storage tanks founded on a concrete slab which mantles an exposed bedrock outcrop. A concrete wall extends around the west and south sides of the tank farm.

The truck rack is a concrete-paved deck where fuel is transferred from the storage tanks to tank-trucks. Prior to the cleanup, pumps were located in a gravel-surfaced area immediately west of the truck rack. The truck rack is drained by a catch basin and oil/water separator. The pumps are now located on a concrete platform.

Utilities on or near the site include buried electrical lines in the parking lot, an East Sound Water and Sewer Authority 4-inch-diameter PVC water treatment discharge pipe which crosses the site from the northeast corner to the east side of the concrete bulkhead, and a septic tank located under the patio area.

For the purpose of discussion, the site comprises an upland and tideland area. The upland includes site areas above the water surface, roughly defined by the base of the concrete bulkhead.

2.1.3 *Geology and Hydrogeology*

A regional geologic map[1] shows the area around the site to be underlain by Mesozoic Era rock of the Constitution Formation, which consists of massive siltstones and shale, highly deformed locally, and contains subordinate graywacke sandstone, tuff, basalt, and chert. Bedrock is visible as an outcrop on the west end of the site, and at locations uphill of the site north of Horseshoe Highway. Bedrock exhibits low permeability when it is not weathered or fractured.

Fill and native silt soils cover the bedrock in varying thicknesses. Fill has been placed north of the dock below and to the north of the concrete bulkhead to create level areas along the waterfront. Native silt fills depressions and mantles flatter areas on the rock surface.

A regional hydrogeologic report (Russell, 1975) indicates that groundwater near the town of Orcas occurs in fractured sections of bedrock at various depths ranging from 6 to 500 feet below ground surface (bgs). Groundwater at the site is present only in limited zones, where it is perched in depressions on the surface of the bedrock. A dug well is located on the slope north of the truck rack. The well depth measures approximately 16 feet from ground surface. According to the site owner, the well is not used. Based on our understanding of local subsurface conditions, the well is charged by perched water migrating along the surface of bedrock from elevated areas north of the site down toward the waterfront.

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[1] Russell, R.H. 1975. Geology and Water Resources of the San Juan Islands, San Juan County, Washington. State of Washington Water Supply Bulletin No. 46.

2.2 RELEASE INFORMATION AND SITE CHARACTERIZATION

The independent cleanup action was undertaken in order to facilitate sale of the property, and not in response to any recent or discrete release. No exhaustive history of the site was conducted, and no complete history of releases or potential releases was compiled. This is not a release report pursuant to WAC 173-340-120(2)(a).

2.2.1 *Type of Facility*

This property has been used for petroleum storage and handling for over 50 years. Petroleum products stored at the site included unleaded and leaded gasoline, diesel fuel, stove oil, and kerosene. Fuel has been transferred to tank-trucks for off-site delivery, dispensed into containers or vehicles at the truck rack, and dispensed into containers or boat tanks from the dock.

2.2.2 *Releases*

Releases in or around the pumps, piping system and dispensers may have occurred throughout the property's long history of use for petroleum storage and handling. Incidental releases associated with motor vehicles on or near the site or on the parking lot are not documented. The parking lot is frequently used by the public and incidental releases may have occurred in association with parked vehicles.

2.2.3 *Contaminants of Concern*

Based on current and past practices on site, contaminants of concern include petroleum hydrocarbons in gasoline, diesel, and motor oil ranges. Petroleum hydrocarbons in these ranges comprise a broad spectrum of specific hydrocarbon compounds.

2.2.4 *Extent of Contamination*

The extent of petroleum contamination is described in Section 3.1.3. Diesel concentration exceeded Method A cleanup levels for soil, which resulted in independent cleanup action and bioassay testing of marine sediments. Groundwater contamination was not a concern.

2.2.5 *Threatened Species or Environments*

Marine sediment bioassay testing was required by Ecology to evaluate potential impacts. The results of testing indicate contamination is below treatment levels established by Ecology for marine sediments. Refer to Section 4.1.2 for further discussion.

2.2.6 *Threats To Public Health*

Under current use, there are no known potential threats to public health from the releases.

2.2.7 *Previous Investigations and Reports*

GeoEngineers' January 31, 1990 Investigative Report. GeoEngineers concluded that soil was present in the gravel parking lot and in the pump area near the truck rack.

GeoEngineers July 19, 1990 Remedial Action Report. GeoEngineers removed approximately 2 to 3 cubic yards of contaminated soil from the pump area near the truck rack. Petroleum contaminated soil remained at the limits of excavation at concentrations between 530 and 12,000 parts per million (ppm) determined in accordance with EPA Method 418.1.

2.3 CLEANUP PLANNING

2.3.1 *Cleanup Standards*

MTCA provides guidelines for establishing risk-based cleanup levels for hazardous and solid-waste contaminated sites. Under MTCA, risk-based cleanup levels are defined as those contaminant concentrations that pose no unacceptable site-specific risk or hazard to exposed populations. MTCA provides three options, termed Methods A, B, and C, to establish site-specific cleanup levels at contaminated sites.

- Method A provides a simplified approach to establish cleanup levels for routine cleanup actions at small sites. Method A cleanup is designed to be conservative, particularly for total petroleum hydrocarbon (TPH) cleanup levels, providing cleanup levels that may not be any more protective of human health than cleanup levels estimated under Methods B or C.

- Method B is the standard method used to establish cleanup levels for groundwater, surface water, soil, and air, and is applicable to all sites. This method requires calculation of risk-based cleanup levels using either the risk equations and parameters listed in the regulations or procedures established under potentially applicable federal laws.

  Method B risk-based concentrations have been previously calculated by Ecology and are presented in its November 1993 *Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC II) Update*. These unapportioned risk-based values represent contaminant concentrations that would result in an individual cancer risk of 1×10^{-6} or a hazard quotient of 1.0.

- Method C is used to establish cleanup levels for specific sites when cleanup levels established by Methods A or B are technically infeasible to achieve, would result in more environmental harm than good, or are lower than background levels. This method does not apply at this site.

Method A cleanup standards appear to be the most appropriate for the site. This is because the limits of contamination are relatively well defined by geologic and manmade features, and contamination can be routinely excavated. Method A cleanup levels for TPH compounds in soil are listed in **Table 2**.

2.3.2 *Limited Supplemental Investigation*

AGI performed a limited supplemental investigation to assess the extent of contamination toward the buildings by hand augering a boring in the patio area north of the office on February 15, 1994. The boring extended to a depth of only 2 feet bgs before encountering refusal. A soil sample was collected at 2 feet bgs for chemical analysis of TPH compounds by EPA Method 8015 Modified. Soil was placed into a laboratory-cleaned 8-ounce jar and sealed with a Teflon-lined lid. The jar was placed into a cooler chilled with Blue Ice and transported to the laboratory following proper chain-of-custody procedures. Analytical results indicated the presence of both gasoline- and diesel-range hydrocarbons below Method A state soil cleanup levels. A copy of the laboratory report and the chain-of-custody is included in **Appendix A.**

2.3.3 *Approach*

AGI's approach to remediate the site was presented in our March 31, 1994 *Work Plan, Remedial Action*. This Work Plan addressed comments and recommendations made by Ecology in a March 2, 1994 meeting. The Work Plan was developed based on information provided in reports by GeoEngineers and AGI's Limited Supplemental Investigation. It appeared contamination conditions at the site could be addressed by routine excavation and off-site treatment. The limits of excavation were defined by physical barriers, such as bedrock and buildings. Potential impact of contamination to groundwater appeared unlikely because of the relatively shallow bedrock, which would serve as a barrier to vertical migration.

3.0 CLEANUP ACTIVITIES

3.1 EXCAVATION

3.1.1 Soil Excavation

Soil excavation was performed by Island Excavation between June 8 and 15, 1994. An AGI representative was on site to monitor the work. Soil excavation began on the northwest side of the storage building; extended to the north, south, and east; and terminated either in exposed bedrock, beach deposits, clean soil, or in areas where further excavation would jeopardize the office building. The limits of the excavation are shown on **Figure 3**.

Three types of material were encountered during excavation at the site. The location and description of each material type is provided below:

- *Bedrock*: Bedrock, as described in Section 2.1.3, was exposed at the west end of the site prior to excavation, and encountered at depth in the western half of the excavation and along the western third of the north sidewall during excavation. The approximate area of bedrock exposed during excavation is shown on **Figure 3.** Photographs of exposed bedrock are shown on **Figure 4**.

- *Fill*: In accordance with the Unified Soil Classification System (USCS), soils comprising Fill are described as a mixture of sandy silt, silty sand, gravel, and gravelly sand. The Fill is medium stiff or medium dense. The bottom of Fill varied between depths of 1 and 10 feet bgs across the site. Fill is underlain by bedrock on roughly the western half of the site. A layer of native soil is present between the Fill and bedrock on the eastern half of the site.

- *Silt*: Native soil underlying Fill on the eastern half of the site is classified per the USCS as medium stiff to stiff nonelastic silt.

All excavated soil (approximately 920 cubic yards) was trucked to the San Juan County Landfill and placed into two treatment cells to be remediated by Solid Phase techniques.

3.1.2 Test Pit Excavations

Contaminated soil was encountered during GeoEngineers' subsurface contamination study in the gravel parking lot located south of Horseshoe Highway, at the northwest end of the site. AGI performed further subsurface investigation in the gravel parking lot by observing the excavation of two test pits (TP1 and TP2). TP1 was excavated through Fill to 2.2 feet bgs and terminated on bedrock. TP2 was excavated through Fill to 4 feet bgs and terminated on bedrock. Location of the test pits are shown on **Figure 3**; test pit logs are presented in **Appendix B**.

3.1.3 Contamination Observations

AGI's visual observations indicated that contamination at the site appeared to originate primarily from the pump and truck rack areas. Contamination appeared to migrate from these areas in the fill soils to the west, south, and southeast, and slightly to the north.

Soil containing petroleum contamination was identified during excavation activities by visual observation of staining and by field screening techniques. Exposed and excavated soils were field screened for VOCs with an organic vapor meter equipped with a photoionization detector (OVM-PID). Each sample was placed into a clean, resealable plastic bag and disaggregated. After several minutes, an OVM-PID probe was inserted through a small opening in the bag. The concentration of maximum organic vapor in the headspace above the soil sample was measured in ppm and recorded. This is not a chemical-specific analysis and is affected by, among other influences, climate (e.g., temperature and humidity), soil type and conditions, instrument calibration, and operation, and type of contaminant being assessed. The intent of this field analysis is to qualitatively compare samples and assist in sample selection for chemical analysis and to direct excavation of soil containing VOCs.

Field observations indicated contaminated soil with moderate to high levels of VOCs was present in all fill soils removed from the site. Field observations indicated that contamination in fill soils attenuated with depth south of the truck rack from 7 to 10 feet bgs by the office, as shown on the photo in **Figure 4**. The extent of contamination was evaluated based on petroleum discoloration of soil and VOC indications from field screening.

After removal of soil to the southern limits of the excavation, it appeared discolored soil containing moderate to high levels of VOCs extended into the tideland area and under the office building. No groundwater was encountered during excavation activities; however, rain water runoff entered into the excavation during the weekend on June 13, 1994.

Soil encountered in test pits had no discoloration and showed very low indication of VOCs.

3.2 SAMPLING

3.2.1 Sample Locations

Sample locations were controlled by presence of bedrock, the results of field screening, and our judgement of representative conditions. Bedrock was exposed over a large portion of the excavation, and soil samples could not be obtained. Where necessary due to surface texture of the bedrock, contaminated soil was removed with a hand shovel. Field screening was used to monitor contaminated soil removal, and soil samples were collected when it appeared the excavation exposed clean sides or bottom. Samples collected in exposed soil at the limits of the excavation were collected in areas which had the highest field screening indication of VOCs.

One soil sample was collected at the base of each test pit excavated in the gravel parking lot.

Sampling locations are shown on **Figure 3** and depth of samples below ground surface are shown in **Table 2**.

3.2.2 *Sampling Procedures*

Soil samples collected for laboratory chemical analysis were collected using a clean stainless steel spoon, and the composite sample was placed in a clean stainless steel bowl for mixing. Soil samples were collected as excavation proceeded between June 9 and 11, 1994 and on June 14 and 15, 1994. Soil was placed into laboratory-cleaned 4- to 8-ounce jars and sealed with a Teflon-lined lid. An AGI custody seal was placed across the lid. Each sample container was labeled with the following information:

- Project name
- Project number
- Sample identification number
- Date and time of collection

The sample jars were placed into a cooler chilled with Blue Ice and transported to the laboratory following proper chain-of-custody procedures.

3.3 CHEMICAL ANALYSIS

3.3.1 *Analytical Methods*

Soil samples were first analyzed for TPH compounds by Washington State Method WTPH-HCID. This analysis determined if TPH compounds were detected greater than 20 ppm in the gasoline range, 50 ppm in the diesel range, and 100 ppm in the heavy-oil range. If TPH compounds were detected by WTPH-HCID, then the sample was analyzed by the appropriate TPH analysis as follows:

- *Gasoline Range*: Analysis for TPH quantified as gasoline by Washington State Method WTPH-G and analysis for benzene, ethylbenzene, toluene and total xylenes (BETX) by EPA Method 8020.

- *Diesel to Heavy Oil Range*: Analysis for TPH quantified as diesel to heavy oil by Washington State Method WTPH-D extended to include heavy oil compounds.

3.3.2 *Analytical Results*

Analytical results, presented in **Table 2** and on **Figure 5**, indicate that all soil above Method A state soil cleanup levels has been removed from the site except below the office building. Copies of the laboratory reports, chain-of-custody forms, and AGI's Quality Assurance Reports for all samples are included in **Appendix C.**

4.0 CLEANUP STATUS

4.1 REMAINING CONTAMINATION

4.1.1 Upland

AGI performed an investigation to evaluate remaining contamination beneath the office building and in the gravel parking lot, the results of which are presented in **Appendix** E. The investigation involved observation of soil conditions under the building after excavation of a trench which exposed contaminated soil, and collection of a composite soil sample from the gravel parking lot for chemical analysis.

We estimated less than 65 cubic yards of contaminated soil upland of marine sediments remains under the building. This is based on our interpretation of the limits of contamination from visual observations and headspace screening of soil exposed in the trench.

The composite soil sample from the gravel parking lot comprises three discrete soil samples at locations indicated on **Figure 3**. The sample was submitted for chemical analysis in accordance with WTPH-D extended. Analytical results indicate diesel and motor oil concentrations of 85 and 180 ppm, respectively. Contamination in parking lot soil is likely due to incidental release from vehicles. No evidence of a contamination source was identified; therefore, the composite sample seems more representative of parking lot soil than previous test pit samples (the laboratory results are included in **Appendix** E).

BETX and TPH concentrations remaining in soil in the upland areas above the Method A state soil cleanup levels are shown on **Figure 5**.

4.1.2 Tideland

Soil extending beyond the southern limits of the excavation onto the tidelands showed concentrations of TPH above Method A soil cleanup levels. AGI conducted field screening of sediments to determine the extent of contamination and collected samples for laboratory analysis at the expected limits of contamination in the beach area. Analytical results, included in the laboratory reports in **Appendix B**, showed no detection of TPH compounds when analyzed by Washington State Method WTPH-HCID at an average distance of 20 feet south of the limits of excavation by the dock and 35 feet south of the storage building. The tideland area was subject to biological toxicity testing as part of a related study, which addressed impacts of upland contamination sources on the tideland. The results of this study are documented in **Appendix D**.

4.2 SOLID PHASE TREATMENT

4.2.1 Treatment Cell Location And Construction

A treatment cell was constructed at the San Juan County Landfill on Orcas Island prior to excavation activities at the site. The location of the San Juan County Landfill is shown on **Figure 1**. Island Excavation graded an area approximately 60 feet wide by 90 feet long on the landfill for a treatment cell. The cell was surrounded by hay bails and lined with 10-millimeter-thick plastic sheeting to

prevent run-on and run-off of rain water. A second cell was constructed at the landfill to handle the larger volume of soil than anticipated that was removed from the site. The second cell dimensions were 60 feet wide and 110 feet in length. The second cell was constructed in the same manner as the first, except that 6 inches of sand was placed after grading because of exposure of debris from the landfill. Approximately 920 cubic yards of soil was placed into the two treatment cells. The first cell contains approximately 410 cubic yards and the second cell approximately 510 cubic yards. Both cells have an average thickness of 2 feet of soil.

4.2.2 Background Soil Analysis

Prior to placing plastic on the graded area for the first treatment cell, two 5-point composite soil samples were collected from in-place soil to assess existing soil conditions and establish a baseline for comparison following treatment. Samples were collected by the same procedures described in Section 3.2.2. Both of these samples (BG-TC #1 and BG-TC #2) were analyzed for TPH by Washington State Method WTPH-HCID. Diesel was detected in Sample BG-TC #2, which was subsequently analyzed for TPH quantified as diesel by WTPH-D. Analytical results, presented in **Table 3**, indicated the presence of TPH in the diesel range below the Method A soil cleanup level for sample BG-TC #2.

4.2.3 Treatment Method

Solid phase treatment is a method to remediate soils which contain hydrocarbon compounds. Solid phase treatment relies on a combination of volatilization and biodegradation of hydrocarbon compounds. Some volatilization occurs when the soil is excavated and placed onto the treatment cell; however, most occurs during tilling after the soil has been placed in the cell. Biodegradation occurs due to microorganisms in the soil which consume the hydrocarbons. Biodegradation can be enhanced by adding nutrients and keeping the soil at an optimum moisture. The degree to which any of these processes contributes to the treatment depends on the type of hydrocarbon present. Generally, the lighter or more volatile hydrocarbons are affected by volatilization. The heavier, less volatile hydrocarbons are affected more from biodegradation. Volatilization occurs at a more rapid rate than biodegradation.

Treatment consisted of tilling the upper foot of soil to promote volatilization and provide sufficient oxygen for optimal bacterial degradation activity. Moisture and nutrients were added to enhance biodegradation.

4.2.4 Initial Concentrations of Soil

Three 5-point composite soil samples were collected from soil the first cell and two 5-point composite soil samples were collected from the second cell. Samples were collected by the same procedures stated in Section 3.2.2. One of these samples was analyzed for TPH by Washington State Method WTPH-HCID to determine the range of hydrocarbon compounds present. Analytical results indicated the presence of TPH compounds in the gasoline, diesel, and heavy oil ranges. Based on this result, all five samples were analyzed for all TPH compounds by Washington State Methods WTPH-G and WTPH-D extended to include heavy oil, and for BETX by EPA Method 8020. Results, presented in **Table 3**, indicated all samples showed TPH concentrations above Method A soil cleanup levels. None of the five samples showed BETX concentrations above Method A soil cleanup levels.

4.2.5 *Treatment Results*

The soil was treated in a total of three layers. Four composite soil samples were collected from each layer after approximately 2 weeks of tilling per layer. The results of chemical analysis were presented in letters dated October 3 and 31, 1994, and are summarized in **Table 4**. The analytical results indicate soil was substantially treated to Class 2 levels, with the remainder less than Class 3 levels.

4.2.6 *End Use*

Guidance for completing cleanup after conducting a site assessment investigation is outlined in Ecology's *Guidance for Remediation of Releases from Underground Storage Tanks*. This document was initiated under Chapter 173-360 WAC, Underground Storage Tank Regulations, to assist tank owners with different options for end use of contaminated soil. Ecology uses this document and appropriate MTCA requirements to evaluate independent cleanups. This document describes petroleum contaminated soils in four separate classes based on contaminant concentrations, and discusses different options for their end uses. The four separate classes and recommended end uses are discussed in the following paragraphs.

Class 1 soils are treated or untreated soils that contain residual concentrations of petroleum compounds at or below the analytical detection limits. Soil that meets this criteria can be used for any purpose.

Class 2 soils are treated or untreated soils that contain detectable levels of petroleum compounds below the MTCA Method A cleanup standards of 100 ppm for gasoline and 200 ppm for diesel and heavier fuel hydrocarbon compounds. Soil that meets this criteria may be placed as fill in any area, but it is recommended that it not be used as topsoil or as fill near wetlands, surface water, groundwater, drinking water wells, or utility trenches.

Class 3 soils are treated or untreated soils that contain concentrations above Method A cleanup standards, but are below 250 ppm for gasoline, 500 ppm for diesel, and 2,000 ppm for heavier fuel hydrocarbon compounds. It is recommended that soils which meet this criteria be treated further or disposed of at the original site, be used for road construction, placed in a permitted municipal landfill, or placed at another site which will then be permitted as a new solid waste disposal area. This approach can present some risk since regulations may become more stringent in the future.

Class 4 soils are treated or untreated soils with residual hydrocarbon compound concentrations above the Class 3 levels. Soils that meet this criteria should either be retreated, landfilled in a permitted municipal landfill, or left on site. If Class 3 or 4 soils are left on site, the site will need to be permitted as a new solid waste disposal area.

San Juan County accepted the soil in its landfill after treatment. The soil was graded in preparation for placement of a cap to cover the landfill.

4.3 INSTITUTIONAL CONTROLS

(Reserved)

4.4 SITE RESTORATION

Following the cleanup, the site was restored and operations resumed. A new concrete slab driveway, curbs, and retaining walls were installed. The pumps were replaced on a new concrete slab, and a new oil/water separator was installed.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

5.1.1 *Cleanup Summary*

Approximately 920 cubic yards of petroleum contaminated soil was excavated around and below fuel pumps and a truck rack at the site. The excavation extended vertically to bedrock or clean soil, and horizontally to clean soil or to the concrete bulkhead and office building, where contaminated soil exceeding Method A cleanup levels was left in place. The contaminated soil was transported to the San Juan County Landfill and is stockpiled for treatment before placement in the landfill per SJCHD requirements.

Contaminated soil in the gravel parking lot was not removed. Although areas where petroleum products may have dripped from vehicles could have hydrocarbon levels above the Method A cleanup level, the parking lot soils generally appear to be below the Method A cleanup level.

5.1.2 *Environmental Quality*

In our opinion, contaminated soil which remains beneath the building and potentially in the gravel parking lot does not pose an immediate threat to human health. Human health is not at risk because low permeability bedrock separates the contaminated soil from groundwater. Further, groundwater is not used as a drinking water supply on or near the site. Contaminated soil is present in tideland sediment and was the subject of a separate study which determined that contamination was below treatment levels established by Ecology for marine sediments.

5.2 RECOMMENDATIONS

We recommend that remaining soil above Method A cleanup levels be removed beneath the building when the building is removed.

DISTRIBUTION

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2 Copies	Skellenger, Bender, Mathias & Bender 1301 5th Avenue Suite 3401 Seattle, Washington 98101-2605 Attention: Ms. Christine Lamson
1 Copy	Department of Natural Resources Post Office Box 47027 Olympia, Washington 98504 Attention: Mr. Rick Cardoza

Quality Assurance/Technical Review by:

F&R

Gary Laakso
Remediation Services Manager

DPD/GMB/tag

Table 1
Index to Independent Remedial Action Reporting Requirements
Russell/Orcas Contamination Assessment
Orcas, Washington

Independent Remedial Action Reporting Requirement	Section Name and Number in This Report	Page Number in This Report	Figure, Table, or Plate Number in This Report
1.0 Project Background/Site Description			
1.0.1 Location	2.1.1 Location	3	Figure 1
1.0.2 Topography and Geology			
(A) Site Diagram	2.1.2 Site Features	3 & 4	Figure 2
(B) Site Soil Types	2.1.3 Geology and Hydrogeology	4	Plate A3
	3.1.1 Soil Excavation	8	
1.1 Release Information/Site Characterization			
(A) Release Information	2.2.2 Releases	5	
(B) Identifying Contaminants of Concern	2.2.3 Contaminants of Concern	5	
(C) Areal and Vertical Extent of Contamination	3.1.2 Contamination Observations	8 & 9	Figure 3
(D) Sensitive Environments	2.2.5 Threatened Species/Environments	5	
(E) Known Threats to Public Health	2.2.6 Threats to Public Health	5	
1.2 Previous Investigations	2.2.7 Previous Investigations	6	
1.3 Selection of Cleanup Standards	2.3.1 Cleanup Standards	6	
1.4 Explanation of Remedial Actions Taken	2.3.3 Approach	7	
1.5 Institutional Controls	4.3 Institutional Controls	14	
1.6 Sampling and Analysis			
(A) Field Screening Techniques Used	3.1.2 Contamination Observations	9	
(B) Sampling Procedures	3.2.2 Sampling Procedures	10	
(C) Laboratory Reports	Appendix B		
(D) Sampling Locations Diagram	3.2.1 Sample Locations	8 & 9	Figure 3
(E) Depth of Sampling	3.2.1 Sample Locations	9	Table 2
(F) Approach to Selecting Number and Location of Samples	3.1.2 Contamination Observations	8 & 9	Figure 3
	3.2.1 Sample Locations	9	
(J) Diagram of Residual Concentrations	4.1 Remaining Contamination	11	Figure 5

AGI TECHNOLOGIES

Table 2
Summary of Soil Chemical Analyses
Russell/Orcas Contamination Assessment
Orcas, Washington

Sample I.D.	Sample Depth (ft bgs)	Date Sampled	EPA Test Method				Washington State Test Method					
			BETX 5030/8020				WTPH-HCID			WTPH-G	WTPH-D	
			Benzene	Ethylbenzene	Toluene	Total Xylenes	Gasoline	Diesel	Oil	Gasoline	Diesel	Oil
			mg/kg				mg/kg			mg/kg		
Excavation Samples												
S1	2[a]	06/09/94	<0.56	8.9	0.99	19	D	D	D	2,300	4,900	2700
S2	2	06/09/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S3	3	06/09/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S4	3	06/09/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S5	3[a]	06/09/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S6	2[a]	06/10/94	<0.16	0.79	0.29	3.4	NA	NA	NA	980	1,600	<260
S7	4	06/10/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S8	2	06/11/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S9	8	06/11/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S10	9	06/11/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S11	10	06/15/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S12	10	06/15/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S13	6	06/15/94	0.22	0.65	0.62	1.8	NA	NA	NA	400	180	<47
S14	4	06/15/94	23	69	45	340	NA	NA	NA	5,500	5,500	2,900
S15	4	06/15/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
S16	5 to 7	06/15/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA

AGI TECHNOLOGIES

Table 2
Summary of Soil Chemical Analyses
Russell/Orcas Contamination Assessment
Orcas, Washington

Sample I.D.	Sample Depth (ft bgs)	Date Sampled	EPA Test Method				Washington State Test Method					
			BETX 5030/8020				WTPH-HCID			WTPH-G	WTPH-D	
			Benzene	Ethylbenzene	Toluene	Total Xylenes	Gasoline	Diesel	Oil	Gasoline	Diesel	Oil
			mg/kg				mg/kg			mg/kg		
Test Pit Samples												
TP1 @ 2'	2	06/14/94	NA	NA	NA	NA	D	D	ND	NA [b]	940	300 [c]
TP2 @ 3.8'	3.8	06/14/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
Method Reporting Limit			0.5	0.5	0.5	0.5	20	40	100	5	10	40
State Soil Cleanup Levels [d]			0.5	20	40	20	100	200	200	100	200	200

Notes:

a) Ground surface is the beach elevation south of the concrete bulkhead.
b) Not analyzed by WTPH-G because chromatogram for the WTPH-HCID analysis indicated lighter-end diesel concentrations quantified in the gasoline range.
c) Refer to Case Narrative at the begining of the WTPH-D analysis section in ATI Laboratory Report (ATI I.D. #9406-193).
d) Method A suggested cleanup level for residential soil promulgated under Washington Administrative Code Chapter 173-340, State of Washington Model Toxics Control Act Cleanup Regulation.

ft bgs – Feet below ground surface.
mg/kg – Milligrams per kilogram is equivalent to parts per million.
NA – Not analyzed.
D – Detected at or above method reporting limit.
ND – Not detected.
TPH – Total petroleum hydrocarbons.

AGI TECHNOLOGIES

Table 3
Summary of Soil Chemical Analyses for Treatment Cell Area and Stockpile Soil
Russell/Orcas Contamination Assessment
Orcas, Washington

Sample I.D.	Sample Depth (ft bgs)	Date Sampled	EPA Test Method				Washington State Test Method					
			BETX 5030/8020				WTPH-HCID			WTPH-G	WTPH-D	
			Benzene	Ethylbenzene	Toluene	Total Xylenes	Gasoline	Diesel	Oil	Gasoline	Diesel	Oil
			mg/kg				mg/kg			mg/kg		
BG-TC #1 [a]	0.3	06/07/94	NA	NA	NA	NA	ND	ND	ND	NA	NA	NA
BG-TC #2 [a]	0.3	06/07/94	NA	NA	NA	NA	ND	D	ND	NA	48	NA
SP1 [b]	N/A	06/09/94	0.081	1.4	0.54	7.2	D	D	D	580	1,100	1,100
SP2 [b]	N/A	06/09/94	<0.058	0.22	<0.058	1.6	NA	NA	NA	290	330	180
SP3 [b]	N/A	06/09/94	<0.016	0.92	0.27	9.1	NA	NA	NA	610	2,200	1,900
SP4 [b]	N/A	06/14/94	0.29	2.1	1.6	16	NA	NA	NA	510	1,300	480
SP5 [b]	N/A	06/15/94	0.071	0.22	0.23	3.2	NA	NA	NA	170	210	80
Method Reporting Limit			0.025	0.025	0.025	0.025	20	50	100	5	10	40
State Soil Cleanup Levels [c]			0.5	20.0	40.0	20.0	100	200	200	100	200	200

Notes:

a) Samples collected from in-place soil at San Juan County Landfill prior to visqueen placement for treatment cell.
b) Samples collected from excavated soil placed into treatment cell.
c) Method A suggested cleanup level for residential soil promulgated under Washington Administrative Code Chapter 173-340, State of Washington Model Toxics Control Act Cleanup Regulation.
ft bgs – Feet below ground surface.
mg/kg – Milligrams per kilogram is equivalent to parts per million.
N/A – Not applicable.
NA – Not analyzed.
D – Detected at or above method reporting limit.
ND – Not detected.
TPH – Total petroleum hydrocarbons.

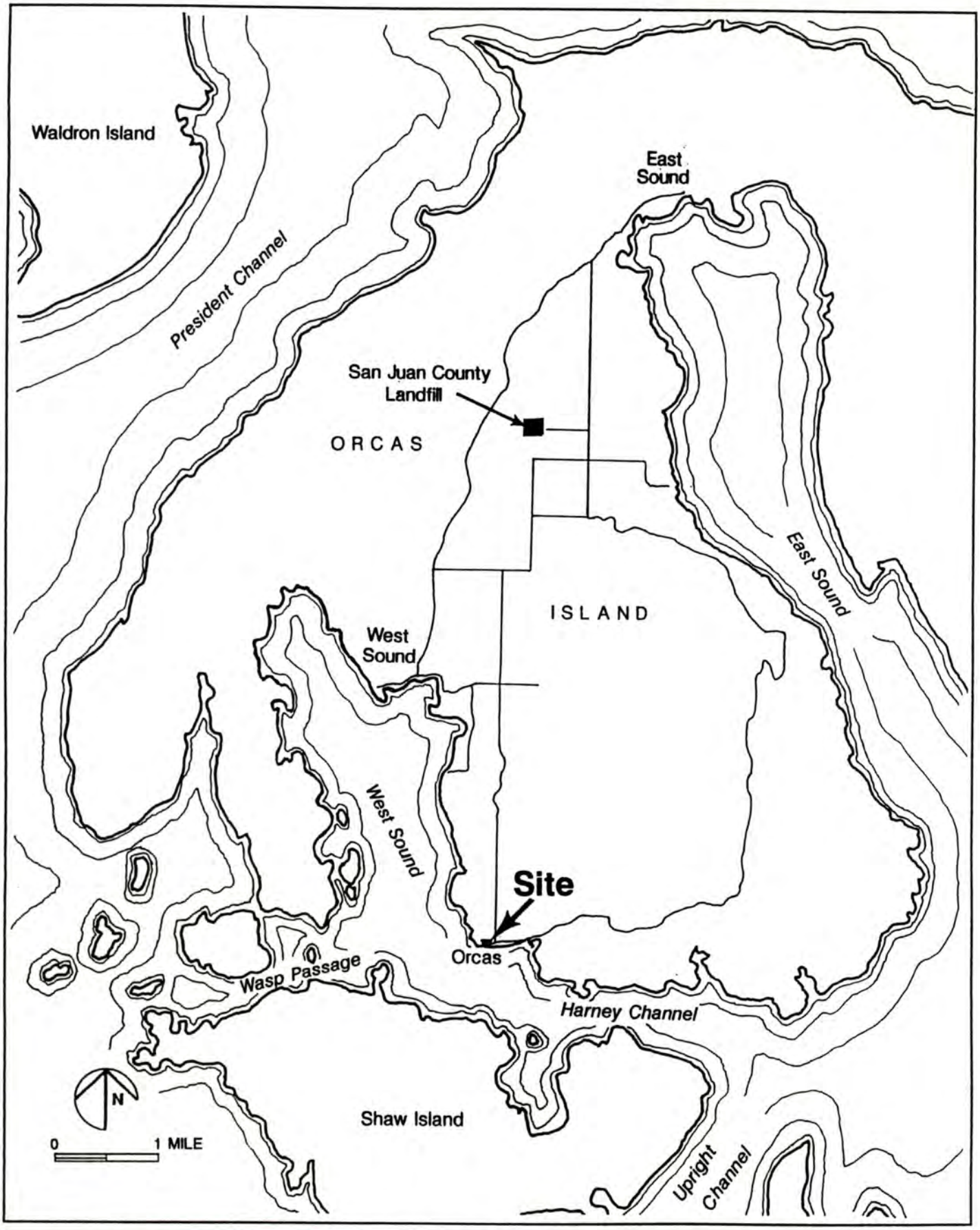
AGI TECHNOLOGIES

Table 4
Analytical Results
Russell/Orcas Contamination Assessment
Orcas Island, Washington

			EPA Test Method				Washington State Test Method		
			BETX – 8020				WTPH–G	WTPH–D	
			Benzene	Ethylbenzene	Toluene	Xylene	Gasoline	Diesel	Motor Oil
Soil Layer	Cell	Sample	mg/kg				mg/kg		
1	North	N.W. Comp.	ND	ND	ND	0.031	ND	59	92
	North	N.E. Comp.	ND	ND	ND	ND	ND	44	53
	South	S.W. Comp.	ND	ND	ND	0.097	ND	190	180
	South	S.E. Comp.	ND	ND	ND	0.079	ND	250	260
2	North	N.W. Comp.	ND	ND	ND	0.048	ND	23	50
	North	N.E. Comp.	ND	ND	ND	0.12	ND	48	56
	South	S.W. Comp.	ND	0.04	0.031	0.18	12	79	220
	South	S.E. Comp.	ND	ND	ND	0.063	ND	23	50
3	North	N.W. Comp.	ND	ND	ND	ND	ND	85	120
	North	N.E. Comp.	ND	ND	ND	ND	ND	97	150
	South	S.W. Comp.	ND	ND	ND	ND	ND	100	150
	South	S.E. Comp.	ND	ND	ND	ND	ND	49	90
Detection Limits			0.025	0.025	0.025	0.025	5	10	40
Criteria									
Class 2			0.5	20	40	20	100	200	200
Class 3			0.5	20	40	20	250	500	2,000

Notes:

mg/kg – Milligrams per kiligram.
ND – Not detected.
TPH – Total petroleum hydrocarbons.



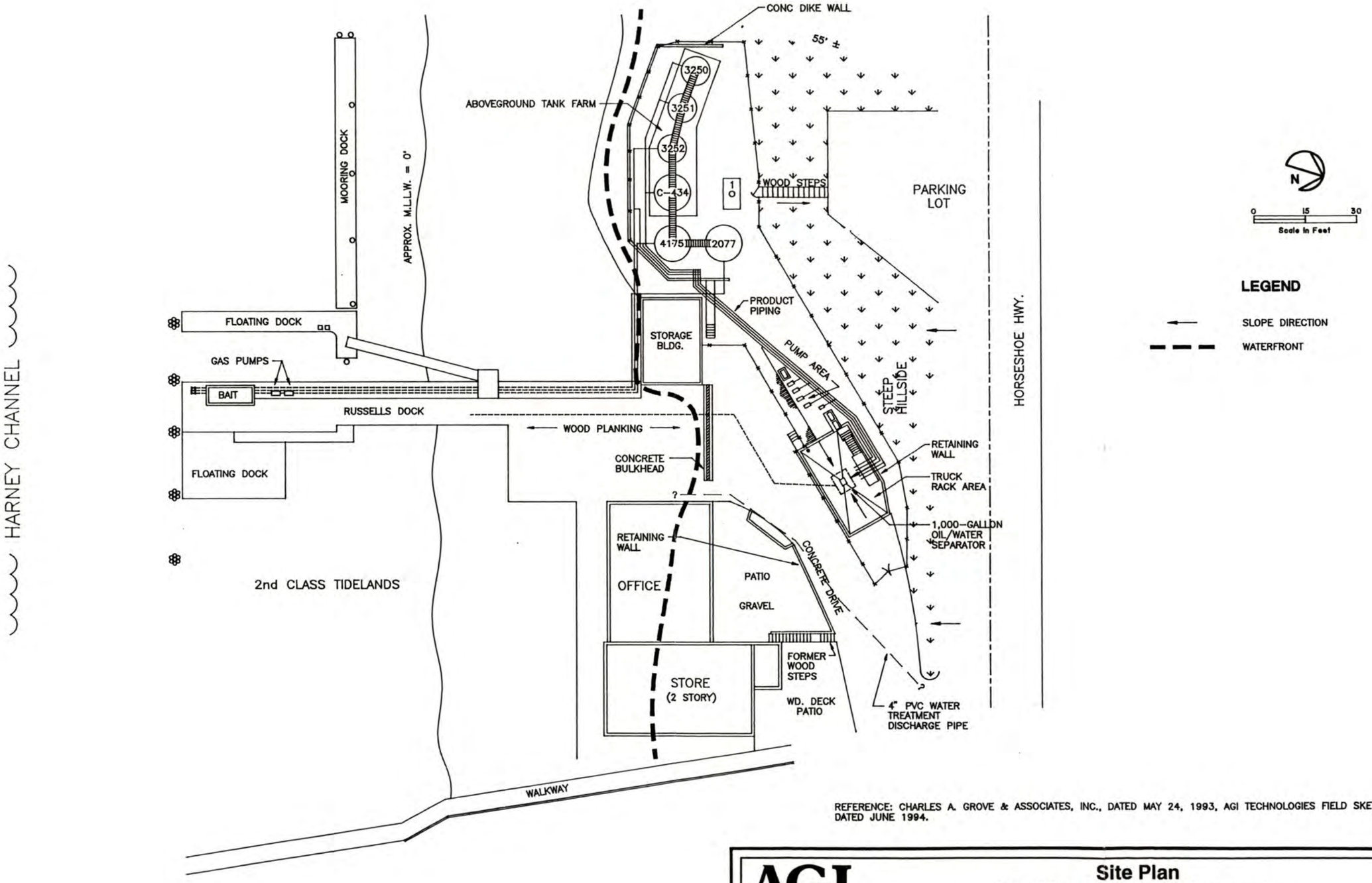
AGI TECHNOLOGIES

Vicinity Map

Russell/Orcas Contamination Assessment
Orcas Island, Washington

FIGURE 1

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
15,676.001	DFF	15 Jul 94			



REFERENCE: CHARLES A. GROVE & ASSOCIATES, INC., DATED MAY 24, 1993, AGI TECHNOLOGIES FIELD SKETCH, DATED JUNE 1994.

AGI TECHNOLOGIES

Site Plan

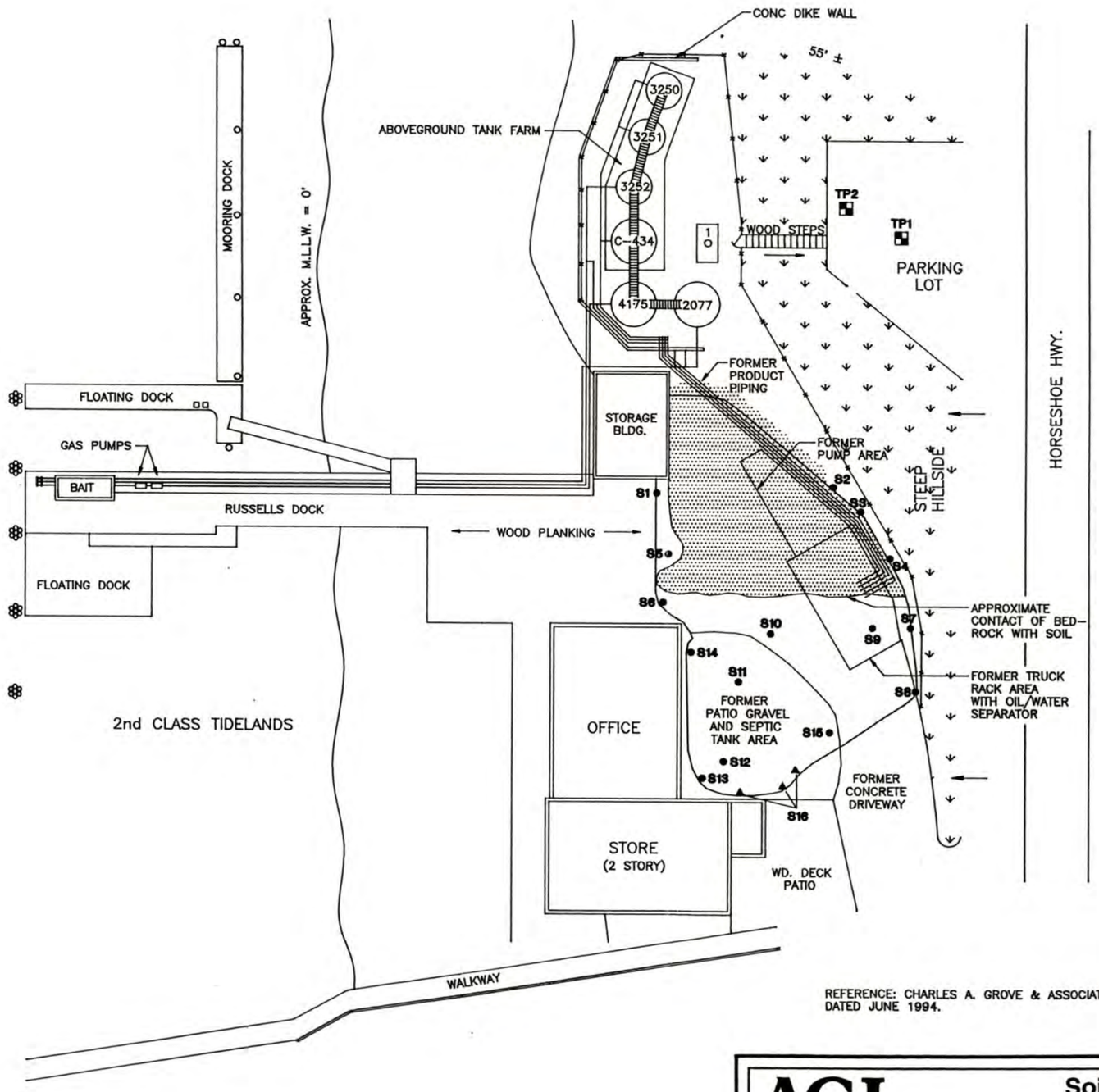
Russell/Orcas Contamination Assessment
Orcas Island, Washington

FIGURE **2**

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
SiteCA.dwg	15,676.001	JFL	17 August 94		

563799

HARNEY CHANNEL



N

0 15 30

Scale in Feet

LEGEND

TP1	TEST PIT NUMBER AND APPROXIMATE LOCATION
S15	DISCRETE SOIL SAMPLE NUMBER AND APPROXIMATE LOCATION
S16	COMPOSITE SOIL SAMPLE NUMBER AND APPROXIMATE LOCATION
	APPROXIMATE LIMITS OF EXCAVATION
	APPROXIMATE AREAS OF EXPOSED BEDROCK
	SLOPE DIRECTION

REFERENCE: CHARLES A. GROVE & ASSOCIATES, INC., DATED MAY 24, 1993, AGI TECHNOLOGIES FIELD SKETCH, DATED JUNE 1994.

AGI TECHNOLOGIES

Soil Sampling Location Map

Russell/Orcas Contamination Assessment
Orcas Island, Washington

FIGURE 3

SoilSamp.dwg	PROJECT NO. 15,676.001	DRAWN JFL	DATE	APPROVED	REVISED	DATE

563799

1. View looking east showing exposed bedrock contact with soil and cross section look at contaminated soil ← (gray soil).

2. View looking west showing exposed bedrock storage building and removed portions of dock on left side of photo. ↓

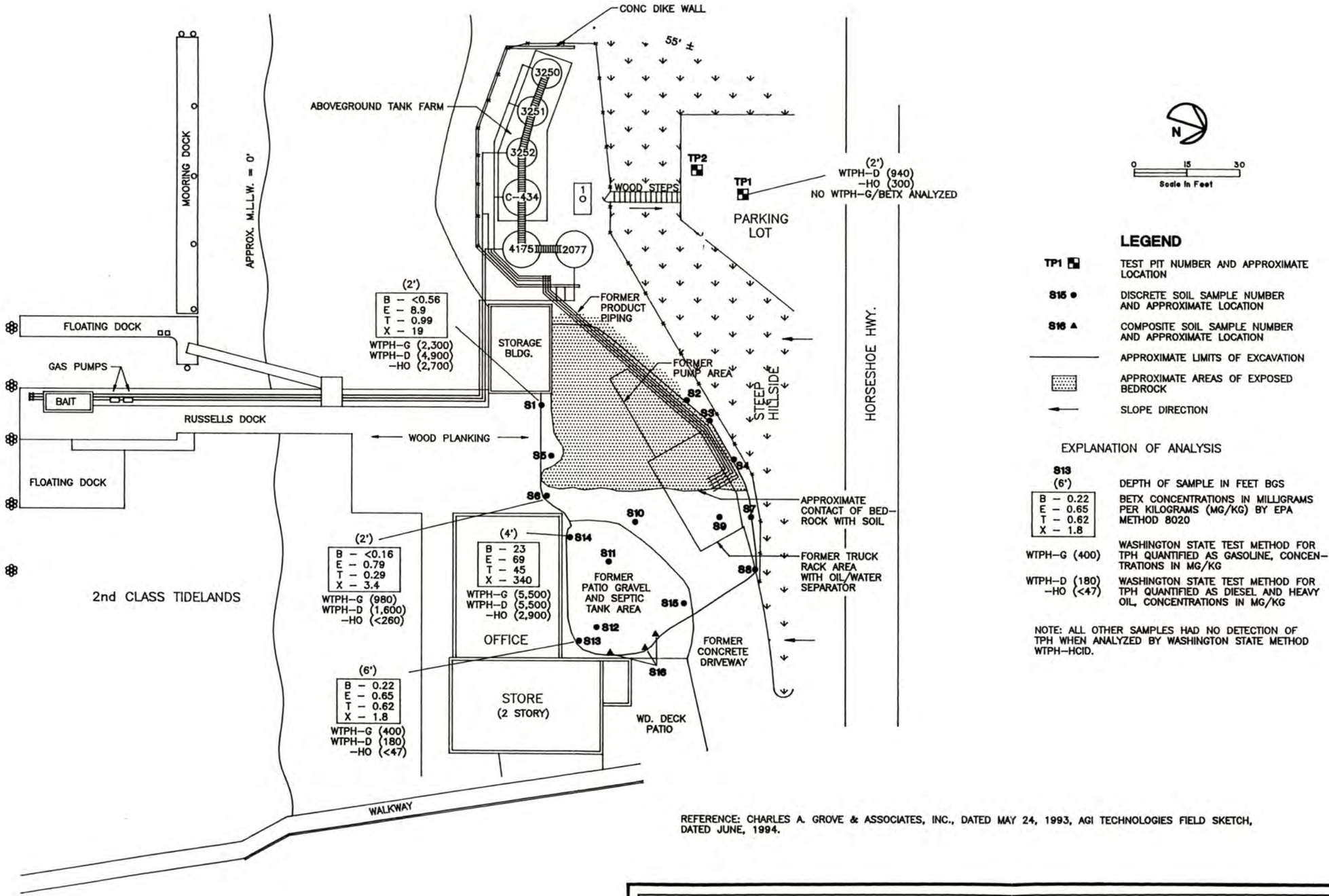
AGI TECHNOLOGIES

Site Photos

Russell/Orcas Contamination Assessment
Orcas, Ohio

FIGURE **4**

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
15,676.001	DFF	15 Jul. 94			



LEGEND

- TP1 ■ — TEST PIT NUMBER AND APPROXIMATE LOCATION
- S15 ● — DISCRETE SOIL SAMPLE NUMBER AND APPROXIMATE LOCATION
- S16 ▲ — COMPOSITE SOIL SAMPLE NUMBER AND APPROXIMATE LOCATION
- APPROXIMATE LIMITS OF EXCAVATION
- APPROXIMATE AREAS OF EXPOSED BEDROCK
- SLOPE DIRECTION

EXPLANATION OF ANALYSIS

- S13 (6') — DEPTH OF SAMPLE IN FEET BGS
- B - 0.22, E - 0.65, T - 0.62, X - 1.8 — BETX CONCENTRATIONS IN MILLIGRAMS PER KILOGRAMS (MG/KG) BY EPA METHOD 8020
- WTPH-G (400) — WASHINGTON STATE TEST METHOD FOR TPH QUANTIFIED AS GASOLINE, CONCENTRATIONS IN MG/KG
- WTPH-D (180) -HO (<47) — WASHINGTON STATE TEST METHOD FOR TPH QUANTIFIED AS DIESEL AND HEAVY OIL, CONCENTRATIONS IN MG/KG

NOTE: ALL OTHER SAMPLES HAD NO DETECTION OF TPH WHEN ANALYZED BY WASHINGTON STATE METHOD WTPH-HCID.

REFERENCE: CHARLES A. GROVE & ASSOCIATES, INC., DATED MAY 24, 1993, AGI TECHNOLOGIES FIELD SKETCH, DATED JUNE, 1994.

AGI TECHNOLOGIES

TPH/BETX Concentration

Russell/Orcas Contamination Assessment
Orcas Island, Washington

FIGURE 5

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
15,676.001	JFL				

TPH.dwg

563799

AGI TECHNOLOGIES

APPENDIX A

Laboratory Data - Limited Supplemental Investigation

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: Russell's Landing/Orcas, WA
Project No.: 15,676.001
Lab Name: Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number: 9402-130
Sample No.: S1
Matrix: Soil

QUALITY ASSURANCE SUMMARY

All data are of known quality and acceptable for use.

ANALYTICAL METHODS

Parameter	Technique	Method
TPH[a]	GC/FID	EPA 8015 Modified
Moisture	Gravimetric	CLP SOW ILM01.0

a - Quantified for gasoline (C_7 - C_{12}) and diesel (C_{12} - C_{24}) range fuel hydrocarbons.

TIMELINESS

Parameter	Date Sampled	Date Extracted	Date Analyzed	Time Until Extraction	Time Until Analysis
TPH	02/15/94	02/17/94	02/19/94	2	4 (14)
Moisture	02/15/94	NA	02/17/94	NA	2 (NA)

NA - Not applicable.
0 - Numbers in parentheses indicate recommended holding times in days.

The sample was extracted and analyzed within the recommended holding time.

FUEL HYDROCARBON CHEMISTRY

EPA 8015M: Both gasoline and diesel range fuel hydrocarbons were detected in sample S1. These reported detections are consistent with the sample chromatogram.

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: Russell's Landing/Orcas, WA
Project No.: 15,676.001
Lab Name: Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number: 9402-130
Sample No.: S1

FIELD QUALITY CONTROL SAMPLES

Field Duplicates: None collected.

Rinsate: None collected.

Trip Blank: None collected.

LAB QUALITY CONTROL SAMPLES

Method Blank: No analytes were detected at or above their method reporting limits (MRLs) by EPA 8015M.

Matrix Spikes: Matrix spike and matrix spike duplicate percent recoveries and relative percent differences (RPDs) are within ATI's control limit criteria for EPA 8015M.

Duplicates: Duplicate sample RPDs are within ATI's control limit criteria for EPA 8015M and CLP SOW ILM01.0.

Blank Spike: Blank spike percent recovery is within ATI's control limit criteria for EPA 8015M.

Surrogates: All surrogate percent recoveries for EPA 8015M are within ATI's control limit criteria.

SIGNATURES

Prepared by Annigta Lin Date 07/18/1994

Checked by Katherine Bourbonais Date 07/19/94

Analytical Technologies, Inc.
560 Naches Avenue, S.W., Suite 101, Renton, WA 98055 (206) 228-8335
Karen L. Mixon, Laboratory Manager

ATI I.D. # 9402-130

February 25, 1994

RECEIVED
MAR - 1 1994
APPLIED GEOTECHNOLOGY INC.

Applied Geotechnology, Inc.
P.O. Box 3885
Bellevue WA 98009

Attention : Jan Deick

Project Number : 15676.001

Project Name : Russell Island @ Orcas

Dear Mr. Deick:

On February 16, 1994, Analytical Technologies, Inc. (ATI), received one sample for analysis. The sample was analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Sincerely,

Victoria L. Bayly
Project Manager

VLB/hal/sb

Enclosure

Analytical Technologies, Inc.

ATI I.D. # 9402-130

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 15676.001
PROJECT NAME : RUSSELL ISLAND @ ORCAS

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9402-130-1	S1	02/15/94	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies,Inc.

ATI I.D. # 9402-130

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 15676.001
PROJECT NAME : RUSSELL ISLAND @ ORCAS

ANALYSIS	TECHNIQUE	REFERENCE	LAB
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
MOISTURE	GRAVIMETRIC	CLP SOW ILM01.0	R

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9402-130

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL ISLAND @ ORCAS	DATE EXTRACTED	: 02/17/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 02/19/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	C7 - C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<25
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	100	52 - 143

AnalyticalTechnologies,Inc.

ATI I.D. # 9402-130-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 02/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 02/16/94
PROJECT NAME	: RUSSELL ISLAND @ ORCAS	DATE EXTRACTED	: 02/17/94
CLIENT I.D.	: S1	DATE ANALYZED	: 02/19/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	38
HYDROCARBON RANGE	C7 - C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	160
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	97	52 - 143

Analytical Technologies, Inc.

ATI I.D. # 9402-130

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	SAMPLE I.D. #	: BLANK
PROJECT #	: 15676.001	DATE EXTRACTED	: 02/17/94
PROJECT NAME	: RUSSELL ISLAND @ ORCAS	DATE ANALYZED	: 02/19/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 (MODIFIED)		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<25.0	500	462	92	N/A	N/A	N/A
CONTROL LIMITS				% REC.			RPD
DIESEL				72 - 117			20
SURROGATE RECOVERIES		SPIKE		DUP. SPIKE		LIMITS	
O-TERPHENYL		101		N/A		52 - 143	

Analytical Technologies, Inc.

ATI I.D. # 9402-130

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 15676.001
PROJECT NAME : RUSSELL ISLAND @ ORCAS
SAMPLE MATRIX : SOIL
EPA METHOD : 8015 (MODIFIED)

SAMPLE I.D. # : 9402-130-1
DATE EXTRACTED : 02/17/94
DATE ANALYZED : 02/19/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	136	151	10	500	637	100	592	91	7

CONTROL LIMITS	% REC.	RPD
DIESEL	70 - 120	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
O-TERPHENYL	103	103	52 - 143

Analytical Technologies, Inc.

ATI I.D. # 9402-130

GENERAL CHEMISTRY ANALYSIS

CLIENT : APPLIED GEOTECHNOLOGY, INC. MATRIX : SOIL
PROJECT # : 15676.001
PROJECT NAME : RUSSELL ISLAND @ ORCAS

PARAMETER	DATE ANALYZED
MOISTURE	02/17/94

Analytical Technologies, Inc.

ATI I.D. # 9402-130

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : APPLIED GEOTECHNOLOGY, INC. MATRIX : SOIL
PROJECT # : 15676.001
PROJECT NAME : RUSSELL ISLAND @ ORCAS UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE
9402-130-1	S1	17

AnalyticalTechnologies,Inc.

ATI I.D. # 9402-130

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

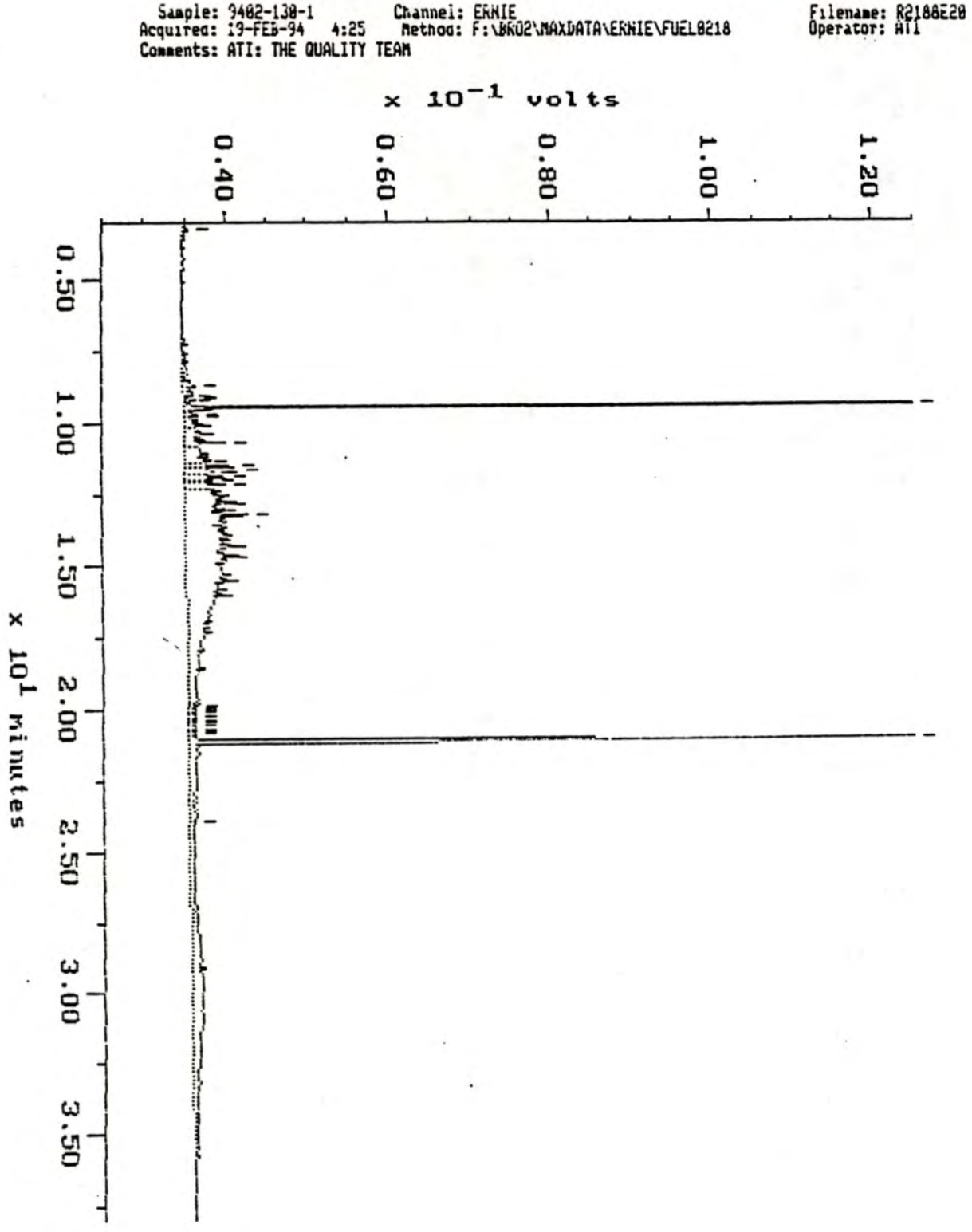
CLIENT : APPLIED GEOTECHNOLOGY, INC. MATRIX : SOIL
PROJECT # : 15676.001
PROJECT NAME : RUSSELL ISLAND @ ORCAS UNITS : %

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	9402-129-5	20	19	5	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Sample Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

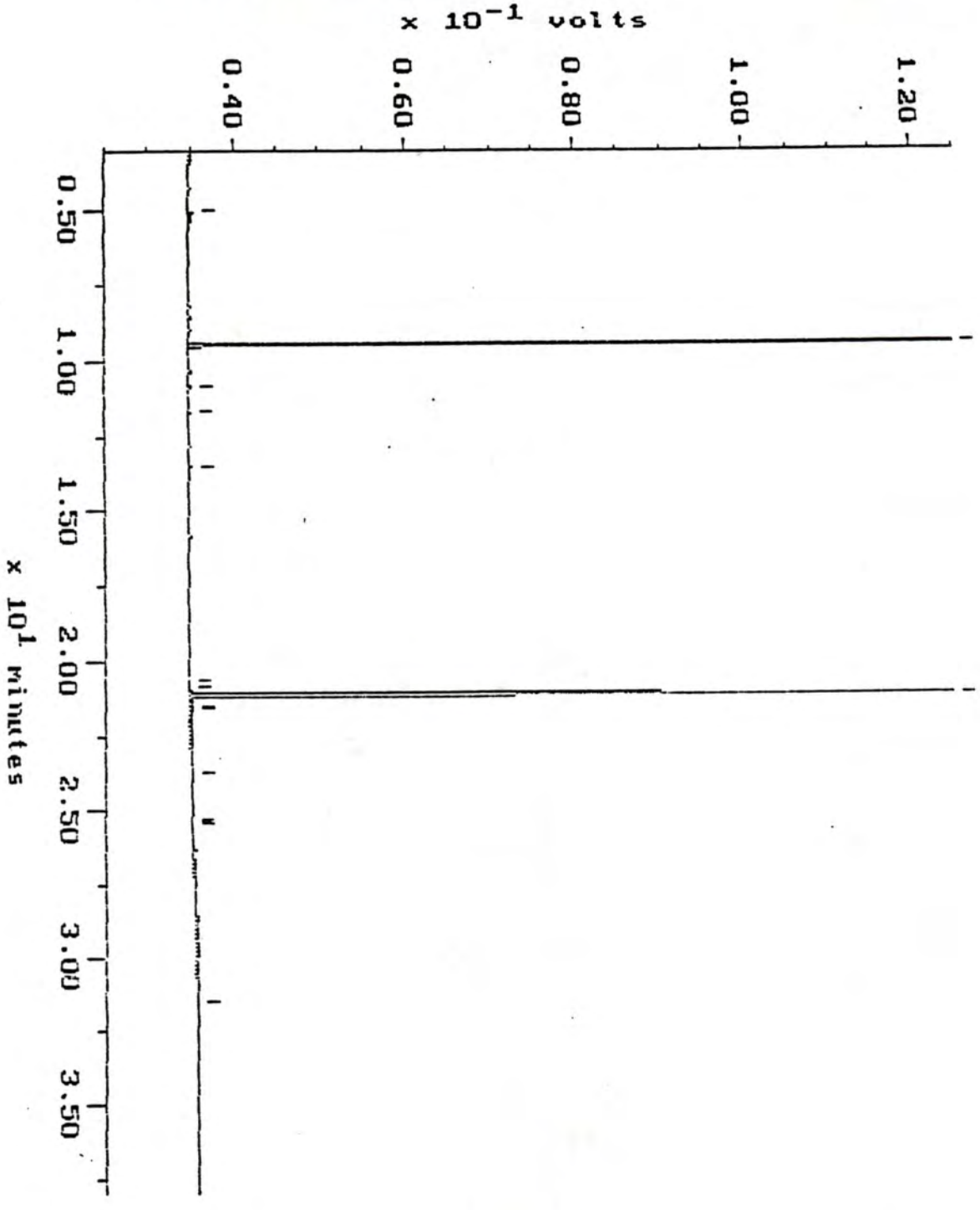
EPA 8015 Modified



Blank

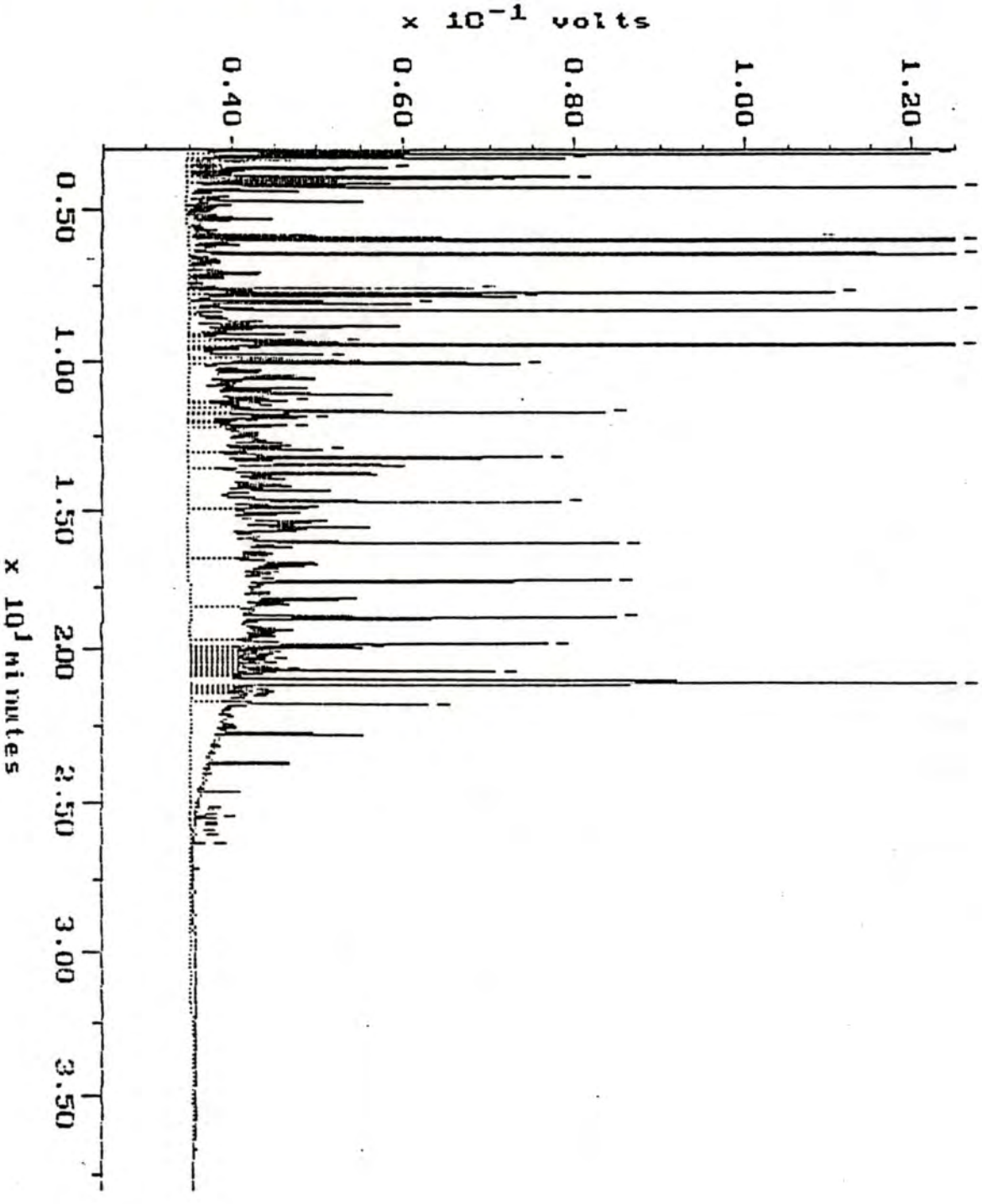
EPA 8015 Modified

Sample: SRB 02-17 Channel: ERNIE Filename: R2188E18
Acquired: 19-FEB-94 2:54 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0218 Operator: ATI
Comments: ATI: THE QUALITY TEAM

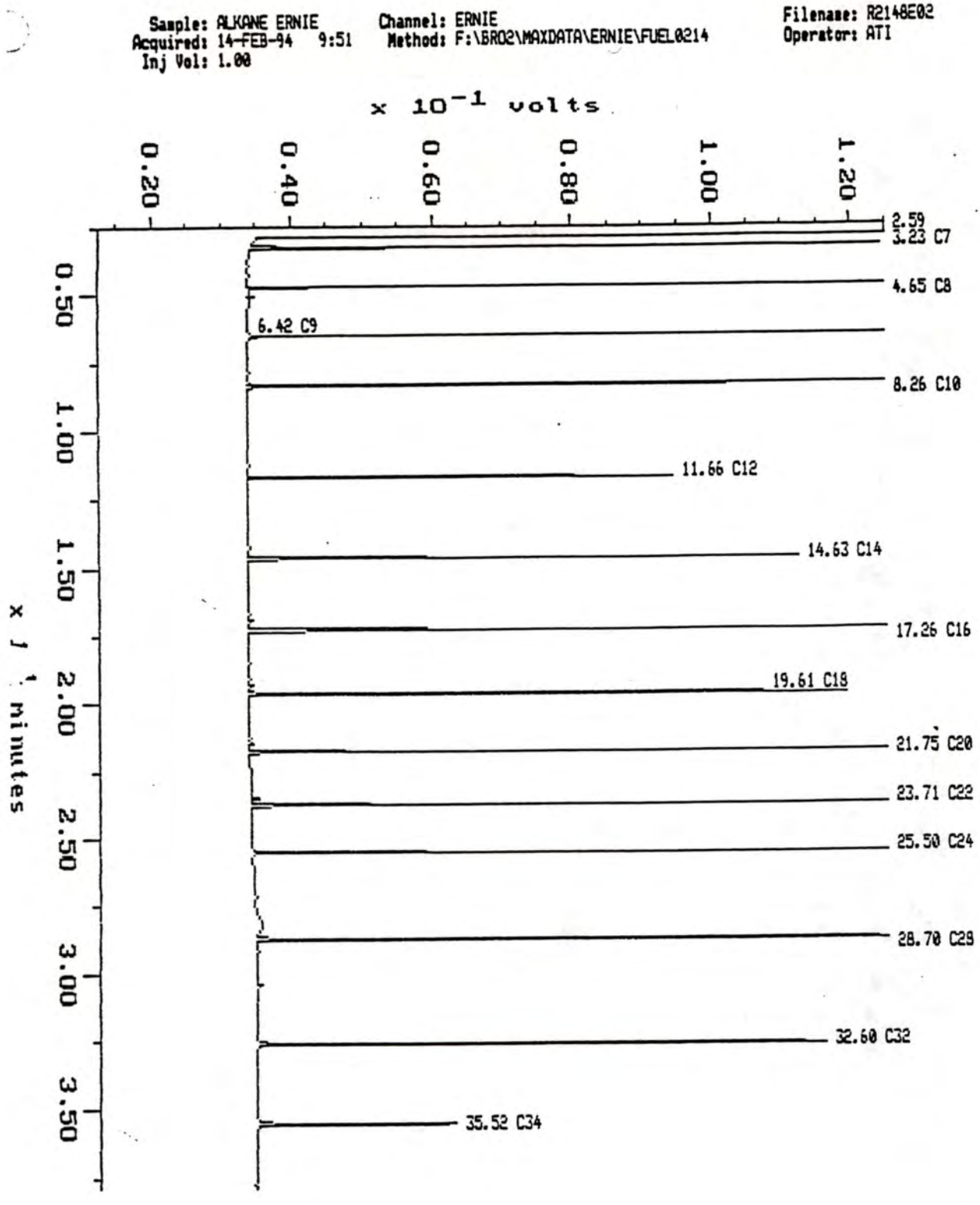


Continuing Calibration

Sample: DG 400 Channel: ERNIE Filename: R2188E17
Acquired: 19-FEB-94 2:08 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0218 Operator: ATI
Comments: ATI: THE QUALITY TEAM



Alkane


Sample: ALKANE ERNIE
Acquired: 14-FEB-94 9:51
Inj Vol: 1.00
Channel: ERNIE
Method: F:\BRO2\MAXDATA\ERNIE\FUEL0214
Filename: R2148E02
Operator: ATI
x 10⁻¹ volts
0.20
0.40
0.60
0.80
1.00
1.20
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 1 minutes
2.59
3.23 C7
4.65 C8
6.42 C9
8.26 C10
11.66 C12
14.63 C14
17.26 C16
19.61 C18
21.75 C20
23.71 C22
25.50 C24
28.70 C28
32.60 C32
35.52 C34

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN-OF-CUSTODY

Date 2/15/94 Page 1 of 1

PROJECT INFORMATION

Project Manager: Jan Dieck
Project Name: Russell's @ Orcas
Project Number: 15,626.001
Site Location: Orcas Is. Sampled By: GMB

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method: _____
Disposed by: _____ Disposal Date: _____

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ AGI Std. ☐ Special

Laboratory Number: 9402-130

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
S1	2/15/94	12:15PM	Soil	-1

PETROLEUM HYDROCARBONS						ORGANIC COMPOUNDS								PESTS/PCBs					METALS							LEACHING TESTS				OTHER				
TPH-ID State:	TPH-G State:	TPH-D State:	TPH Special Instructions	418.1 State:	8015M	8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GCMS Volatiles	8270 GCMS Semivol.	8310 HPLC PAHs	8040 Phenols	DWS - Volatiles and Semivol.	8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/pest	Selected metals: list	Total Lead (Wa)	Organic Lead (Ca)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals				NUMBER OF CONTAINERS
					X																											1

LAB INFORMATION

Lab Name:
Lab Address:
Via:

SAMPLE RECEIPT

Total Number of Containers:	1
Chain of Custody Seals?: Y/N/NA	Y
Intact?: Y/N/NA	Y
Received in Good Condition/Cold:	Y

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date: Ellen M Bobnick 2/15/94	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time: 10:05	Signature: Time:	Signature: Time:
Printed Name: Date: R SWEENEY 2/16/94	Printed Name: Date:	Printed Name: Date:
Company: ATLWA	Company:	Company:

APPENDIX B

Log of Test Pit 1 and 2

UNIFIED SOIL CLASSIFICATIONS SYSTEM

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS More than half is larger than No. 200 Sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW		Well graded gravels, gravel-sand mixtures
			GP		Poorly graded gravels, gravel-sand mixtures
		Gravels with over 12% fines	GM		Silty Gravels, poorly graded gravel-sand-silt mixtures
			GC		Clayey gravels, poorly graded gravel-sand-clay mixtures
	SANDS More than half coarse fraction is larger than No. 4 sieve size	Clean sands with little or no fines	SW		Well graded sands, gravelly sands
			SP		Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM		Silty sand, poorly graded sand-silt mixtures
			SC		Clayey sands, poorly graded sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 Sieve	SILTS AND CLAYS Liquid limit less than 50		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH		Inorganic silts, micaceous or diatomacious fine sandy or silty soils, elastic silts
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT		Peat and other highly organic soils

SAMPLE
- "Undisturbed"
- Bulk/Grab
- Not Recovered
- Recovered, Not Retained

CONTACT BETWEEN UNITS
- Well Defined Change
- Gradational Change
- Obscure Change
- End of Exploration

BLOWS PER FOOT

Hammer is 140 pounds with 30-inch drop, unless otherwise noted

S - SPT Sampler (2.0-Inch O.D.)
T - Thin Wall Sampler (2.8-Inch Sample)
H - Split Barrel Sampler (2.4-Inch Sample)

MOISTURE DESCRIPTION

Dry - Considerably less than optimum for compaction
Moist - Near optimum moisture content
Wet - Over optimum moisture content
Saturated - Below water table, in capillary zone, or in perched groundwater

PHYSICAL PROPERTY TESTS

Consol - Consolidation
LL - Liquid Limit
PL - Plastic Limit
Gs - Specific Gravity
SA - Size Analysis
TxS - Triaxial Shear
TxP - Triaxial Permeability
Perm - Permeability
Po - Porosity
MD - Moisture/Density
DS - Direct Shear
VS - Vane Shear
Comp - Compaction

UU - Unconsolidated, Undrained
CU - Consolidated, Undrained
CD - Consolidated, Drained

AGI TECHNOLOGIES

Soil Classification/Legend

Russell/Orcas Contamination Assessment
Orcas Island, Washington

PLATE **B1**

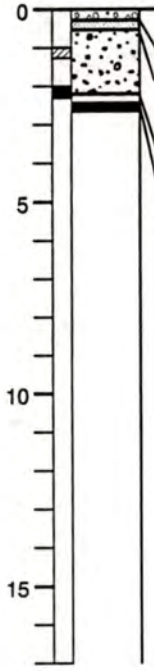
PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
15,676.001	SES	15 August 94			

676001sl.cdr

Test Pit Number 1

Date 6/14/94

Laboratory Tests	OVM (ppm)	Depth (feet)	Sample
		0	
	3		
	10		
		5	
		10	
		15	



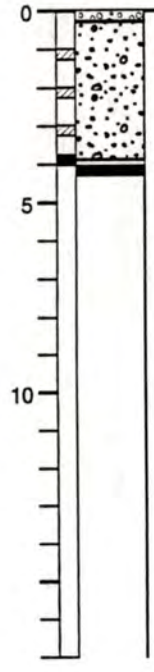
Crushed Rock.
Buried Asphalt.
BROWN SAND (SW) dense, moist; fine to coarse grained, with abundant clast of basalt bedrock.
Bedrock.

No groundater encountered during excavation.

Test Pit Number 2

Date 6/14/94

Laboratory Tests	OVM (ppm)	Depth (feet)	Sample
		0	
	4		
	0		
	0		
		5	
		10	



Crushed Rock.
BROWN SAND (SW) loose, moist; fine to coarse grained, with some gravel, and a trace of silt.

Bedrock.

No groundwater encountered during excavation.

AGI TECHNOLOGIES

Log of Test Pits 1 and 2

Russell/Orcas Contamination Assessment
Orcas Island, Washington

PLATE **B2**

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
15,676.001	SES	15 August 94	GMS		

676001tp.cdr

APPENDIX C

Laboratory Data - Contamination Assessment

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Russell's Landing/Orcas, WA
Project No.:	15,676.001
Lab Name:	Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number:	9406-193
Sample No.:	TH3@2.4', TH5@1.7', TP1@2', TP2@3.8', SP4, S11, S12, S13, S14, S15, S16, TH9@1.4', TH10@1.1', SP5
Matrix:	Soil

QUALITY ASSURANCE SUMMARY

All data are of known quality and acceptable for use.

ANALYTICAL METHODS

Parameter	Technique	Method
BETX	GC/PID	EPA 8020
TPH-G[a]	GC/FID	WTPH-G
TPH-D[b]	GC/FID	WTPH-D
TPH-HCID[c]	GC/FID	WTPH-HCID
Moisture	Gravimetric	CLP SOW ILM01.0

a - Quantified for gasoline (toluene - dodecane) range fuel hydrocarbons (FHC).
b - Quantified for diesel (C_{12} - C_{24}) and oil (C_{24} - C_{34}) range FHC.
c - Identified of gasoline, diesel, and oil range FHC.

TIMELINESS

Parameter	Date Sampled	Date Extracted	Date Analyzed	Time Until Extraction	Time Until Analysis
BETX	06/14/94	06/16/94	06/20/94	2	6 (14)
TPH-G	06/14/94	06/16/94	06/20/94	2 (14)	6 (21)
TPH-D	06/14/94	06/23/94	06/30/94	9 (14)	16 (30)
TPH-HCID	06/14/94	06/20/94	06/21/94	6 (14)	7 (21)
Moisture	06/14/94	NA	06/17/94	NA	3 (NA)

Earliest sample collection date and/or latest sample extraction/analysis date, whichever applicable, has been used to verify holding time compliance.
NA - Not applicable.
0 - Numbers in parentheses indicate recommended holding times in days for soil.
All samples were extracted and analyzed within recommended holding times for soil.

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Russell's Landing/Orcas, WA
Project No.:	15,676.001
Lab Name:	Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number:	9406-193
Sample No.:	TH3@2.4', TH5@1.7', TP1@2', TP2@3.8', SP4, S11, S12, S13, S14, S15, S16, TH9@1.4', TH10@1.1', SP5

FUEL HYDROCARBON CHROMATOGRAMS

WTPH-G: Gasoline range FHC were detected in samples SP4, S13, S14, and SP5; these detections are confirmed by reviewing sample chromatograms.

WTPH-D: Both diesel and oil range FHC were detected in samples TP1@2', SP4, S14, and SP5, and diesel range FHC were detected in Sample S13. These detections are confirmed by reviewing sample chromatograms.

WTPH-HCID: Gasoline and diesel range FHC were detected in sample TP1@2'; the detection is confirmed by reviewing the sample chromatogram. Note that oil range FHC were also detected in this sample when analyzed by WTPH-D. The discrepancy may result from the more stringent extraction methodology for WTPH-D. As WTPH-HCID is a semi-quantitative method and WTPH-D is intended to provide quantitatively reliable results, diesel and oil range FHC results obtained by WTPH-D should be used for this sample.

FIELD QUALITY CONTROL SAMPLES

Field Duplicates: None collected.

Rinsate: None collected.

Trip Blank: None collected.

LAB QUALITY CONTROL SAMPLES

Method Blank: No analytes were detected at or above their method reporting limits (MRLs) by the following methods:

EPA 8020
WTPH-G
WTPH-D
WTPH-HCID

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: Russell's Landing/Orcas, WA
Project No.: 15,676.001
Lab Name: Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number: 9406-193
Sample No.: TH3@2.4', TH5@1.7', TP1@2', TP2@3.8', SP4, S11, S12, S13, S14, S15, S16, TH9@1.4', TH10@1.1', SP5

Matrix Spikes: Matrix spike (MS) and matrix spike duplicate (MSD) percent recoveries and relative percent differences (RPDs) are within ATI's control limit criteria for the following methods:

EPA 8020
WTPH-G
WTPH-D

Duplicates: Duplicate sample RPDs are within ATI's control limit criteria for the following methods:

WTPH-G
WTPH-D
CLP SOW ILM01.0

Blank Spike: Blank spike (BS) percent recoveries are within ATI's control limit criteria for the following methods:

EPA 8020
WTPH-G
WTPH-D

Surrogates: All surrogate percent recoveries are within ATI's control limit criteria for WTPH-HCID.

EPA 8020/WTPH-G: One surrogate spike (bromofluorobenzene) was not recovered from sample S14 due to sample matrix interference and necessary dilution for analysis. Sample results are not qualified on this basis since other associated QC parameters (e.g., BS, MS/MSD) are within acceptable criteria.

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: Russell's Landing/Orcas, WA
Project No.: 15,676.001
Lab Name: Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number: 9406-193
Sample No.: TH3@2.4', TH5@1.7', TP1@2', TP2@3.8', SP4, S11, S12, S13, S14, S15, S16, TH9@1.4', TH10@1.1', SP5

Surrogates: (Cont.) WTPH-D: Surrogate spike (*o*-terphenyl) recovery of 205 percent from sample SP4 exceeded ATI's upper control limit of 150 percent due to sample matrix interference and necessary dilution for analysis. Sample results are not qualified on this basis since other associated QC parameters (e.g., BS, MS/MSD) are within acceptable criteria.

SIGNATURES

Prepared by Kimiyo Lin Date 07/14/94

Checked by Katherine Bourbonais Date 7/14/94

Analytical Technologies, Inc.
560 Naches Avenue, S.W., Suite 101, Renton, WA 98055 (206) 228-8335
Karen L. Mixon, Laboratory Manager

ATI I.D. # 9406-193

July 7, 1994

RECEIVED
JUL 11 1994
APPLIED GEOTECHNOLOGY INC.

AGI Technologies
P.O. Box 3885
Bellevue WA 98009

Attention : Glen Bobnick

Project Number : 15676.001

Project Name : Russell of Orcas

Dear Mr. Bobnick:

On June 16, 1994, Analytical Technologies, Inc. (ATI), received 14 samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Sincerely,

Victoria L. Bayly
Project Manager

VLB/hal/mrj

Enclosure

Analytical Technologies, Inc.

ATI I.D. # 9406-193

SAMPLE CROSS REFERENCE SHEET

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9406-193-1	TH3 @ 2.4'	06/14/94	SOIL
9406-193-2	TH5 @ 1.7'	06/14/94	SOIL
9406-193-3	TP1 @ 2'	06/14/94	SOIL
9406-193-4	TP2 @ 3.8'	06/14/94	SOIL
9406-193-5	SP4	06/14/94	SOIL
9406-193-6	S11	06/15/94	SOIL
9406-193-7	S12	06/15/94	SOIL
9406-193-8	S13	06/15/94	SOIL
9406-193-9	S14	06/15/94	SOIL
9406-193-10	S15	06/15/94	SOIL
9406-193-11	S16	06/15/94	SOIL
9406-193-12	TH9 @ 1.4'	06/15/94	SOIL
9406-193-13	TH10 @ 1.1'	06/15/94	SOIL
9406-193-14	SP5	06/15/94	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	14

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9406-193

ANALYTICAL SCHEDULE

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

ANALYSIS	TECHNIQUE	REFERENCE	LAB
BETX	GC/PID	EPA 8020	R
TOTAL PETROLEUM HYDROCARBONS	GC/FID	WA DOE WTPH-G	R
HYDROCARBON IDENTIFICATION	GC/FID	WA DOE WTPH-HCID	R
TOTAL PETROLEUM HYDROCARBONS	GC/FID	WA DOE WTPH-D	R
MOISTURE	GRAVIMETRIC	CLP SOW ILM01.0	R

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PTL = ATI - Portland
ANC = ATI - Anchorage
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9406-193

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSEL OF ORCAS	DATE EXTRACTED	: 06/16/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/17/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
TOTAL XYLENES	<0.025
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	94	52 - 116
TRIFLUOROTOLUENE	96	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-5

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/16/94
CLIENT I.D.	: SP4	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	0.29
ETHYLBENZENE	2.1
TOLUENE	1.6
TOTAL XYLENES	16 D3
FUEL HYDROCARBONS	510 D3
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	114	52 - 116
TRIFLUOROTOLUENE	87 D3	50 - 150

D3 = Value from a five fold diluted analysis.

Analytical Technologies, Inc.

ATI I.D. # 9406-193-8

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/16/94
CLIENT I.D.	: S13	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	0.22
ETHYLBENZENE	0.65
TOLUENE	0.62
TOTAL XYLENES	1.8
FUEL HYDROCARBONS	400 D3
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	111	52 - 116
TRIFLUOROTOLUENE	77 D3	50 - 150

D3 = Value from a five fold diluted analysis.

Analytical Technologies, Inc.

ATI I.D. # 9406-193-9

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/16/94
CLIENT I.D.	: S14	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 20

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS	
BENZENE	23	
ETHYLBENZENE	69	
TOLUENE	45	
TOTAL XYLENES	340	D7
FUEL HYDROCARBONS	5500	
HYDROCARBON RANGE	TOLUENE TO DODECANE	
HYDROCARBON QUANTITATION USING	GASOLINE	

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	F	52 - 116
TRIFLUOROTOLUENE	87	50 - 150

D7 = Value from a 100 fold diluted analysis.
F = Out of limits due to matrix interference.

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-193-14

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/16/94
CLIENT I.D.	: SP5	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	0.071
ETHYLBENZENE	0.22
TOLUENE	0.23
TOTAL XYLENES	3.2
FUEL HYDROCARBONS	170
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	101	52 - 116
TRIFLUOROTOLUENE	82	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

BETX - GASOLINE
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-G/8020(BETX)

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 06/16/94
DATE ANALYZED : 06/17/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.0250	1.00	0.909	91	N/A	N/A	N/A
TOLUENE	<0.0250	1.00	1.01	101	N/A	N/A	N/A
TOTAL XYLENES	<0.0250	2.00	2.01	100	N/A	N/A	N/A
GASOLINE	<5.00	50.0	44.1	88	N/A	N/A	N/A

CONTROL LIMITS	% REC.	RPD
BENZENE	82 - 109	20
TOLUENE	86 - 116	20
TOTAL XYLENES	83 - 119	20
GASOLINE	78 - 115	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
BROMOFLUOROBENZENE	101	N/A	52 - 116
TRIFLUOROTOLUENE	95	N/A	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

BETX - GASOLINE
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-G/8020(BETX)

SAMPLE I.D. # : 9406-208-4
DATE EXTRACTED : 06/16/94
DATE ANALYZED : 06/17/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
GASOLINE	<5.00	<5.00	NC	N/A	N/A	N/A	N/A	N/A	N/A

CONTROL LIMITS	% REC.	RPD
GASOLINE	N/A	20

SURROGATE RECOVERIES	SAMPLE	SAMPLE DUP.	LIMITS
TRIFLUOROTOLUENE	85	83	50 - 150

NC = Not calculable.

Analytical Technologies, Inc.

ATI I.D. # 9406-193

BETX - GASOLINE
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-G/8020(BETX)

SAMPLE I.D. # : 9406-208-5
DATE EXTRACTED : 06/16/94
DATE ANALYZED : 06/17/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
BENZENE	<0.0250	N/A	N/A	1.00	0.874	87	0.845	85	3
TOLUENE	<0.0250	N/A	N/A	1.00	0.944	94	0.915	92	3
TOTAL XYLENES	<0.0250	N/A	N/A	2.00	1.94	97	1.83	92	6
GASOLINE	<5.00	<5.00	NC	50.0	49.5	99	50.4	101	2

CONTROL LIMITS	% REC.	RPD
BENZENE	62 - 104	20
TOLUENE	63 - 115	20
TOTAL XYLENES	64 - 117	20
GASOLINE	59 - 111	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
BROMOFLUOROBENZENE	92	88	52 - 116
TRIFLUOROTOLUENE	85	86	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/17/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/17/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	105	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	107	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-193-1

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: TH3 @ 2.4'	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	101	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-2

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: TH5 @ 1.7'	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	100	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-3

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: TP1 @ 2'	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.

DIESEL QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	102	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-193-4

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: TP2 @ 3.8'	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	101	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-6

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/17/94
CLIENT I.D.	: S11	DATE ANALYZED	: 06/18/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	91	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-7

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/17/94
CLIENT I.D.	: S12	DATE ANALYZED	: 06/18/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	93	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-10

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/17/94
CLIENT I.D.	: S15	DATE ANALYZED	: 06/18/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	93	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-11

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/17/94
CLIENT I.D.	: S16	DATE ANALYZED	: 06/18/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	96	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-12

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/17/94
CLIENT I.D.	: TH9 @ 1.4'	DATE ANALYZED	: 06/17/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	112	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-13

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/17/94
CLIENT I.D.	: TH10 @ 1.1'	DATE ANALYZED	: 06/18/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULTS

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	95	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

CASE NARRATIVE

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

CASE NARRATIVE: TOTAL PETROLEUM HYDROCARBONS ANALYSIS - (WA DOE WTPH-D)

Sample 9406-193-3 (TP1 @ 2') was originally analyzed for WA DOE WTPH-HCID. The HCID had a positive result for diesel greater than 50 mg/kg. Per client request, this sample was analyzed for WA DOE WTPH-D. Because all of the other samples were analyzed for WA DOE WTPH-D extended, this sample was too. The HCID result was negative for the hydrocarbon range greater than C_{24} at concentrations greater than 100 mg/kg. However, the hydrocarbon range for C_{24}-C_{34} in the WA DOE WTPH-D extended showed a positive result of 300 mg/kg motor oil at 1:5 dilution. The extract was reanalyzed full strength and showed a positive result of 220 mg/kg. Upon discussion it was determined that the differences in concentrations were most likely due to the differences in the sample extraction techniques between WA DOE WTPH-HCID and WA DOE WTPH-D. The WA DOE WTPH-D horn-sonication method is far more destructive that the water-bath sonication of the WA DOE WTPH-HCID method and would therefore be able to extract more hydrocarbons out of the soil. There was evidence of the presence of hydrocarbons in this range, and the discrepancies between the two methods is probably more noticeable since the concentration is very close to the detection limit. Both sets of data are reported.

All corresponding quality assurance and quality control results defined as matrix spike/matrix spike duplicate (MS/MSD) and blank spike (BS) were within the established control limits. All holding times were met.

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ATI I.D. # 9406-193

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<40
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	99	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/23/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/23/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<40
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	98	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193RE

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/23/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/30/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<40
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	97	50 - 150

RE = Reanalysis.

Analytical Technologies, Inc.

ATI I.D. # 9406-193-3

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/23/94
CLIENT I.D.	: TP1 @ 2'	DATE ANALYZED	: 06/24/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 5

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	940
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	300
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
)-TERPHENYL	128	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-3RE

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/23/94
CLIENT I.D.	: TP1 @ 2'	DATE ANALYZED	: 06/30/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	860
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	220
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
o-TERPHENYL	118	50 - 150

RE = Reanalysis.

Analytical Technologies, Inc.

ATI I.D. # 9406-193-5

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/14/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: SP4	DATE ANALYZED	: 06/22/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 5

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	1300
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	480
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY			LIMITS
O-TERPHENYL	205	G	50 - 150

G = Out of limits due to high level of target analytes in sample.

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-193-8

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: S13	DATE ANALYZED	: 06/22/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	180
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<47
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
)-TERPHENYL	104	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193-9

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: S14	DATE ANALYZED	: 06/23/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 10

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	5500
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	2900
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
)-TERPHENYL	129	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-193-14

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/15/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/16/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: SP5	DATE ANALYZED	: 06/22/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	210
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	80
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
?-TERPHENYL	102	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 06/20/94
DATE ANALYZED : 06/21/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<10.0	200	194	97	N/A	N/A	N/A
CONTROL LIMITS				% REC.			RPD
DIESEL				69 - 115			20
SURROGATE RECOVERIES		SPIKE		DUP. SPIKE		LIMITS	
O-TERPHENYL		100		N/A		50 - 150	

Analytical Technologies, Inc.

ATI I.D. # 9406-193

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 06/23/94
DATE ANALYZED : 06/23/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<10.0	200	199	100	N/A	N/A	N/A
CONTROL LIMITS				% REC.			RPD
DIESEL				69 - 115			20
SURROGATE RECOVERIES		SPIKE		DUP. SPIKE		LIMITS	
O-TERPHENYL		98		N/A		50 - 150	

Analytical Technologies, Inc.

ATI I.D. # 9406-193

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 9406-233-2
DATE EXTRACTED : 06/20/94
DATE ANALYZED : 06/21/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	400	474	17	N/A	N/A	N/A	N/A	N/A	N/A

CONTROL LIMITS	% REC.	RPD
DIESEL	N/A	20

SURROGATE RECOVERIES	SAMPLE	SAMPLE DUP.	LIMITS
O-TERPHENYL	103	102	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 9406-159-2
DATE EXTRACTED : 06/20/94
DATE ANALYZED : 06/21/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	43.1	49.3	13	200	250	103	237	97	5

CONTROL LIMITS	% REC.	RPD
DIESEL	61 - 120	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
O-TERPHENYL	102	97	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-193

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 9406-268-24
DATE EXTRACTED : 06/23/94
DATE ANALYZED : 06/24/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	<10.0	<10.0	NC	200	198	99	193	97	3

CONTROL LIMITS	% REC.	RPD
DIESEL	61 - 120	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
O-TERPHENYL	100	95	50 - 150

NC = Not calculable.

Analytical Technologies, Inc.

ATI I.D. # 9406-193

GENERAL CHEMISTRY ANALYSIS

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

MATRIX : SOIL

PARAMETER	DATE ANALYZED
MOISTURE	06/17/94

Analytical Technologies, Inc.

ATI I.D. # 9406-193

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

MATRIX : SOIL
UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE
9406-193-1	TH3 @ 2.4'	21
9406-193-2	TH5 @ 1.7'	19
9406-193-3	TP1 @ 2'	7.8
9406-193-4	TP2 @ 3.8'	9.1
9406-193-5	SP4	24
9406-193-6	S11	11
9406-193-7	S12	18
9406-193-8	S13	14
9406-193-9	S14	24
9406-193-10	S15	18
9406-193-11	S16	19
9406-193-12	TH9 @ 1.4'	21
9406-193-13	TH10 @ 1.1'	16
9406-193-14	SP5	16

Analytical Technologies, Inc.

ATI I.D. # 9406-193

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

MATRIX : SOIL
UNITS : %

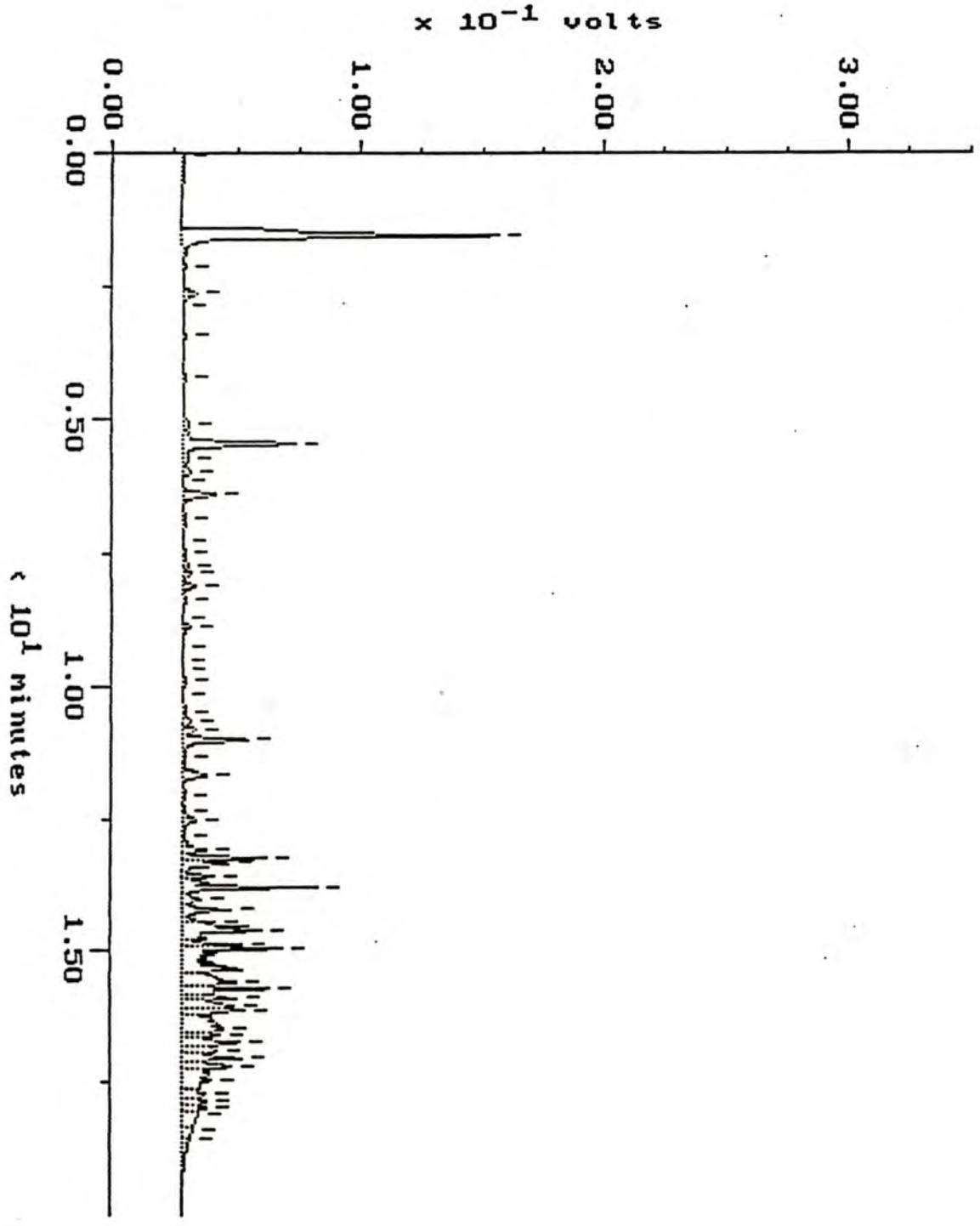
PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	9406-193-10	18	18	0	N/A	N/A	N/A
MOISTURE	9406-210-1	9.5	9.7	2	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

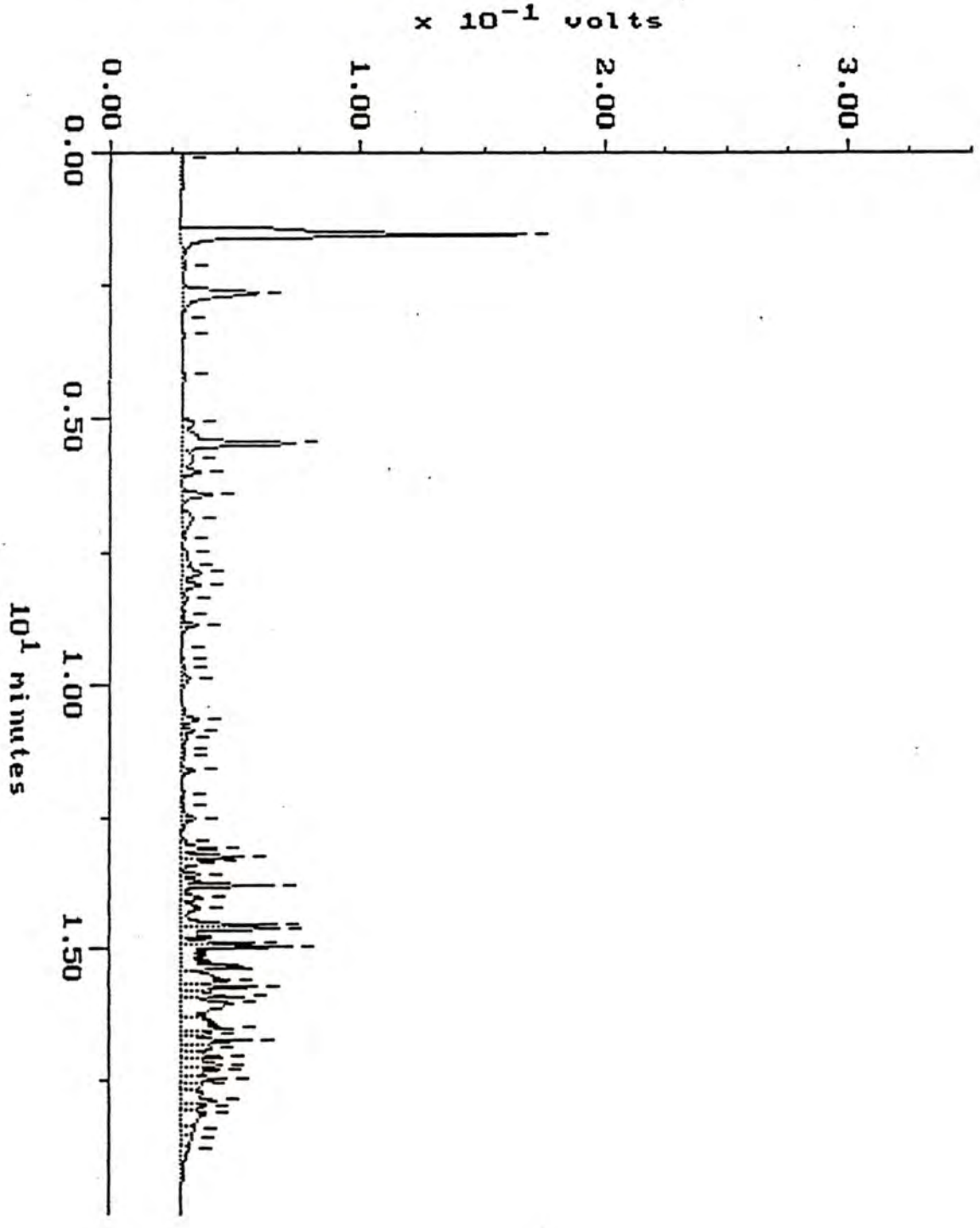
WA DOE WTPH-G

Sample: 9406-193-5 DIL Channel: FID Filename: R6219604
Acquired: 21-JUN-94 11:00 Method: F:\BRO2\MAXDATA\GLAD\062194GS Operator: ATI
Dilution: 1 : 5.000
Comments: ATI : A COMMITMENT TO QUALITY



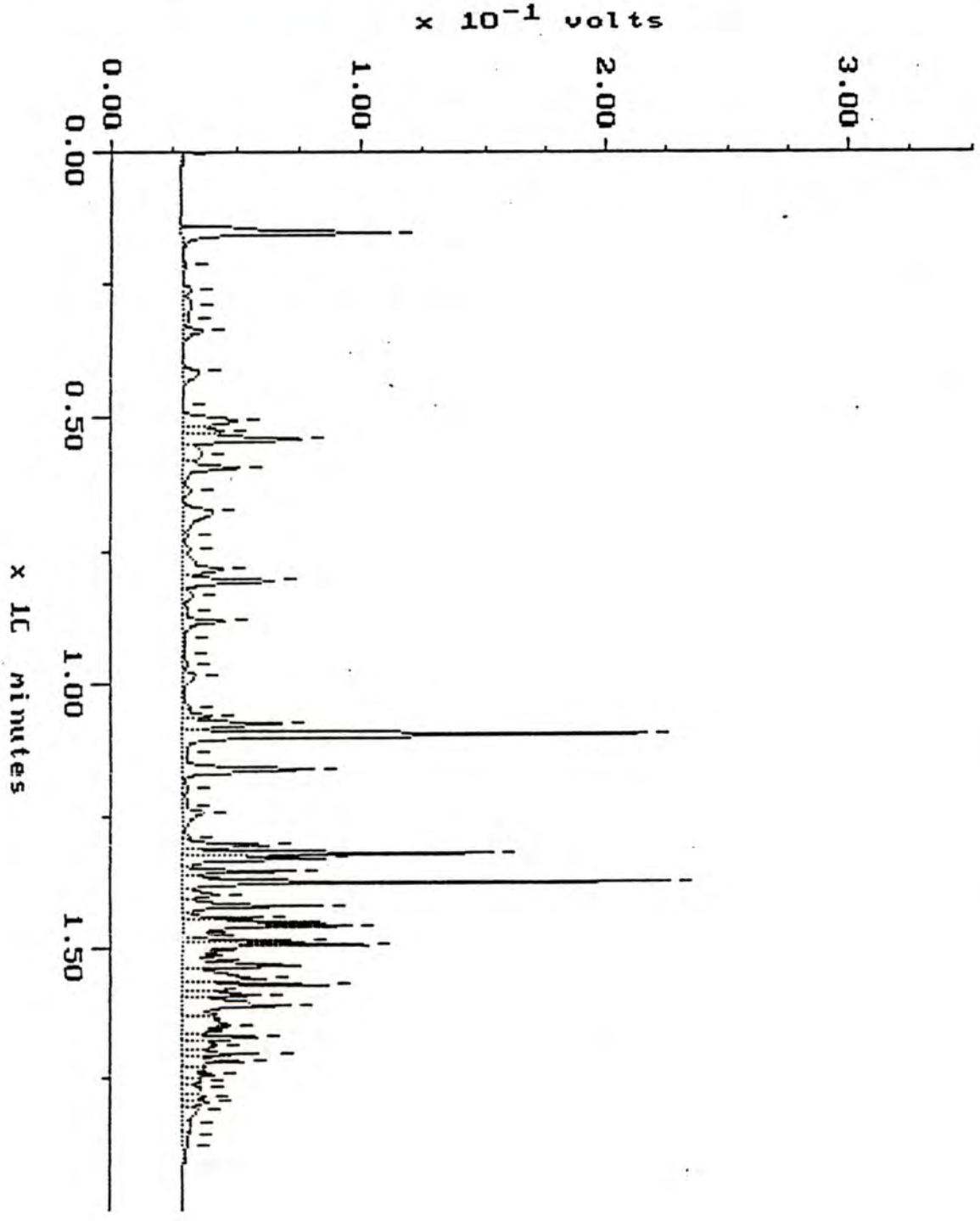
WA DOE WTPH-G

Sample: 9406-193-8 DIL Channel: FID Filename: R6219G05
Acquired: 21-JUN-94 11:30 Method: F:\BRO2\MAXDATA\GLAD\062194GS Operator: ATI
Dilution: 1 : 5.000
Comments: ATI : A COMMITMENT TO QUALITY



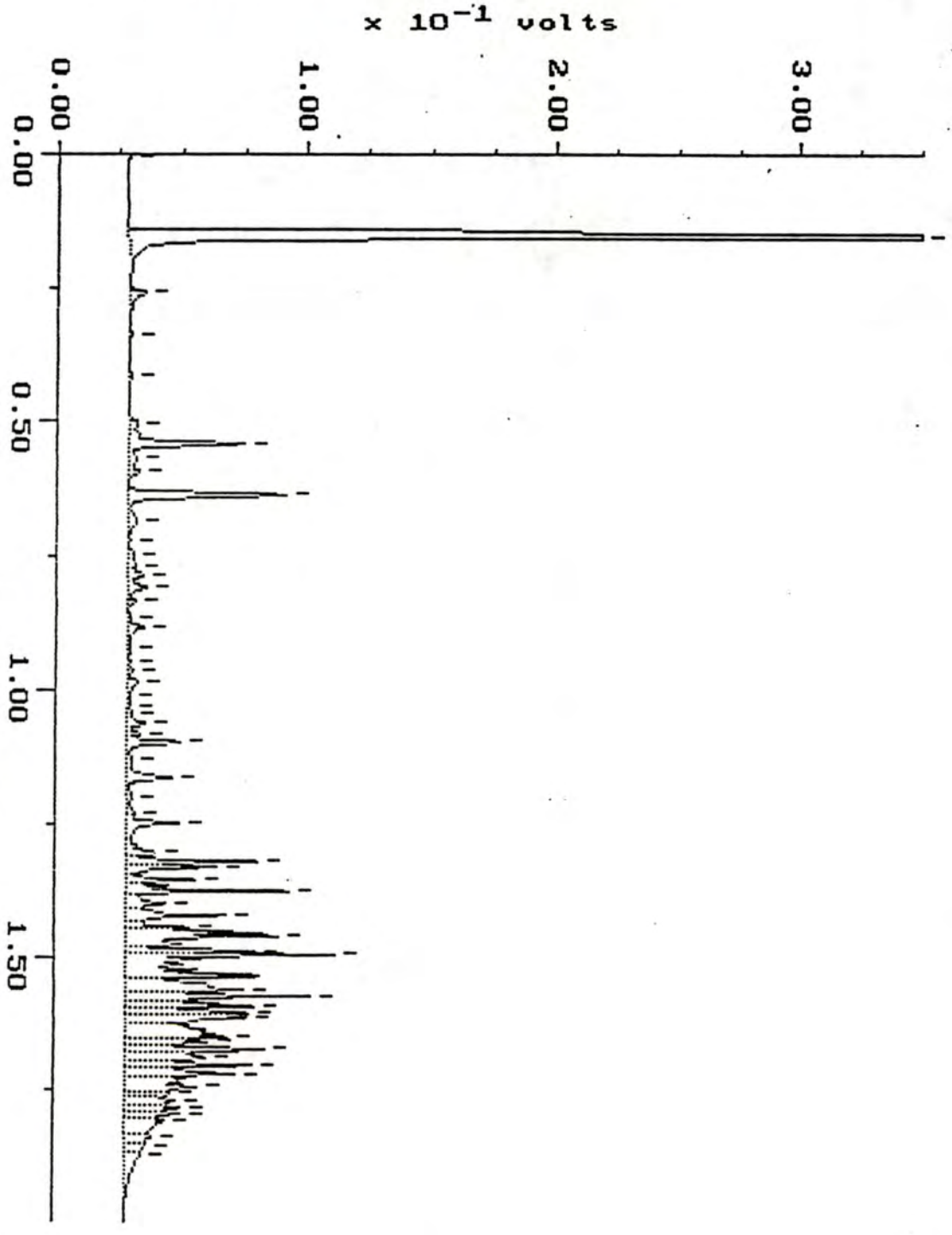
WA DOE WTPH-G

Sample: 9406-193-9 DIL Channel: FID Filename: R6209G18
Acquired: 20-JUN-94 19:02 Method: F:\BRO2\MAXDATA\GLAD\062094GS Operator: ATI
Dilution: 1 : 20.000
Comments: ATI : A COMMITMENT TO QUALITY



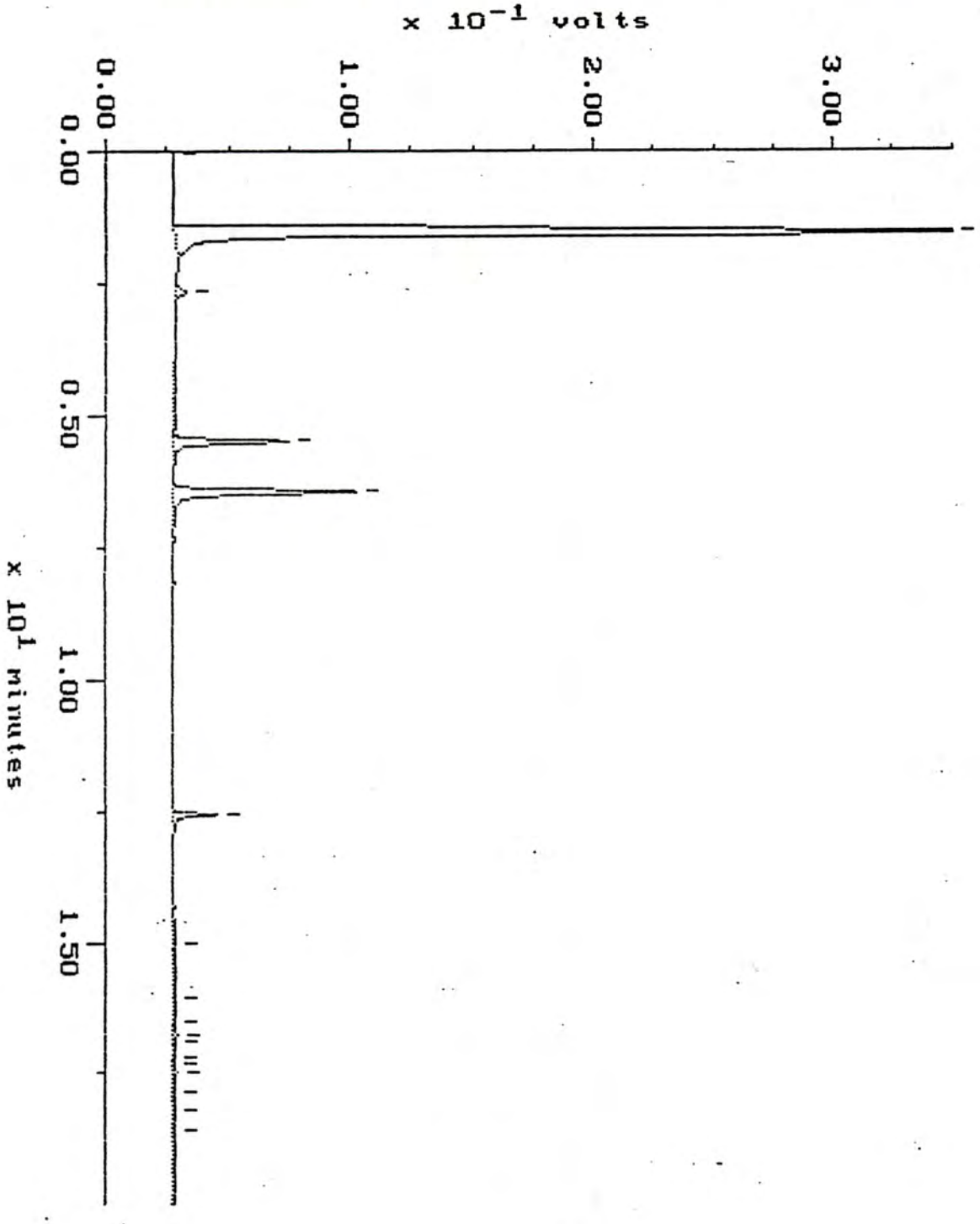
WA DOE WTPH-G

Sample: 9406-193-14 Channel: FID Filename: R6209G22
Acquired: 20-JUN-94 21:06 Method: F:\BRD2\MAXDATA\GLAD\062094GS Operator: ATI
Comments: ATI : A COMMITMENT TO QUALITY



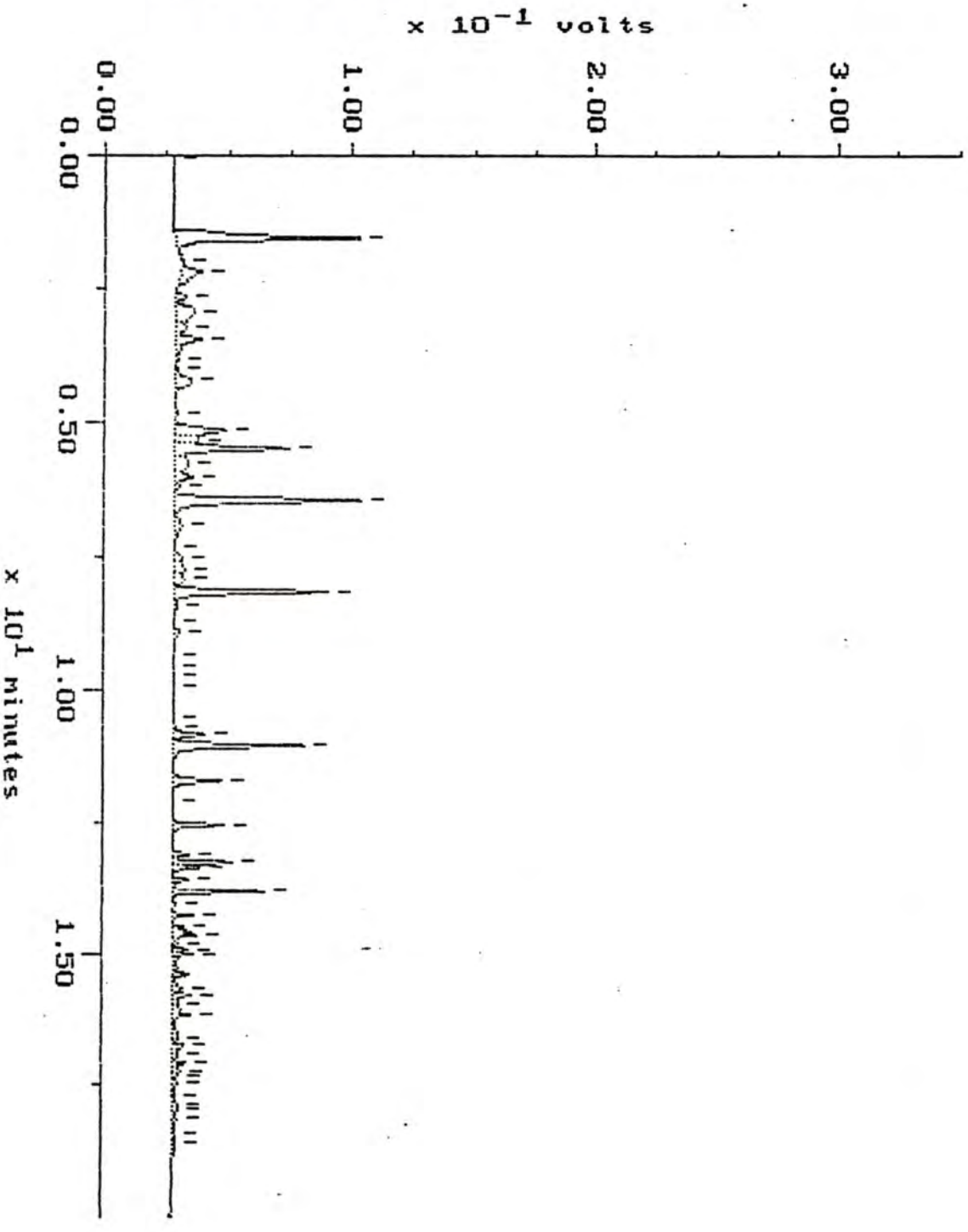
WA DOE WTPH-G Blank

Sample: SRB 6-16 Channel: FID Filename: R6179G04
Acquired: 17-JUN-94 9:02 Method: F:\BRO2\MAXDATA\GLAD\061794GS Operator: ATI
Comments: ATI : A COMMITMENT TO QUALITY



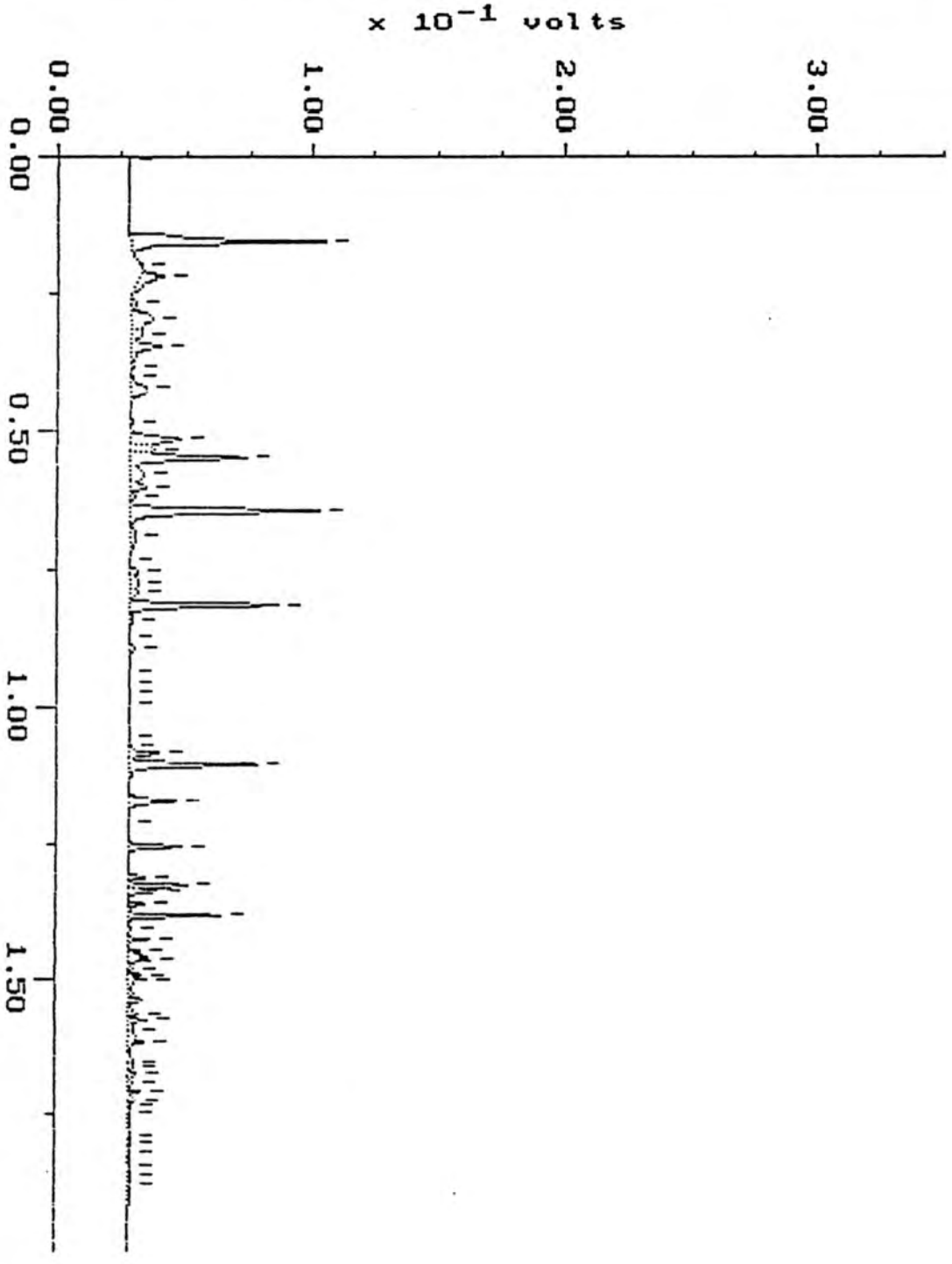
CONTINUING CALIBRATION

Sample: STD-C 6 Channel: FID Filename: R6179G01
Acquired: 17-JUN-94 7:17 Method: F:\BR02\MAXDATA\GLAD\061794GS Operator: ATI
Comments: ATI : A COMMITMENT TO QUALITY



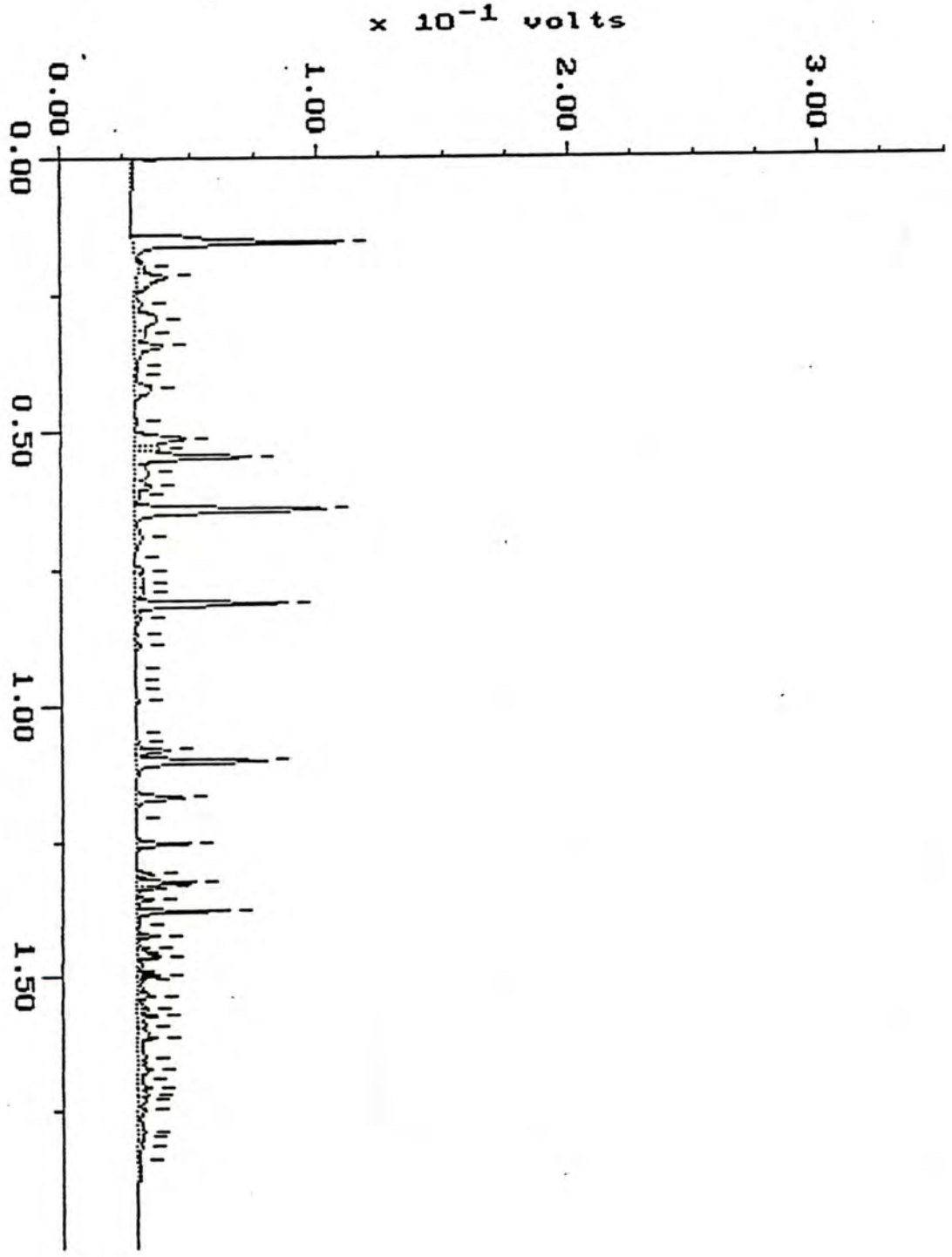
CONTINUING CALIBRATION

Sample: STD-C G Channel: FID Filename: R6209G01
Acquired: 20-JUN-94 7:32 Method: F:\BRO2\MAXDATA\GLAD\0620946S Operator: ATI
Comments: ATI : A COMMITMENT TO QUALITY



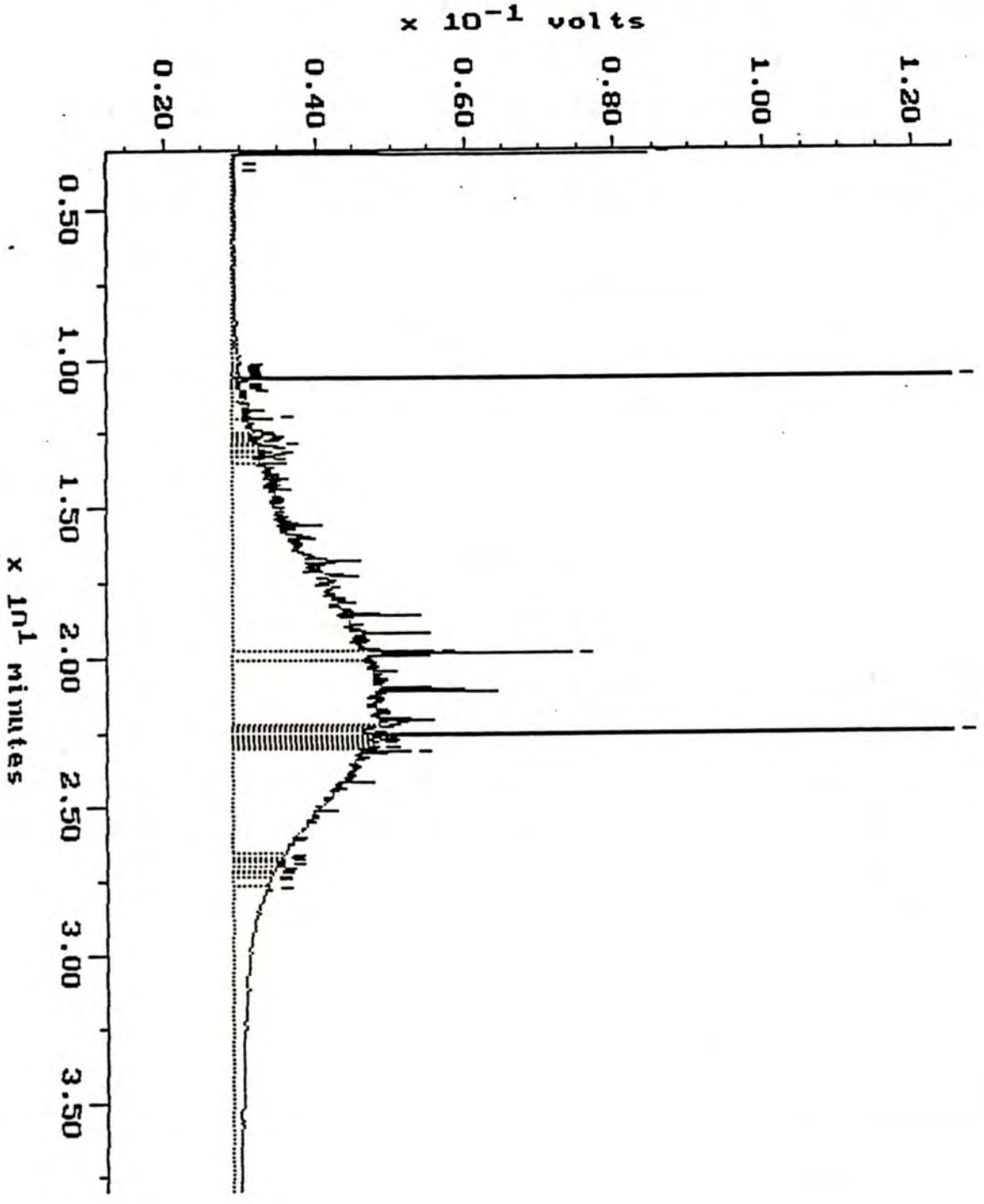
CONTINUING CALIBRATION

Sample: STD-C 6 Channel: FID Filename: R6219601
Acquired: 21-JUN-94 8:22 Method: F:\BRO2\MAXDATA\GLAD\0621946S Operator: ATI
Comments: ATI : A COMMITMENT TO QUALITY



WA DOE WTPH-HCID

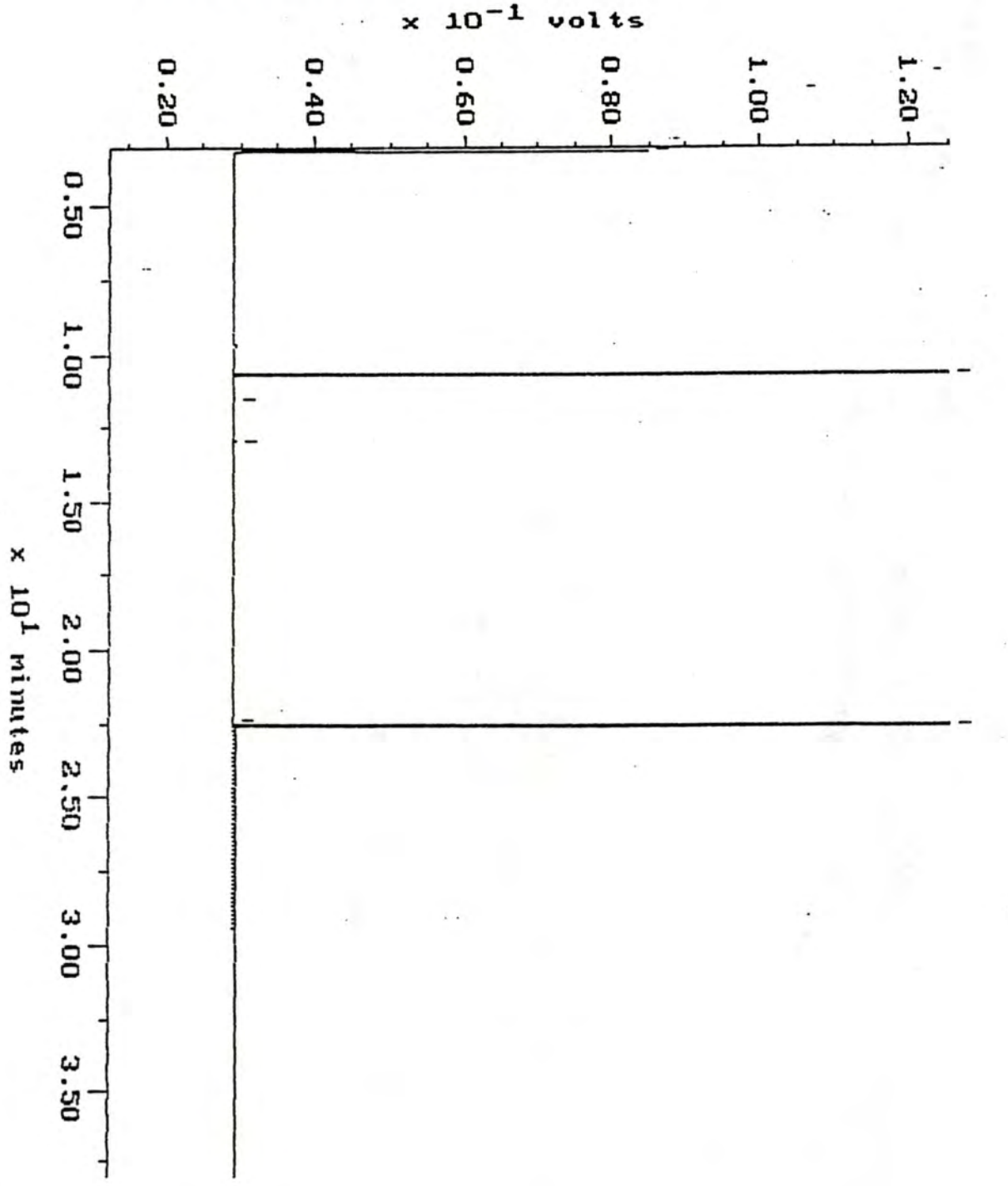
Sample: 9406-193-3 Channel: BERT Filename: R6288B10
Acquired: 21-JUN-94 1:03 Method: F:\BRO2\MAXDATA\BERT\FUEL0620 Operator: ATI
Comments: ATI: THE QUALITY TEAM



WA DOE WTPH-HCID

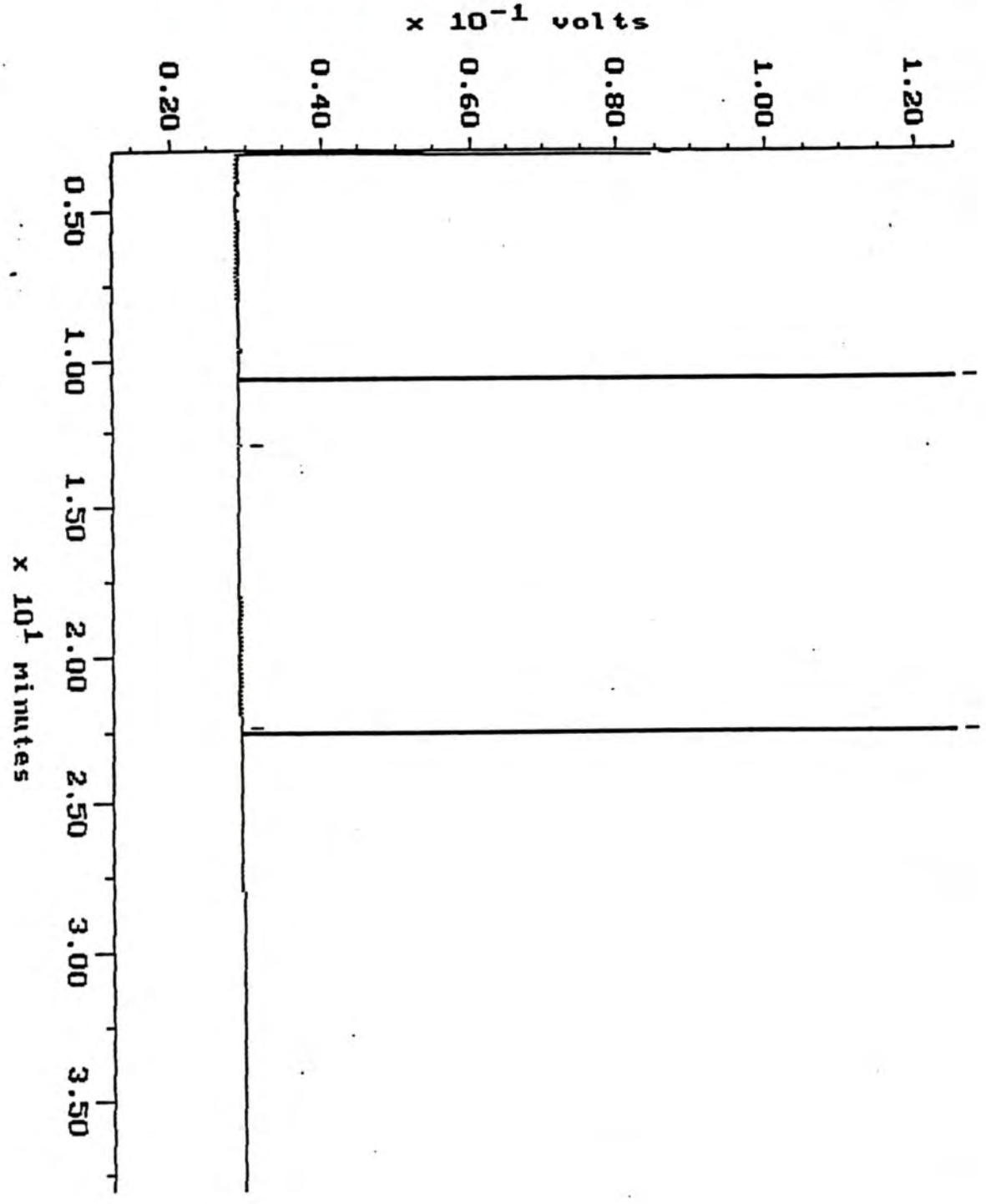
Blank

Sample: SRB 6-17 HCID Channel: BERT Filename: R6168B23
Acquired: 17-JUN-94 12:53 Method: F:\BRO2\MAXDATA\BERT\FUEL0616 Operator: ATI
Comments: ATI: THE QUALITY TEAM



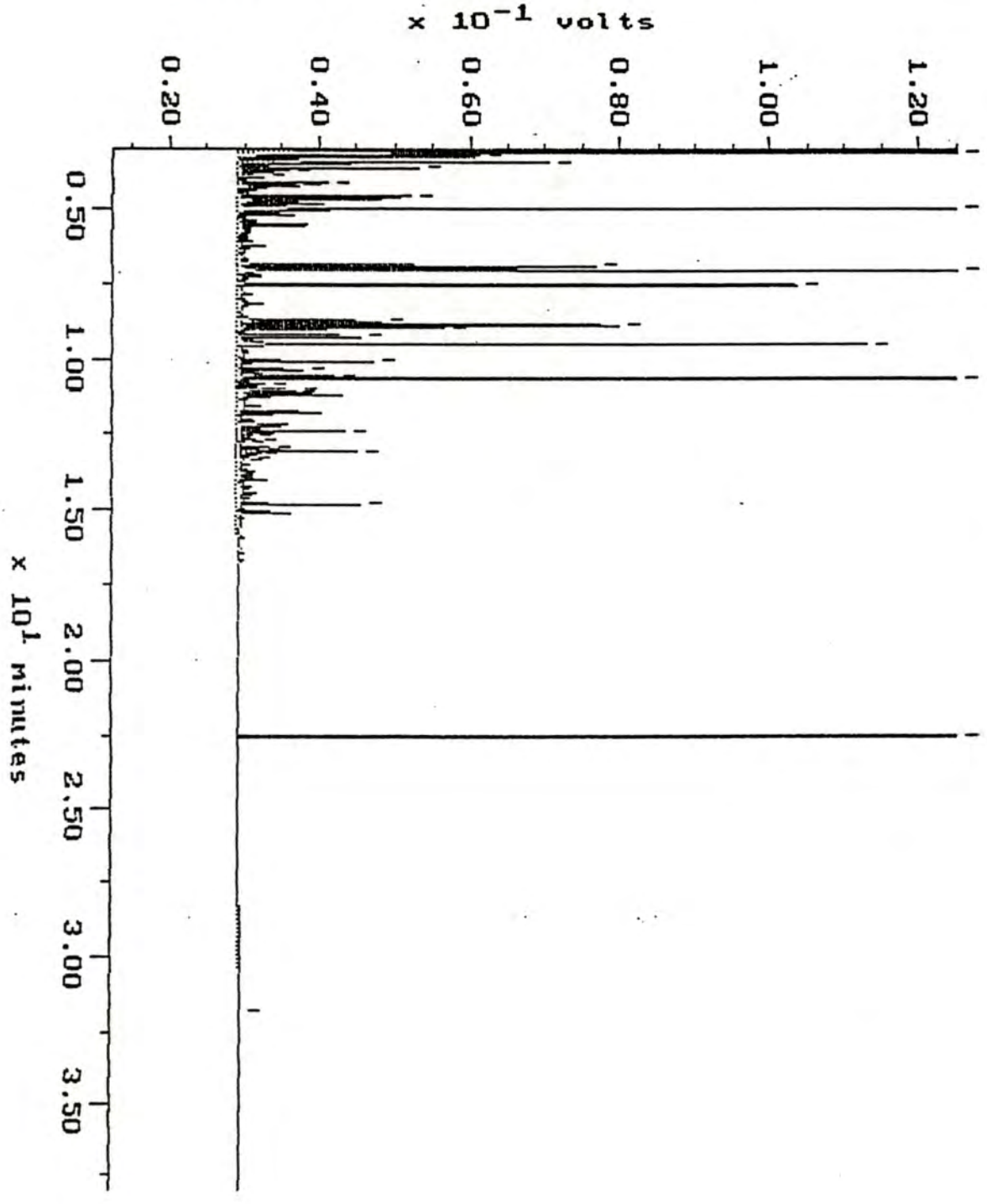
WA DOE WTPH-HCID Blank

Sample: SRB 6-20 Channel: BERT Filename: R6208B05
Acquired: 20-JUN-94 20:37 Method: F:\BR02\MAXDATA\BERT\FUEL0620 Operator: ATI
Comments: ATI: THE QUALITY TEAM



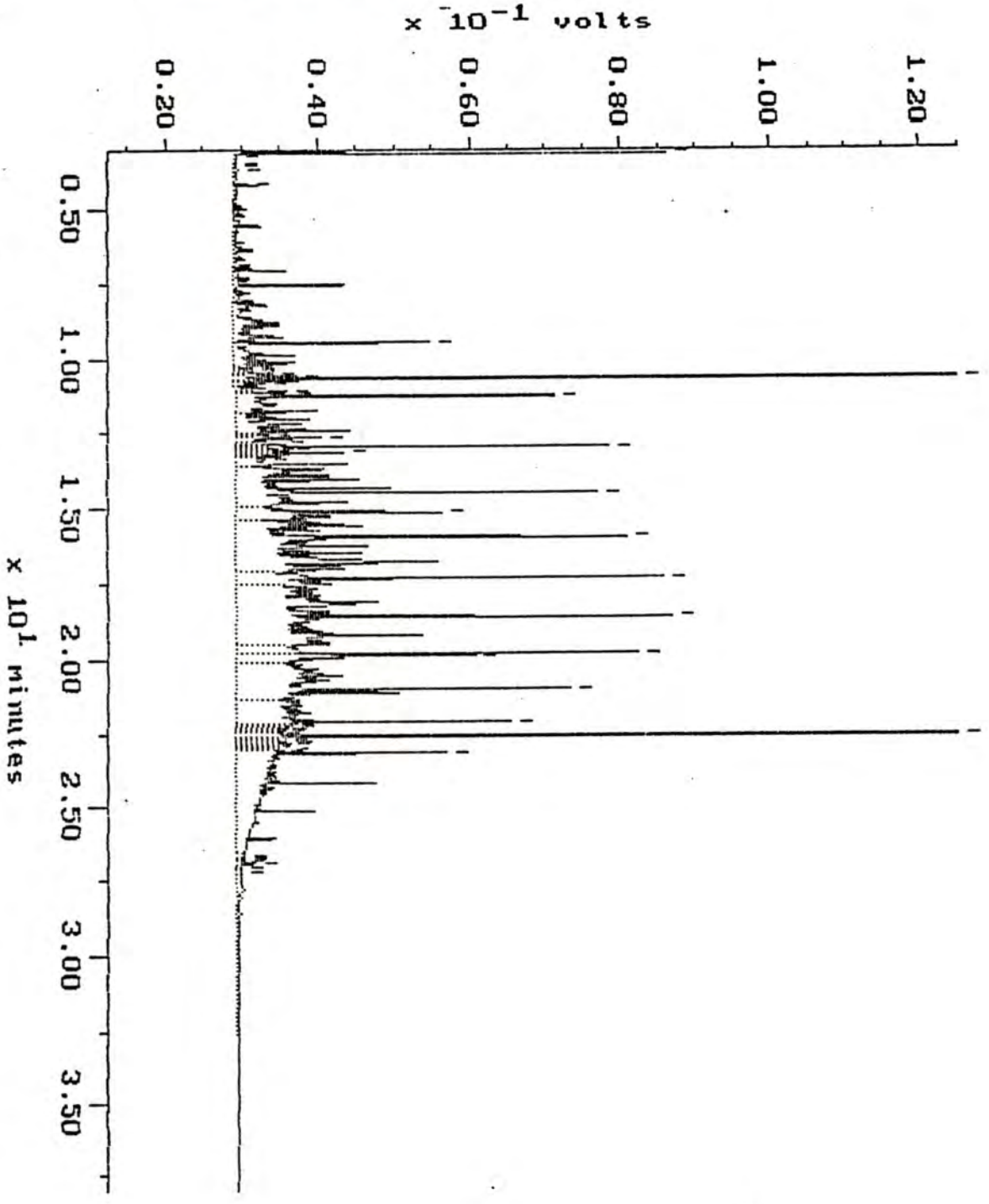
CONTINUING CALIBRATION

Sample: GAS 400 Channel: BERT Filename: R6168B20
Acquired: 17-JUN-94 9:40 Method: F:\BR02\MAXDATA\BERT\FUEL0616 Operator: ATI
Comments: ATI: THE QUALITY TEAM



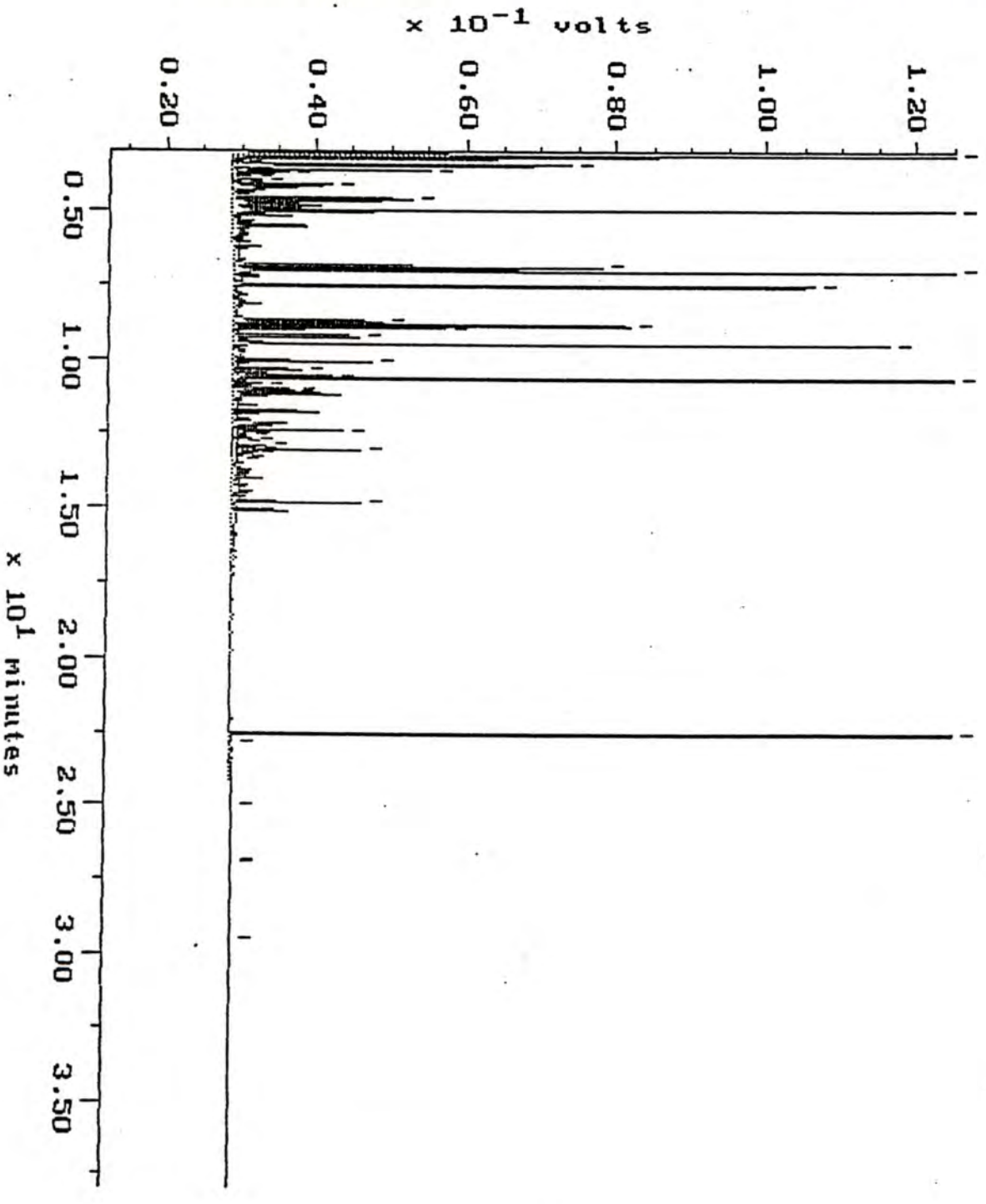
CONTINUING CALIBRATION

Sample: D 500 Channel: BERT Filename: R6168B19
Acquired: 17-JUN-94 8:53 Method: F:\BRO2\MAXDATA\BERT\FUEL0616 Operator: ATI
Comments: ATI: THE QUALITY TEAM



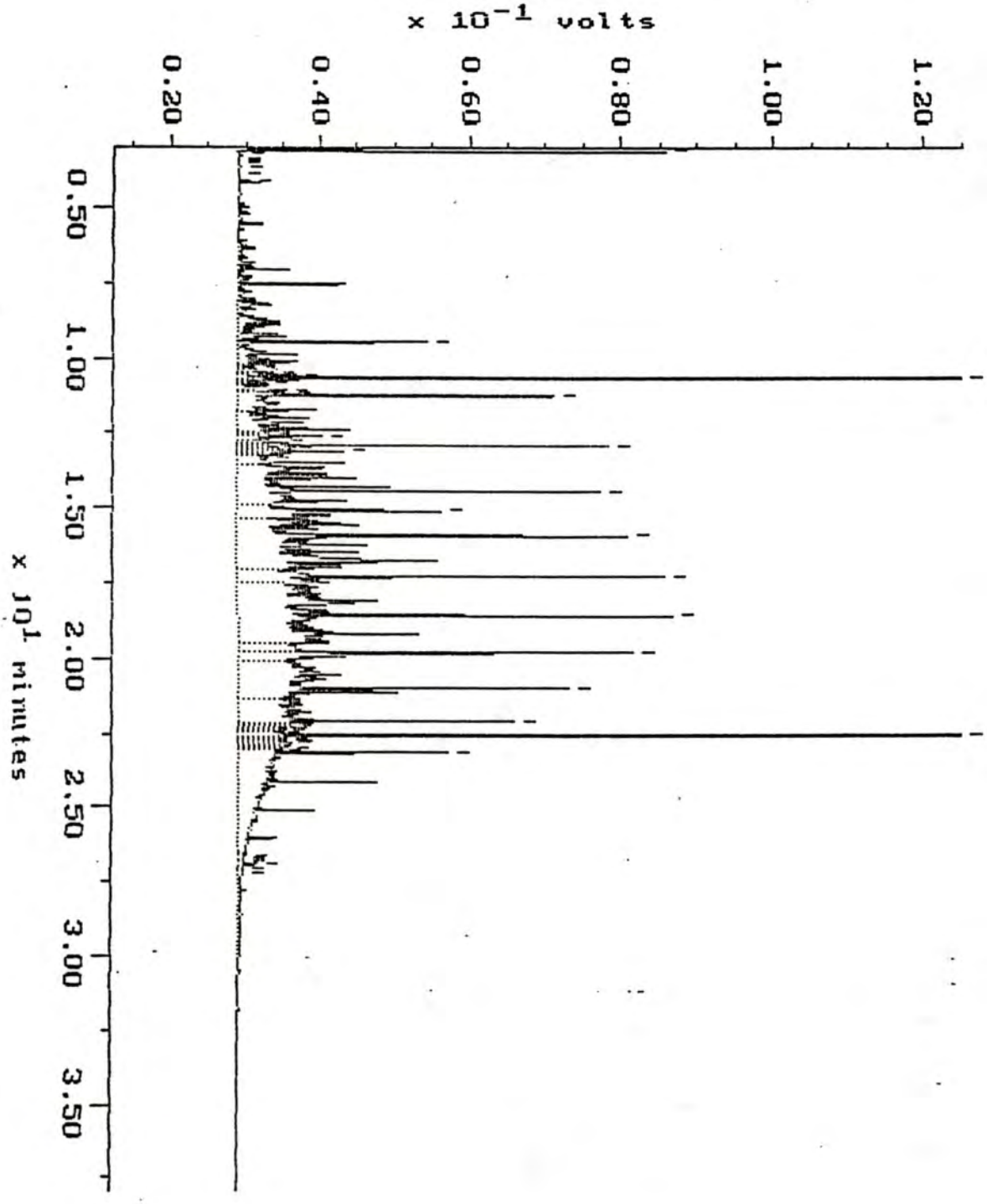
CONTINUING CALIBRATION

Sample: C-100 Channel: BERT Filename: B6178B01
Acquired: 17-JUN-94 19:11 Method: F:\BRO2\MAXDATA\BERT\FUEL0617 Operator: ATI
Comments: ATI: THE QUALITY TEAM

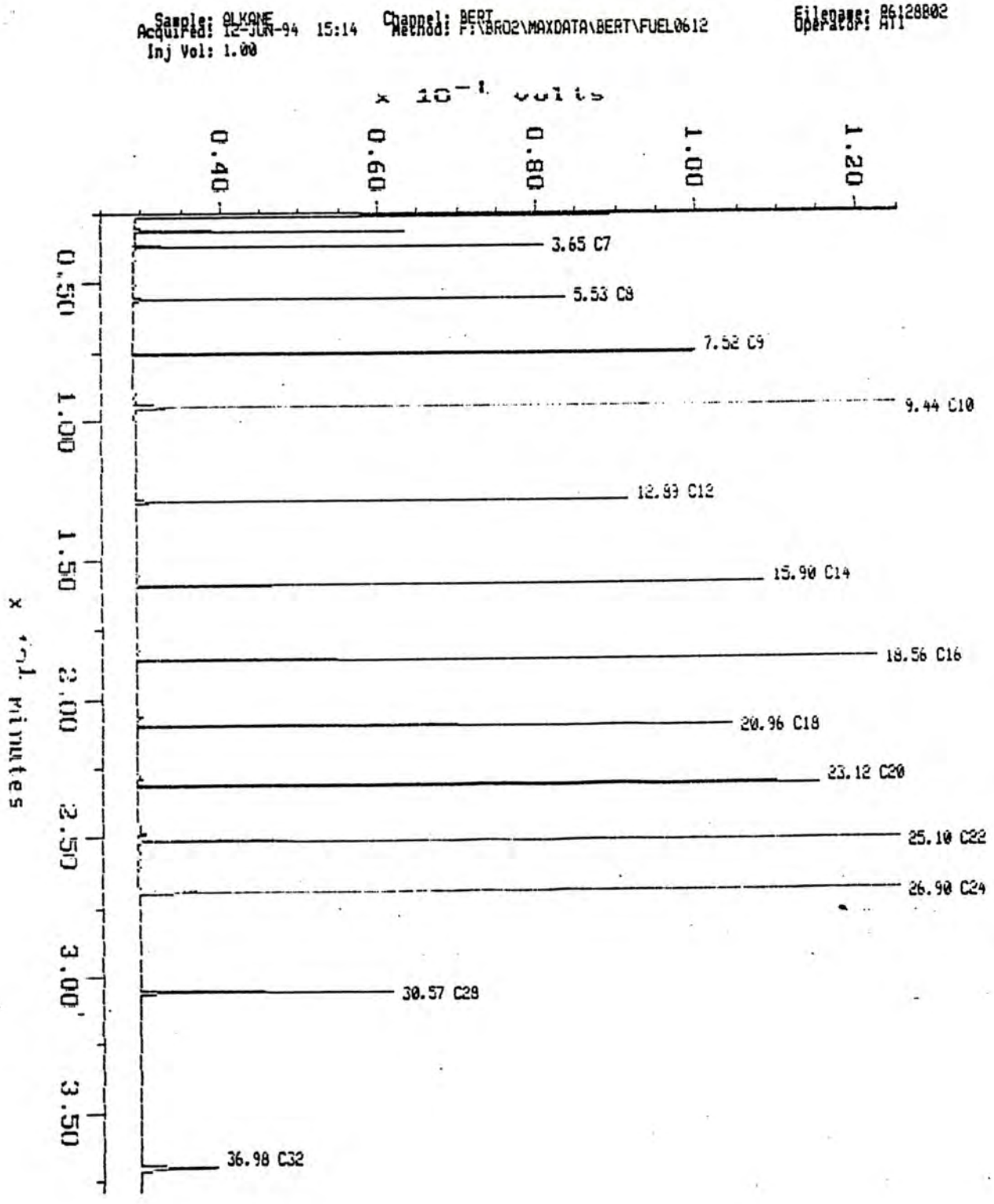


CONTINUING CALIBRATION

Sample: D 500 Channel: BERT Filename: R6178B02
Acquired: 17-JUN-94 19:58 Method: F:\BR02\MAXDATA\BERT\FUEL0617 Operator: ATI
Comments: ATI: THE QUALITY TEAM

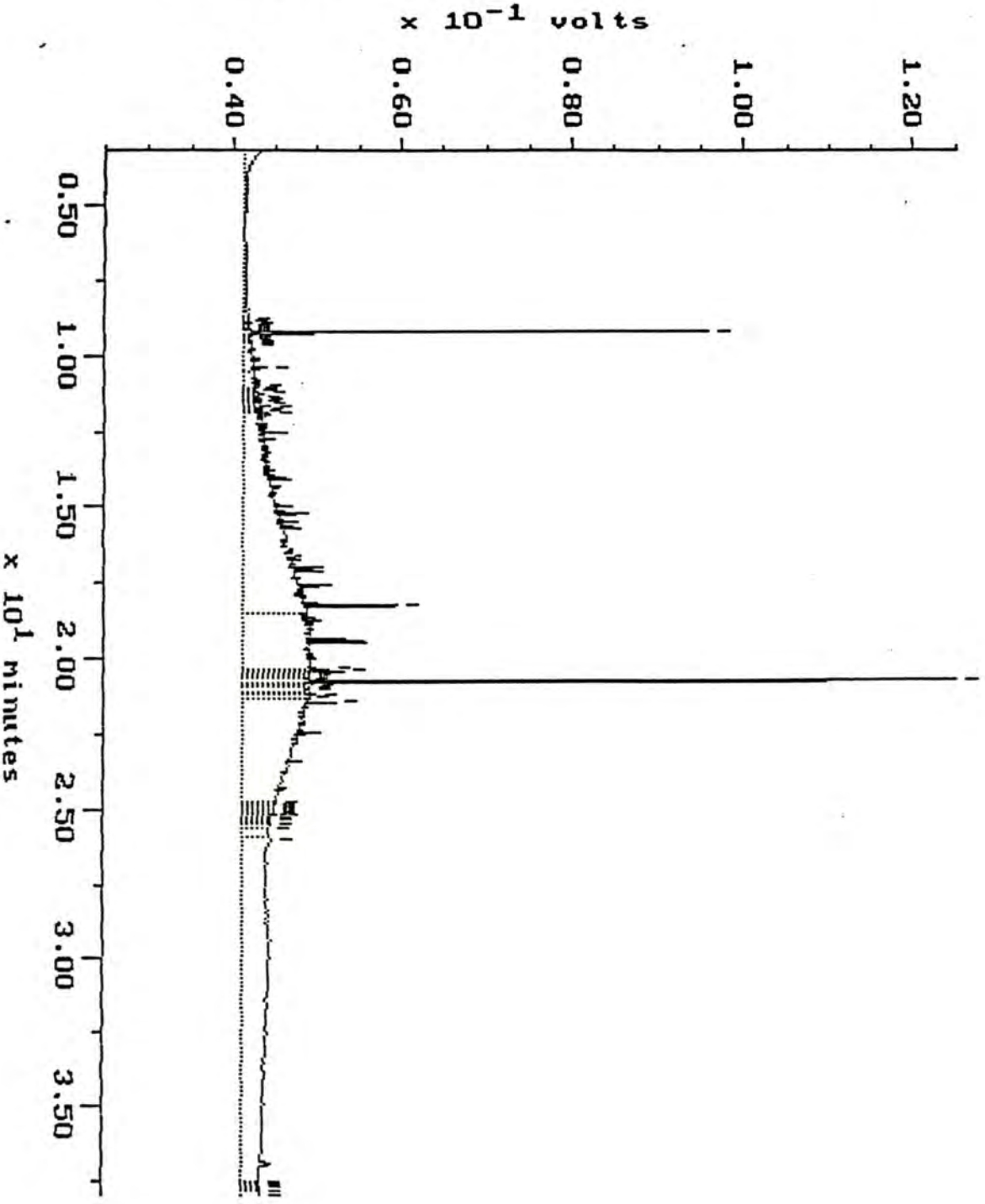


Alkane


Sample: ALKANE
Acquired: 12-JUN-94 15:14
Inj Vol: 1.00
Channel: BERT
Method: F:\BRO2\MAXDATA\BERT\FUEL0612
Filename: 86128802
Operator: HTI
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10¹ Minutes
3.65 C7
5.53 C8
7.52 C9
9.44 C10
12.89 C12
15.90 C14
18.56 C16
20.96 C18
23.12 C20
25.10 C22
26.90 C24
30.57 C28
36.98 C32

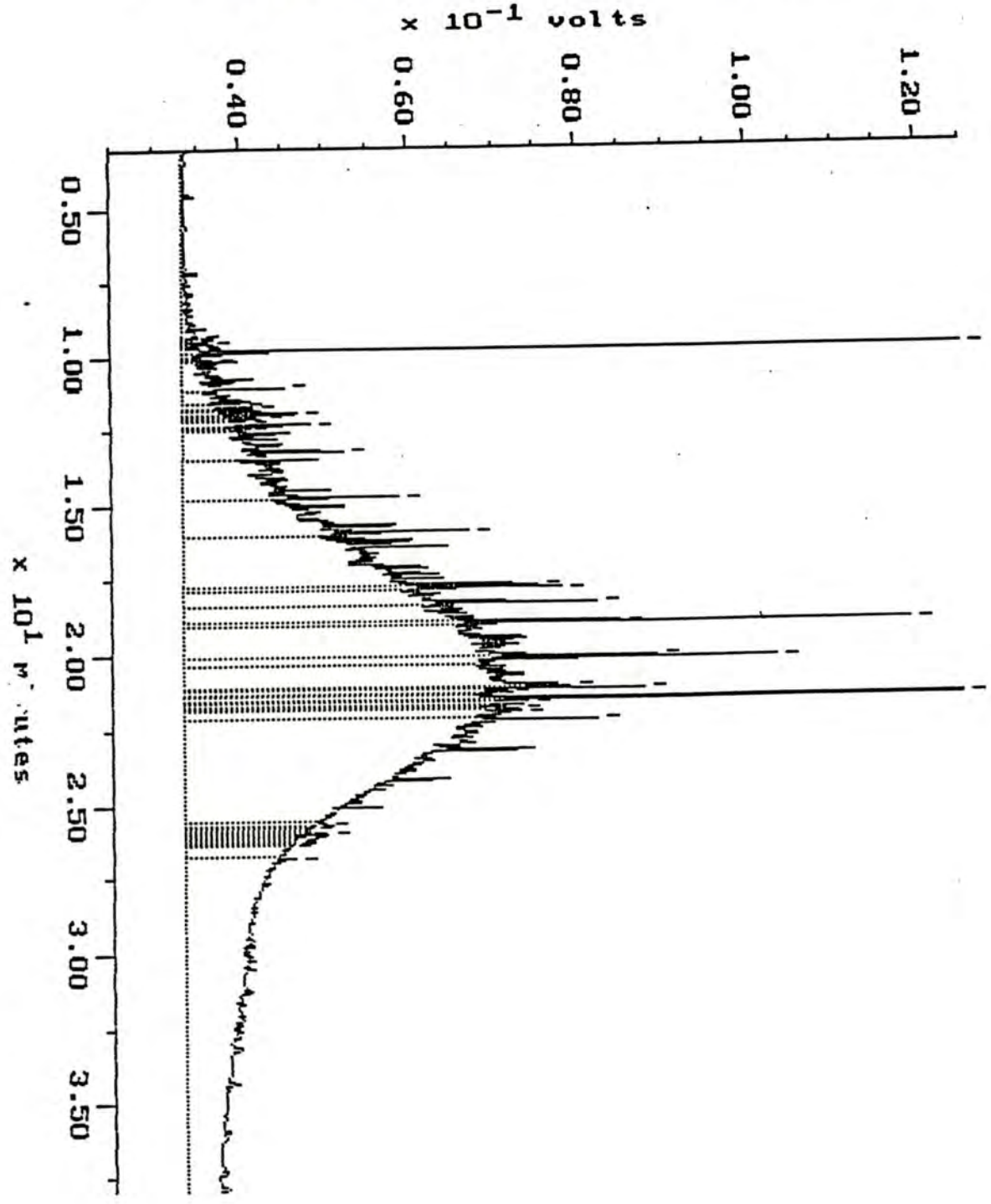
WA DOE WTPH-D

Sample: 9406-193-3 DIL Channel: ERNIE Filename: R6238E24
Acquired: 24-JUN-94 6:44 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0623 Operator: ATI
Dilution: 1 : 5.000
Comments: ATI: THE QUALITY TEAM



WA DOE WTPH-D

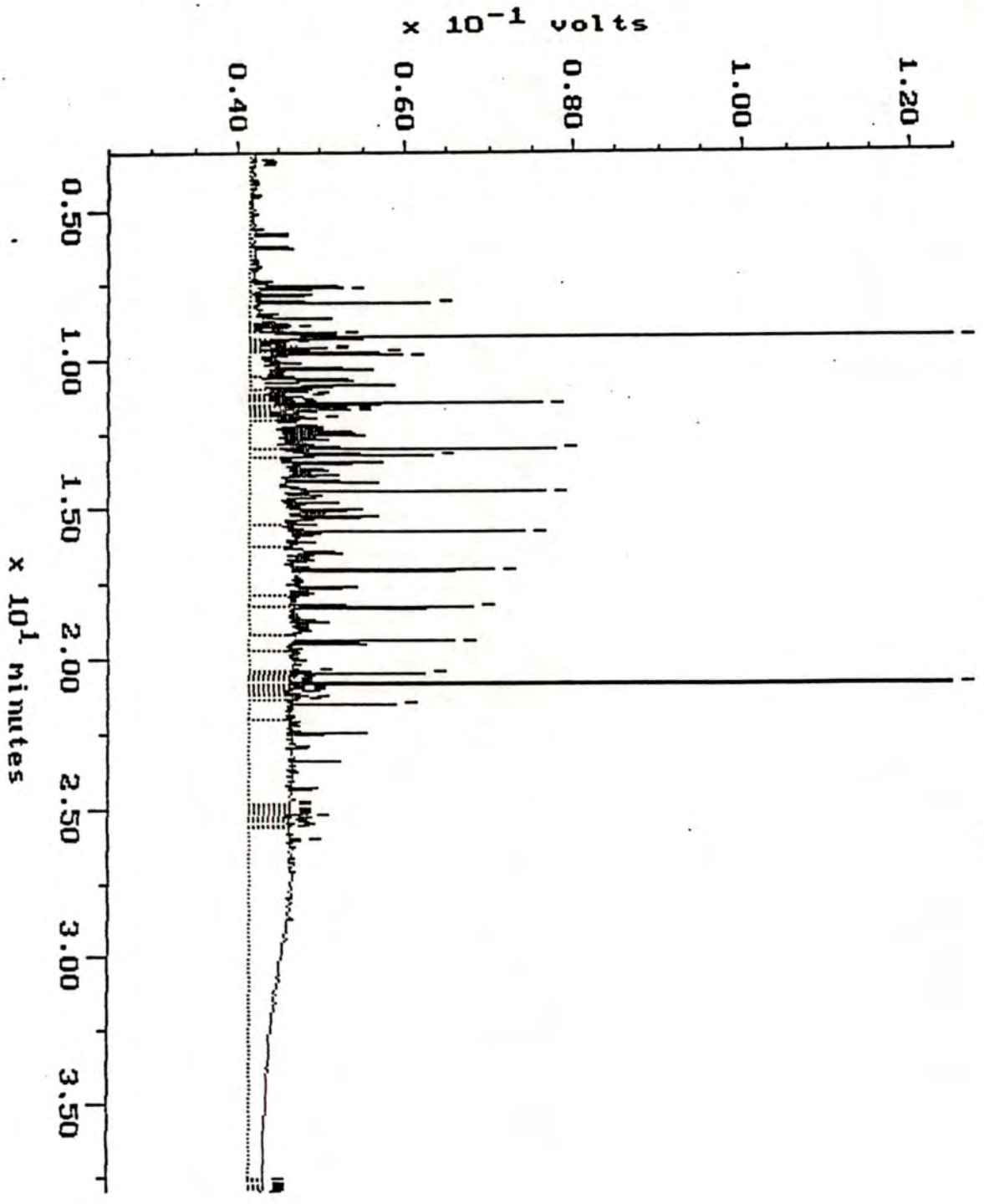
Sample: 9406-193-3 Channel: NANCY Filename: R6308N01
Acquired: 30-JUN-94 18:04 Method: F:\BRD2\MAXDATA\NANCY\FUEL0630 Operator: ATI
Comments: ATI RUSH FUELS:PROVIDERS OF EXCELLENCE AND QUALITY IN CLIENT SERVICE



WA DOE WTPH-D

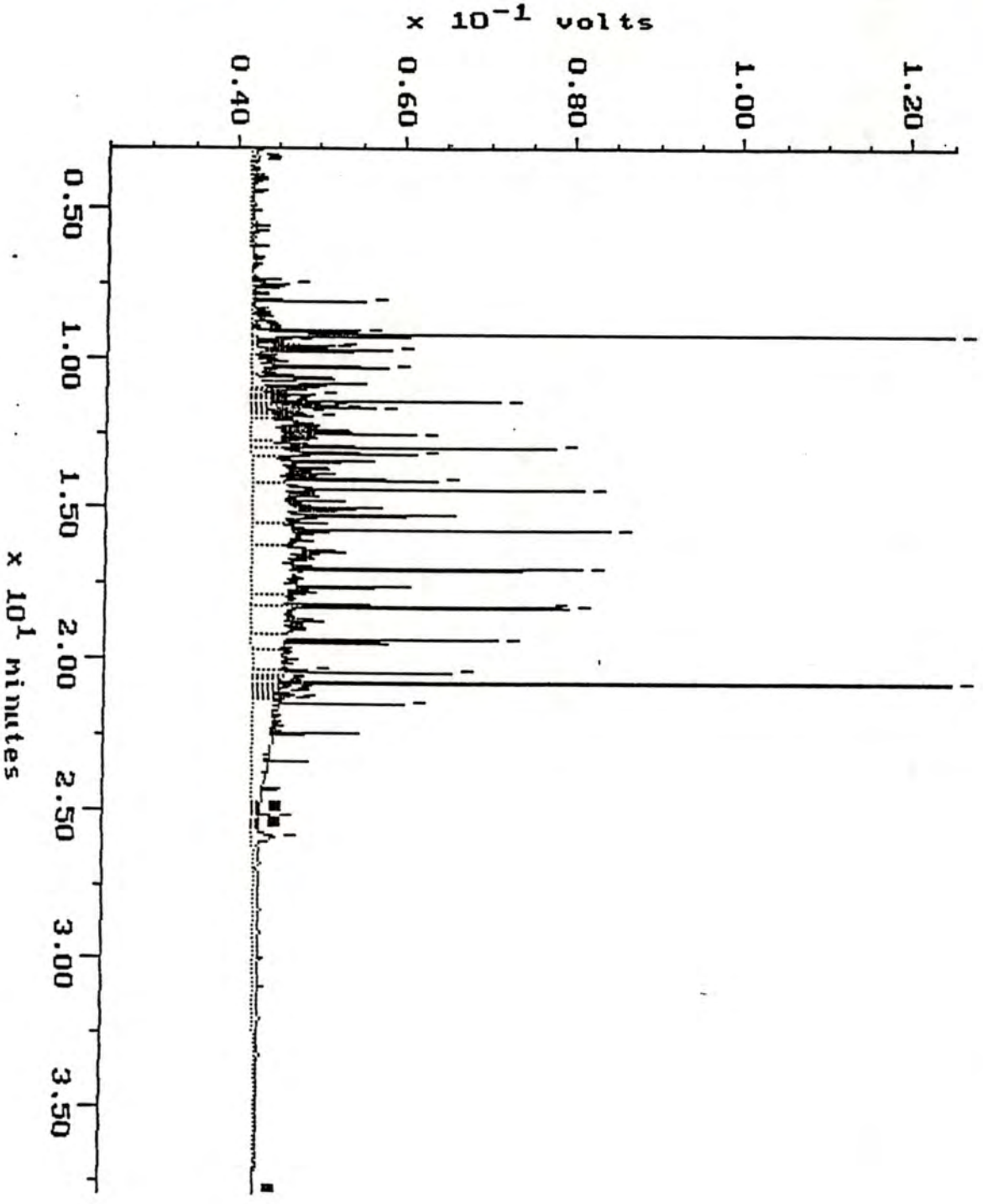
Sample: 9406-193-5 DIL Channel: ERNIE
Acquired: 22-JUN-94 8:42 Method: F:\BR02\MAXDATA\ERNIE\FUEL0621
Dilution: 1 : 5.000
Comments: ATI: THE QUALITY TEAM

Filename: R6218E31
Operator: ATI



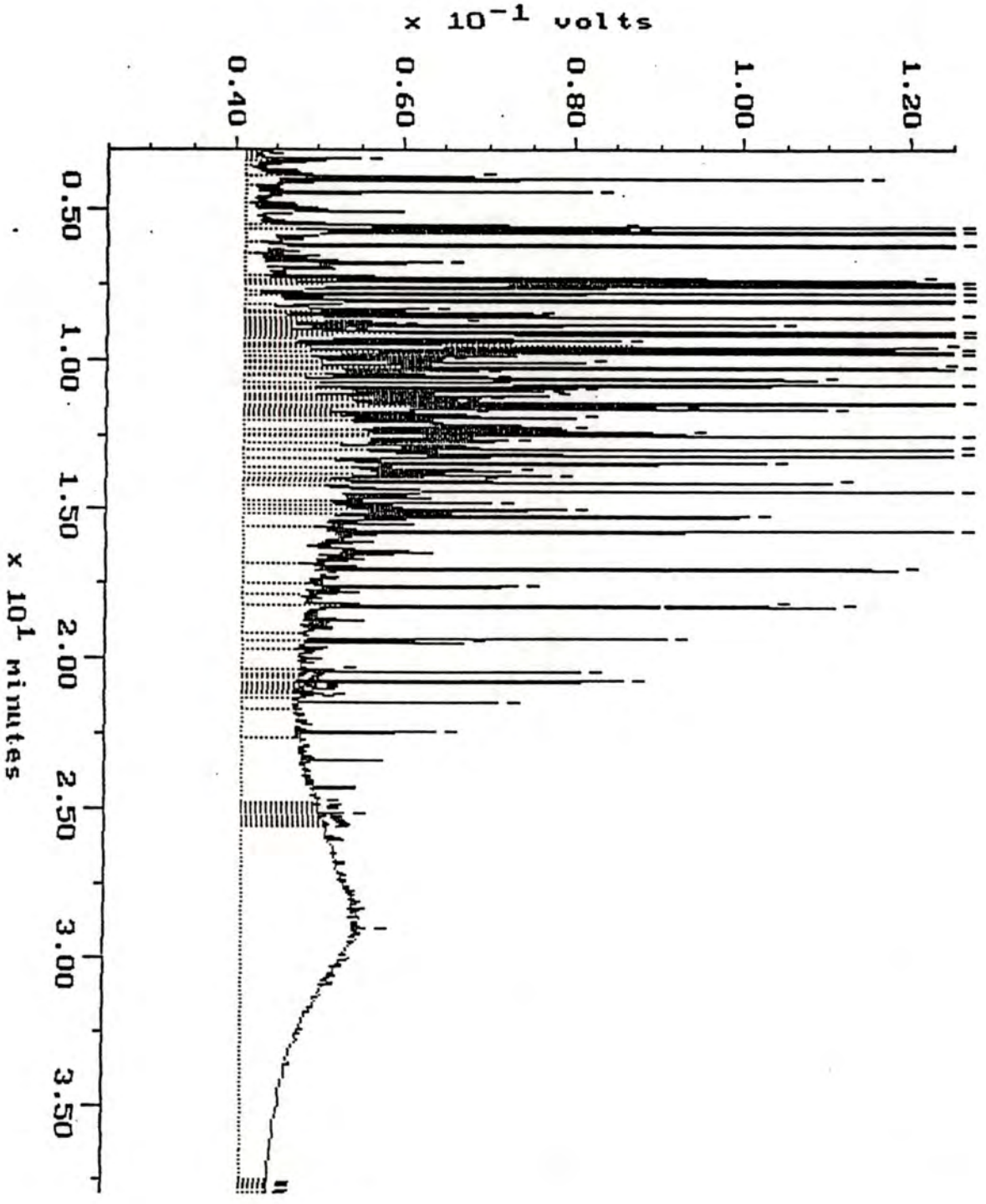
WA DOE WTPH-D

Sample: 9406-193-8 Channel: ERNIE Filename: R6218E38
Acquired: 22-JUN-94 7:56 Method: F:\BR02\MAXDATA\ERNIE\FUEL0621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



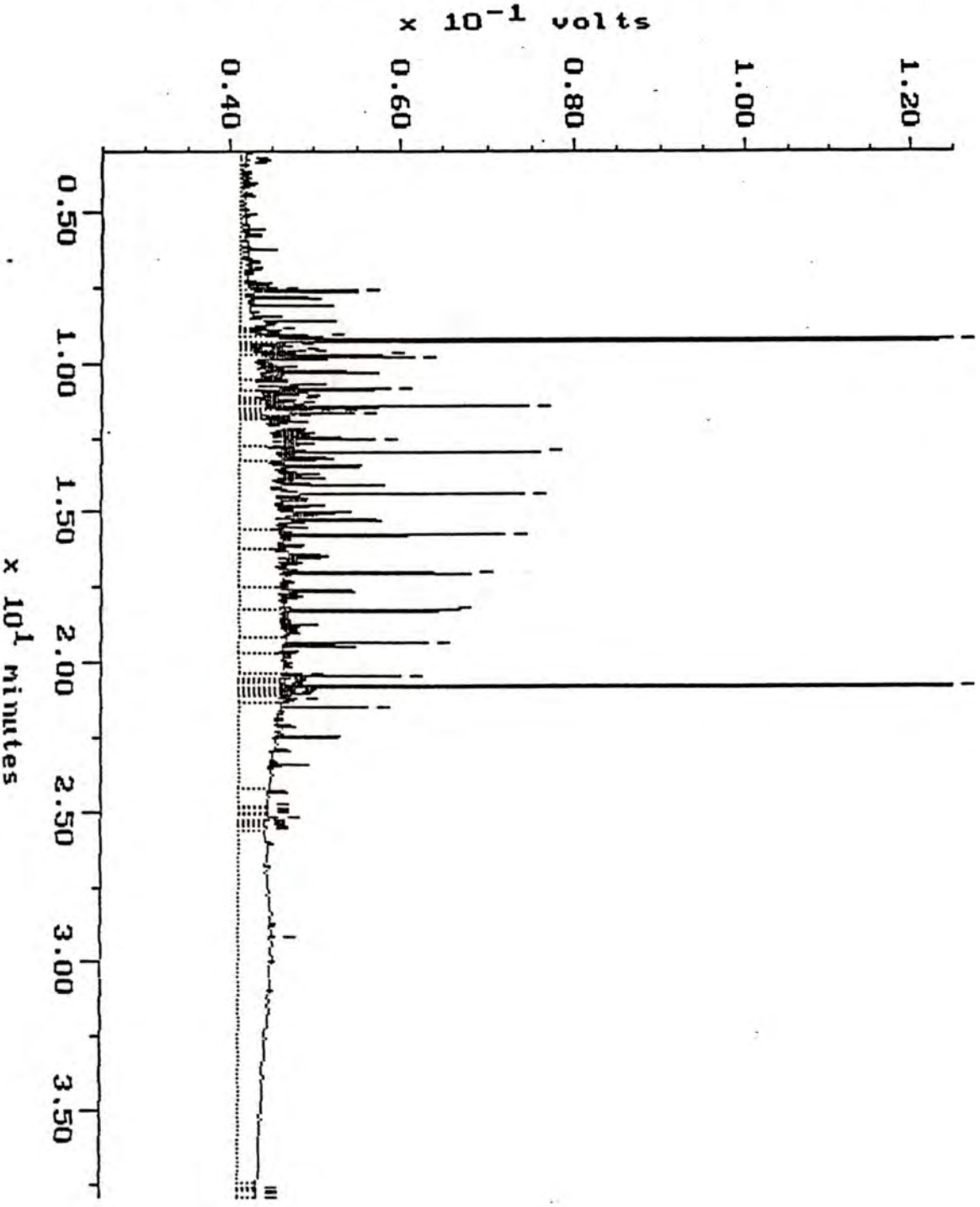
WA DOE WTPH-D

Sample: 9406-193-9 DIL Channel: ERNIE Filename: R6238E04
Acquired: 23-JUN-94 15:07 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0623 Operator: ATI
Dilution: 1 : 10.000
Comments: ATI: THE QUALITY TEAM



WA DOE WTPH-D

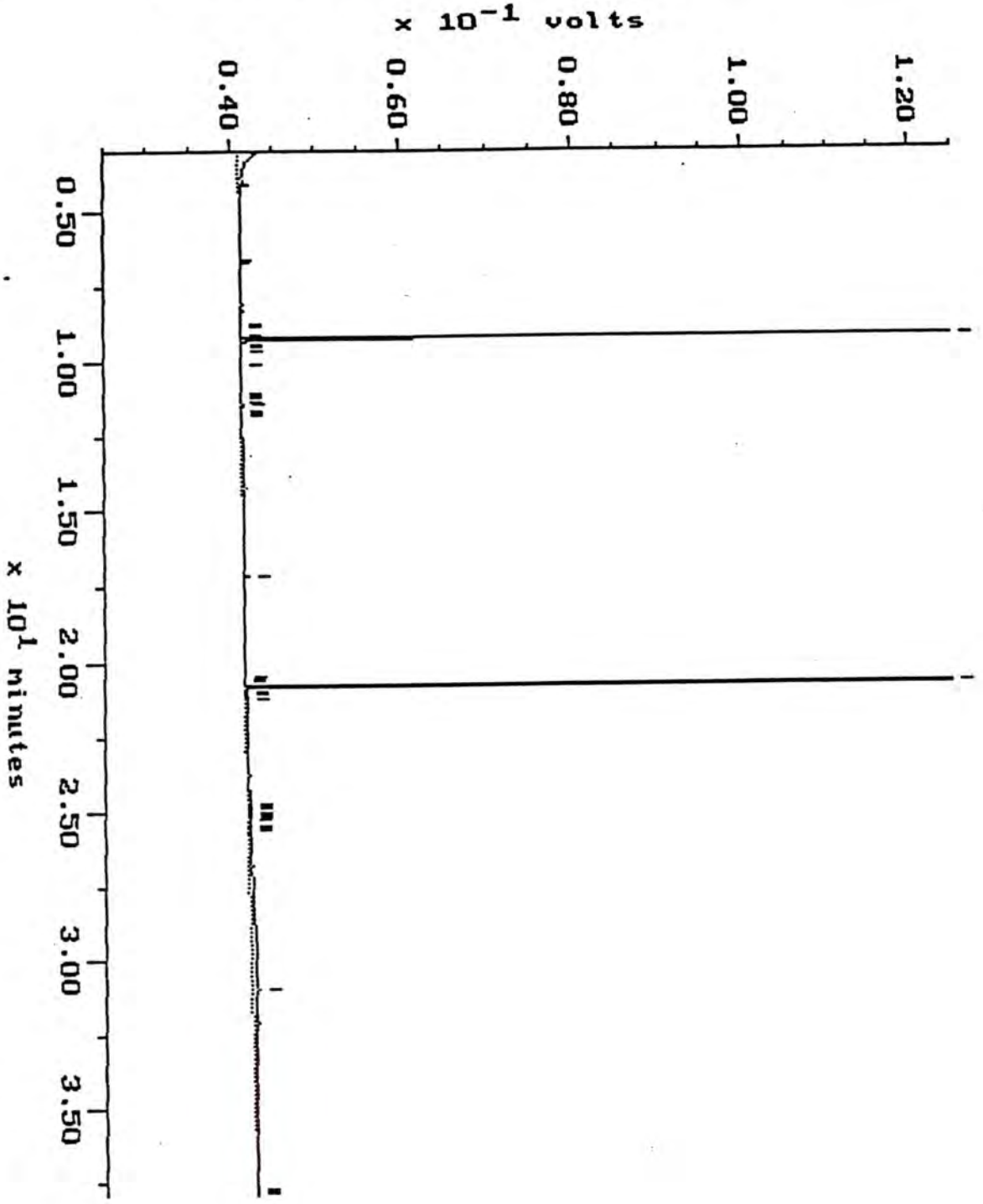
Sample: 9406-193-14 Channel: ERNIE Filename: R6218E33
Acquired: 22-JUN-94 12:04 Method: F:\BRO2\MAXDATA\ERNIE\FUELB621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



Blank

Sample: SRB B 6-28 Channel: ERNIE
Acquired: 21-JUN-94 12:37 Method: F:\BR02\MAXDATA\ERNIE\FUEL0621
Comments: ATI: THE QUALITY TEAM

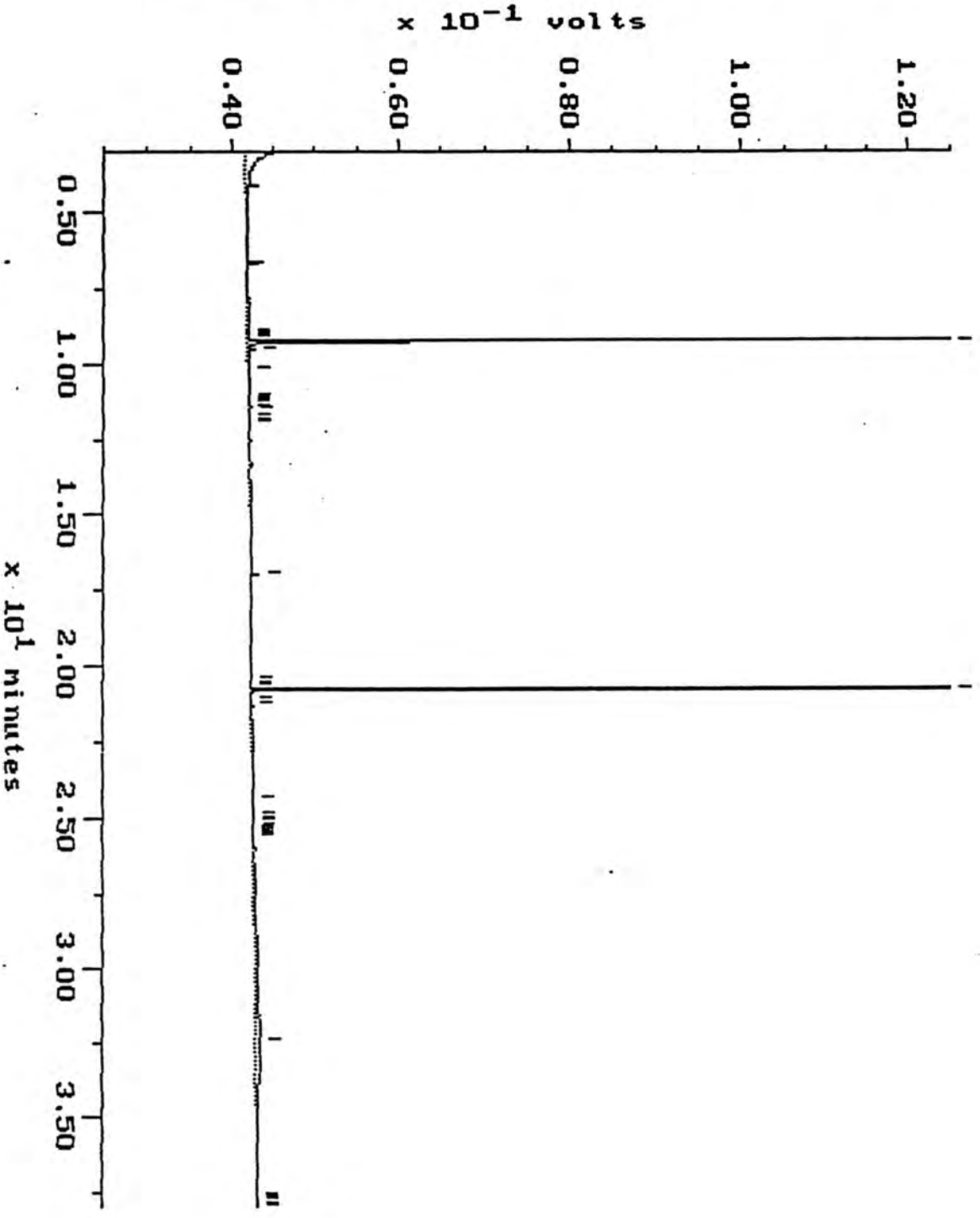
Filename: R6218E05
Operator: ATI



WA DOE WTPH-D

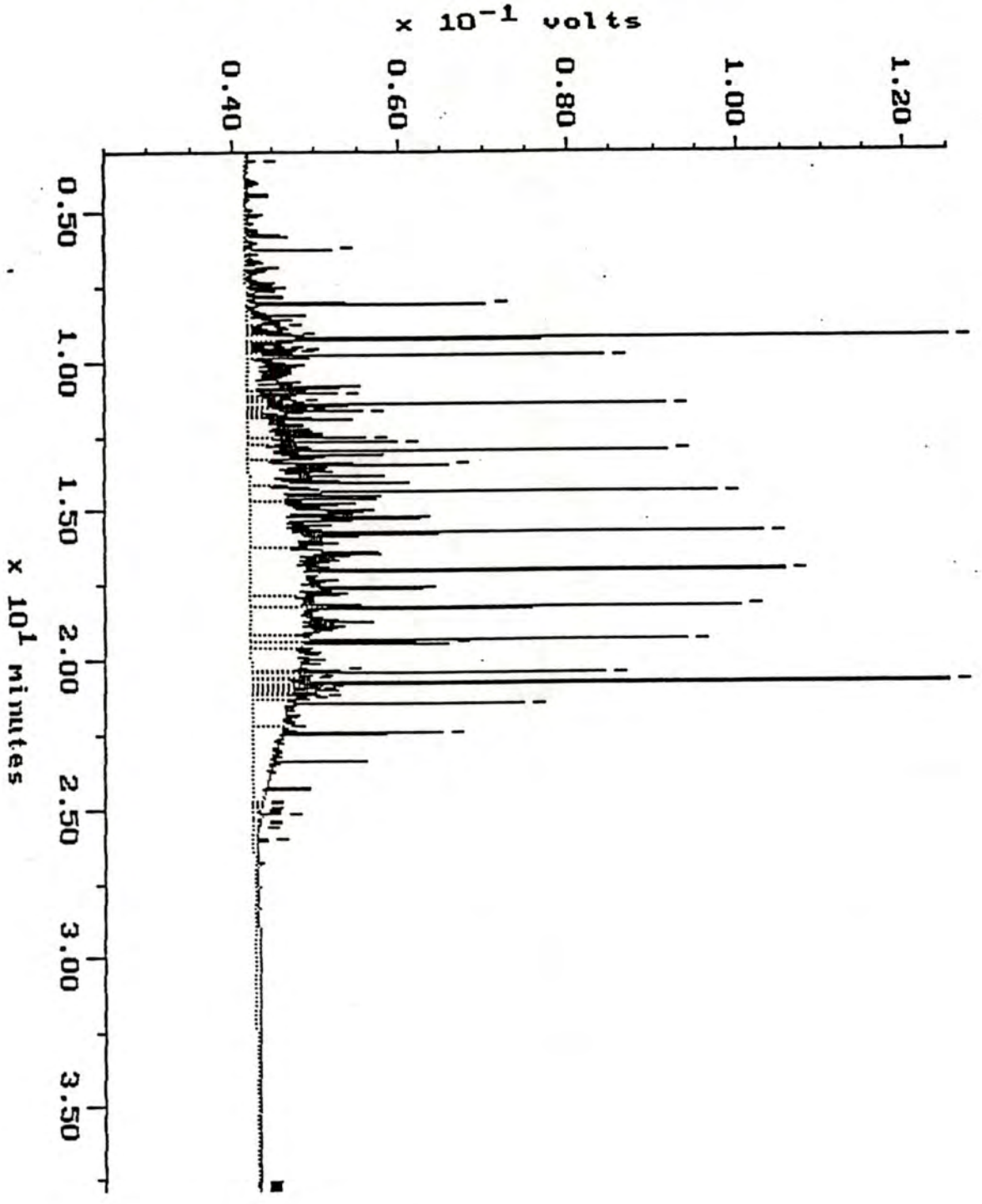
Blank

Sample: SRB-C 6-23 Channel: ERNIE Filename: R6238E13
Acquired: 23-JUN-94 22:12 Method: F:\BR02\MAXDATA\ERNIE\FUEL0623 Operator: ATI
Comments: ATI: THE QUALITY TEAM



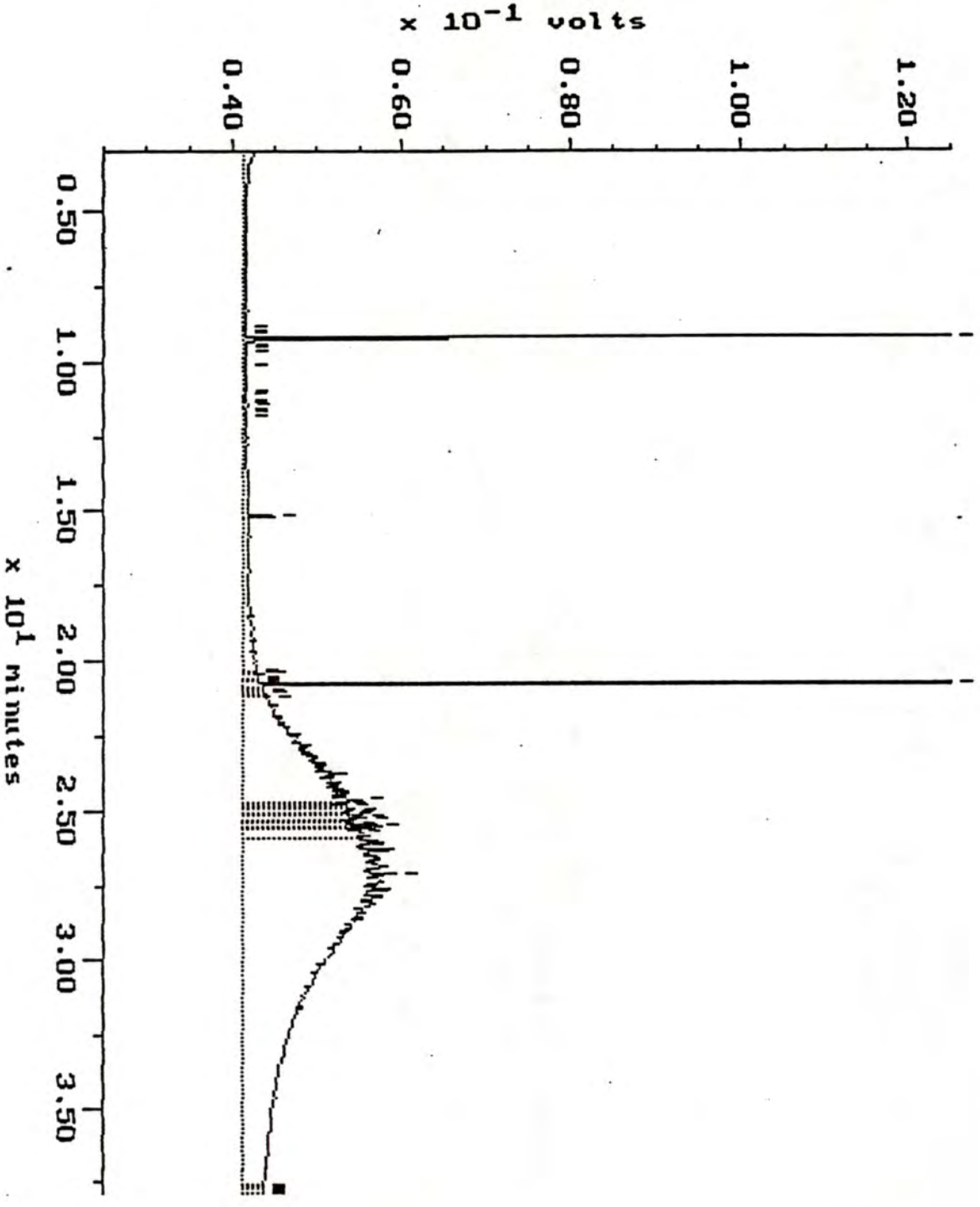
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6218E02
Acquired: 21-JUN-94 10:17 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



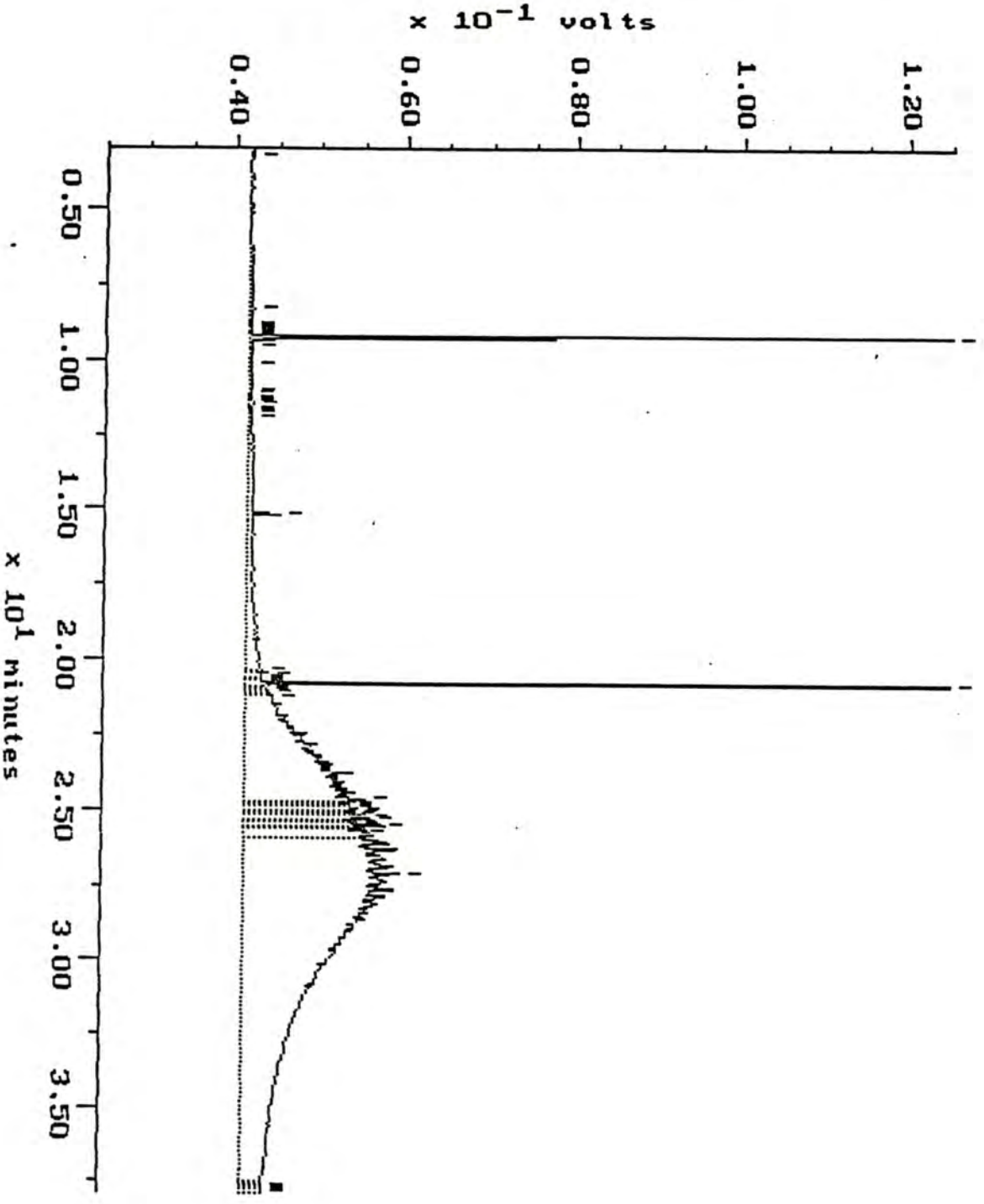
CONTINUING CALIBRATION

Sample: MO 508 Channel: ERNIE Filename: R6218E83
Acquired: 21-JUN-94 11:03 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



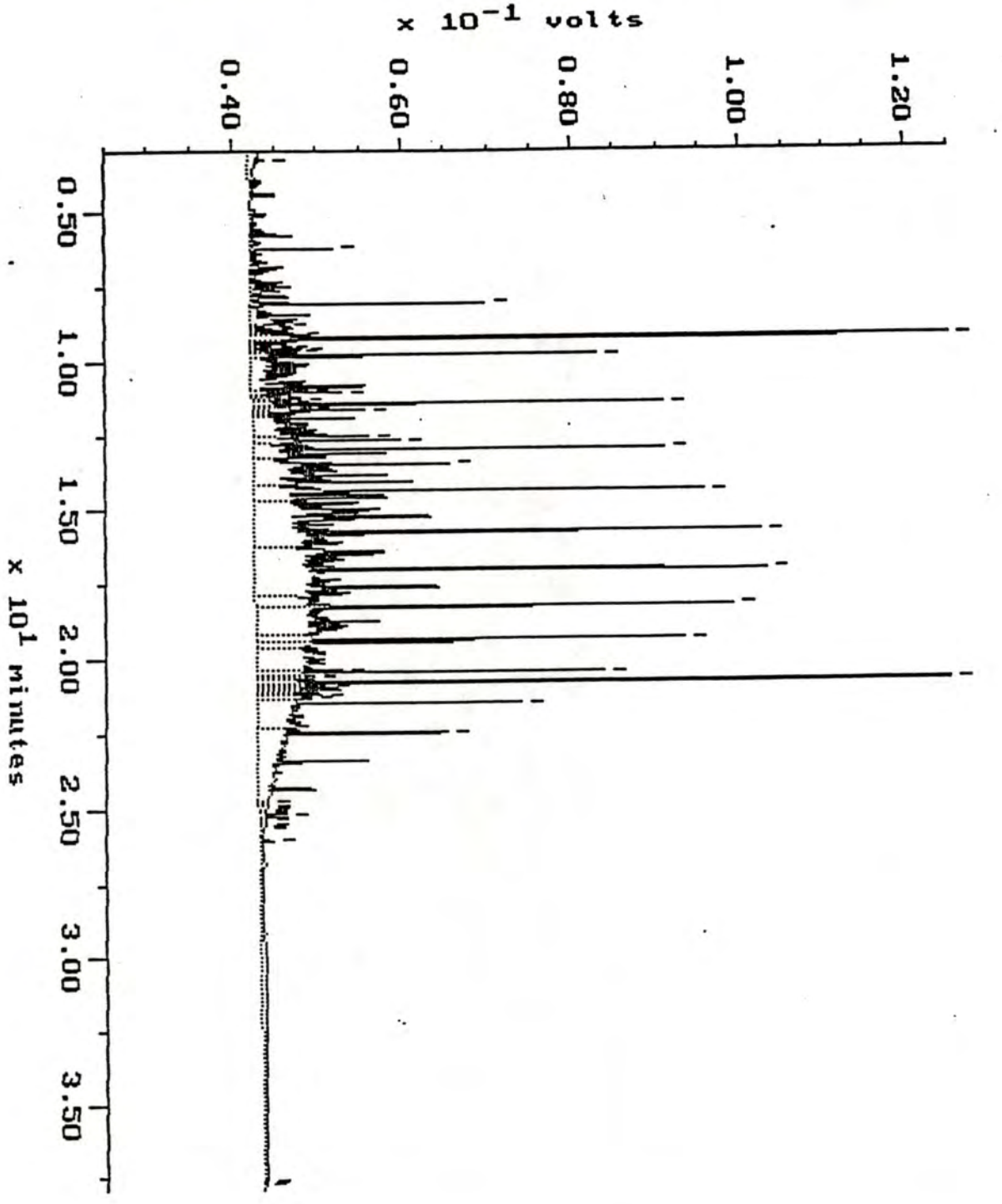
CONTINUING CALIBRATION

Sample: MO 588 Channel: ERNIE Filename: R6238E03
Acquired: 23-JUN-94 14:21 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0623 Operator: ATI
Comments: ATI: THE QUALITY TEAM



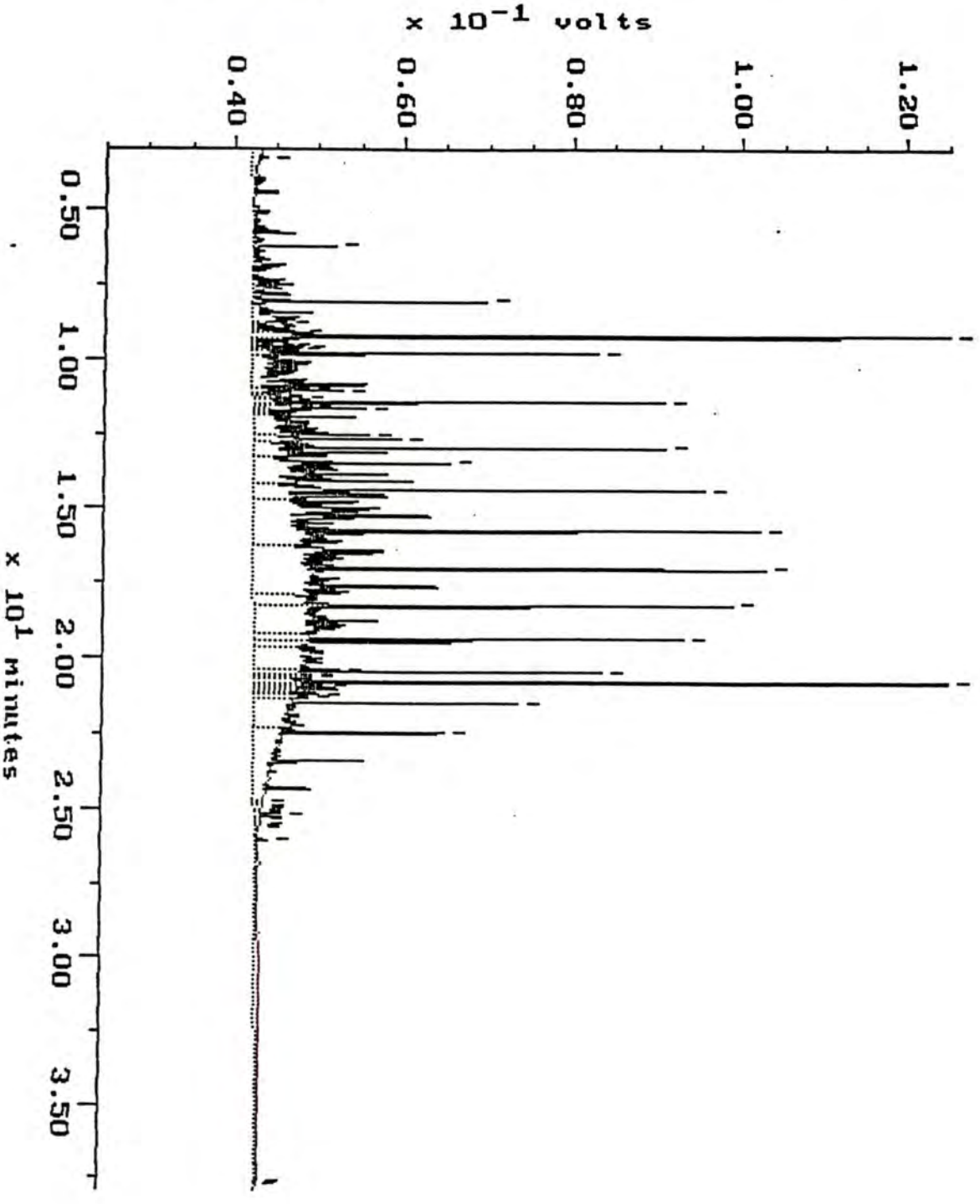
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6238E82
Acquired: 23-JUN-94 13:35 Method: F:\BRO2\MAXDATA\ERNIE\FUEL8623 Operator: ATI
Comments: ATI: THE QUALITY TEAM



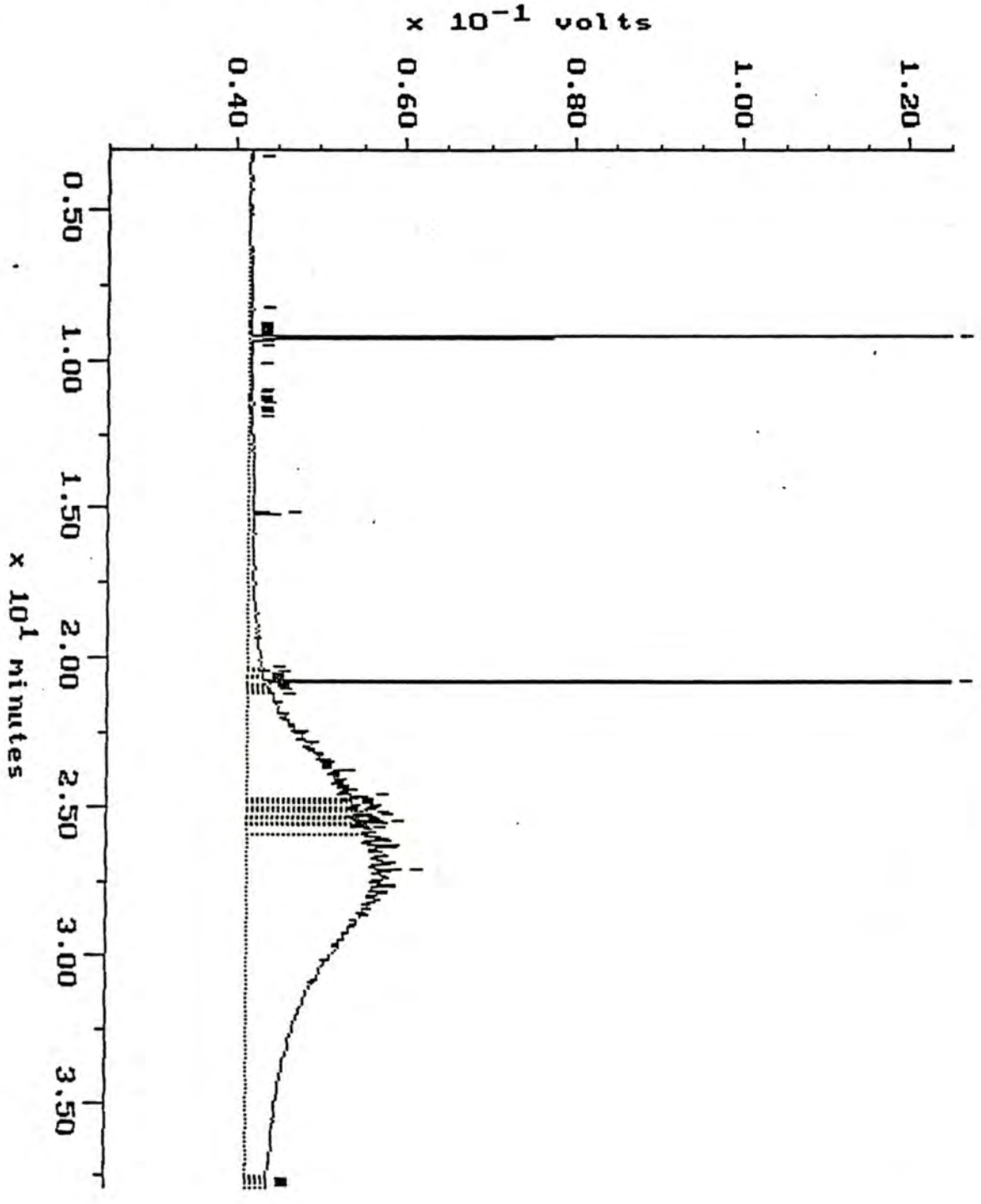
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6238E02
Acquired: 23-JUN-94 13:35 Method: F:\BRO2\MAXDATA\ERNIE\FUEL8623 Operator: ATI
Comments: ATI: THE QUALITY TEAM

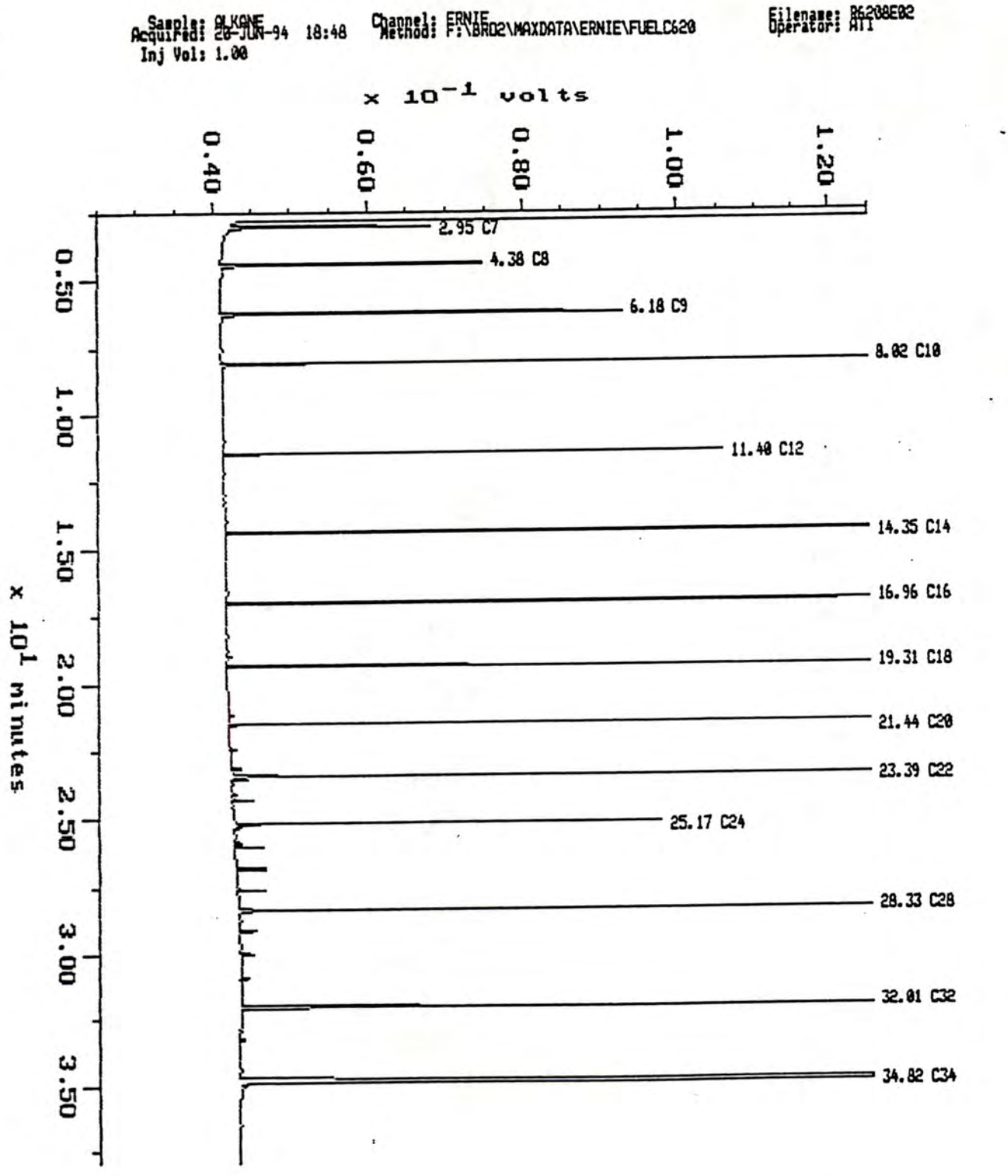


CONTINUING CALIBRATION

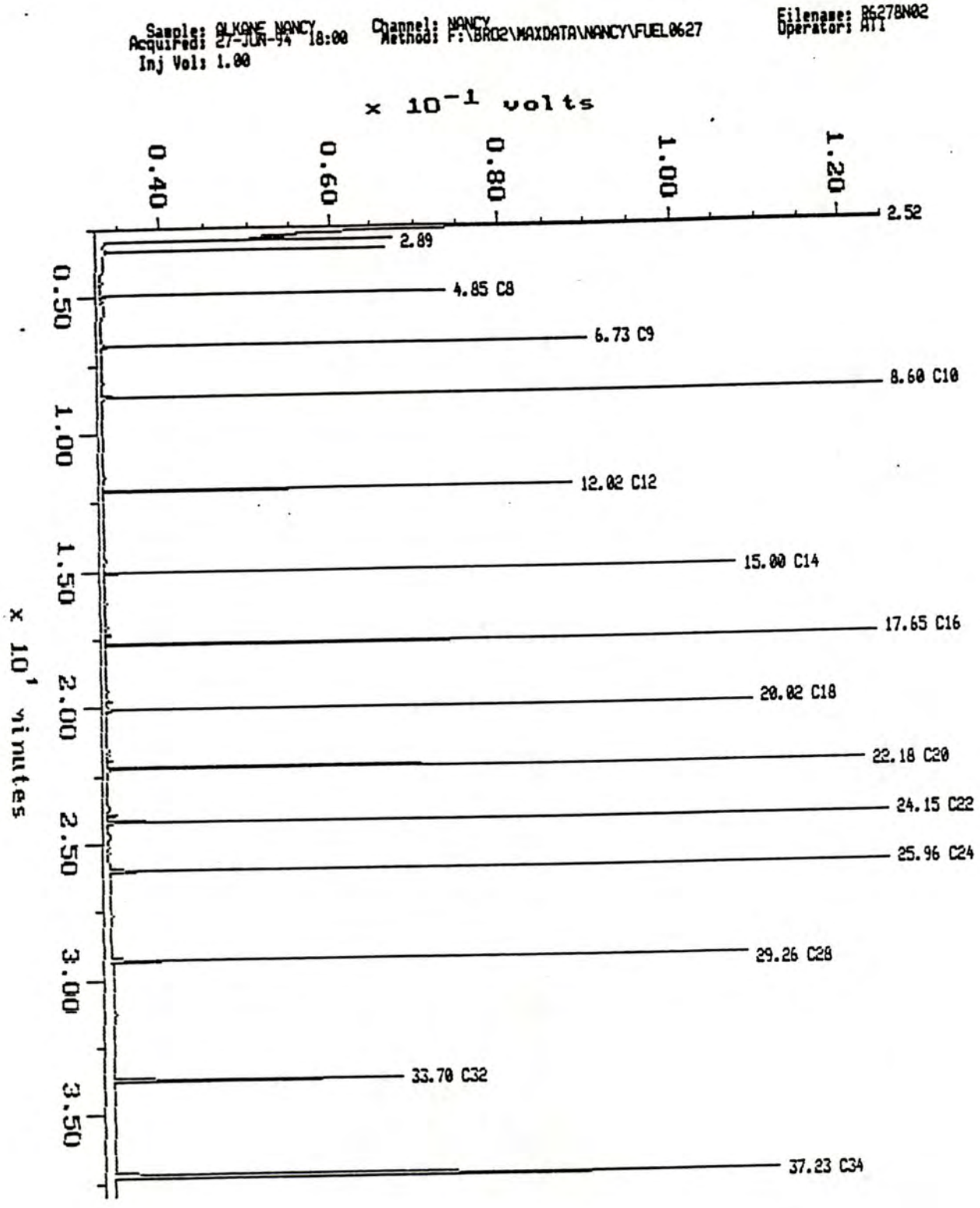
Sample: MO 500 Channel: ERNIE Filename: R6238E03
Acquired: 23-JUN-94 14:21 Method: F:\BRO2\MAXDATA\ERNIE\FUEL8623 Operator: ATI
Comments: ATI: THE QUALITY TEAM



Alkane


Sample: ALKANE
Acquired: 28-JUN-94 18:48
Inj Vol: 1.00
Channel: ERNIE
Method: F:\BR02\MAXDATA\ERNIE\FUELC620
Filename: R6208E02
Operator: ATI
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
x 10¹ minutes
0.50
1.00
1.50
2.00
2.50
3.00
3.50
2.95 C7
4.38 C8
6.18 C9
8.02 C10
11.40 C12
14.35 C14
16.96 C16
19.31 C18
21.44 C20
23.39 C22
25.17 C24
28.33 C28
32.01 C32
34.82 C34

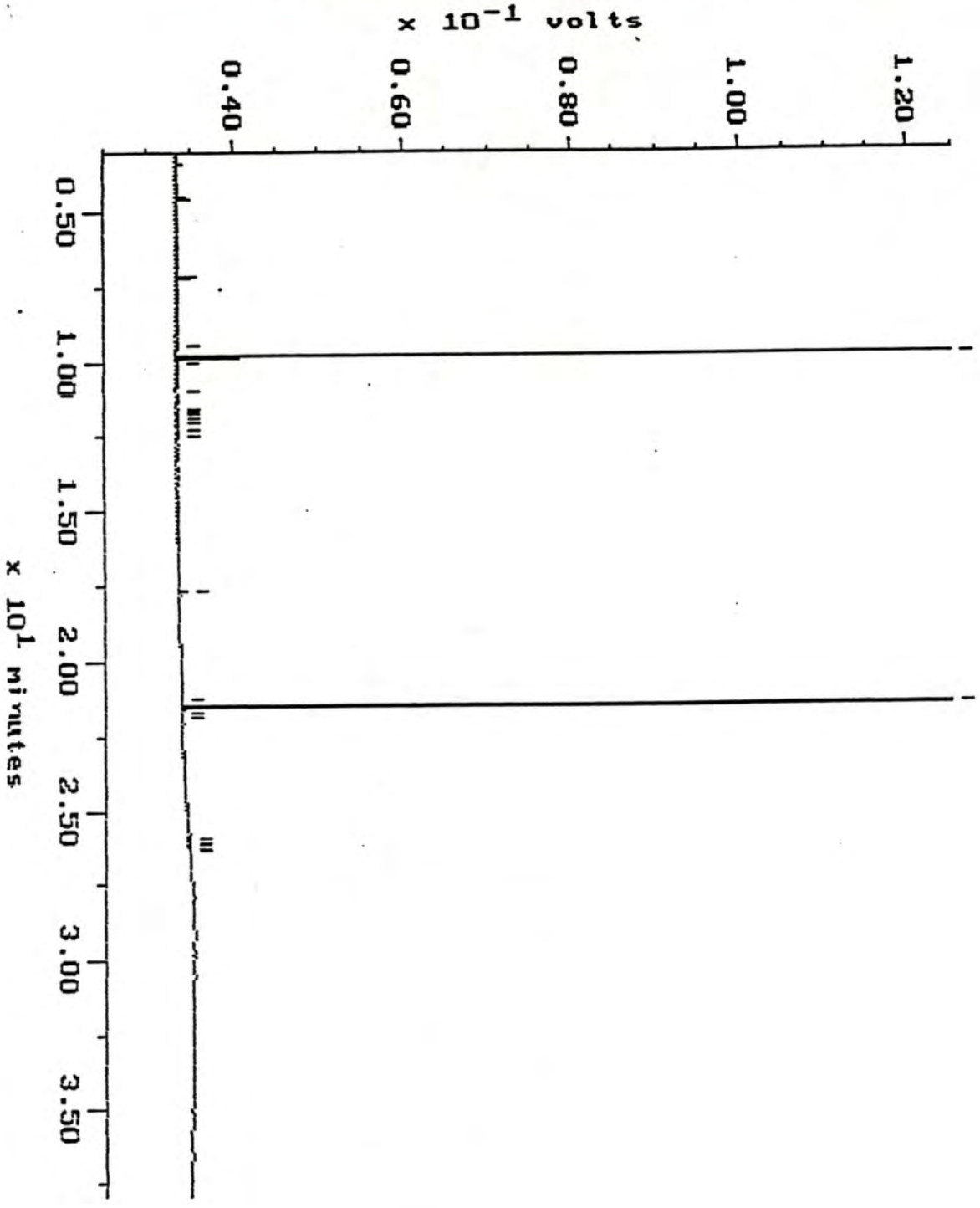
Alkane


Sample: ALKANE NANCY
Acquired: 27-JUN-94 18:00
Inj Vol: 1.00
Channel: NANCY
Method: F:\BRO2\MAXDATA\NANCY\FUEL0627
Filename: R6278N02
Operator: ATI
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
2.52
2.89
4.85 C8
6.73 C9
8.60 C10
12.02 C12
15.00 C14
17.65 C16
20.02 C18
22.18 C20
24.15 C22
25.96 C24
29.26 C28
33.70 C32
37.23 C34
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10¹ minutes

Blank

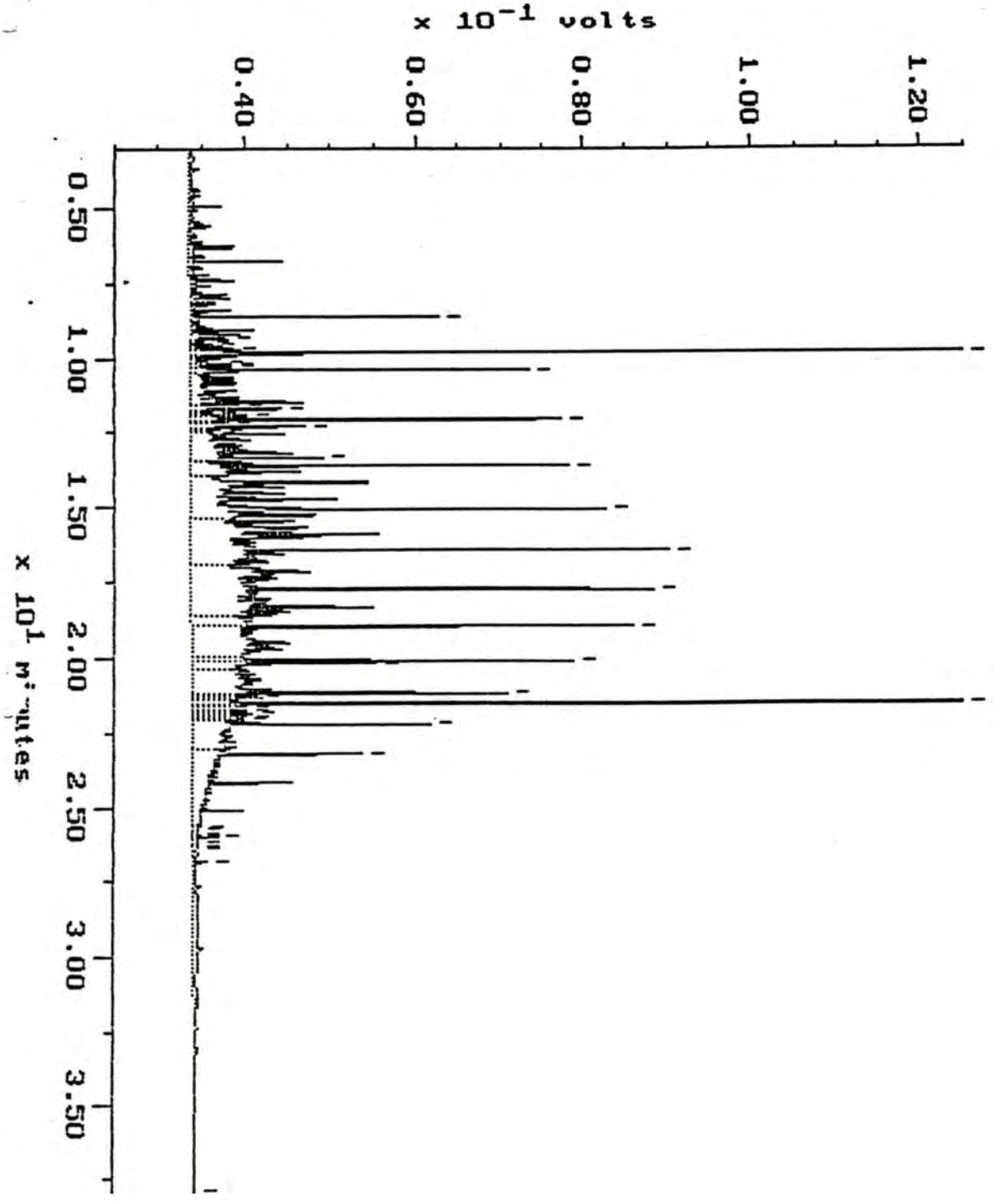
WA DOE WTPH-D

Sample: SRB-C 6-23 Channel: NANCY Filename: R6308N03
Acquired: 30-JUN-94 19:40 Method: F:\BRO2\MAXDATA\NANCY\FUEL0630 Operator: ATI
Comments: ATI RUSH FUELS:PROVIDERS OF EXCELLENCE AND QUALITY IN CLIENT SERVICE



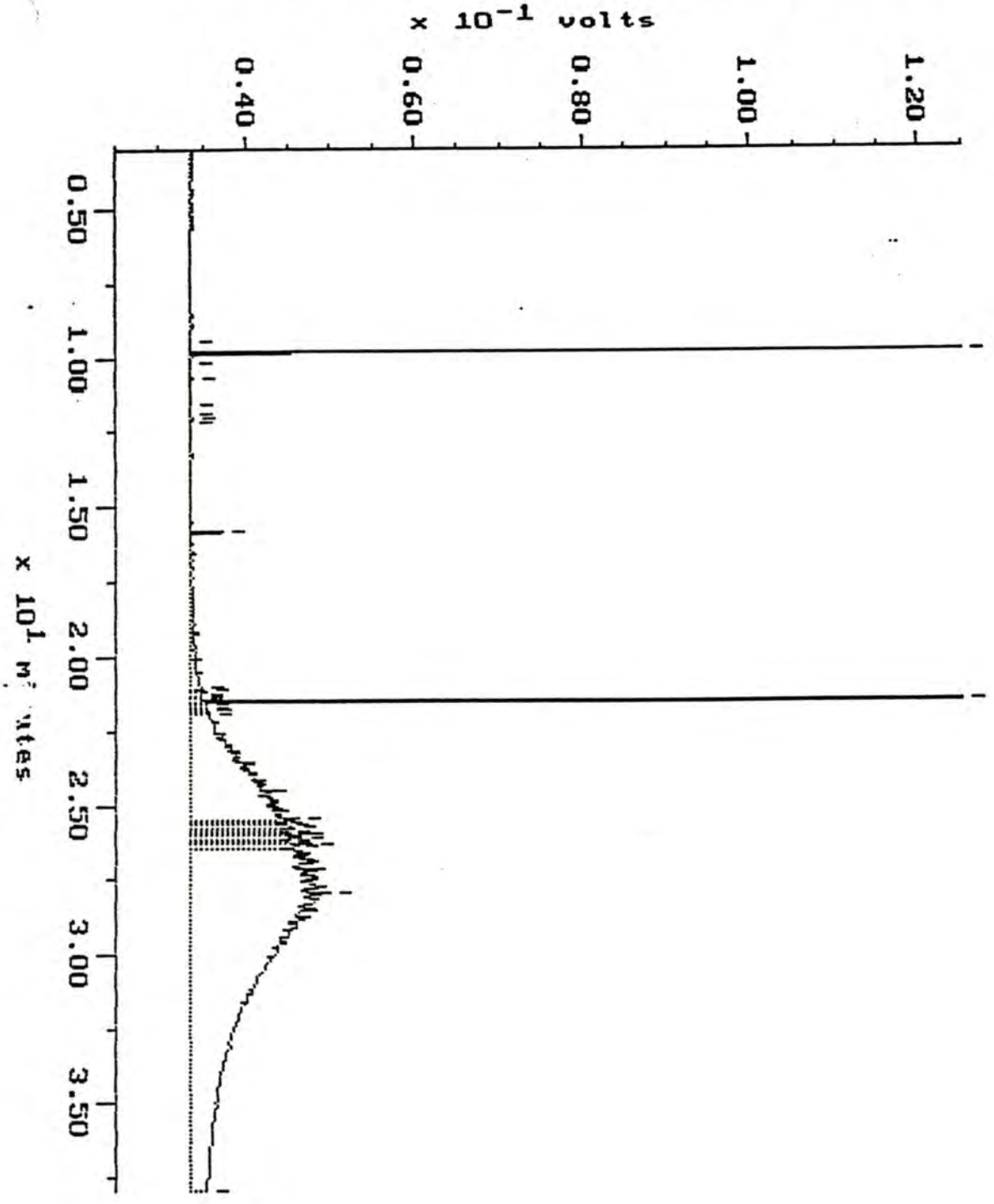
CONTINUING CALIBRATION

Sample: D 500 Channel: NANCY Filename: R6308N04
Acquired: 30-JUN-94 20:28 Method: F:\BRO2\MAXDATA\NANCY\FUEL0630 Operator: ATI
Comments: ATI RUSH FUELS:PROVIDERS OF EXCELLENCE AND QUALITY IN CLIENT SERVICE



CONTINUING CALIBRATION

Sample: MO 500 Channel: NANCY Filename: R6308N05
Acquired: 30-JUN-94 21:17 Method: F:\BRO2\MAXDATA\NANCY\FUEL0630 Operator: ATI
Comments: ATI RUSH FUELS:PROVIDERS OF EXCELLENCE AND QUALITY IN CLIENT SERVICE



Ap[illegible]d Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN-OF-CU[illegible]ODY

Date 6-16-94 Page 1 of _____

PROJECT INFORMATION

Project Manager: Glen Babnick
Project Name: Russells at Orcas
Project Number: 15,476.001
Site Location: Orcas Is, WA Sampled By: DPD

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method: _____
Disposed by: _____ Disposal Date: _____

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐AGI Std. ☐Special

Laboratory Number: 9406-11AB

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-ID State: WA.	TPH-G State: WA.	TPH-D State: WA. Fuel # 6 C36	TPH Special Instructions	418.1 State:	8015M	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GCMS Volatiles	8270 GCMS Semivol.	8310 HPLC PAHs	8040 Phenols	DWS - Volatiles and Semivol.	PESTS/PCB's: 8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/pest	METALS: Selected metals: list	Total Lead (Wa)	Organic Lead (Ca)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER				NUMBER OF CONTAINERS
TH3 @ 2.4'	6-14-94	14:00	Soil	1	X																																		1
TH5 @ 1.7'	6-14-94	14:40		2	X																																		1
TP1 @ 2'	6-14-94	15:35		3	X		✓	BTEX 6/17/94 per EPA 8020																															1
TP2 @ 3.8'	6-14-94	15:50		4	X																																		1
SP4	6-14-94	10:45		5		X	X						X																										1
S11	6-15-94	08 40		6	X																																		1
S12	6-15-94	0855		7	X																																		1
S13	6-15-94	0900	↓	8		X	X						X																										1

LAB INFORMATION

Lab Name: ATI
Lab Address: 560 Naches Blvd.
Renton WA
Via: Courier

SAMPLE RECEIPT

Total Number of Containers:	8
Chain of Custody Seals: Y/N/NA	Y
Intact?: Y/N/NA	Y
Received in Good Condition/Cold:	Y

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 09:00	Signature: Time:	Signature: Time:
Printed Name: David P Dawson Date: 6-16-94	Printed Name: Date:	Printed Name: Date:
Company: AEI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: [signature] Time: 10:02	Signature: Time:	Signature: Time:
Printed Name: BOB ARIS Date: 6.16.94	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:

AGI OFFICES: Bellevue: (206) 453-8383 Tacoma: (206) 383-4380
Portland: (503) 222-2820 Pleasanton: (415) 460-5495

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to AGI Project Files; Gold to AGI Disposal Files

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AGI Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN-OF-CUSTODY

Date 6-16-94 Page 2 of 3

PROJECT INFORMATION

Project Manager: Glen Bebnisk
Project Name: Russell of Orcas
Project Number: 15,676.001
Site Location: Orcas Is. WA Sampled By: DPD

DISPOSAL INFORMATION

☐ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐AGI Std. ☐Special

Laboratory Number: 9406-193

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-ID State: WA.	TPH-G State: WA.	TPH-D State: WA, Extend to C36	TPH Special Instructions	418.1 State:	8015M	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GCMS Volatiles	8270 GCMS Semivol.	8310 HPLC PAHs	8040 Phenols	DWS - Volatiles and Semivol.	PESTS/PCB's: 8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/pest	METALS: Selected metals: list	Total Lead (Wa)	Organic Lead (Ca)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER		24hr TAT		NUMBER OF CONTAINERS
S14	6-15-94 09:05	09:05	Soil	9		X	X						X																										1
S15	6-15-94 10:55	10:55		10	X																																		1
S16	6-15-94	14:15		11	X																																		1
TH 9 @ 1.4'	6-15-94	16:18		12	X																															X			1
TH 10 @ 1.1'	6-15-94	16:30		13	X																																		1
SP5	6-15-94	15:45		14		X	X						X																										1

LAB INFORMATION

Lab Name: ATI
Lab Address: Renton WA
Via: Courier

SAMPLE RECEIPT

Total Number of Containers:	6
Chain of Custody Seals: Y/N/NA	Y
Intact?: Y/N/NA	Y
Received in Good Condition/Cold:	Y

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 09:41	Signature: Time:	Signature: Time:
Printed Name: David P Dewson Date: 6-16-94	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time: 1002	Signature: Time:	Signature: Time:
Printed Name: BOB ARIS Date: 6-16-94	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:

AGI OFFICES: Bellevue: (206) 453-8383 Tacoma: (206) 383-4380
Portland: (503) 222-2820 Pleasanton: (415) 460-5495

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to AGI Project Files; Gold to AGI Disposal Files

Rev. 4/92

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Russell's Landing/Orcas, WA
Project No.:	15,676.001
Lab Name:	Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number:	9406-159
Sample No.:	BG-TC #1, BG-TC #2, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, SP1, SP2, SP3
Matrix:	Soil

QUALITY ASSURANCE SUMMARY

All data are of known quality and acceptable for use.

ANALYTICAL METHODS

Parameter	Technique	Method
BETX	GC/PID	EPA 8020
TPH-G[a]	GC/FID	WTPH-G
TPH-D[b]	GC/FID	WTPH-D
TPH-HCID[c]	GC/FID	WTPH-HCID
Moisture	Gravimetric	CLP SOW ILM01.0

a - Quantified for gasoline (toluene to dodecane) range fuel hydrocarbons.
b - Quantified for diesel (C_{12} to C_{24}) and oil (C_{24} - C_{34}) range fuel hydrocarbons
c - Hydrocarbon identification for gasoline, diesel, and oil range fuel hydrocarbons.

TIMELINESS

Parameter	Date Sampled	Date Extracted	Date Analyzed	Time Until Extraction	Time Until Analysis
BETX	06/09/94	06/15/94	06/20/94	6	11 (14)
TPH-G	06/09/94	06/15/94	06/20/94	6 (14)	11 (21)
TPH-D	06/07/94	06/20/94	06/21/94	13 (14)	14 (30)
TPH-HCID	06/07/94	06/15/94	06/15/94	8 (14)	8 (21)
Moisture	06/07/94	NA	06/13/94	NA	6 (NA)

Earliest sample collection date and/or latest sample extraction/analysis date has been used to verify holding time compliance.
NA - Not applicable.
( ) - Numbers in parentheses indicate recommended holding times in days for soil.
All samples were extracted and analyzed within recommended holding times for soil.

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: Russell's Landing/Orcas, WA
Project No.: 15,676.001
Lab Name: Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number: 9406-159
Sample No.: BG-TC #1, BG-TC #2, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, SP1, SP2, SP3

FUEL HYDROCARBON CHROMATOGRAMS

WTPH-HCID: Diesel range fuel hydrocarbons (FHC) were detected in sample BG-TC#2; and gasoline, diesel, and oil-range FHC were detected in samples S1 and SP1. These detections are confirmed by reviewing sample chromatograms.

WTPH-G: Gasoline range FHC were detected in samples S1, S6, SP1, SP2, and SP3; these detections are confirmed by reviewing sample chromatograms.

WTPH-D: Diesel range FHC were detected in samples BG-TC #2 and S6; diesel and oil range FHC were detected in samples S1, SP1, SP2, and SP3. These detections are confirmed by reviewing sample chromatograms.

FIELD QUALITY CONTROL SAMPLES

Field Duplicates: None collected.

Rinsate: None collected.

Trip Blank: None collected.

LAB QUALITY CONTROL SAMPLES

Method Blank: No analytes were detected at or above their method reporting limits (MRLs) for the following methods:

EPA 8020
WTPH-G
WTPH-D
WTPH-HCID

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: Russell's Landing/Orcas, WA
Project No.: 15,676.001
Lab Name: Analytical Technologies, Inc. (ATI) - Renton, WA
Lab Number: 9406-159
Sample No.: BG-TC #1, BG-TC #2, S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, SP1, SP2, SP3

Matrix Spikes: Matrix spike (MS) and matrix spike duplicate (MSD) percent recoveries and relative percent differences (RPDs) are within ATI's control limit criteria for the following methods:

EPA 8020
WTPH-G
WTPH-D

Duplicates: Duplicate sample RPDs are within ATI's control limit criteria for the following methods:

WTPH-G
WTPH-D
CLP SOW ILM01.0

Blank Spike: Blank spike percent recoveries are within ATI's control limit criteria for WTPH-D.

Blank spike (BS) and blank spike duplicate (BSD) percent recoveries and RPDs are within ATI's control limit criteria for EPA 8020 and WTPH-G.

Surrogates: All surrogate percent recoveries are within ATI's control limit criteria for WTPH-D and WTPH-HCID.

EPA 8020/WTPH-G: Neither surrogate spike (bromofluorobenzene and trifluorotoluene) was recovered from sample S1; bromofluorobenzene recovery of 117 percent from sample S6 exceeded ATI's upper control limit of 116 percent. Both samples contained high concentrations of target analytes, which caused matrix interference. Other QC parameters (e.g., MS/MSD, BS/BSD) associated with these samples are acceptable; sample results are not qualified on this basis.

SIGNATURES

Prepared by Kristopher Kinney Date 07/12/94

Checked by Katherine Bourbonais Date 07/13/94

AnalyticalTechnologies,Inc.
560 Naches Avenue, S.W., Suite 101, Renton, WA 98055 (206) 228-8335
Karen L. Mixon, Laboratory Manager

ATI I.D. # 9406-159

June 29, 1994

RECEIVED
JUN 30 1994
APPLIED GEOTECHNOLOGY INC.

AGI Technologies
P.O. Box 3885
Bellevue WA 98009

Attention : Glen Bobnick

Project Number : 15676.001

Project Name : Russell of Orcas

Dear Mr. Bobnick:

On June 13, 1994, Analytical Technologies, Inc. (ATI), received 15 samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Sincerely,

Victoria L. Bayly
Project Manager

VLB/hal/ff

Enclosure

Analytical Technologies, Inc.

ATI I.D. # 9406-159

SAMPLE CROSS REFERENCE SHEET

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9406-159-1	BG-TC #1	06/07/94	SOIL
9406-159-2	BG-TC #2	06/07/94	SOIL
9406-159-3	S1	06/09/94	SOIL
9406-159-4	S2	06/09/94	SOIL
9406-159-5	S3	06/09/94	SOIL
9406-159-6	S4	06/09/94	SOIL
9406-159-7	S5	06/09/94	SOIL
9406-159-8	S6	06/10/94	SOIL
9406-159-9	S7	06/10/94	SOIL
9406-159-10	S8	06/11/94	SOIL
9406-159-11	S9	06/11/94	SOIL
9406-159-12	S10	06/11/94	SOIL
9406-159-13	SP1	06/09/94	SOIL
9406-159-14	SP2	06/09/94	SOIL
9406-159-15	SP3	06/09/94	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	15

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9406-159

ANALYTICAL SCHEDULE

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

ANALYSIS	TECHNIQUE	REFERENCE	LAB
BETX	GC/PID	EPA 8020	R
TOTAL PETROLEUM HYDROCARBONS	GC/FID	WA DOE WTPH-G	R
HYDROCARBON IDENTIFICATION	GC/FID	WA DOE WTPH-HCID	R
TOTAL PETROLEUM HYDROCARBONS	GC/FID	WA DOE WTPH-D	R
MOISTURE	GRAVIMETRIC	CLP SOW ILM01.0	R

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PTL = ATI - Portland
ANC = ATI - Anchorage
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9406-159

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	<0.025
ETHYLBENZENE	<0.025
TOLUENE	<0.025
TOTAL XYLENES	<0.025
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	99	52 - 116
TRIFLUOROTOLUENE	100	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-159-3

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: S1	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 20

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	<0.56
ETHYLBENZENE	8.9
TOLUENE	0.99
TOTAL XYLENES	19
FUEL HYDROCARBONS	2300
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	F	52 - 116
TRIFLUOROTOLUENE	F	50 - 150

F = Out of limits due to matrix interference.

Analytical Technologies, Inc.

ATI I.D. # 9406-159-8

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/10/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: S6	DATE ANALYZED	: 06/17/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 5

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	<0.16
ETHYLBENZENE	0.79
TOLUENE	0.29
TOTAL XYLENES	3.4
FUEL HYDROCARBONS	980
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	117 F	52 - 116
TRIFLUOROTOLUENE	97	50 - 150

F = Out of limits due to matrix interference.

Analytical Technologies, Inc.

ATI I.D. # 9406-159-13

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: SP1	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 2

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	0.081
ETHYLBENZENE	1.4
TOLUENE	0.54
TOTAL XYLENES	7.2
FUEL HYDROCARBONS	580
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	110	52 - 116
TRIFLUOROTOLUENE	104	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-14

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: SP2	DATE ANALYZED	: 06/20/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 2

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	<0.058
ETHYLBENZENE	0.22
TOLUENE	<0.058
TOTAL XYLENES	1.6
FUEL HYDROCARBONS	290
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	90	52 - 116
TRIFLUOROTOLUENE	95	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-15

BETX - GASOLINE
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: SP3	DATE ANALYZED	: 06/19/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-G/8020(BETX)	DILUTION FACTOR	: 5

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
BENZENE	<0.16
ETHYLBENZENE	0.92
TOLUENE	0.27
TOTAL XYLENES	9.1
FUEL HYDROCARBONS	610
HYDROCARBON RANGE	TOLUENE TO DODECANE
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
BROMOFLUOROBENZENE	95	52 - 116
TRIFLUOROTOLUENE	105	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159

BETX - GASOLINE
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-G/8020(BETX)

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 06/15/94
DATE ANALYZED : 06/15/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.0250	1.00	0.989	99	0.978	98	1
TOLUENE	<0.0250	1.00	0.998	100	0.992	99	1
TOTAL XYLENES	<0.0250	2.00	1.98	99	1.96	98	1
GASOLINE	<5.00	50.0	48.0	96	43.1	86	11

CONTROL LIMITS	% REC.	RPD
BENZENE	82 - 109	20
TOLUENE	86 - 116	20
TOTAL XYLENES	83 - 119	20
GASOLINE	78 - 115	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
BROMOFLUOROBENZENE	99	97	52 - 116
TRIFLUOROTOLUENE	103	99	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159

BETX - GASOLINE
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-G/8020(BETX)

SAMPLE I.D. # : 9406-183-1
DATE EXTRACTED : 06/15/94
DATE ANALYZED : 06/18/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
BENZENE	<0.0250	N/A	N/A	1.00	0.938	94	0.946	95	1
TOLUENE	0.0595	N/A	N/A	1.00	0.968	91	0.974	91	1
TOTAL XYLENES	0.0870	N/A	N/A	2.00	1.94	93	1.92	92	1
GASOLINE	<5.00	<5.00	NC	50.0	41.3	83	45.6	91	10

CONTROL LIMITS	% REC.	RPD
BENZENE	62 - 105	20
TOLUENE	63 - 115	20
TOTAL XYLENES	64 - 117	20
GASOLINE	59 - 111	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
BROMOFLUOROBENZENE	92	94	52 - 116
TRIFLUOROTOLUENE	90	96	50 - 150

NC = Not calculable.

Analytical Technologies, Inc.

ATI I.D. # 9406-159

HYDROCARBON IDENTIFICATION DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/14/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	105	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	102	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-1

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/07/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: BG-TC #1	DATE ANALYZED	: 06/14/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	100	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-2

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/07/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: BG-TC #2	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	104	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-3

HYDROCARBON IDENTIFICATION DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S1	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT
GASOLINE QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.
DIESEL QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.
PETROLEUM HYDROCARBONS >C24 QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	121	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-159-4

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S2	DATE ANALYZED	: 06/14/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	101	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-5

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S3	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	100	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-159-6

HYDROCARBON IDENTIFICATION DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S4	DATE ANALYZED	: 06/15/84
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	103	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-7

HYDROCARBON IDENTIFICATION DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S5	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	102	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-9

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/10/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S7	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

	RESULT
GASOLINE CONCENTRATION	LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.
DIESEL CONCENTRATION	LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.
PETROLEUM HYDROCARBONS >C24 CONCENTRATION	LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	101	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-10

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/11/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S8	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	105	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-11

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/11/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S9	DATE ANALYZED	: 06/14/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.

DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	102	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-12

HYDROCARBON IDENTIFICATION DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/11/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/14/94
CLIENT I.D.	: S10	DATE ANALYZED	: 06/14/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

	RESULT
GASOLINE CONCENTRATION LESS THAN 20 mg/Kg BY WA DOE WTPH-HCID.	
DIESEL CONCENTRATION LESS THAN 50 mg/Kg BY WA DOE WTPH-HCID.	
PETROLEUM HYDROCARBONS >C24 CONCENTRATION LESS THAN 100 mg/Kg BY WA DOE WTPH-HCID.	

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	103	50 - 150

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ATI I.D. # 9406-159-13

HYDROCARBON IDENTIFICATION
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: SP1	DATE ANALYZED	: 06/15/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-HCID	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

RESULT

GASOLINE QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.

DIESEL QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.

PETROLEUM HYDROCARBONS >C24 QUALITATIVELY IDENTIFIED BY WA DOE WTPH-HCID.

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	101	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/16/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<40
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	100	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	99	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-2

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/07/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/20/94
CLIENT I.D.	: BG-TC #2	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	48
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	100	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-3

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: S1	DATE ANALYZED	: 06/16/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 10

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	4900
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	2700
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	143	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-8

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/10/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: S6	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 5

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	1600
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<260
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	122	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 9406-159-13

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: SP1	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 5

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	1100
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	1100
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	124	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-14

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: SP2	DATE ANALYZED	: 06/19/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	330
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	180
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	102	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159-15

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 06/09/94
PROJECT #	: 15676.001	DATE RECEIVED	: 06/13/94
PROJECT NAME	: RUSSELL OF ORCAS	DATE EXTRACTED	: 06/15/94
CLIENT I.D.	: SP3	DATE ANALYZED	: 06/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 10

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	2200
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	1900
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	136	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 06/15/94
DATE ANALYZED : 06/16/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<10.0	200	182	91	N/A	N/A	N/A
CONTROL LIMITS				% REC.			RPD
DIESEL				69 - 115			20
SURROGATE RECOVERIES		SPIKE		DUP. SPIKE		LIMITS	
O-TERPHENYL		94		N/A		50 - 150	

Analytical Technologies, Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 06/20/94
DATE ANALYZED : 06/21/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<10.0	200	194	97	N/A	N/A	N/A
CONTROL LIMITS				% REC.			RPD
DIESEL				69 - 115			20
SURROGATE RECOVERIES		SPIKE		DUP. SPIKE		LIMITS	
O-TERPHENYL		100		N/A		50 - 150	

Analytical Technologies, Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 9406-159-14
DATE EXTRACTED : 06/15/94
DATE ANALYZED : 06/19/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	286	288	1	N/A	N/A	N/A	N/A	N/A	N/A

CONTROL LIMITS	% REC.	RPD
DIESEL	N/A	20

SURROGATE RECOVERIES	SAMPLE	SAMPLE DUP.	LIMITS
O-TERPHENYL	102	101	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 9406-233-2
DATE EXTRACTED : 06/20/94
DATE ANALYZED : 06/21/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	400	474	17	N/A	N/A	N/A	N/A	N/A	N/A

CONTROL LIMITS	% REC.	RPD
DIESEL	N/A	20

SURROGATE RECOVERIES	SAMPLE	SAMPLE DUP.	LIMITS
O-TERPHENYL	103	102	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 9406-175-28
DATE EXTRACTED : 06/15/94
DATE ANALYZED : 06/19/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	<10.0	13.8	NC	200	202	101	200	100	1

CONTROL LIMITS	% REC.	RPD
DIESEL	61 - 120	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
O-TERPHENYL	102	98	50 - 150

NC = Not calculable.

Analytical Technologies, Inc.

ATI I.D. # 9406-159

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 9406-159-2
DATE EXTRACTED : 06/20/94
DATE ANALYZED : 06/21/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	43.1	49.3	13	200	250	103	237	97	5

CONTROL LIMITS	% REC.	RPD
DIESEL	61 - 120	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
O-TERPHENYL	102	97	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 9406-159

GENERAL CHEMISTRY ANALYSIS

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

MATRIX : SOIL

PARAMETER	DATE ANALYZED
MOISTURE	06/13/94

Analytical Technologies, Inc.

ATI I.D. # 9406-159

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

MATRIX : SOIL
UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE
9406-159-1	BG-TC #1	7.2
9406-159-2	BG-TC #2	10
9406-159-3	S1	10
9406-159-4	S2	18
9406-159-5	S3	14
9406-159-6	S4	19
9406-159-7	S5	19
9406-159-8	S6	22
9406-159-9	S7	20
9406-159-10	S8	16
9406-159-11	S9	18
9406-159-12	S10	11
9406-159-13	SP1	16
9406-159-14	SP2	14
9406-159-15	SP3	22

Analytical Technologies, Inc.

ATI I.D. # 9406-159

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL OF ORCAS

MATRIX : SOIL
UNITS : %

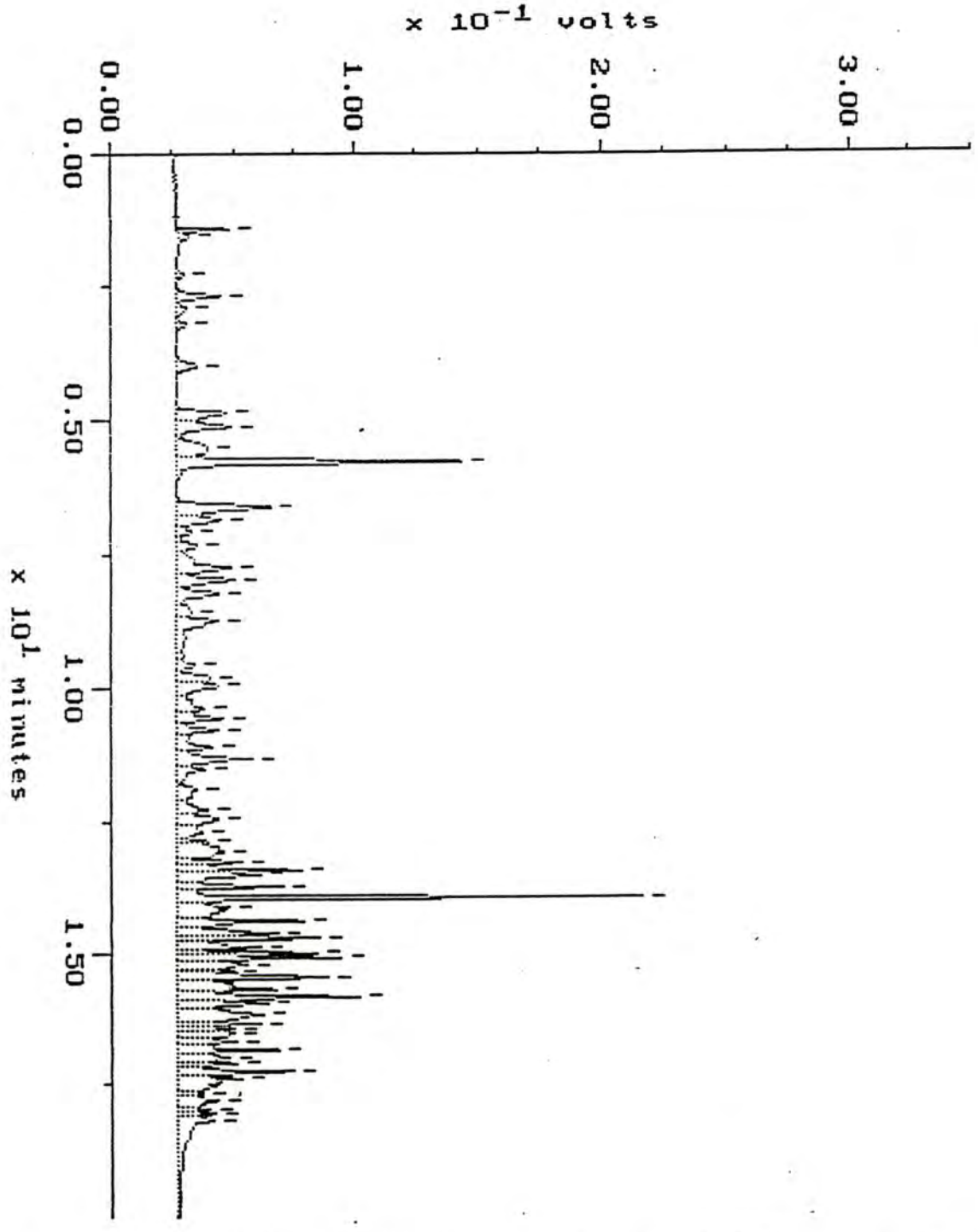
PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	9406-132-5	23	22	4	N/A	N/A	N/A
MOISTURE	9406-137-8	6.2	6.2	0	N/A	N/A	N/A
MOISTURE	9406-159-9	20	20	0	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

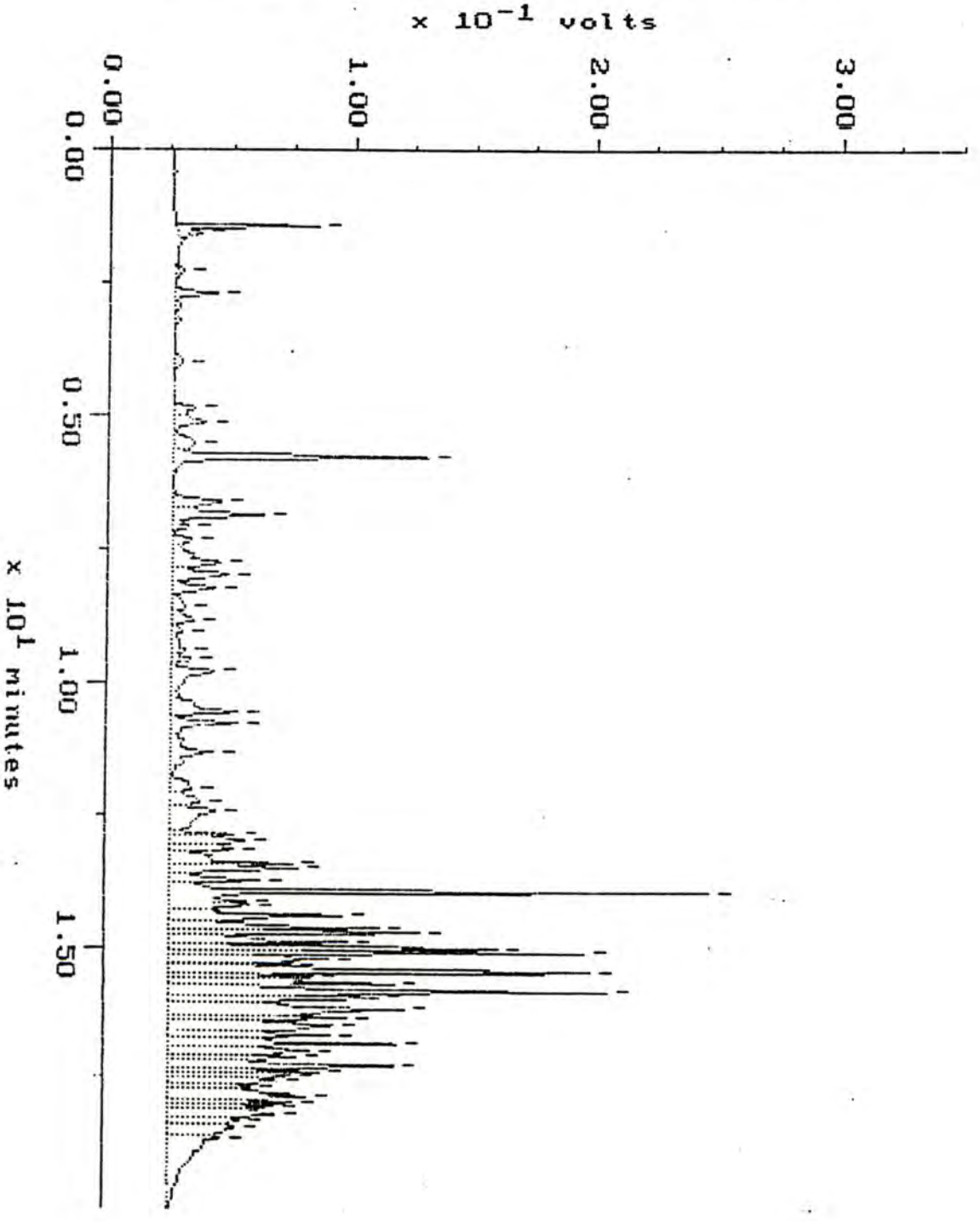
WA DOE WTPH-G

Sample: 9406-159-3 DIL Channel: FID Filename: R6159P26
Acquired: 15-JUN-94 21:27 Method: F:\BRD2\MAXDATA\PICARD\061594PC Operator: ATI
Dilution: 1 : 20.000
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



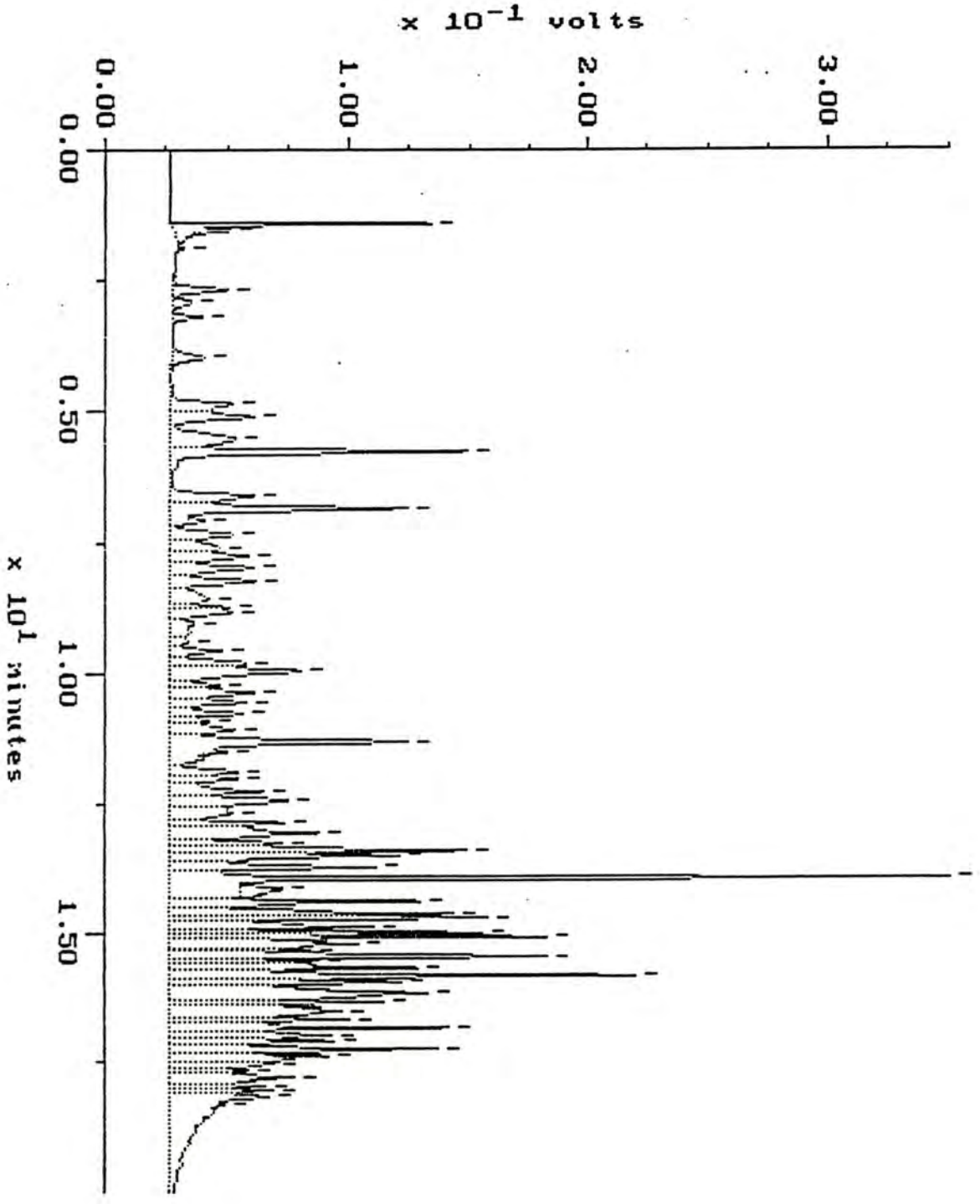
WA DOE WTPH-G

Sample: 9406-159-8 DIL Channel: FID Filename: R6179P16
Acquired: 17-JUN-94 19:06 Method: F:\BRC2\MAXDATA\PICARD\061794PC Operator: ATI
Dilution: 1 : 5.000
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



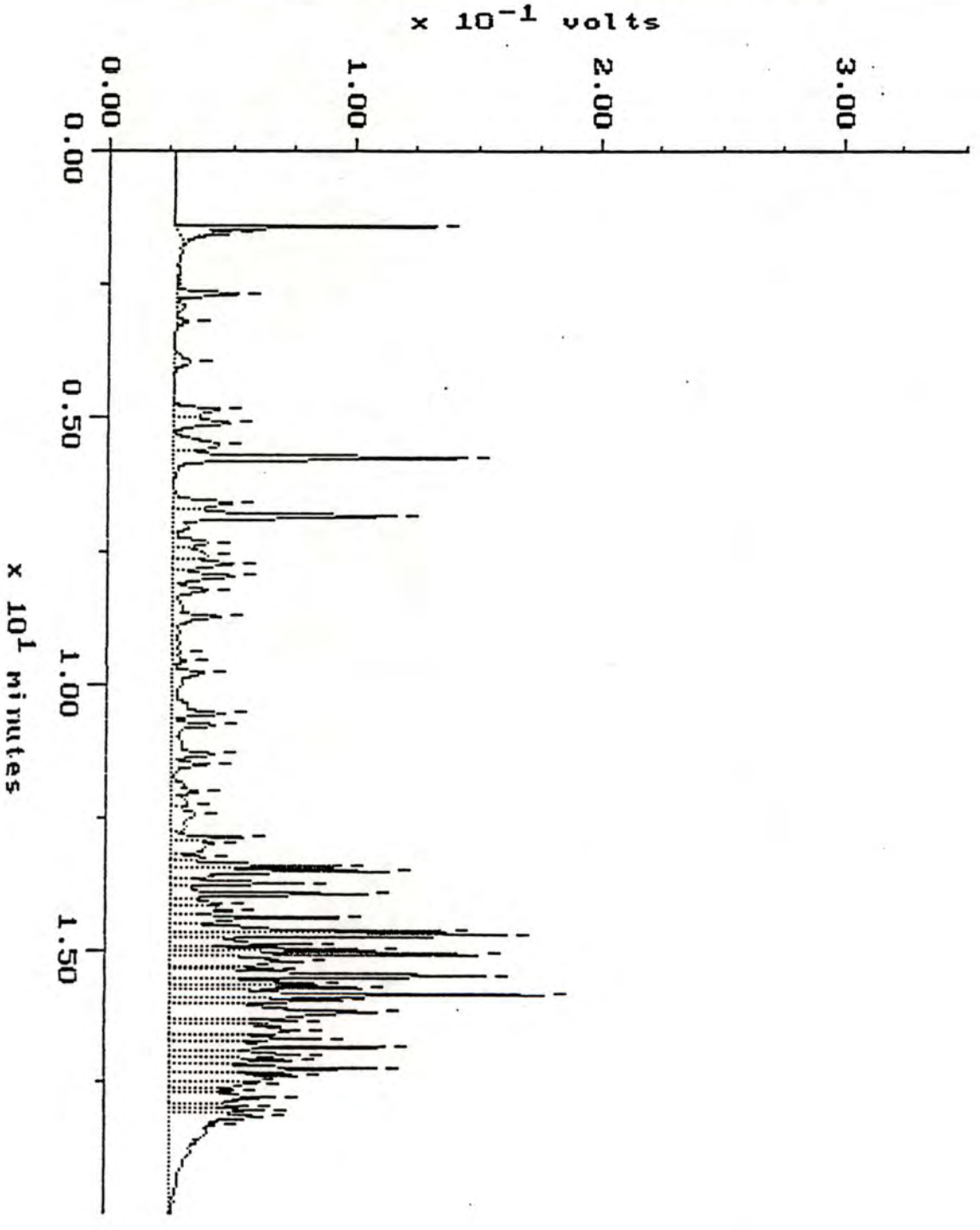
WA DOE WTPH-G

Sample: 9406-159-13 DIL Channel: FID Filename: R6199P21
Acquired: 20-JUN-94 1:19 Method: F:\BRD2\MAXDATA\PICARD\061994PC Operator: ATI
Dilution: 1 : 2.000
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



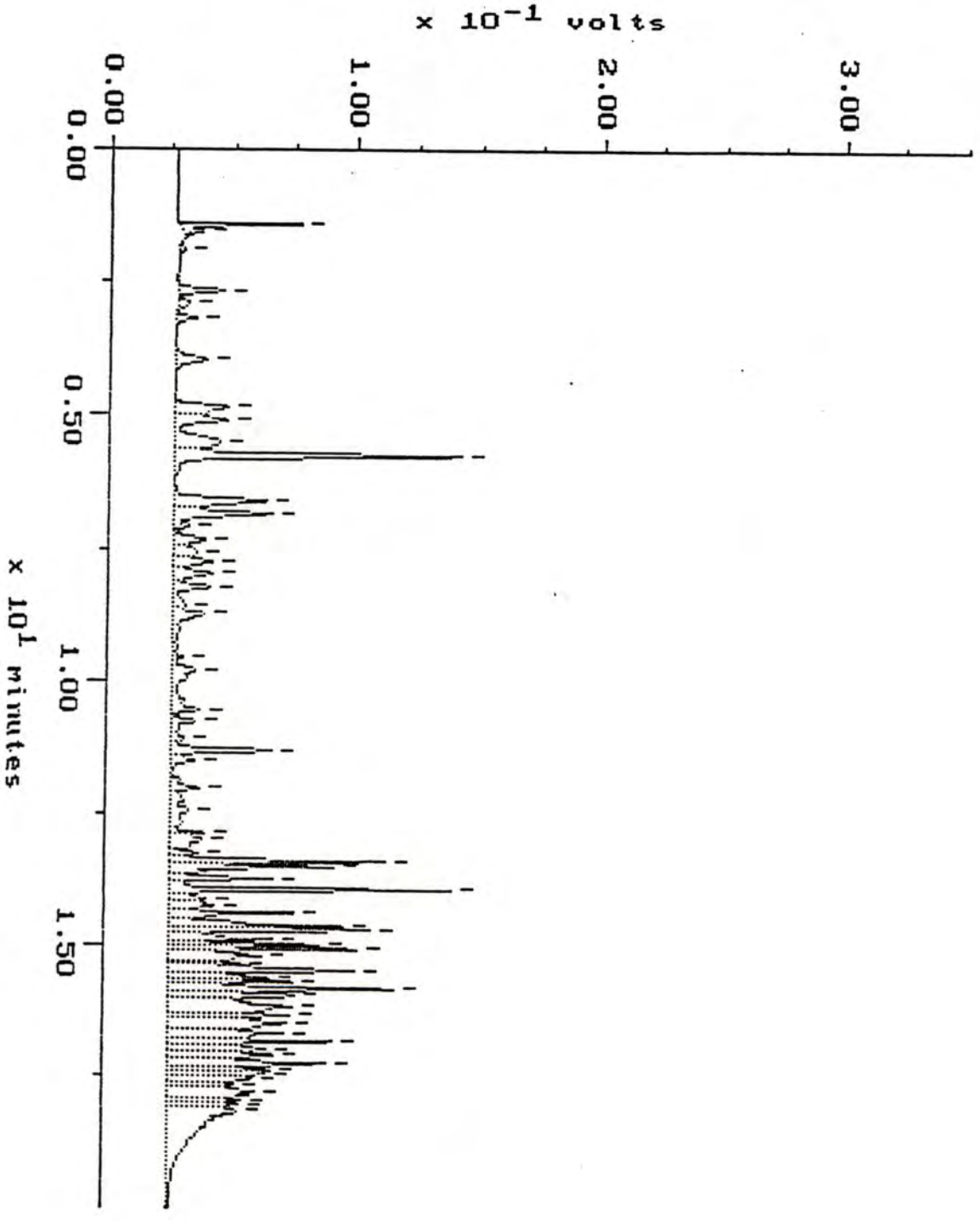
WA DOE WTPH-G

Sample: 9406-159-14 DIL Channel: FID Filename: R6199P24
Acquired: 20-JUN-94 2:51 Method: F:\BRO2\MAXDATA\PICARD\061994PC Operator: ATI
Dilution: 1 : 2.000
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



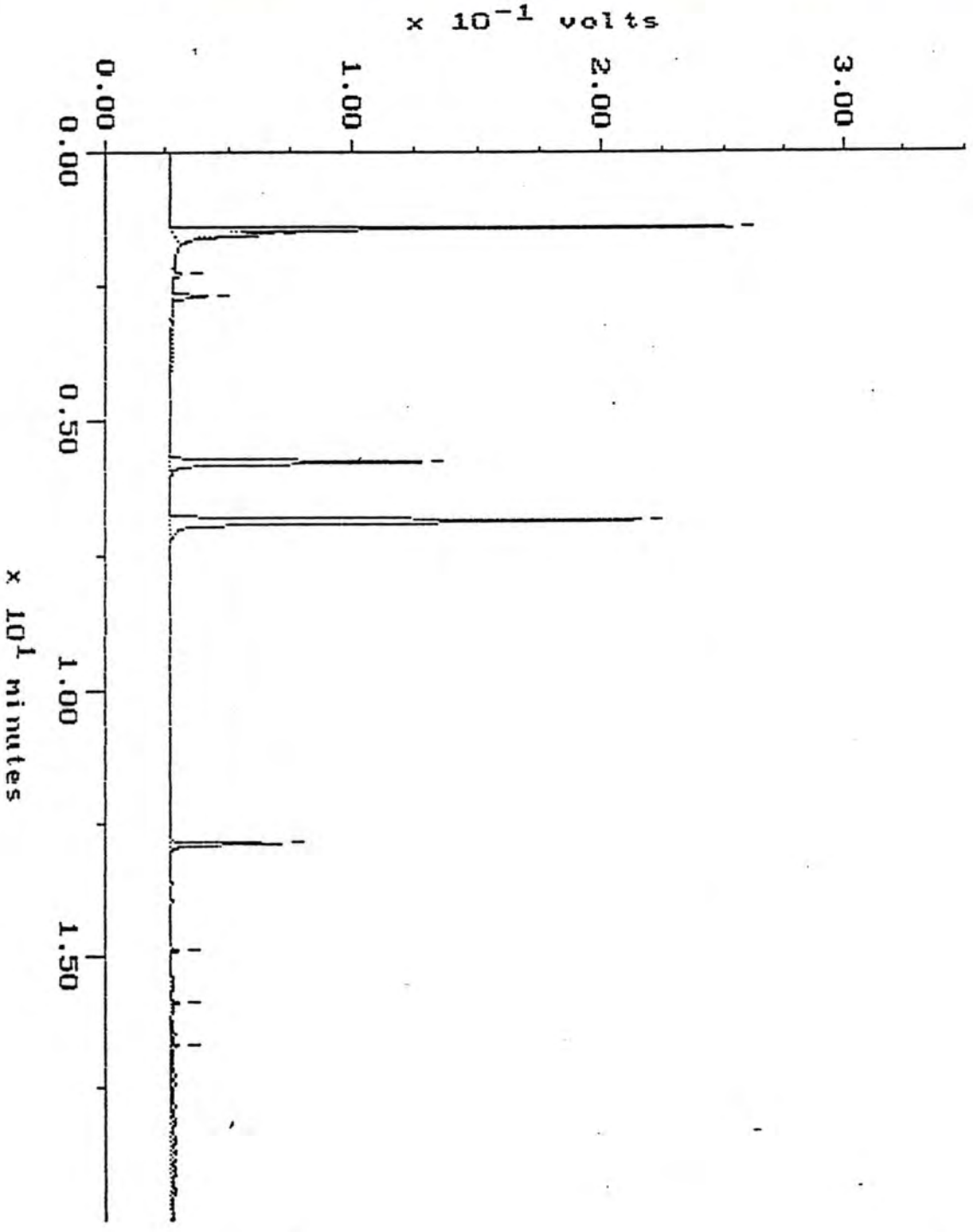
WA DOE WTPH-G

Sample: 9406-159-15 DIL Channel: FID Filename: R6199P16
Acquired: 19-JUN-94 22:45 Method: F:\BRO2\MAXDATA\PICARD\061994PC Operator: ATI
Dilution: 1 : 5.000
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



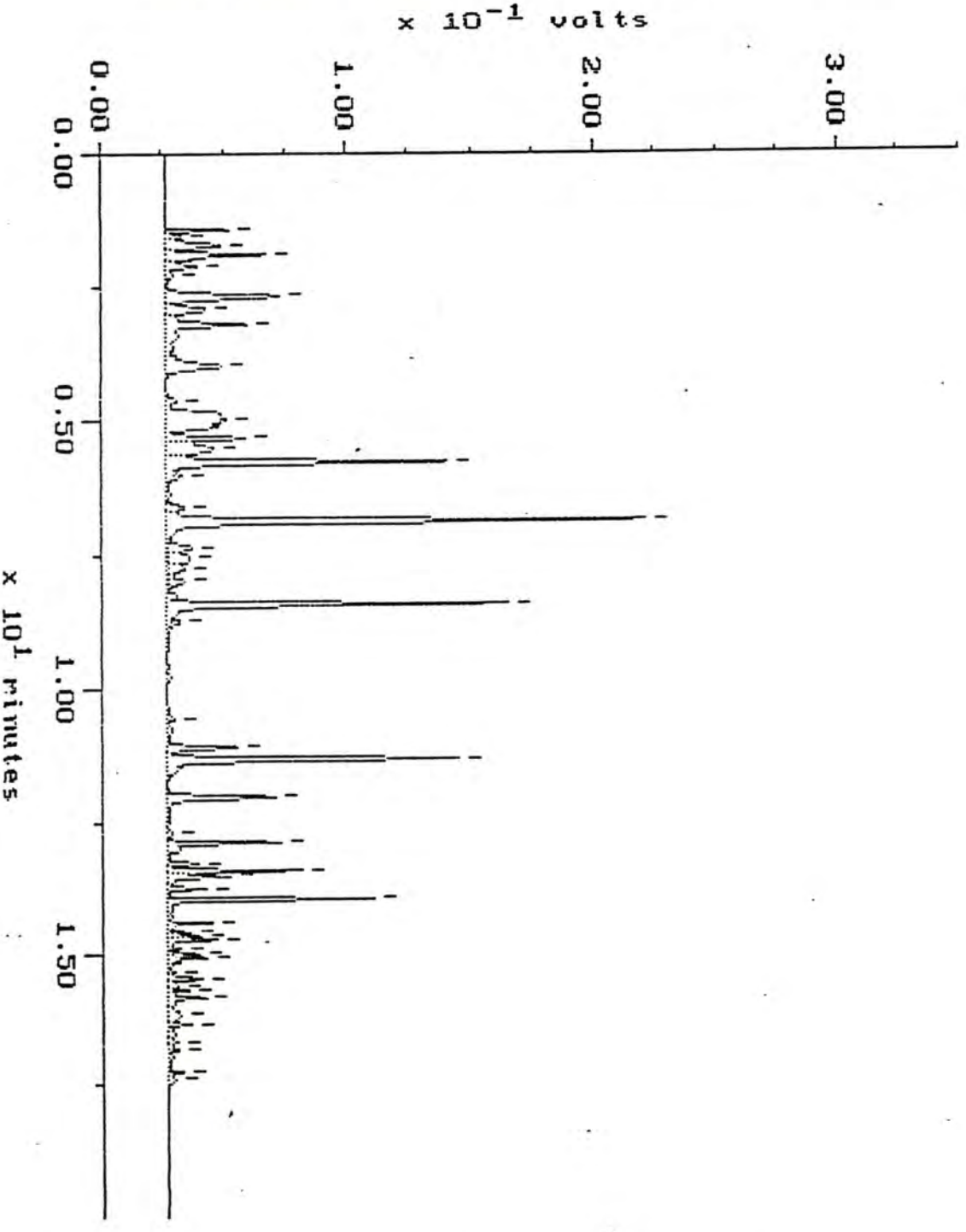
WA DOE WTPH-G Blank

Sample: SRB-B 6-15 Channel: FID Filename: R6159P22
Acquired: 15-JUN-94 19:27 Method: F:\BRO2\MAXDATA\PICARD\061594PC Operator: ATI
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



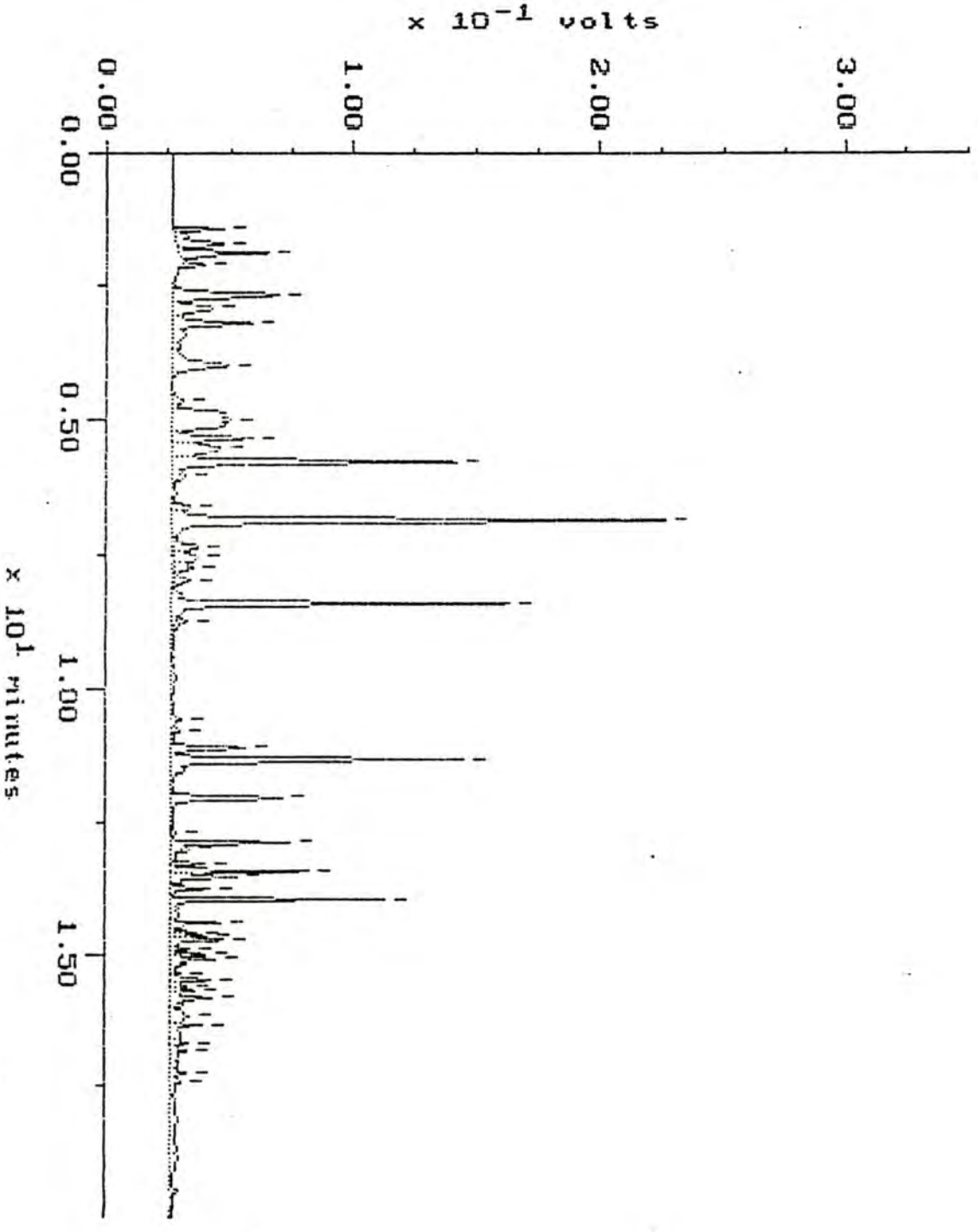
CONTINUING CALIBRATION

Sample: STD C G Channel: FID Filename: R6159P14
Acquired: 15-JUN-94 15:18 Method: F:\BRO2\MAXDATA\PICARD\061594PC Operator: ATI
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



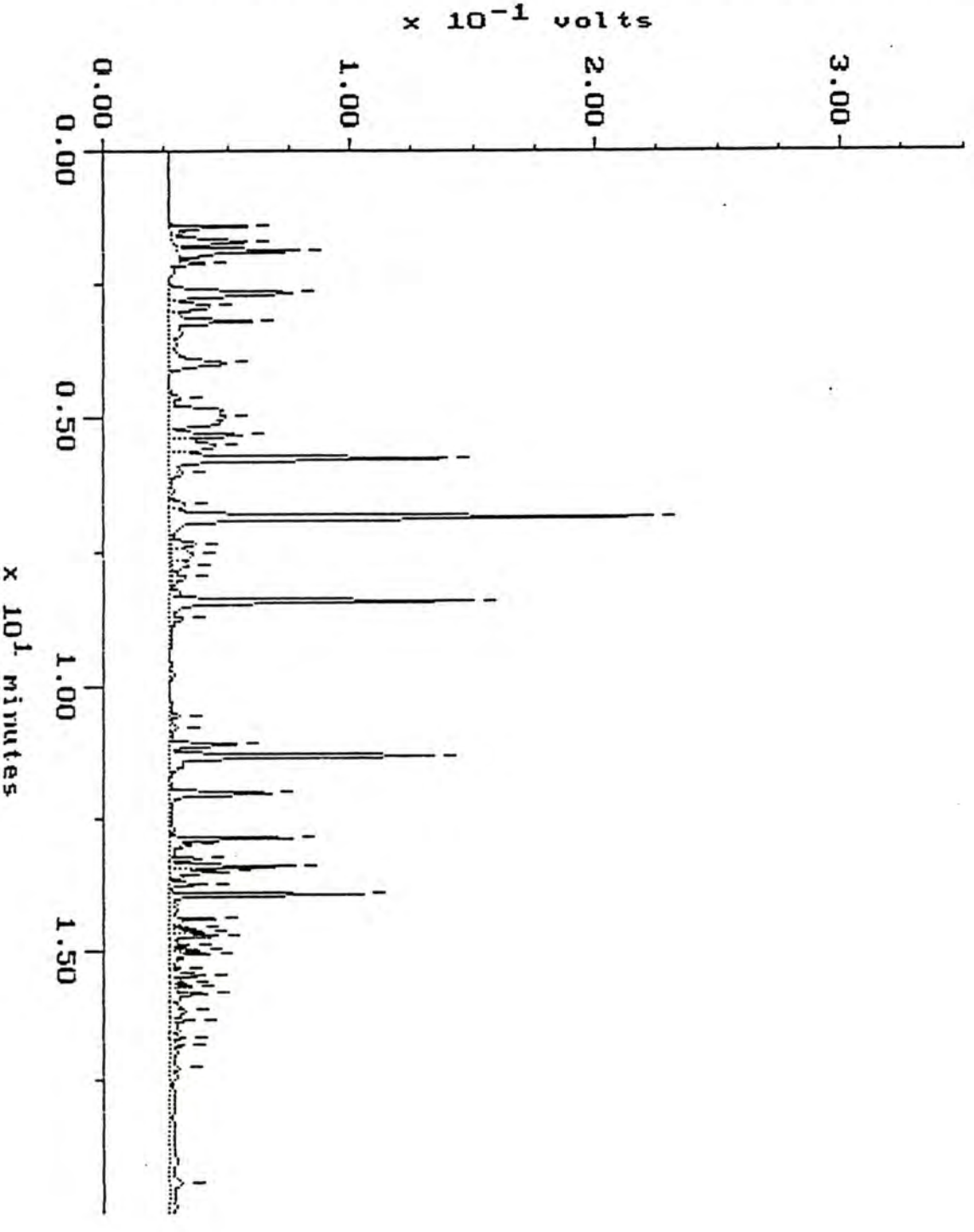
CONTINUING CALIBRATION

Sample: STD-C G Channel: FID Filename: R6179P01
Acquired: 17-JUN-94 7:26 Method: F:\BRO2\MAXDATA\PICARD\061794PC Operator: ATI
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



CONTINUING CALIBRATION

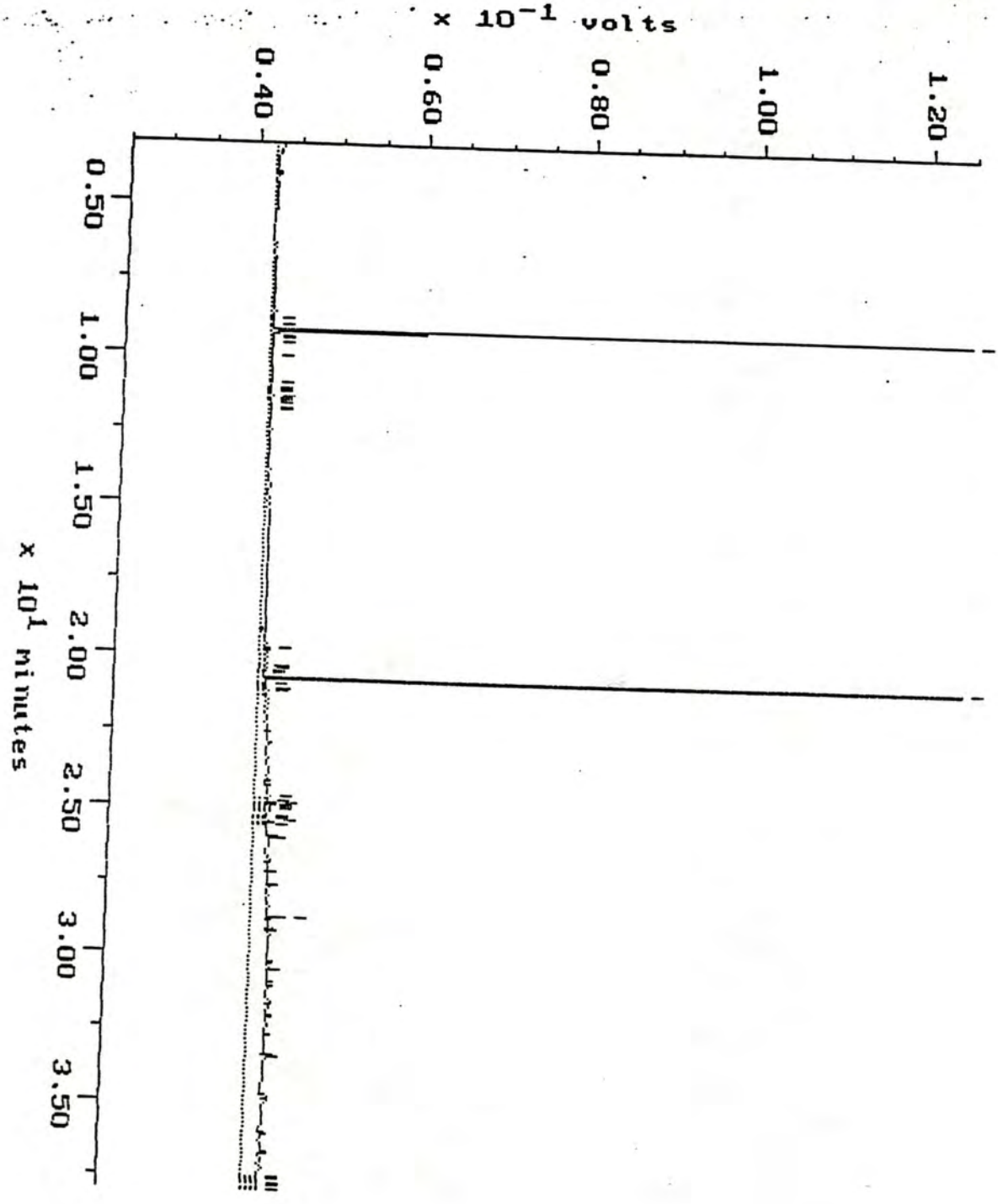
Sample: STD-C G Channel: FID Filename: R6199P01
Acquired: 19-JUN-94 13:47 Method: F:\BRO2\MAXDATA\PICARD\061994PC Operator: ATI
Comments: ATI FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY.



WA DOE WTPH-HCID

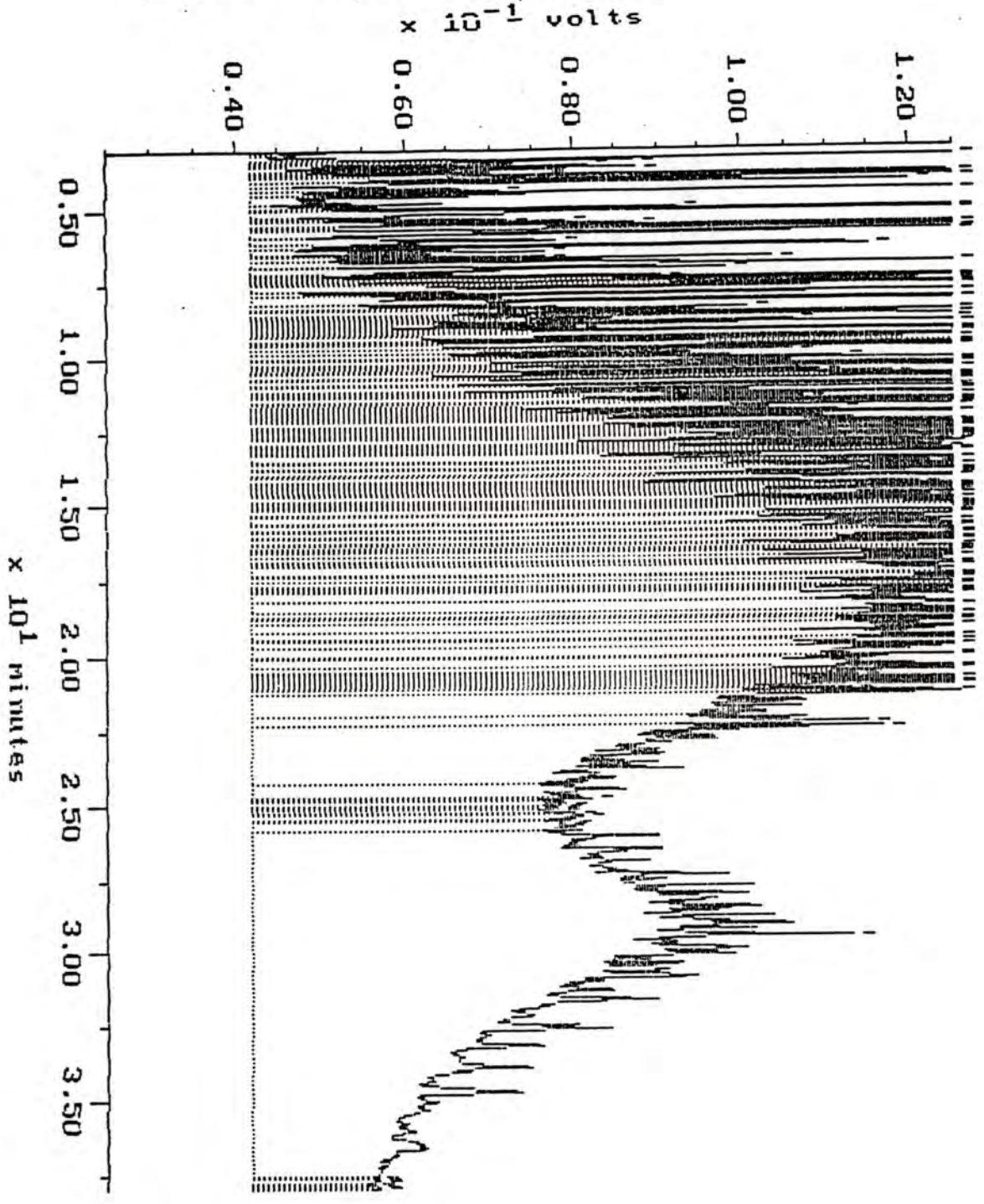
Sample: 9406-159-2 Channel: ERNIE
Acquired: 15-JUN-94 3:58 Method: F:\BR02\MAXDATA\ERNIE\FUEL0614
Comments: ATI: THE QUALITY TEAM

Filename: R6148E17
Operator: ATI



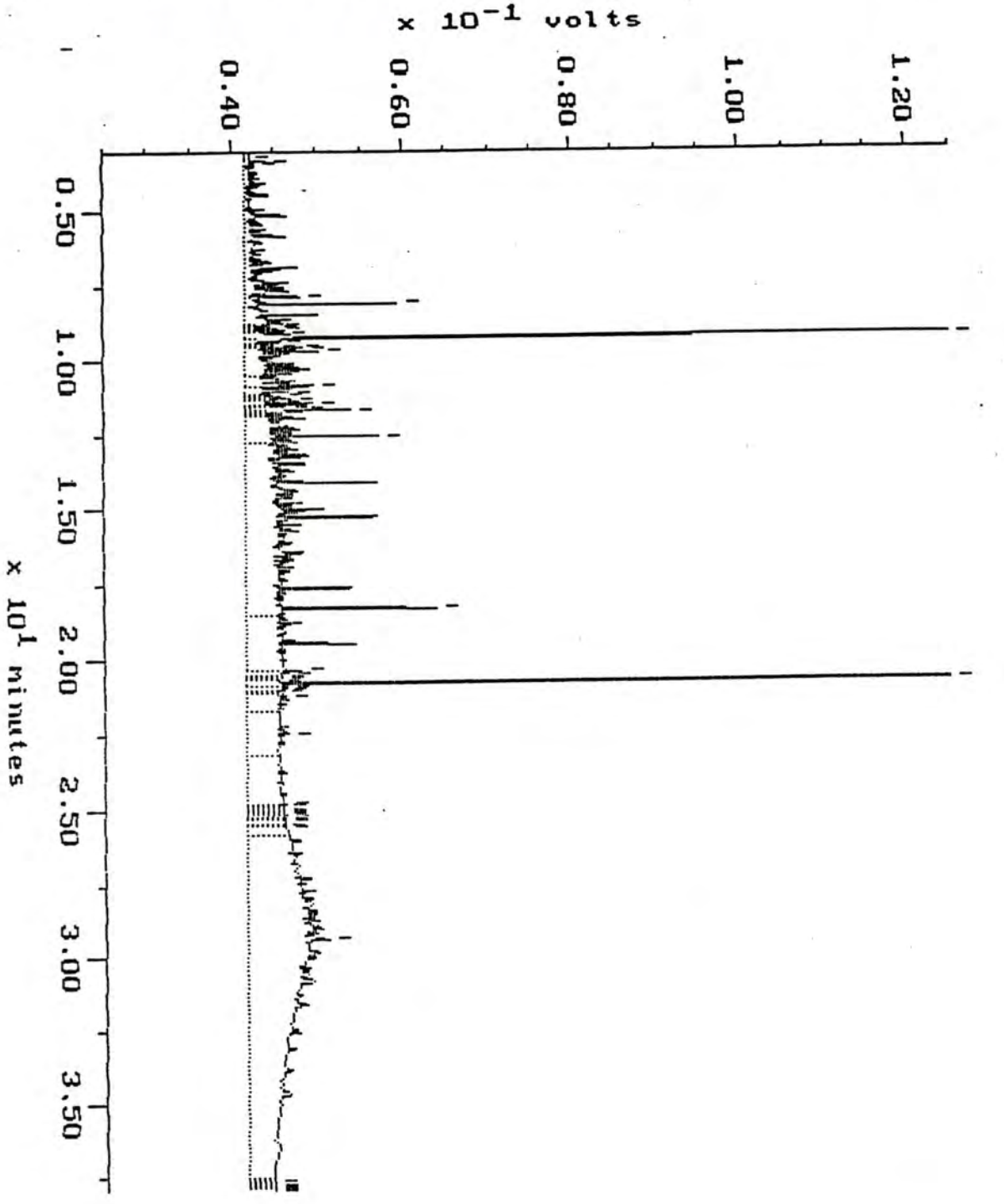
WA DOE WTPH-HCID

Sample: 9406-159-3 Channel: ERNIE Filename: R6148E18
Acquired: 15-JUN-94 4:43 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0614 Operator: ATI
Comments: ATI: THE QUALITY TEAM

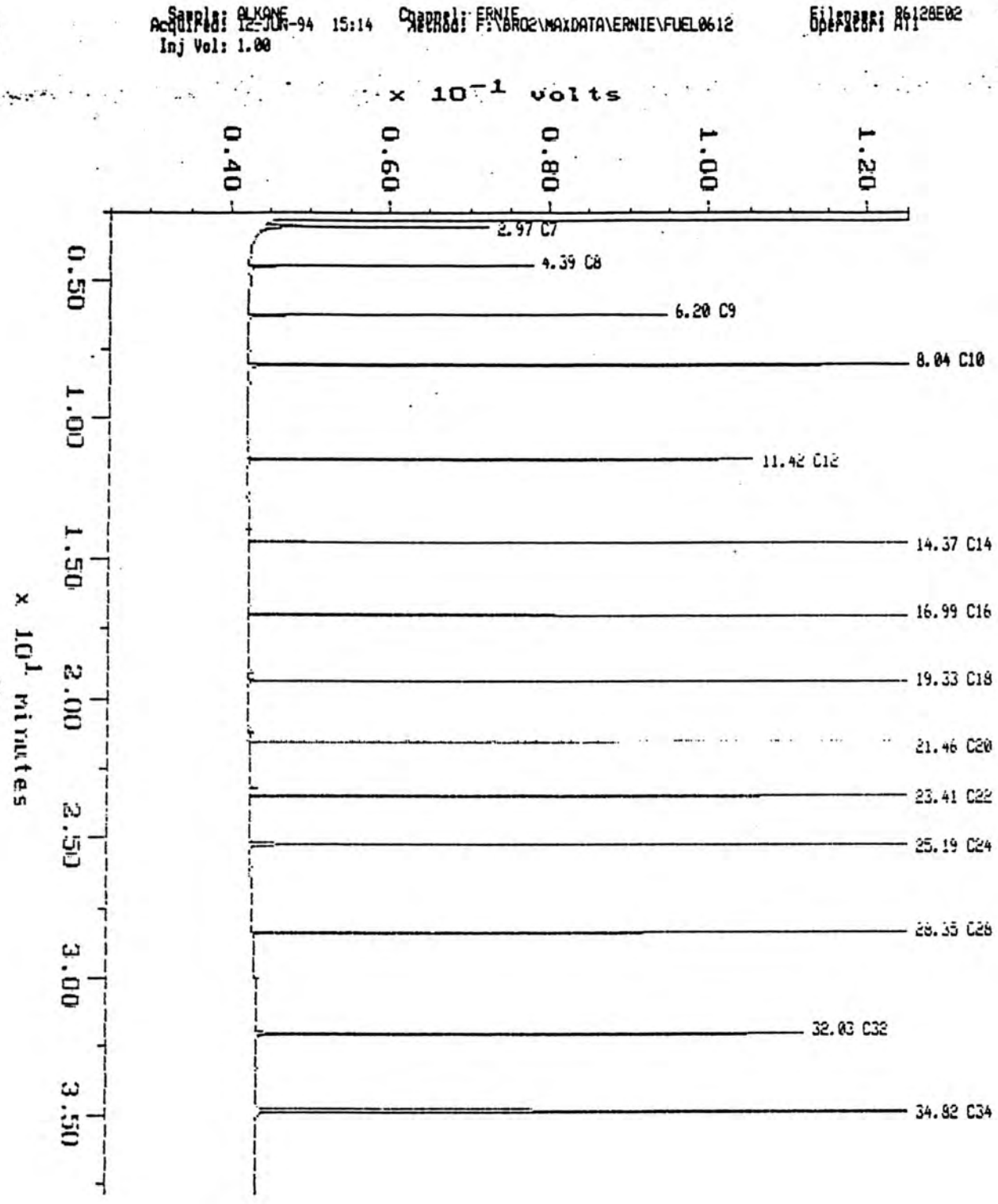


WA DOE WTPH-HCID

Sample: 9406-159-13 Channel: ERNIE Filename: R6158E02
Acquired: 15-JUN-94 13:08 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0615 Operator: ATI
Comments: ATI: THE QUALITY TEAM



Alkane


Sample: ALKANE
Acquired: 12-JUN-94 15:14
Inj Vol: 1.00
Channel: ERNIE
Method: F:\BRO2\MAXDATA\ERNIE\FUEL0612
Filename: R6128E02
Operator: ATI
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
2.97 C7
4.39 C8
6.20 C9
8.04 C10
11.42 C12
14.37 C14
16.99 C16
19.33 C18
21.46 C20
23.41 C22
25.19 C24
28.35 C28
32.03 C32
34.82 C34
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10¹ minutes

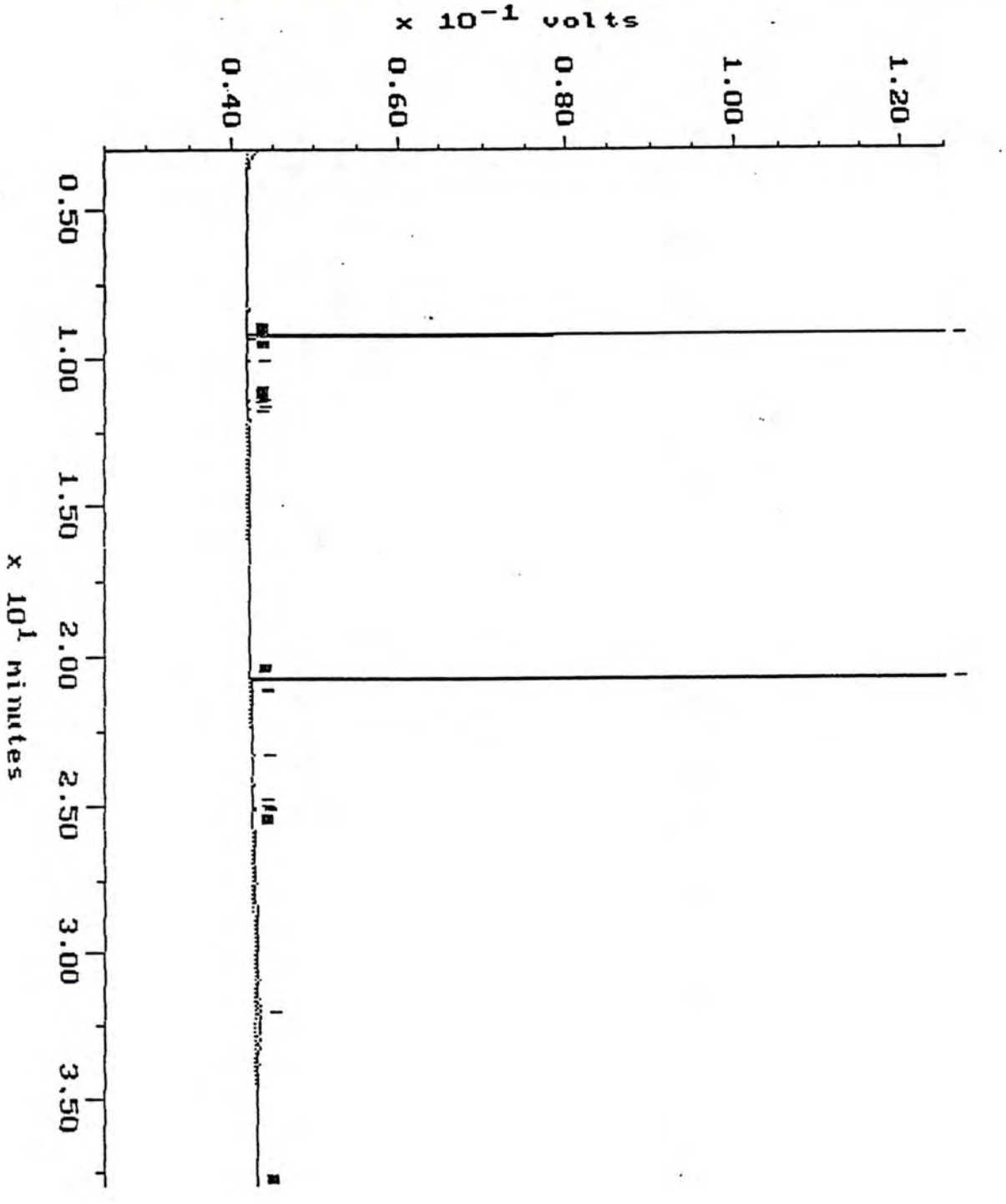
WA DOE WTPH-HCID

Blank

Sample: SRB 6-14 HCID
Acquired: 14-JUN-94 17:14
Comments: ATI: THE QUALITY TEAM

Channel: ERNIE
Method: F:\BRO2\MAXDATA\ERNIE\FUEL0614

Filename: R6148E03
Operator: ATI

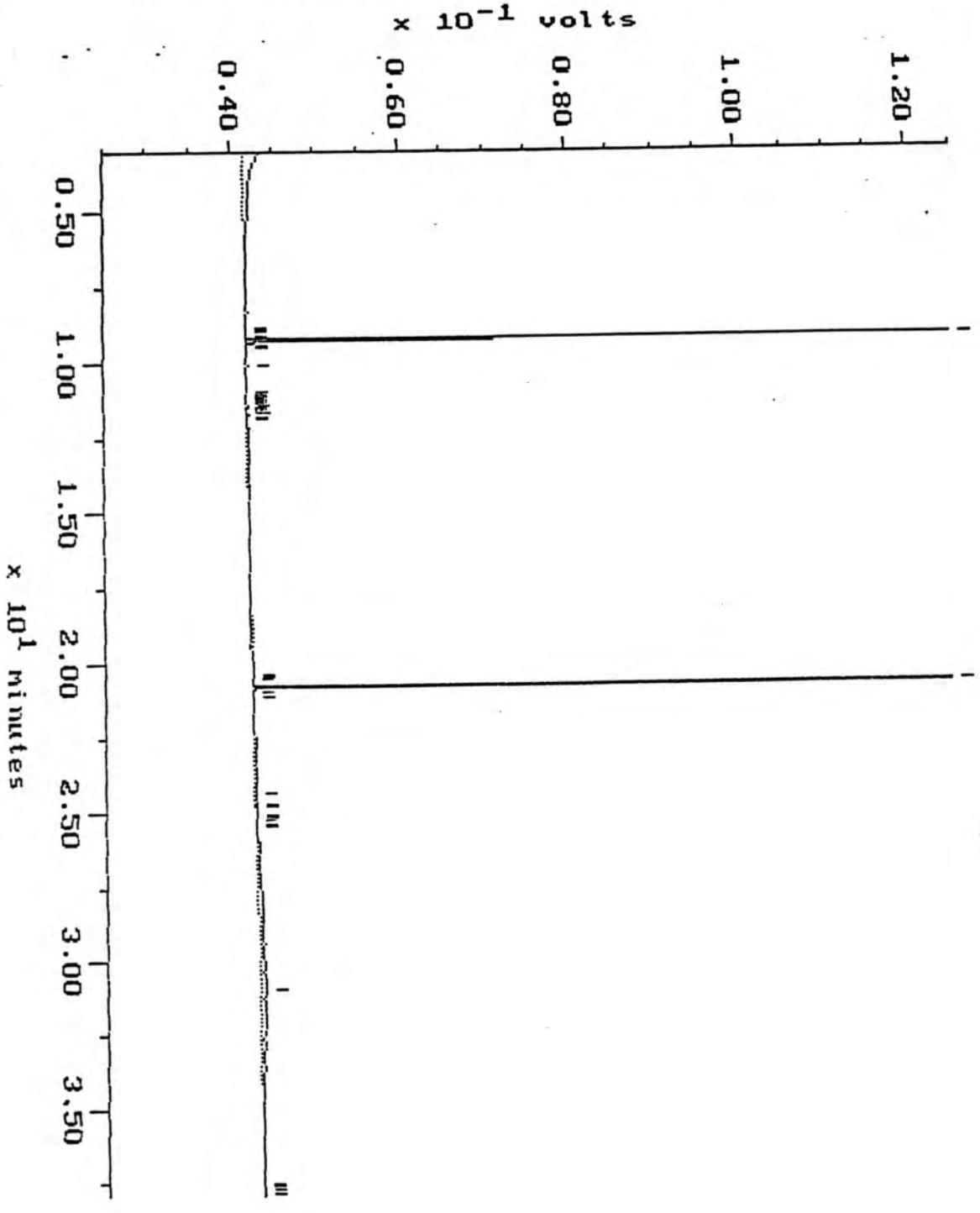


WA DOE WTPH-HCID

Blank

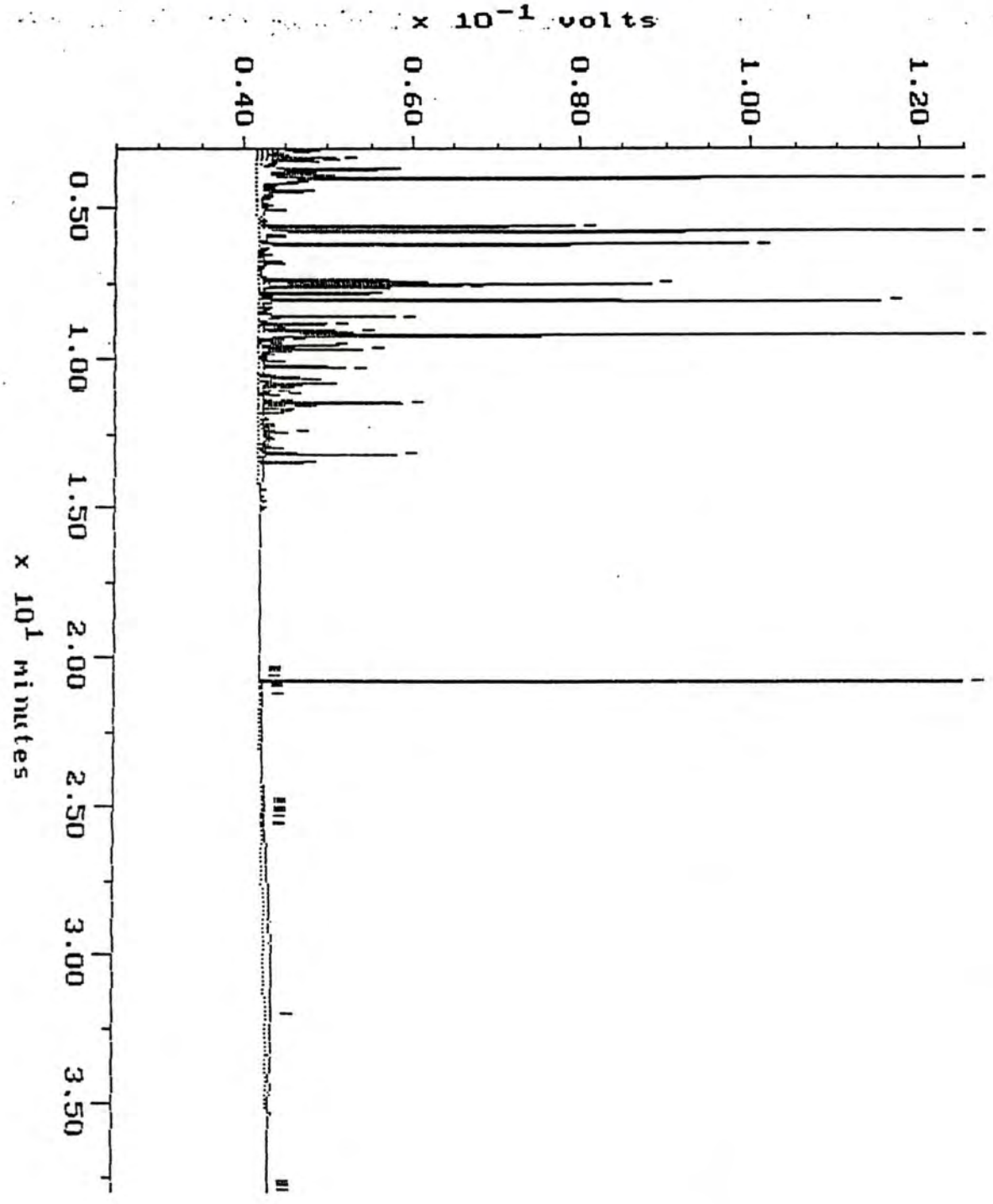
Sample: SRB 6-14 HCID Channel: ERNIE
Acquired: 15-JUN-94 15:27 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0615
Comments: ATI: THE QUALITY TEAM

Filename: R6158E05
Operator: ATI



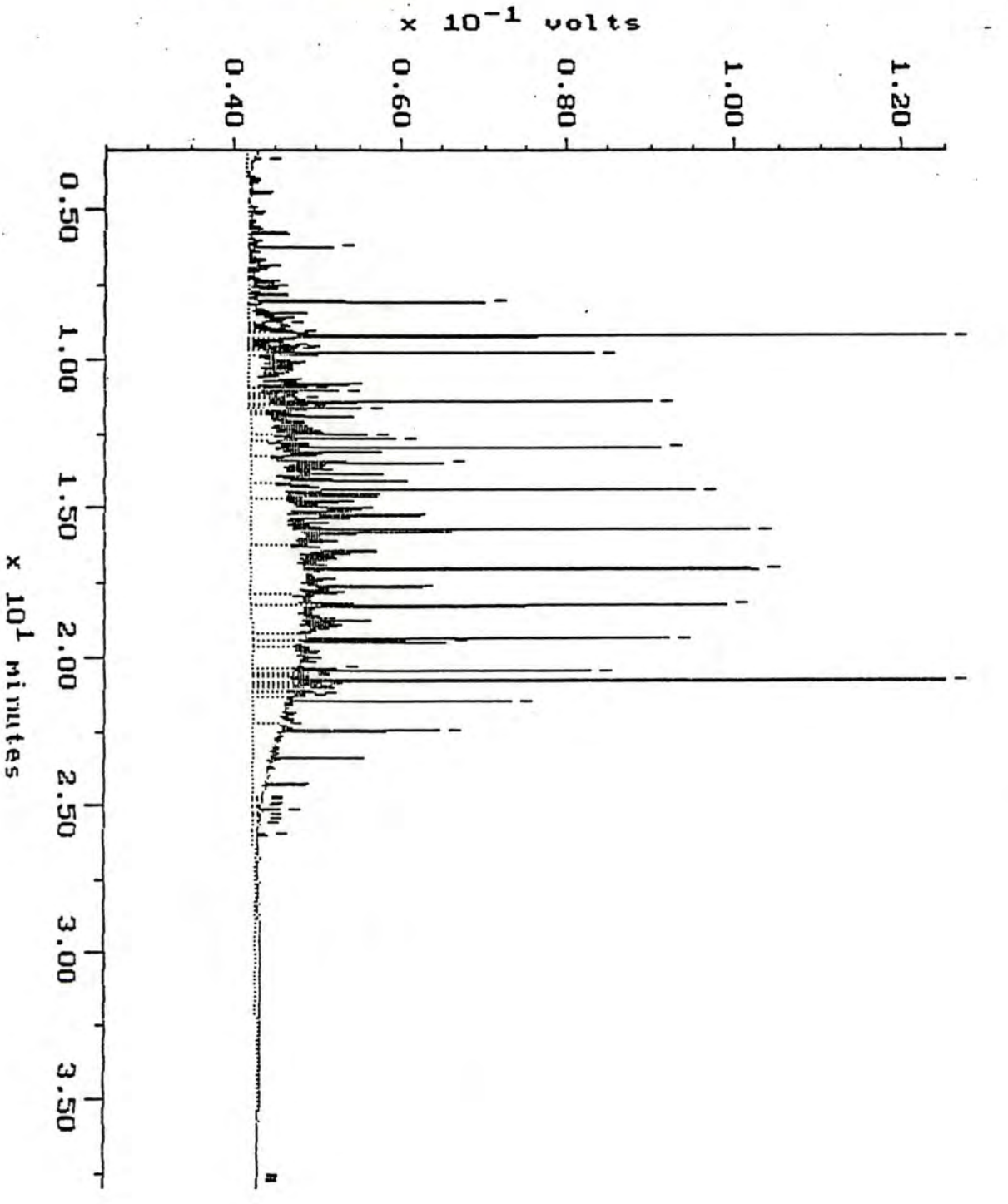
CONTINUING CALIBRATION

Sample: GAS 100 Channel: ERNIE Filename: R6138E24
Acquired: 14-JUN-94 11:47 Method: F:\BR02\MAXDATA\ERNIE\FUEL0613 Operator: ATI
Comments: ATI: THE QUALITY TEAM



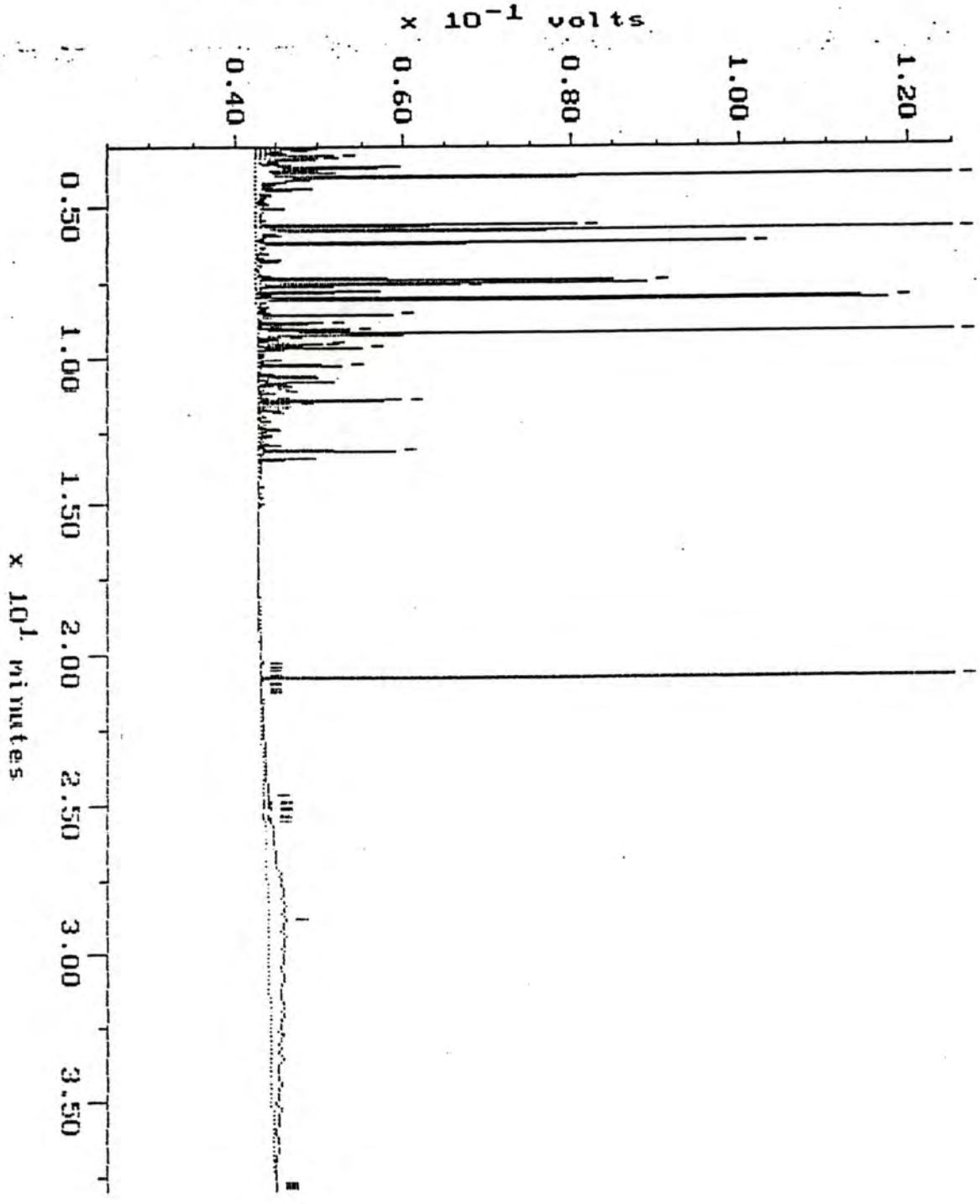
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6138E25
Acquired: 14-JUN-94 12:33 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0613 Operator: ATI
Comments: ATI: THE QUALITY TEAM



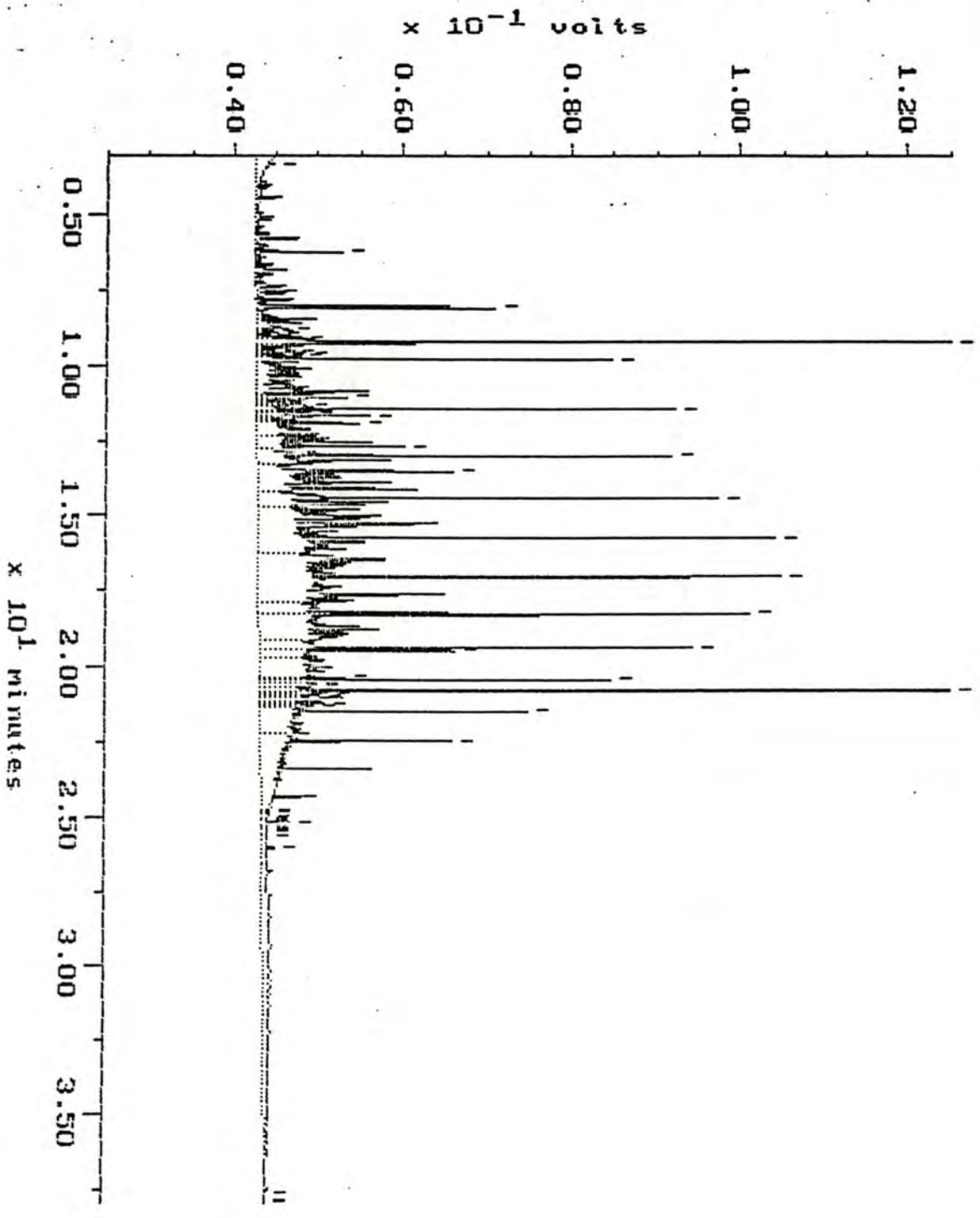
CONTINUING CALIBRATION

Sample: GAS 400 Channel: ERNIE Filename: B6148E20
Acquired: 15-JUN-94 6:15 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0614 Operator: ATI
Comments: ATI: THE QUALITY TEAM



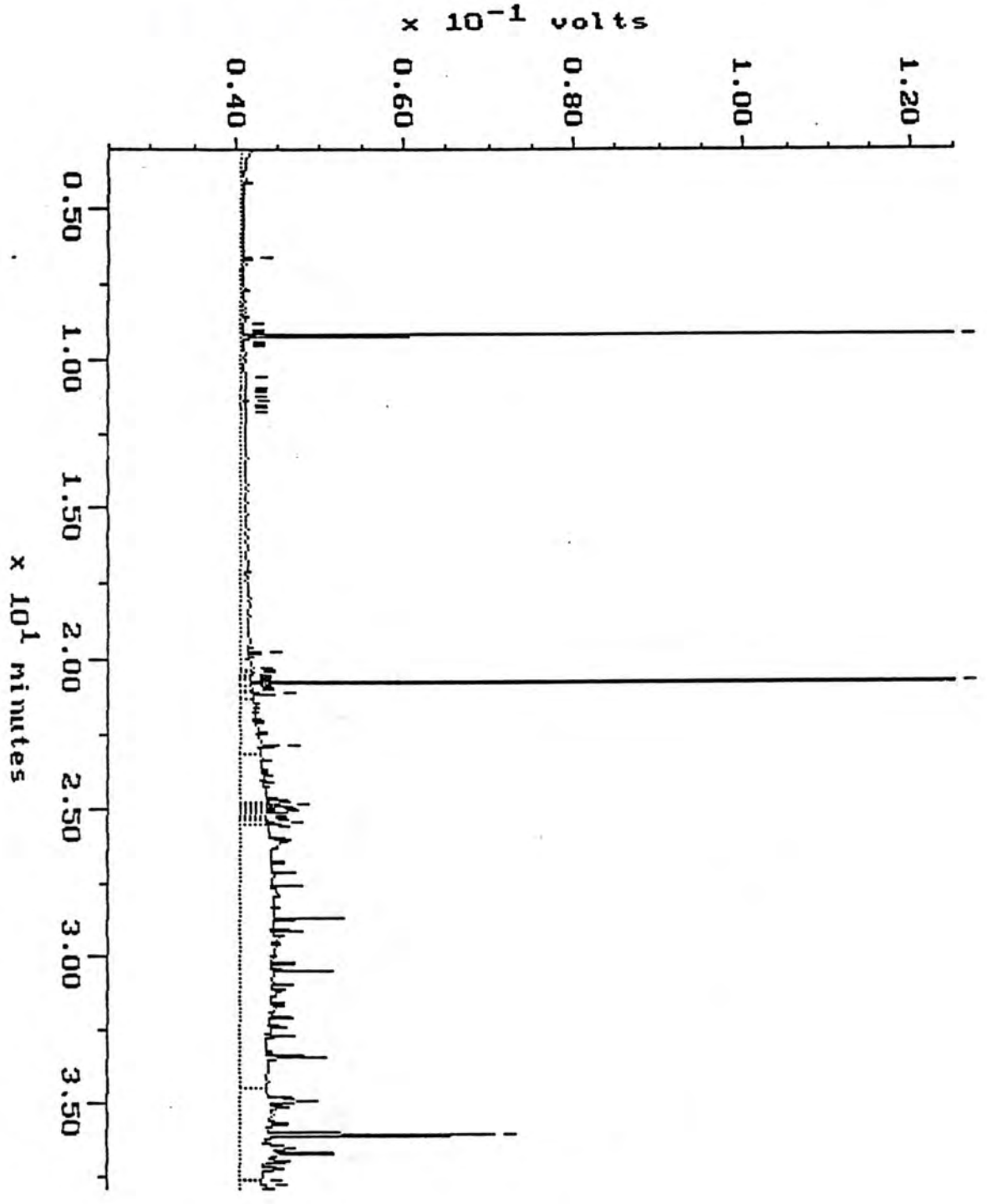
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6148E21
Acquired: 15-JUN-94 7:01 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0614 Operator: ATI
Comments: ATI: THE QUALITY TEAM



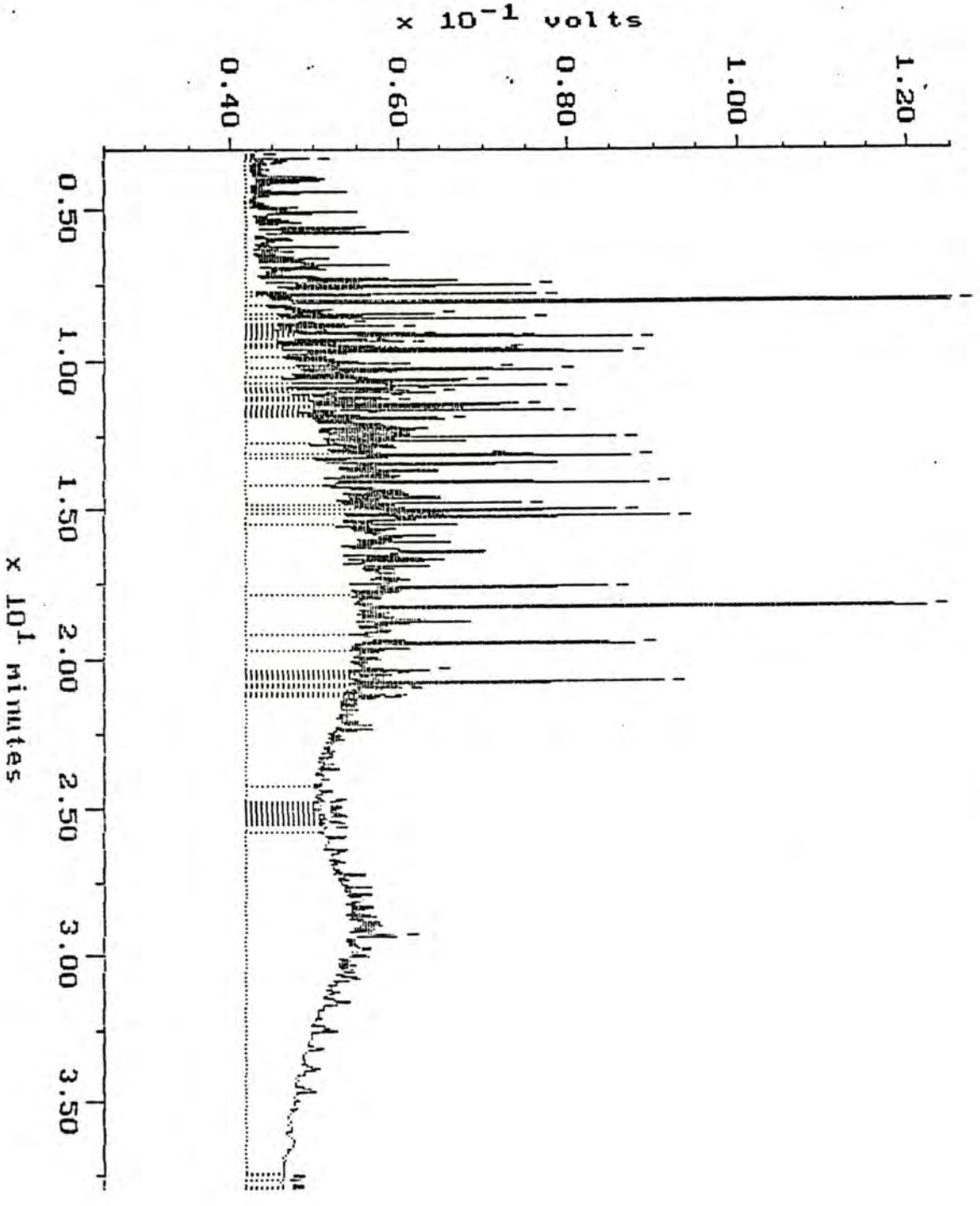
WA DOE WTPH-D

Sample: 9406-159-2 Channel: ERNIE Filename: R6218E07
Acquired: 21-JUN-94 14:11 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



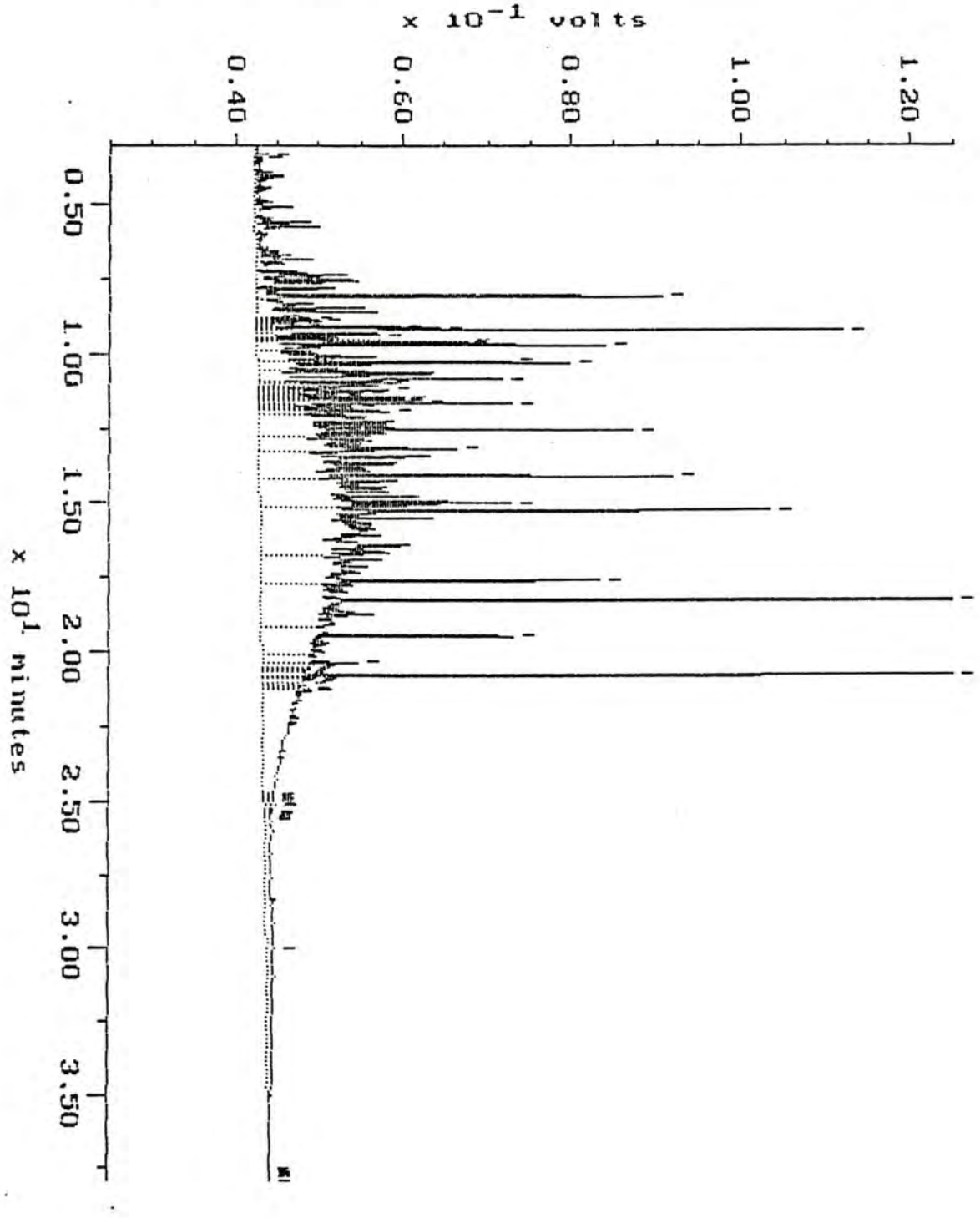
WA DOE WTPH-D

Sample: 9406-159-3 DIL Channel: ERNIE Filename: R6158E23
Acquired: 16-JUN-94 5:42 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0615 Operator: ATI
Dilution: 1 : 10.000
Comments: ATI: THE QUALITY TEAM



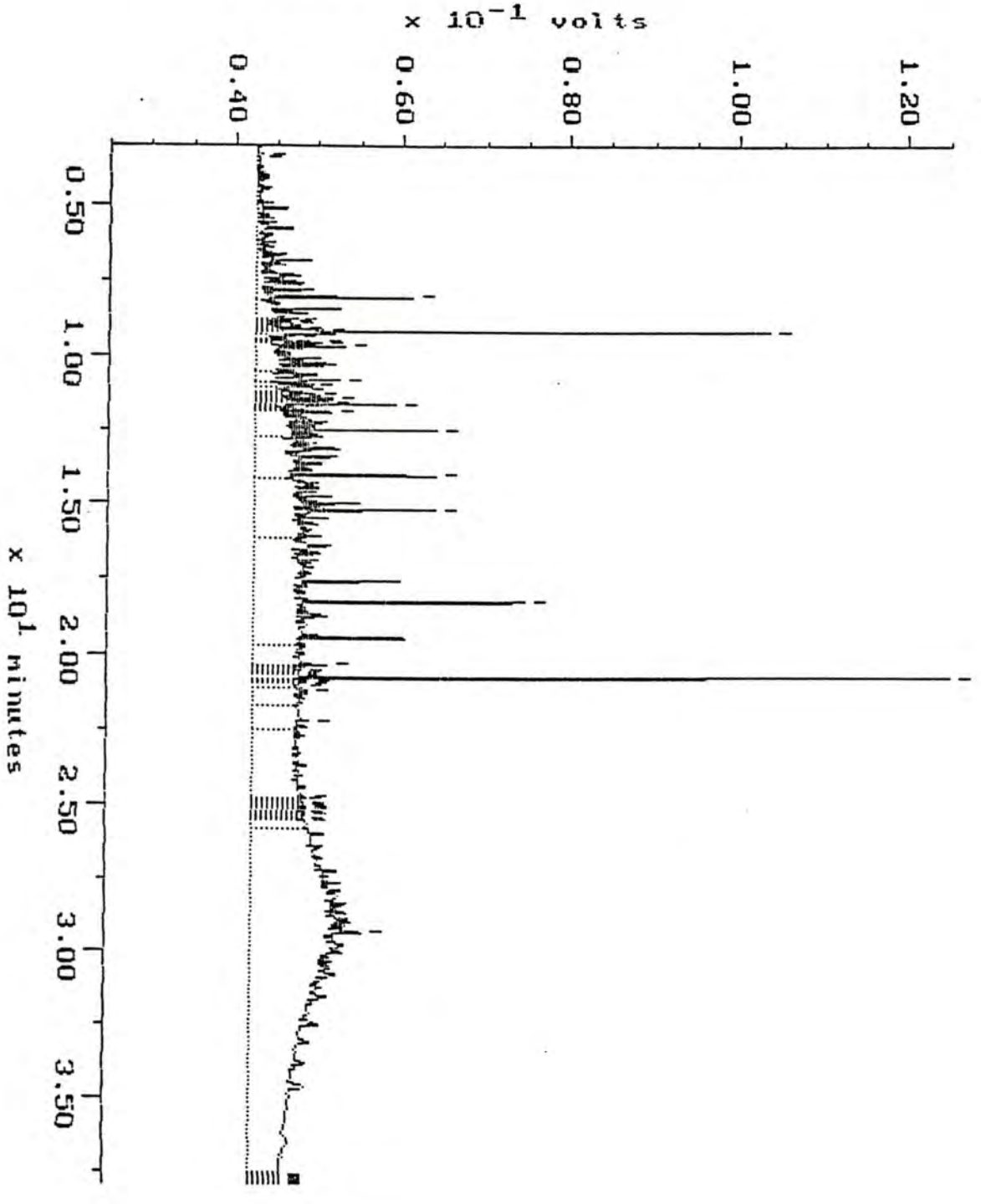
WA DOE WTPH-D

Sample: 9409-170-1 Oil Channel: ERNIE Filename: 02220E06
Modified: 21-JUN-94 6:17 Method: F:\GPC2\MAXDATA\ERNIE\FUELC620 Operator: ATI
Dilution: 1 : 5.000
Comments: ATI: THE QUALITY TEAM

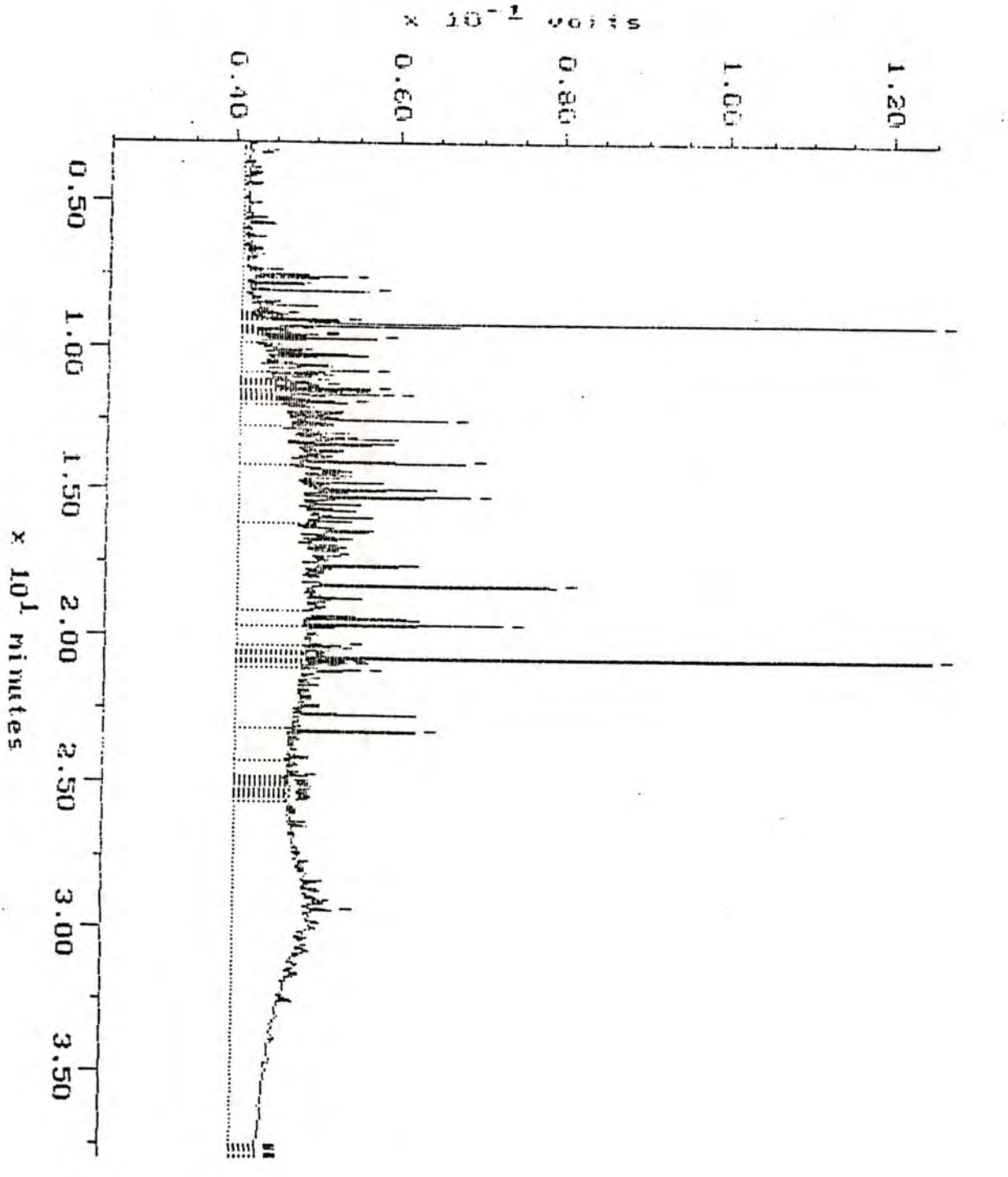


WA DOE WTPH-D

Sample: 9406-159-13 DIL Channel: ERNIE Filename: R0208E09
Acquired: 21-JUN-94 1:03 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0620 Operator: ATI
Dilution: 1 : 5.000
Comments: ATI: THE QUALITY TEAM

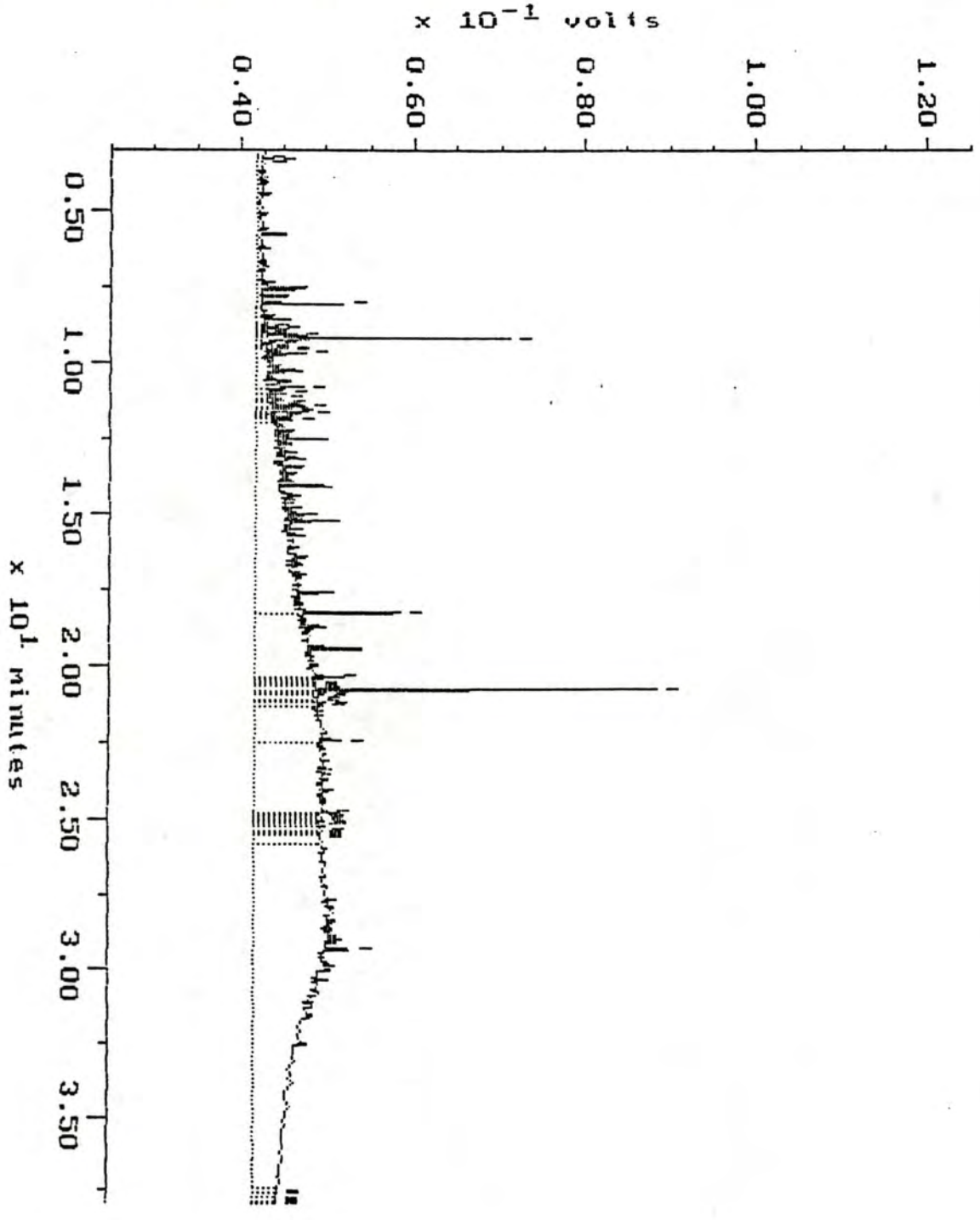


WA DOE WTPH-D


x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10¹ minutes

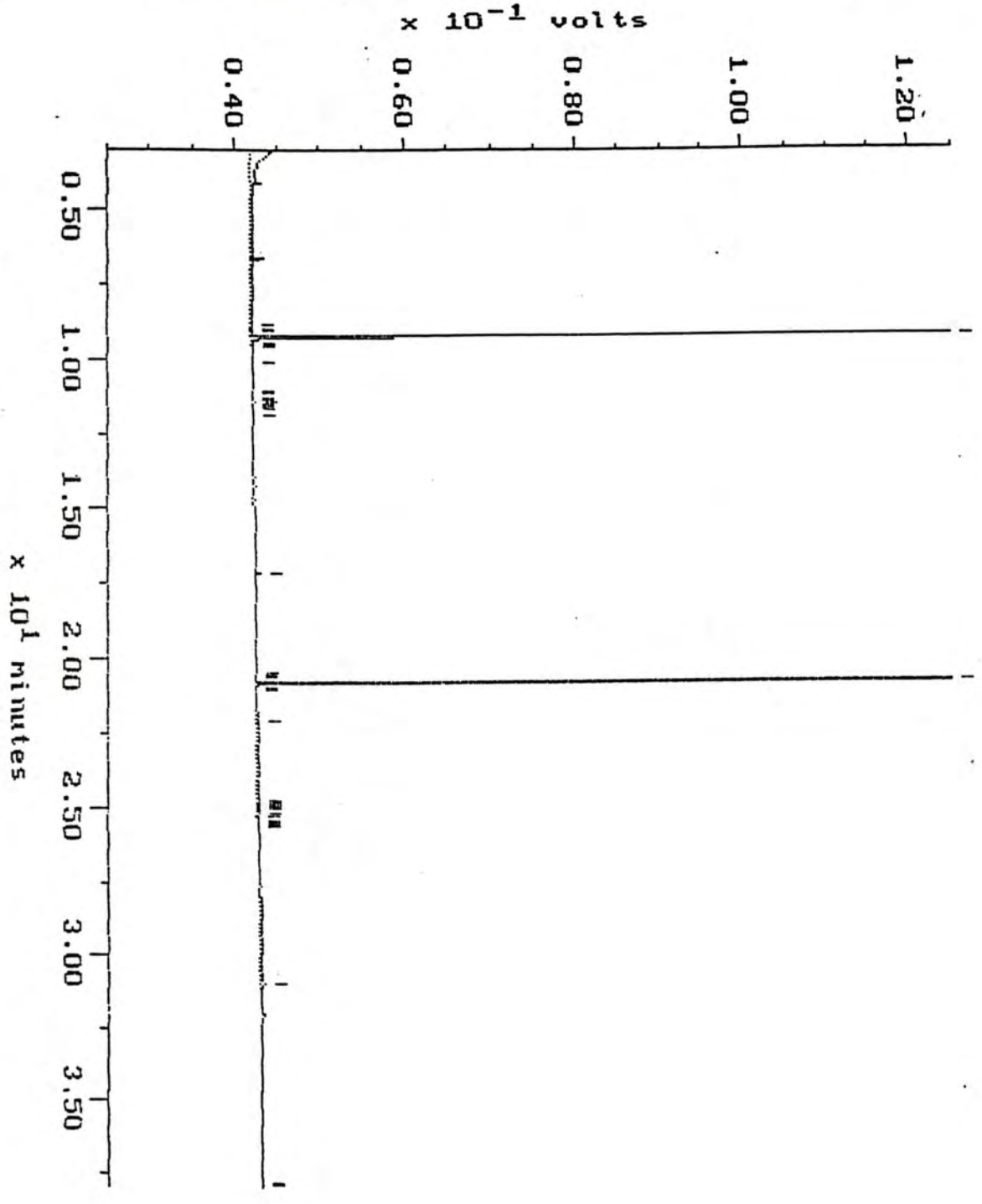
WA DOE WTPH-D

Sample: 9406-153-15 DIL Channel: ERNIE Filename: R6208E11
Acquired: 21-JUN-94 2:37 Method: F:\BRO2\MAXDATA\ERNIE\FUELC620 Operator: ATI
Dilution: 1 : 10.000
Comments: ATI: THE QUALITY TEAM



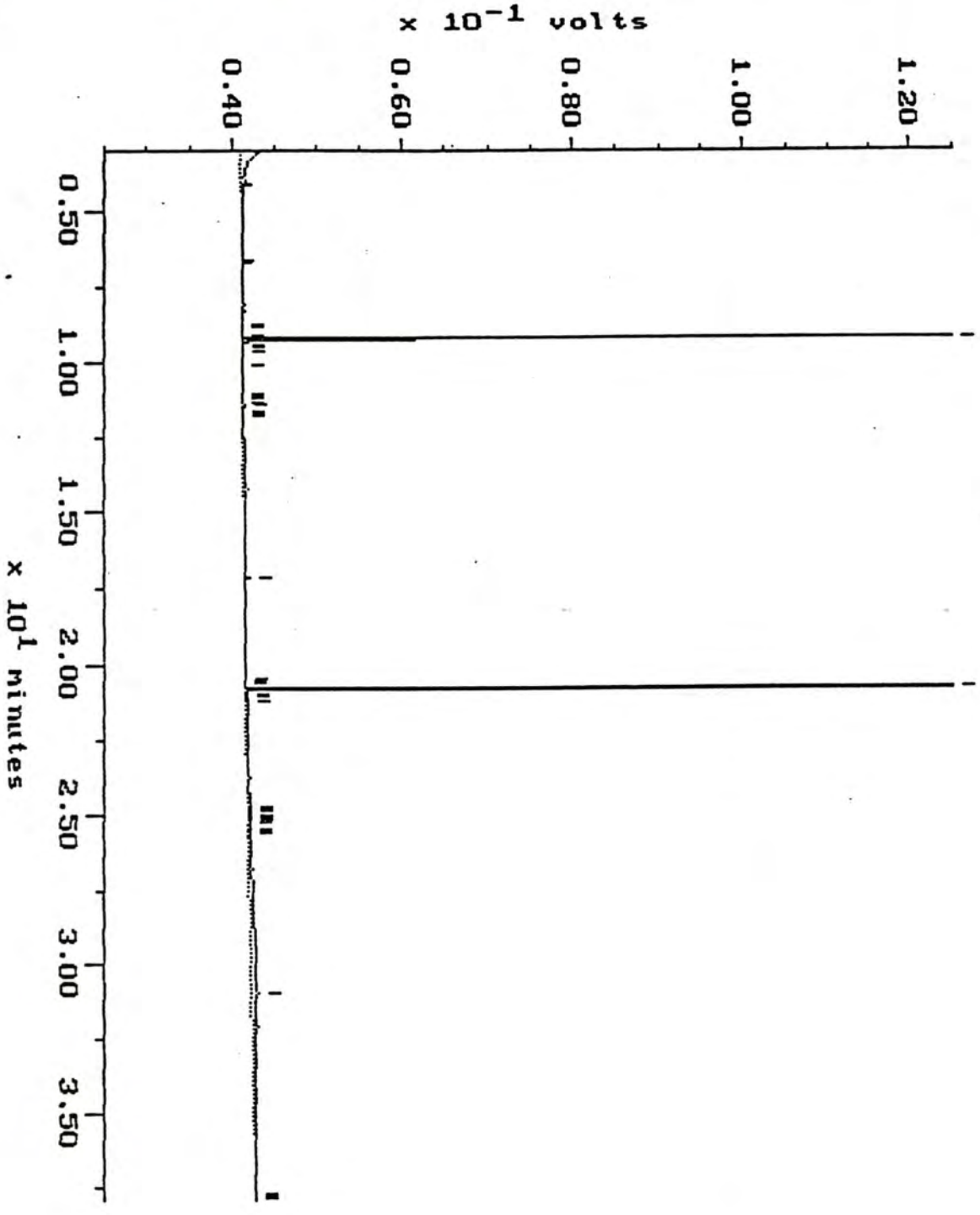
Blank

Sample: SRB-C 6-15 Channel: ERNIE Filename: R6158E20
Acquired: 16-JUN-94 3:21 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0615 Operator: ATI
Comments: ATI: THE QUALITY TEAM



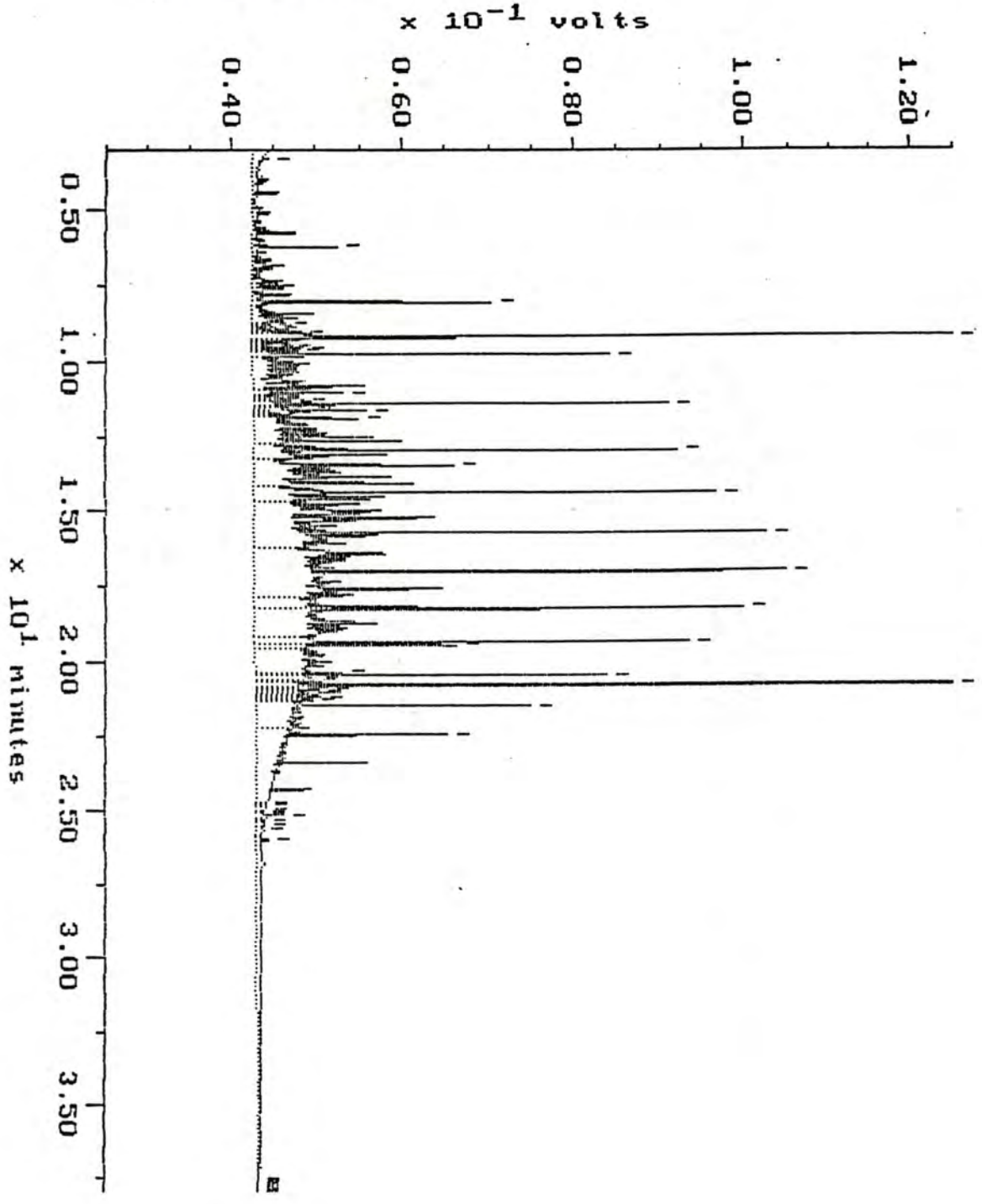
Blank

Sample: SRB B 6-20 Channel: ERNIE Filename: R6218E05
Acquired: 21-JUN-94 12:37 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



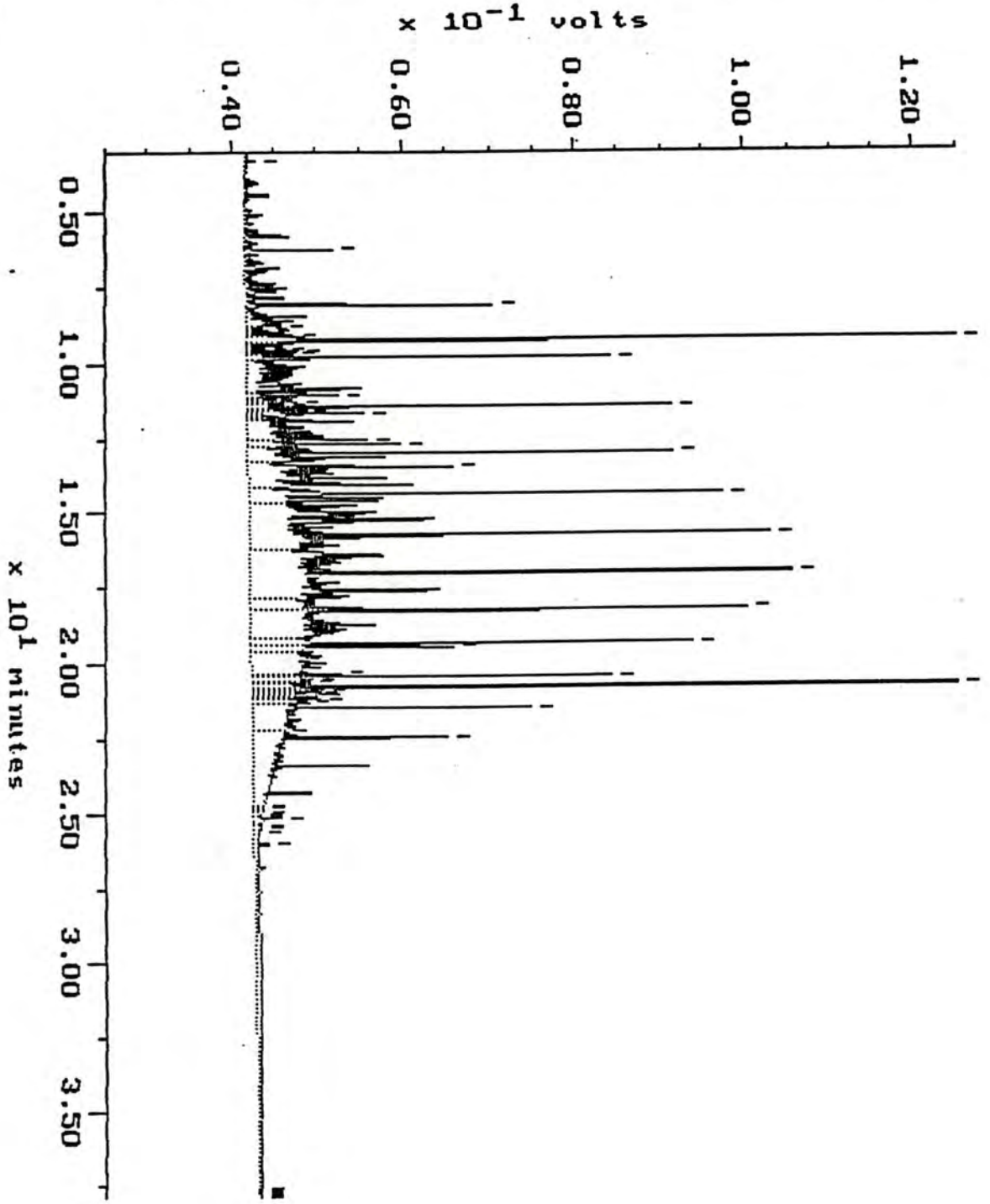
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6158E17
Acquired: 16-JUN-94 1:01 Method: F:\BR02\MAXDATA\ERNIE\FUEL0615 Operator: ATI
Comments: ATI: THE QUALITY TEAM



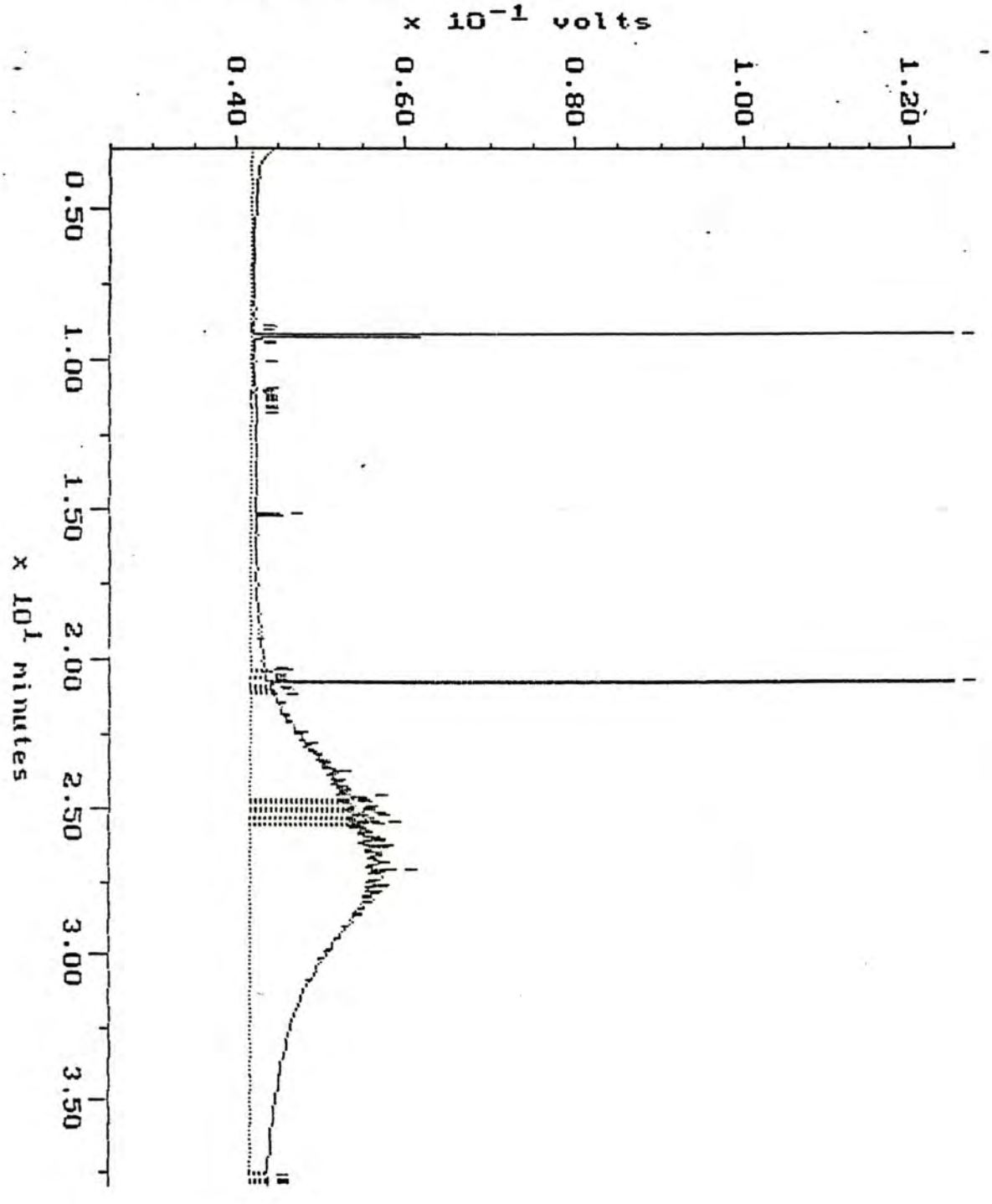
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6218E02
Acquired: 21-JUN-94 10:17 Method: F:\BRO2\MAXDATA\ERNIE\FUEL8621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



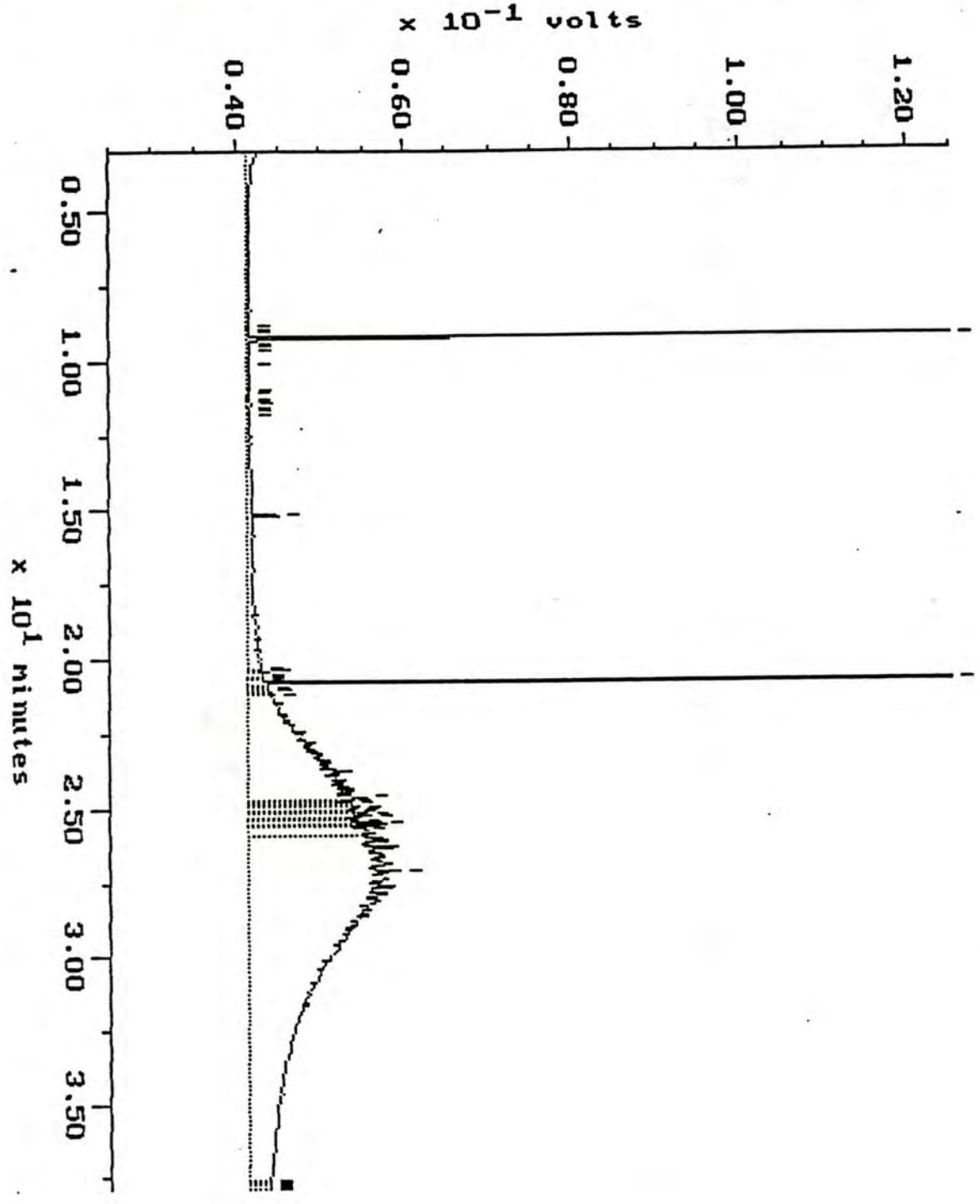
CONTINUING CALIBRATION

Sample: MO 500 Channel: ERNIE Filename: R6158E18
Acquired: 16-JUN-94 1:48 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0615 Operator: ATI
Comments: ATI: THE QUALITY TEAM



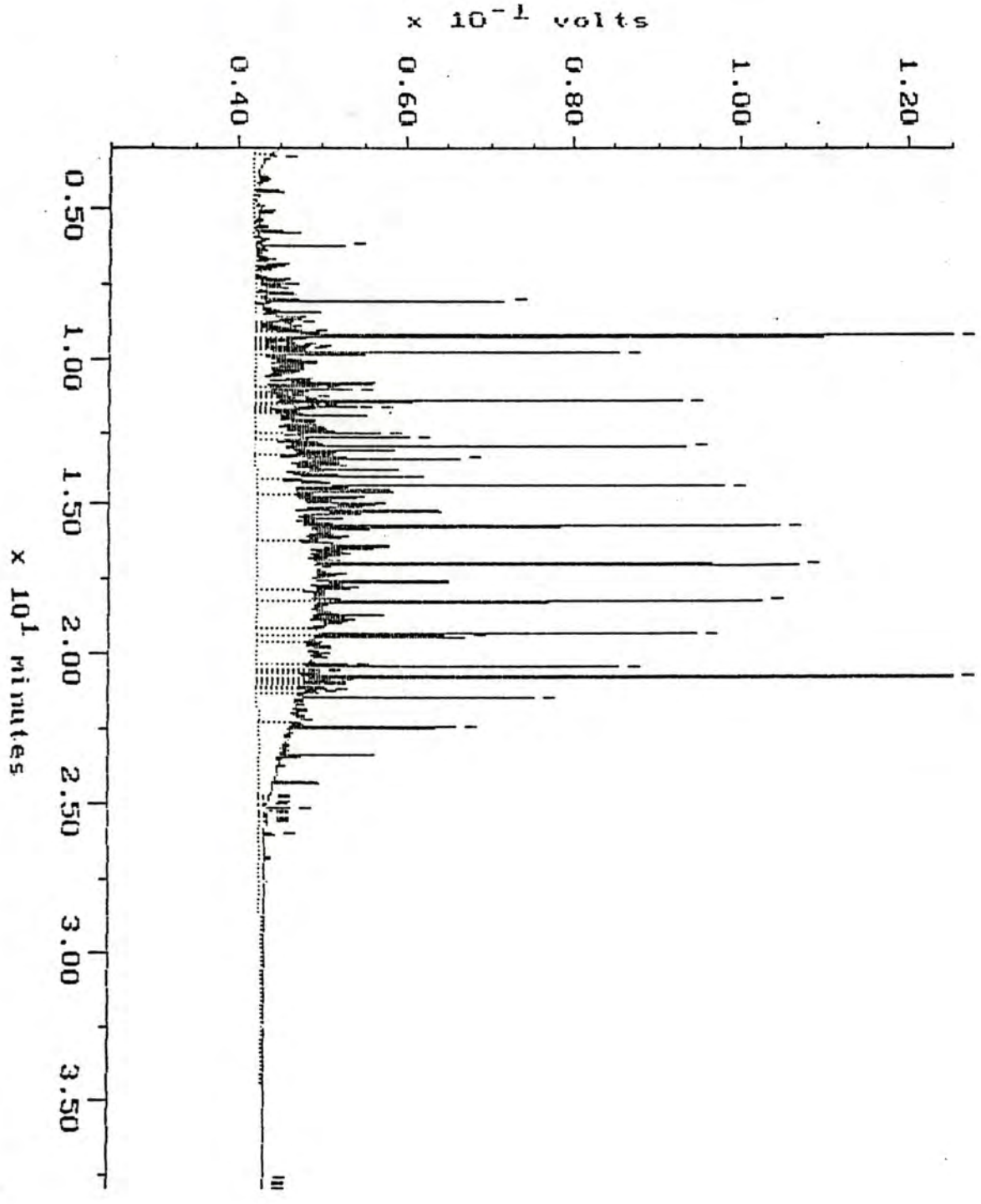
CONTINUING CALIBRATION

Sample: MO 588 Channel: ERNIE Filename: R6218E03
Acquired: 21-JUN-94 11:03 Method: F:\BR02\MAXDATA\ERNIE\FUEL0621 Operator: ATI
Comments: ATI: THE QUALITY TEAM



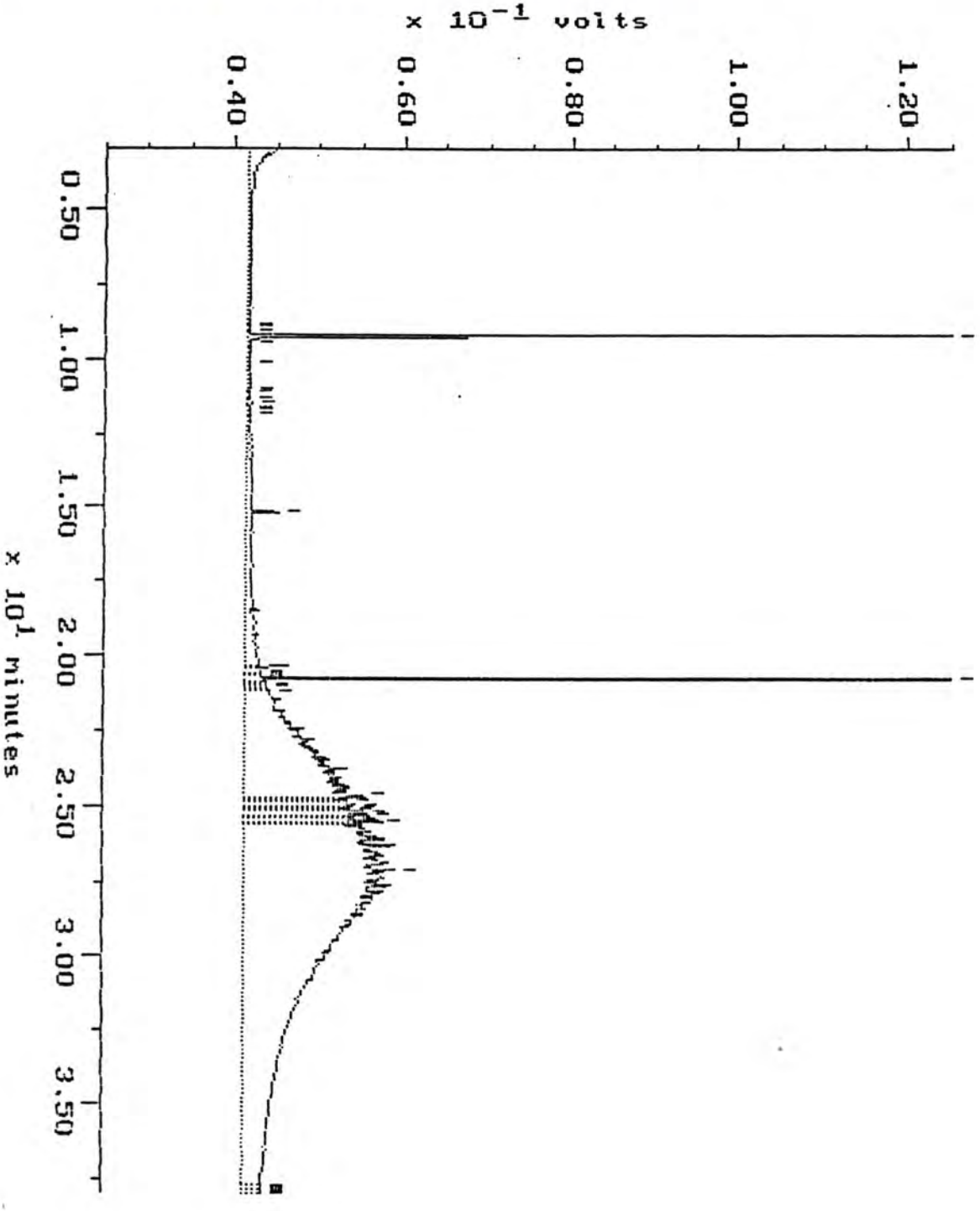
CONTINUING CALIBRATION

Sample: D 500 Channel: ERNIE Filename: R6198E02
Acquired: 19-JUN-94 16:07 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0619 Operator: ATI
Comments: ATI: THE QUALITY TEAM



CONTINUING CALIBRATION

Sample: MO 500 Channel: ERNIE Filename: R6198E03
Acquired: 19-JUN-94 10:54 Method: F:\BRO2\MAXDATA\ERNIE\FUEL0619 Operator: ATI
Comments: ATI: THE QUALITY TEAM

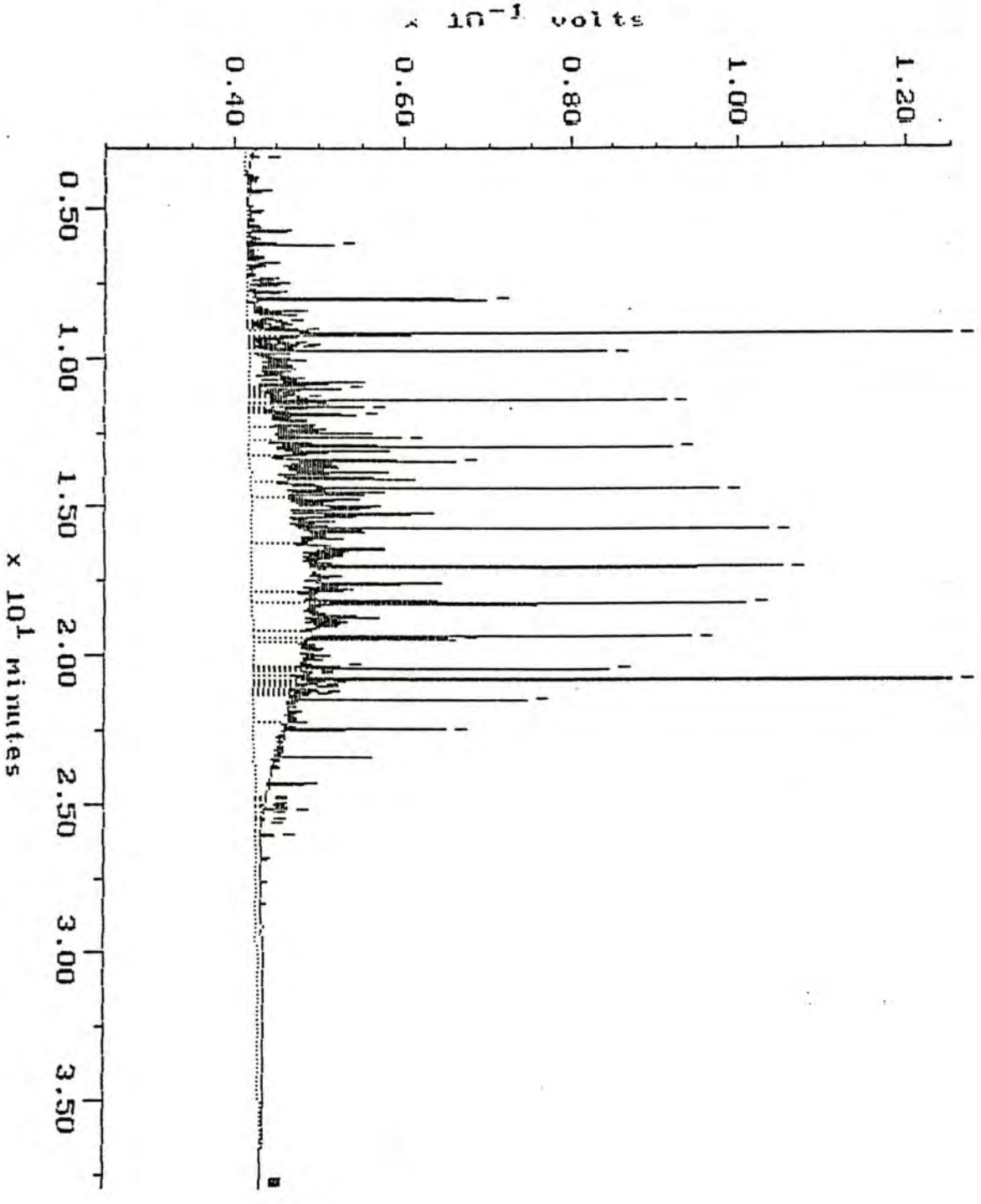


CONTINUING CALIBRATION

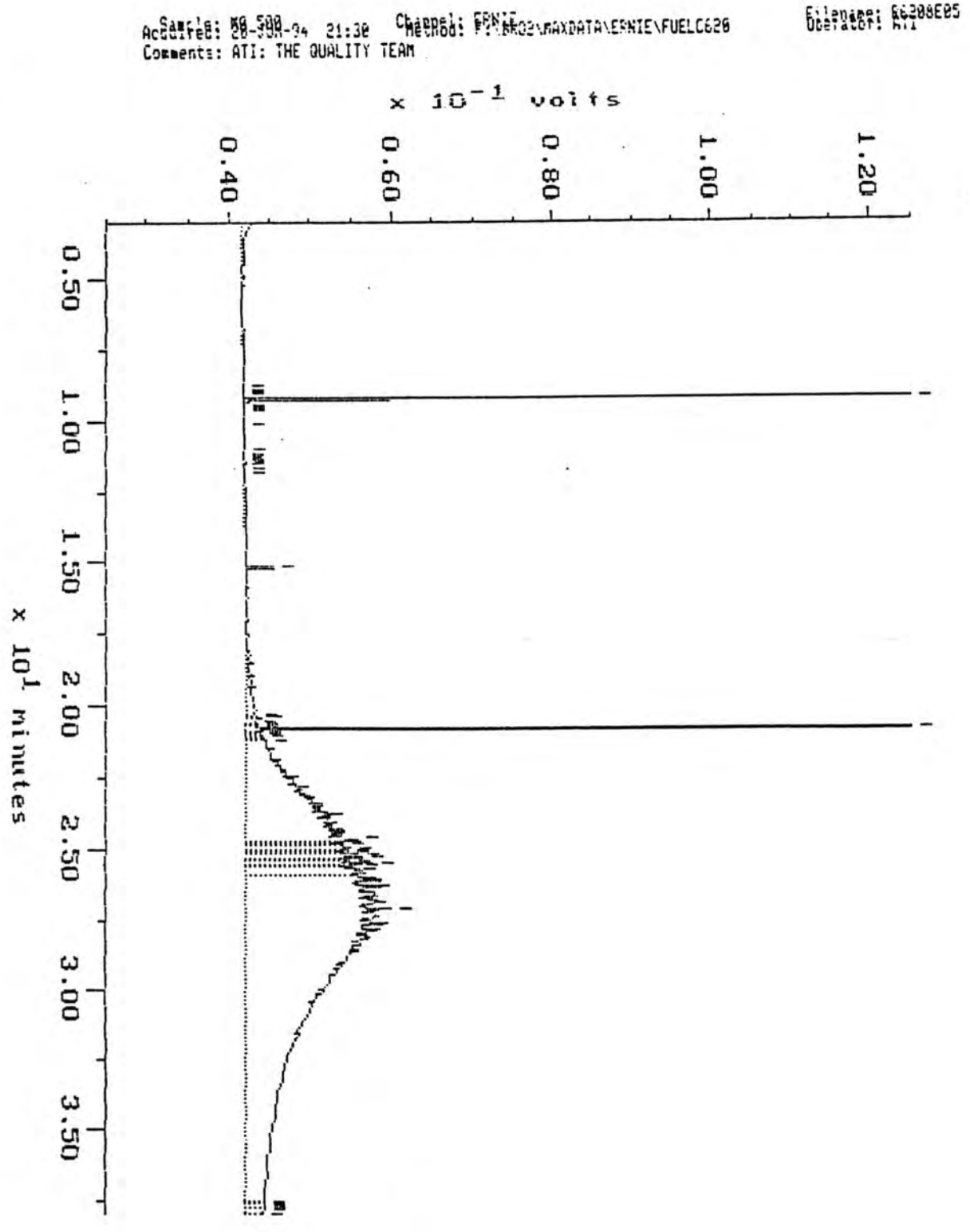
Sample: 5-500
Acquired: 28-JUN-94 20:37
Comments: ATI: THE QUALITY TEAM

Channel: ERNIE
Method: F:\BR02\MAXDATA\ERNIE\FUELC628

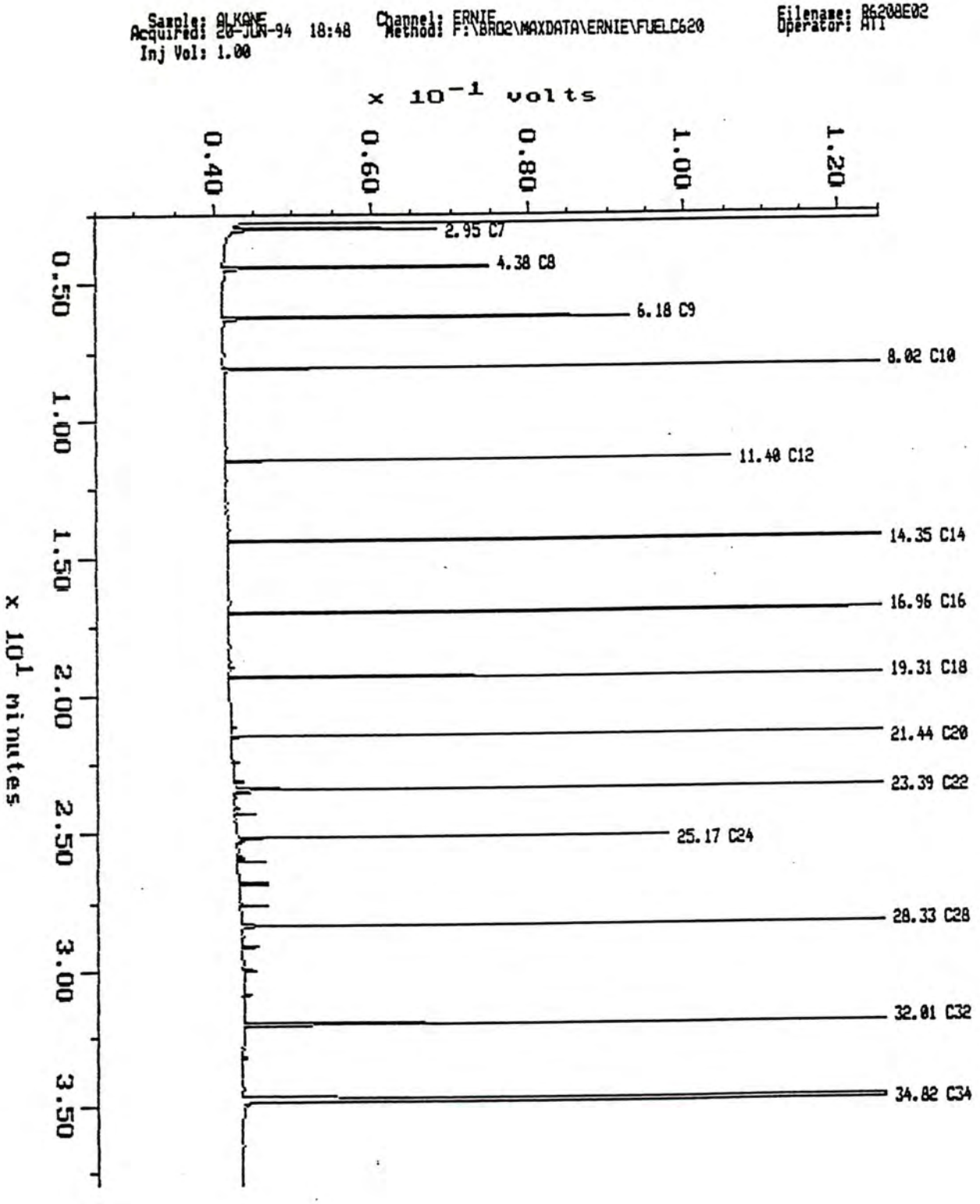
Filename: R6288E04
Operator: ATI



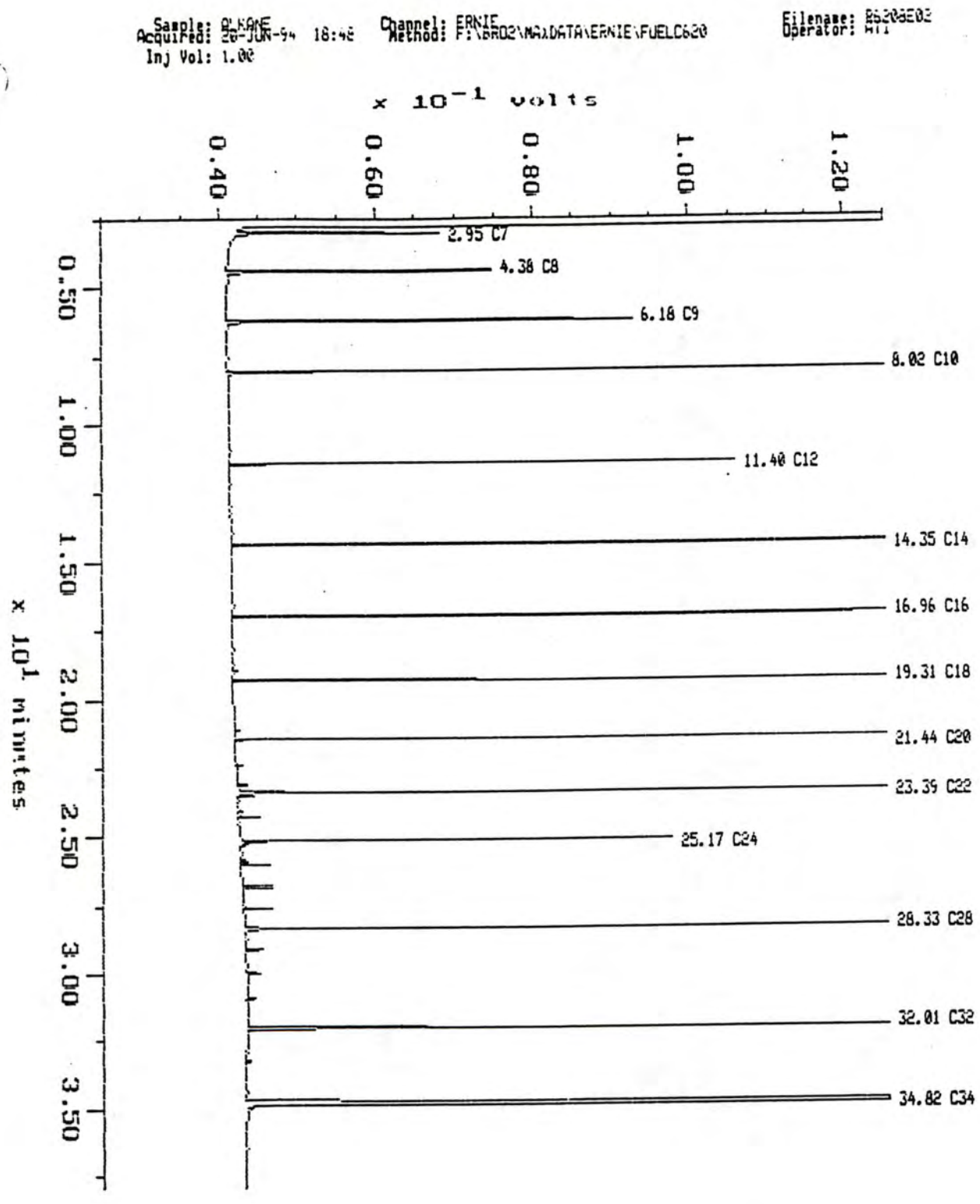
CONTINUING CALIBRATION



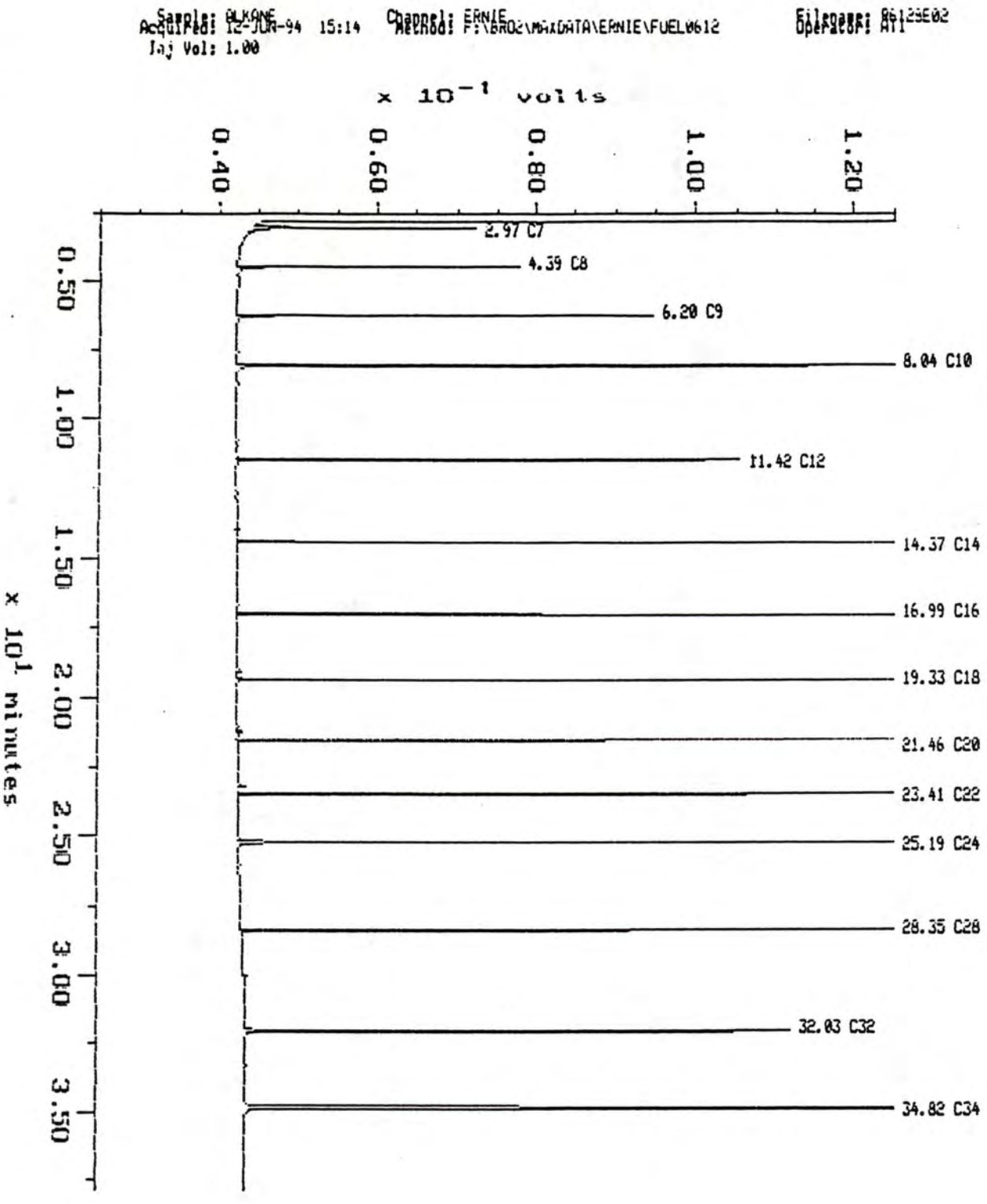
Alkane


Sample: ALKANE
Acquired: 20-JUN-94 18:48
Inj Vol: 1.00
Channel: ERNIE
Method: F:\BRO2\MAXDATA\ERNIE\FUELC620
Filename: B6208E02
Operator: ATI
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
x 10¹ minutes
0.50
1.00
1.50
2.00
2.50
3.00
3.50
2.95 C7
4.38 C8
6.18 C9
8.02 C10
11.48 C12
14.35 C14
16.96 C16
19.31 C18
21.44 C20
23.39 C22
25.17 C24
28.33 C28
32.01 C32
34.82 C34

Alkane


Sample: ALKANE
Acquired: 20-JUN-94 18:48
Inj Vol: 1.00
Channel: ERNIE
Method: F:\BRO2\MAXDATA\ERNIE\FUELC620
Filename: B5208E02
Operator: HTI
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
2.95 C7
4.38 C8
6.18 C9
8.02 C10
11.40 C12
14.35 C14
16.96 C16
19.31 C18
21.44 C20
23.39 C22
25.17 C24
28.33 C28
32.01 C32
34.82 C34
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10¹ minutes

Alkane


Sample: ALKANE
Acquired: 12-JUN-94 15:14
Inj Vol: 1.00
Channel: ERNIE
Method: F:\BRO2\MAXDATA\ERNIE\FUEL0612
Operator: AT1
x 10⁻¹ volts
0.40
0.60
0.80
1.00
1.20
x 10¹ minutes
0.50
1.00
1.50
2.00
2.50
3.00
3.50
2.97 C7
4.39 C8
6.20 C9
8.04 C10
11.42 C12
14.37 C14
16.99 C16
19.33 C18
21.46 C20
23.41 C22
25.19 C24
28.35 C28
32.03 C32
34.82 C34

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Geotechnical Engineering
Geology & Hydrogeology

CHAIN-OF-C...STODY

Date 6-11-94 Page 1 of 2

PROJECT INFORMATION

Project Manager: Glen Bebnick
Project Name: Russell of Orcas
Project Number: 15,676.001
Site Location: Orcas; Orcas Is. WA Sampled By: DPD

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method: _____
Disposed by: _____ Disposal Date: _____

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐AGI Std. ☐Special

Laboratory Number: 9406-159

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-ID State: WA	TPH-G: ~~State~~/BETX	TPH-D: ~~State~~ Extended	TPH Special Instructions	418.1 State:	~~8015M~~ TPH-D	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GCMS Volatiles	8270 GCMS Semivol.	8310 HPLC PAHs	8040 Phenols	DWS - Volatiles and Semivol.	PESTS/PCB's: 8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/pest	METALS: Selected metals: ~~list~~	Total Lead (Pb)	Organic Lead (Ca)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Pb)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER: Hold	Run at 24 hr Turn	Run at 48 hr Turn		NUMBER OF CONTAINERS
BG-TC #1*	6-7-94	20:15	Soil	1	X																																		1
BG-TC #2*	6-7-94	20:25		2	X					✓	BX	1L	5V																										1
S1	6-9-94	11:30		3	X	✓	✓	BTEX	1/14/94			(RTPH)																								X				1
S2	6-9-94	12:55		4	X																																		1
S3	6-9-94	12:58		5	X																																		1
S4	6-9-94	14:00		6	X																																		1
S5	6-9-94	16:15		7	X																																		1
S6*	6-10-94	11:40	↓	8		✓	✓	BTEX	1/15/94		(NTPH)																								X				1

LAB INFORMATION

Lab Name: ATI
Lab Address: 560 Naches Blvd.
Renton WA
Via:

SAMPLE RECEIPT

Total Number of Containers:	8
Chain of Custody Seals: Y/N/NA	Y
Intact?: Y/N/NA	Y
Received in Good Condition/Cold:	Y

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: * Extract within holding time
Hold S6 until Results for HCID on S1; Then run appropriate methods for detected compounds for S1 & S6; Gasoline-WTPH-G/BETX
Diesel Range-WTPH-D; Heavy oil-WTPH-418.1

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: David Dawson Time: 1724	Signature: Time:	Signature: Time:
Printed Name: David Dawson Date: 6-11-94	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: M. Lock Time: 0730	Signature: Time:	Signature: Time:
Printed Name: M. POSTMA Date: 6/13/94	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:

AGI OFFICES: Bellevue: (206) 453-8383 Tacoma: (206) 383-4380
Portland: (503) 222-2820 Pleasanton: (415) 460-5495

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to AGI Project Files; Gold to AGI Disposal Files

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Geotechnical Engineering
Geology & Hydrogeology

CHAIN-OF-CUSTODY

Date 6-11-94 Page 2 of 2

PROJECT INFORMATION

Project Manager: Glen Babnick
Project Name: Russell of Orcas
Project Number: 15,676.001
Site Location: Orcas, Orcas Is. WA. Sampled By: DPA

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method:
Disposed by: Disposal Date:

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐AGI Std. ☐Special

Laboratory Number: 9406-159

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-ID State: WA	TPH-G State: BETX	TPH-D State: extended	TPH Special Instructions	418.1 State:	8015M	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GCMS Volatiles	8270 GCMS Semivol.	8310 HPLC PAHs	8040 Phenols	DWS - Volatiles and Semivol.	PESTS/PCB's: 8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/pest	METALS: Selected metals: list	Total Lead (Wa)	Organic Lead (Ca)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER: Hold	Run at your Term.	Run at your Term		NUMBER OF CONTAINERS
#S7	6-10-94	15:15	Soil	9	X																																		1
" S8	6-11-94	11:40		10	X																																		1
S9	6-11-94	11:48		11	X																															X			1
S10	6-11-94	12:55		12	X																																		1
SP1	6-8-94	17:35		13	X	X	X																														X			1
SP2	6-8-94	17:50		14		X	X																															X		1
SP3	6-9-94	18:00		15		X	X																															X		1

LAB INFORMATION

Lab Name: ATI
Lab Address: 560 Naches Blvd
Renton Wa
Via: Courier

SAMPLE RECEIPT

Total Number of Containers:	7
Chain of Custody Seals: Y/N/NA	Y
Intact?: Y/N/NA	Y
Received in Good Condition/Cold:	Y

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Hold SP2 & SP3 until results for HCID on SP1 Then run appropriate method for detected compounds for SP1, SP2 & SP3

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 1725	Signature: Time:	Signature: Time:
Printed Name: David Dawson Date: 6-11-94	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time: 0930	Signature: Time:	Signature: Time:
Printed Name: M. Postma Date: 6/13/94	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:

AGI OFFICES: Bellevue: (206) 453-8383 Tacoma: (206) 383-4380
Portland: (503) 222-2820 Pleasanton: (415) 460-5495

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Rev. 4/92

AGI TECHNOLOGIES

APPENDIX D

Sediment Sampling and Analysis Report

AGI
TECHNOLOGIES

September 2, 1994

15,676.002

Ms. Margaret Russell
Post Office Box 25
Seattle, Washington 98280

Dear Ms. Russell:

Report
Sediment Sampling and Analysis
Russell's Landing
Orcas, Washington

This letter transmits the results of sediment sampling and analysis at Russell's Landing (the site) on Orcas Island, Washington. AGI Technologies (AGI) performed the sediment sampling and analysis following our June 30, 1994 draft Work Plan and associated guidance from the Washington State Department of Ecology (Ecology). Sediment sampling and analysis was performed in general accordance with requirements promulgated under Washington Administrative Code (WAC) Chapter 173-204 and protocols recommended in Puget Sound Estuary Program (PSEP) guidelines (PSEP, 1986a, 1986b, and 1991). References are included in Attachment 1 to this letter.

BACKGROUND

The site is an active bulk plant and fuel transfer facility located on the waterfront immediately west of the Washington State ferry dock in Orcas, Washington. A portion of the subtidal area on the site is leased from the Department of Natural Resources (DNR). The location of the site is shown on Figure 1.

Ownership of the property/facilities and the DNR lease are being considered for transfer. The DNR requires that sediment on leased tideland be evaluated for potential contamination prior to a lease transfer. Fuel hydrocarbon (FHC) contamination was known to be present in upland areas of the site. The FHC contamination on the site has to be remediated prior to completing the property transfer.

A Remedial Action (RA) was performed on the site by AGI in June 1994 to excavate soils contaminated by gasoline, diesel, and oil range FHC from the upland area. Based on AGI's observations during the excavation, the FHC contamination has extended onto the beach. Ecology required that potential environmental impact due to FHC contamination be addressed by sediment sampling and analysis.

AGI TECHNOLOGIES

PURPOSE AND SCOPE

The purpose of our service was to collect sediment samples representing site conditions, and reference samples representing background conditions for selected testing and report the results to the Ecology. Our scope of services included:

- Collecting a total of eight sediment samples from the subtidal and intertidal zones. Three site samples and one reference sample were collected from each zone.
- Analyzing sediment samples for biological toxicity, total organic carbon (TOC), and particle size.
- Reviewing the test results for quality and preparing a quality assurance report (QAR) to document data completeness and data quality.
- Preparing this letter summarizing test results.

SEDIMENT SAMPLING

Sediment samples were collected from eight locations, six in the vicinity of the site (site samples) and two in a reference area (reference samples), on July 6, 1994. Sediment samples were collected and composited from each of the eight locations. Samples were collected by a diver and tender of Global Diving & Salvaging, Inc. and an AGI representative. Site sample locations are shown on Figure 2 and reference sample locations are shown on Figure 3.

Site samples SS1, SS2, and SS3 were collected from locations in the site subtidal zone. These samples helped determine if potential leaks or spills from the gas pumps and piping located on a dock extending seaward from the waterfront (see Figure 2) resulted in contamination of adjacent sediments.

Site samples SS4, SS5, and SS6 were collected along the shoreline in the intertidal zone to address potential environmental impact due to FHC from the upland area of the site. More specifically, the purpose of sample SS4 was to address pumps and truck loading; sample SS5 to address above-ground storage tanks and associated piping; and sample SS6 to address a former propane tank.

Reference samples SS7 and SS8 were collected from intertidal and subtidal zones, respectively, in an area approximately 1/4 mile east of the site. Reference sample locations were selected against two criteria: 1) the area is not impacted by FHC contamination, and 2) intertidal and subtidal sediment textures are similar to that of respective site samples.

Sample collection procedures were in general accordance with recommendations under PSEP guidelines (PSEP, 1991). A 3-square-inch by 6-inch stainless steel corer with plastic caps on both ends was used for sample collection. Samples were collected through a penetration depth of 10 centimeters (cm) with a minimum of 5 cm overlying water to minimize sample disturbance. The overlying water was removed by siphoning, and the accepted sediment sample composited in a stainless steel bowl to the required volume (i.e., 5 liters [L]) at each location. The composited

stainless steel bowl to the required volume (i.e., 5 liters [L]) at each location. The composited sediment sample was then transferred to five laboratory-cleaned, 1-L glass jars. Each jar was labeled, placed in an ice-filled chest, and transported to the project laboratories under chain-of-custody procedures.

ANALYTICAL SCHEDULE AND RESULTS

Samples were submitted to Parametrix Inc. in Kirkland, Washington for biological testing (i.e., *Amphipod* 10-day mortality, *Bivalve Larvae* 2-day mortality/abnormality, and *Juvenile Polychaete* 20-day biomass) and North Creek Analytical in Bothell, Washington for TOC and particle size analyses. The particle size analysis was intended to determine the appropriate test organism to be used in *Amphipod* bioassay. Analytical results were reviewed by AGI for data completeness and quality. Copies of the laboratory data and QAR are included in Attachment 2. The QAR indicates the data completeness goal is achieved and all reported data are of known quality and acceptable for use.

Biological toxicity test results for site sediments are compared with Sediment Quality Standards (SQSs) promulgated under WAC-173-204-320-(3). Results for site samples SS1, SS2, and SS3 are compared against SQSs based on reference sample SS8; site samples SS4, SS5, and SS6 were compared against SQSs based on reference sample SS7. For *Amphipod* bioassay, mortalities for all test sediments are less than 25 percent maximum. For *Bivalve Larvae* bioassay, combined mortality and abnormality of each test sediment is less than the maximum of the reference sediment plus 15 percent. For *Polychaete* bioassay, mean biomass for each test sediment is greater than the minimum of 70 percent of the reference sediment biomass. Toxicity testing results are summarized in Table 1.

The TOC results, as shown in Table 2, are all below the typical Puget Sound marine sediment upper range of 3.0 percent (Ecology, 1991).

The particle size analysis confirmed that using the *Crassostrea gigas* for Amphipod testing was appropriate since fine grains are less than 50 percent and gravel contents are no greater than 35 percent for all test sediments (Ecology, 1991). Particle size analysis results are presented in Table 3.

LIMITATIONS

The analyses, conclusions, and recommendations in this letter are based on conditions encountered at the time of our field investigation, information provided by Bickford Ford Mercury, and our experience and professional judgement. AGI cannot be responsible for interpretation by others of the data contained herein. Our work has been performed in a manner consistent with that level of care and skill normally exercised by members of the profession currently practicing under similar conditions in the area. No other warranty, express or implied, is made.

AGI TECHNOLOGIES

If you have any questions regarding this report, please call either of the undersigned at (206) 453-8383.

Sincerely,

AGI Technologies

Mingta Lin
Project Chemist

Glen M. Bobnick, P.E.
Senior Engineer

MTL/GMB/tag

cc: Chris Lamson; Skellenger, Bender, Mathias & Bender

attachments

AGI TECHNOLOGIES

Table 1
Analytical Results – Biological Toxicity
Russell/Orcas Sediment Sampling and Analysis
Orcas, Washington

Sample I.D.	Biological Toxicity Testing		
	Amphipod (10–day) Mortality (%)	Bivalve Larvae (48–hour) Mortality & Abnormality (%)	Polychaete (20–day) Biomas (mg/org)
West Beach[a]	3.0	2.8 [c]	20.7
SS1	11.0	4.7	24.1
SS2	14.0	3.7	27.8
SS3	9.0	15.3	23.2
SS4	8.0	5.7	19.9
SS5	5.0	3.1	20.9
SS6	8.0	4.7	21.1
SS7	6.0	10.8	24.2
SS8	10.0	6.4	24.6
SQS[c]	<25%	<15% + (reference mortality & abnormality).	>70% of reference biomass.

Notes:

Reported value is mean of five replicates for each testing.

a) Negative control sample; collected from West Beach off North Whidbey Island, Washington

b) Sediment Quality Standards (SQS) promulgated under WAC–173–204–320(3). Samples SS1, SS2, and SS3 are compared against reference sample SS8; samples SS4, SS5, and SS6 are compared against reference sample SS7. A sample result matching SQS definition is determined to have adverse effects on biological resources.

c) Survivorship > 100% with 2.8% abnormality. Control sample is seawater.

mg/org – Milligrams per organism.

AGI TECHNOLOGIES

Table 2
Analytical Results – Total Organic Carbon
Russell/Orcas Sediment Sampling and Analysis
Orcas, Washington

Sample I.D.	Reporting Limit (%C)	Sample Result (%C)
SS1	0.0050	0.52
SS1 Dup	0.0050	0.55
SS1 Trp	0.0050	0.54
SS2	0.0050	0.89
SS3	0.0050	0.16
SS4	0.0050	0.056
SS5	0.0050	0.14
SS6	0.0050	0.066
SS7	0.0050	0.47
SS8	0.0050	0.24

Notes:

%C – Percent carbon
SS1 Dup – Duplicate analysis of sample SS1.
SS1 Trp – Triplicate analysis of sample SS1.

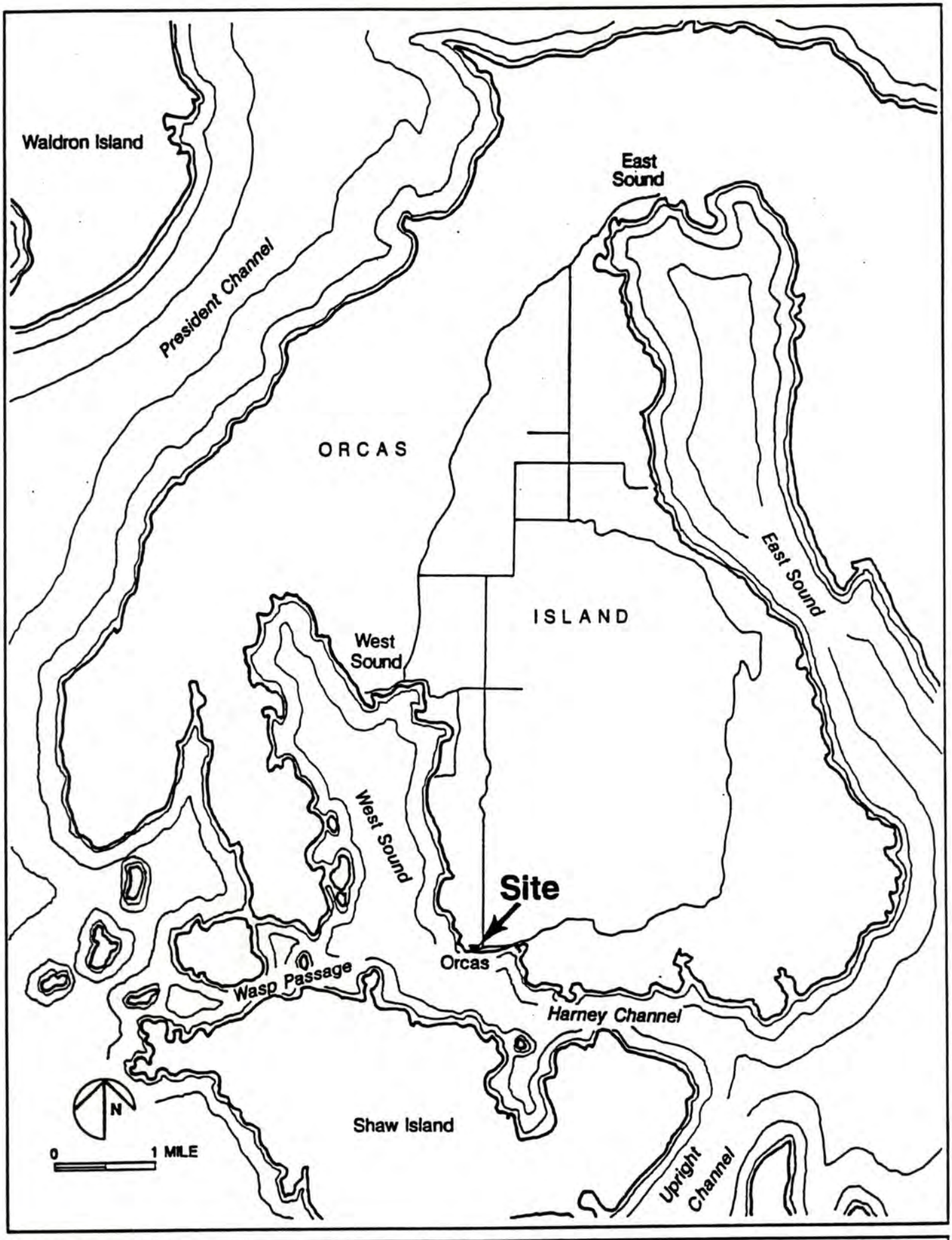
AGI TECHNOLOGIES

Table 3
Analytical Results – Particle Size
Russell/Orcas Sediment Sampling and Analysis
Orcas, Washington

Particle Size (µm)	Fractional Percentage									
	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS8 Dup	SS8 Trp
>4750	8.8	5.2	17.6	6.9	35.0	23.1	14.7	1.9	1.2	1.7
4750–2000	11.4	6.8	16.9	2.9	10.5	11.3	3.6	0.7	0.90	0.30
2000–850	11.5	7.0	20.8	2.9	7.3	10.1	1.3	0.8	0.70	0.50
850–425	15.2	9.9	22.4	12.2	7.5	21.0	18.0	0.9	0.90	0.60
425–250	16.9	12.4	12.6	47.1	19.8	25.3	33.5	1.5	1.8	1.0
250–106	23.5	26.3	5.7	27.2	20.0	7.5	17.8	41.1	41.6	39.8
106–75	3.5	7.8	0.30	0.10	0.10	0.0	0.7	20.0	20.5	21.3
75–62.5	1.1	2.7	0.10	0.0	0.0	0.0	0.4	8.5	8.7	9.4
62.5–31.2	8.1	16.5	3.6	0.80	0.0	1.6	10.0	24.5	23.8	25.5
31.2–15.6	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.6–7.8	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.8–3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3.9–1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.9–0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes:

µm – micrometer.
SS8 Dup – Duplicate analysis of sample SS8.
SS8 Trp – Triplicate analysis of sample SS8.



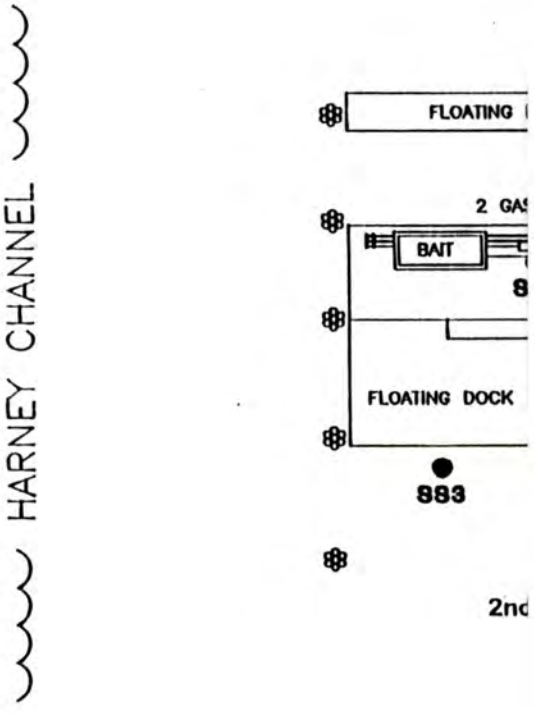
AGI TECHNOLOGIES

Vicinity Map

Russell/Orcas Sediment Sampling and Analysis
Orcas, Ohio

FIGURE 1

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
15,676.002	DFF	15 Jul. 94			



LEGEND

- ● SB3 — SUBTIDAL SEDIMENT SAMPLE NUMBER AND APPROXIMATE LOCATION
- × SB6 — INTERTIDAL SEDIMENT SAMPLE NUMBER AND APPROXIMATE LOCATION

ES, INC., DATED MAY 24, 1993, AND
Y 6, 1994.

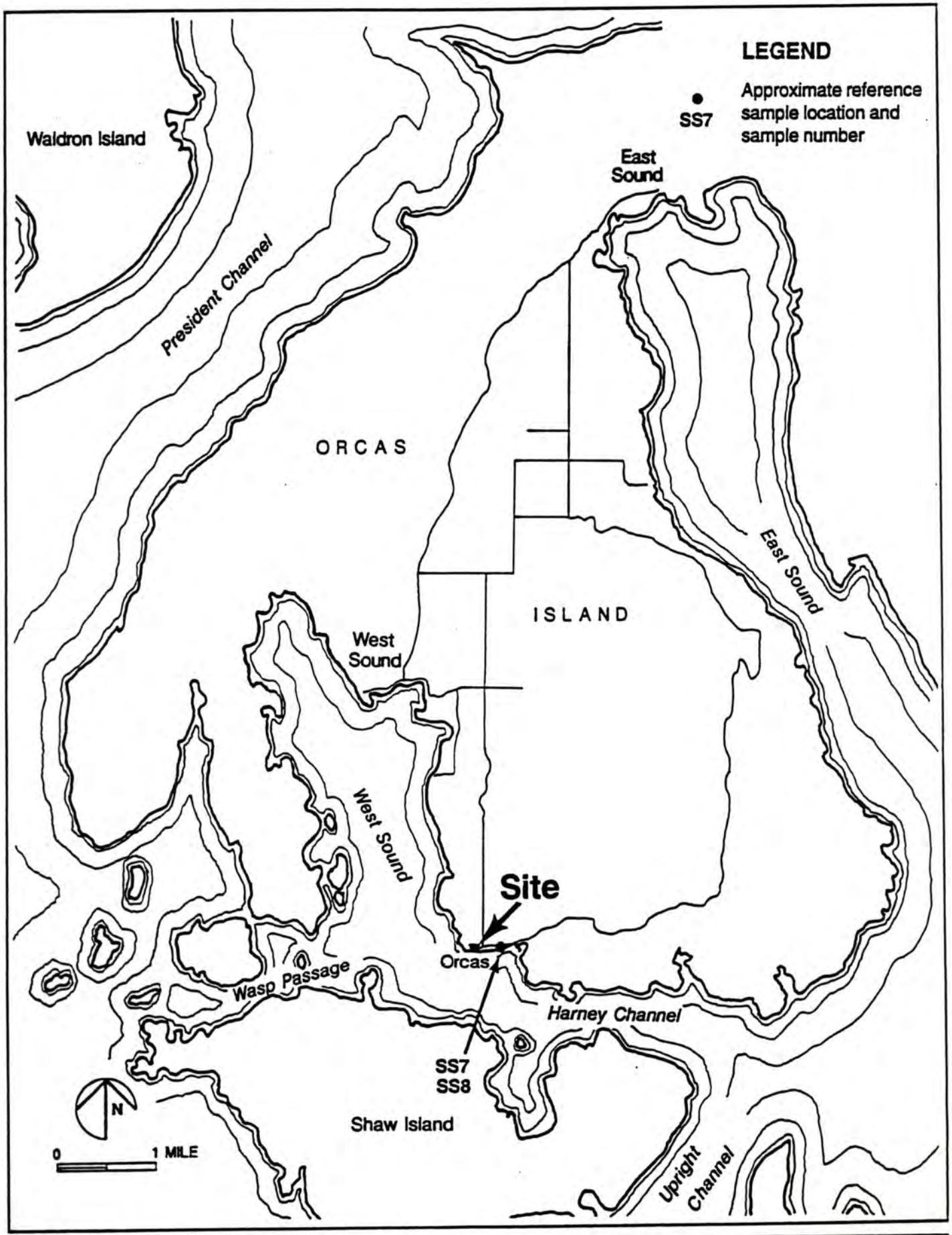
pling Location Map

nent Sampling and Analysis
, Washington

FIGURE 2

DATE — APPROVED — REVISED — DATE

563799



AGI TECHNOLOGIES

Approximate Reference Sample Locations

Russell/Orcas Sediment Sampling and Analysis
Orcas, Ohio

FIGURE 3

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
15,676.002	DFF	15 Jul. 94			

ATTACHMENT 1

REFERENCES

Ecology 1991. Sediment Cleanup User Manual, Washington Department of Ecology.

GeoEngineers, 1990. Report of Remedial Action, Unocal Bulk Plant 0533, Orcas, Washington.

PSEP 1986a. General Considerations for Collecting Environmental samples in Puget Sound.

PSEP 1986b. Recommended Protocols for Measuring Sediment Conventional Variables in Puget Sound, Final Report.

PSEP 1991. Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments, Interim Final Report.

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Russell's Landing Sediment Sampling and Analysis/Orcas, WA
Project No.:	15,676.002
Lab Name:	Toxicology Laboratory, Parametrix, Inc. (Parametrix) - Kirkland, WA North Creek Analytical (NCA) - Bothell, WA
Lab Number:	Parametrix - 55-2756-01 (01); NCA - 407-0219
Sample No.:	SS1, SS2, SS3, SS4, SS5, SS6, SS7, SS8
Matrix:	Marine Sediment

QUALITY ASSURANCE SUMMARY

All data are of known quality and acceptable for use.

ANALYTICAL METHODS

Biological Toxicity Testing:

Parameter	Technique	Method
Amphipod	Bioassay	PSEP[a]
Bivalve	Bioassay	PSEP[a]
Polychaete	Bioassay	PSEP[a]

Chemical/Physical Testing:

Parameter	Technique	Method
Total Organic Carbon (TOC)	Combustion	SM 5310B[b]
Particle Size	Sieve	PSEP[c]

a - Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments, Interim Final Report. Puget Sound Estuary Program (PSEP), 1991.
b - Standard Methods for the Examination of Water and Wastewater. 17th edition, 1989.
c - Recommended Protocols for Measuring Sediment Conventional Variables in Puget Sound, Final Report. PSEP, 1986.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

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North Creek Analytical (NCA) - Bothell, WA
Lab Number: Parametrix - 55-2756-01 (01); NCA - 407-0219
Sample No.: SS1, SS2, SS3, SS4, SS5, SS6, SS7, SS8

TIMELINESS

Parameter	Date Sampled	Date Analyzed	Time Until Analysis
Amphipod	07/06/94	07/14/94	8 (14)
Bivalve	07/06/94	07/13/94	7 (14)
Polychaete	07/06/94	07/18/94	12 (14)
TOC	07/06/94	07/18/94	12 (180)
Particle Size	07/06/94	07/19/94[d]	13 (NA)

NA - Not applicable.
() - Numbers in parentheses indicate recommended holding times in days.
d - Samples were analyzed 07/13/94 and 07/19/94.

All samples were analyzed within recommended holding times.

BIOLOGICAL TOXICITY TESTING

Test Organism

Based on test sediment textures (e.g., salinity, particle size), usage of *Rhepoxynius abronius* for Amphipod testing; *Crassostrea gigas* for Bivalve Larvae testing; and *Neanthes* for Polychaete testing are considered appropriate.

Reference Toxicant

Median lethal concentrations (LC_{50}) for Amphipod, Bivalve, and Polychaete test organisms of 0.66, 2.0, and 5.0 parts per million (ppm) cadmium ions are within Parametrix's control limit criteria, indicating satisfactory sensitivity of test organism to toxicants.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Russell's Landing Sediment Sampling and Analysis/Orcas, WA
Project No.:	15,676.002
Lab Name:	Toxicology Laboratory, Parametrix, Inc. (Parametrix) - Kirkland, WA North Creek Analytical (NCA) - Bothell, WA
Lab Number:	Parametrix - 55-2756-01 (01); NCA - 407-0219
Sample No.:	SS1, SS2, SS3, SS4, SS5, SS6, SS7, SS8

Interstitial Water Quality

Interstitial water salinity, pH, temperature, and dissolved oxygen (DO) were measured at appropriate frequencies and maintained at adequate levels; ammonia and sulfide were measured at appropriate frequencies and no elevated concentrations were observed through the course of testing for Amphipod, Bivalve, and Polychaete bioassays.

Reference Sample

Amphipod bioassay molarities for reference samples SS7 and SS8 of 6.0 and 10.0 percent, respectively, are less than 25 percent; and Polychaete bioassay biomass for reference samples of 24.2 and 24.6 milligrams per organism (mg/org.) are greater than 80 percent the control sediment biomass (20.7 mg/org.). Performance standards are achieved for the testing.

Control Sample

Amphipod bioassay mortality for the control sediment of 3.0 percent is less than 10 percent; Bivalve bioassay combined mortality and abnormality for the seawater control sample of 2.8 percent is less than 50 percent; and Polychaete bioassay mortality for the control sediment of 0 percent is less than 10 percent. Performance standards are achieved for the testing.

Report Deliverables and Data Reduction

Deliverables required by PSEP guidelines are reported for each testing. One sample result (reported mean value) was recalculated from raw data for each of Amphipod, Bivalve, and Polychaete testing. No discrepancy of data reduction was identified.

CHEMICAL/PHYSICAL TESTING

Method Blank

No analytes were detected at or above their method detection limit (MRL) by SM 5310B.

AGI TECHNOLOGIES

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name:	Russell's Landing Sediment Sampling and Analysis/Orcas, WA
Project No.:	15,676.002
Lab Name:	Toxicology Laboratory, Parametrix, Inc. (Parametrix) - Kirkland, WA North Creek Analytical (NCA) - Bothell, WA
Lab Number:	Parametrix - 55-2756-01 (01); NCA - 407-0219
Sample No.:	SS1, SS2, SS3, SS4, SS5, SS6, SS7, SS8

Laboratory Control Sample (LCS) Spike

LCS spike percent recovery of 99 percent is within NCA's control limits of 88 to 111 percent for SM 5310B.

Duplicates

Duplicate sample (sample SS1) relative percent difference (RPD) of 5.6 percent is within NCA's control limit criteria of 25 percent for SM 5310B; analytical precision is indicated. Reproducibility of particle size analysis is considered acceptable based on triplicate (sample SS8) analysis results.

Standard Reference Material (SRM)

SRM percent recovery of 106 percent is considered acceptable for SM 5310B; analytical accuracy is indicated.

SIGNATURES

Prepared by Huimin Lin Date 08/25/1994

Checked by Katharine Bourbonais Date 8/25/94

Report

Results of Sediment Bioassays Conducted on Marina Sediment Samples Collected from Russell's of Orcas Facility

Prepared for:
AGI

August 1994

Project No.: 55-2756-01 (01)

Parametrix, Inc.

RESULTS OF SEDIMENT BIOASSAYS CONDUCTED ON MARINA SEDIMENT SAMPLES COLLECTED FROM RUSSELL'S OF ORCAS FACILITY

Prepared for:

AGI
300 120th Avenue, NE
Building 4, Suite 125
Bellevue, WA 98005

Prepared by:

PARAMETRIX, INC.
5808 Lake Washington Blvd. N.E.
Kirkland, WA 98033

AUGUST 1994

SIGNATURE PAGE

Submitted by: Parametrix, Inc.
5808 Lake Washington Blvd. NE
Kirkland, WA 98033

Prepared by: _____ 8/16/94
Fran Sweeney — Date
Project Manager

Approved by: _____ 8/16/94
Kevin Brix — Date
Director, Toxicology Laboratory

Approved by: _____ 8/16/94
Steve Cappellino — Date
QA/QC Officer

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Pacific Oyster *(Crassostrea gigas)*
20-Day *Neanthes*

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EXECUTIVE SUMMARY OF TEST RESULTS

Station	Amphipod Mortality (%)	Pacific Oyster Mortality (%)	*Neanthes* Mortality (%)	*Neanthes* Growth Endpoint
West Beach	3.0	1/	0.0	1.0
SS1	11.0	4.7	0.0	1.2
SS2	14.0	3.7	4.0	1.3
SS3	9.0	15.3	4.0	1.1
SS4	8.0	5.7	0.0	0.9
SS5	5.0	3.1	0.0	1.0
SS6	8.0	4.7	0.0	1.0
SS7	6.0	10.8	4.0	1.2
SS8	10.0	6.4	0.0	1.2

1/= The negative control for the *larvae* test contains seawater only. This value is normalized to zero for comparison to the test sediment.

Reference Toxicants

	Amphipod	Pacific Oyster	*Neanthes*
LC50 (Cd)	0.66 ppm Cd	2 ppm Cd	5 ppm Cd

1. INTRODUCTION

Parametrix' Toxicology Laboratory was contracted by AGI to conduct bioassay testing on marine sediment samples collected from the Russell's of Orcas Facility.

Three bioassays were conducted on a total of 8 marine sediment sample using the following test organisms.

- *Rhepoxynius abronius* - a benthic dwelling amphipod
- *Crassostrea gigas* - larvae of the pacific oyster
- *Neanthes sp.* - a benthic dwelling polychaete worm

2. METHODS AND MATERIALS

2.1 PROCEDURES

All bioassays were conducted in accordance to the Puget Sound Estuary Program (PSEP) using the following Parametrix test protocols:

- #9020, Bioassay Procedures for Conducting Static Sediment Acute Toxicity Tests According to *Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments* (U.S. EPA Region 10, April, 1994) Using *Rhepoxynius abronius*

- #9021, Bioassay Procedures for Conducting Static Acute Sediment Toxicity Tests According to *Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments* (U.S. EPA Region 10, April, 1994) Using the Pacific Oyster *Crassostrea gigas*

- #9023, Bioassay Procedures for Conducting Static Renewal 20-day Chronic Sediment Toxicity Tests According to *Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments* (U.S. EPA Region 10, April, 1994) Using the Polychaete, *Neanthes sp.*

Summaries of test conditions are provided in Tables 1, 2, and 3. In addition to the biological procedures, aqueous ammonia and sulfide measurements were taken at initiation and termination of the amphipod, pacific oyster, and 20-day *Neanthes* tests.

No statistical analysis were conducted on mortality or biomass data. Probit analysis was used to generate LC50 values for positive controls.

Table 1. Summary of test conditions for the *Rhepoxynius abronius* bioassay.

Job Name: AGI	Job Number: 55-2756-01 (01)
	Dates: 14 - 25 July 1994

Test Protocol:	Bioassay Procedures for Conducting Static Sediment Acute Toxicity Tests According to Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments (USEPA Region 10, April, 1994) Using the Amphipod *Rhepoxynius abronius*.
Test Material:	Sediment provided by AGI Consultants
Test Organisms:	*Rhepoxynius abronius* (Amphipod)
Source:	West Beach, Whidbey Island
Number/Container:	20
Test Concentrations:	175 ml sediment in 1000 ml seawater
Replicates:	Five
Reference Toxicant:	Cadmium chloride
Test Duration:	10 days
Dilution Water:	Natural seawater collected from the Seattle Aquarium, salinity adjusted to 28 ppt.
Test Chambers:	1 liter glass beakers
Lighting:	Continuous overhead lighting
Temperature:	15 ± 1°C
Aeration:	Gentle aeration at <100 bubbles/minute
Chemical Data:	Salinity, temperature, pH, dissolved oxygen of the overlying water, at initiation and every 24 hours; ammonia and sulfide at initiation and test termination. Sediment interstitial salinity at test initiation.
Effect Measured:	Mortality
Test Acceptability:	Mean control mortality ≤10%

Table 2. Summary of test conditions for the *Crassostrea gigas* bioassay.

Job Name: AGI Job Number: 55-2756-01 (01)

Dates: 13 - 15 July 1994

Test Protocol:	Bioassay Procedures for Conducting Static Sediment Acute Toxicity Tests According to Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments (USEPA Region 10, April, 1994) Using the *Crassostrea gigas*.
Test Material:	Sediment provided by AGI Consultants
Test Organisms:	*Crassostrea gigas* (pacific oyster)
Source:	Ms. Kim Seiwers, Santa Cruz, CA
Stock Density:	Approximately 5,000 embryos/ml
Inoculation Volume:	5.0 ml inoculant per test vessel
Test Concentrations:	18 grams of sediment in 900 ml of seawater
Replicates:	5
Reference Toxicant:	Cadmium as cadmium chloride
Test Duration:	48 hours
Dilution Water:	Seawater collected off the SouthWest side of Possession Point, WA, adjusted to 28 ppt with laboratory DI water.
Test Chambers:	1-liter glass jars
Lighting:	14 hours light, 10 hours dark
Temperature:	20 ± 1°C
Aeration:	Gentle aeration at <100 bubbles/minute, if D.O. drops below 60% of saturation
Chemical Data:	Salinity, pH, dissolved oxygen, and temperature of overlying water, at initiation and every 24 hours; ammonia and sulfide at initiation and test termination.
Effect Measured:	Mortality and abnormality
Test Acceptability:	≥70% normal larval survival in seawater control.

Table 3. Summary of test conditions for the 20-day *Neanthes sp.* bioassay.

Job Name: AGI	Job Number: 55-2756-01 (01)
	Dates: 18 July - 8 August 1994
Test Protocol:	Bioassay Procedures for Conducting Static Sediment Acute Toxicity Tests According to Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments (USEPA Region 10, April, 1994) Using the Polychaete, *Neanthes sp.*
Test Material:	Sediment provided by AGI Consultants
Test Organisms:	*Neanthes arenaceodentata* (polychaete worm)
Source:	In-house culture
Number/Container:	5
Test Concentrations:	175 ml of sediment in 1000 ml of seawater
Replicates:	5
Reference Toxicant:	Cadmium as cadmium chloride
Test Duration:	20 days
Dilution Water:	Natural seawater collected from the Seattle Aquarium, salinity adjusted to 28 ppt.
Test Chambers:	1-liter glass beakers
Lighting:	Continuous overhead lighting
Temperature:	20° ± 1°C
Aeration:	Gentle aeration at <100 bubbles/minute
Renewals:	Every third day
Feeding:	TetraMarin® every other day (40 mg/test vessel)
Chemical Data:	Salinity, temperature, pH, and dissolved oxygen of overlying water, at initiation and every third day; ammonia and sulfide at initiation and test termination.
Effect Measured:	Mortality and growth
Test Acceptability:	Mean control mortality no greater than 10%

2.2 TEST SEDIMENT

Eight samples were provided to Parametrix' Toxicology Laboratory on 6 July 1994. Upon arrival, appropriate chain-of-custody (COC) procedures were followed; sample labels were checked against the custody form; containers inspected for damage during shipping; and sediment volumes verified for adequacy. After completing all COC procedures, the samples were logged into Parametrix' holding refrigerators and held at 4±2°C until test initiation. Testing was initiated within two weeks of sample receipt.

2.3 CONTROL SEDIMENT

The West Beach control sediment used in the bioassays was collected by Parametrix staff from Whidbey Island at the same time and place of amphipod collection. Prior to initiation of the amphipod test, the control sediment was sieved through a 0.5mm screen and washed with clean seawater to ensure that no amphipods remained in the sediment.

Table 4. Control and reference sediment location and criteria.

West Beach Control Sediment[1]

Location:	North Whidbey Island, Washington
Latitude and Longitude:	48°23.00'N,122°40.00'W
LORAN C TDD Readings for Station:	28481.0 by 42338.8
Grain Size Distribution:	100% sand
Date Collected:	7/13/94

[1] Location criteria for control sediment are provided for reference use only. The control sediment and organisms (amphipods) were collected with a benthic dredge. The sediment from which the amphipods are sieved is used for control sediment. The location criteria given here are for a position located within the amphipod collection area.

3. RESULTS

3.1 TEST RESULTS

An executive summary of test results is located at the front of this document. The results of ammonia and sulfide analyses are given in Appendix A. All original raw data, chain-of-custody, and project notes are maintained in Parametrix project files. Copies of the chain of custody forms can be found in Appendix B. Test acceptability control criteria was met for all tests conducted.

3.2 NOTES AND OBSERVATIONS

No protocol deviations occurred during the course of testing.

Table 5. Summary of Test Results

Station	Amphipod Mortality (%)	Pacific Oyster Mortality (%)	*Neanthes* Mortality (%)	*Neanthes* Growth Endpoint
West Beach	3.0	1/	0.0	1.0
SS1	11.0	4.7	0.0	1.2
SS2	14.0	3.7	4.0	1.3
SS3	9.0	15.3	4.0	1.1
SS4	8.0	5.7	0.0	0.9
SS5	5.0	3.1	0.0	1.0
SS6	8.0	4.7	0.0	1.0
SS7	6.0	10.8	4.0	1.2
SS8	10.0	6.4	0.0	1.2

1/= The negative control for the *larvae* test contains seawater only. This value is normalized to zero for comparison to the test sediment

Reference Toxicants

	Amphipod	Pacific Oyster	*Neanthes*
LC50 (Cd)	0.66 ppm Cd	2 ppm Cd	5 ppm Cd

4. REFERENCES

EPA Probit Analysis Program used for calculating EC values, Version 1.4

Parametrix Protocol #9020, Bioassay Procedures for Conducting Static Sediment Acute Toxicity Tests According to *Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments* (U.S. EPA Region 10, April, 1994) Using *Rhepoxynius abronius*

Parametrix Protocol #9021, Bioassay Procedures for Conducting Static Sediment Acute Toxicity Tests According to *Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments* (U.S. EPA Region 10, April, 1994) Using *Crassostrea gigas*

Parametrix Protocol #9023, Bioassay Procedures for Conducting Static Renewal 20-day Chronic Sediment Toxicity Tests According to *Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments* (U.S. EPA Region 10, April, 1994) Using the Polychaete, *Neanthes sp.*

PTI Environmental Services. 1991. Recommended guidelines for conducting laboratory bioassays on Puget Sound sediments. U.S. Environmental Protection Agency, Region 10. Puget Sound Estuary Program (PSEP).

U.S. Army Corps of Engineers. 1989. Puget Sound Dredged Disposal Analysis (PSDDA) Management Plan Report, unconfined open-water disposal of dredged material phase II (north and south Puget Sound). U.S. Army Corps of Engineers, Seattle district; U.S. Environmental Protection Agency, Region 10; Washington State Department of Natural Resources; Washington State Department of Ecology; Seattle, Washington.

AMPHIPOD

DATA TABLES

Sample	Rep.	Visible D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Mean Emergence	Emergence Std Dev.	Alive	Dead	Reburial	% Mortality	Sample % Mortality	Mortality Std Dev. 1/
West Beach	1	0	0	0	0	0	0	0	0	0	0	0		20	0	20	0.0		
	2	1	1	1	1	0	1	0	0	0	0	0.5		19	1	19	5.0		
	3	0	1	1	1	1	1	1	2	0	0	0.8		19	1	19	5.0		
	4	0	0	0	0	0	0	0	0	0	0	0		20	0	20	0.0		
	5	1	1	1	1	0	1	0	0	0	0	0.5	0.31	19	1	18	5.0	3.0%	2.45
SS1	6	2	0	0	0	0	0	0	2	1	1	0.6		16	2	16	20.0		
	7	0	1	3	2	1	2	1	1	0	0	1.1		18	0	18	10.0		
	8	0	0	0	1	2	0	3	0	1	1	0.8		17	1	17	15.0		
	9	0	0	1	1	2	1	1	0	1	0	0.7		19	1	19	5.0		
	10	0	0	0	1	1	0	0	2	0	0	0.4	0.23	19	1	19	5.0	11.0%	5.83
SS2	11	0	2	1	3	4	1	4	4	4	1	2.4		19	1	19	5.0		
	12	0	0	0	0	0	0	0	1	0	0	0.1		17	0	17	15.0		
	13	0	1	3	2	3	1	4	2	2	4	2.2		15	2	15	25.0		
	14	0	0	0	0	0	2	1	4	5	3	1.5		17	2	16	15.0		
	15	0	0	1	0	1	2	1	1	0	4	1	0.84	18	0	17	10.0	14.0%	6.63
SS3	16	0	1	0	1	1	1	0	1	1	0	0.6		20	0	19	0.0		
	17	0	1	1	1	3	2	3	3	3	1	1.8		19	0	19	5.0		
	18	0	1	1	1	2	1	1	1	0	1	0.9		16	1	16	20.0		
	19	0	0	0	1	0	2	0	5	5	0	1.3		19	0	18	5.0		
	20	0	0	0	0	0	3	2	2	3	1	1.1	0.40	17	1	16	15.0	9.0%	7.35
SS4	21	0	0	0	0	0	0	1	0	0	1	0.2		20	0	18	0.0		
	22	0	0	0	0	0	0	1	0	1	0	0.2		19	1	19	5.0		
	23	0	0	0	0	0	0	0	0	0	2	0.2		18	1	18	10.0		
	24	0	2	1	1	0	1	1	0	0	0	0.6		16	1	15	20.0		
	25	0	0	0	0	0	0	0	0	0	0	0	0.20	19	0	19	5.0	8.0%	6.78
SS5	26	0	0	0	1	0	0	0	0	0	0	0.1		20	0	19	0.0		
	27	0	0	0	0	0	0	0	0	1	0	0.1		20	0	19	0.0		
	28	0	0	0	0	1	0	0	0	0	1	0.2		19	0	19	5.0		
	29	0	0	0	0	0	0	1	1	1	0	0.3		19	0	19	5.0		
	30	0	0	1	0	0	0	1	0	0	0	0.2	0.07	17	0	17	15.0	5.0%	5.48
SS6	31	0	0	0	0	0	1	0	1	2	1	0.5		18	1	18	10.0		
	32	0	0	1	0	0	0	1	1	2	0	0.5		19	0	19	5.0		
	33	0	0	1	1	1	1	0	0	1	0	0.5		18	2	17	10.0		
	34	0	0	0	0	1	0	1	1	0	1	0.4		19	0	18	5.0		

Sample	Rep.	Visible D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Mean Emergence	Emergence Std Dev.	Alive	Dead	Reburial	% Mortality	Sample % Mortality	Mortality Std Dev. 1/
	35	0	0	0	0	0	0	1	0	0	2	0.3	0.08	18	0	18	10.0	8.0%	2.45
SS7	36	0	1	2	2	0	2	2	2	2	2	1.5		17	2	17	15.0		
	37	1	1	0	0	0	0	0	0	0	0	0.2		20	0	18	0.0		
	38	0	3	2	0	0	0	1	0	0	0	0.6		19	0	19	5.0		
	39	0	0	1	0	1	1	1	1	0	1	0.6		18	0	18	10.0		
	40	1	2	2	1	1	0	1	1	0	0	0.9	0.43	20	0	18	0.0	6.0%	5.83
SS8	41	1	0	0	0	3	1	1	1	1	0	0.8		19	1	19	5.0		
	42	0	0	0	0	1	0	0	0	0	0	0.1		18	0	18	10.0		
	43	0	3	4	5	1	5	4	3	2	1	2.8		16	0	16	20.0		
	44	0	0	0	0	0	0	0	1	1	0	0.2		18	1	18	10.0		
	45	1	1	1	0	0	0	0	0	0	1	0.4	1.00	19	0	17	5.0	10.0%	5.48
Ref Tox (CdCl2)																			
0.0 mg/L	1	--	--	--	--	--	--	--	--	--	--		--	10	0	--	0.0	5.0%	--
0.0 mg/L	2	--	--	--	--	--	--	--	--	--	--		--	9	1	--	10.0		--
0.095 mg/L	1	--	--	--	--	--	--	--	--	--	--		--	10	0	--	0.0	0.0%	--
0.095 mg/L	2	--	--	--	--	--	--	--	--	--	--		--	10	0	--	0.0		--
0.19 mg/L	1	--	--	--	--	--	--	--	--	--	--		--	9	1	--	10.0	10.0%	--
0.19 mg/L	2	--	--	--	--	--	--	--	--	--	--		--	9	1	--	10.0		--
0.38 mg/L	1	--	--	--	--	--	--	--	--	--	--		--	8	2	--	20.0	20.0%	--
0.38 mg/L	2	--	--	--	--	--	--	--	--	--	--		--	8	2	--	20.0		--
0.75 mg/L	1	--	--	--	--	--	--	--	--	--	--		--	4	6	--	60.0	55.0%	--
0.75 mg/L	2	--	--	--	--	--	--	--	--	--	--		--	5	5	--	50.0		--
1.5 mg/L	1	--	--	--	--	--	--	--	--	--	--		--	0	10	--	100.0	95.0%	--
1.5 mg/L	2	--	--	--	--	--	--	--	--	--	--		--	1	9	--	90.0		--

1/ Note: Station standard deviations calculated on raw, untransformed data.

* Data not counted on days 3 and 4.

EPA PROBIT ANALYSIS PROGRAM
USED FOR CALCULATING EC VALUES
Version 1.4

AGI Rhepoxynius abronius Ref Tox Test - 7/14/94

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
Control	100	5	0.0500	0.0000	0.0394
0.0950	100	0	0.0000	-.0410	0.0005
0.1900	100	10	0.1000	0.0631	0.0166
0.3800	100	20	0.2000	0.1672	0.1721
0.7500	100	55	0.5500	0.5316	0.5854
1.5000	100	95	0.9500	0.9480	0.9192

Chi - Square Heterogeneity = 10.165

****
* WARNING *
*
* Significant heterogeneity exists. The results reported *
* for this data set may not be valid. The results should *
* be interpreted with appropriate caution. *
****

Mu = -0.179743
Sigma = 0.254181

Parameter	Estimate	Std. Err.	95% Confidence Limits	
Intercept	5.707145	0.207321	(5.047448,	6.366841)
Slope	3.934203	0.747861	(1.554510,	6.313897)
Spontaneous Response Rate	0.039369	0.023322	(-0.034842,	0.113579)

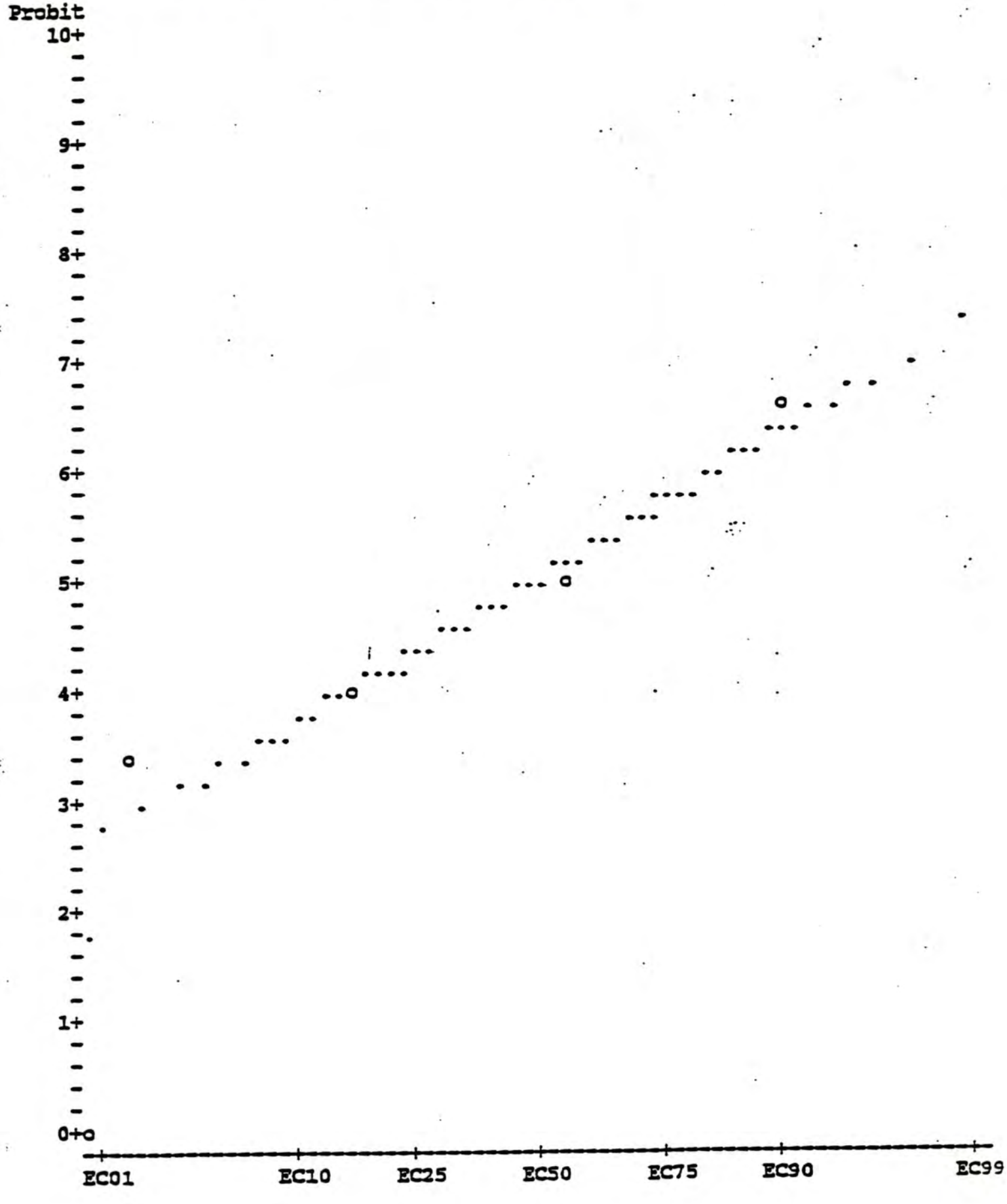
AGI Rhepoxynius abronius Ref Tox Test - 7/14/94

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	0.1694	0.0169	0.3115
EC 5.00	0.2524	0.0456	0.4072
EC10.00	0.3122	0.0767	0.4728
EC15.00	0.3604	0.1086	0.5255
EC50.00	0.6611	0.4120	0.9379
EC85.00	1.2125	0.8691	3.0121
EC90.00	1.3996	0.9760	4.2175
EC95.00	1.7312	1.1435	7.0386
EC99.00	2.5796	1.5069	18.7886

AGI Rhepoxynius abronius Ref Tox Test - 7/14/94

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



AMPHIPOD

(Rhepoxynius abronius)

DATA PACKET

CLIENT: AGI

PROJECT NAME: Russell's O/ORCAS

PROJECT NUMBER: 55 2756 01 (01)

AMPHIPOD SEDIMENT SETUP RECORD SHEET

Project Name: AGI - Russell's 0/0BCMS

Date: 7/14/94

Project Number: 55275601(01)

Station I.D.	Lab I.D.	Interstitial Salinity	Comments	Initials
W. BEACH	AGIR001-005	28		FS
SS1	006-010	29	SULFUR ODOR	FS
SS2	011-015	31		FS
SS3	016-020	30	PETROLEUM ODOR	FS
SS4	021-025	31		FS
SS5	026-030	@	@ GRAIN SIZE TOO	FS
SS6	031-035	30	LONGE TO OBTAIN	FS
SS7	036-040	31	INTERSTITIAL H2O	FS
SS8	041-045	@		FS

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 552756101 01

Day: 0 of Test

Date: 7/15/94

Time: 1:30

Temp: 15 °C

Observer(s): Allison Cadwell

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
R-tox Con A	7.9	8.6	28	
R-tox 1.5 A	7.9	8.5	28	
R 005	7.8	6.7	28	
R 020	7.8	7.4	28	
R 025	7.9	7.7	28	
R 030	7.9	7.9	28	
R 010	7.8	7.9	28	
R 015	7.8	7.4	28	
R 045	7.7	7.0	28	
R 035	7.9	7.7	28	
R 040	7.8	5.5	28	aeration increased

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 55275.01.01

Day: 1 of Test

Date: 7/16/94

Time: 806

Temp: 15 °C

Observer(s): K. Brix

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
005	7.8	7.7	27	
020	7.8	7.7	27	
025	7.5	7.8	27	
030	7.7	7.9	28	
010	7.0	7.4	28	
015	7.9	7.7	28	
045	7.9	7.7	28	
035	7.8	7.5	28	
040	7.7	7.6	28	
Ref Tox Conc A	7.9	7.8	28	
Ref Tox 1.5 A	7.9	7.6	28	

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 552756101

Day: 2 of Test

Date: 7/17/94

Time: 1150

Temp: 14 °C

Observer(s): EA

Container	Water Quality Parameters pH	D.O.	Salinity	Comments
005	7.6	8.1	28	
020	7.7	8.0	28	
025	7.8	8.2	28	
030	7.8	8.2	28	
010	7.7	8.1	28	
015	7.7	7.6	28	
045	7.6	7.7	28	
035	7.8	8.0	28	
040	7.7	7.9	28	
Reflux Cont A	8.0	7.8	29	
Reflux 1.5A	8.0	8.0	29	

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: PGE

Job Number: 55 27560.01

Day: 3 of Test

Date: 7/18/94

Time: 8:20

Temp: 15 °C

Observer(s): AC

Container	Water Quality Parameters pH	D.O.	Salinity	D.O.	Comments
005	7.9	~~AC 9.2~~ *	28	*7.8	*DO meter re-calibrated membrane replaced
020	8.0	~~AC 9.2~~ *	28	*7.8	
025	8.0	~~AC 9.2~~ *	28	*7.8	
030	8.0	~~AC 9.3~~ *	28	*7.7	
010	8.0	~~AC 9.2~~ *	28	*7.7	
015	7.9	7.0	28		
045	7.9	7.2	28		
035	8.0	7.5	28		
040	8.0	7.4	28		
Reftox Con A	7.9	7.2	29		
Reftox 1.5 A	8.0	7.6	29		

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: A6I

Job Number: 552756 01 01

Day: 4 of Test

Date: 7/19

Time: 0830

Temp: 16°C

Observer(s): [illegible]

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
005	7.8	7.9	28	
020	7.9	7.8	29	
025	7.9	7.9	29	
30	8.0	7.9	29	
10	7.9	7.0	29	
15	7.9	7.5	29	
45	8.0	7.6	29	
35	8.0	7.8	30	
40	8.0	7.9	29	
RefCmA	8.0	7.4	29	
Ref1.5A	8.0	7.9	30	

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: #61

Job Number: 552756 01 01

Day: 5 of Test

Date: 7/20/94

Time: 8:30

Temp: 14.5 °C

Observer(s): AC

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
005	7.7	8.0	28	
020	7.8	8.0	28	
025	7.8	8.0	28	
030	7.9	8.2	29	
010	7.8	8.0	29	
015	7.8	7.0	28	
045	7.9	7.2	28	
035	7.9	7.8	28	
040	7.9	7.8	29	
~~Refs Con A~~				
~~Refs 1.5 A~~				

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: A6I

Job Number: 552756 01 01

Day: 6 of Test

Date: 7/21/94

Time: 8:15

Temp: 14 °C

Observer(s): AC

Container	Water Quality Parameters pH	D.O.	Salinity	Comments
005	7.6	8.1	28	
020	7.7	8.0	28	
025	7.7	8.1	28	
030	7.8	8.2	28	
010	7.7	8.0	28	
015	7.7	6.6	28	
045	7.9	7.3	28	
035	7.8	8.0	28	
040	7.9	8.0	28	

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: A6I

Job Number: 552756 01 01

Day: 7 of Test

Date: 7/22/94

Time: 9:10

Temp: 14 °C

Observer(s): AC

Container	Water Quality Parameters pH	D.O.	Salinity	Comments
005	7.5	8.2	28	
020	7.7	8.2	28	
025	7.7	8.2	28	
030	7.8	8.2	28	
010	7.7	8.1	28	
015	7.9	6.6	28	
045	8.0	6.6	28	
035	7.8	8.0	28	
040	8.0	8.0	28	

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: A61

Job Number: 55275601 01

Day: 8 of Test

Date: 7/23

Time: 7:35

Temp: 15°C

Observer(s): DB

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
005	7.6	7.9	28	
~~020~~	7.7	8.1	~~28~~	
025	7.7	8.0	28	
030	7.8	8.1	28	
010	7.8	7.9	28	
015	7.9	6.9	28	
~~035~~	7.9	7.7	~~28~~	
035	7.8	7.9	28	
040	8.0	7.9	28	

AMPHIPOD BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 55 275601 01

Day: 9 of Test

Date: 7/24

Time: 7:40

Temp: 15.5 ~~15.6~~ CFS

Observer(s): JB

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
005	7.5	8.0	25	
020	7.6	7.9	24	
025	7.7	7.9	25	
030	7.7	8.2	24	
010	7.7	8.0	25	
015	7.9	7.9	24	
045	7.9	7.7	24	
035	7.7	8.1	24	
040	8.0	8.0	25	

AMPHIPOD BIOASSAY CHEMISTRY DATA - END OF TEST

Job Name: ACE

Job Number: 55 27560101

Day: 10 of Test

Date: 7/25

Time: 642

Temp: 15 °C

Observer(s): DB.

Container	Water Quality Parameters pH	D.O.	Salinity	Comments
005	DB ~~7.8~~ 7.7	7.81	28	Values changed due to recalibration
020	DB ~~8.0~~ 7.8	7.91	28	
025	DB ~~8.0~~ 7.8	8.01	29	
030	DB ~~8.1~~ 7.8	8.01	28	
010	DB ~~8.2~~ 7.9	7.81	28	
015	DB ~~8.4~~ 8.1	7.8	29	
045	DB ~~8.2~~ 8.1	7.7	29	
035	DB ~~8.1~~ 7.8	7.8	28	
040	DB ~~8.4~~ 8.1	7.8	29	

AMPHIPOD BIOASSAY DAILY EMERGENCE DATA

Job Name AGI Start Date 7/15/94

Job Number 552756 01 01 End Date 7/25/94

Container	Amphipods Visible									
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
005	1	1	1	1	0	1	0	0	0	0
007	1	1	1	1	0	1	0	0	0	0
001	0	0	0	0	0	0	0	0	0	0
038	0	3	2	0	0	0	1	0	0	0
028	0	0	0	0	1	0	0	0	0	1
020	0	0	0	0	0	3	2	2	3	1
034	0	0	0	0	1	0	1	1	0	1
033	0	0	1	1	1	1	0	0	1	0
036	0	1	2	2	0	2	2	2	2	2
044	0	0	0	0	0	0	0	1	1	0
025	0	0	0	0	0	0	0	0	0	0
037	1	1	0	0	0	0	0	0	0	0
042	0	0	0	0	1	0	0	0	0	0
021	0	0	0	0	0	0	1	0	0	1
011	0	2	1	3	KS4	1	4	4	4	1
030	0	0	1	0	0	0	4	0	0	0
022	0	0	0	0	0	0	1	0	1	0
023	0	0	0	0	0	0	0	0	0	2
010	0	0	0	1	0	2	0	5	5	0
041	1	0	0	0	3	1	1	1	1	0
040	0	0	0	1	1	0	0	2	0	0
029	0	0	0	0	0	0	1	1	1	0
032	0	0	1	0	0	0	1	1	2	0
016	0	1	0	1	1	1	0	1	1	0
026	0	0	0	1	0	0	0	0	0	0
015	0	0	1	0	1	2	1	1	0	4
007	0	1	3	2	1	2	1	1	0	0
027	0	0	0	0	0	0	0	0	1	0
031	0	0	0	0	0	1	0	1	2	1
Initials	KA	KA	MC	DK	AC/MC	AC	KA/AC	DK	DK	DK

AMPHIPOD BIOASSAY DAILY EMERGENCE DATA

Job Name AGT Start Date 7/15/94

Job Number 55275601 01 End Date 7/25/94

	Amphipods Visible									
Container	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
008	0	0	0	1	2	0	3	0	1	1
045	1	1	1	0	0	0	0	0	0	1
013	0	1	3	2	3	1	4	2	2	4
005	0	1	1	1	1	1	1	2	0	0
014	0	0	0	0	0	2	1	4	5	3
006	2	0	0	0	0	0	0	2	1	1
035	0	0	0	0	0	0	1	0	0	2
018	0	1	1	1	2	1	1	1	0	1
017	0	1	1	1	3	2	3	3	3	1
009	0	0	1	1	2	1	1	0	1	0
012	0	0	0	0	0	0	0	1	0	0
040	1	2	3	1	1	0	1	1	0	1
039	0	0	1	0	1	1	1	1	0	0
024	0	2	1	1	0	1	1	0	0	1
043	0	3	4	5	1	5	4	3	3	1
004	0	0	0	0	0	0	0	0	0	0
Initials	KB	[illegible]	MC	DSJ	AC/MC	AC	[illegible]	[illegible]	[illegible]	[illegible]

RHEPOXYNIUS BIOASSAY BREAKDOWN

Positive Control-Reference Toxicant

Job Name #6I

Reference Toxicant ~~+/3+/9~~ CdasCdCl2 FS

Date Stock Prep. 1/24/94

Job Number 55276501 01

Date 7/19/94

Container	Concentration (mg/l)	Found		Initials
		Alive	Dead	
Control A	0	10	0	SA
B	0	9	1	SA
0.09 A	0.09	10	0	SA
B	0.09	10	0	SA
0.1875 A	0.1875	9	1	SA
B	0.1875	9	1	SA
0.375 A	0.375	8	2	SA
B	0.375	8	2	SA
0.75 A	0.75	4	6	SA
0.75 B	0.75	5	5	SA
1.5A	1.5	0	10	SA
1.5B	1.5	1	9	SA

AMPHIPOD BIOASSAY BREAKDOWN

Job Name: A6E

Job Number: 55 2765 01 01 Date: 7/25/94

Container	Found: Alive	Found: Dead	Comments	Reburials	Initials
001	20	Ø		20	DB
002	19	1		19	DB
003	19	1		19	DB
004	20	0		20	MC
005	19	1		18	DB
006	16	2		16	DB
007	18	0		18	MC
008	17	1		17	DB
009	19	1		19	KB
010	19	1		19	MC
011	19	1		19	DB
012	17	0		17	KB
013	15	2		15	MC
014	17	2		16	MC
015	FS ~~18~~ 18	Ø		17	KB
016	20	0		19	DB
017	19	0		19	MC
018	16	1		16	DB
019	19	0		18	DB
020	17	1		16	DB
021	20	MC		18	MC
022	19	1		19	DB
023	18	1		18	DB
024	16	1		15	DB
025	19	0		19	MC
026	20	0		19	MC
027	20	0		19	MC
028	19	0		19	MC
029	19	0		19	MC
030	17	0		17	DB
031	19	1		18	DB
032	19	0		19	DB
033	19	2		17	MC
034	19	0		18	DB
035	18	0		18	MC
036	17	2		17	MC

AMPHIPOD BIOASSAY BREAKDOWN

Job Name AGI

Job Number 552765 01 01 Date 7/25/94

Container	Found: Alive	Found: Dead	Comments	Reburials	Initials
037	20	0		18	KB
038	19	0		19	DB
039	18	0		18	DB
040	20	0		18	KB
041	19	1		19	MC
042	19	0		18	KB
043	16	0		16	KB
044	19	1		18	DB
045	19	0		17	DB

PACIFIC OYSTER

DATA TABLES

Station			Normal	Abnormal	Total Survival	Combined % Mort./Abnorm.	Combined Replicate % Mort./Abnorm.	Combined Station % Mort./Abnorm.	Station Mort./Abnorm. Standard Deviation 1/	% Abnormality	Replicate % Abnormality	Station % Abnormality	Station Abnormality Standard Deviation 1/
Initial Counts			199										
			227										
			217										
			187										
			237										
			216										
			203										
			229										
			197										
			257			Initial seawater average count is 217							
Seawater	1	A	219	6	225	% Normal Survival 102.5%				2.7			
		B	240	7	247	% Abnormal = 2.8%				2.8			
	2	A	222	8	230					3.5			
		B	209	9	218					4.1			
	3	A	241	5	246					2.0			
		B	209	4	213					1.9			
	4	A	229	3	232	Final seawater control count is 222				1.3			
		B	236	4	240					1.7			
	5	A	207	8	215	This number is used as 100% survival for all further				3.7			
		B	211	10	221	comparisons.				4.5		2.8	1.1
SS1	6	A	199	19	218	10.5				8.7			
		B	204	3	207	8.2	9.4			1.4	5.1		
	7	A	230	8	238	0.0				3.4			
		B	257	2	259	0.0	0.0			0.8	2.1		
	8	A	220	1	221	1.0				0.5			
		B	225	3	228	0.0	0.5			1.3	0.9		
	9	A	202	6	208	9.1				2.9			
		B	203	2	205	8.7	8.9			1.0	1.9		
	10	A	216	3	219	2.8				1.4			
		B	207	2	209	6.9	4.9	4.7	4.3	1.0	1.2	2.2	2.5
SS2	11	A	299	1	300	0.0				0.3			
		B	262	4	266	0.0	0.0			1.5	0.9		
	12	A	271	2	273	0.0				0.7			
		B	310	4	314	0.0	0.0			1.3	1.0		
	13	A	221	6	227	0.6				2.6			
		B	231	6	237	0.0	0.3			2.5	2.6		
	14	A	231	2	233	0.0				0.9			
		B	222	3	225	0.1	0.1			1.3	1.1		
	15	A	171	3	174	23.1				1.7			
		B	192	6	198	13.6	18.4	3.7	8.0	3.0	2.4	1.6	0.9

Station			Normal	Abnormal	Total Survival	Combined % Mort./Abnorm.	Combined Replicate % Mort./Abnorm.	Combined Station % Mort./Abnorm.	Station Mort./Abnorm. Standard Deviation 1/	% Abnormality	Replicate % Abnormality	Station % Abnormality	Station Abnormality Standard Deviation 1/
SS3	16	A	203	4	207	8.7				1.9			
		B	187	3	190	15.9	12.3			1.6	1.8		
	17	A	206	2	208	7.3				1.0			
		B	203	4	207	8.7	8.0			1.9	1.4		
	18	A	163	2	165	26.7				1.2			
		B	260	2	262	0.0	13.3			0.8	1.0		
	19	A	177	2	179	20.4				1.1			
		B	238	1	239	0.0	10.2			0.4	0.8		
	20	A	123	1	124	44.7				0.8			
		B	177	1	178	20.4	32.5	15.3	13.6	0.6	0.7	1.1	0.5
SS4	21	A	267	5	272	0.0				1.8			
		B	304	2	306	0.0	0.0			0.7	1.2		
	22	A	196	0	196	11.8				0.0			
		B	238	2	240	0.0	5.9			0.8	0.4		
	23	A	237	1	238	0.0				0.4			
		B	261	1	262	0.0	0.0			0.4	0.4		
	24	A	173	1	174	22.2				0.6			
		B	271	4	275	0.0	11.1			1.5	1.0		
	25	A	171	2	173	23.1				1.2			
		B	248	0	248	0.0	11.5	5.7	9.7	0.0	0.6	0.7	0.6
SS5	26	A	202	2	204	9.1				1.0			
		B	282	1	283	0.0	4.6			0.4	0.7		
	27	A	285	3	288	0.0				1.0			
		B	240	2	242	0.0	0.0			0.8	0.9		
	28	A	269	4	273	0.0				1.5			
		B	262	2	264	0.0	0.0			0.8	1.1		
	29	A	218	2	220	1.9				0.9			
		B	283	3	286	0.0	1.0			1.0	1.0		
	30	A	179	1	180	19.5				0.6			
		B	256	0	256	0.0	9.7	3.1	6.4	0.0	0.3	0.8	0.4
SS6	31	A	263	6	269	0.0				2.2			
		B	206	0	206	7.3	3.7			0.0	1.1		
	32	A	290	10	300	0.0				3.3			
		B	182	9	191	18.1	9.1			4.7	4.0		
	33	A	216	4	220	2.8				1.8			
		B	180	7	187	19.0	10.9			3.7	2.8		
	34	A	240	7	247	0.0				2.8			
		B	246	2	248	0.0	0.0			0.8	1.8		
	35	A	247	1	248	0.0				0.4			
		B	272	3	275	0.0	0.0	4.7	7.7	1.1	0.7	2.1	1.6

Station			Normal	Abnormal	Total Survival	Combined % Mort./Abnorm.	Combined Replicate % Mort./Abnorm.	Combined Station % Mort./Abnorm.	Station Mort./Abnorm. Standard Deviation 1/	% Abnormality	Replicate % Abnormality	Station % Abnormality	Station Abnormality Standard Deviation 1/
SS7	36	A	267	1	268	0.0				0.4			
		B	271	3	274	0.0	0.0			1.1	0.7		
	37	A	145	4	149	34.8				2.7			
		B	223	2	225	0.0	17.4			0.9	1.8		
	38	A	137	1	138	38.4				0.7			
		B	168	1	169	24.4	31.4			0.6	0.7		
	39	A	200	1	201	10.0				0.5			
		B	254	3	257	0.0	5.0			1.2	0.8		
	40	A	245	2	247	0.0				0.8			
		B	252	3	255	0.0	0.0	10.8	15.7	1.2	1.0	1.0	0.7
SS8	41	A	160	1	161	28.0				0.6			
		B	201	0	201	9.6	18.8			0.0	0.3		
	42	A	183	1	184	17.7				0.5			
		B	204	2	206	8.2	13.0			1.0	0.8		
	43	A	307	2	309	0.0				0.6			
		B	283	2	285	0.0	0.0			0.7	0.7		
	44	A	242	7	249	0.0				2.8			
		B	231	4	235	0.0	0.0			1.7	2.3		
	45	A	241	6	247	0.0				2.4			
		B	259	3	262	0.0	0.0	6.4	9.7	1.1	1.8	1.2	0.9

Station	Normal	Abnormal	Total Survival	Combined % Mort./Abnorm.	Combined Replicate % Mort./Abnorm.	Combined Station % Mort./Abnorm.	Station Mort./Abnorm. Standard Deviation 1/	% Abnormality	Replicate % Abnormality	Station % Abnormality	Station Abnormality Standard Deviation 1/
Reference Toxicant (CdCl2)											
0.0 mg/L.	175	4	179	21.3				2.2			
	209	2	211	6.0				0.9			
	216	6	222	2.8				2.7			
	117	2	119	47.4		19.4	20.3	1.7		1.9	
.19 mg/L.	228	5	233	27.1				2.1			
	244	5	249	19.0				2.0			
	249	1	250	19.5				0.4			
	243	2	245	16.8		20.6	4.5	0.8		1.3	
.38 mg/L.	162	5	167	21.7				3.0			
	180	3	183	13.6				1.6			
	179	5	184	26.7				2.7			
	185	6	191	9.1		17.8	7.9	3.1		2.6	
.75 mg/L.	174	10	184	2.8				5.4			
	192	1	193	24.9				0.5			
	163	5	168	55.0				3.0			
	202	6	208	32.1		28.7	21.5	2.9		3.0	
1.5 mg/L.	216	18	234	90.1				7.7			
	167	12	179	70.3				6.7			
	100	75	175	90.1				42.9			
	151	45	196	91.0		85.4	10.1	23.0		20.1	
3.0 mg//L.	22	105	127	100.0				82.7			
	66	151	217	100.0				69.6			
	22	202	224	100.0				90.2			
	20	216	236	100.0		100.0	0.0	91.5		83.5	
6.0 mg//L.	1	94	95	100.0				98.9			
	2	85	87	100.0				97.7			
	0	164	164	100.0				100.0			
	1	180	181	100.0		100.0	0.0	99.4		99.0	

1/ Note: Station standard deviations calculated on raw, untransformed data.

EPA PROBIT ANALYSIS PROGRAM
USED FOR CALCULATING EC VALUES
Version 1.4

WDOE - Oyster Ref Toxicity Test 7/20/94

Conc.	Number Exposed	Number Resp.	Observed Proportion Responding	Adjusted Proportion Responding	Predicted Proportion Responding
0.1875	100	0	0.0000	0.0000	0.0004
0.3750	100	0	0.0000	0.0000	0.0090
0.7500	100	14	0.1400	0.1400	0.0857
1.5000	100	26	0.2600	0.2600	0.3561
3.0000	100	79	0.7900	0.7900	0.7356
6.0000	100	94	0.9400	0.9400	0.9483

Chi - Square Heterogeneity = 10.399

****
* WARNING *
* *
* Significant heterogeneity exists. The results reported *
* for this data set may not be valid. The results should *
* be interpreted with appropriate caution. *
****

Mu = 0.287282
Sigma = 0.301362

Parameter	Estimate	Std. Err.	95% Confidence Limits
Intercept	4.046721	0.159839	(3.603007, 4.490434)
Slope	3.318274	0.386758	(2.244635, 4.391913)

Theoretical Spontaneous Response Rate = 0.0000

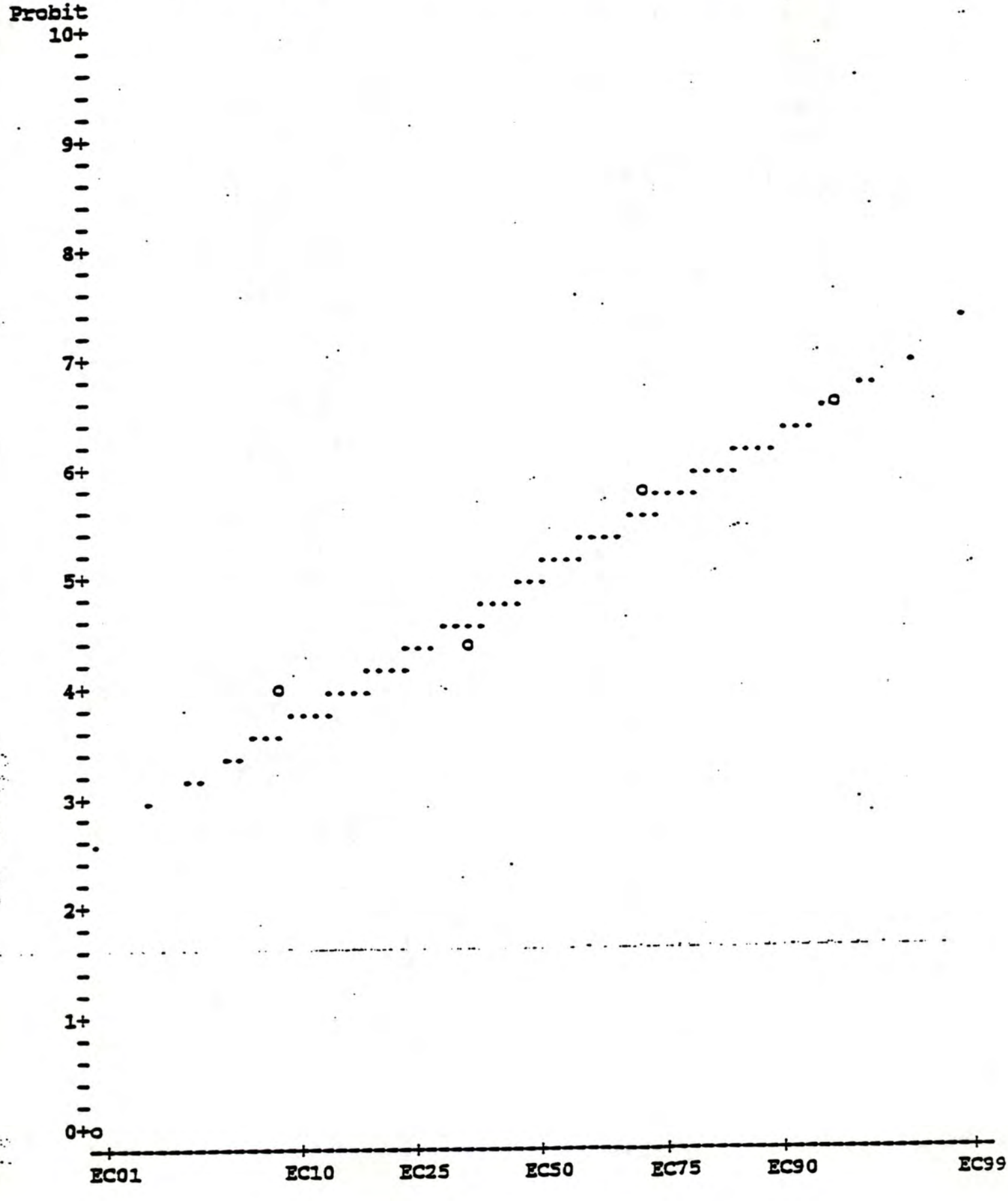
WDOE - Oyster Ref Toxicity Test 7/20/94

Estimated EC Values and Confidence Limits

Point	Conc.	Lower 95% Confidence Limits	Upper 95% Confidence Limits
EC 1.00	0.3857	0.1727	0.5963
EC 5.00	0.6188	0.3408	0.8688
EC10.00	0.7963	0.4865	1.0688
EC15.00	0.9440	0.6159	1.2347
EC50.00	1.9377	1.5205	2.4932
EC85.00	3.9775	3.0047	6.2901
EC90.00	4.7153	3.4641	7.9788
EC95.00	6.0672	4.2530	11.4132
EC99.00	9.7351	6.1849	22.5679

WDOE - Oyster Ref Toxicity Test 7/20/94

PLOT OF ADJUSTED PROBITS AND PREDICTED REGRESSION LINE



Ethidium for Tabs
B Sch

Crassostrea gigas

C. gigas
Species

DATA PACKET

CLIENT: AGI

PROJECT NAME: Russell's O/ORCAS

PROJECT NUMBER: 552756 01 (01)

LARVAE SEDIMENT SETUP RECORD SHEET

Project Name: A6I

Date: 7/13/94

Project Number: 552756 01 (01)

Station I.D.	Lab ac I.D.	Interstitial Salinity	Comments	Initials
~~552~~	~~A6IEC001-005~~	~~30~~		
~~553~~	~~554 554 006-010~~	~~31~~		
553	~~552 554~~ 011-015	31		
554	~~552 554~~ 016-020	30		
~~555~~	~~552 554~~ 021-025	30		
~~556~~	~~552 554~~ 026-030	29		
556	~~552 554~~ 031-035	*		
~~557~~	~~552 554~~ 036-040	31		
555	~~552 554~~ 041-045			
~~557~~	557			
				FS
SW	A6IEC001-005	30		FS
SS1	006-010	29		FS
SS2	011-015	31		FS
SS3	016-020	30		FS
SS4	021-025	31		FS
SS5	026-030	30 @	@ Grain Size TOO Large	FS
SS6	031-035	30	TO OBTain INTRASTITIAL	FS
SS7	036-040	31	Salinity. FS	FS
SS8	041-045	@		

~~ECHINODERM~~ BIOASSAY

Job Name AG1 Page 1 of 5

Job Number 55 2756 01 (01)

	Day 0	Day 1	Day 2
Date	7-13-94	7-14-94	7-15-94
Temperature	MC ~~15°C~~ 19°C	21° C	19° C
Time	MC ~~11:15~~ 16:30	8:50	9:00
Observer	MC/~~BB~~	AC/MC	AC

Container	pH	Salinity	DO	pH	Salinity	DO	pH	Salinity	DO
B 005	7.9	29	7.5	7.9	29	7.8	7.9	29	6.8
B 045	7.9	28	6.9	7.8	28	6.4	7.7	28	5.8
B 035	7.9	29	7.4	7.9	28	~~6.8~~ 7.8	7.9	29	6.9
B 030	7.9	28	7.3	7.9	28	7.9	7.9	28	7.0
B 015	7.9	28	6.8	7.9	28	6.0	7.8	28	5.6
B 040	7.9	28	6.9	7.8	28	6.2	7.7	28	5.6
B 010	7.9	28	7.0	7.8	28	6.2	7.8	28	5.8
B 020	8.0	28	7.0	7.9	28	6.5	7.8	28	6.0
B 025	7.9	28	7.5	7.9	29	7.9	7.9	28	6.8
0.0 ARA	7.9	28	7.7	7.9	28	8.0	7.9	28	6.9
6.0 ARA	7.9	28	7.7	7.9	28	8.1	7.9	28	7.1

BIOASSAY ORGANISM LARVAL COUNTS - ~~ECHINODERM~~

Job Name AGI Counted by FS QCd by DB

Job Number 552756 01(01) Date 7/18/94 Date 7/18/94

Container	Normal	Abnormal	QC Normal	QC Abnormal	Comments
T, 1 A	199	/			
B	227	/			
T, 2 A	217	/			
B	187	/			
T, 3 A	237	/			
B	216	/			
T, 4 A	203	/			
B	229	/			
T, 5 A	197	/			
B	257	/			
AGI001-A	219	6			
B	240	7			
002 A	222	8			
B	209	9	211	7	
003 A	241	5			
B	209	4			
004 A	229	3			
B	236	4			
005 A	207	8			
B	211	10			
006 A	109	19			
006 B	204	3			
007 A	230	8			
007 B	257	2			
008 A	220	1			
008 B	225	3			
009 A	202	6			
009 B	203	2			
010 A	216	3			
B	207	2	206	5	
011 A	299	1			
B	262	4			
012 A	271	2			
B	310	4			

BIOASSAY ORGANISM LARVAL COUNTS ~~ECHINODERM~~

Job Name AGI Counted by FS/MC 8/2/94 QC'd by MC

Job Number 55 2756 01 (01) Date 7/28/94 Date 8/2/94

Container	Normal	Abnormal	QC Normal	QC Abnormal	Comments
013 A	221	6			
B	231	6			
014 A	231	2			
B	222	3			
015 A	171	3			
B	192	6			
016 A	203	4			
B	187 ES	3			
017 A	~~186~~ 206	2			
B	203	4			
~~0018~~ A	163	2	170	3	
B	260	2			
019 A	177	2			
B	238	1			
020 A	123	1			
B	177	1			
021 A	267	5			
B	304	2			
022 A	196	0			
B	238	2			
023 A	237	1			
B	261	1			
024 A	173	1			
B	271	4			
025 A	171	2			
B	248	0			
026 A	202	2			
B	282	1	276	3	
027 A	285	3			
B	240	2			
028 A	269	4			
B	262	2			
029 A	218	2			
B	283	3			
030 A	179	1			
B	256	0			

BIOASSAY ORGANISM LARVAL COUNTS ~~ECHINODERM~~

Job Name A & I | Counted by MC | QCd by FS

Job Number 552756 01 (01) | Date 8/2 - 8/3 | Date 8/24/3

Container	Normal	Abnormal	QC Normal	QC Abnormal	Comments
031 A	263	6			
B	206	0			
032 A	290	10			
B	182	9			
033 A	216	4			
B	180	7			
034 A	240	7			
B	246	2			
035 A	247	1			
B	272	3			
036 A	267	1			
B	271	3			
037 A	145	4			
B	223	2			
038 A	137	1			
B	168	1			
039 A	200	1			
B	254	3			
040 A	245	2			
B	252	3			
041 A	160	1			
B	201	0			
042 A	193	1			
B	204	2			
043 A	307	2			
B	283	2			
044 A	242	7			
B	231	4			
045 A	241	6	238	0	
B	259	3	234	3	

BIOASSAY ORGANISM LARVAL COUNTS ~~ECHINODERM~~

Job Name ACL ~~LRS~~ FS - Reftox Counted by MC QC1 by FS

Job Number 55 2756 01(01) Date 8/14 Date 8/14

Container		Normal	Abnormal	QC Normal	QC Abnormal	Comments
0.0	A1	175	4			
	A2	209	2			
	B1	216	6			
	B2	117	2			
.19	A1	228	5			
	A2	244	5	239	3	
	B1	249	1			
	B2	243	2			
.38	A1	162	5			
	A2	180	3			
	B1 ~~B3~~	179	5			
	B2	185	6			
.75	A1	174	10			
	A2	102	1			
	B1	163	5			
	B2	202	6			
1.5	A1	216	18			
	A2	167	12	159	13	
	B1	100	75			
	B2	151	45			
3.0	A1	22	105			
	A2	66	151			
	B1	22	202			
	B2	20	216			
6.0	A1	1	94			
	A2	2	85			
	B1	0	164			
	B2	1	180			

NEANTHES

DATA TABLES

Station	Lab I.D.	Alive	Found Dead	Dead	% Mortality	Station % Mortality	Mortality Std. Dev. 1	Weight of Pan (mg)	Dry Weight of Pan and Worms (mg)	Dry Weight of Worms (mg)	Dry Weight of Worms (mg/org.)	Average Dry Weight per Station (mg/org.)	Growth Endpoint	Growth Endpoint Average
T Initial	A							131.33	136.42	5.09	1.0	1.0		
	B							125.12	130.12	5.00	1.0			
	C							104.65	109.82	5.17	1.0			
West Beach	1	5	0	0	0.0	0.0%	0.00	102.99	211.66	108.67	21.7	20.7	1.04	1.0
	2	5	0	0	0.0			107.44	216.61	109.17	21.8		1.04	
	3	5	0	0	0.0			106.03	217.28	111.25	22.3		1.06	
	4	5	0	0	0.0			126.26	217.34	91.08	18.2		0.86	
	5	5	0	0	0.0			117.88	215.38	97.50	19.5		0.92	
SS1	6	5	0	0	0.0	0.0%	0.00	116.30	244.33	128.03	25.6	24.1	1.23	1.2
	7	5	0	0	0.0			117.32	206.70	89.38	17.9		0.84	
	8	5	0	0	0.0			113.47	257.73	144.26	28.9		1.39	
	9	5	0	0	0.0			96.12	210.08	113.96	22.8		1.09	
	10	5	0	0	0.0			97.79	223.59	125.80	25.2		1.21	
SS2	11	5	0	0	0.0	4.0%	8.94	106.65	250.56	143.91	28.8	27.8	1.39	1.3
	12	4	0	1	20.0			90.35	249.53	159.18	39.8		1.94	
	13	5	0	0	0.0			107.02	243.23	136.21	27.2		1.31	
	14	5	0	0	0.0			97.69	198.28	100.59	20.1		0.96	
	15	5	0	0	0.0			98.21	213.36	115.15	23.0		1.10	
SS3	16	4	0	1	20.0	4.0%	8.94	102.84	200.95	98.11	24.5	23.2	1.18	1.1
	17	5	0	0	0.0			101.96	193.03	91.07	18.2		0.86	
	18	5	0	0	0.0			104.48	222.85	118.37	23.7		1.13	
	19	5	0	0	0.0			128.85	241.12	112.27	22.5		1.07	
	20	5	0	0	0.0			92.35	228.18	135.83	27.2		1.31	
SS4	21	5	0	0	0.0	0.0%	0.00	92.97	197.76	104.79	21.0	19.9	1.00	0.9
	22	5	0	0	0.0			94.35	196.54	102.19	20.4		0.97	
	23	5	0	0	0.0			101.63	195.46	93.83	18.8		0.89	
	24	5	0	0	0.0			98.57	190.33	91.76	18.4		0.87	
	25	5	0	0	0.0			92.47	197.04	104.57	20.9		0.99	
SS5	26	5	0	0	0.0	0.0%	0.00	100.23	218.94	118.71	23.7	20.9	1.14	1.0
	27	5	0	0	0.0			94.66	189.84	95.18	19.0		0.90	
	28	5	0	0	0.0			93.82	191.30	97.48	19.5		0.92	
	29	5	0	0	0.0			94.40	210.98	116.58	23.3		1.11	
	30	5	0	0	0.0			98.77	194.22	95.45	19.1		0.90	

SS6	31	5	0	0	0.0	0.0%	0.00	94.28	217.30	123.02	24.6	21.1	1.18	1.0
	32	5	0	0	0.0			95.48	173.13	77.65	15.5		0.73	
	33	5	0	0	0.0			101.82	216.75	114.93	23.0		1.10	
	34	5	0	0	0.0			95.14	232.98	137.84	27.6		1.33	
	35	5	0	0	0.0			85.28	158.82	73.54	14.7		0.68	
SS7	36	5	0	0	0.0	4.0%	8.94	175.83	303.79	127.96	25.6	24.2	1.23	1.2
	37	5	0	0	0.0			133.46	273.59	140.13	28.0		1.35	
	38	4	0	1	20.0			174.24	294.59	120.35	30.1		1.45	
	39	5	0	0	0.0			115.67	180.00	64.33	12.9		0.59	
	40	5	0	0	0.0			127.07	249.56	122.49	24.5		1.17	
SS8	41	5	0	0	0.0	0.0%	0.00	113.86	219.79	105.93	21.2	24.6	1.01	1.2
	42	5	0	0	0.0			123.67	273.54	149.87	30.0		1.45	
	43	5	0	0	0.0			121.94	191.94	70.00	14.0		0.65	
	44	5	0	0	0.0			118.46	264.70	146.24	29.2		1.41	
	45	5	0	0	0.0			115.54	259.26	143.72	28.7		1.39	

Reference Toxicant (Cd)							
0.0	A	5	0	0	0.0		--
	B	5	0	0	0.0		--
1.8	A	5	0	0	0.0		--
	B	5	0	0	0.0		--
3.0	A	5	0	0	0.0		--
	B	5	0	0	0.0		--
5.0	A	4	1	1	20.0		--
	B	5	0	0	0.0		--
8.4	A	0	5	5	100.0		--
	B	0	5	5	100.0		--
14.0	A	0	5	5	100.0		--
	B	0	5	5	100.0		--

1/ Note: Station standard deviations calculated on raw, untransformed data.

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: 7/18/94 TEST NUMBER: 01 DURATION: 4 DAY
CHEMICAL: CD SPECIES: NEANTHES

RAW DATA:

CONCENTRATION(MG/L)	1.80	3.00	5.00	8.40	14.00
NUMBER EXPOSED:	100	100	100	100	100
MORTALITIES:	0	0	20	100	100

SPEARMAN-KARBER TRIM: 0.00%

SPEARMAN-KARBER ESTIMATES: EC50: 5.85
95% LOWER CONFIDENCE: 5.61
95% UPPER CONFIDENCE: 6.09

20 DAY NEANTHES

(Neanthes arenaceodentata)

DATA PACKET

CLIENT: AGI

PROJECT NAME: RUSSELL'S 3/ONCAS

PROJECT NUMBER: 55 2756 01 (01)

20 DAY NEANTHES TEST NOTES AND OBSERVATIONS

Project Name: Russell's O/O RCRA's

Date: 7/19/94

Project Number: _____

Initial Weights

Rep	WI (mg)	WF (mg)	mg/worm
1	131.33	136.42	1.02
2	125.12	130.12	1.00
3	104.65	109.82	1.03

20 DAY NEANTHES SEDIMENT SETUP RECORD SHEET

Project Name: AGI

Date: 7-18-94

Project Number: 55 275L 01 (11)

Station I.D.	Lab I.D.	Interstitial Salinity	Comments	Initials
W Beach	N001 - 005	*	*Grain size too	FS
SS1	N006- 010	30	large to obtain	FS
SS2	N011 -015	30	interstitial water	FS
SS3	N016 - 020	30		FS
SS4	N021- 025	29		FS
SS5	N026- 030	*		FS
SS6	N031 - 035	30		FS
SS7	N036-040	*		FS
SS8	N041-045	*		FS

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 5<1xc oil(4)

Day: 0 of Test

Date: 7-19-94

Time: 13:45

Temp: 20 °C

Observer(s): MC

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
N 035	8.0	7.5	28	
N 025	8.0	7.6	28	
N 030	8.0	7.6	28	
N 040	7.9	7.0	29	
N 005	7.9	7.2	29	
N 020	7.9	7.2	29	
N 010	7.9	7.4	29	
N 045	7.8	7.3	29	
N 015	7.9	6.8	29	
Con A 0.0	7.9	7.0	28	
A 14 C	7.9	7.0	28	

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: ACT

Job Number: 55 1755 01 (C)

Day: 3 of Test

Date: 7/22/94

Time: 11:00

Temp: 21 °C

Observer(s): AC/OB

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
N 035	7.7	~~7.0~~ *	29	* 6.6
N 025	7.7	6.3	28	
N 030	7.6	6.1	29	
N 040	7.6	5.6	29	
N 005	7.4	6.0	29	
N 020	7.6	6.0	30	
N 010	7.7	6.0	30	
N 045	7.7	6.3	29	
N 015	7.7	6.3	29	
Con A 0.0	7.9	7.0	28	
A 14.0	~~7.9~~	7.0	28	

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 55 3756 01 (01)

Day: 6 of Test

Date: 7-25-94

Time: 8:30

Temp: 20.5 °C

Observer(s): DBI MC

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
N 035	7.7	6.8	30	
N 025	7.7	6.8	29	
N 030	7.6	6.7	30	
N 040	7.6	6.2	29	
N 005	7.5	1.5	29	
N 020	7.6	6.6	30	
N 010	7.6	6.4	31	
N 045	7.7	6.2	30	
N 015	7.8	6.4	30	

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 55 2756 01 (ii)

Day: 9 of Test

Date: 7/29/94

Time: 9:15

Temp: 21 °C

Observer(s): YB, KM [illegible]

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
N035	~~7.9~~ 8.0	6.6	30	
N025	7.9	6.6	29	
N030	7.8	6.4	29	
N040	8.0	5.1	29	~~AFS spiked, 1128 fed~~ FS
N005	7.6	5.2	29	
N020	7.8	6.0	30	
N010	7.8	6.0	31	
N045	7.9	5.7	30	
N015	8.0	6.2	29	

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: ~~USS~~ AGL

Job Number: 55 3754 01 (11)

Day: 12 of Test

Date: 7-31-94

Time: 9:15

Temp: 20.5 °C

Observer(s): MC

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
N ~~0754~~ 01	8.0	6.9	29	
N ~~0753~~ 0	7.8	6.9	29	
N ~~0753~~ 5	7.8	6.8	29	
N 0240251	7.6	6.0	29	
N 005	7.4	6.7	29	
N ~~0753~~ 3	7.8	6.7	29	
N ~~0754~~ 5	8.1	7.0	29	
N ~~0754~~ 5	7.6	6.3	30	
~~N 0754~~ 10	7.8	6.9	29	

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 55 3756 01 (01)

Day: 15 of Test

Date: 8-3-94

Time: 10:10

Temp: 20 °C

Observer(s): KM KB LB

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
N040	7.8	6.8	30	salinity adjusted to 28 w/10 mL DI KM
N030	7.6	6.9	30	salinity adjusted to 28 w/10 mL DI KM
N035	7.6	6.7	30	salinity adjusted to 28 w/20 mL DI KM
N025	7.6	6.8	29	
N005	7.5	6.6	30	salinity adjusted to 28 w/20 mL DI KM
N045	7.6	5.6	~~32~~ 30	Salinity adj to 28 w/40 mL of DI LB
N015	7.9	7.1	~~31~~ 30	Salinity adjusted to 28 w/ 40mL DI LB
N020	7.7	6.5	30	Salinity adjusted to 28 w/ 40mL DI LB
N010	7.6	6.3	~~32~~ 30	Salinity adjusted to 28 w/ 40mL DI LB
				@ Refractometer recalibrated + Turkey Fron use. Solinity = 30 ppt using New Instrument - FS

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: AGI

Job Number: 55 2756 (21)

Day: 18 of Test

Date: 3/6/94

Time: 1315

Temp: 21 °C

Observer(s): DH

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
NC42	DH 7.67	6.6	30	
N038	7.8	6.6	30	
N035	7.8	6.6	29	
N025	7.9	6.7	30	
N009	7.8	6.7	30	
N045	7.9	6.4	30	
N019	8.2	7.0	30	
N020	8.0	6.9	30	
N018	7.9	6.6	30	

20 DAY NEANTHES BIOASSAY CHEMISTRY DATA

Job Name: ACI

Job Number: 552756 01101

Day: 20 of Test

Date: 8-8-94

Time: 0815

Temp: 21 °C

Observer(s): DB/DPLH

Container	Water Quality Parameters			Comments
	pH	D.O.	Salinity	
N040	7.7	6.8	30	
N030	7.5	6.7	30	
N035	7.5	6.7	30	
N025	7.5	6.7	30	
N005	7.5	6.8	30	
N045	7.6	6.4	~~31~~ 30	
N015	7.8	6.9	~~31~~ 30	
N020	7.7	6.8	30	
N010	7.6	6.7	30	

20 DAY NEANTHES BIOASSAY BREAKDOWN
Positive Control-Reference Toxicant

Job Name: Russell's O/Arcas — Reference Toxicant: Cd

Date Stock Prep.: 1/24/94

Job Number: 552756 01 (01) — Date: 7/23/94

Container	Concentration (mg/l)	Found: Alive	Found: Dead	Initials
0.0 A	0	5	0	ES
D		5	0	
1.8 A	1.8	5	0	
B		5	0	
3.0 A	3.0	5	0	
D		5	0	
5.0 A	5.0	4	1	
B		5	0	
8.4 A	8.4	0	5	
B		0	5	
14 A	14	0	5	
B		0	5	

20 DAY NEANTHES BIOASSAY BREAKDOWN

Job Name: AGI Date: 08/09/94

Job Number: 55275601 01 Day 20 of Test

Container	Found Alive	Found Dead	Comments	Initials
001	5	0		YB
002	5	0		DP
003	5	0		PB
004	5	0		YB
005	5	0		PD
006	5	0		DP
007	5	0		DB
008	5	0		AC
009	5	0		KB
010	5	0		DP
011	5	0		YB
012	4	0		YB
013	5	0		YB
014	5	0		KB
015	5	0		PD
016	4	0		DB
017	5	0		DP
018	5	0		YB
019	5	0		DP
020	4 5	0		AC
021	5	0		YB
022	5	0		DB
023	5	0		DP
024	5	0		YB
025	5	0		PD
026	5	0		KB
027	5	0		DB
028	5	0		YB
029	5	0		DP
030	5	0		YB
031	5	0		DB
032	5	0		DP
033	5	0		DB
034	5	0		PD
035	5	0		DB
036	5	0		DB

20 DAY NEANTHES BIOASSAY BREAKDOWN

Job Name: AGI

Date: 8/8/94

Job Number: 55275601 01

Day 20 of Test

Container	Found		Comments	Initials
	Alive	Dead		
037	5	0		YB
038	4	0		BP
039	5	0		BP
040	5	0		MB
041	5	0		YB
042	5	0		BP
043	5	0		DF
044	5	0		AC
045	5	0		BF

NEANTHES BIOMASS DATA

Job Name A61

Job Number 001-035 Date 8/8/94

Day of Test 20

Replicate Number	Weight of Pan (g)	Dry Weight of Pan and Worms (g)	Dry Weight of Worms (g)
001	102.79	211.66	108.67
002	107.44	216.61	109.17
003	106.03	217.28	111.25
004	126.26	217.34	91.08
005	117.88	215.38	97.50
006	116.30	244.33	128.03
007	117.32	206.70	89.38
008	113.47	257.73	144.26
009	96.12	210.08	113.96
010	97.79	223.59	125.80
011	106.65	250.56	143.91
012	90.35	249.53	159.18
013	107.02	243.23	136.21
014	97.69	198.28	100.59
015	98.21	213.36	115.15
016	102.84	200.95	98.11
017	101.96	193.03	91.07
018	104.45	222.85	118.37
019	129.65	241.12	112.27
020	97.35	225.18	135.83
021	92.97	197.76	104.79
022	94.35	196.54	102.19
023	101.63	195.46	93.83
024	98.57	190.33	91.76
025	97.47	197.04	104.57
026	100.23	218.94	118.71
027	94.66	189.84	95.18
028	93.82	191.30	97.48
029	94.40	210.98	116.58
030	95.77	194.22	98.45
031	94.28	217.30	123.02
032	95.46	173.13	77.67
033	101.82	216.75	114.93
034	95.14	232.98	137.84
035	95.28	168.82	73.54

NEANTHES BIOMASS DATA

Job Name A61

Job Number 036-045 Date 8/8/94

Day of Test _____

Replicate Number	Weight of Pan (g)	Dry Weight of Pan and Worms (g)	Dry Weight of Worms (g)
~~A1B 040~~ 036	175.83	303.79	127.96
037	133.46	273.59	140.13
038	174.24	294.59	120.35
039	115.67	180.00	64.33
040	127.07	249.56	122.49
041	113.56	219.79	105.93
042	173.62	273.54	149.87
043	121.94	191.94	70.00
044	118.46	264.70	146.24
045	115.54	259.26	143.72

APPENDIX A

AMMONIA AND SULFIDE ANALYSIS

AGI - Russell's of Oreas Facility

ORGANISM: *Rhepoxynius abronius* PROJECT NUMBER: 55-2756-01 (01)

ANALYSIS: Ammonia TEST DATES: $T_{Initial}$ 7/15/94
T_{Final} 7/25/94

DETECTION LIMIT: 0.01 (mg/l)

Sample I.D.	$T_{Initial}$ (mg/l)	T_{Final} (mg/l)
Control	ND[1]	0.68
SS1	0.44	0.45
SS2	0.28	1.02
SS3	ND[1]	0.21
SS4	ND[1]	0.13
SS5	0.22	0.12
SS6	ND[1]	ND[1]
SS7	0.86	0.27
SS8	0.40	1.55

[1]ND = Not detected

AGI - Russell's of Orcas Facility

ORGANISM: *Rhepoxynius abronius*

PROJECT NUMBER: 55-2756-01 (01)

ANALYSIS: Sulfide

TEST DATES: $T_{Initial}$ 7/15/94
T_{Final} 7/25/94

DETECTION LIMIT: 0.003 (mg/l)

Sample I.D.	$T_{Initial}$ (mg/l)	T_{Final} (mg/l)
Control	ND[1]	0.006
SS1	ND[1]	ND[1]
SS2	ND[1]	ND[1]
SS3	ND[1]	ND[1]
SS4	ND[1]	ND[1]
SS5	ND[1]	0.004
SS6	ND[1]	0.004
SS7	ND[1]	0.005
SS8	ND[1]	0.005

[1]ND = Not detected

AGI - Russell's of Oreas Facility

ORGANISM: *Crassostrea gigis*

PROJECT NUMBER: 55-2756-01 (01)

ANALYSIS: Ammonia

TEST DATES: $T_{Initial}$ 7/13/94
T_{Final} 7/15/94

DETECTION LIMIT: 0.01 (mg/l)

Sample I.D.	$T_{Initial}$ (mg/l)	T_{Final} (mg/l)
Control	ND[1]	ND[1]
SS1	ND[1]	ND[1]
SS2	ND[1]	ND[1]
SS3	ND[1]	ND[1]
SS4	ND[1]	ND[1]
SS5	ND[1]	ND[1]
SS6	ND[1]	ND[1]
SS7	ND[1]	ND[1]
SS8	ND[1]	ND[1]

[1]ND = Not detected

AGI - Russell's of Oreas Facility

ORGANISM: *Crassostrea gigas*

PROJECT NUMBER: 55-2756-01 (01)

ANALYSIS: Sulfide

TEST DATES: $T_{Initial}$ 7/13/94
T_{Final} 7/15/94

DETECTION LIMIT: 0.003 (mg/l)

Sample I.D.	$T_{Initial}$ (mg/l)	T_{Final} (mg/l)
Control	ND[1]	ND[1]
SS1	ND[1]	ND[1]
SS2	ND[1]	ND[1]
SS3	ND[1]	ND[1]
SS4	ND[1]	ND[1]
SS5	ND[1]	ND[1]
SS6	ND[1]	ND[1]
SS7	ND[1]	ND[1]
SS8	0.018	ND[1]

[1]ND = Not detected

AGI - Russell's of Orcas Facility

ORGANISM: *Neanthes spp.*

PROJECT NUMBER: 55-2756-01 (01)

ANALYSIS: Ammonia

TEST DATES: $T_{Initial}$ 7/19/94
T_{Final} 8/8/94

DETECTION LIMIT: 0.01 (mg/l)

Sample I.D.	$T_{Initial}$ (mg/l)	T_{Final} (mg/l)
Control	ND[1]	4.77
SS1	0.99	ND[1]
SS2	0.59	ND[1]
SS3	ND[1]	0.06
SS4	ND[1]	0.15
SS5	0.22	0.23
SS6	ND[1]	0.22
SS7	2.16	0.13
SS8	1.32	ND[1]

[1]ND = Not detected

AGI - Russell's of Oreas Facility

ORGANISM: *Neanthes spp.*

PROJECT NUMBER: 55-2756-01 (01)

ANALYSIS: Sulfide

TEST DATES: $T_{Initial}$ 7/19/94
T_{Final} 8/8/94

DETECTION LIMIT: 0.003 (mg/l)

Sample I.D.	$T_{Initial}$ (mg/l)	T_{Final} (mg/l)
Control	ND[1]	4.77
SS1	ND[1]	ND[1]
SS2	ND[1]	ND[1]
SS3	ND[1]	0.061
SS4	ND[1]	0.141
SS5	ND[1]	0.229
SS6	ND[1]	0.221
SS7	ND[1]	0.128
SS8	ND[1]	ND[1]

[1]ND = Not detected

Laboratory Analysis Record — Parameter Inc.

Analysis: Ammonia — Matrix: SW

Organism: Ulvaria — Test Date: 8/18/94 (T5) — Start: JHH

Project Name: ACI — Date: 8/19/94

Project Number: — Start Time: — End Time:

Instrument Cal: Cole Unit 001: Orion Model #720A

001) Specific Ion Probe # — Serial # 5916 — Slope: .526 (-55 to -61 mV/decade)

Ammonia Standard
Sulfide Standard: SCP # PACK-AN-3

0.1 ppm
1.0 ppm
10.0 ppm

Method Detection Limit = 0.01 ppm
Reporting Limit = 0.1 ppm
Lab Temp: 25°C

Time	Sample ID	Lab Sample ID	mV Reading	% Recovery	Time	Sample ID	Lab Sample ID	mV Reading	% Recovery
		0.1 ppm CS	7						
9:16		1.0 ppm CS	57.0						
9:18		10.0 ppm CS	1						
9:20		0.1 ppm CCV	0.102						
9:25		1.0 ppm CCV	0.987						
9:28		10.0 ppm CCV	9.88						
9:29		0.1 Blank	N.D						
9:30	SW	SW	N.D						
9:32	SW	SW MS	0.777						
9:34	DUP	001-005	4.77						
9:36	SS1	006-010	N.D						
9:37	SS2	011-015	N.D						
9:38	SS3	016-020	0.0580						
9:42	SS3	016-020 MS	0.0570						
9:45	SS4	021-025	0.146						
9:48	SS5	026-030	0.229						
9:49	SS6	031-035	0.221						
9:52	SS7	036-040	0.123						
9:55	SS7	036-040 MS	0.915						
9:57	SS8	041-045	N.D						

CS • Calibration Standard
CCV • Continuing Calibration Verification (1 in 10)
DUP • Duplicate (1 in 10)
MS • Sample Matrix Spike (1 in 10)

SB • Sample Blank (1 in 10)
SCW • Synthetic Ocean Water (for Ammonia determinations)
SW • Ambient Seawater (preferably 2 ppt)
SS • Seawater (2 ppt) for Silicate, 27 ppt for Ammonia
RS • Reference Sample (1 in 10)

48.5 ppt Lab Water to 15 ppt
0.5 ppt Lab Water to 100 ppt

Laboratory Analysis Record — Parsons Inc

Analysis: Ammonia — Media: [illegible]

Organism: [illegible]
Project Name: 461
Project Number: [illegible]

Test Date: 7/15/94 (T1)
7/15/94 (T2)

Start: [illegible]
Date: 7/15/94
Start Time: [illegible]
End Time: [illegible]

Instrument Cal: Unit 001: Orion Model #720A

001) Specific Ion Probe # [illegible] Serial # 5916 Slope %: [illegible] (-56 to -60 mV/decade)

Ammonia Standard
Sulfide Standard (SOP # PMX-AN-3)

Method Detection Limit = 0.01 ppm
Reporting Limit = 0.1 ppm
Lab Temp: 25 C

Time (hrs)	Sample ID	Lab Sample ID	NH3-N (ppm)	% Recovery	Time (hrs)	Sample ID	Lab Sample ID	NH3-N (ppm)	% Recovery
					11:50	Seawater	SW T1	0.000	
					11:51	Seawater	SW T1.5	.040	
					11:52	Seawater	SW T2	0.000	
					11:55	SS1	SS1-010 T1	0.000	
					11:57	SS2	SS2-015 T1	0.000	
					12:00	SS3	SS3-020 T1	0.000	
					12:01	SS3	SS3-020 T1.5	0.000	
11:22	Seawater	SW T0	0.000		12:04	SS4	SS4-025 T1	0.000	
11:23	Seawater	SW T0.5	0.052		12:07	SS5	SS5-030 T1	0.000	
11:24	SS1	SS1-010 T0	0.040		12:09	SS6	SS6-035 T1	0.000	
11:27	SS2	SS2-015 T0	0.000		12:09	SS6	SS6-035 T1.5	.012	
11:29	SS3	SS3-020 T0	0.000		12:10	SS7	SS7-040 T1	0.000	
11:32	SS3	SS3-020 T0.5	0.000		12:13	SS8	SS8-045 T1	0.000	
11:35	SS4	SS4-025 T0	0.000						
11:38	SS4	SS4-025 T0.5	0.054						
11:41	SS5	SS5-030 T0	0.000						
11:43	SS6	SS6-035 T0	0.000						
11:44	SS7	SS7-040 T0	0.000						
11:46	SS8	SS8-045 T0	0.000						

CS • Calibration Standard
MB • Method Blank (deionized water)
DUP • Duplicate (laboratory) (1 in 20)
MS • Spike Addition (laboratory) (1 in 20)
[illegible] mls sample [illegible] mls
[illegible] mls spike @ [illegible] ppm

SPB • Sample Preservation Blank
SCW • Synthetic Ocean Water (for dilution preparation)
SA • Ammonia Standard (procedure 2 ppm)
SW • Seawater (0.2 um filtered UV sterilized 2 ppt)
RS • Reference Sample (Lab) (1 in 20)

Laboratory Analysis Record — Parametrix Inc.

Analysis: Total Sulfide Media: SW

Organism: BIVALVE Staff: GHS
Project Name: AG-1 Test Date: 7/13/94 7/15/94 (TF) Date: 7/14/94
Project Number: Start Time: 12:15
End Time: 16:35

Instrument Calibrations Unit 001: Orion Model #720A

001) Specific Ion Probe 9416 Serial # UP1 Slope % 30 (-25 to -30 mV/decade)
002) Specific Ion Probe # Serial # Slope % (-25 to -30 mV/decade)

Sulfide Standards (SOP # PMX-AN-2)

7.74
0.774
0.0774

Orion Method Detection Limit = 0.003 ppm Sulfide
ASTM Method D4658 Lower Limit 0.04 ppm Sulfide
Reporting Limit 0.5 ppm Sulfide
Lab Temp: 24.4 °C

Time (hrs)	Sample ID.	Lab Sample ID.	Sulfide (ppm)	% Recovery	mV	Time (hrs)	Sample ID.	Lab Sample ID.	Sulfide (ppm)	% Recovery	mV
		0.0774				14:59	Seawater	SW TF	0.000		
		0.774	30			15:02	Seawater	SW TFMS	0.150	84%	
		7.74				15:05	Seawater	SW-005 TF	0.000		
		0.0774				15:07	SS1	SS1-010 TF	0.000		
		0.774				15:12	SS1	SS1-015 TF	0.000		
		7.74				15:14	SS2	SS2-015 TF	0.000		
		DI Blank				15:18	SS2	SS2-015 TFMS	0.150		
						15:20	SS3	SS3-020 TF	0.000		
14:22	Seawater	SW TF	0.000			15:22	SS4	SS4-025 TF	0.000		
14:23	Seawater(FS)	SW-005 TFMS	0.149			15:24	SS5	SS5-030 TF	0.000		
14:26	SS1	SS1-010 TF	0.000			15:27	SS6	SS6-035 TF	0.000		
14:31	SS2	SS2-015 TF	0.000			15:29	SS7	SS7-040 TF	0.000		
14:33	SS2	SS2-015 TFMS	0.154			15:33	SS8	SS8-045 TF	0.000		
14:35	SS3	SS3-020 TF	0.000								
14:37	SS4	SS4-025 TF	0.000								
14:40	SS5	SS5-030 TF	0.000								
14:42	SS6	SS6-035 TF	0.000								
14:44	SS7	SS7-040 TF	0.000								
14:53	SS7	SS7-040 TFD	0.000								
14:55	SS8	SS8-045 TF	0.0185								

CS • Calibration Standard
MB • Method Blank (daily with each seawater batch)
DUP • Duplicate (laboratory) (1 in 20)
MS • Spike Addition (laboratory) (1 in 20)
15 pts sample 7th at SAOB
1st pt spike @ 7th ppm
2.45 mL sample 27.5 mL SAOB
1.0 mL spike @ 7.74 ppm

SPS • Source Preservation Blank
SCW • Synthetic Ocean Water (for standard preparation)
SBS • Sulfide Standard (prepared in SAOB)
SW • Seawater (0.2 µm filtered UV processed in SAOB)
RS • Reference Sample (local) (1 in 20)

Laboratory Analysis Record

Parameter: Ion

Analyte: Ammonia

Matrix: Sw

Organization: USGS TWRI

Project Name: [illegible]

Project Number:

Test Date: 7/14/14 (Pre-Cal)
7/14/14 (Post-Cal)

Start: Greg
Date: 7/14/14
Start Time:
End Time:

Instrument Cal Unit 001: Orion Model #720A

001) Specific Ion Probe # Serial # 5916 Slope %: 57.4 (-55 to -61 mV/decade)

Ammonium Standard
Sulfuric Standard (SOP = EPA-AN-3)
0.1 ppm
1.0 ppm
10.0 ppm

Method Detection Limit = 0.01 ppm
Reporting Limit = 0.1 ppm
Lab Temp: 21.1

Time	Sample ID	Sample ID	mV	% Recovery	Time	Sample ID	Sample ID	mV	% Recovery
[illegible]		[illegible]	7		18:06		[illegible]	2.66	
[illegible]		[illegible]	7 [illegible]		18:08		[illegible]	2.91	
[illegible]		[illegible]	[illegible]		18:11		[illegible]	.727	
[illegible]		[illegible]	0.124		18:12		[illegible]	7.69	
16:50		[illegible]	1.1						
16:54		[illegible]	0.5		[illegible]	[illegible]	[illegible]	0.000	
[illegible]		[illegible]	4.402		[illegible]	Seawater	[illegible]	.701	
17:20	[illegible]	[illegible]	0.000		16:57	W. Beach	[illegible]	0.000	
[illegible]		[illegible]	1.12		16:59	SS1	[illegible]	0.000	
[illegible]		[illegible]	0.000		17:03	SS2	[illegible]	0.159	
17:57		[illegible]	0.24		17:05	SS3	[illegible]	0.000	
17:[illegible]		[illegible]	1.72		17:07	SS4	[illegible]	0.000	
17:[illegible]		[illegible]	[illegible]		17:[illegible]	SS5	[illegible]	.777	
[illegible]		[illegible]	[illegible]		17:14	SS5	[illegible]	.193	
17:[illegible]		[illegible]	[illegible]		17:17	SS6	[illegible]	0.000	
[illegible]		[illegible]	2.17		[illegible]	SS7	[illegible]	1.22	
[illegible]		[illegible]	7.24		17:[illegible]	SS7	[illegible]	7.16	
17:57		[illegible]	2.25		17:26	SS8	[illegible]	[illegible]	
[illegible]		[illegible]	[illegible]					422 ppm	
[illegible]		[illegible]	1.49						

C • Calibration Solution
MB • Method Blank (only one per analyte batch)
DUP • Duplicate (laboratory) (1 in 10)
MS • Spike Addition (laboratory) (1 in 10)
[illegible] • [illegible]
[illegible] • [illegible]

SPB • Sample Preparation Blank
SCW • Synthetic Cross Water (for [illegible])
SPK • Additional Spike (preparation) (1 in 20)
SD • Sample (DI or filtered) for [illegible] (1 in 20)
RS • Reference Sample (Blind) (1 in 10)

Laboratory Analysis Record — Parametrix, Inc.

Analysis: Ammonia — Matrix: SW

Organism: Neanthes — Test Date: 8/8/94 (TA) — Start: JHH

Project Name: ACI — Date: 8/16/94

Project Number: — Start Time: — End Time:

Instrument Cal: Unit 001: Orion Model #720A

001) Specific Ion Probe # — Serial # — Slope %: .526 (-56 to -50 mV/decade)

Ammonia Standard
Sulfide Standard (SOP # PVLX-AN-3)

0.1 ppm
1.0 ppm
10.0 ppm

Method Detection Limit = 0.01 ppm
Reporting Limit = 0.1 ppm
Lab Temp: —

Time	Sample ID	Cal Sample ID	Value (ppm)	% Recovery	Time	Sample ID	Cal Sample ID	Value (ppm)	% Recovery
		0.1 ppm CS	7						
9:16		1.0 ppm CS	57.0						
9:18		10.0 ppm CS	)						
9:20		0.1 ppm SW	0.102						
9:25		1.0 ppm SW	13.987						
9:28		10.0 ppm SW	9.88						
9:29		DI Blank	N.D						
9:30	SW	SW	N.D						
9:32	SW	SW MS	0.779						
9:34	CONTROL	001-005	4.77						
9:36	SS1	006-010	N.D						
9:37	SS2	011-015	N.D						
9:38	SS3	016-020	0.0540						
9:42	SS3	016-020 MS	0.0570						
9:45	SS4	021-025	0.146						
9:49	SS5	026-030	0.229						
9:49	SS6	031-035	0.221						
9:52	SS7	036-040	0.129						
9:55	SS7	036-040 MS	0.915						
9:57	SS8	041-045	N.D						

CS • Calibration Standard
MB • Method Blank (deionized water and reagents added)
DUP • Duplicate (laboratory) (1 in 20)
MS • Spike Addition (laboratory) (1 in 20)
48.5 ml sample + LCS + ISA
0.15 ml spike = 100 ppm
SPS • Sample Preservation Blank
SDW • Synthetic Ocean Water (for ammonia determinations)
SW • Ambient Seawater (processed 2 per day)
SW • Seawater (1 in duplicate 1:1 processed 2 per day)
RS • Reference Sediment (Bank) (1 in 20)

Laboratory Analysis Record — Parametrix, Inc.

Analysis: Total Sulfide — Media: Sea Water

Organism: Neanthes
Project Name: AG1 — Test Date: 7/11/94 (T0)
Project Number:

Staff: JAB
Date: 7/12/94
Start Time: 22:28
End Time: 23:36

Instrument Calibrations Unit 001: Orion Model #720A

001) Specific Ion Probe 9416 — Serial # UP1 — Slope % 30 (-25 to -30 mV/decade)
002) Specific Ion Probe # ____ — Serial # ____ — Slope % ____ (-25 to -30 mV/decade)

Sulfide Standards (SCP # PMX-AN-2)

0.0774
0.774
7.74

Orion Method Detection Limit = 0.005 ppm Sulfide
ASTM Method D4658 Lower Limit 0.04 ppm Sulfide
Reporting Limit 0.5 ppm Sulfide
Lab Temp: 27.2 °C

Time (hrs)	Sample ID	Lab Sample ID	Sulfide (ppm)	% Recovery	mV	Time (hrs)	Sample ID	Lab Sample ID	Sulfide (ppm)	% Recovery	mV
		BLOSTHCS									
22:28		0.774CS	7.30								
		0.0774CS									
22:31		0.0774CS	0.078								
22:34		0.774SW	7.86								
22:37		0.774SW	7.86								
22:45		DI BLANK	0.000								
22:50	Seawater	SW T0	0.000								
22:52	Seawater	SW T0.5	0.155								
22:54	Nil. Beach	001 -005 T0	0.000								
22:56	SS1	006 -010 T0	0.000								
23:05	SS1	011 -015 T0	0.000								
23:10	SS2	016 -020 T0	0.000								
23:13	SS3	016 -020 T0	0.000								
23:15	SS3	016 -020 T0.5	0.176								
23:19	SS4	021 -025 T0	0.000								
23:25	SS5	026 -030 T0	0.000								
23:27	SS6	031 -035 T0	0.000								
23:29	SS7	036 -040 T0	0.000								
23:36	SS8	041 -045 T0	0.000								

CS • Calibration Standard
MB • Method Blank (done with each seawater batch)
DUP • Duplicate (laboratory) (1 in 20)
MS • Spike Addition (laboratory) (1 in 20)
24 rep samples 24 of SAC8
1 rep spike @ 7.74 ppm

SPB • Sample Preservation Blank
SDW • Synthetic Dilution Water (for titration preparation)
Sat • Sulfide Saturated (prepared in jar)
SW • Seawater (0.2 um filtered UV processed in jar)
RS • Reference Sample (fixed) (1 in 20)

Laboratory Analysis Record

Analyst: Ammonia

Matrix: SW

Company: Houston

Test Date: 8/24/94

Project Name: ACI

Project Number:

Start: AM

Date: 8/25/94

Start Time:

End Time:

Instrument Call Curve ID: Cetac Model #

ID: Specific Ion Probe # Serial # Slope: .526 (-55 to -61 mV/decade)

Reagent Blank:
Standard: SC2 = 2.5 mg/L

0.1 ppm
1.0 ppm
10.0 ppm

Method Detection Limit = 0.01 ppm
Reporting Limit = 0.1 ppm
Lab Temp:

Time In	Sample ID	Lab ID	Results (ppm)	Dilution	Time In	Sample ID	Lab ID	Results (ppm)	Dilution
		Blank	7						
9:16		2.5 ppm	2 .526						
9:17		10.0 ppm	)						
9:20		Wash Cup	0.102						
9:25		1.0 ppm SW	0.987						
9:26		10.0 ppm SW	9.88						
9:29		Rinse Blank	N.D						
9:30	SW	SW	N.D						
9:32	SW	SW Dup	0.777						
9:34	111 DTT	111-DUP	4.77						
9:36	555	555-MID	N.D						
9:37	552	552-DUP	N.D						
9:38	553	553-MID	0.050						
9:42	553	553-DUP	0.050						
9:45	554	554-DUP	0.146						
9:48	555	555-MID	0.221						
9:49	556	556-DUP	0.221						
9:52	557	557-MID	0.120						
9:55	557	557-DUP	0.915						
9:57	558	558-DUP	N.D						

C • Client Sample
SW • Matrix Blank (Same as Rinse Blank)
DUP • Duplicate (Same as Sample)
MID • Sample Matrix (Same as Sample)

Ex: 4.5 ppm Lab ID for 1.0 ppm
0.5 ppm Lab ID for Blank

SCD • Sample Conductivity Blank
SCW • Sample Cetac Wash (for Sample Conductivity)
SW • Matrix Blank (Same as Sample)
SW • Sample Conductivity Blank (Same as Sample)
SW • Matrix Blank (Same as Sample)

Analyst: Ammonia

Media: Seawater

Organism: Abalone
Project Name: [illegible]
Project Number:

Test Date: [illegible]

Start: JB
Date: 5/27/94
Start Time: 12:46
End Time: 12:47

Instrument Cell Test 001: Orion Model #720A

001) Specific Ion Probe # Serial # 5916 Slope 59.4 (-55 to -61 mV/decade)

Ammonium Standard
Sulfide Standard (SOP # PACK-AN-3)

0.1
1.0
10.0

Method Detection Limit = 0.01 ppm
Reporting Limit = 0.1 ppm
Lab Temp 24.1

Time	Sample ID	Sample ID	Value (ppm)	Response	Time	Sample ID	Sample ID	Value (ppm)	Response
		0.1 CS1			13:[illegible]		[illegible]	[illegible]	
		1.0 CS	← 59.4						
		10.0 CS1			12:[illegible]	[illegible]	[illegible]	3.000	
		0.1 STD	.124		12:[illegible]	Seawater	[illegible]	.680	
		1.0 STD	1.100		12:[illegible]	W. Beach	[illegible]	[illegible]	
		10 STD	10.01		12:[illegible]	551	[illegible]	.440	
		DI	0.000		12:[illegible]	552	[illegible]	.275	
12:[illegible]	[illegible]	[illegible]	[illegible]		12:[illegible]	553	[illegible]	3.000	
[illegible]	[illegible]	[illegible]	.655		12:[illegible]	554	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]		12:[illegible]	555	[illegible]	3.000	
[illegible]	[illegible]	[illegible]	[illegible]		12:[illegible]	556	[illegible]	0.000	
[illegible]	[illegible]	[illegible]	1.14		12:[illegible]	557	[illegible]	0.856	
12:[illegible]	[illegible]	[illegible]	2.10		12:[illegible]	558	[illegible]	1.68	
12:[illegible]	[illegible]	[illegible]	.555		12:39	559	[illegible]	.407	
12:[illegible]	[illegible]	[illegible]	[illegible]		12:[illegible]	[illegible]	[illegible]	[illegible]	
12:[illegible]	[illegible]	[illegible]	1.45						
12:[illegible]	[illegible]	[illegible]	[illegible]						
12:[illegible]	[illegible]	[illegible]	[illegible]						
12:[illegible]	[illegible]	[illegible]	[illegible]						
13:14	[illegible]	[illegible]	[illegible]						

C • Calibration Standard
MB • Method Blank (Only one per analysis batch)
DUP • Duplicate (Laboratory) (1 in 20)
MS • Spike Addition (Laboratory) (1 in 20)
___ mg/L Spike ___ mL
___ mg/L Spike @ ___ mL

SPK • Sample Preparation Blank
SCM • Synthetic Check Matrix (for Chemical Precipitation)
LCS • Additional Standard (Frequency 1 in 20)
SRM • Standard Reference Material (Frequency 1 in 20)
RS • Reference Sample (Limit) (1 in 20)

Laboratory Analysis Record — Parametrix Inc.

Analysis: Ammonia — Media: SW

Organism: Rhepox
Project Name: Hoks Harb
Project Number:

Test Dates: 7/25/94 (TF)
Ret 7/25/94 (TF)

Start: JAB
Date: 7/27/94
Start Time: 11:18
End Time: 15:25

Instrument Cal: Unit 001: Orion Model #720A

001) Specific Ion Probe # — Serial # 5916 — Slope %: 57.7 (-56 to -50 mV/decade)

Ammonia Standard
Sulfide Standard (SOP # PMX-AN-3)

0.1
1.0
10.0

Method Detection Limit = 0.01 ppm
Reporting Limit = 0.1 ppm
Lab Temp: 26.7

Time (hrs)	Sample ID	Lab Sample ID	NH3-N (ppm)	% Recovery	Time (hrs)	Sample ID	Lab Sample ID	NH3-N (ppm)	% Recovery
	n	0.1 CS	n		[illegible]	7	[illegible]	1.66	
		1.0 CS	59.8		15:05				
		10 CS	U		14:18	Seawater Blank	SW-BL	0.00	
		.1 STD	.129		14:20	Seawater	SW-NH3	0.097	
		1.0 STD	1.100		14:22	W. Beach	[illegible]	0.667	
		10 STD	10.01		14:25	SS1	[illegible]	0.466	
		DI	0.00		14:27	SS2	[illegible]	1.02	
14:55	[illegible]	[illegible]	0.000		14:31	SS3	[illegible]	0.209	
14:58		[illegible]	0.911		14:35	SS4	[illegible]	0.127	
15:00		[illegible]	0.755		14:38	SS5	[illegible]	0.125	
15:02		[illegible]	0.41		14:40	Hog SS6	[illegible]	0.466	
15:05		[illegible]	0.14		14:42	SS6	[illegible]	0.947	
15:07		[illegible]	3.90		14:47	SS7	[illegible]	0.765	
15:09		[illegible]	0.62		14:50	SS8	[illegible]	1.55	
15:13		[illegible]	0.101		14:52	SS8	[illegible]	1.61	
15:15		[illegible]	3.90		[illegible]				
15:17		[illegible]	3.66						
15:19		[illegible]	0.101						
15:21		[illegible]	1.20						
15:23		[illegible]	6.377						

CS • Calibration Standard
MB • Method Blank (deionized water used to prepare reagents)
DUP • Duplicate (laboratory) (1 in 10)
MS • Sample Matrix (laboratory) (1 in 10)
[illegible] mg/L NH3-N to [illegible]
[illegible] mg/L NH3-N @ [illegible]

SW • Sample Preservation Blank
SCW • Synthetic Ocean Water (for sediment preparation)
SW • Ammonia Standard (procedure 2 ppm)
SW • Seawater (1:2 or filtered 0.7 procedure 2 ppm)
SS • Receiving Sediment (final) (1 in 10)

Laboratory Analysis Record

Analyst: Total Sulfide Matrix: SW

Organization: PHASOX Test Date: 7/15/[illegible], 7/16/04 (b) Start: [illegible]
Project Name: _____ Date: 7/16/04
Project Number: [illegible] Start Time: 17:15
End Time: 14:15

Instrument Calibrations Unit 001: Orion Model #720A

001) Specific Ion Probe 9416 Serial # [illegible] Slope = 57 (-25 to -35 mV/decade)
002) Specific Ion Probe # N/A Serial # N/A Slope = N/A (-25 to -35 mV/decade)

Sulfide Standards (SC2 = PHOX-WW-2)

0.0777
0.777
7.77

Orion Method Detection Limit = 0.005 ppm Sulfide
ASTM Method D4658 Lower Limit 0.04 ppm Sulfide
Reporting Limit 0.5 ppm Sulfide
Lab Temp 24.4 °C

Time (hrs)	Station ID	Lab Sample ID	Sulfide (ppm)	% Recovery	mV	Time (hrs)	Station ID	Lab Sample ID	Sulfide (ppm)	% Recovery	mV
		0.0777 CS	7								
		0.777 CS	6	300							
		7.77 CS	1			1[illegible]	A01	SW [illegible]	0.000		
[illegible]		[illegible]	0.777			[illegible]	[illegible]	SW [illegible]	0.139		
12:15		0.777 CS	0.777			12:[illegible]	[illegible]	[illegible]	0.000		
12:19		0.777 CS	0.777			12:[illegible]	SS1	[illegible]	0.000		
12:22		7.77 CS	7.77			12:[illegible]	SS1	[illegible]	0.000		
12:28		21 Hour				13:[illegible]	SS2	[illegible]	0.000		
[illegible]		SW [illegible]				13:[illegible]	SS2	[illegible]	0.000		
12:37		[illegible]	0.139	97.2		13:[illegible]	SS3	[illegible]	0.000		
12:42						13:[illegible]	SS3	[illegible]	0.145		
12:52						13:[illegible]	SS4	[illegible]	0.000		
13:02						13:[illegible]	SS5	[illegible]	0.000		
13:12						13:[illegible]	SS6	[illegible]	0.000		
13:17						13:[illegible]	SS7	[illegible]	0.000		
13:22						13:[illegible]	SS8	[illegible]	0.000		
13:27						[illegible]					
13:32											
13:37											
13:42											
13:47											
13:52											
13:57											
14:02											
14:07											
14:12											
14:17											

N/A

CS • Calibration Standard
SAB • Method Blank (distilled water with reagents added)
SD • Duplicate (homogenized) (1 in 10)
SA • Spike Addition (homogenized) (1 in 10)
2.5 ml spike @ 24.5 ml SAOB
5.0 ml spike @ [illegible] ml

SPB • Sample Preservation Blank
SDW • Sampling Device Wash (for equipment contaminant)
SB • Station Background (groundwater, etc.)
SW • Station Water (for chlorine, DO, temperature, pH)
SS • Regulatory Samples (Grab) (1 in 10)

N/A = DATA NOT APPLICABLE TO AGI RHOPOX TEST

Laboratory Analysis Record — Parametrix, Inc.

Analysis: Total Sulfide Media: Sea Water

Organism: Rhepoxy
Project Name: AC-1
Project Number:
Test Date: 7/25/94 (TF)

Staff: JHB
Date: 7/28/94
Start Time: 1101
End Time: 1100

Instrument Calibrations: Unit 001: Orion Model #720A

001) Specific Ion Probe 9416 Serial # UP1 Slope % 29.2 (-25 to -30 mV/decade)
002) Specific Ion Probe # N/A Serial # N/A Slope % N/A (-25 to -30 mV/decade)

Sulfide Standards (SOP # PMX-AN-2)

0.0774
0.774
7.74

Orion Method Detection Limit = 0.003 ppm Sulfide
ASTM Method D4658 Lower Limit 0.04 ppm Sulfide
Reporting Limit 0.5 ppm Sulfide
Lab Temp: 27.2 °C

Time (hrs)	Sample I.D.	Lab Sample I.D.	Sulfide (ppm)	% Recovery	mV	Time (hrs)	Sample I.D.	Lab Sample I.D.	Sulfide (ppm)	% Recovery	mV
11:01		0.0774CS									
		0.774CS	29.2								
		7.74CS									
		0.0774STD	0.0744								
		0.774STD	0.762								
		7.74STD	7.68								
		DI BLANK	0.000								
12:09	Seawater	SW TF	N.D								
12:10	Seawater	SW TF MS	0.114								
12:11	W. Beach	001	0.057								
12:21	SS1	006-010 TF	N.D								
12:23	SS2	011-015 TF	N.D								
12:25	SS2	011-015 TF MS	0.115	74.3							
12:29	SS3	016-020 TF	N.D								
12:31	SS3	016-020 TF	N.D								
12:34	SS4	021-025 TF	N.D								
12:40	SS5	026-030 TF	0.044								
12:48	SS6	031-035 TF	0.058								
12:55	SS7	036-040 TF	0.048								
13:00	SS8	041-045 TF	0.045								

CS = Calibration Standard
MB = Method Blank (duplicate each sequence batch)
DUP = Duplicate (laboratory) (1 in 20)
MS = Spike Addition (laboratory) (1 in 20)
24.5 ml spike 24.5 ml SAOB
1.0 ml spike @ 1.74 ppm

SPS = Sample Preservation Blank
SOW = Synthetic Ocean Water (for standard preparation)
Sol = Sulfide Standard (prepared 2 per)
SW = Seawater (0.2 um filtered UV processed 2 per)
RS = Replicate Sample (field) (1 in 20)

APPENDIX B

CHAIN OF CUSTODY

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN-OF-CUSTODY

Date 7-6-94 Page ____ of ____

PROJECT INFORMATION

Project Manager: Glen Babnick
Project Name: Russell's at Orcas
Project Number: 15,624.001
Site Location: Orcas Is. WA Sampled By: DPD

DISPOSAL INFORMATION

☐ Lab Disposal (return if not indicated)
Disposal Method: ____
Disposed by: ____ Disposal Date: ____

QC INFORMATION (check one)

☐SW-846 ☐CLP ☐Screening ☐AGI Std. ☐Special

Laboratory Number:

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-D Stand.	TPH-G Stand.	TPH-D Stand. silica gel	TPH Special Instructions	418.1 Stand.	8015M	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GCMS Volatiles	8270 GCMS Semivol.	8310 HPLC PAHs	8040 Phenols	DWS - Volatiles and Semivol.	PESTS/PCB's: 8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herbicides	METALS: Selected metals list	Total Lead (Pb)	Organic Lead (Pb)	TCL Metals (23)	Priority Pol. Metals (13)	DWS - Metals	MFSP - Metals (Pb)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER: Bio Assay				NUMBER OF CONTAINERS
SS1	7-6-94	13:40	Sediments																																X				4
SS2		15:00																																	X				4
SS3		16:00																																	X				4
SS4		16:00																																	X				4
SS5		17:45																																	X				4
SS6		18:45																																	X				4
SS7		19:25																																	X				4
SS8		20:30																																	X				4

LAB INFORMATION

Lab Name: Parametrix
Lab Address: 5808 Lk. WA. Blvd. Kirkland WA
Via:

SAMPLE RECEIPT

Total Number of Containers: 32
Chain of Custody Seals: ⊘N/A
Intact? ⊘N/A
Received in Good Condition/Cold: Yes

RELINQUISHED BY: 1.

Signature: Time: 1300
Printed Name: David Pawson Date: 7-7-94
Company: AGI

RECEIVED BY: 1.

Signature: Time: 1300
Printed Name: Fred Swanty Date: 7/7/94
Company: PMX

RELINQUISHED BY: 2.

Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 2.

Signature: Time:
Printed Name: Date:
Company:

RELINQUISHED BY: 3.

Signature: Time:
Printed Name: Date:
Company:

RECEIVED BY: 3.

Signature: Time:
Printed Name: Date:
Company:

Turn Around Time: ☒ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk.

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

AGI OFFICES: Bellevue: (206) 453-8383 Tacoma: (206) 383-4380
Portland: (503) 222-2820 Pleasanton: (415) 460-5495

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to AGI Project Files; Gold to AGI Disposal Files

AGI TECHNOLOGIES

APPENDIX E

Laboratory Data - Gravel Parking Lot

Analytical Technologies, Inc.
560 Naches Avenue, S.W., Suite 101, Renton, WA 98055 (206) 228-8335
Karen L. Mixon, Laboratory Manager

ATI I.D. # 409152

October 3, 1994

AGI Technologies
P.O. Box 3885
Bellevue WA 98009

RECEIVED
OCT 04 1994
Technologies

Attention : Glen Bobnick

Project Number : 15676.001

Project Name : Russell At Orcas

Dear Mr. Bobnick:

On September 19, 1994, Analytical Technologies, Inc. (ATI), received one sample for analysis. The sample was analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Sincerely,

Victoria L. Bayly
Project Manager

VLB/hal/ff

Enclosure

Analytical Technologies, Inc.

ATI I.D. # 409152

SAMPLE CROSS REFERENCE SHEET

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL AT ORCAS

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
409152-1	UPPER PARKING LOT	09/16/94	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	1

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 409152

ANALYTICAL SCHEDULE

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL AT ORCAS

ANALYSIS	TECHNIQUE	REFERENCE	LAB
TOTAL PETROLEUM HYDROCARBONS	GC/FID	WA DOE WTPH-D	R
MOISTURE	GRAVIMETRIC	CLP SOW ILM01.0	R

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PTL = ATI - Portland
ANC = ATI - Anchorage
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 409152

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL AT ORCAS	DATE EXTRACTED	: 09/21/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 09/21/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<40
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	104	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 409152

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: N/A
PROJECT #	: 15676.001	DATE RECEIVED	: N/A
PROJECT NAME	: RUSSELL AT ORCAS	DATE EXTRACTED	: 09/21/94
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 09/22/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	<40
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	108	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 409152-1

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: AGI TECHNOLOGIES	DATE SAMPLED	: 09/16/94
PROJECT #	: 15676.001	DATE RECEIVED	: 09/19/94
PROJECT NAME	: RUSSELL AT ORCAS	DATE EXTRACTED	: 09/21/94
CLIENT I.D.	: UPPER PARKING LOT	DATE ANALYZED	: 09/22/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D	DILUTION FACTOR	: 1

RESULTS ARE CORRECTED FOR MOISTURE CONTENT

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	85
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
FUEL HYDROCARBONS	180
HYDROCARBON RANGE	C24 - C34
HYDROCARBON QUANTITATION USING	MOTOR OIL

SURROGATE PERCENT RECOVERY		LIMITS
O-TERPHENYL	106	50 - 150

AnalyticalTechnologies,Inc.

ATI I.D. # 409152

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL AT ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 09/21/94
DATE ANALYZED : 09/21/94
UNITS : mg/Kg

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<10.0	200	178	89	173	87	3

CONTROL LIMITS	% REC.	RPD
DIESEL	69 - 115	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
O-TERPHENYL	105	104	50 - 150

Analytical Technologies, Inc.

ATI I.D. # 409152

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: AGI TECHNOLOGIES	SAMPLE I.D. #	: 409122-10
PROJECT #	: 15676.001	DATE EXTRACTED	: 09/21/94
PROJECT NAME	: RUSSELL AT ORCAS	DATE ANALYZED	: 09/22/94
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: WA DOE WTPH-D		

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	<10.0	<10.0	NC	N/A	N/A	N/A	N/A	N/A	N/A

CONTROL LIMITS	% REC.	RPD
DIESEL	N/A	20

SURROGATE RECOVERIES	SAMPLE	SAMPLE DUP.	LIMITS
O-TERPHENYL	103	107	50 - 150

NC = Not calculable.

Analytical Technologies, Inc.

ATI I.D. # 409152

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL AT ORCAS
SAMPLE MATRIX : SOIL
METHOD : WA DOE WTPH-D

SAMPLE I.D. # : 409122-3
DATE EXTRACTED : 09/21/94
DATE ANALYZED : 09/21/94
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	<10.0	<10.0	NC	200	175	88	167	84	5

CONTROL LIMITS	% REC.	RPD
DIESEL	61 - 120	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
O-TERPHENYL	103	102	50 - 150

NC = Not calculable.

Analytical Technologies, Inc.

ATI I.D. # 409152

GENERAL CHEMISTRY ANALYSIS

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL AT ORCAS

MATRIX : SOIL

PARAMETER	DATE ANALYZED
MOISTURE	09/21/94

Analytical Technologies, Inc.

ATI I.D. # 409152

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL AT ORCAS

MATRIX : SOIL
UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE
409152-1	UPPER PARKING LOT	16

Analytical Technologies, Inc.

ATI I.D. # 409152

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : AGI TECHNOLOGIES
PROJECT # : 15676.001
PROJECT NAME : RUSSELL AT ORCAS

MATRIX : SOIL
UNITS : %

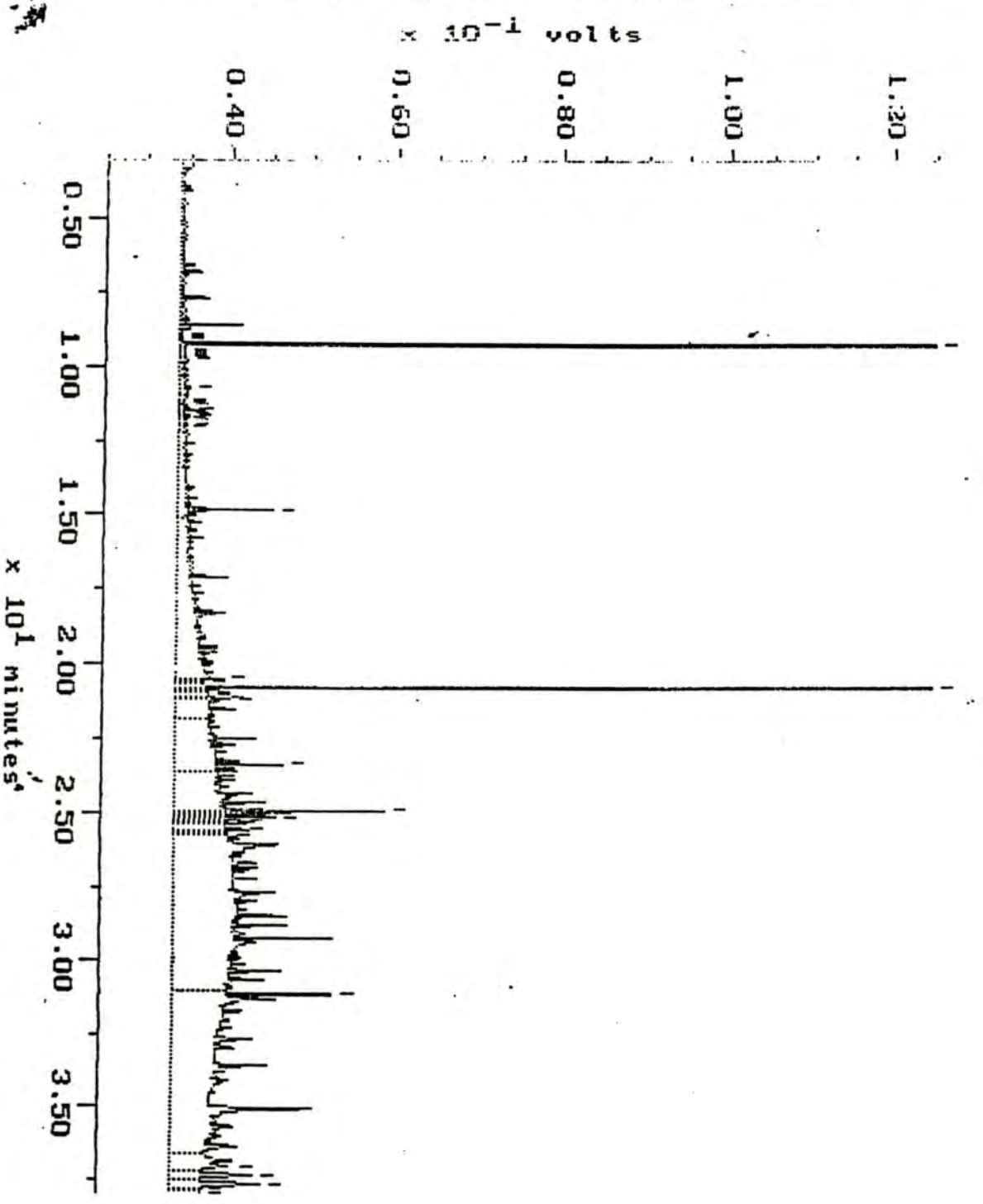
PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	409173-1	1.4	1.4	0	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Sample Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

WA DOE WTPH-D

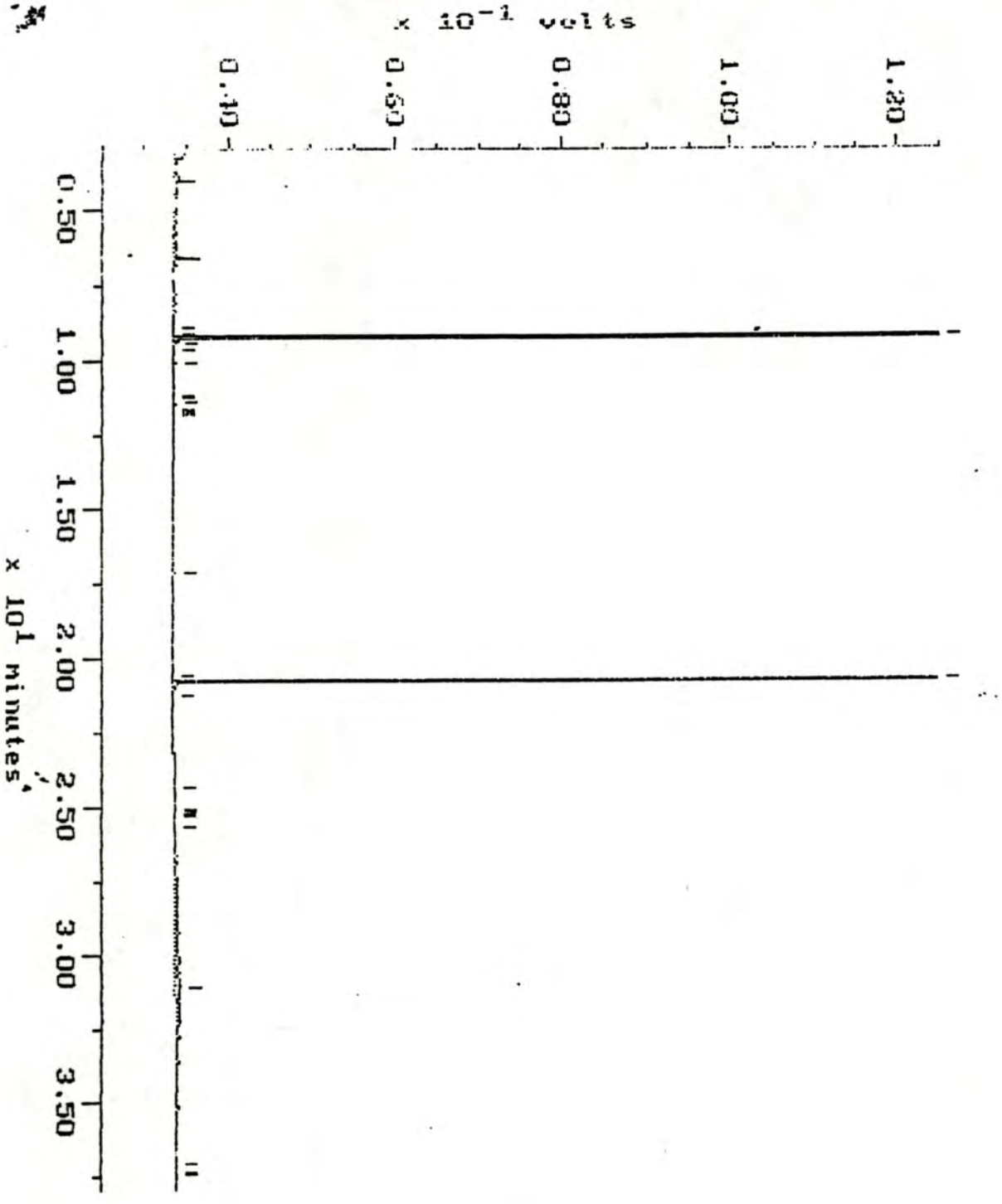
Sample: 409152-1 Channel: FRED Filename: W0228F07
Acquired: 22-SEP-94 20:47 Method: F:\BRO2\MAXDATA\FRED\FUEL0922 Operator: ATI
Comments: ATI RUSH FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY



WA DOE WTPH-D

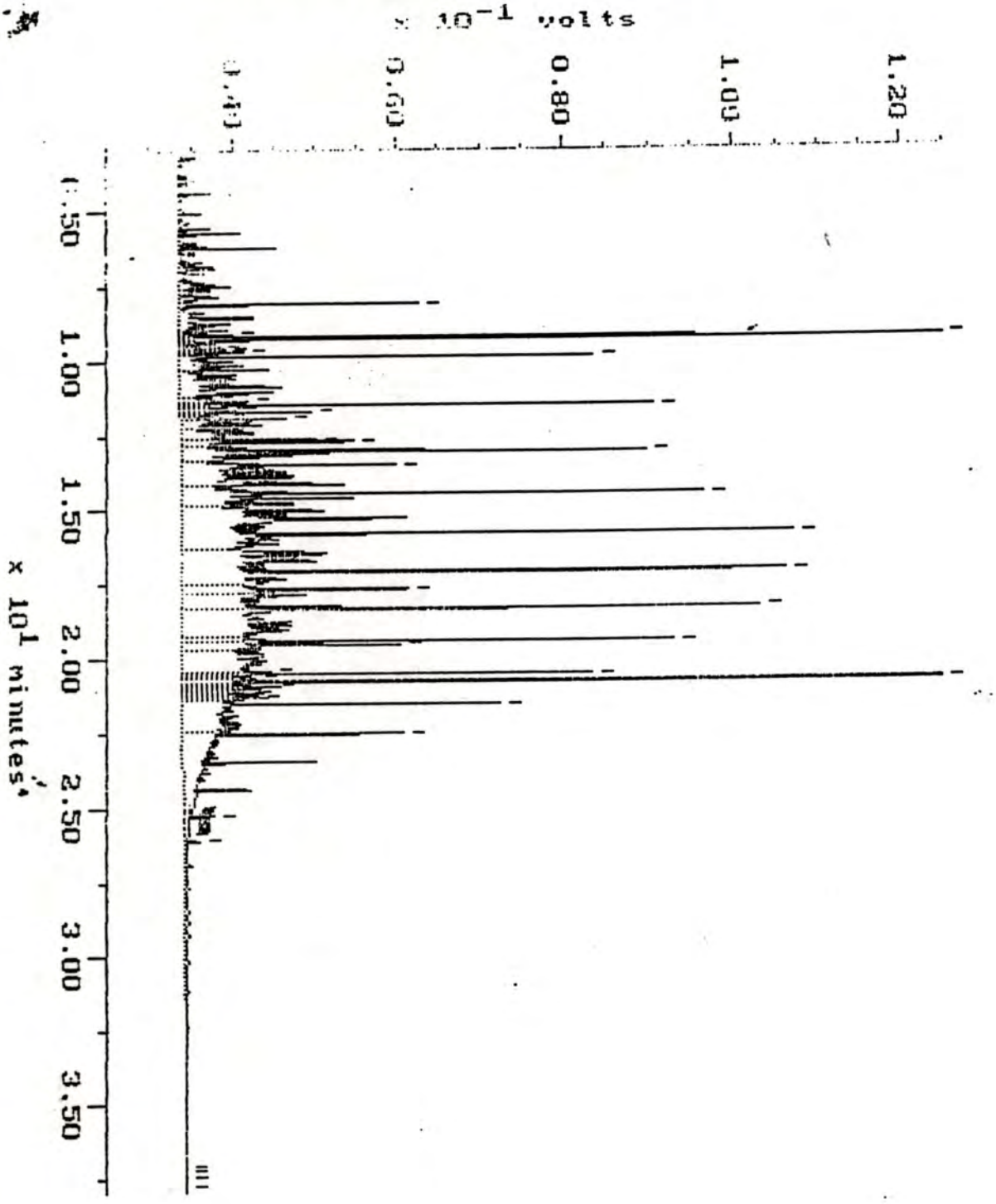
Blank

Sample: SRB A 9-21 Channel: FRED Filename: W9213F02
Acquired: 21-SEP-94 13:55 Method: F:\SRC2\MAXDATA\FRED\FUEL9821 Operator: ATI
Comments: ATI RUSH FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY



CONTINUING CALIBRATION

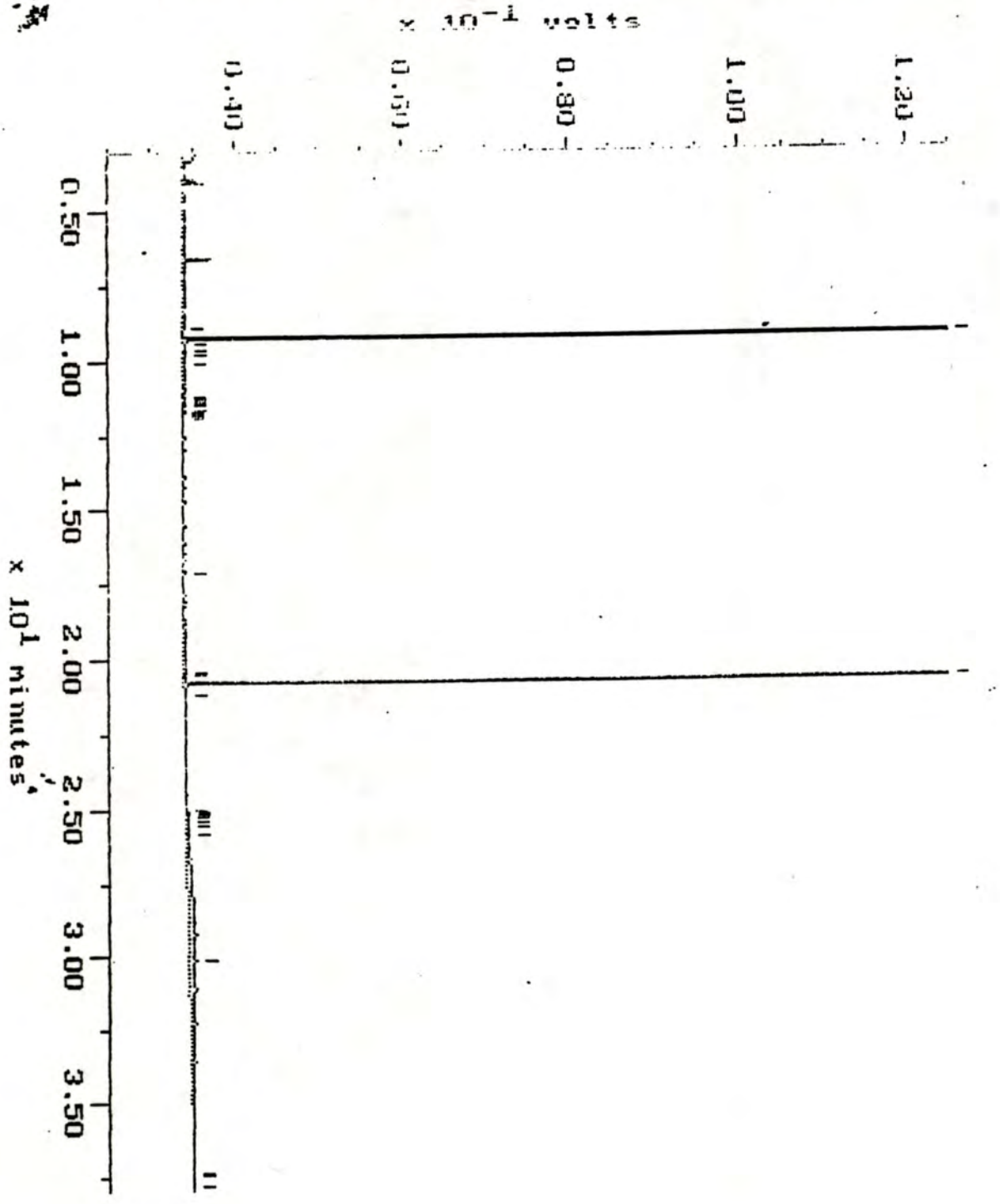
Sample: [illegible]
Acquired: [illegible]-SEP-94 13:00
Channel: FRED
Method: F:\BRO2\MAXDATA\FRED\FUEL0921
Filename: H921SF01
Operator: ATI
Comments: ATI RUSH FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY



WA DOE WTPH-D

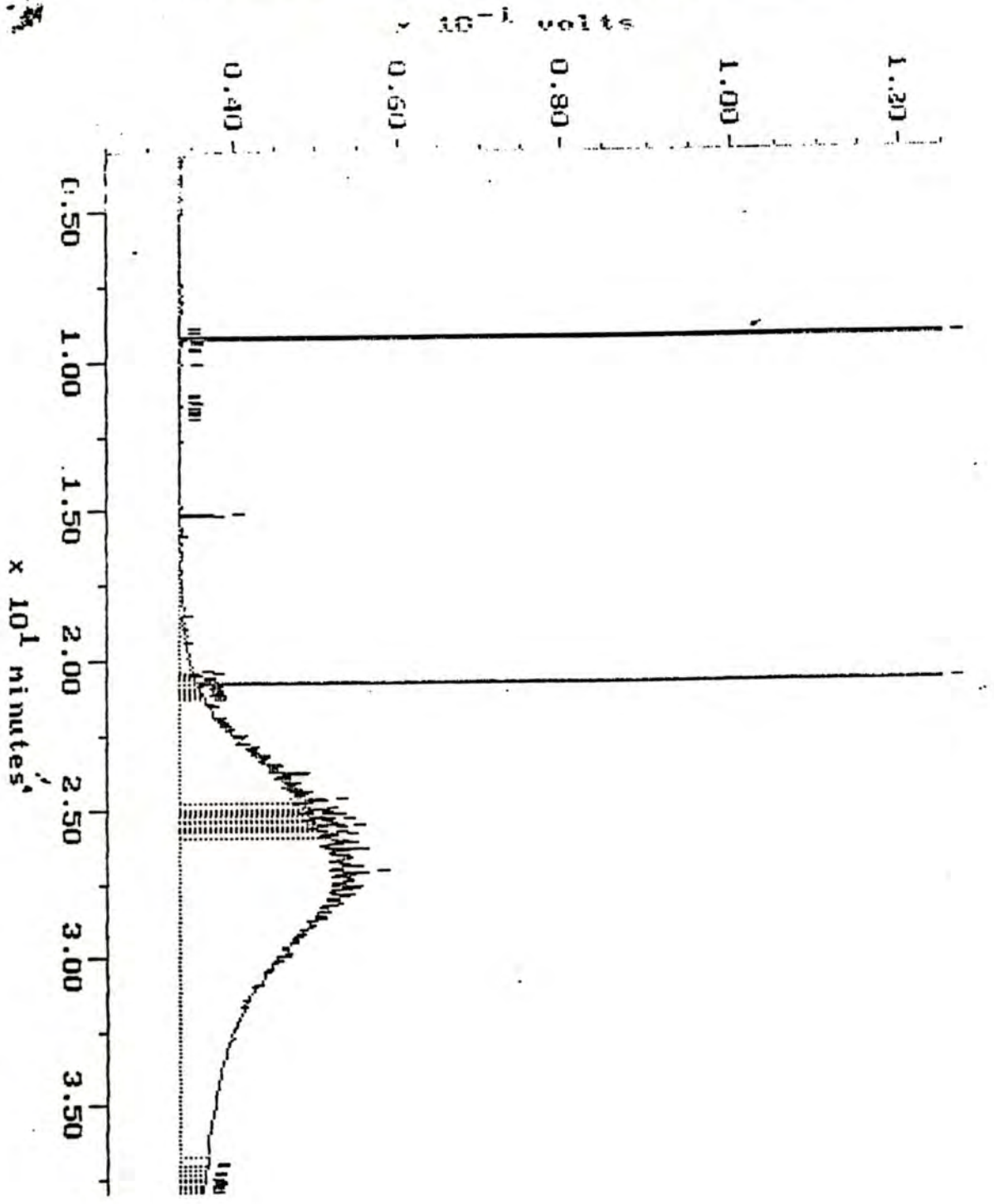
Blank

Sample: SRB A 9-21 Channel: FRED Filename: W9220505
Acquired: 22-SEP-94, 10:15 Method: F:\DR02\MAXDATA\FRED\FUEL0922 Operator: ATI
Comments: ATI RUN: FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY



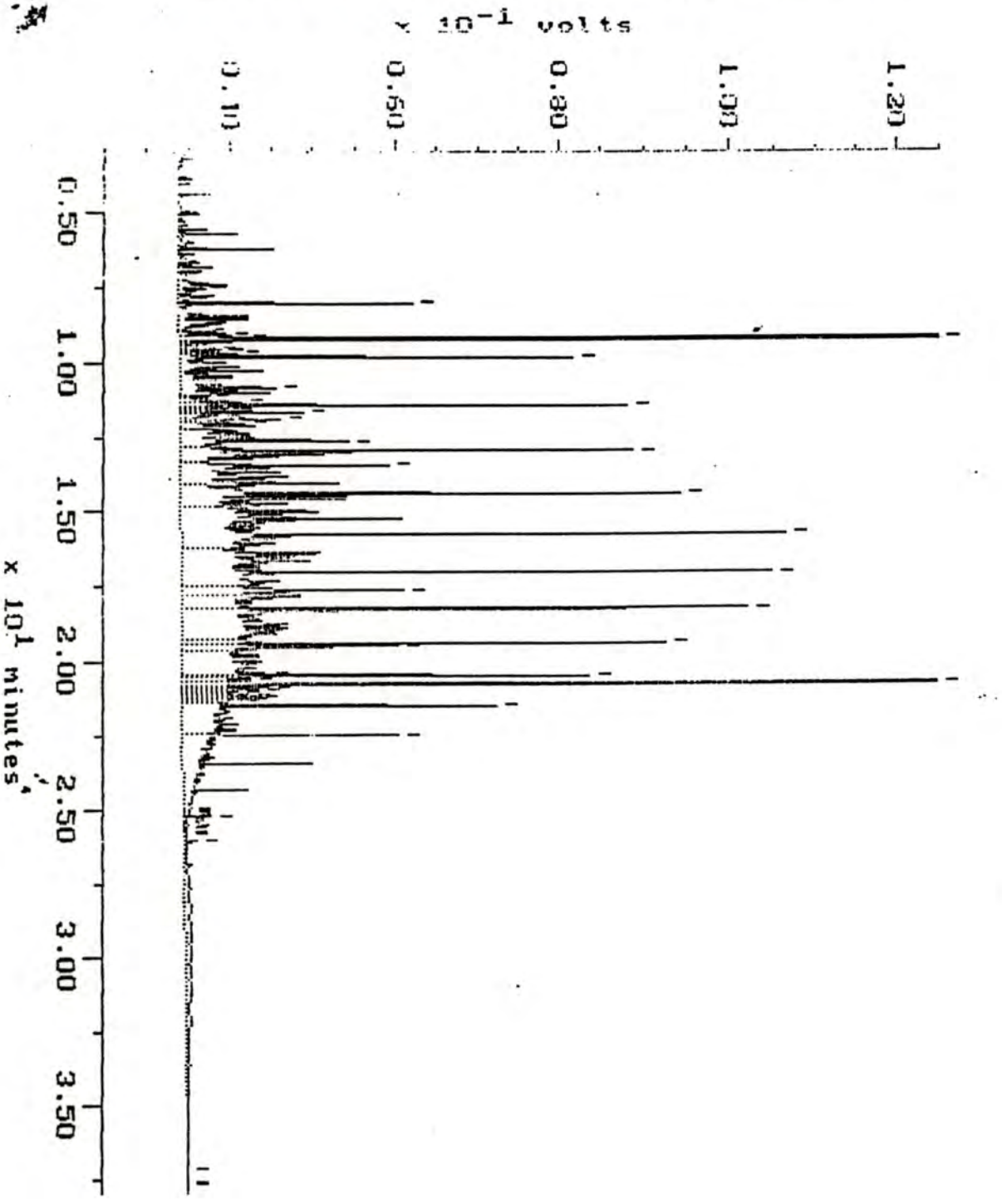
CONTINUING CALIBRATION

Sample: 90 500 Channel: FRED Filename: W9222F03
Acquired: 22-SEP-94 17:42 Method: F:\SR02\MAXDATA\FRED\FUEL0922 Operator: ATI
Comments: ATI RUSH FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY



CONTINUING CALIBRATION

Sample: D 500 Channel: FRED Filename: M9223F02
Acquired: 22-SEP-94, 16:55 Method: F:\BR02\MAXDATA\FRED\FUEL0922 Operator: ATI
Comments: ATI RUSH FUELS: A MISSION OF EXCELLENCE IN ANALYTICAL CHROMATOGRAPHY

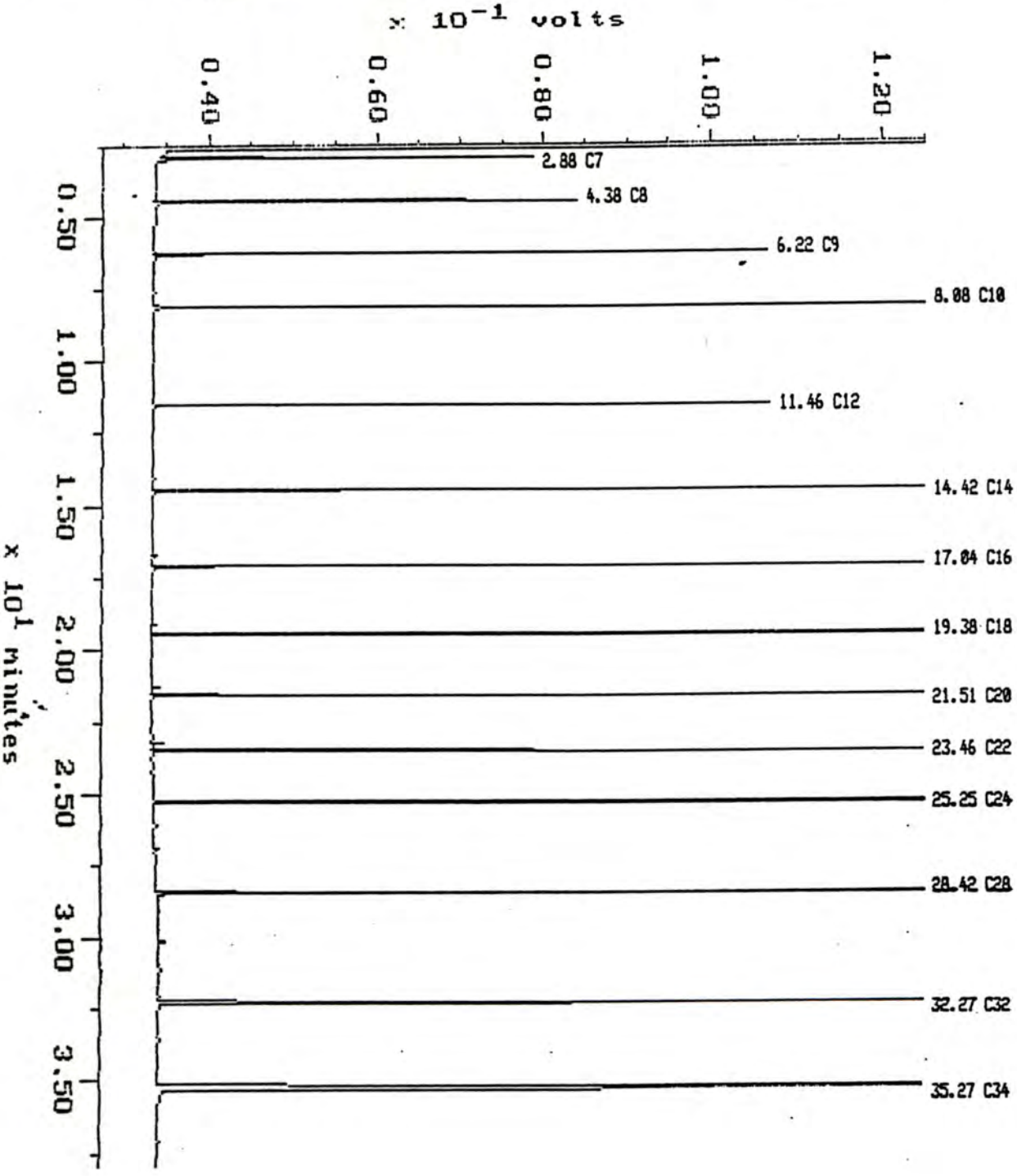


Alkane

Sample: ALKANE FRED
Acquired: 18-SEP-94 15:10
Inj Vol: 1.00

Channel: FRED
Method: F:\BRD2\MAXDATA\FRED\FUEL0918

Filename: R9188F02
Operator: ATI



Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN-OF-CUSTODY

Date Sept 16, 1994 Page 1 of 1

PROJECT INFORMATION

Project Manager: Glen Bobnick
Project Name: Russell at Orcas
Project Number: 15,676.001
Site Location: Orcas Is. Wa Sampled By: DPD

DISPOSAL INFORMATION

☒ Lab Disposal (return if not indicated)
Disposal Method: _____
Disposed by: _____ Disposal Date: _____

QC INFORMATION (check one)

☐ SW-846 ☐ CLP ☐ Screening ☐ AGI Std. ☐ Special

Laboratory Number: 409152

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: TPH-ID State:	TPH-G State:	TPH-D State: Wa Extend to C34	TPH Special Instructions	418.1 State:	8015M	ORGANIC COMPOUNDS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8020M - BETX only	8240 GCMS Volatiles	8270 GCMS Semivol.	8310 HPLC PAHs	8040 Phenols	DWS - Volatiles and Semivol.	PESTS/PCB's: 8080 OC Pest/PCBs	8080M PCBs only	8140 OP Pesticides	8150 OC Herbicides	DWS - Herb/pest	METALS: Selected metals: list	Total Lead (Wa)	Organic Lead (Ca)	TCL Metals (23)	Priority Poll. Metals (13)	DWS - Metals	MFSP - Metals (Wa)	LEACHING TESTS: TCLP - Volatiles (ZHE)	TCLP - Semivolatiles	TCLP - Pesticides	TCLP - Metals	OTHER	NUMBER OF CONTAINERS
Upper Parking Lot - 3 point	9-16-94	17:55	Soil	1			X																												1

LAB INFORMATION

Lab Name: ATI
Lab Address: 560 Naches
Renton Wa
Via: Courier

SAMPLE RECEIPT

Total Number of Containers:	1
Chain of Custody Seals: Y/N/NA	N
Intact?: Y/N/NA	N
Received in Good Condition/Cold:	N

Turn Around Time: ☐ Standard ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☒ 1 wk. DA 9.19.94

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Extend WTPH-D to C34

RELINQUISHED BY: 1.

Signature: _____ Time: 1335
Printed Name: _____ Date: 9/19/94
Company: AGI

RECEIVED BY: 1.

Signature: _____ Time: 9.50
Printed Name: _____ Date: 9-19-94
Company: ATI

RELINQUISHED BY: 2.

Signature: _____ Time: _____
Printed Name: _____ Date: _____
Company: _____

RECEIVED BY: 2.

Signature: _____ Time: _____
Printed Name: _____ Date: _____
Company: _____

RELINQUISHED BY: 3.

Signature: _____ Time: _____
Printed Name: _____ Date: _____
Company: _____

RECEIVED BY: 3.

Signature: _____ Time: _____
Printed Name: _____ Date: _____
Company: _____

AGI OFFICES: Bellevue: (206) 453-8383 Tacoma: (206) 383-4380
Portland: (503) 222-2820 Pleasanton: (415) 460-5495

DISTRIBUTION: White, Canary to Analytical Laboratory; Pink to AGI Project Files; Gold to AGI Disposal Files

Rev. 4/92

AGI
TECHNOLOGIES

TRANSMITTAL

To: Ms. Margaret Russell
P.O. Box 25
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Date: November 11, 1994

Attention:

Project: Russell's Landing

Number: 15,676.001

Subject: Contamination Assessment

Quantity	Date	Description
1	11/11/94	Final Report

For Your:

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Remarks:

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