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December 29, 2005

Louise Bardy
Washington State Department of Ecology
Toxics Cleanup Program
Northwest Regional Office
3190 – 160th Avenue SE
Bellevue, WA 98009-5452

Dear Ms. Bardy:

This letter transmits the results of the Phase II site assessment conducted by CDM on behalf of King County at the Ellisport Creek Greenspace site on Vashon Island.

The investigation incorporated comments from Ecology's review of the project Sampling and Quality Assurance Plan dated April 7, 2005. The report presents a comprehensive overview of environmental conditions on the upland portion of the property. King County would appreciate your review of the report.

We would then like to meet with Ecology in late January 2006 if possible, or as soon as you are able, to discuss planning for a sediment investigation in the tideland portion of the site and potential options to address hydrocarbon impacts on the upland.

Sincerely,

Lucy Auster
Senior Planner

cc: Jim Neely, Unit Supervisor, Solid Waste Division
Lance Peterson, Senior Hydrogeologist, Camp Dresser & McKee, Inc.
Emery Bayley, Technical Services Manager, ECOSS

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**Phase II Site Assessment
Ellisport Creek Greenspace Project Site
Vashon Island, Washington**

December 23, 2005

Prepared For:

King County Solid Waste Division
Department of Natural Resources and Parks,
Water and Land Resources Division
King Street Center
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CDM Project No. 19897.45486.Task 1

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A Report Prepared For:

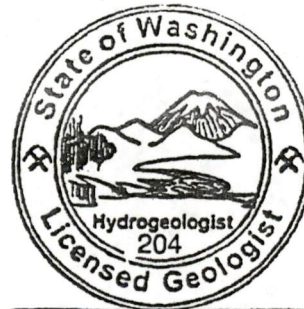
King County Division of Solid Waste
Department of Natural Resources and Parks
Water and Land Resources Division
King Street Center
201 South Jackson Street, Suite 701
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**PHASE II SITE ASSESSMENT
ELLISPORT CREEK GREENSPACE PROJECT SITE
VASHON ISLAND, WASHINGTON**

December 23, 2005



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CDM Project No. 19897.45486.Task 1

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Executive Summary

This report summarizes Phase II environmental site assessment activities performed by Camp Dresser & McKee Inc. (CDM) at the Ellisport Creek Greenspace project site on Vashon Island, Washington. The assessment was conducted on behalf of King County to collect supplemental environmental information at the site.

CDM's field investigation, conducted on September 20 through 23, 2005, included collecting ten surface soil samples within the upper one foot of the land surface and one sediment sample and excavating eight test pits to depths ranging from 2.3 to 6 feet below ground surface. Soil samples were submitted for analytical testing of diesel, lube oil, and Bunker C oil. The sediment sample was analyzed for total organic carbon (TOC) and polycyclic aromatic hydrocarbons (PAHs). When high concentrations of petroleum hydrocarbons were detected in soil samples, they were also analyzed for PAHs.

Because most of the site is a natural wetland, potential impacts to terrestrial ecological receptors (plants and animals) were considered in evaluating the detected compounds. The analytical results were therefore evaluated with respect to the Terrestrial Ecological Evaluation Process under WAC 173-340-7490 through 7494. The evaluation consisted of comparing analytical results to the tabulated ecological indicator concentrations contained in WAC 173-340.

Of the 18 samples analyzed for TPH during this investigation, two samples (from test pits TP-8 and TP-12) contained concentrations of Bunker C oil exceeding the MTCA Method A cleanup level of 2,000 mg/kg. Four of the samples exhibiting the highest concentrations of TPH were further analyzed for PAHs by EPA Method 8270C/SIM. Two of those four samples (TP-7 and TP-8) contained PAHs exceeding MTCA Method A or B cleanup levels. Both Method A and B cleanup levels are based on human exposure. There is no ecological indicator level for Bunker C. The ecological indicator level for diesel-range TPH is 200 mg/kg. Six samples contained TPH exceeding 200 mg/kg. The sediment sample contained 145,000 mg/kg of TOC, or a dry weight percentage of 14.5 percent. PAH concentrations in the sample were all below their respective Marine Sediment Quality Standards.

The results of this investigation indicate Bunker C is present in soil at concentrations exceeding human health-based cleanup levels (MTCA Method A and Method B). Assessment results suggest that the residual Bunker C is not an immediate threat to the environment although no site specific Terrestrial Ecological Evaluation (TEE) or comprehensive sediment studies have been conducted. Based on our understanding of future site use, the receptor for the residual Bunker C is sediment/aquatic life. Contaminant pathways include surface water to sediment and groundwater to sediment.

A site-specific TEE will likely be required to define risk to the environment from the site. The goal of the TEE process is the protection of terrestrial ecological receptors (plants and animals) from exposure to contaminated soil with the potential to cause significant adverse effects. Preliminary options for cleanup include source removal and natural attenuation.

Section 1

Introduction

This report summarizes Phase II environmental site assessment (ESA) activities performed by Camp Dresser & McKee Inc. (CDM) on behalf of King County (the County) at the Ellisport Creek Greenspace Project site (the site) located on Vashon Island, Washington. **Figure 1** shows the site location and **Figure 2** shows a general site plan. CDM's services were performed in accordance with our March 9, 2005 proposal, Work Order No. 10, Contract No. E23023E. In addition, an April 7, 2005 Sampling and Quality Assurance Plan (SQAP) prepared by CDM was used to direct field activities.

The County's Department of Natural Resources and Parks, Water and Land Resources Division and the Vashon Park District have identified this location as a natural habitat restoration site. Cleanup and development of this site as a greenspace has many supporters amongst the residents of Vashon Island as well as the Vashon-Maury Island Audubon Society and the Vashon-Maury Island Land Trust. Remediation of contamination and replacement of existing drainage restrictions will allow restoration of Ellisport Creek to original intertidal habitat with salt marsh vegetation and eelgrass beds in the lower reaches to provide habitat for juvenile sea-run cutthroat and Coho.

1.1 Purpose and Scope

The purpose of this study was to conduct a Phase II ESA of residual soil contamination at the site. The King County Brownfields Program has received EPA Brownfields grant funding to perform the assessment in support of future cleanup of the site. Specifically, the project goal was to develop a more refined estimate of the lateral and vertical extent of contamination resulting from the storage of Bunker C oil at the site by comparing contaminant concentrations to Model Toxics Control Act (MTCA) Method A and B cleanup levels and to the ecological indicator levels based on WAC 173-340-900, Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals. This information would then be used to assist in cleanup planning for the site.

CDM's scope of services included:

- Developing a project Sampling and Quality Assurance Plan (SQAP) for review and approval by U.S. EPA Region 10 as part of Brownfields grant funding. The SQAP describes the project scope/objectives, field sampling procedures and analytical methods, and laboratory information (reporting limits/QA/QC information, etc.).
- Addressing SQAP review comments from the Washington State Department of Ecology (Ecology). Ecology recommended slight modifications to the sampling plan including the addition of one surface soil sample and one sediment sample.

In addition, Ecology asked for an evaluation of the management of soil generated during test pit excavation.

- Obtaining a Short Form Clearing and Grading permit from the King County Department of Development and Environmental Services (DDES) to allow for test pit excavation using a mini-excavator.
- Providing input to the County to aid in the development of an Endangered Species Act Effects Analysis and a Preliminary Cultural Resources Assessment transmitted by the County to EPA.
- Providing an archeologist during test pit excavation activities to monitor for culturally significant artifacts.
- Collecting 12 surface soil samples and analyzing them for diesel, oil, and Bunker C-range total petroleum hydrocarbons (TPH) by Northwest Method NWTPH-Dx. Selected samples were also analyzed for polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8270C using sensitive ion monitoring (SIM) to achieve lower detection limits.
- Excavating eight test pits using a mini-excavator. Test pit soil samples were analyzed for diesel, oil, and Bunker C-range TPH by Northwest Method NWTPH-Dx. Selected samples were analyzed for PAHs by EPA Method 8270C/SIM.
- Collecting a sediment sample and analyzing it for total organic carbon (TOC) by Method SW846 9060 and for PAHs by EPA Method 8270C/SIM.
- Preparing this report documenting the field activities and analytical laboratory sample results.

1.2 Site Description and Background

The site is located where Ellisport Creek discharges into Tramp Harbor on the east coast of Vashon Island (**Figure 1**). Elevations on the site are estimated to range from near sea level along the banks of Ellisport Creek to 40 feet above Mean Sea Level along the northwest and northeast margins of the site. The site consists of four privately owned contiguous parcels totaling 8.66 acres of which 5.65 acres are tide land (**Figure 2**). The remaining 3.01 acres are mostly wetland bisected by Ellisport Creek. The upland portion of the site carries King County Assessment Parcel Nos. 15352040-015, -065, and -115. The tideland portion of the site carries Parcel No. 0522039048. Chautauqua Beach Drive S.W., a paved two-lane road, crosses the site and separates the upland and tideland areas. A gravel road leads northwest along the western edge of the site to a house on a parcel located immediately to the north. Photographs are included in **Appendix A**.

An approximately 250-foot-wide wetland area bisected by Ellisport Creek encompasses the center of the site. Wooded slopes border both sides of the wetland

to the east and the west. The creek branches into several channels through the wetland, and two 3-foot-diameter pipe culverts beneath Chautauqua Beach Drive S.W. drain the creek to Tramp Harbor. The easternmost culvert is partially filled with sandy sediment and typically carries no flow. The site slopes to the southeast and is vegetated with Alder, salmonberries, English ivy, and blackberries. Horsetail and various grasses and ferns are common in and near areas of standing water.

Between about 1920 and 1940, the site housed a lumber mill, millpond, and greenhouses for growing vegetables. The mill was located on the east side of Ellisport Creek while the greenhouses were located on the west side (see **Figure 2**). Based on a review of King County assessor records dated 1938 and aerial photos for 1936 and 1960, three above-ground storage tanks (ASTs) were located on the property. Two of the ASTs had capacities of approximately 8,000 gallons while the third had a capacity of approximately 48,000 gallons. Several concrete blocks/foundations have been identified on the west side of Ellisport Creek that likely are support structures for the former ASTs (see **Figure 2**). It is believed the tanks were used to store fuel for a boiler that heated the greenhouses as part of a Bunker C fuel oil transfer facility. Oil was moved by barge to tank to truck to heat off-site greenhouses. Fuel transfer operations were terminated around 1960. The above-ground storage tanks were reportedly removed in the early 1960's.

1.3 Geology, Surface Water, and Groundwater Conditions

Vashon Island is located within the Puget Sound physiographic region, which consists of a topographic basin between the Cascade and Olympic Mountains. The area is characterized by gently rolling glacial drift plains covered with small ridges, hills, and depressions formed by the continental ice sheet that covered the area during the Pleistocene Epoch. Vashon Island characteristically has steep slopes around most of its shoreline. The island's upland rises to an elevation of approximately 400 feet above sea level. Soils located above sea level on the island are generally derived from this latest glacial event known as the Vashon stage of the Fraser glaciation which ended some 11,000 years ago (J.R. Carr/Associates, 1983). The island is typically mantled with glacial drift comprised primarily of till. The till is typically a heterogeneous mixture of gravel, sand, silt, and clay deposited and compacted by glacial ice. Some of the till is less dense as it was deposited when the glacial ice melted. Below the glacial drift is a sandy unit that serves as the principal aquifer on the island. Soils located below sea level are primarily silts and clays.

Subsurface exploration at the site encountered primarily brown to gray silty sand with some gravel within the 6-foot maximum depth of exploration. Several of the test pits excavated during this investigation encountered till-like soils. The source of the wetland on the west side of Ellisport Creek is drainage from spring seepage along the wooded slope to the west of the site. The Phase II ESA was conducted at the end of the 2005 dry season (late September 2005). Several areas of standing water were noted as shown on **Figure 2**. These wet areas may be contiguous as dense vegetation

prevented a detailed inspection. Several locations where the wetland drains into Ellisport Creek were also noted while traversing the creek bed. One drainage is more pronounced than the others and is the location where a sediment sample was collected as described in Section 2. Because the site contains a wetland, groundwater is found at a very shallow depth below the land surface. Outside of areas containing standing water, groundwater seepage was noted from several inches to 4 feet below ground surface (bgs) during subsurface investigations at the site.

1.4 Previous Investigations

In 1995, volunteer scientists working for King County Department of Natural Resources surveyed the site. Also in 1995, a private ecologist surveyed the site and listed flora and fauna. In July 1998, other King County representatives visited the site and collected three soil samples from the wetland area and one surface water sample from Ellisport Creek. The results of this survey indicated that heavy petroleum hydrocarbon oil occurs in soil within the wetland at levels above 45,000 milligrams per kilogram (mg/kg). The single sample of surface water collected from Ellisport Creek did not contain quantifiable petroleum hydrocarbons. We understand that the discovery of soil contamination was reported to Ecology.

The Vashon Park District commissioned a Limited Phase II Environmental Site Assessment for the property from AGI Technologies (now CDM) in 1999. Soil samples were collected at 17 hand auger drill sites denoted S1 through S17 on Figure 3. In addition six test pits (denoted TP1 through TP6 on Figure 3) were excavated using hand tools. Soil samples were collected from each hand auger site at a depth of 6 inches. The test pits were dug up to 5 feet deep to make observations of groundwater conditions. Groundwater depths were from several inches to 3 feet bgs. Test pit data and observations for the 1999 and 2005 investigations are summarized in Table 3.

The 17 soil samples were screened for the presence of petroleum hydrocarbons. Samples containing hydrocarbons were quantified through the analysis of diesel and oil-range TPH by Washington State Method WTPH-D Extended. The sample with the highest concentration of TPH (sample S7) was also analyzed for polychlorinated biphenyls (PCBs) and PAHs. One groundwater samples was also collected from a test pit excavated at the location of sample S7. The water sample was analyzed for TPH by Method WTPH-D Extended; benzene, ethylbenzene, toluene, and xylenes (BETX); and PAHs.

Hydrocarbons in both the diesel and oil-ranges were detected in seven of the 17 soil samples and in the one water sample. PAHs were also detected in the one soil sample and one water sample analyzed. The analytical data for the 1999 investigation are summarized in Table 1 and Table 2. Two of the soil samples (S4 and S7) contained TPH concentrations greater than the Model Toxics Control Act Method A cleanup level of 2,000 mg/kg. The highest TPH concentration was at S7 (154,000 mg/kg total TPH) where a black tar-like substance was present at 2-inches bgs. The groundwater sample (W1) was collected from TP6 excavated at this location. The principal

contaminants at the site, TPH and PAHs, were attributed to the presence of Bunker C Oil. Data from the investigation were used to delineate a 220-foot-long by 110-foot-wide zone in the area of the former tanks that potentially contains elevated concentrations of Bunker C. Elevated concentrations were defined as concentrations greater than 200 mg/kg which was the applicable state cleanup level at the time and was based on human exposure. The current cleanup level, based on human exposure, is 2,000 mg/kg for Bunker C-range hydrocarbons.

Section 2

Field Investigation

CDM's field investigation was conducted on September 20 through 23, 2005. Field exploration and sampling procedures are summarized in **Appendix B**.

Ten surface soil samples, denoted EC-1 through EC-4 and EC-6 through EC-13, were collected at selected locations around the site (two of the samples, EC-S4 and EC-S9, were duplicates). Surface samples were collected at a depth of 0.1 to 0.9 feet bgs after clearing vegetation from the ground surface. One sediment sample (denoted EC-S5) was collected at the location of the most pronounced surface water discharge to Ellisport Creek from the site. Sample locations are shown on **Figure 4**.

In addition, a total of eight test pits, denoted TP-7 through TP-14, were excavated to depths ranging from 2.3 to 6 feet bgs using a mini-excavator. Hokkaido Drilling, Inc. of Graham, Washington was the test pit excavation contractor. Test pit locations are shown on **Figure 4**. The soil encountered in each test pit was classified in accordance with the Unified Soil Classification System as shown on **Figure C1** in **Appendix C**. Logs of the test pits are also presented in **Appendix C** as **Figures C2** through **C9**. Soils encountered in the test pits consisted primarily of silty sand. The test pits were terminated due to groundwater seepage with the exception of TP-8 where the presence of a buried concrete foundation prevented further excavation. Test pit data and observations for the 1999 and the 2005 investigations are summarized in **Table 3**.

Surface and test pit soil samples were screened in the field for the presence of hydrocarbon-like odor or staining. Surface samples EC-S6 and EC-S12 were collected in the Ellisport Creek channel above the water line where a very dark hydrocarbon-like coating was noted on the soil surface. Small globules of hydrocarbon-like sheen were noted in the area of sample EC-S6. The area of AGI sample S4 collected in 1999 was water saturated and contained a hydrocarbon-like sheen. A hydrocarbon-like sheen was also noted on standing water at the base of test pits TP-7 and TP-8. Soil encountered in test pit TP-8 at 3 feet bgs was saturated with a black tar-like hydrocarbon believed to be Bunker C oil. While the whole site could not be traversed during the investigation due to dense vegetation, Ellisport Creek and accessible areas to the west were inspected for free product Bunker C and none was found and no distressed vegetation was noted.

Vegetation clearing was necessary to conduct the field investigation in accordance with the short form Clear and Grade permit obtained from DDES. An archaeologist from AMEC Earth and Environmental (AMEC) of Kirkland, Washington was on site to monitor test pit excavation activities. AMEC's report is presented in **Appendix D**. Silt fences for erosion control were established before excavating test pits located near Ellisport Creek. In addition, straw waddles were placed along the silt fence as added precaution. All removed soil was replaced in each test pit and compacted with the excavator bucket. Correspondence with Ecology associated with management of the

test pit soil is included in **Appendix E**. Disturbed areas were stabilized at the completion of the investigation by placing 2-inches of clean straw over them.

The exploration locations were marked with a wooden stake labeled with the surface sample or test pit identification. Sample locations and pertinent site features were determined in the field under the State Plane Coordinate System NAD 1983, north zone using a Trimble Pathfinder GPS unit.

Selected soil samples collected during the investigation were submitted for analytical testing to OnSite Environmental Inc. (OnSite) in Redmond, Washington in accordance with the April 7, 2005 SQAP and comments from Ecology. Test pit and surface soil samples were analyzed for diesel, lube oil, and Bunker C-range TPH by Northwest Method NWTPH-Dx. Samples containing comparably high TPH concentrations were further analyzed for PAHs by EPA Method 8270C/SIM. The one sediment sample was analyzed for TOC by SW846 9060 and for PAHs by EPA Method 8270C/SIM.

Analytical results, discussed in the following section, were compared to MTCA Method A and B cleanup levels and to the ecological indicator levels based on WAC 173-340-900, Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals. The sediment sample results were compared to the Sediment Management Standards (Chapter 173-204 WAC).

Section 3

Analytical Testing Results

The laboratory results for the testing performed on surface soil samples are presented in **Table 4**. Surface soil sample locations are shown on **Figure 5**. The analytical laboratory evaluated standard chromatograms to determine the appropriate hydrocarbon range (diesel, lube oil, or Bunker C). Low concentrations of TPH in the Bunker C range were quantified. Concentrations ranged from 59 to 420 mg/kg. The sample containing the highest concentration of Bunker C (sample EC-S6 as 410 mg/kg) was also analyzed for PAH compounds. Ten PAH compounds were identified at concentrations ranging from 0.039 to 0.088 mg/kg.

Table 5 presents laboratory results for soil samples collected from the eight test pit excavations (see **Figure 4** for test pit locations). Lube oil or Bunker C-range TPH was present in samples from five of the test pits at concentrations ranging from 280 to 44,000 mg/kg. Four of the samples exhibiting the highest concentrations of lube oil and Bunker C-range hydrocarbons (from TP-7, TP-8, TP-12 and TP-13) were further analyzed for PAHs by EPA Method 8270C/SIM. PAH compounds were detected in all four samples at concentrations ranging from 0.0087 to 60 mg/kg.

Analytical laboratory results for the sediment sample (EC-S5) are shown in **Table 6**. The sample contained 145,000 mg/kg of TOC, or a dry weight percentage of 14.5 percent. Thirteen PAHs compounds were detected.

Copies of the completed chain-of-custody forms and laboratory reports are presented in **Appendix F**.

Section 4

Regulatory Evaluation

The Model Toxics Control Act (MTCA) requires that soil cleanup levels be protective of human health; however, since the planned use for the site is natural habitat, potential impacts to terrestrial ecological receptors (plants and animals) as well as sediment impacts were also considered in evaluating the detected compounds.

Specifically, the analytical results were evaluated with respect to the Terrestrial Ecological Evaluation (TEE) Process under WAC 173-340-7490 through 7494. MTCA establishes a tiered process for evaluating threats to terrestrial ecological receptors. Tier 1 allows for an exclusion from further evaluation those sites that do not pose a current or potential threat to terrestrial ecological receptors, Tier 2 involves a simplified evaluation, and Tier 3 requires a site-specific evaluation. Conditions that necessitate a site-specific evaluation, and which likely apply to the subject site, include greenbelts, protected wetlands, and locally designated environmentally sensitive areas. A site-specific terrestrial ecological evaluation was beyond the scope of this investigation.

MTCA allows compounds identified in soil to be compared to ecological indicator concentrations contained in Table 749-3 (pp. 243-244 in MTCA) as a guide in the evaluation whether contaminant concentrations are protective of terrestrial plants and animals. Values in Table 749-3 are included on Tables 4 and 5 where they exist.

Tabulated Method A and Method B cleanup levels are also shown in Tables 4 and 5. The Method A and B values are based on protection of human health via ingestion or direct contact (Ecology 2001a, Ecology, 2001b). The carcinogenic polycyclic aromatic hydrocarbon (cPAH) soil sample results were normalized to a Toxicity Equivalent Factor (TEF). Each cPAH has a specific TEF, and the sum of the TEF-adjusted cPAHs equals the Toxic Equivalent (TEQ) as outlined in WAC 173-340-708(8). Data for cPAHs were adjusted with the TEF only when the concentration in the sample was above the method detection limit.

Of the 18 samples analyzed for TPH during this investigation, two samples (from test pits TP-8 and TP-12) contained concentrations of Bunker C oil exceeding the MTCA Method A cleanup level of 2,000 mg/kg. The highest concentration of Bunker C oil (44,000 mg/kg in TP-8) was found in the area of what may be a former structure as a concrete slab was present at 1.3 feet bgs. After excavating adjacent to the slab an apparent concrete foundation was encountered at 4 feet bgs. The foundation precluded excavating deeper than 6 feet bgs.

There is no ecological indicator level for Bunker C. The ecological indicator level for diesel-range TPH is 200 mg/kg. Six samples contained TPH exceeding 200 mg/kg.

Of the five samples analyzed for PAHs during this investigation, the normalized cPAHs were just above the 0.1 mg/kg Method A cleanup level in the samples collected at EC-S6 and TP-7. The normalized cPAH value for the sample collected from TP-8 was substantively above the Method A cleanup level. Several individual carcinogenic PAHs exceeded the Method B cleanup level in the soil samples from test pits TP-7 and TP-8. Sample EC-S6 was collected in the Ellisport Creek channel above the water line immediately downstream of the most pronounced surface water discharge point to Ellisport Creek. EC-S6 also contained TPH quantified as Bunker C oil at 410 mg/kg. The sample from TP-7 contained TPH quantified as Bunker C oil at 540 mg/kg.

None of the detected PAH compounds exceed their ecological indicator levels.

Laboratory results for the sediment sample (EC-S5) obtained from the surface water discharge point into Ellisport Creek are presented in **Table 6**. The analytical data were organic-carbon normalized per the Sediment Management Standards, Chapter 173-204 WAC; the process is described in **Appendix G**. The TOC concentration was 145,000 mg/kg. The resulting normalized data shows no exceedance in the Sediment Management Standards for PAHs in this sample.

Section 5

Conclusions and Cleanup Options

The results of this investigation indicate Bunker C is present in soil at concentrations exceeding human health-based cleanup levels (MTCA Method A and Method B). Assessment results suggest that the residual Bunker C is not an immediate threat to the environment although a site-specific TEE or comprehensive sediment studies were not conducted.

Groundwater is present near the land surface in areas not covered with standing water. No areas of free product Bunker C were identified in soil and no distressed vegetation was noted. In addition, no evidence of free product seepage to Ellisport Creek was identified. The concentrations of Bunker C are not uniform across the site. Several hot spots are present in near surface soil and in the subsurface, however, many areas appear to have not been impacted. An estimate of the area containing Bunker C-saturated soil is shown in red on Figure 5. The TPH concentration in this area would be expected to be similar to that documented at TP-6, i.e., approximately 50,000 mg/kg. Figure 5 also shows all explorations locations for the 1999 and 2005 environmental investigations. Based on our understanding of future site use, the receptor for areas with the residual Bunker C is sediment/aquatic life. Contaminant pathways include surface water to sediment and groundwater to sediment. Based on conditions observed at the site, no human exposure pathway to subsurface Bunker C-contaminated soil is present. The areas impacted by Bunker C either have a soil or vegetation mat cover resulting in a low probability for human ingestion or dermal exposure.

Potential options for cleanup include source removal and natural attenuation. Source removal can be accomplished through soil excavation. Soil excavation would involve the physical removal of petroleum-contaminated soil coupled with replacement with clean fill and wetland restoration. Prior to undertaking any cleanup a site-specific TEE will likely be required to define risk to the environment from the site. The goal of the TEE process is the protection of terrestrial ecological receptors (plants and animals) from exposure to contaminated soil with the potential to cause significant adverse effects.

Monitored natural attenuation may be an appropriate cleanup approach since given the age of the Bunker C release, the most mobile petroleum hydrocarbon fractions have most likely leached. A monitored natural attenuation study would be implemented to monitor groundwater hydraulically downgradient of the site and investigate sediment quality within Ellisport Creek and in Puget Sound sediments south of Chautauqua Beach Drive. The goal of the natural attenuation study would be to demonstrate that unacceptable concentration of contaminants are not leaving the site via the surface water or groundwater pathways and Puget Sound sediments are not being impacted.

Section 6

References

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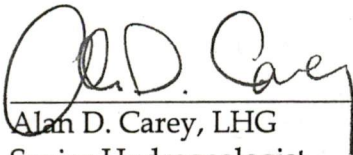
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Attention: Mr. Jim Neely

Quality Assurance / Technical Review by:



Alan D. Carey, LHG
Senior Hydrogeologist

Tables

Table 1
Test Pit Data and Observations

King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Test Pit	Total Depth (ft bgs)	Depth to Groundwater (ft bgs)	Observations
TP1	5	3	No indications of soil or groundwater contamination observed.
TP2	3	0.2	Sheen noted on groundwater.
TP3	3	None	Black tar-like substance encountered at 3 ft bgs.
TP4	2	1	Sheen noted on groundwater.
TP5	5	2	No indications of soil or groundwater contamination observed.
TP6	1.5	1.3	Black tar-like substance encountered at 0.2 ft bgs. Sheen noted on groundwater. Groundwater sample W1 collected.
TP-7	3.5	1	Sheen noted on groundwater.
TP-8	6	4	Black oil-saturated soil noted at 1.3 and 3 ft bgs. Sheen noted on groundwater.
TP-9	4.5	4	No indications of soil or groundwater contamination observed.
TP-10	3	1.5	No indications of soil or groundwater contamination observed.
TP-11	5	4	No indications of soil or groundwater contamination observed.
TP-12	3	0.5	No indications of soil or groundwater contamination observed.
TP-13	3.7	2.4	No indications of soil or groundwater contamination observed.
TP-14	2.3	1.5	No indications of soil or groundwater contamination observed.

Notes:

TP1 through TP6 were excavated in July 1999 and TP-7 through TP-14 were excavated in September 2005.
 ft bgs - feet below ground surface.



Table 2
NWTPH-HCID and WTPH-D (extended) Soil and Groundwater Sample Testing Results (AGI, 1999)
 King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Soil Samples

Sample No.	Sample Depth ft bgs	Washington State Test Method				
		NWTPH - HCID			WTPH-D (extended)	
		Gasoline	Diesel	Oil	Diesel	Oil
		mg/kg			mg/kg	
S1	0.5	ND	ND	D	ND	52
S2	0.5	ND	ND	D	ND	ND
S3	0.5	ND	ND	D	ND	110
S4	0.5	ND	ND	D	380	4,400
S5	0.5	ND	ND	ND	NA	NA
S6	0.5	ND	ND	D	120	420
S7	0.5	ND	ND	D	64,000	90,000
S8	0.5	ND	ND	D	ND	370
S9	0.5	ND	ND	ND	NA	NA
S10	0.5	ND	ND	ND	NA	NA
S11	0.5	ND	ND	D	32	310
S12	0.5	ND	ND	ND	NA	NA
S13	0.5	ND	ND	ND	NA	NA
S14	0.5	ND	ND	ND	NA	NA
S15	0.5	ND	ND	ND	NA	NA
S16	0.5	ND	ND	ND	NA	NA
S17	0.5	ND	ND	ND	NA	NA
Laboratory Detection Limit		20	50	100	25	50
Cleanup Level ^a		--	--	--	2,000	2,000

Groundwater Sample

Sample No.	Date Sampled	Washington State Test Method				
		NWTPH - HCID			WTPH-D (extended)	
		Gasoline	Diesel	Oil	Diesel	Oil
		µg/L			µg/L	
W1	07/14/99	NA	NA	NA	57,000	100,000
Cleanup Level ^b		--	--	--	1,000	1,000

Notes:

Soil samples were collected on 7/13/99.

Bold value indicates that concentration exceeds cleanup level.

a) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.

b) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested groundwater cleanup level; promulgated August 15, 2001.

HCID - Ecology Hydrocarbon Identification Method.

WTPH-D (extended) - total petroleum hydrocarbons quantified as diesel and oil.

D - detected above laboratory detection limit.

NA - not analyzed.

ND - not detected at or above laboratory detection limit.

ft bgs - feet below ground surface.

mg/kg - milligram per kilogram.

µg/L - microgram per liter.



Table 3

Summary of BETX, PCB, and PAH Detections in Soil and Groundwater (AGI, 1999)

King County/Ellisport Creek Greenspace Property Assessment

Vashon Island, Washington

Analyte	Laboratory Detection Limit Soil	Cleanup Level Soil ^a	Sample I.D. S7	Laboratory Detection Limit Groundwater	Cleanup Level Groundwater ^a	Sample I.D. W1
EPA Test Method 8021						
	<u>mg/kg</u>	<u>mg/kg</u>	<u>mg/kg</u>	<u>µg/L</u>	<u>µg/L</u>	<u>µg/L</u>
Benzene	0.4	0.03	ND	1	5	ND
Ethylbenzene	0.4	6	ND	1	700	ND
Toluene	0.4	7	ND	1	1,000	ND
Xylenes	1.2	9	ND	1	1,000	5
EPA Test Method 8082M						
	<u>mg/kg</u>	<u>mg/kg</u>	<u>mg/kg</u>			
PCB-1016	0.1	1	ND	N/A	N/A	NA
PCB-1221	0.1	1	ND	N/A	N/A	NA
PCB-1232	0.1	1	ND	N/A	N/A	NA
PCB-1242	0.1	1	ND	N/A	N/A	NA
PCB-1248	0.1	1	ND	N/A	N/A	NA
PCB-1254	0.1	1	ND	N/A	N/A	NA
PCB-1260	0.1	1	ND	N/A	N/A	NA
Polycyclic Aromatic Hydrocarbons (PAHs)						
EPA Test Method 8270						
	<u>mg/kg</u>	<u>mg/kg</u>	<u>mg/kg</u>	<u>µg/L</u>	<u>µg/L</u>	<u>µg/L</u>
Napthalene	1	5	ND	0.5	160	34
Acenaphthylene	1		ND	0.5		0.5
Acenaphathene	1	4,800 ^b	1.7	0.5	960	8.2
Fluorene	1	3,200 ^b	ND	0.5	640	10
Phenanthrene	1		2.1	0.5		37
Anthracene	1	24,000 ^b	ND	0.5	2,400	8.1
Fluoranthene	1	3,200 ^b	1.3	0.5	640	9.4
Pyrene	1	2,400 ^b	6.8	0.5	480	14
Benzo[a]anthracene*	1		1	0.5		3.6
Chrysene*	1		3.9	0.5		7.2
Benzo(b)fluoranthene*	1		ND	0.5		5.3
Benzo(k)fluoranthene*	1		ND	0.5		5.3
Benzo(a)pyrene*	1		1.4	0.5		2.7
Indeno(1,2,3-c,d)pyrene*	1		ND	0.5		ND
Dibenz(a,h)anthracene*	1		ND	0.5		ND
Benzo(g,h,i)perylene	1		1.3	0.5		1.3
TEQ cPAHs*		0.1	1.889		0.1	4.317

Notes:

*Carcinogenic polycyclic aromatic hydrocarbons (cPAHs).

Bold values exceed cleanup level.

- a) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested cleanup level for unrestricted land uses; promulgated August 15, 2001. Method B, CLARC tables (November 2001) used when Method A cleanup levels are not available. Risk values based on direct contact for soil and potable groundwater values for water.
- b) Method B formula value (direct contact pathway as a carcinogen or noncarcinogen) from the Department of Ecology Publication #94-145, Cleanup Levels and Risk Calculations under the Model Toxics Control Act Cleanup Level Regulation CLARC Version 3.1). Updated November 2001.

N/A - not applicable.

NA - not analyzed.

ND - not detected

mg/kg - milligrams per kilogram.

µg/L - micrograms per liter

TEQ - Toxic Equivalent value.



Table 4
Analytical Laboratory Results for Surface Soil Samples
 King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Analyte	Regulatory Criteria			Sample I.D., Date Sampled, Sample Depth				
	Method A Cleanup Level ^a	Method B Cleanup Level ^b	Ecological Indicator Level ^c	EC-S1 09/21/05 0.7 foot bgs	EC-S2 09/21/05 0.7 foot bgs	EC-S3 09/21/05 0.8 foot bgs	EC-S4 09/21/05 (Dup of EC-S3)	EC-S6 09/21/05 0-0.1 foot bgs
NWTPH-Dx (mg/kg)								
Diesel	2,000	NL	200	<41	<36	<40	<40	<36
Lube Oil	2,000	NL	NL	<82	<71	<81	--	--
Oil as Bunker C	2,000	NL	NL	--	--	--	94	410
PAHs (EPA 8270C/SIM) (mg/kg)								
Naphthalene	5 ^d	1,600	NL	--	--	--	--	<0.0095
2-Methylnaphthalene		NL	NL	--	--	--	--	<0.0095
1-Methylnaphthalene		NL	NL	--	--	--	--	<0.0095
Acenaphthylene	NL	NL	NL	--	--	--	--	<0.0095
Acenaphthene	NL	4,800	20	--	--	--	--	<0.0095
Fluorene	NL	3,200	30	--	--	--	--	<0.0095
Phenanthrene	NL	NL	NL	--	--	--	--	<0.0095
Anthracene	NL	24,000	NL	--	--	--	--	<0.0095
Fluoranthene	NL	3,200	NL	--	--	--	--	0.039
Pyrene	NL	2,400	NL	--	--	--	--	0.061
Benzo(a)anthracene*		0.137	NL	--	--	--	--	0.064
Chrysene*		0.137	NL	--	--	--	--	0.057
Benzo(b)fluoranthene*		0.137	NL	--	--	--	--	0.077
Benzo(k)fluoranthene*		0.137	NL	--	--	--	--	0.025
Benzo(a)pyrene*		0.137	12	--	--	--	--	0.088
Indeno(1,2,3-c,d)pyrene*		0.137	NL	--	--	--	--	0.039
Dibenz(a,h)anthracene*		0.137	NL	--	--	--	--	0.012
Benzo(g,h,i)perylene	NL	NL	NL	--	--	--	--	0.14
TEQ cPAHs*	0.1							0.11

Table 4

Analytical Laboratory Results for Surface Soil Samples

King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Analyte	Regulatory Criteria			Sample I.D., Date Sampled, Sample Depth				
	Method A Cleanup Level ^a	Method B Cleanup Level ^b	Ecological Indicator Level ^c	EC-S7 09/21/05 0.9 foot bgs	EC-S8 09/21/05 0.5 foot bgs	EC-S9 09/21/05 (Dup of EC-S8)	EC-S10 09/21/05 0.9 foot bgs	EC-S11 09/21/05 0.9 foot bgs
NWTPH-Dx (mg/kg)								
Diesel	2,000	NL	200	<31	<36	<39	<27	<28
Lube Oil	2,000	NL	NL	<62	--	--	--	--
Oil as Bunker C	2,000	NL	NL	--	84	110	71	59
PAHs (EPA 8270C/SIM) (mg/kg)								
Naphthalene	5 ^d	1,600	NL	--	--	--	--	--
2-Methylnaphthalene		NL	NL	--	--	--	--	--
1-Methylnaphthalene		NL	NL	--	--	--	--	--
Acenaphthylene	NL	NL	NL	--	--	--	--	--
Acenaphthene	NL	4,800	20	--	--	--	--	--
Fluorene	NL	3,200	30	--	--	--	--	--
Phenanthrene	NL	NL	NL	--	--	--	--	--
Anthracene	NL	24,000	NL	--	--	--	--	--
Fluoranthene	NL	3,200	NL	--	--	--	--	--
Pyrene	NL	2,400	NL	--	--	--	--	--
Benzo(a)anthracene*		0.137	NL	--	--	--	--	--
Chrysene*		0.137	NL	--	--	--	--	--
Benzo(b)fluoranthene*		0.137	NL	--	--	--	--	--
Benzo(k)fluoranthene*		0.137	NL	--	--	--	--	--
Benzo(a)pyrene*		0.137	12	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene*		0.137	NL	--	--	--	--	--
Dibenz(a,h)anthracene*		0.137	NL	--	--	--	--	--
Benzo(g,h,i)perylene	NL	NL	NL	--	--	--	--	--
TEQ cPAHs*	0.1							

Table 4

Analytical Laboratory Results for Surface Soil Samples

King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Analyte	Method A Cleanup Level ^a	Method B Cleanup Level ^b	Ecological Indicator Level ^c	Sample I.D., Date Sampled, Sample Depth	
				EC-S12 09/21/05 0-0.1 foot bgs	EC-S13 09/21/05 0.8 foot bgs
NWTPH-Dx (mg/kg)					
Diesel	2,000	NL	200	<27	<28
Lube Oil	2,000	NL	NL	<54	<56
Oil as Bunker C	2,000	NL	NL	--	--
PAHs (EPA 8270C/SIM) (mg/kg)					
Naphthalene	5 ^d	1,600	NL	--	--
2-Methylnaphthalene		NL	NL	--	--
1-Methylnaphthalene		NL	NL	--	--
Acenaphthylene	NL	NL	NL	--	--
Acenaphthene	NL	4,800	20	--	--
Fluorene	NL	3,200	30	--	--
Phenanthrene	NL	NL	NL	--	--
Anthracene	NL	24,000	NL	--	--
Fluoranthene	NL	3,200	NL	--	--
Pyrene	NL	2,400	NL	--	--
Benzo(a)anthracene*		0.137	NL	--	--
Chrysene*		0.137	NL	--	--
Benzo(b)fluoranthene*		0.137	NL	--	--
Benzo(k)fluoranthene*		0.137	NL	--	--
Benzo(a)pyrene*		0.137	12	--	--
Indeno(1,2,3-c,d)pyrene*		0.137	NL	--	--
Dibenz(a,h)anthracene*		0.137	NL	--	--
Benzo(g,h,i)perylene	NL	NL	NL	--	--
TEQ cPAHs*	0.1				

Notes:

Bold values exceed one or more of the regulatory criteria.

a) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.

b) Method B cleanup levels based on Washington State Department of Ecology CLARC tables (November 2001). Risk values based on direct contact.

c) Ecological indicator level based on WAC Chapter 173-340-900, Table 749-3, Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals.

d) Total for all naphthalenes.

TEQ -Toxic Equivalent value.

*Carcinogenic polycyclic aromatic hydrocarbons (cPAHs).

-- not analyzed.

mg/kg - milligrams per kilogram.

< - analyte not detected at or greater than the listed concentration.

NL - Not listed

bgs - below ground surface.



Table 5
Analytical Laboratory Results for Test Pit Soil Samples
 King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Analyte	Regulatory Criteria			Sample Location, Laboratory I.D., Date Sampled, Sample Depth				
	Method A Cleanup Level ^a	Method B Cleanup Level ^b	Ecological Indicator Level ^c	TP-7 EC-S14 09/22/05 1.3 feet bgs	TP-8 EC-S16 09/22/05 6 feet bgs	TP-9 EC-S17 09/22/05 2.8 feet bgs	TP-10 EC-S18 09/22/05 2 feet bgs	TP-11 EC-S19 09/22/05 3 feet bgs
NWTPH-Dx (mg/kg)								
Diesel	2,000	NL	200	<51	<620	<41	<33	<30
Lube Oil	2,000	NL	NL	540	--	280	<65	<60
Oil as Bunker C	2,000	NL	NL	--	44,000	--	--	--
PAHs (EPA 8270C/SIM) (mg/kg)								
Naphthalene	5 ^d	1,600	NL	0.021	7.4	--	--	--
2-Methylnaphthalene		NL	NL	<0.014	60	--	--	--
1-Methylnaphthalene		NL	NL	<0.014	40	--	--	--
Acenaphthylene	NL	NL	NL	0.016	1.1	--	--	--
Acenaphthene	NL	4,800	20	0.027	6.4	--	--	--
Fluorene	NL	3,200	30	0.015	12	--	--	--
Phenanthrene	NL	NL	NL	0.098	63	--	--	--
Anthracene	NL	24,000	NL	0.026	13	--	--	--
Fluoranthene	NL	3,200	NL	0.26	6.2	--	--	--
Pyrene	NL	2,400	NL	0.27	50	--	--	--
Benzo(a)anthracene*		0.137	NL	0.099	11	--	--	--
Chrysene*		0.137	NL	0.14	15	--	--	--
Benzo(b)fluoranthene*		0.137	NL	0.15	2.8	--	--	--
Benzo(k)fluoranthene*		0.137	NL	0.049	<0.82	--	--	--
Benzo(a)pyrene*		0.137	12	0.096	7.0	--	--	--
Indeno(1,2,3-c,d)pyrene*		0.137	NL	0.065	1.3	--	--	--
Dibenz(a,h)anthracene*		0.137	NL	0.017	<0.82	--	--	--
Benzo(g,h,i)perylene	NL	NL	NL	0.085	4.6	--	--	--
TEQ cPAHs*	0.1			0.14	8.87			

Table 5
Analytical Laboratory Results for Test Pit Soil Samples
 King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Analyte	Regulatory Criteria			Sample Location, Laboratory I.D., Date Sampled, Sample Depth		
	Method A Cleanup Level ^a	Method B Cleanup Level ^b	Ecological Indicator Level ^c	TP-12 EC-S20 09/22/05 1.5 feet bgs	TP-13 EC-S21 09/22/05 1.5 feet bgs	TP-14 EC-S22 09/22/05 1.3 feet bgs
NWTPH-Dx (mg/kg)						
Diesel	2,000	NL	200	<150	<30	<63
Lube Oil	2,000	NL	NL	--	--	<130
Oil as Bunker C	2,000	NL	NL	2,200	1,100	--
PAHs (EPA 8270C/SIM) (mg/kg)						
Naphthalene	5 ^d	1,600	NL	<0.0078	<0.0080	--
2-Methylnaphthalene		NL	NL	<0.0078	0.0099	--
1-Methylnaphthalene		NL	NL	<0.0078	<0.0080	--
Acenaphthylene	NL	NL	NL	0.0087	0.0089	--
Acenaphthene	NL	4,800	20	<0.0078	<0.0080	--
Fluorene	NL	3,200	30	<0.0078	<0.0080	--
Phenanthrene	NL	NL	NL	<0.0078	0.012	--
Anthracene	NL	24,000	NL	0.015	0.013	--
Fluoranthene	NL	3,200	NL	<0.0078	0.010	--
Pyrene	NL	2,400	NL	0.019	0.032	--
Benzo(a)anthracene*		0.137	NL	0.017	0.012	--
Chrysene*		0.137	NL	0.024	0.049	--
Benzo(b)fluoranthene*		0.137	NL	0.021	0.047	--
Benzo(k)fluoranthene*		0.137	NL	<0.0078	0.014	--
Benzo(a)pyrene*		0.137	12	0.038	0.050	--
Indeno(1,2,3-c,d)pyrene*		0.137	NL	0.043	0.033	--
Dibenz(a,h)anthracene*		0.137	NL	0.027	0.018	--
Benzo(g,h,i)perylene	NL	NL	NL	0.16	0.094	--
TEQ cPAHs*	0.1			0.06	0.07	

Notes:

Bold values exceed one or more of the regulatory criteria.

a) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.

b) Method B cleanup levels based on Washington State Department of Ecology CLARC tables (November 2001). Risk values based on direct contact.

c) Ecological indicator level based on WAC Chapter 173-340-900, Table 749-3, Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals.

d) Total for all naphthalenes.

TEQ - Toxic Equivalent value.

*Carcinogenic polycyclic aromatic hydrocarbons (cPAHs).

-- not analyzed.

mg/kg - milligrams per kilogram.

< - analyte not detected at or greater than the listed concentration.

NL - Not listed

bgs - below ground surface.

Table 6

Analytical Laboratory Results - Sediment

King County/Ellisport Creek Greenspace Property Assessment
 Vashon Island, Washington

Analyte	Sediment Quality Standards Chemical Criteria ^a	Sample I.D. and Date Sampled	
		EC-S5	
		09/21/05	
		Dry Weight	OC-Normalized
Total Organic Carbon (SW846 9060)			
TOC		145,000 mg/kg	
TOC Percent/Decimal Quantity		14.5% or 0.145	
PAHs (EPA 8270C/SIM) (mg/kg)			
Naphthalene ^b	99	<0.035	NA
2-Methylnaphthalene	38	<0.035	NA
1-Methylnaphthalene		<0.035	NA
Acenaphthylene ^b	66	0.058	0.4
Acenaphthene ^b	16	<0.035	NA
Fluorene ^b	23	<0.035	NA
Phenanthrene ^b	100	0.048	0.331
Anthracene ^b	220	0.053	0.366
Fluoranthene ^c	160	0.098	0.676
Pyrene ^c	1,000	1.3	8.966
Benzo(a)anthracene ^c	110	0.70	4.828
Chrysene ^c	110	1.3	8.966
Benzo(b)fluoranthene ^c	230 ^d	0.76	5.241
Benzo(k)fluoranthene ^c		0.079	0.545
Benzo(a)pyrene ^c	99	2.8	19.31
Indeno(1,2,3-c,d)pyrene ^c	34	0.80	5.517
Dibenz(a,h)anthracene ^c	12	0.56	3.862
Benzo(g,h,i)perylene ^c	31	3.1	21.379
Total LPAH	370	0.159	1.097
Total HPAH	960	11.50	79.29

Notes:

a) Washington Administrative Code Chapter 173-204, Sediment Management Standards, Table I - Marine Sediment Quality Standards. The listed chemical parameter criteria represent concentrations in parts per million, normalized, or expressed on a total organic carbon basis. To normalize to total organic carbon, the dry weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content of the sediment.

b) LPAH - Low molecular weight polycyclic aromatic hydrocarbons.

c) HPAH - High molecular weight polycyclic aromatic hydrocarbons.

d) Total value for all benzofluoranthenes.

mg/kg - milligrams per kilogram.

NA - Analytes that were not detected do not have a normalized concentration.

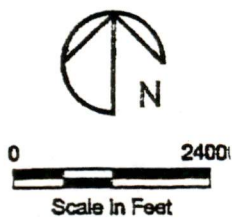
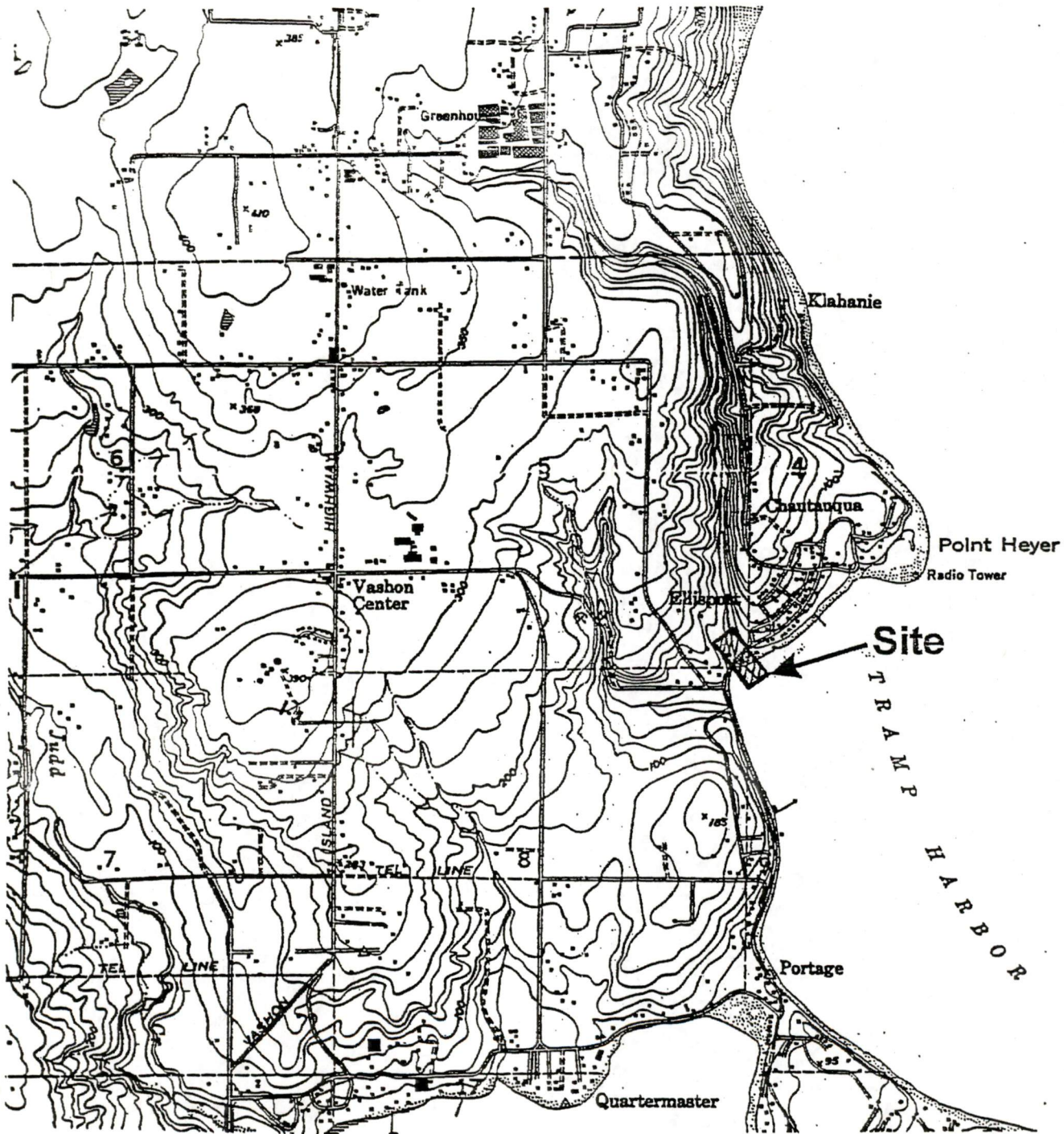
OC - Organic carbon.

TOC - Total organic carbon.

< - analyte not detected at or greater than the listed concentration.



Figures



Reference: USGS Map, Vashon, Washington 1949, Revised 1958

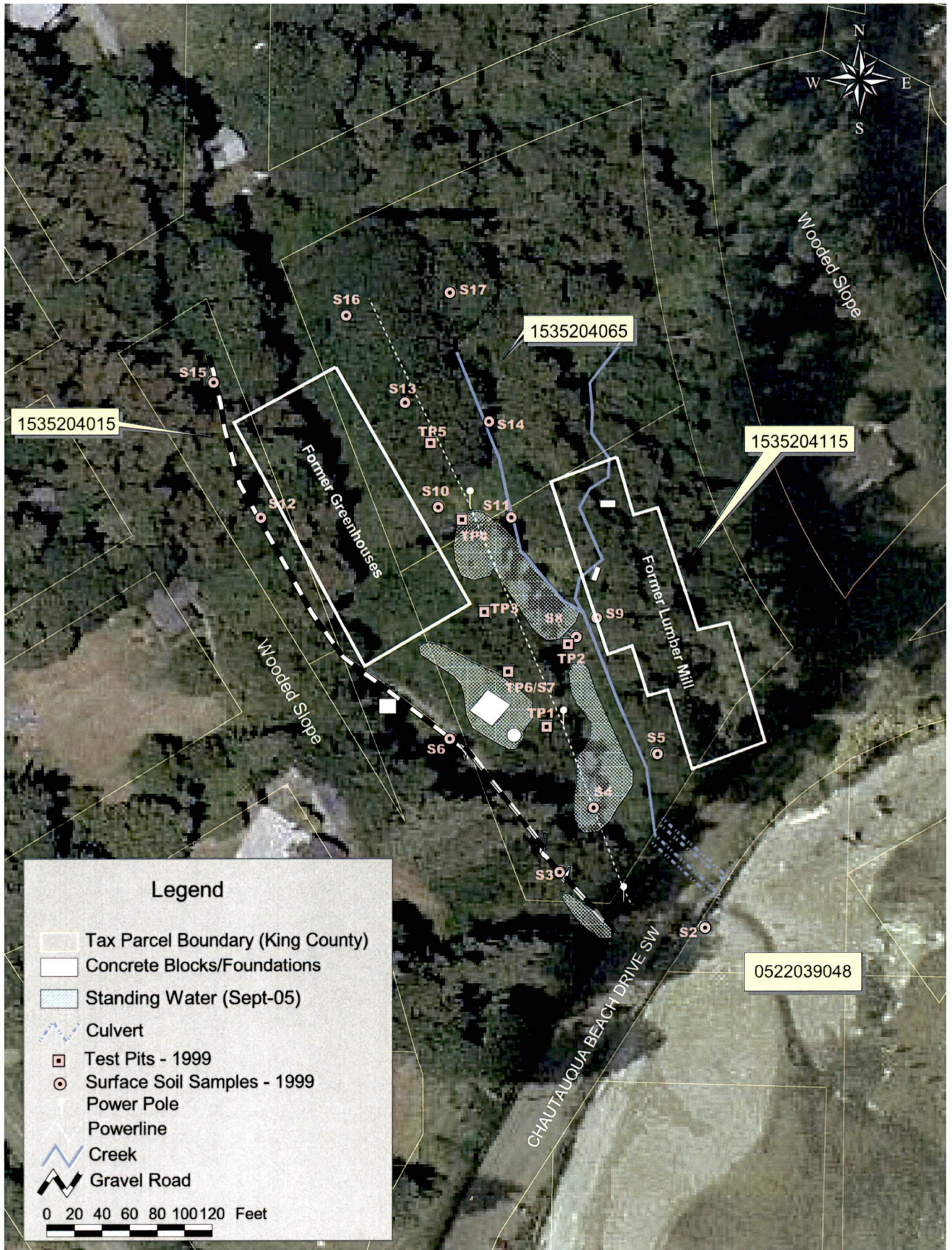


KING COUNTY/ELLISPORT CREEK GREENSPACE
 PROPERTY ASSESSMENT
 VASHON ISLAND, WA



Figure No. 1
Vicinity Map

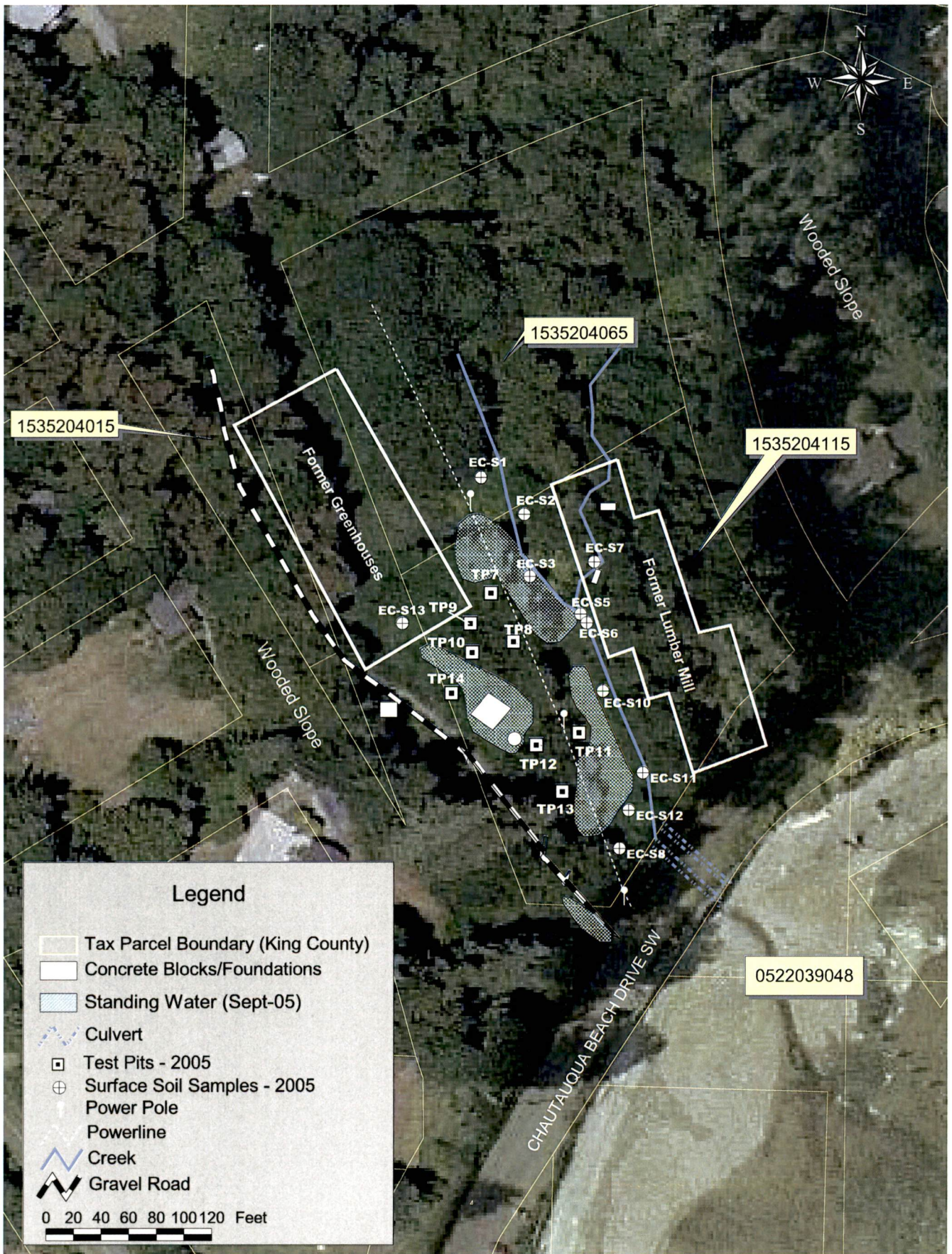




KING COUNTY/ELLISPORT CREEK GREENSPACE
 PROPERTY ASSESSMENT
 VASHON ISLAND, WA

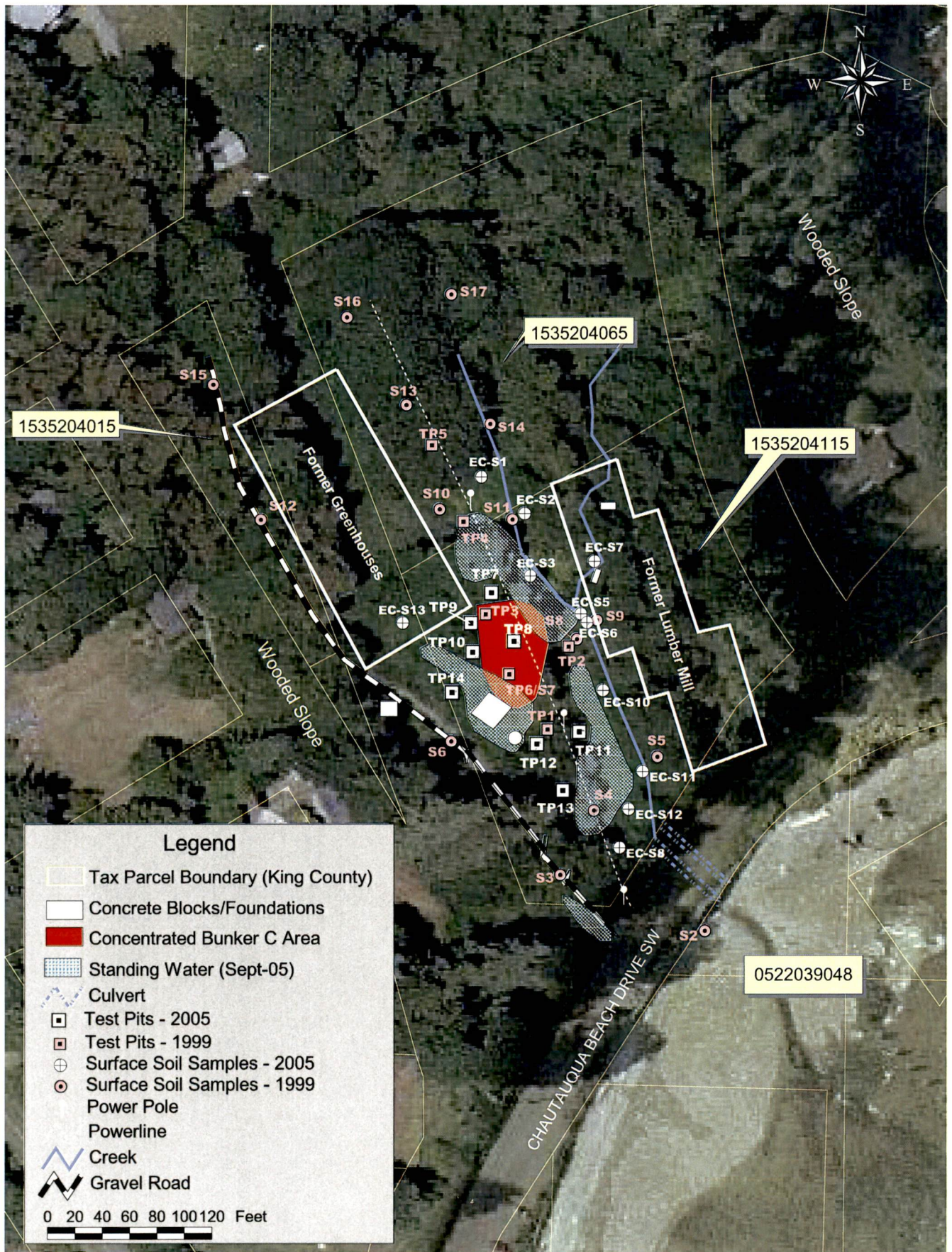
Figure 3
 1999 Investigation Locations





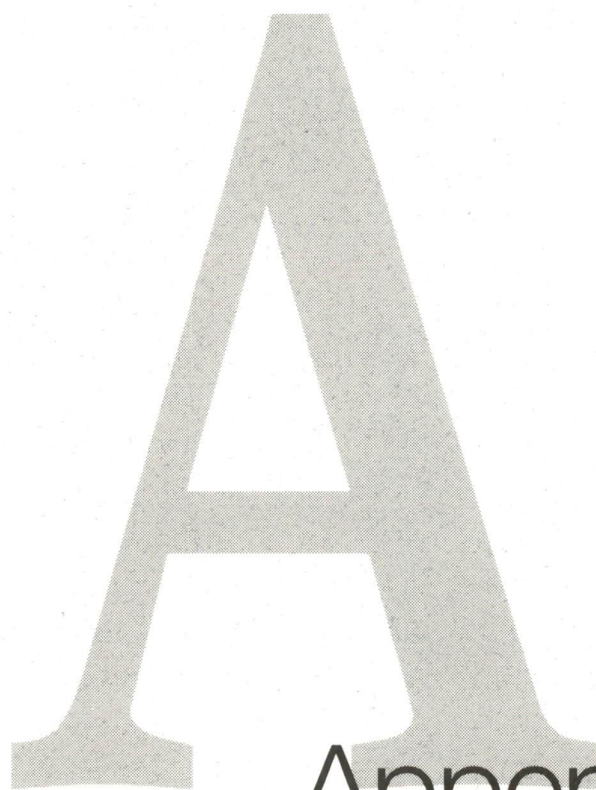
KING COUNTY/ELLISPORT CREEK GREENSPACE
 PROPERTY ASSESSMENT
 VASHON ISLAND, WA

Figure 4
 2005 Investigation Locations



KING COUNTY/ELLISPORT CREEK GREENSPACE
PROPERTY ASSESSMENT
VASHON ISLAND, WA

Figure 5
1999 & 2005
Sampling Location Map



Appendix
A

Appendix A

Site Photos

FIELD PHOTOGRAPHY LOG SHEET
Ellisport Creek Phase II Assessment
Vashon Island, Washington

October 7, 2005

Photograph No. A-1

Photographed By:
Josh Miller

Description: View toward
northwest of upland
portion of site from tide
land portion of site.



October 7, 2005

Photograph No. A-2

Photographed By:
Josh Miller

Description: View toward
southeast of tide land
portion of site from
Chautauqua Beach Drive
S.W.



FIELD PHOTOGRAPHY LOG SHEET
Ellisport Creek Phase II Assessment
Vashon Island, Washington

October 23, 2005

Photograph No. A-3

Photographed By:
Lance Peterson

Description: View of the northwest area of the site (from general vicinity of AGI sample S15) looking across the site toward the southeast (gravel road in foreground).



September 21, 2005

Photograph No. A-4

Photographed By:
Lance Peterson

Description: View of S4 sample location (collected by AGI in 1999). Note standing water. Water contained hydrocarbon-like sheen.



FIELD PHOTOGRAPHY LOG SHEET
Ellisport Creek Phase II Assessment
Vashon Island, Washington

October 7, 2005

Photograph No. A-5

Photographed By:
Josh Miller

Description: Sediment
Sample EC-S5. Location at surface water
discharge from site into Ellisport Creek.



September 21, 2005

Photograph No. A-6

Photographed By:
Josh Miller

Description: Sample EC-S6
location in Ellisport Creek
channel. Note
hydrocarbon-like coating
on surface, brown soil
underneath.



FIELD PHOTOGRAPHY LOG SHEET
Ellisport Creek Phase II Assessment
Vashon Island, Washington

September 22, 2005

Photograph No. A-7

Photographed By:
Lance Peterson

Description: View of test pit TP-8 showing Bunker C-saturated soil. Water seepage was present at 4 feet below ground surface. Water contained a hydrocarbon-like sheen. Large concrete footing present at upper and right side of test pit.



October 23, 2005

Photograph No. A-8

Photographed By:
Lance Peterson

Description: Test pits TP-9 and TP-10 area in background, wet area in foreground.



FIELD PHOTOGRAPHY LOG SHEET
Ellisport Creek Phase II Assessment
Vashon Island, Washington

September 22, 2005

Photograph No. A-9

Photographed By:
Lance Peterson

Description: Soil
conditions at test pit
TP-11. Note water
seepage at 3.5 feet
below ground surface.



September 22, 2005

Photograph No. A-10

Photographed By:
Lance Peterson

Description: Soil
conditions at TP-12. Note
water seepage at 2 feet
below ground surface.



FIELD PHOTOGRAPHY LOG SHEET
Ellisport Creek Phase II Assessment
Vashon Island, Washington

September 20, 2005

Photograph No. A-11

Photographed By:
Lance Peterson

Description: Clearing
vegetation prior to
excavating test pit TP-8.



October 23, 2005

Photograph No. A-12

Photographed By:
Lance Peterson

Description: Test pit TP-7
in foreground, TP-8 in
background; after
stabilization with clean
straw.



B

Appendix B

Appendix B

Field Exploration and Sampling Procedures

Appendix B

Field Exploration and Sampling Procedures

Soil Sampling

Surface samples were collected at the Ellisport Creek Greenspace project site on September 20 and 21, 2005 at a depth of 0.1 to 0.9 feet below ground surface (bgs) after clearing vegetation and forest duff from the ground surface. Hokkaido Drilling, Inc. of Graham, Washington excavated eight test pits at the site on September 22, 2005. A Camp Dresser & McKee (CDM) hydrogeologist observed the test pit excavation. Test pits were excavated using a mini-excavator to depths of 2.3 to 6 feet (bgs). Test pit soil samples were collected directly from the excavation or from the excavator bucket. Soil samples from each sampling location were packed with a minimum of headspace into a 4-ounce laboratory-supplied glass jar. Each sampled interval was logged according to the Unified Soil Classification System.

The following procedures were used to collect subsurface soil samples:

1. A soil sample was collected by transferring it to a laboratory-supplied glass jar. The sample container was labeled, placed in a cooler, and chilled with ice.
2. The surface and test pit soils were described on the field log. Observation of hydrocarbon-like staining, odors, and sheen were noted.

Sample Handling and Shipping

Samples selected for analytical testing were kept out of direct sunlight and were checked for label completeness and cap tightness. Each sealed sample container was placed in packing material upright in a cooler and chilled with Blue Ice. The samples were stored and transported under chain-of-custody procedures. Copies of the completed chain-of-custody forms are presented with the laboratory reports in **Appendix F**.

Documentation

Daily Field Report

The CDM representative reported daily activities on a Field Investigation Daily Report form. Personnel on site, visitors, weather, general activities planned and performed, and any problems were included on the Daily Field Report. Daily Field Reports and other documentation of field activities are contained in the project file.

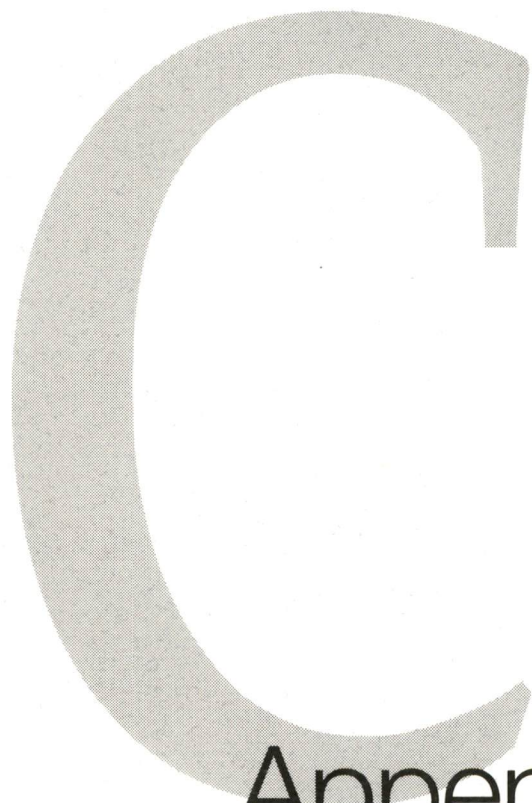
Soil Sampling

CDM documented field activities associated with soil sampling on a log completed in the field. This included a comprehensive discussion of field observations, including visual observations, field parameter measurements, QA observations, and problems encountered. Soil Sampling Records were completed for all samples submitted for analytical testing.

Sample containers were labeled with the following information:

- Project identification
- Date
- Time
- Sampler's initials
- Sample identification number.

Chain-of-custody forms were filled out with the requested analyses information and accompanied the samples to the laboratory.



Appendix
C

Appendix C

Test Pit Boring Logs

SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS		TYPICAL NAMES		SAMPLE TYPE SYMBOLS
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	Disturbed bag or jar sample Std. Penetration Test (2.0" OD) Type U Ring Sampler (3.25" OD) California Sampler (3.0" OD) Undisturbed Tube Sample Grab Sample Core Run Non-standard Penetration Test (with split spoon sampler)
		Gravel with over 12% fines	GP Poorly graded gravels, gravel-sand mixtures	
			GM Silty gravels, gravel-sand-silt mixtures	
		SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	
	Sands with over 12% fines		SP Poorly graded sands, gravelly sands	
			SM Silty sand, sand-silt mixtures	
			SC Clayey sands, sand-clay mixtures	
			SILTS AND CLAYS Liquid limit less than 50	
	CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
	SILTS AND CLAYS Liquid limit greater than 50	OL Organic clays and organic silty clays of low plasticity		
MH Inorganic silts, micaceous or diatomaceous 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		

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

MOISTURE DESCRIPTION

- Dry - Free of moisture, dusty
- Moist - Damp but no visible free water
- Wet - Visible free water, saturated

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing			Structure			General Attitude
	Parting:	less than 1/16 in. (1/6 cm)		Pocket:	Erratic, discontinuous deposit of limited extent	
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)		Lens:	Lenticular deposit	Low angle:	10 to 45 deg.
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)		Varved:	Alternating seams of silt and clay	High angle:	45 to 80 deg.
Stratum:	> 12 in. (30 1/2 cm)		Laminated:	Alternating seams	Near Vertical:	80 to 90 deg.
Scattered:	< 1 per ft. (30 1/2 cm)		Interbedded:	Alternating layers		
Numerous:	> 1 per ft. (30 1/2 cm)					

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogenous	Same color and appearance throughout

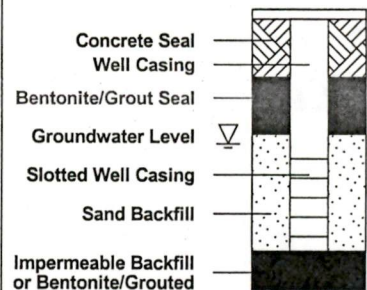
RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	Over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

Notes:

1. Sample descriptions in this report are based on visual field and laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.
2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.
3. WOR = weight of rod.

WELL COMPLETIONS








PHYSICAL PROPERTY TEST

- AL - Atterberg Limits
- FC - Fines Content
- GSD - Grain Size Distribution
- MC - Moisture Content
- MD - Moisture Content/Dry Density
- Comp - Compaction Test (Proctor)
- SG - Specific Gravity
- CBR - California Bearing Ratio
- RM - Resilient Modulus
- Perm - Permeability
- TXP - Triaxial Permeability
- Cons - Consolidation
- Chem - Analytical Chemical Analysis
- Corr - Corrosion
- VS - Vane Shear
- DS - Direct Shear
- UC - Unconfined Compression
- TX - Triaxial Compression
- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington

Project No: 19897.45486 Figure: C1

Strataprobe TP-7

Other Tests	OVM (ppm)	TMP	Depth (feet)	Sample	Symbol	DESCRIPTION	Elev. (feet)
			1			BROWN ORGANIC SILT (OH) Medium stiff, wet, with some sand.	
Lab Sample Collected			1			DARK BROWN SILTY SAND (SM) Medium dense, wet, with some gravel, incidental brick material, organics, interbedded silt. Seepage noted at 1 ft bgs.	
			2			Becomes brown.	
			3				Pronounced seepage noted at 3 ft bgs.
			4			Test pit terminated at 3.5 ft bgs. Groundwater encountered at 1 ft bgs during excavation. Hydrocarbon-like sheen noted in water at base of test pit, no hydrocarbon-like odor noted in soil.	
			5				
			6				
			7				

Location: _____
Surface Elevation: _____

Date Completed: 9-22-05
Logged By: LEP

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington

Test Pit TP-7
Project No: 19897.45486

Figure: C2
1 of 1



TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITS.GPJ CDM BLLV.GDT 12/21/05 REV.

TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITTS.GPJ CDM BLLV.GDT 12/21/05 REV.

Other Tests	OVM (ppm)	TMP	Depth (feet)	Sample	Symbol	<p style="text-align: center;">Strataprobe TP-8</p> <p style="text-align: center;">DESCRIPTION</p>	Elev. (feet)
			1			<p>BROWN SILTY SAND (SM) Medium dense, moist, with some organics and gravel (Fill).</p>	
			2			<p>Encounter approximately 4-inch-thick layer of oil-saturated soil on top of concrete slab at 1.3 ft bgs. Excavate to edge of concrete approximately 3 ft to east and proceed downward.</p> <p>Becomes brown.</p>	
			3				
			4			<p>BLACK GRAVELLY SILTY SAND (SM) Medium dense, moist, with some gravel, glass and brick debris (Fill)</p> <p>Many large timbers present. Soil is oil-saturated.</p>	
			5				
			6			<p>Test pit terminated at 6 ft bgs. Unable to dig further due to large concrete block located on south and east sides of test pit. Groundwater encountered at 4 ft bgs during excavation. Hydrocarbon-like sheen on water.</p>	
			7				

Lab Sample Collected

Location: _____
Surface Elevation: _____

Date Completed: 9-22-05
Logged By: LEP

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington

Test Pit TP-8
Project No: 19897.45486

Figure: C3
1 of 1



TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITS.GPJ CDM_BLLV.GDT 12/21/05 REV.

Other Tests	OVM (ppm)	TMP	Depth (feet)	Sample	Symbol	<p style="text-align: center;">Strataprobe TP-9</p> <p style="text-align: center;">DESCRIPTION</p>	Elev. (feet)
			1			<p>BROWN SILTY SAND (SM) Medium dense, moist, with miscellaneous debris (pots, steel pipe, concrete blocks 1'x1') (Fill).</p> <p>Becomes wet at 2.8 ft bgs.</p> <p>Seepage noted at 4 ft bgs.</p>	
			2				
Lab Sample Collected			3				
			4				
			5			<p>Test pit terminated at 4.5 ft bgs. Groundwater encountered at 4 ft bgs during excavation. No hydrocarbon-like sheen on water. No hydrocarbon-like odor noted in soil.</p>	
			6				
			7				

Location: _____
Surface Elevation: _____

Date Completed: 9-22-05
Logged By: LEP

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington



Test Pit TP-9
Project No: 19897.45486

Figure: C4
1 of 1

Strataprobe TP-10

Elev. (feet)

Other Tests

OVM (ppm)

TMP

Depth (feet)

Sample

Symbol

DESCRIPTION

Lab Sample Collected

1

2

3

4

5

6

7

BROWN SILTY SAND (SM)
Medium dense, moist, with some gravel (roots from tree in upper 1.5').

Note water seepage at ~1.5 ft bgs.

Test pit terminated at 3 ft bgs.
Groundwater encountered at 1.5 ft bgs during excavation.
No hydrocarbon-like odor noted in soil.
No hydrocarbon-like sheen on water.



TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITS.GPJ CDM_BLLV/GDT 12/21/05 REV.

Location: _____
Surface Elevation: _____

Date Completed: 9-22-05
Logged By: LEP

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington



Test Pit TP-10
Project No: 19897.45486

Figure: C5
1 of 1

TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITS.GPJ_CDM_BLLV.GDT 12/21/05 REV.

Other Tests	OVM (ppm)	TMP	Depth (feet)	Sample	Symbol	Elev. (feet)
Strataprobe TP-11						
DESCRIPTION						
			1		BROWN GRAVELLY SAND (SP) Medium dense, moist, (Fill pad for adjacent utility pole?).	
			2			
			3		GRAY SILTY SAND (SM) Dense, wet, with some gravel (Till).	
			4		Water seepage noted at 3.5 ft bgs.	
			5		Test pit terminated at 5 ft bgs. Groundwater encountered at 4 ft bgs during excavation. No hydrocarbon-like odor noted in soil. No hydrocarbon-like sheen on water.	
			6			
			7			

Location: _____
Surface Elevation: _____

Date Completed: 9-22-05
Logged By: LEP

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington

Test Pit TP-11
Project No: 19897.45486

Figure: C6
1 of 1



TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITS.GPJ CDM BILLY.GDT 12/21/05 REV.

Other Tests	OVM (ppm)	TMP	Depth (feet)	Sample	Symbol	<p style="text-align: center;">Strataprobe TP-12</p> <p style="text-align: center;">DESCRIPTION</p>	Elev. (feet)
			▽			<p>DARK BROWN SILT (ML) Soft, wet, with some sand and organics.</p>	
			1			<p>GRAY SILTY SAND (SM) Dense, wet, with some gravel (Till).</p> <p>Becomes brown.</p>	
			2			<p>GRAY SAND (SP) Dense, saturated, with some silt (Till).</p>	
			3			<p>Test pit terminated at 3 ft bgs. Groundwater encountered at 0.5 ft bgs during excavation. Seepage noted at 0.5 ft bgs and 2 ft bgs. No hydrocarbon-like odor in soil. No hydrocarbon-like sheen on water.</p>	
			4				
			5				
			6				
			7				

Location: _____
Surface Elevation: _____

Date Completed: 9-22-05
Logged By: LEP

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington

Test Pit TP-12
Project No: 19897.45486

Figure: C7
1 of 1



Strataprobe TP-13

Other Tests	OVM (ppm)	TMP	Depth (feet)	Sample	Symbol	DESCRIPTION	Elev. (feet)
			1			<p>BROWN SILT (ML) Medium stiff, wet, with some sand, gravel, and organics.</p> <hr style="border-top: 1px dashed black;"/> <p>GRAY-BROWN SILTY SAND (SM) Dense, moist, with some gravel (Till).</p> <p style="text-align: center;">~2-inch-thick asphalt-like material noted in south corner of test pit at ~1.5 ft bgs.</p>	
			2				
			3				
			4			<p>Test pit terminated at 3.7 ft bgs. Groundwater encountered at 2.4 ft bgs during excavation. No hydrocarbon-like odor noted in soil. No hydrocarbon-like sheen noted on water.</p>	
			5				
			6				
			7				

Location: _____
Surface Elevation: _____

Date Completed: 9-22-05
Logged By: LEP

King County
Ellisport Creek Greenspace Project Site
Vashon Island, Washington

Test Pit TP-13
Project No: 19897.45486

Figure: C8
1 of 1



TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITS.GPJ CDM BLLV.GDT 12/21/05 REV.

Lab
Sample
Collected

Strataprobe TP-14

Other Tests	OVM (ppm)	TMP	Depth (feet)	Sample	Symbol	DESCRIPTION	Elev. (feet)
						Forest duff/tree roots.	
Lab Sample Collected			1			BROWN SILT (ML) Medium stiff, wet, with some sand and organics.	
						Seepage noted at 1.8 ft bgs.	
			2			GRAY SILTY SAND (SM) Dense, saturated, with some gravel (Till).	
			3			Test pit terminated at 2.3 ft bgs. Groundwater encountered at 1.5 ft bgs during excavation. No hydrocarbon-like odor noted in soil. No hydrocarbon-like sheen on water.	
			4				
			5				
			6				
			7				

Location: _____
 Surface Elevation: _____

Date Completed: 9-22-05
 Logged By: LEP

King County
 Ellisport Creek Greenspace Project Site
 Vashon Island, Washington

Test Pit TP-14
 Project No: 19897.45486

Figure: C9
 1 of 1



TEST PIT TEMP KING COUNTY ELLISPORT CREEK TEST PITS.GPJ CDM BLLV.GDT 12/21/05 REV.

D

Appendix
D

Appendix D

Cultural Resources Monitoring Report



October 25, 2005
5-91M-154890

Received
OCT 26 2005

CDM

Camp Dresser McKee
11811 NE First Street, Suite 201
Bellevue, Washington 98005
(425) 453-8383
Fax: (425) 646-9523

Attention: Mr. Lance Peterson

Subject: Ellisport Creek Greenspace Assessment—Cultural Resources Monitoring

Dear Mr. Peterson:

King County Department of Natural Resources and Parks (DNRP), Solid Waste Division, conducted limited testing of soils at the Ellisport Creek Greenspace site to determine the level of soil contamination in support of future cleanup of the site. The soil testing at this location is funded by the U.S. Environmental Protection Agency's (EPA) Brownfield program. It is subject to Section 106 of the National Historic Preservation Act and its implementing regulations because it is a federal undertaking.

The Archaeologist for King County Department of Transportation, Road Services Division recommended archaeological monitoring at this site. Camp Dresser McKee (CDM) retained AMEC Earth & Environmental, Inc. (AMEC) to monitor excavation of sediments associated with the soil testing at the Ellisport Creek Greenspace site on Vashon Island, Washington. This report describes the results of the archaeological monitoring conducted by AMEC on September 22, 2005.

Site Description

The property is located in the southeast quarter of Section 5, Township 22 North, Range 3 East, Vashon Quadrangle, Willamette Meridian (Figure 1). The area of potential effect for this Phase II Site Assessment was defined by King County DNRP as "those portions of a 3.5-acre wooded wetland and 5 acres of tidelands in which testing is proposed" (Miller N.D.). The test pits were located to the west of Ellisport Creek and to the north of Chautauqua Beach Drive (Figure 2).

Prior to World War II, the Ellisport Creek Greenspace site was the location of a sawmill and greenhouse operation. Bunker oil was transported to this location for use in the greenhouse operations. Storage of bunker oil may have resulted in soil contamination at this site.

AMEC Earth & Environmental, Inc.
11335 NE 122nd Way, Suite 100
Kirkland, Washington
USA 98034
Tel (425) 820-4669
Fax (425) 821-3914
www.amec.com

Previous Investigations

A Section 106 cultural resources assessment was completed by Fenelle Miller, the archaeologist for King County Department of Transportation, Road Services Division (Miller N.D.). Her report identified cultural resources in the project vicinity but determined that there were no known cultural resources in the project area. In addition, she determined that the project had no potential to adversely affect traditional cultural properties or aboveground historic resources. However, because the project site is located within a wetland, archeological testing was not conducted. A recommendation was made to have a professional archaeologist monitor all ground-disturbing activities to prevent adverse effects to any previously undetected cultural resources that may be present.

Consultation

Prior to the field work, AMEC notified Judy Wright, the Tribal Historian for the Puyallup Tribe, to review the proposed work. Two members of the Tribe came out to the project site on September 20, 2005 to observe the testing and assist with monitoring for archaeological resources.

Procedures

On September 22, 2005, AMEC monitored the collection of soil samples at the project site. These samples were collected to measure the extent of hydrocarbon contamination. Six surface soil samples were collected and eight test pits were excavated and sampled. The surface samples (T1 through T6) were taken from a small area within 1 foot of the surface, and the eight test pits were excavated to depths between 3 and 10 feet below ground surface. AMEC monitored the backhoe excavation of the eight test pits (T7 through T14). The goals of the monitoring were to identify archaeological resources that may be significant, and to prevent adverse effects to these resources from the sampling excavations.

AMEC monitored the excavation from the edge of the test pit and communicated with the backhoe operator when a closer inspection of the profile or sediments was necessary. The sediments that were removed were visually inspected for cultural materials. Archaeological screening methods were not employed because hydrocarbons were expected in the sediments. Observations were documented for each test pit that described the sediment composition and the cultural materials observed.

Observations

The sediments on the west side of Ellisport Creek in this area are part of the Everett soil series and are made up of somewhat excessively drained soils underlain by gravelly sand at a depth of 18 to 36 inches (USDA 1973). Although the soil profiles within the test units varied slightly in composition, most units exhibited a sequence, from surface to bottom, of duff, a silty loam stratum, and unweathered glacial till (Photographs 3 through 18). Small fragments of mollusk shell (<1 centimeters) were identified in T7, and wood, brick, glass, asphalt, metal, and concrete fragments were identified in T7, T8, T9, and T13 (Table 1). In T8, excavations encountered a concrete footing

that may have been associated with the bunker-oil storage tank. Hydrocarbons were present above and adjacent to the footing.

Table 1: Cultural Materials Present in the Test Pits

Test Pit	Cultural Materials Present
T7	Brick fragments
T8	Concrete footing, brick, wood, and glass fragments
T9	Ceramic pipe and metal fragments
T10	
T11	
T12	
T13	Small piece of asphalt
T14	

Conclusions and Recommendations

In conclusion, there was no evidence for any pre-contact period cultural remains in the project area. Several fragments of historic cultural materials, as well as the remains of architectural features, were documented. The significance of the historic archaeological materials encountered during the monitoring observations was not assessed; only part of the footing was exposed. The sediments surrounding the concrete footing did show further potential for providing information regarding the historic operations associated with the greenhouse and sawmill. Other physical remains associated with the historic operations that were located here may be present at other locations within the project area. Therefore, if further soil remediation or cleanup is proposed beyond the testing already completed, all subsurface work should have an archaeological monitor present. If significant historic archaeological deposits associated with the greenhouses or sawmill operations are discovered during the remediation excavations, work should be halted and King County and the Department of Archaeology and Historic Preservation should be contacted. If pre-contact archaeological deposits are discovered, the Puyallup Tribe should be notified also.

Sincerely,

AMEC Earth & Environmental, Inc.



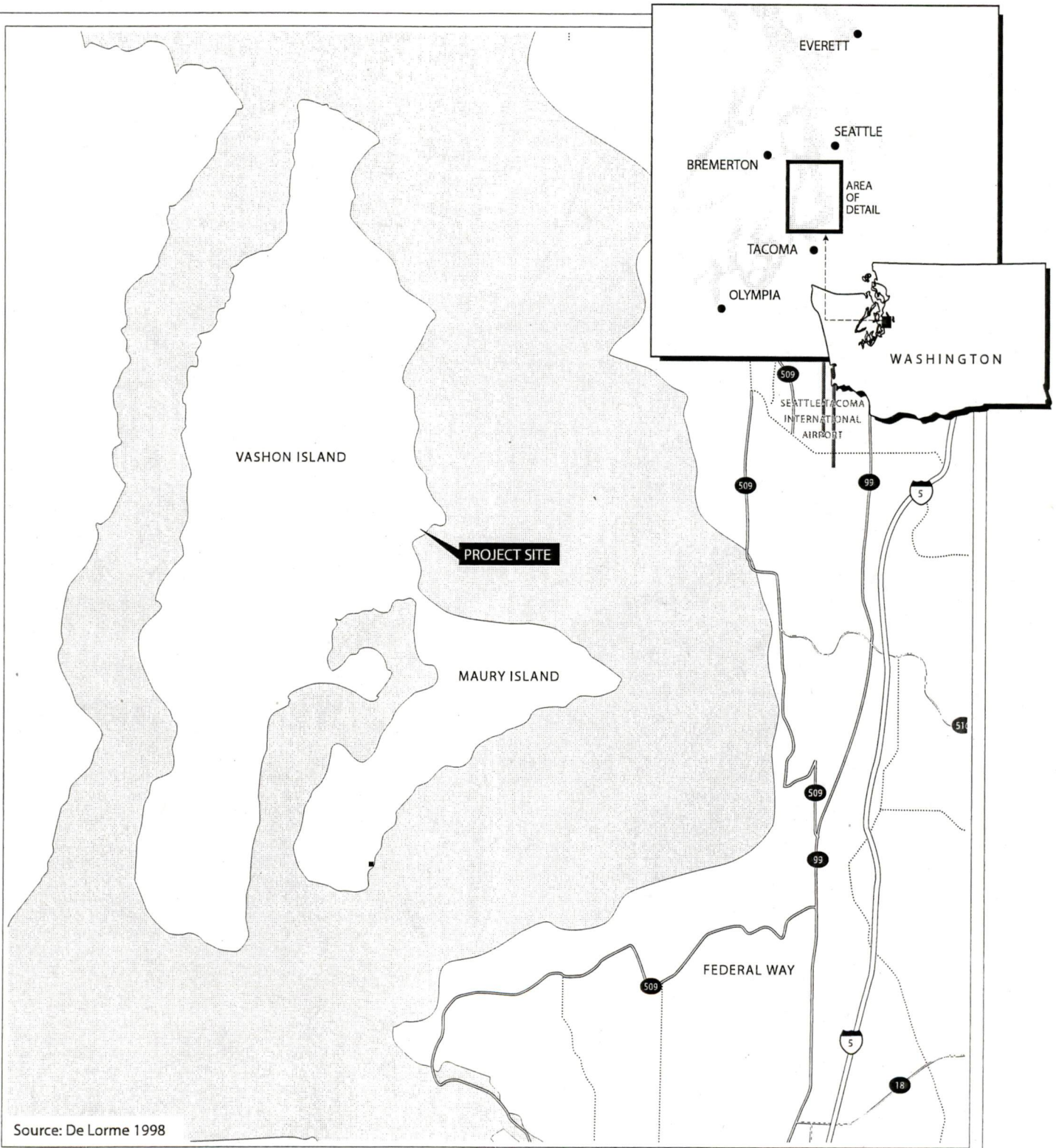
Lara C. Rooke
Archaeologist

cc: Judy Wright, Puyallup Tribe

References Cited

USDA. 1973. Soil survey, King County area, Washington. Soil Conservation Service, United States Department of Agriculture.

Miller, Fenelle. N.D. Preliminary cultural resources assessment of the proposed Phase II Site Assessment at the Ellisport Creek site on Vashon Island. Conducted in support of the EPA's Section 106 compliance responsibilities. Prepared for King County Department of Natural Resources and Parks, Solid Waste Division, Washington.



Source: De Lorme 1998



FIGURE 1

PROJECT VICINITY MAP



Source: Google Earth 2005



NTS

ELLISPORT CREEK

FIGURE 2

TEST PIT LOCATIONS





Photograph 1: View from the Project Site Southeast.



Photograph 2: View towards the Project Site West.



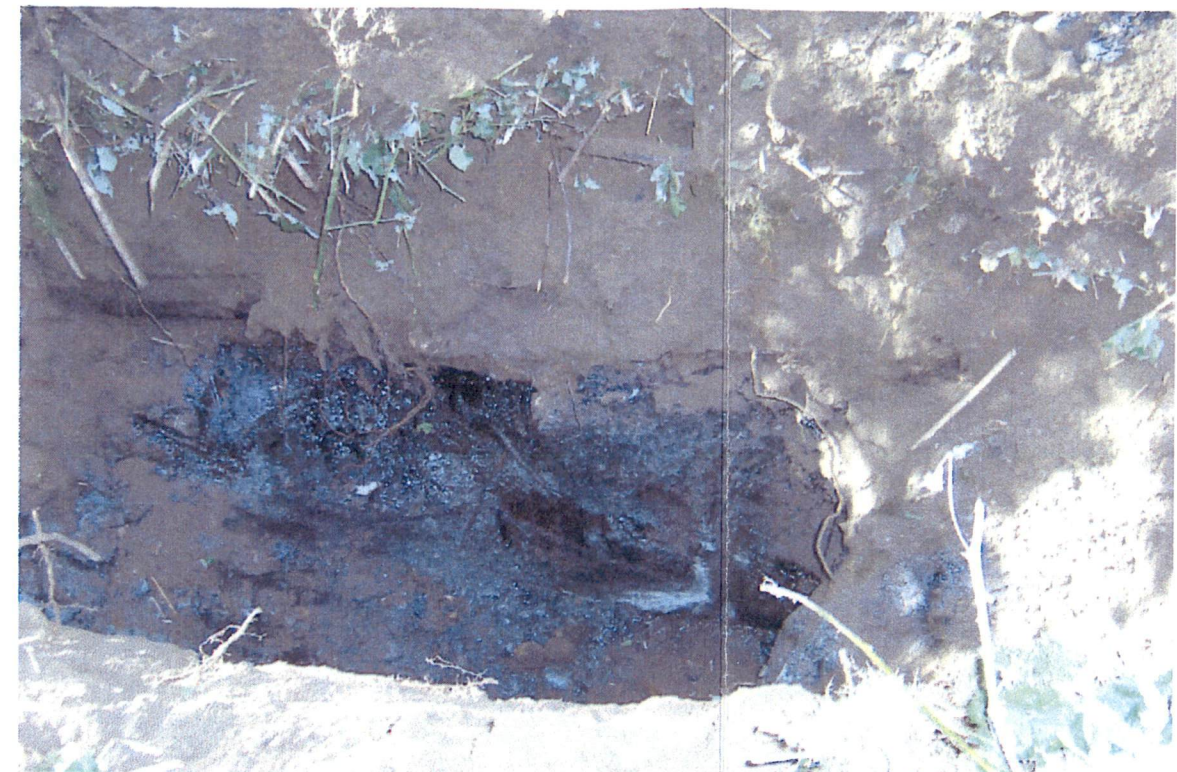
Photograph 3: The Location of Test Pit 7.



Photograph 4: The Profile of Test Pit 7.



Photograph 5: The Location of Test Pit 8.



Photograph 6: The Profile of Test Pit 8.



Photograph 7: The Location of Test Pit 9.



Photograph 8: The Profile of Test Pit 9.



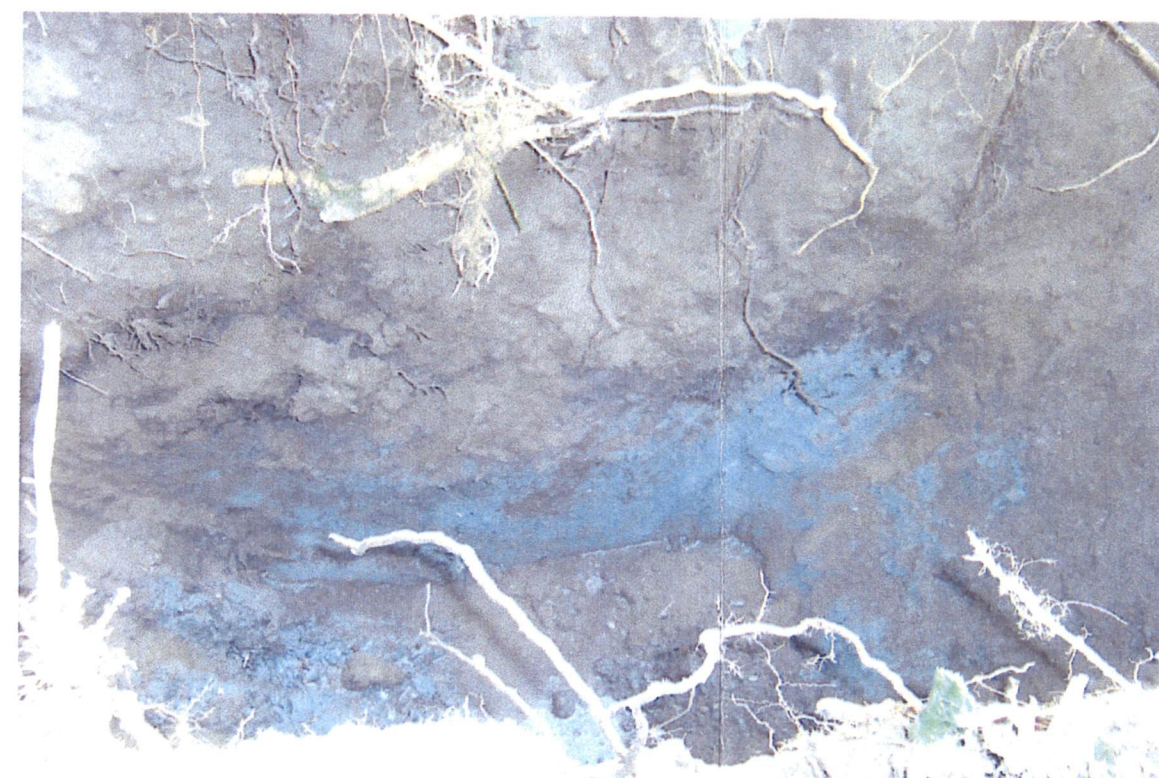
Photograph 9: The Location of Test Pit 10.



Photograph 10: The Profile of Test Pit 10.



Photograph 11: The Location of Test Pit 11.



Photograph 12: The Profile of Test Pit 11.



Photograph 13: The Location of Test Pit 12.



Photograph 14: The Profile of Test Pit 12.



Photograph 15: The Location of Test Pit 13.



Photograph 16: The Profile of Test Pit 13.



Photograph 17: The Location of Test Pit 14.



Photograph 18: The Profile of Test Pit 14.

E

Appendix

E

F

Appendix F

Appendix E

Soil Management Correspondence



JUL 27 2005

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

July 26, 2005

Mr. Lance Peterson
Camp Dresser & McKee, Inc.
11811 NE 1st Street
Suite 201
Bellevue, WA 98005



Your address
is in the
**Cedar-
Sammamish**
watershed

Dear Mr. Peterson:

Re: Ellisport Creek Greenspace Project Site in Vashon Island
Reference: Letter from L. Peterson, CDM to B. Maeng, Ecology, dated July 19, 2005

This letter is to respond to your inquiry regarding whether the soils to be excavated from the test pits at the Ellisport Creek Greenspace Project site in Vashon Island designate under State Dangerous Waste Regulations (Chapter 173-303 WAC).

The Washington State Department of Ecology reviewed the sampling data included in the above referenced letter. Based on the sampling data reviewed, the soils do not designate as dangerous wastes under the State Dangerous Waste Regulations. Therefore, excavation of the soils is not considered as generation of dangerous wastes, and the soils can be replaced within each respective test pit. However, since the soils are contaminated with total petroleum hydrocarbons (TPH), the excavated soils shall be properly managed to prevent contact with rain (or storm water) in order to eliminate the potential migration of generated TPH contaminated storm water into the adjacent surface water body.

If you have any questions, please feel free to call me at (425)-649-7253 or email me at bmae461@ecy.wa.gov.

Sincerely,

Byung Maeng, PE
Hazardous Waste and Toxics Reduction Program
Northwest Regional Office

BM:sd

cc: Louise Bardy, Ecology-TCP



11811 N.E. 1st Street, Suite 201
Bellevue, Washington 98005
tel: 425 453-8383
fax: 425 646-9523

July 19, 2005

Mr. Byung Maeng
Washington State Department of Ecology
Toxics Cleanup Program
Northwest Regional Office
3190-160th Avenue SE
Bellevue, Washington 98009-5452

Subject: Media Evaluation - Proposed Phase II Environmental Site Assessment
Ellisport Creek Greenspace Project Site
53616 SE 116th
Vashon Island, Washington
Ecology Identifier: 62636476

Dear Mr. Maeng:

This letter responds to a comment resulting from the Washington State Department of Ecology's (Ecology) review of the April 7, 2005 Sampling and Quality Assurance Plan prepared by Camp Dresser & McKee Inc. (CDM) for the above-referenced project. This letter was prepared by CDM on behalf of the King County Solid Waste Division (the County). CDM is under contract with the County to conduct a Phase II environmental site assessment (ESA) planned for the site in the summer of 2005. The ESA is being performed to collect supplemental information to aid in cleanup planning associated with a Bunker C oil release that occurred prior to 1960. The proposed ESA includes excavation of up to 10 shallow test pits. At the completion of each test pit the removed material will be replaced within each respective test pit.

Ecology's comment pertains to the "waste" generated from test pit excavation, specifically whether the excavated material could be considered a dangerous waste. We evaluated the soil to be excavated according to WAC-173-303 Dangerous Waste Regulation, specifically toxicity characteristic, toxicity criteria, and persistence criteria. The evaluation yielded the following results:

- Toxicity Characteristic (WAC 173-303090(8)) – Generated waste is excluded from the toxicity characteristic
- Toxicity criteria (WAC 173-303-100) – Generated waste is not a toxic dangerous waste
- Persistence criteria – (WAC 173-303-100) – Generated waste is not a persistent dangerous waste



Mr. Byung Maeng
July 19, 2005
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The evaluation used polycyclic aromatic hydrocarbon (PAH) data obtained during Phase II investigation work conducted at the site by CDM (formerly AGI Technologies) in 1999. The tabulated data are attached to this letter.

Toxicity Characteristic

WAC 173-303-071(3) (t) exempts petroleum-contaminated media and debris from toxicity characteristic for dangerous waste numbers D018 through D043.

Toxicity Criteria

The Toxic Category or Classification (i.e. A, B, C, D) was obtained using the U.S. Environmental Protection Agency's (EPA) IRIS database (<http://www.epa.gov/iris/subst/0455.htm>) and information from Safety Data Sheets (http://www.irmm.jrc.be/html/reference_materials_catalogue/catalogue/index.htm).

The Equivalent Concentration was found by entering the percent concentration values (calculated in Table 1) in the following formula:

$$\text{EquivalentConcentration}(\%) = \frac{\sum X\%}{1} + \frac{\sum A\%}{10} + \frac{\sum B\%}{100} + \frac{\sum C\%}{1000} + \frac{\sum D\%}{10000}$$

PAH	Classification	Equivalent Concentration (%)
Acenaphathene	**A	0.000032415
Phenanthrene	D	
Fluoranthene	D	
Pyrene	D	
*Benzo[a]Fluoranthene	**A	
Chrysene	B2	
Benzo(a)Pyrene	B2	
Benzo(g,h,i)Perylene	D	

* Not found on PAH list of concern (WAC 173-303-040)-Used in calculation as worse case scenario.

**Classification could not be found; assumed worse case scenario by assigning classification A.

Since the Equivalent Concentration (%) is less than 0.001%, the soil is not a dangerous waste under the toxicity criteria.



Mr. Byung Maeng
July 19, 2005
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Persistence Criteria

The total PAH concentration was determined by summing the concentration percentages of each detected PAH (Table 1). The total PAH concentration was calculated to be 0.00195%. Since the percent concentration is less than 1.0%, the soil is not a persistent dangerous waste.

Table 1 – PAH Percent Concentration

PAH	ug/kg	Percent Concentration
Acenaphathene	1700	0.00017
Phenanthrene	2100	0.00021
Fluoranthene	1300	0.00013
Pyrene	6800	0.00068
*Benzo[a]Fluoranthene	1000	0.0001
Chrysene	3900	0.00039
Benzo(a)Pyrene	1400	0.00014
Benzo(g,h,i)Perylene	1300	0.00013
Total %		0.00195

*Not found on PAH list of concern (WAC 173-303-040)-Used in calculation as worse case scenario.

In summary, soil generated during proposed test pit excavation is not a dangerous waste based on existing analytical data. It will be appropriate to manage test pit spoils by using them to backfill the excavation following soil sample collection.

Very truly yours,

Lance E. Peterson, LHG
Senior Hydrogeologist
Camp Dresser & McKee Inc.

cc: Louise Bardy, Washington State Department of Ecology
Lucy Sandler Auster, King County



Attachment

Tabulated analytical data from the following report:

AGI, 1999. *Limited Phase II Environmental Site Assessment, Ellisport Creek Acquisition Site, Vashon Island, Washington*. Prepared for Vashon Park District. September 17, 1999.

Polycyclic Aromatic Hydrocarbon (PAH) data from soil sample S7 were used in the media evaluation.

Table 1
NWTPH-HCID and WTPH-D (extended) Soil and Groundwater Sample Testing Results
 Vashon Park District/Ellisport Phase II Site Assessment
 Vashon, Washington

Soil Samples

Sample No.	Date Sampled	Washington State Test Method				
		NWTPH - HCID			WTPH-D (extended)	
		Gasoline	Diesel	Oil	Diesel	Oil
		mg/kg			mg/kg	
S1	07/13/99	ND	ND	D	ND	52
S2	07/13/99	ND	ND	D	ND	ND
S3	07/13/99	ND	ND	D	ND	110
S4	07/13/99	ND	ND	D	380	4,400
S5	07/13/99	ND	ND	ND	NA	NA
S6	07/13/99	ND	ND	D	120	420
S7	07/13/99	ND	ND	D	64,000	90,000
S8	07/13/99	ND	ND	D	ND	370
S9	07/13/99	ND	ND	ND	NA	NA
S10	07/13/99	ND	ND	ND	NA	NA
S11	07/13/99	ND	ND	D	32	310
S12	07/13/99	ND	ND	ND	NA	NA
S13	07/13/99	ND	ND	ND	NA	NA
S14	07/13/99	ND	ND	ND	NA	NA
S15	07/13/99	ND	ND	ND	NA	NA
S16	07/13/99	ND	ND	ND	NA	NA
S17	07/13/99	ND	ND	ND	NA	NA
Laboratory Detection Limit		20	50	100	25	50
Cleanup Level ^a		--	--	--	200	200

Groundwater Sample

Sample No.	Date Sampled	Washington State Test Method				
		NWTPH - HCID			WTPH-D (extended)	
		Gasoline	Diesel	Oil	Diesel	Oil
		µg/L			µg/L	
W1	07/14/99	NA	NA	NA	57,000	100,000
Cleanup Level ^b		--	--	--	1,000	1,000

Notes:

- Shaded value indicates that concentration exceeds cleanup level.
- a) Washington Administrative Code Chapter 173-340 Model Toxics Control Act Cleanup Regulation Method A suggested cleanup level for residual soil.
- b) Washington Administrative Code Chapter 173-340 Model Toxics Control Act Cleanup Regulation Method A suggested cleanup level for groundwater.
- HCID - Ecology Hydrocarbon Identification Method.
- WTPH-D (extended) – total petroleum hydrocarbons quantified as diesel and oil.
- D - detected above laboratory detection limit.
- NA - not analyzed.
- ND – not detected at or above laboratory detection limit.
- mg/kg – milligram per kilogram.
- µg/L - microgram per liter.

Table 2
BETX, PCB, and PAH Soil and Groundwater Sample Testing Results
 Vashon Park District/Ellisport Phase II Site Assessment
 Vashon, Washington

Analyte	Laboratory Detection Limit Soil	Cleanup Level Soil	Sample I.D. S7	Laboratory Detection Limit Groundwater	Cleanup Level Groundwater	Sample I.D. W1
EPA Test Method 8021						
	<u>mg/kg</u>	<u>mg/kg</u>	<u>mg/kg</u>	<u>µg/L</u>	<u>µg/L</u>	<u>µg/L</u>
Benzene	0.4	0.5	ND	1	5	ND
Ethylbenzene	0.4	20	ND	1	30	ND
Toluene	0.4	40	ND	1	40	ND
Xylenes	1.2	20	ND	5	20	ND
EPA Test Method 8082M						
	<u>mg/kg</u>	<u>mg/kg</u>	<u>mg/kg</u>			
PCB-1016	0.1	1	ND	N/A	N/A	NA
PCB-1221	0.1	1	ND	N/A	N/A	NA
PCB-1232	0.1	1	ND	N/A	N/A	NA
PCB-1242	0.1	1	ND	N/A	N/A	NA
PCB-1248	0.1	1	ND	N/A	N/A	NA
PCB-1254	0.1	1	ND	N/A	N/A	NA
PCB1260	0.1	1	ND	N/A	N/A	NA
Polyaromatic Hydrocarbons (PAHs)						
EPA Test Method 8270						
	<u>µg/kg</u>	<u>µg/kg</u>	<u>µg/kg</u>	<u>µg/L</u>	<u>µg/L</u>	<u>µg/L</u>
Napthalene	1,000		ND	0.5		34
Acenaphthylene	1,000		ND	0.5		0.5
Acenaphathene	1,000		1,700	0.5		8.2
Fluorine	1,000		ND	0.5		10
Phenanthrene	1,000		2,100	0.5		37
Anthracene	1,000		ND	0.5		8.1
Fluoranthene	1,000		1,300	0.5		9.4
Pyrene	1,000		6,800	0.5		14
Benzo [a] Fluoranthene	1,000		1,000	0.5		3.6
Chrysene	1,000		3,900	0.5		7.2
Benzo (b) Fluoranthene	1,000		ND	0.5		5.3
Benzo (k) Fluoranthene	1,000		ND	0.5		5.3
Benzo (a) Pyrene	1,000		1,400	0.5		2.7
Indeno (1,2,3-cd) Pyrene	1,000		ND	0.5		ND
Dibenz (a,h) Anthracene	1,000		ND	0.5		ND
Benzo (g,h,i) Perylene	1,000		1,300	0.5		1.3

Notes:

mg/kg – milligram per kilogram.

µg/kg - microgram per kilogram.

ug/L - micrograms per liter

N/A - not applicable.

NA - not analyzed.

ND – not detected

Appendix F

Analytical Laboratory Reports

Quality Assurance Report

Project and Sample Information

Project Name: Ellisport Creek Greenspace Project Site
Project No.: 19897-45486
Lab Name: OnSite Environmental Inc. (OnSite), Redmond, Washington
Spectra Laboratories, Tacoma, Washington
Lab Numbers: OnSite 0509-192 and 0509-193
Sample No.: EC-S1-9/05, EC-S2-9/05, EC-S3-9/05, EC-S4-9/05, EC-S5-9/05,
EC-S6-9/05, EC-S7-9/05, EC-S8-9/05, EC-S9-9/05, EC-S10-9/05,
EC-S11-9/05, EC-S12-9/05, EC-S13-9/05, EC-S14-9/05, EC-S15-
9/05, EC-S16-9/05, EC-S17-9/05, EC-S18-9/05, EC-S19-9/05, EC-
S20-9/05, EC-S21-9/05, EC-S22-9/05
Matrix: Soil

1.0 Quality Assurance Summary

This Quality Assurance Report (QAR) provides a summary of quality assurance (QA) findings. This review of the project data was performed using the Ellisport Creek Greenspace Project Site Sampling and Quality Assurance Plan (SQAP; CDM, 2005); OnSite Environmental Inc. (OnSite) control limit criteria; and National Functional Guidelines for Organic Data Review (U.S. EPA, 1999). OnSite contracted with Spectra Laboratories to complete total organic carbon analysis of one sample.

This report includes a review of holding times, method blanks, surrogate and matrix spike recoveries, laboratory blank and matrix spike duplicate data, and chain-of-custody records. Selected samples were analyzed for diesel- and oil-range total petroleum hydrocarbons (TPH) quantitated as Bunker C oil, polycyclic aromatic hydrocarbons (PAHs), and total organic carbon (TOC). All samples extracted for NWTPH-Dx analysis were treated with an acid/silica gel cleanup procedure.

All data are of known quality and are acceptable for use.

2.0 Analytical Methods

The following methods were used to analyze the samples:

Parameter	Method
Diesel- and Oil-Range TPH	NWTPH-Dx (quantitated as Bunker C)
PAHs	EPA 8270C/SIM
Total Organic Carbon	EPA SW-846 9060

Project and Sample Information

Project Name: Ellisport Creek Greenspace Project Site
Project No.: 19897-45486
Lab Name: OnSite Environmental Inc. (OnSite), Redmond, Washington
Spectra Laboratories, Tacoma, Washington
Lab Numbers: OnSite 0509-192 and 0509-193
Sample No.: EC-S1-9/05, EC-S2-9/05, EC-S3-9/05, EC-S4-9/05, EC-S5-9/05,
EC-S6-9/05, EC-S7-9/05, EC-S8-9/05, EC-S9-9/05, EC-S10-9/05,
EC-S11-9/05, EC-S12-9/05, EC-S13-9/05, EC-S14-9/05, EC-S15-
9/05, EC-S16-9/05, EC-S17-9/05, EC-S18-9/05, EC-S19-9/05, EC-
S20-9/05, EC-S21-9/05, EC-S22-9/05
Matrix: Soil

3.0 Timeliness

Diesel- and Oil-range TPH

The recommended holding time for NWTPH-Dx is 14 days. All samples were extracted and analyzed within the recommended holding time. See **Table E-1** for holding times per sample.

PAHs

The recommended holding time for EPA Method 8270C/SIM is 14 days. All samples were extracted and analyzed within the recommended holding time. Sample EC-S6-9/05 was analyzed 15 days after collection, but was extracted within the 14 day holding period meeting the EPA recommended time. See **Table E-2** for holding times per sample.

Total Organic Carbon

The recommended holding time for EPA Method SW-846 9060 is 28 days. The one sample submitted for TOC analysis was analyzed within the recommended holding time (see **Table E-3**).

4.0 Chain-of-Custody

Field chain-of-custody forms were complete. All chain-of-custody forms were signed and dated. No issues with sample receipt conditions were indicated on the chain-of-custody forms or in the Case Narrative section of the laboratory reports. All samples listed on the chain-of-custody forms were analyzed as indicated.

Project and Sample Information

Project Name: Ellisport Creek Greenspace Project Site
Project No.: 19897-45486
Lab Name: OnSite Environmental Inc. (OnSite), Redmond, Washington
Spectra Laboratories, Tacoma, Washington
Lab Numbers: OnSite 0509-192 and 0509-193
Sample No.: EC-S1-9/05, EC-S2-9/05, EC-S3-9/05, EC-S4-9/05, EC-S5-9/05,
EC-S6-9/05, EC-S7-9/05, EC-S8-9/05, EC-S9-9/05, EC-S10-9/05,
EC-S11-9/05, EC-S12-9/05, EC-S13-9/05, EC-S14-9/05, EC-S15-
9/05, EC-S16-9/05, EC-S17-9/05, EC-S18-9/05, EC-S19-9/05, EC-
S20-9/05, EC-S21-9/05, EC-S22-9/05
Matrix: Soil

5.0 Field Quality Control Samples

Following is a list of the field quality controls samples that were collected during the September 2005 sampling event:

Field Duplicates

<u>Sample ID</u>	<u>Duplicate ID</u>
EC-S3-9/05	EC-S4-9/05
EC-S8-9/05	EC-S9-9/05

Rinsate Samples

Sample ID
Rinsate

Trip Blank – submitted with samples collected on September 22, 2005

Field Duplicates: Duplicate relative percent differences (RPD) could not be calculated for the first set of field duplicates as the analytes were not detected in one or both of the samples. The duplicate RPD for the second set of field duplicates was 26.8% for lube oil-range TPH. See **Table E-4** for calculation of RPD for each duplicate set.

A RPD duplicate precision limit for diesel and oil-range TPH was not established by the SQAP for the Ellisport Creek Greenhouse Project Site. The precision and representativeness of duplicate soil samples is largely based on how homogenous soil is in the area where the samples were collected. Each sample was collected as a discrete unit and was not composited, increasing the likelihood of variability between duplicates.

Project and Sample Information

Project Name: Ellisport Creek Greenspace Project Site
Project No.: 19897-45486
Lab Name: OnSite Environmental Inc. (OnSite), Redmond, Washington
Spectra Laboratories, Tacoma, Washington
Lab Numbers: OnSite 0509-192 and 0509-193
Sample No.: EC-S1-9/05, EC-S2-9/05, EC-S3-9/05, EC-S4-9/05, EC-S5-9/05,
EC-S6-9/05, EC-S7-9/05, EC-S8-9/05, EC-S9-9/05, EC-S10-9/05,
EC-S11-9/05, EC-S12-9/05, EC-S13-9/05, EC-S14-9/05, EC-S15-
9/05, EC-S16-9/05, EC-S17-9/05, EC-S18-9/05, EC-S19-9/05, EC-
S20-9/05, EC-S21-9/05, EC-S22-9/05
Matrix: Soil

5.0 Field Quality Control Samples (continued)

Rinsate Sample: No analytes were detected at or above OnSite's Practical Quantitation Limit (PQL) for NWTPH-Dx.

Trip Blank: No analytes were detected at or above OnSite's PQL for NWTPH-Dx.

6.0 Laboratory Quality Control Samples

Method Blank: Diesel- and Oil-range TPH: No target compounds were detected at or above the PQL.

PAHs: No target compounds were detected at or above the PQL.

Matrix Spike: Diesel- and Oil-range TPH: Matrix spike analyses were not performed on samples submitted for diesel- and oil-range TPH analyses. Refer to duplicate data for precision data.

PAHs: Matrix spike and matrix spike duplicate (MS/MSD) percent recoveries and RPD values were within OnSite's control limit criteria for PAHs except for one matrix spike sample where the percent recovery value for benzo(k)fluoranthene was less than the control limit. Since the spike blank was within control limits, no further action was taken. In another matrix spike, the sample contained high concentrations of four of the 11 spike compounds which rendered the spiked concentration of these compounds meaningless for MS/MSD recovery data. RPD values, however, were within OnSite's control limits.

Project and Sample Information

Project Name: Ellisport Creek Greenspace Project Site
Project No.: 19897-45486
Lab Name: OnSite Environmental Inc. (OnSite), Redmond, Washington
Spectra Laboratories, Tacoma, Washington
Lab Numbers: OnSite 0509-192 and 0509-193
Sample No.: EC-S1-9/05, EC-S2-9/05, EC-S3-9/05, EC-S4-9/05, EC-S5-9/05,
EC-S6-9/05, EC-S7-9/05, EC-S8-9/05, EC-S9-9/05, EC-S10-9/05,
EC-S11-9/05, EC-S12-9/05, EC-S13-9/05, EC-S14-9/05, EC-S15-
9/05, EC-S16-9/05, EC-S17-9/05, EC-S18-9/05, EC-S19-9/05, EC-
S20-9/05, EC-S21-9/05, EC-S22-9/05
Matrix: Soil

6.0 Laboratory Quality Control Samples (continued)

Duplicate: Diesel- and Oil-range TPH: Laboratory duplicate analyses were performed for NWTPH-Dx. Results were within OnSite's duplicate criteria. Analytes were not detected in one or both of the samples and RPD values could not be calculated.

PAHs: Duplicate analyses were not performed on samples submitted for PAH analyses. Refer to MS/MSD data for precision information.

Surrogates: Diesel- and Oil-range TPH: The laboratory used one surrogate spike compound for diesel- and oil-range TPH analyses. All surrogate percent recoveries were within the laboratory control limits (LCL - 50%, UCL - 150%).

PAHs: The laboratory used three surrogate-spiking compounds for PAH analyses. All surrogate percent recoveries were within OnSite's control limit criteria for EPA Method 8270C/SIM. Surrogate percent recoveries were not available for samples for which dilution was necessary.

Project and Sample Information

Project Name: Ellisport Creek Greenspace Project Site
Project No.: 19897-45486
Lab Name: OnSite Environmental Inc. (OnSite), Redmond, Washington
Spectra Laboratories, Tacoma, Washington
Lab Numbers: OnSite 0509-192 and 0509-193
Sample No.: EC-S1-9/05, EC-S2-9/05, EC-S3-9/05, EC-S4-9/05, EC-S5-9/05,
EC-S6-9/05, EC-S7-9/05, EC-S8-9/05, EC-S9-9/05, EC-S10-9/05,
EC-S11-9/05, EC-S12-9/05, EC-S13-9/05, EC-S14-9/05, EC-S15-
9/05, EC-S16-9/05, EC-S17-9/05, EC-S18-9/05, EC-S19-9/05, EC-
S20-9/05, EC-S21-9/05, EC-S22-9/05
Matrix: Soil

Signatures

Prepared by: Jennette Mullin Date: 11/28/05
Checked by: Amce Peterson Date: 11/23/05

Table E-1 - Sample Holding Times - Diesel and Oil-Range TPH
Ellisport Creek Greenspace Project Site

Sample ID	Date Sampled	Date Extracted	Date Analyzed	Time Until Extraction (days)	Time Until Analysis (days)
EC-S1-9/05	9/21/2005	9/27/2005	10/4/2005	6	13
EC-S2-9/05	9/21/2005	9/27/2005	10/4/2005	6	13
EC-S3-9/05	9/21/2005	9/27/2005	10/4/2005	6	13
EC-S4-9/05	9/21/2005	9/27/2005	9/28/2005	6	7
EC-S6-9/05	9/21/2005	9/27/2005	9/28/2005	6	7
EC-S7-9/05	9/21/2005	9/27/2005	9/28/2005	6	7
EC-S8-9/05	9/21/2005	9/27/2005	10/2/2005	6	11
EC-S9-9/05	9/21/2005	9/27/2005	10/2/2005	6	11
EC-S10-9/05	9/21/2005	9/27/2005	10/2/2005	6	11
EC-S11-9/05	9/21/2005	9/27/2005	9/28/2005	6	7
EC-S12-9/05	9/21/2005	9/27/2005	9/28/2005	6	7
EC-S13-9/05	9/21/2005	9/27/2005	9/28/2005	6	7
EC-S14-9/05	9/22/2005	9/27/2005	10/4/2005	5	12
EC-S16-9/05	9/22/2005	9/27/2005	10/4/2005	5	12
EC-S17-9/05	9/22/2005	9/27/2005	10/4/2005	5	12
EC-S18-9/05	9/22/2005	9/27/2005	9/29/2005	5	7
EC-S19-9/05	9/22/2005	9/27/2005	9/29/2005	5	7
EC-S20-9/05	9/22/2005	9/27/2005	9/29/2005	5	7
EC-S21-9/05	9/22/2005	9/27/2005	9/29/2005	5	7
EC-S22-9/05	9/22/2005	9/27/2005	9/29/2005	5	7

Note:

Recommended holding time for NWTPH-Dx is 14 days.

Table E-2 - Sample Holding Times - PAHs
Ellisport Creek Greenspace Project Site

Sample ID	Date Sampled	Date Extracted	Date Analyzed	Time Until Extraction (days)	Time Until Analysis (days)
EC-S5-9/05	9/21/2005	9/26/2005	9/27/2005	5	6
EC-S6-9/05	9/21/2005	10/5/2005	10/6/2005	14	15
EC-S14-9/05	9/22/2005	10/5/2005	10/6/2005	13	14
EC-S16-9/05	9/22/2005	10/5/2005	10/6/2005	13	14
EC-S20-9/05	9/22/2005	10/5/2005	10/6/2005	13	14
EC-S21-9/05	9/22/2005	10/5/2005	10/6/2005	13	14

Note:
 Recommended holding time for EPA Method 8270C/SIM is 14 days.

Table E-3 - Sample Holding Times - Total Organic Carbon
Ellisport Creek Greenspace Project Site

Sample ID	Date Sampled	Date Analyzed	Time Until Analysis (days)
EC-S5-9/05	9/21/2005	10/5/2005	14

Note:
 Recommended holding time for EPA Method SW-846 9060 is 28 days.

Table E-4: Calculation of Relative Percent Difference for Field Duplicates
 Ellisport Creek Greenspace Project Site

Analyte (µg/L)	Sample ID	Duplicate ID	RPD %
	EC-S3-9/05	EC-S4-9/05	
NWTPH-Dx			
Diesel Range	<40	<40	0.00
Lube Oil Range	<81	94	0.00

Analyte (µg/L)	Sample ID	Duplicate ID	RPD %
	EC-S8-9/05	EC-S9-9/05	
NWTPH-Dx			
Diesel Range	<36	<39	0.00
Lube Oil Range	84	110	26.80

< - analyte not detected at or greater than the listed concentration



October 7, 2005

Lance Peterson
CDM
P.O. Box 3885
Bellevue, WA 98009

Received
OCT 13 2005
CDM

Re: Analytical Data for Project 19897-45986
Laboratory Reference No. 0509-193

Dear Lance:

Enclosed are the analytical results and associated quality control data for samples submitted on September 23, 2005.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,



David Baumeister
Project Manager

Enclosures

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

Case Narrative

Samples were collected on September 21, 2005 and received by the laboratory on September 23, 2005. They were maintained at the laboratory at a temperature of 2°C to 6°C except as noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

PAHs EPA 8270C/SIM Analysis

Sample 09-150-03 was analyzed as the matrix spike/matrix spike duplicate. The percent recovery (%R) value for benzo(k)fluoranthene (54%) was less than the control limit of 57-131%. Since the spike blank was within control limits, no further action was taken.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

NWTPH-Dx

Date Extracted: 9-27-05
 Date Analyzed: 9-27&28&10-4-05

Matrix: Soil
 Units: mg/kg (ppm)

Client ID:	EC-S1-9/05	EC-S2-9/05	EC-S3-9/05
Lab ID:	09-193-01	09-193-02	09-193-03
Diesel Range:	ND	ND	ND
PQL:	41	36	40
Identification:	---	---	---
Lube Oil Range:	ND	ND	ND
PQL:	82	71	81
Identification:	---	---	---
Surrogate Recovery o-Terphenyl:	92%	61%	99%
Flags:	Y	Y	Y

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

NWTPH-Dx

Date Extracted: 9-27-05
 Date Analyzed: 9-27&28-05

Matrix: Soil
 Units: mg/kg (ppm)

Client ID:	EC-S4-9/05	EC-S6-9/05	EC-S7-9/05
Lab ID:	09-193-04	09-193-06	09-193-07
Diesel Range:	ND	ND	ND
PQL:	40	36	31
Identification:	---	---	---
Lube Oil Range:	94	410	ND
PQL:	81	71	62
Identification:	Bunker C	Bunker C	---
Surrogate Recovery			
o-Terphenyl:	72%	84%	96%
Flags:	Y	Y	Y

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

NWTPH-Dx

Date Extracted: 9-27-05
 Date Analyzed: 9-28&10-02-05

Matrix: Soil
 Units: mg/kg (ppm)

Client ID:	EC-S8-9/05	EC-S9-9/05	EC-S10-9/05
Lab ID:	09-193-08	09-193-09	09-193-10
Diesel Range:	ND	ND	ND
PQL:	36	39	27
Identification:	---	---	---
Lube Oil Range:	84	110	71
PQL:	71	77	54
Identification:	Bunker C	Bunker C	Bunker C
Surrogate Recovery o-Terphenyl:	71%	81%	106%
Flags:	Y	Y	Y

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

NWTPH-Dx

Date Extracted: 9-27-05
 Date Analyzed: 9-27&28-05

Matrix: Soil
 Units: mg/kg (ppm)

Client ID:	EC-S11-9/05	EC-S12-9/05	EC-S13-9/05
Lab ID:	09-193-11	09-193-12	09-193-13
Diesel Range:	ND	ND	ND
PQL:	28	27	28
Identification:	---	---	---
Lube Oil Range:	59	ND	ND
PQL:	55	54	56
Identification:	Bunker C	---	---
Surrogate Recovery			
o-Terphenyl:	72%	74%	96%
Flags:	Y	Y	Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

NWTPH-Dx
METHOD BLANK QUALITY CONTROL

Date Extracted: 9-27-05
Date Analyzed: 9-27-05

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0927S1

Diesel Range: **ND**

PQL: 25

Identification: ---

Lube Oil Range: **ND**

PQL: 50

Identification: ---

Surrogate Recovery

o-Terphenyl: 108%

Flags: Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

NWTPH-Dx
DUPLICATE QUALITY CONTROL

Date Extracted: 9-27-05
Date Analyzed: 10-2-05

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 09-193-10 09-193-10 DUP

Diesel Range: **ND** **ND**
PQL: 25 27

RPD: N/A

Surrogate Recovery
o-Terphenyl: 102% 106%

Flags: Y Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

NWTPH-Dx
DUPLICATE QUALITY CONTROL

Date Extracted: 9-27-05
Date Analyzed: 9-27-05

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 09-193-11 09-193-11 DUP

Diesel Range: ND ND

PQL: 25 25

RPD: N/A

Surrogate Recovery
o-Terphenyl: 93% 92%

Flags: Y Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

NWTPH-Dx

Date Extracted: 9-26-05
Date Analyzed: 9-26-05

Matrix: Water
Units: mg/L (ppm)

Client ID: Rinsate
Lab ID: 09-193-14

Diesel Range: **ND**
PQL: 0.25
Identification: ---

Lube Oil Range: **ND**
PQL: 0.40
Identification: ---

Surrogate Recovery
o-Terphenyl: 70%

Flags: Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

NWTPH-Dx
METHOD BLANK QUALITY CONTROL

Date Extracted: 9-26-05
Date Analyzed: 9-26-05

Matrix: Water
Units: mg/L (ppm)

Lab ID: MB0926W1

Diesel Range: **ND**
PQL: 0.25

Identification: ---

Lube Oil Range: **ND**
PQL: 0.40

Identification: ---

Surrogate Recovery
o-Terphenyl: 89%

Flags: Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

**NWTPH-Dx
DUPLICATE QUALITY CONTROL**

Date Extracted: 9-26-05
Date Analyzed: 9-26-05

Matrix: Water
Units: mg/L (ppm)

Lab ID: 09-201-01 09-201-01 DUP

Diesel Range: 0.267 ND
PQL: 0.25 0.25

RPD: N/A

Surrogate Recovery
o-Terphenyl: 90% 61%

Flags: Y Y

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

PAHs by EPA 8270C/SIM

Date Extracted: 9-26-05
 Date Analyzed: 9-27-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-193-05
 Client ID: EC-S5-9/05

Compound:	Results	Flags	PQL
Naphthalene	ND		0.035
2-Methylnaphthalene	ND		0.035
1-Methylnaphthalene	ND		0.035
Acenaphthylene	0.058		0.035
Acenaphthene	ND		0.035
Fluorene	ND		0.035
Phenanthrene	0.048		0.035
Anthracene	0.053		0.035
Fluoranthene	0.098		0.035
Pyrene	1.3		0.035
Benzo[a]anthracene	0.70		0.035
Chrysene	1.3		0.035
Benzo[b]fluoranthene	0.76		0.035
Benzo[k]fluoranthene	0.079		0.035
Benzo[a]pyrene	2.8		0.035
Indeno(1,2,3-c,d)pyrene	0.80		0.035
Dibenz[a,h]anthracene	0.56		0.035
Benzo[g,h,i]perylene	3.1		0.035

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	79	27 - 107
2-Fluorobiphenyl	84	33 - 100
Terphenyl-d14	85	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

**PAHs by EPA 8270C/SIM
 METHOD BLANK QUALITY CONTROL**

Date Extracted: 9-26-05
 Date Analyzed: 9-27-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: MB0926S1

Compound:	Results	Flags	PQL
Naphthalene	ND		0.0067
2-Methylnaphthalene	ND		0.0067
1-Methylnaphthalene	ND		0.0067
Acenaphthylene	ND		0.0067
Acenaphthene	ND		0.0067
Fluorene	ND		0.0067
Phenanthrene	ND		0.0067
Anthracene	ND		0.0067
Fluoranthene	ND		0.0067
Pyrene	ND		0.0067
Benzo[a]anthracene	ND		0.0067
Chrysene	ND		0.0067
Benzo[b]fluoranthene	ND		0.0067
Benzo[k]fluoranthene	ND		0.0067
Benzo[a]pyrene	ND		0.0067
Indeno(1,2,3-c,d)pyrene	ND		0.0067
Dibenz[a,h]anthracene	ND		0.0067
Benzo[g,h,i]perylene	ND		0.0067

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	63	27 - 107
2-Fluorobiphenyl	62	33 - 100
Terphenyl-d14	81	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

**PAHs by EPA 8270C/SIM
 MS/MSD QUALITY CONTROL**

Date Extracted: 9-26-05
 Date Analyzed: 9-27-05

Matrix: Soil
 Units: mg/kg (ppm)

Lab ID: 09-150-03

Compound:	Sample Amount	Spike Amount	MS	Percent Recovery	MSD	Percent Recovery	Recovery Limits	Flags
Naphthalene	0.00877	0.0833	0.0597	61	0.0556	56	30-115	
Acenaphthylene	ND	0.0833	0.0626	75	0.0544	65	46-125	
Acenaphthene	ND	0.0833	0.0582	70	0.0551	66	40-119	
Fluorene	ND	0.0833	0.0622	75	0.0578	69	50-133	
Phenanthrene	ND	0.0833	0.0596	72	0.0565	68	48-128	
Anthracene	ND	0.0833	0.0588	71	0.0545	65	53-134	
Fluoranthene	ND	0.0833	0.0654	79	0.0629	75	50-143	
Pyrene	ND	0.0833	0.0624	75	0.0603	72	44-139	
Benzo[a]anthracene	ND	0.0833	0.0616	74	0.0578	69	62-129	
Chrysene	ND	0.0833	0.0610	73	0.0566	68	42-127	
Benzo[b]fluoranthene	ND	0.0833	0.0577	69	0.0509	61	57-132	
Benzo[k]fluoranthene	ND	0.0833	0.0550	66	0.0450	54	57-131	I
Benzo[a]pyrene	ND	0.0833	0.0535	64	0.0524	63	59-132	
Indeno(1,2,3-c,d)pyrene	ND	0.0833	0.0572	69	0.0524	63	55-135	
Dibenz[a,h]anthracene	ND	0.0833	0.0554	66	0.0514	62	36-146	
Benzo[g,h,i]perylene	ND	0.0833	0.0584	70	0.0566	68	42-140	

	RPD	RPD Limit	Flags
Naphthalene	7	25	
Acenaphthylene	14	25	
Acenaphthene	6	25	
Fluorene	7	25	
Phenanthrene	5	25	
Anthracene	8	25	
Fluoranthene	4	25	
Pyrene	3	25	
Benzo[a]anthracene	6	25	
Chrysene	8	25	
Benzo[b]fluoranthene	12	25	
Benzo[k]fluoranthene	20	25	
Benzo[a]pyrene	2	25	
Indeno(1,2,3-c,d)pyrene	9	25	
Dibenz[a,h]anthracene	7	25	
Benzo[g,h,i]perylene	3	25	

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

PAHs by EPA 8270C/SIM

Date Extracted: 10-5-05
 Date Analyzed: 10-6-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-193-06
 Client ID: EC-S6-9/05

Compound:	Results	Flags	PQL
Naphthalene	ND		0.0095
2-Methylnaphthalene	ND		0.0095
1-Methylnaphthalene	ND		0.0095
Acenaphthylene	ND		0.0095
Acenaphthene	ND		0.0095
Fluorene	ND		0.0095
Phenanthrene	ND		0.0095
Anthracene	ND		0.0095
Fluoranthene	0.039		0.0095
Pyrene	0.061		0.0095
Benzo[a]anthracene	0.064		0.0095
Chrysene	0.057		0.0095
Benzo[b]fluoranthene	0.077		0.0095
Benzo[k]fluoranthene	0.025		0.0095
Benzo[a]pyrene	0.088		0.0095
Indeno(1,2,3-c,d)pyrene	0.039		0.0095
Dibenz[a,h]anthracene	0.012		0.0095
Benzo[g,h,i]perylene	0.14		0.0095

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	64	27 - 107
2-Fluorobiphenyl	66	33 - 100
Terphenyl-d14	78	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

**PAHs by EPA 8270C/SIM
 METHOD BLANK QUALITY CONTROL**

Date Extracted: 10-5-05
 Date Analyzed: 10-5-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: MB1005S1

Compound:	Results	Flags	PQL
Naphthalene	ND		0.0067
2-Methylnaphthalene	ND		0.0067
1-Methylnaphthalene	ND		0.0067
Acenaphthylene	ND		0.0067
Acenaphthene	ND		0.0067
Fluorene	ND		0.0067
Phenanthrene	ND		0.0067
Anthracene	ND		0.0067
Fluoranthene	ND		0.0067
Pyrene	ND		0.0067
Benzo[a]anthracene	ND		0.0067
Chrysene	ND		0.0067
Benzo[b]fluoranthene	ND		0.0067
Benzo[k]fluoranthene	ND		0.0067
Benzo[a]pyrene	ND		0.0067
Indeno(1,2,3-c,d)pyrene	ND		0.0067
Dibenz[a,h]anthracene	ND		0.0067
Benzo[g,h,i]perylene	ND		0.0067

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	82	27 - 107
2-Fluorobiphenyl	80	33 - 100
Terphenyl-d14	82	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-193
 Project: 19897-45986

**PAHs by EPA 8270C/SIM
 MS/MSD QUALITY CONTROL**

Date Extracted: 10-5-05
 Date Analyzed: 10-5-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-259-08

Compound:	Sample Amount	Spike Amount	MS	Percent Recovery	MSD	Percent Recovery	Recovery Limits	Flags
Naphthalene	0.0454	0.0833	0.118	87	0.140	114	30-115	
Acenaphthylene	0.0145	0.0833	0.0929	94	0.106	109	46-125	
Acenaphthene	ND	0.0833	0.0741	89	0.0830	100	40-119	
Fluorene	ND	0.0833	0.0850	102	0.0887	106	50-133	
Phenanthrene	0.102	0.0833	0.207	125	0.223	146	48-128	A
Fluoranthene	0.102	0.0833	0.218	139	0.235	160	50-143	A
Pyrene	0.100	0.0833	0.211	133	0.224	149	44-139	A
Benzo[a]anthracene	0.0486	0.0833	0.136	104	0.137	106	62-129	
Chrysene	0.0937	0.0833	0.186	111	0.202	131	42-127	A
Benzo[b]fluoranthene	0.124	0.0833	0.215	109	0.230	127	57-132	
Benzo[k]fluoranthene	0.0321	0.0833	0.0963	77	0.106	88	57-131	
Benzo[a]pyrene	0.0499	0.0833	0.124	89	0.130	96	59-132	
Indeno(1,2,3-c,d)pyrene	0.0475	0.0833	0.110	75	0.119	86	55-135	
Benzo[g,h,i]perylene	0.0604	0.0833	0.125	78	0.136	90	42-140	

	RPD	RPD Limit	Flags
Naphthalene	17	25	
Acenaphthylene	13	25	
Acenaphthene	11	25	
Fluorene	4	25	
Phenanthrene	8	25	
Fluoranthene	8	25	
Pyrene	6	25	
Benzo[a]anthracene	1	25	
Chrysene	9	25	
Benzo[b]fluoranthene	7	25	
Benzo[k]fluoranthene	9	25	
Benzo[a]pyrene	5	25	
Indeno(1,2,3-c,d)pyrene	9	25	
Benzo[g,h,i]perylene	8	25	

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-193
Project: 19897-45986

% MOISTURE

Date Analyzed: 9-26&27-05

Client ID	Lab ID	% Moisture
EC-S1-9/05	09-193-01	39
EC-S2-9/05	09-193-02	30
EC-S3-9/05	09-193-03	38
EC-S4-9/05	09-193-04	38
EC-S5-9/05	09-193-05	62
EC-S6-9/05	09-193-06	30
EC-S7-9/05	09-193-07	19
EC-S8-9/05	09-193-08	30
EC-S9-9/05	09-193-09	35
EC-S10-9/05	09-193-10	7
EC-S11-9/05	09-193-11	9
EC-S12-9/05	09-193-12	38
EC-S13-9/05	09-193-13	11



Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

G - Insufficient sample quantity for duplicate analysis.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

O - Hydrocarbons indicative of diesel fuel are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a silica gel cleanup procedure.

Y - Sample extract treated with an acid/silica gel cleanup procedure.

Z -

ND - Not Detected at PQL

PQL - Practical Quantitation Limit

RPD - Relative Percent Difference



SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

10/05/2005

P.O.#: 09-193


OnSite Environmental Inc
14648 NE 95th Street
Redmond, WA 98052
Attn: David Baumeister

Client ID: EC-S5-9/05
Sample Matrix: Soil
Date Sampled: 09/21/2005
Date Received: 09/28/2005
Spectra Project: 2005090345
Spectra Number: 1

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method</u>
Total Organic Carbon	145000	mg/Kg Dry	SW846 9060

TOC PQL 10ppm ; Date analyzed 10-5-05

SPECTRA LABORATORIES



Steve Hibbs, Laboratory Manager
a6/scj

Page 1 of 1

Chain of Custody

9/21/05

Turnaround Request (in working days)	Laboratory Number: 09-193																
(Check One)	Requested Analysis																
<input type="checkbox"/> Same Day <input type="checkbox"/> 1 Day	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH	TOC	% Moisture
<input type="checkbox"/> 2 Day <input type="checkbox"/> 3 Day																	
<input checked="" type="checkbox"/> Standard (7 working days)																	
<input type="checkbox"/> _____ (other)																	

Company: CDM

Project Number: 19897-45486

Project Name: King County/Ellisport Creek

Project Manager: Lance Peterson

Sampled by: Anne Peterson

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH	TOC	% Moisture	
1	EC-S1-9/05	9/21/05	12:55	Soil	1	X	X	X															X
2	EC-S2-9/05		13:05		1	X	X	X															X
3	EC-S3-9/05		13:25		1			X															X
4	EC-S4-9/05		13:30		1			X															X
5	EC-S5-9/05		13:55		6							X									X		X
6	EC-S6-9/05		14:10		1			X															X
7	EC-S7-9/05		14:20		1			X															X
8	EC-S8-9/05		14:55		1			X															X
9	EC-S9-9/05		15:00		1			X															X
10	EC-S10-9/05		16:10		1			X															X

Signature	Company	Date	Time	Comments/Special Instructions:
<u>Anne Peterson</u>	<u>CDM</u>	<u>9/23/05</u>	<u>0930</u>	Contract No. E23023E NWTPH-Dx: quantitative as Bunker C Analyze EC-S5-9/05 as a sediment sample Added 9/26/05 DB Added 10/14/05 DB
<u>[Signature]</u>	<u>OnSite Env</u>	<u>9/23/05</u>	<u>1355</u>	
Reviewed by/Date	Reviewed by/Date	Chromatograms with final report		

Company: CDM

Project Number: 19897-45486

Project Name: King County / Ellispot Creek

Project Manager: Lance Peterson

Sampled by:

Turnaround Request (in working days)

(Check One)

Same Day 1 Day

2 Day 3 Day

Standard (7 working days)

_____ (other)

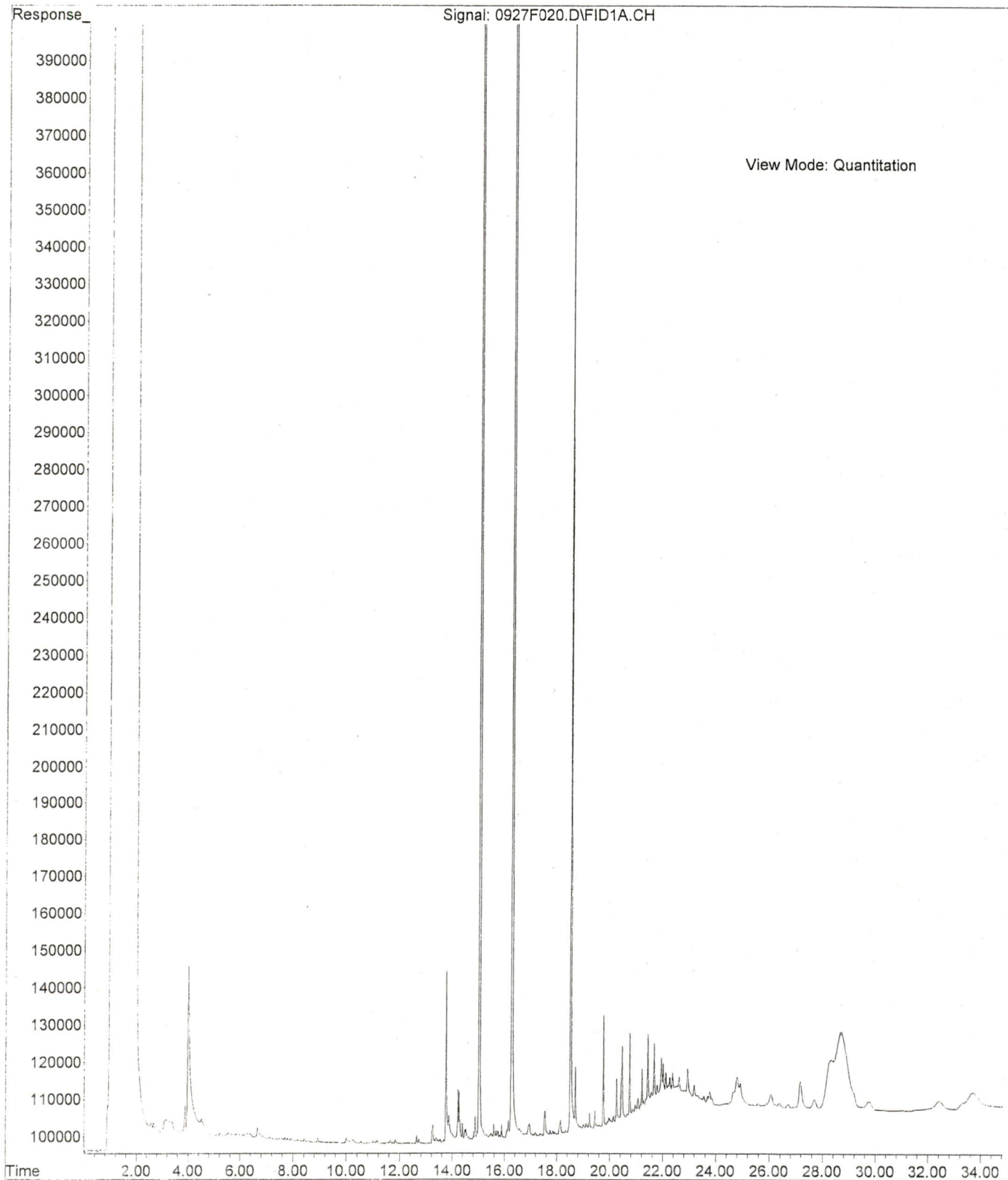
Laboratory Number: **09-193**

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Dx	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH	% Moisture	
11	EC-S11 - 9/05	9/21/05	1620	soil	1			X														X
12	EC-S12 - 9/05		1630		1			X														X
13	EC-S13 - 9/05		1650		1			X														X
14	Rinsate		1520	liquid water JRP	2			X														

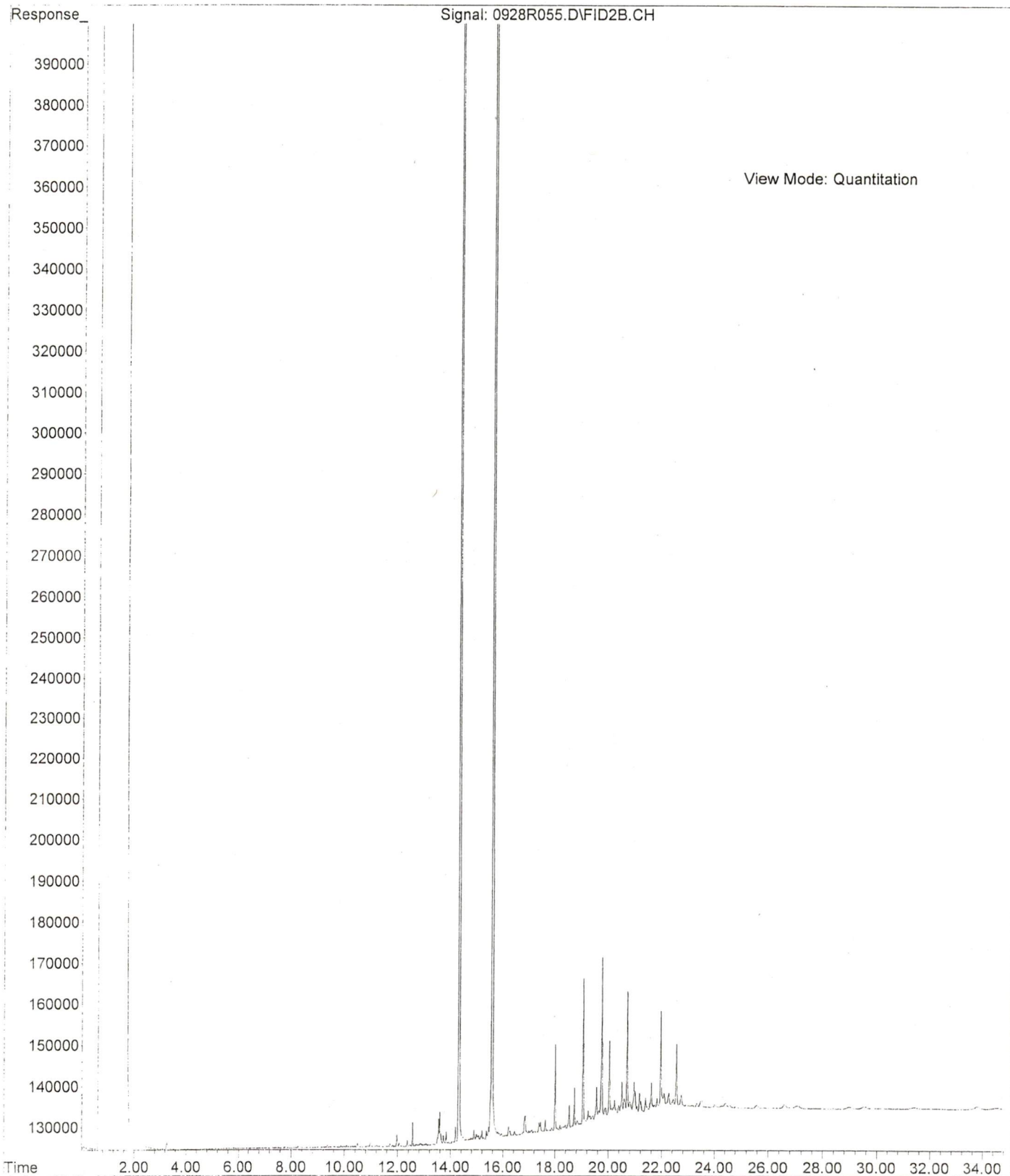
Signature	Company	Date	Time	Comments Special Instructions:
<u>Lance Peterson</u>	<u>CDM</u>	<u>9/23/05</u>	<u>0930</u>	<u>see notes p.1</u>
<u>[Signature]</u>	<u>OnSite Env</u>	<u>9/23/05</u>	<u>1355</u>	
Reviewed by/Date	Reviewed by/Date	Chromatograms with final report <input checked="" type="checkbox"/>		

RAW DATA

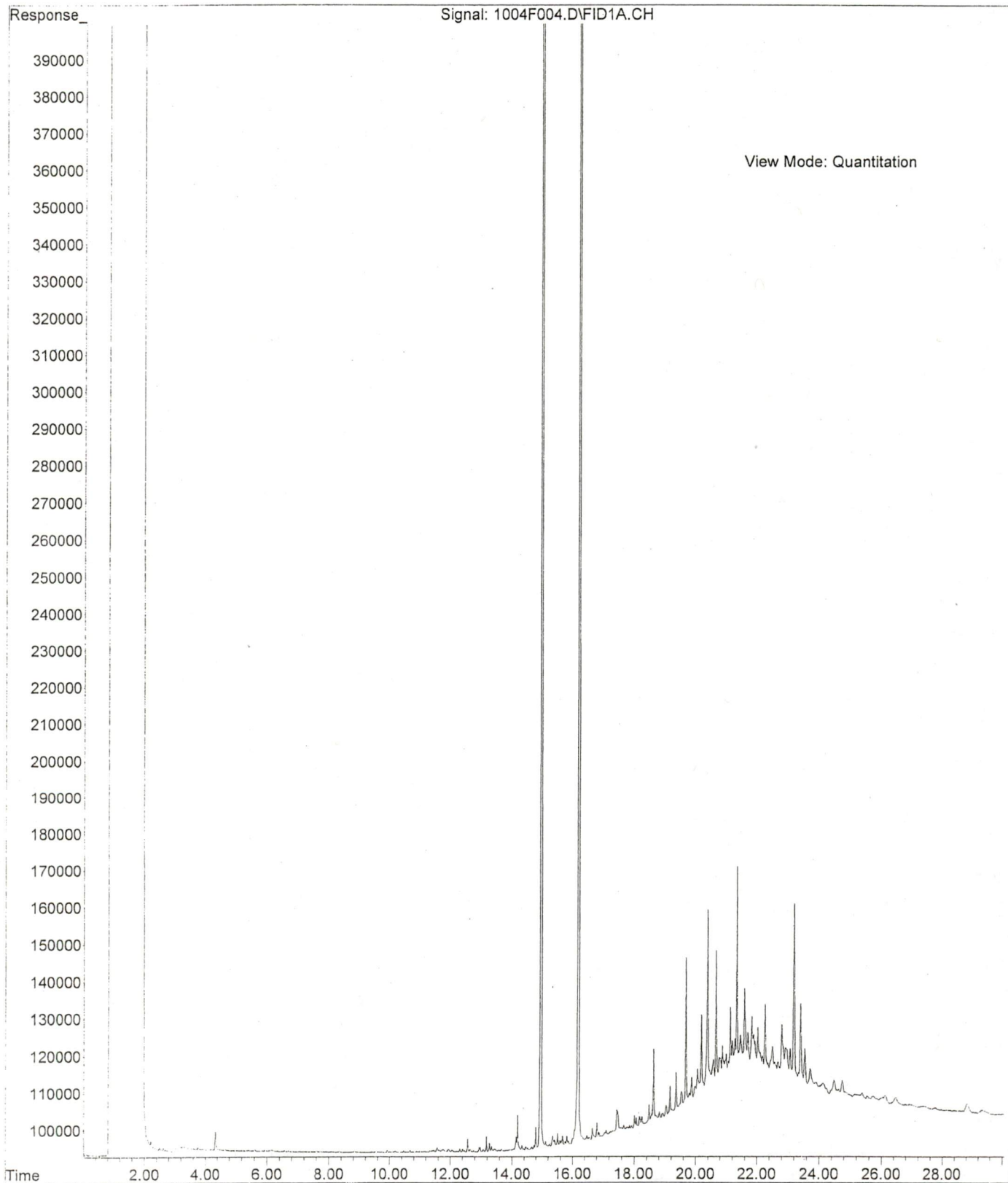
File :X:\DIESELS\TERI\DATA\T050927\0927F020.D
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Instrument : Teri
Sample Name: 09-193-01
Misc Info : 1
Vial Number: 20



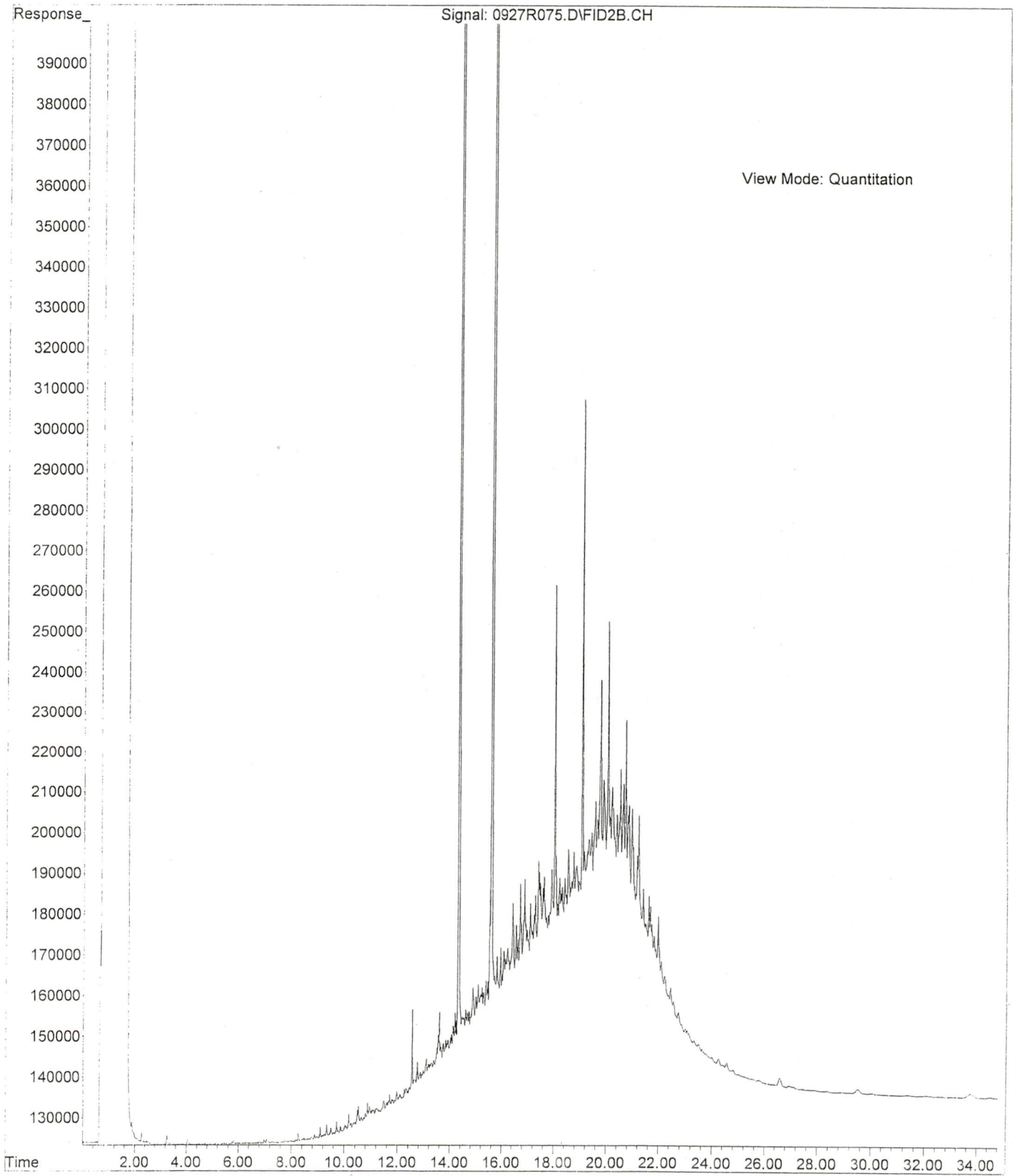
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Operator : DY
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Instrument : Teri
Sample Name: 09-193-02 RC
Misc Info : 2
Vial Number: 55



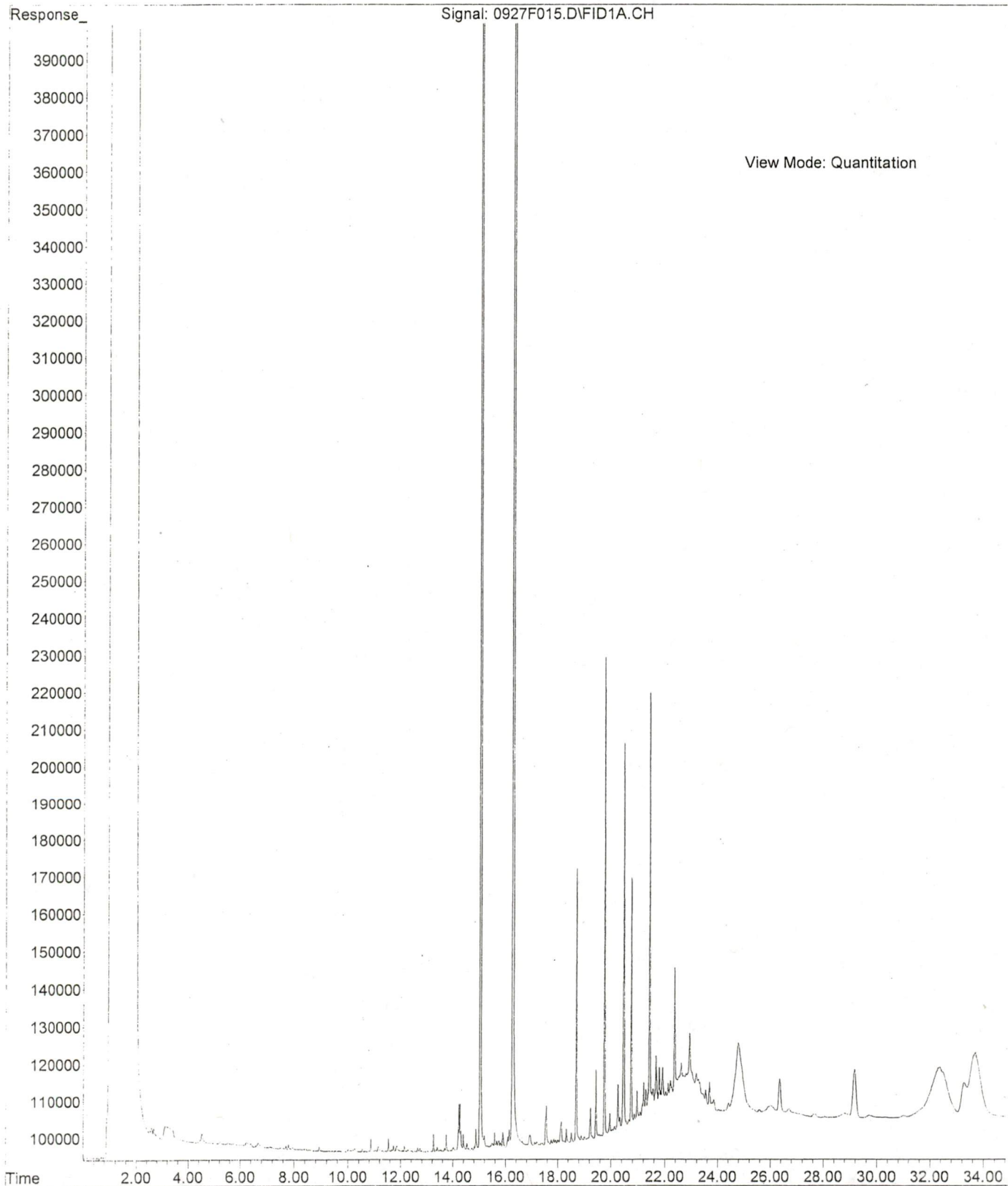
File : X:\DIESELS\TERI\DATA\T051004\1004F004.D
Operator : DY
Acquired : 04 Oct 2005 13:31 using AcqMethod TERI_FRONT.M
Instrument : Teri
Sample Name: 09-193-03 RC
Misc Info : 1
Vial Number: 4



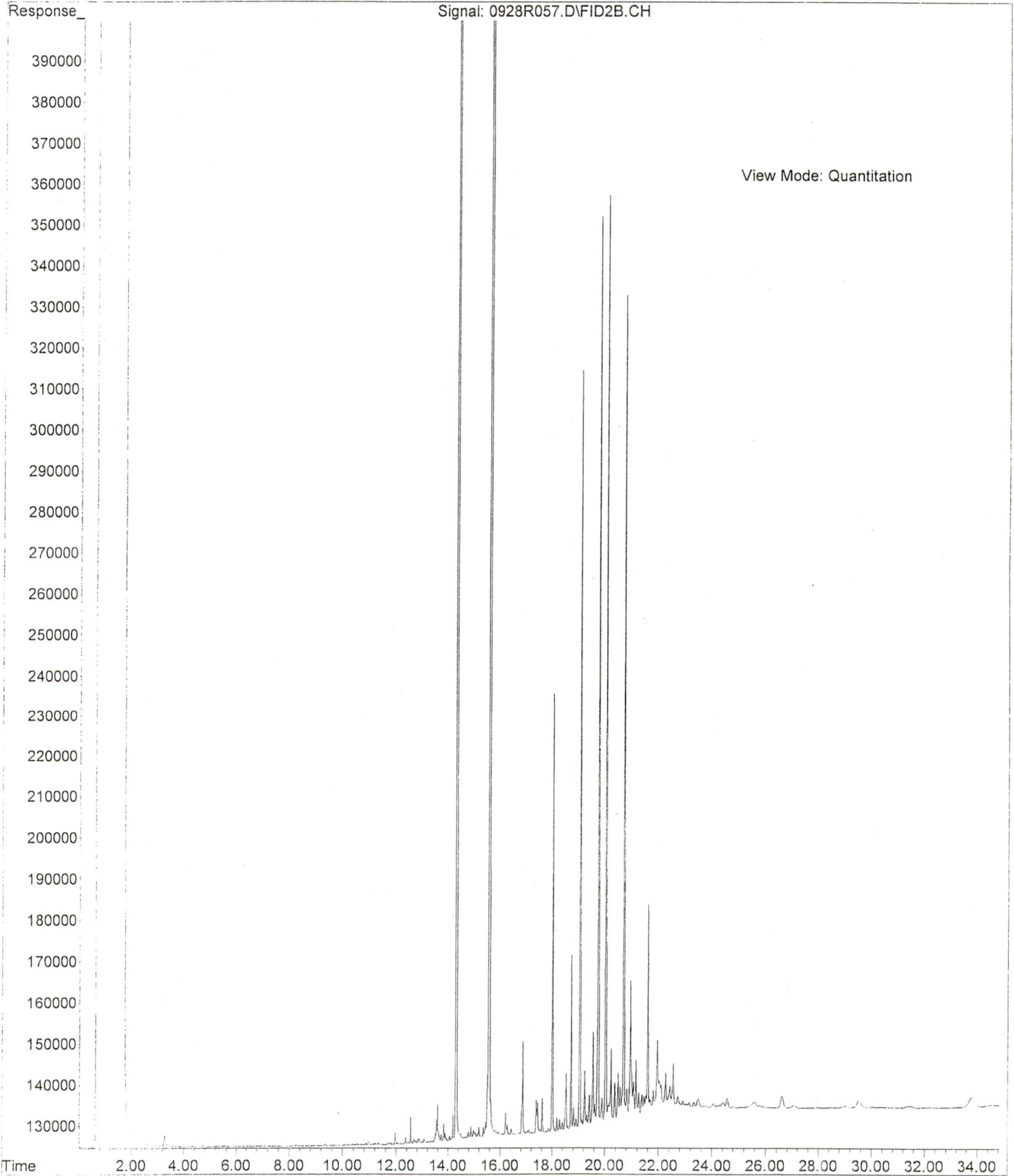
File :X:\DIESELS\TERI\DATA\T050927.SEC\0927R075.D
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Acquired : 28 Sep 2005 6:56 using AcqMethod TERI_FRONT.M
Instrument : Teri
Sample Name: 09-193-06
Misc Info : 2
Vial Number: 75



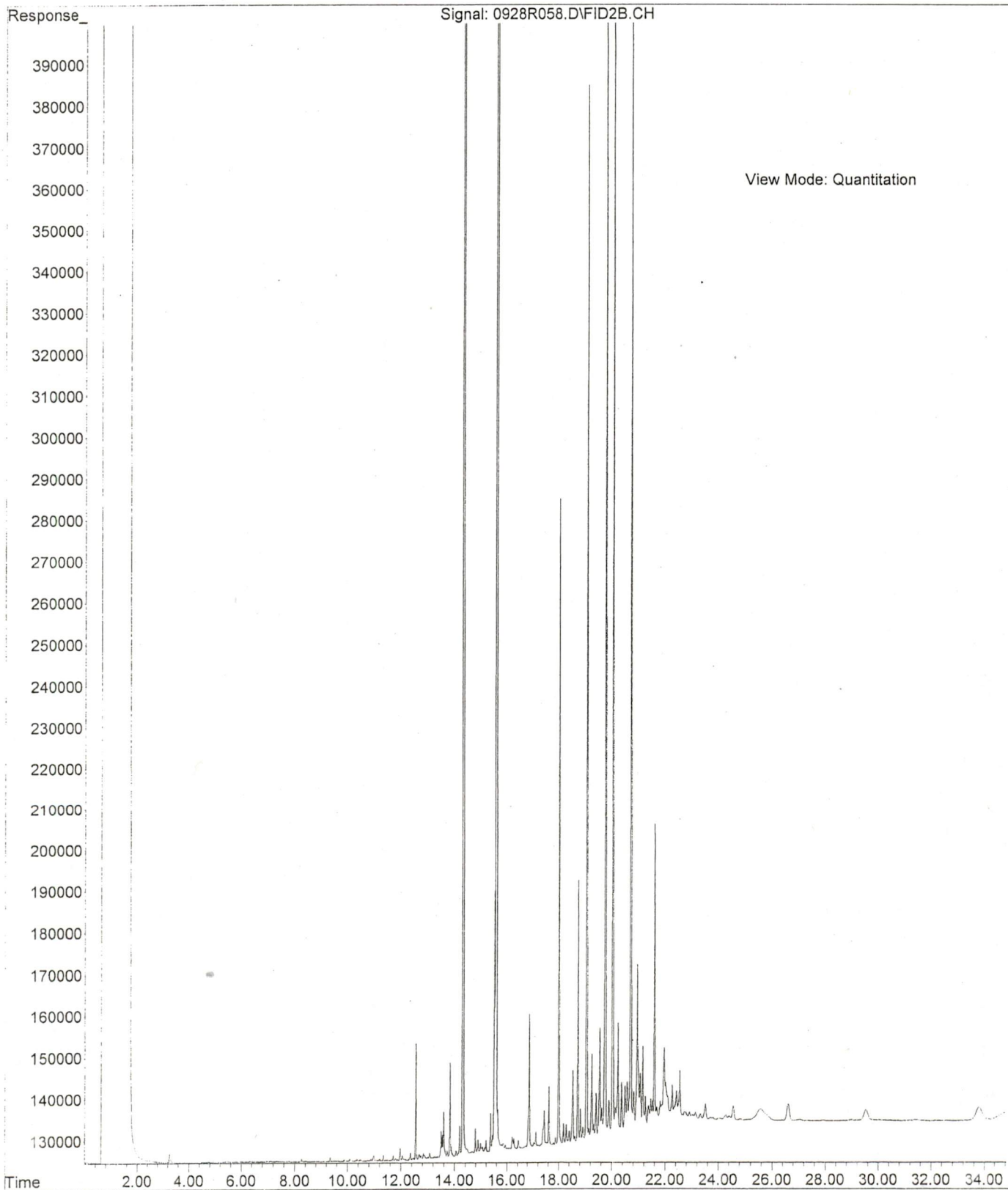
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Acquired : 27 Sep 2005 23:41 using AcqMethod TERI_FRONT.M
Instrument : Teri
Sample Name: 09-193-07
Misc Info : 1
Vial Number: 15



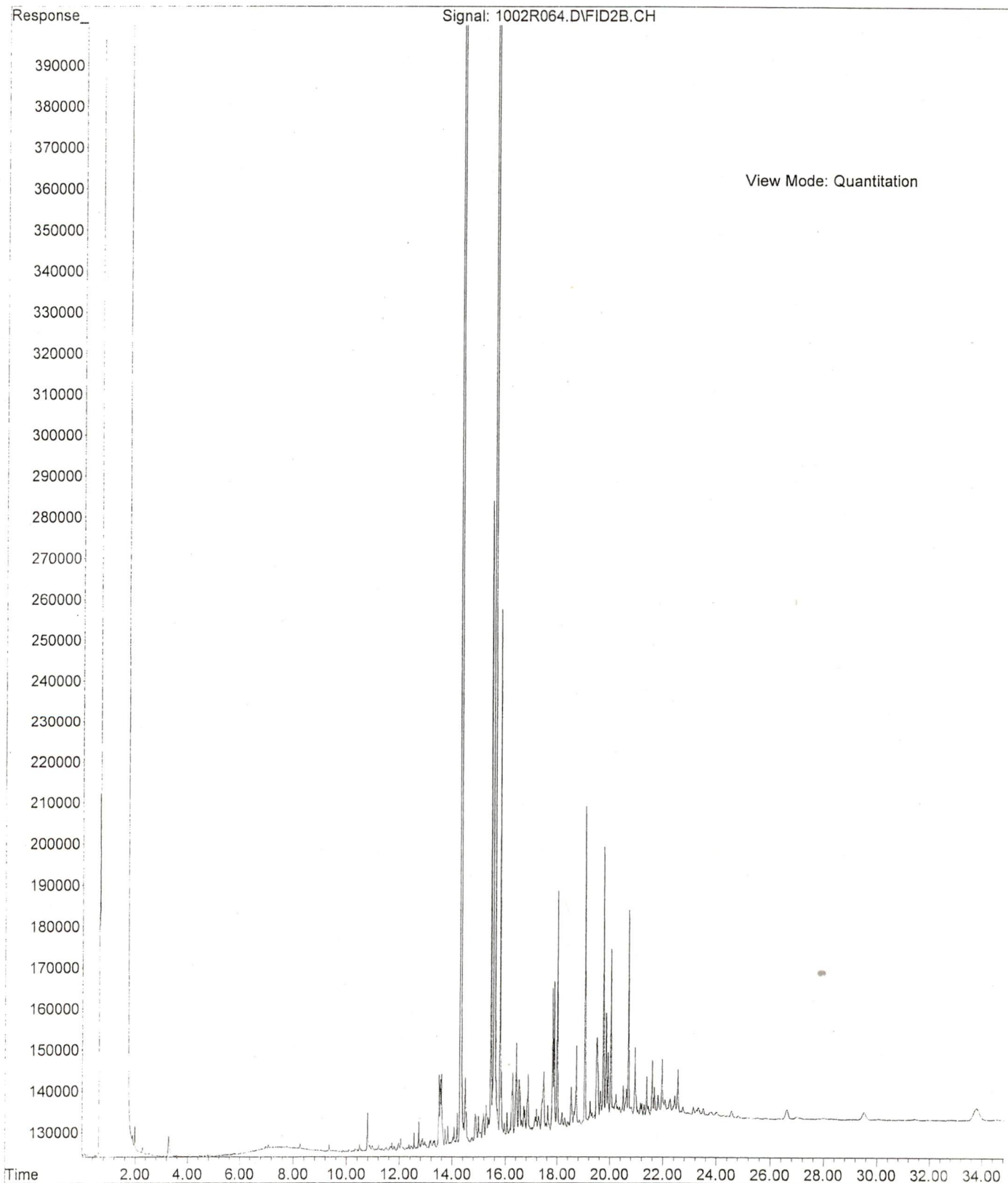
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Instrument : Teri
Sample Name: 09-193-08 RC
Misc Info : 2
Vial Number: 57



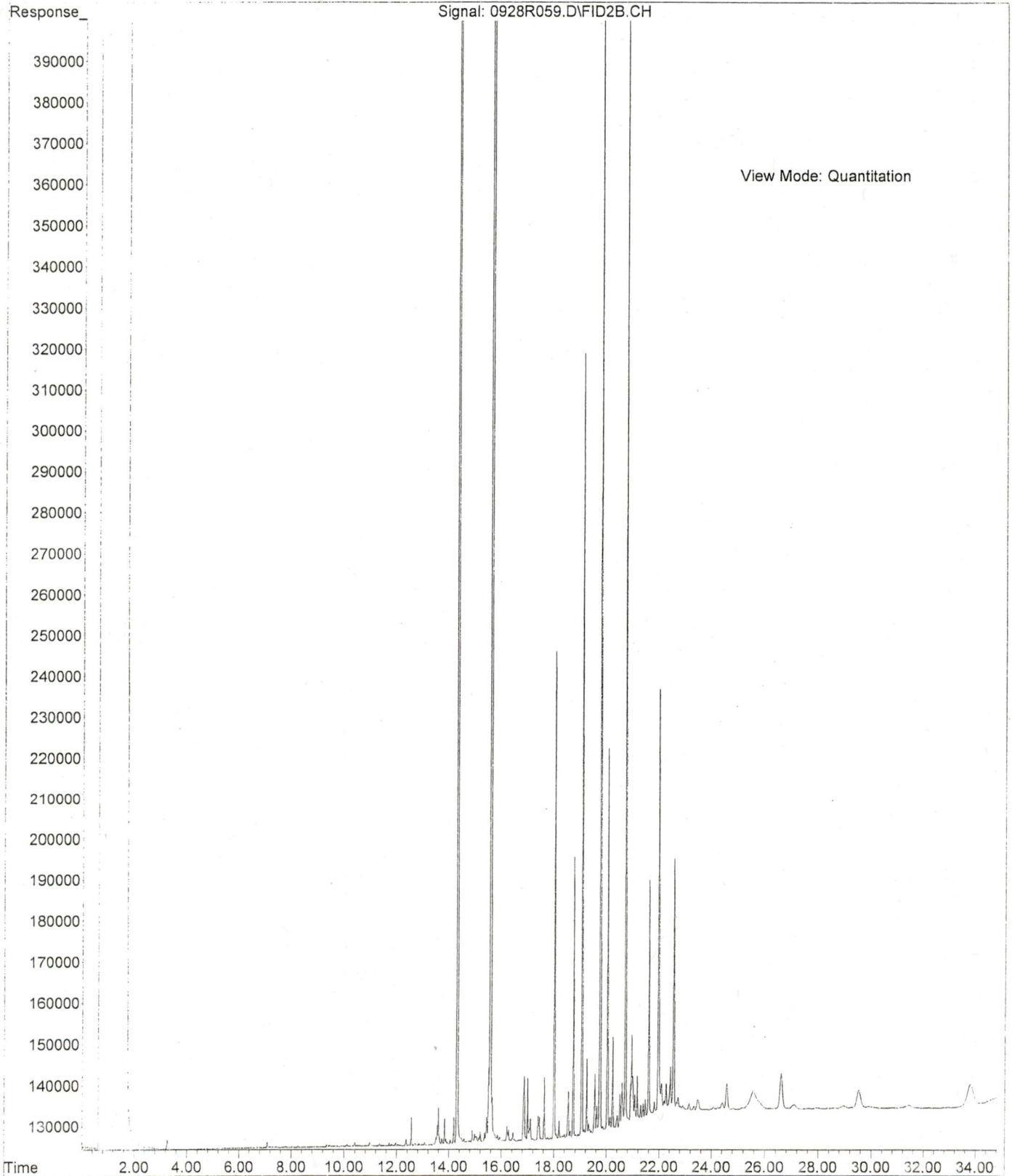
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Instrument : Teri
Sample Name: 09-193-09 RC
Misc Info : 2
Vial Number: 58



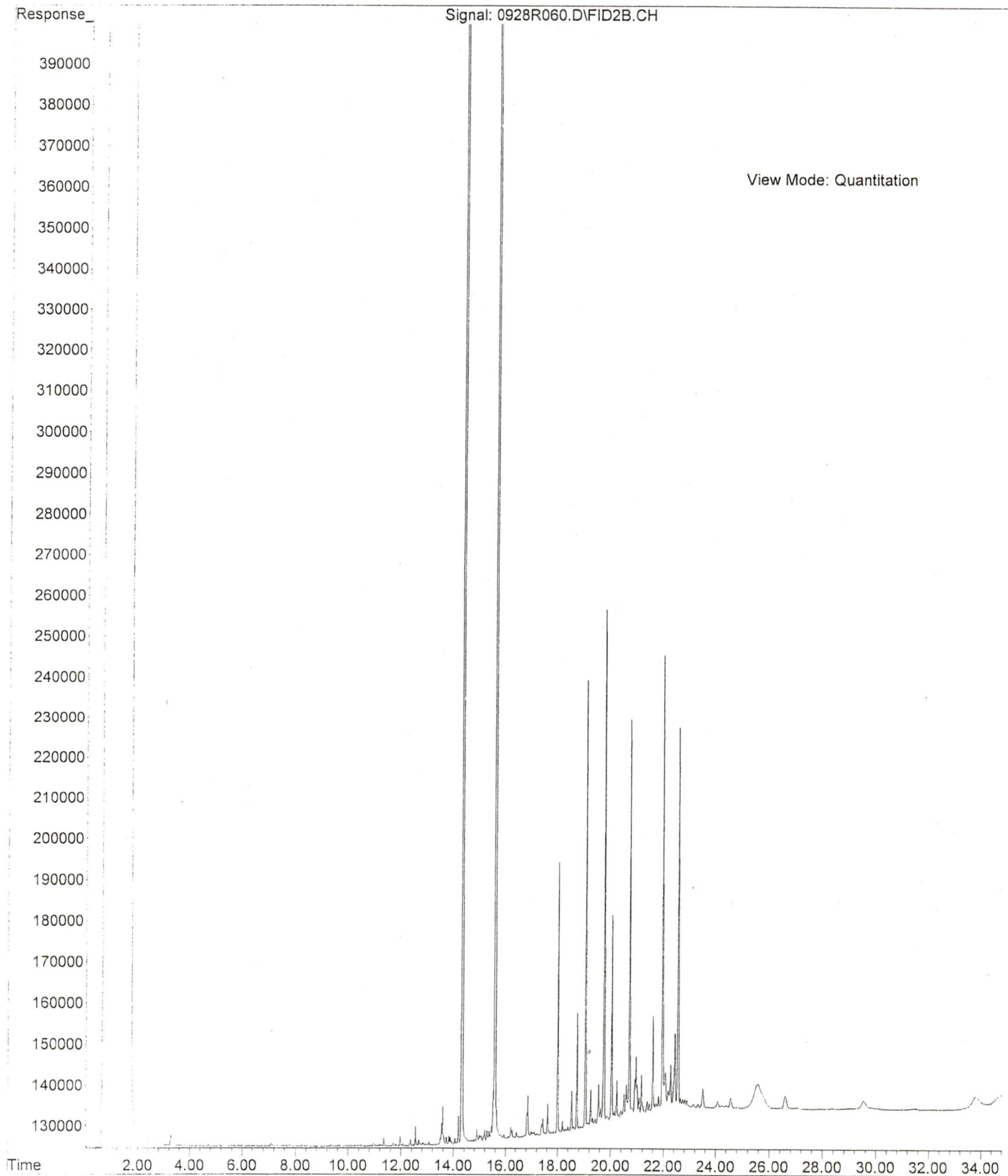
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Instrument : Teri
Sample Name: 09-193-10 RC
Misc Info : 2
Vial Number: 64



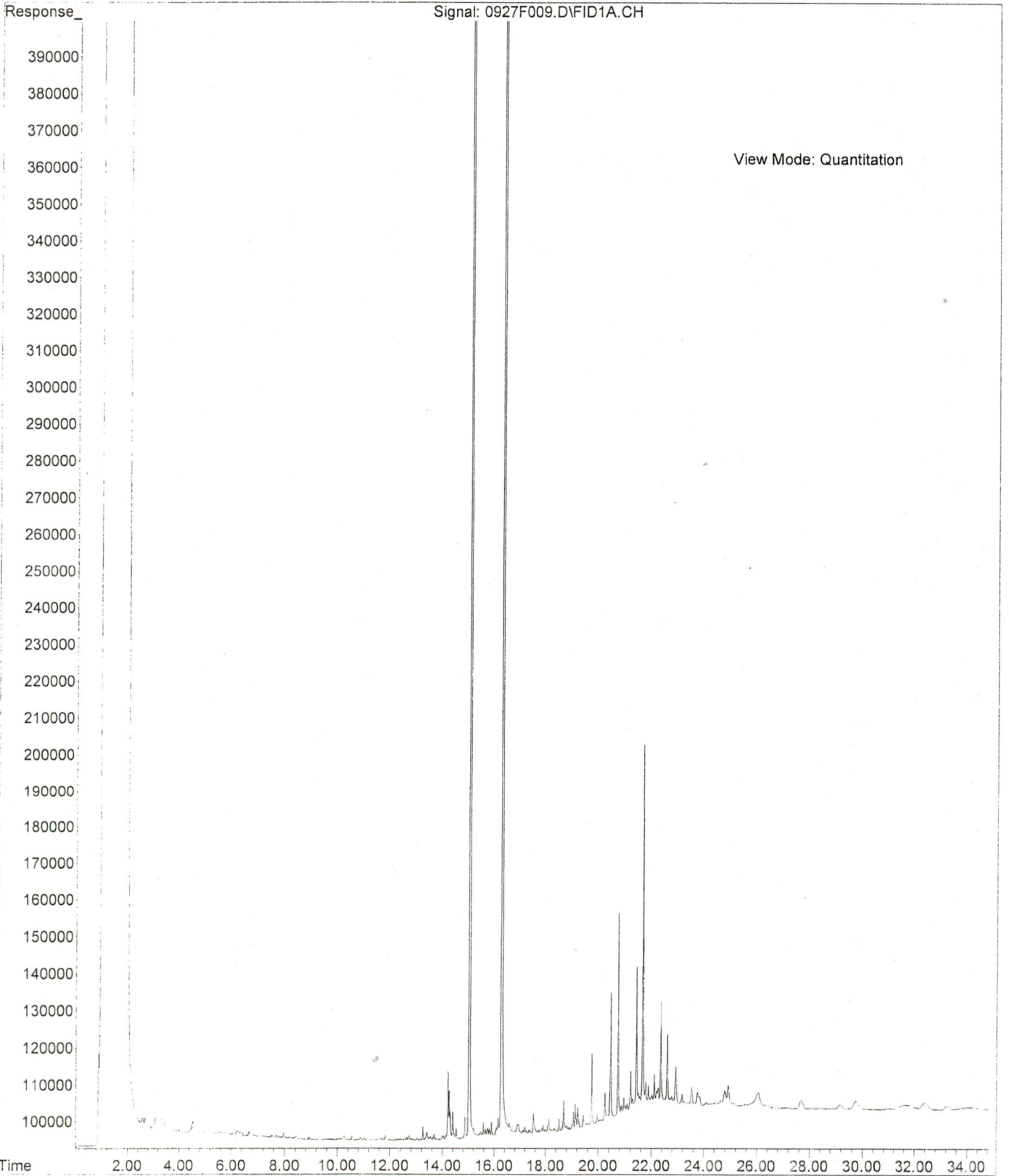
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Operator : DY
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Instrument : Teri
Sample Name: 09-193-11 RC
Misc Info : 2
Vial Number: 59



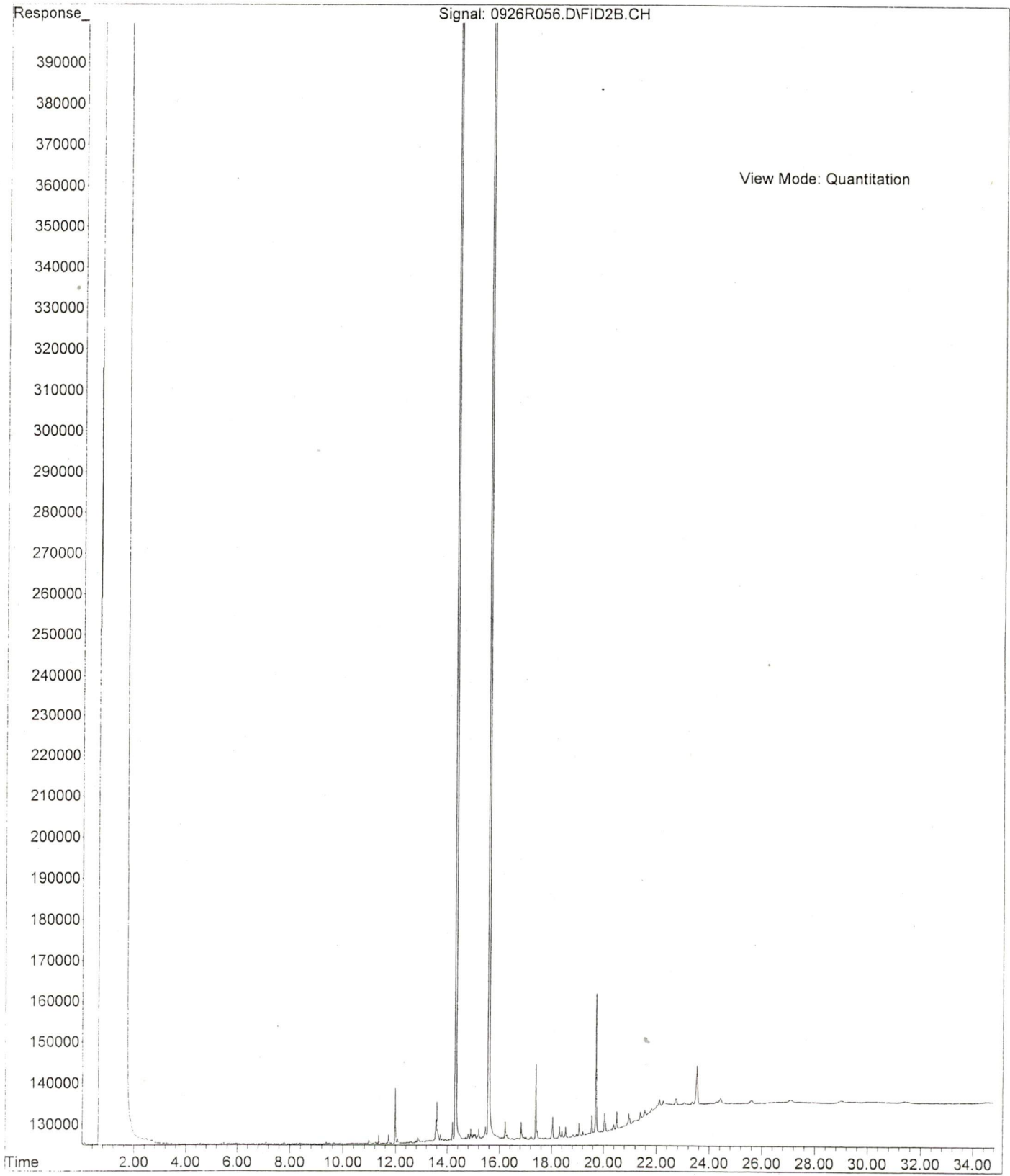
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Operator : DY
Acquired : 28 Sep 2005 23:12 using AcqMethod TERI_FRONT.M
Instrument : Teri
Sample Name: 09-193-12 RC
Misc Info : 2
Vial Number: 60



File :X:\DIESELS\TERI\DATA\T050927\0927F009.D
Operator : DY
Acquired : 27 Sep 2005 19:18 using AcqMethod TERI_FRONT.M
Instrument : Teri
Sample Name: 09-193-13
Misc Info : 1
Vial Number: 9



File :X:\DIESELS\TERI\DATA\T050926.SEC\0926R056.D
Operator : DY
Acquired : 26 Sep 2005 15:09 using AcqMethod TERI_FRONT.M
Instrument : Teri
Sample Name: 09-193-14a
Misc Info : 2
Vial Number: 56





**OnSite
Environmental Inc.**

Analytical Testing and Mobile Laboratory Services

October 7, 2005

Lance Peterson
CDM
P.O. Box 3885
Bellevue, WA 98009

Received
OCT 13 2005
CDM

Re: Analytical Data for Project 19897-45486
Laboratory Reference No. 0509-192

Dear Lance:

Enclosed are the analytical results and associated quality control data for samples submitted on September 23, 2005.

The standard policy of OnSite Environmental Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,



David Baumeister
Project Manager

Enclosures

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-192
Project: 19897-45486

Case Narrative

Samples were collected on September 22, 2005 and received by the laboratory on September 23, 2005. They were maintained at the laboratory at a temperature of 2°C to 6°C except as noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

NWTPH-Dx

Date Extracted: 9-27-05
 Date Analyzed: 9-29&10-4-05

Matrix: Soil
 Units: mg/kg (ppm)

Client ID:	EC-S14-9/05	EC-S16-9/05	EC-S17-9/05
Lab ID:	09-192-01	09-192-03	09-192-04
Diesel Range:	ND	ND	ND
PQL:	51	620	41
Identification:	---	---	---
Lube Oil Range:	540	44000	280
PQL:	100	1200	82
Identification:	Lube Oil	Bunker C	Lube Oil
Surrogate Recovery o-Terphenyl:	83%	---	86%
Flags:	Y	Y,S	Y

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

NWTPH-Dx

Date Extracted: 9-27-05
 Date Analyzed: 9-28&29-05

Matrix: Soil
 Units: mg/kg (ppm)

Client ID:	EC-S18-9/05	EC-S19-9/05	EC-S20-9/05
Lab ID:	09-192-05	09-192-06	09-192-07
Diesel Range:	ND	ND	ND
PQL:	33	30	150
Identification:	---	---	---
Lube Oil Range:	ND	ND	2200
PQL:	65	60	290
Identification:	---	---	Bunker C
Surrogate Recovery o-Terphenyl:	100%	89%	117%
Flags:	Y	Y	Y

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

NWTPH-Dx

Date Extracted: 9-27-05
 Date Analyzed: 9-28&29-05

Matrix: Soil
 Units: mg/kg (ppm)

Client ID:	EC-S21-9/05	EC-S22-9/05
Lab ID:	09-192-08	09-192-09

Diesel Range:	ND	ND
PQL:	30	63
Identification:	---	---

Lube Oil Range:	1100	ND
PQL:	60	130
Identification:	Bunker C	---

Surrogate Recovery		
o-Terphenyl:	126%	106%

Flags:	Y	Y
--------	---	---

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-192
Project: 19897-45486

NWTPH-Dx
METHOD BLANK QUALITY CONTROL

Date Extracted: 9-27-05
Date Analyzed: 9-28-05

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0927S2

Diesel Range: **ND**
PQL: 25
Identification: ---

Lube Oil Range: **ND**
PQL: 50
Identification: ---

Surrogate Recovery
o-Terphenyl: 101%

Flags: Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-192
Project: 19897-45486

NWTPH-Dx
DUPLICATE QUALITY CONTROL

Date Extracted: 9-27-05
Date Analyzed: 9-28-05

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 09-192-06 09-192-06 DUP

Diesel Range: ND ND

PQL: 25 25

RPD: N/A

Surrogate Recovery
o-Terphenyl: 89% 112%

Flags: Y Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-192
Project: 19897-45486

NWTPH-Dx

Date Extracted: 9-26-05
Date Analyzed: 9-26-05

Matrix: Water
Units: mg/L (ppm)

Client ID: Trip Blank
Lab ID: 09-192-10

Diesel Range: **ND**
PQL: 0.26
Identification: ---

Lube Oil Range: **ND**
PQL: 0.41
Identification: ---

Surrogate Recovery
o-Terphenyl: 89%

Flags: Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-192
Project: 19897-45486

NWTPH-Dx
METHOD BLANK QUALITY CONTROL

Date Extracted: 9-26-05
Date Analyzed: 9-26-05

Matrix: Water
Units: mg/L (ppm)

Lab ID: MB0926W1

Diesel Range: **ND**
PQL: 0.25

Identification: ---

Lube Oil Range: **ND**
PQL: 0.40

Identification: ---

Surrogate Recovery
o-Terphenyl: 89%

Flags: Y

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-192
Project: 19897-45486

NWTPH-Dx
DUPLICATE QUALITY CONTROL

Date Extracted: 9-26-05
Date Analyzed: 9-26-05

Matrix: Water
Units: mg/L (ppm)

Lab ID: 09-201-01 09-201-01 DUP

Diesel Range: 0.267 ND
PQL: 0.25 0.25

RPD: N/A

Surrogate Recovery
o-Terphenyl: 90% 61%

Flags: Y Y

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

PAHs by EPA 8270C/SIM

Date Extracted: 10-5-05
 Date Analyzed: 10-6-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-192-01
 Client ID: EC-S14-9/05

Compound:	Results	Flags	PQL
Naphthalene	0.021		0.014
2-Methylnaphthalene	ND		0.014
1-Methylnaphthalene	ND		0.014
Acenaphthylene	0.016		0.014
Acenaphthene	0.027		0.014
Fluorene	0.015		0.014
Phenanthrene	0.098		0.014
Anthracene	0.026		0.014
Fluoranthene	0.26		0.014
Pyrene	0.27		0.014
Benzo[a]anthracene	0.099		0.014
Chrysene	0.14		0.014
Benzo[b]fluoranthene	0.15		0.014
Benzo[k]fluoranthene	0.049		0.014
Benzo[a]pyrene	0.096		0.014
Indeno(1,2,3-c,d)pyrene	0.065		0.014
Dibenz[a,h]anthracene	0.017		0.014
Benzo[g,h,i]perylene	0.085		0.014

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	60	27 - 107
2-Fluorobiphenyl	60	33 - 100
Terphenyl-d14	79	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

PAHs by EPA 8270C/SIM

Date Extracted: 10-5-05
 Date Analyzed: 10-6-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-192-03
 Client ID: EC-S16-9/05

Compound:	Results	Flags	PQL
Naphthalene	7.4		0.82
2-Methylnaphthalene	60		0.82
1-Methylnaphthalene	40		0.82
Acenaphthylene	1.1		0.82
Acenaphthene	6.4		0.82
Fluorene	12		0.82
Phenanthrene	63		0.82
Anthracene	13		0.82
Fluoranthene	6.2		0.82
Pyrene	50		0.82
Benzo[a]anthracene	11		0.82
Chrysene	15		0.82
Benzo[b]fluoranthene	2.8		0.82
Benzo[k]fluoranthene	ND		0.82
Benzo[a]pyrene	7.0		0.82
Indeno(1,2,3-c,d)pyrene	1.3		0.82
Dibenz[a,h]anthracene	ND		0.82
Benzo[g,h,i]perylene	4.6		0.82

Surrogate :	Percent Recovery	Flags	Control Limits
Nitrobenzene-d5	---	S	27 - 107
2-Fluorobiphenyl	---	S	33 - 100
Terphenyl-d14	---	S	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

PAHs by EPA 8270C/SIM

Date Extracted: 10-5-05
 Date Analyzed: 10-6-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-192-07
 Client ID: EC-S20-9/05

Compound:	Results	Flags	PQL
Naphthalene	ND		0.0078
2-Methylnaphthalene	ND		0.0078
1-Methylnaphthalene	ND		0.0078
Acenaphthylene	0.0087		0.0078
Acenaphthene	ND		0.0078
Fluorene	ND		0.0078
Phenanthrene	ND		0.0078
Anthracene	0.015		0.0078
Fluoranthene	ND		0.0078
Pyrene	0.019		0.0078
Benzo[a]anthracene	0.017		0.0078
Chrysene	0.024		0.0078
Benzo[b]fluoranthene	0.021		0.0078
Benzo[k]fluoranthene	ND		0.0078
Benzo[a]pyrene	0.038		0.0078
Indeno(1,2,3-c,d)pyrene	0.043		0.0078
Dibenz[a,h]anthracene	0.027		0.0078
Benzo[g,h,i]perylene	0.16		0.0078

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	64	27 - 107
2-Fluorobiphenyl	75	33 - 100
Terphenyl-d14	87	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

PAHs by EPA 8270C/SIM

Date Extracted: 10-5-05
 Date Analyzed: 10-6-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-192-08
 Client ID: **EC-S21-9/05**

Compound:	Results	Flags	PQL
Naphthalene	ND		0.0080
2-Methylnaphthalene	0.0099		0.0080
1-Methylnaphthalene	ND		0.0080
Acenaphthylene	0.0089		0.0080
Acenaphthene	ND		0.0080
Fluorene	ND		0.0080
Phenanthrene	0.012		0.0080
Anthracene	0.013		0.0080
Fluoranthene	0.010		0.0080
Pyrene	0.032		0.0080
Benzo[a]anthracene	0.012		0.0080
Chrysene	0.049		0.0080
Benzo[b]fluoranthene	0.047		0.0080
Benzo[k]fluoranthene	0.014		0.0080
Benzo[a]pyrene	0.050		0.0080
Indeno(1,2,3-c,d)pyrene	0.033		0.0080
Dibenz[a,h]anthracene	0.018		0.0080
Benzo[g,h,i]perylene	0.094		0.0080

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	73	27 - 107
2-Fluorobiphenyl	80	33 - 100
Terphenyl-d14	89	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

**PAHs by EPA 8270C/SIM
 METHOD BLANK QUALITY CONTROL**

Date Extracted: 10-5-05
 Date Analyzed: 10-5-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: MB1005S1

Compound:	Results	Flags	PQL
Naphthalene	ND		0.0067
2-Methylnaphthalene	ND		0.0067
1-Methylnaphthalene	ND		0.0067
Acenaphthylene	ND		0.0067
Acenaphthene	ND		0.0067
Fluorene	ND		0.0067
Phenanthrene	ND		0.0067
Anthracene	ND		0.0067
Fluoranthene	ND		0.0067
Pyrene	ND		0.0067
Benzo[a]anthracene	ND		0.0067
Chrysene	ND		0.0067
Benzo[b]fluoranthene	ND		0.0067
Benzo[k]fluoranthene	ND		0.0067
Benzo[a]pyrene	ND		0.0067
Indeno(1,2,3-c,d)pyrene	ND		0.0067
Dibenz[a,h]anthracene	ND		0.0067
Benzo[g,h,i]perylene	ND		0.0067

Surrogate :	Percent Recovery	Control Limits
Nitrobenzene-d5	82	27 - 107
2-Fluorobiphenyl	80	33 - 100
Terphenyl-d14	82	55 - 106

Date of Report: October 7, 2005
 Samples Submitted: September 23, 2005
 Laboratory Reference: 0509-192
 Project: 19897-45486

**PAHs by EPA 8270C/SIM
 MS/MSD QUALITY CONTROL**

Date Extracted: 10-5-05
 Date Analyzed: 10-5-05
 Matrix: Soil
 Units: mg/kg (ppm)
 Lab ID: 09-259-08

Compound:	Sample Amount	Spike Amount	MS	Percent Recovery	MSD	Percent Recovery	Recovery Limits	Flags
Naphthalene	0.0454	0.0833	0.118	87	0.140	114	30-115	
Acenaphthylene	0.0145	0.0833	0.0929	94	0.106	109	46-125	
Acenaphthene	ND	0.0833	0.0741	89	0.0830	100	40-119	
Fluorene	ND	0.0833	0.0850	102	0.0887	106	50-133	
Phenanthrene	0.102	0.0833	0.207	125	0.223	146	48-128	A
Fluoranthene	0.102	0.0833	0.218	139	0.235	160	50-143	A
Pyrene	0.100	0.0833	0.211	133	0.224	149	44-139	A
Benzo[a]anthracene	0.0486	0.0833	0.136	104	0.137	106	62-129	
Chrysene	0.0937	0.0833	0.186	111	0.202	131	42-127	A
Benzo[b]fluoranthene	0.124	0.0833	0.215	109	0.230	127	57-132	
Benzo[k]fluoranthene	0.0321	0.0833	0.0963	77	0.106	88	57-131	
Benzo[a]pyrene	0.0499	0.0833	0.124	89	0.130	96	59-132	
Indeno(1,2,3-c,d)pyrene	0.0475	0.0833	0.110	75	0.119	86	55-135	
Benzo[g,h,i]perylene	0.0604	0.0833	0.125	78	0.136	90	42-140	

	RPD	RPD Limit	Flags
Naphthalene	17	25	
Acenaphthylene	13	25	
Acenaphthene	11	25	
Fluorene	4	25	
Phenanthrene	8	25	
Fluoranthene	8	25	
Pyrene	6	25	
Benzo[a]anthracene	1	25	
Chrysene	9	25	
Benzo[b]fluoranthene	7	25	
Benzo[k]fluoranthene	9	25	
Benzo[a]pyrene	5	25	
Indeno(1,2,3-c,d)pyrene	9	25	
Benzo[g,h,i]perylene	8	25	

Date of Report: October 7, 2005
Samples Submitted: September 23, 2005
Laboratory Reference: 0509-192
Project: 19897-45486

% MOISTURE

Date Analyzed: 9-27-05

Client ID	Lab ID	% Moisture
EC-S14-9/05	09-192-01	51
EC-S16-9/05	09-192-03	19
EC-S17-9/05	09-192-04	39
EC-S18-9/05	09-192-05	23
EC-S19-9/05	09-192-06	16
EC-S20-9/05	09-192-07	15
EC-S21-9/05	09-192-08	17
EC-S22-9/05	09-192-09	60



Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

G - Insufficient sample quantity for duplicate analysis.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

O - Hydrocarbons indicative of diesel fuel are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a silica gel cleanup procedure.

Y - Sample extract treated with an acid/silica gel cleanup procedure.

Z -

ND - Not Detected at PQL

PQL - Practical Quantitation Limit

RPD - Relative Percent Difference

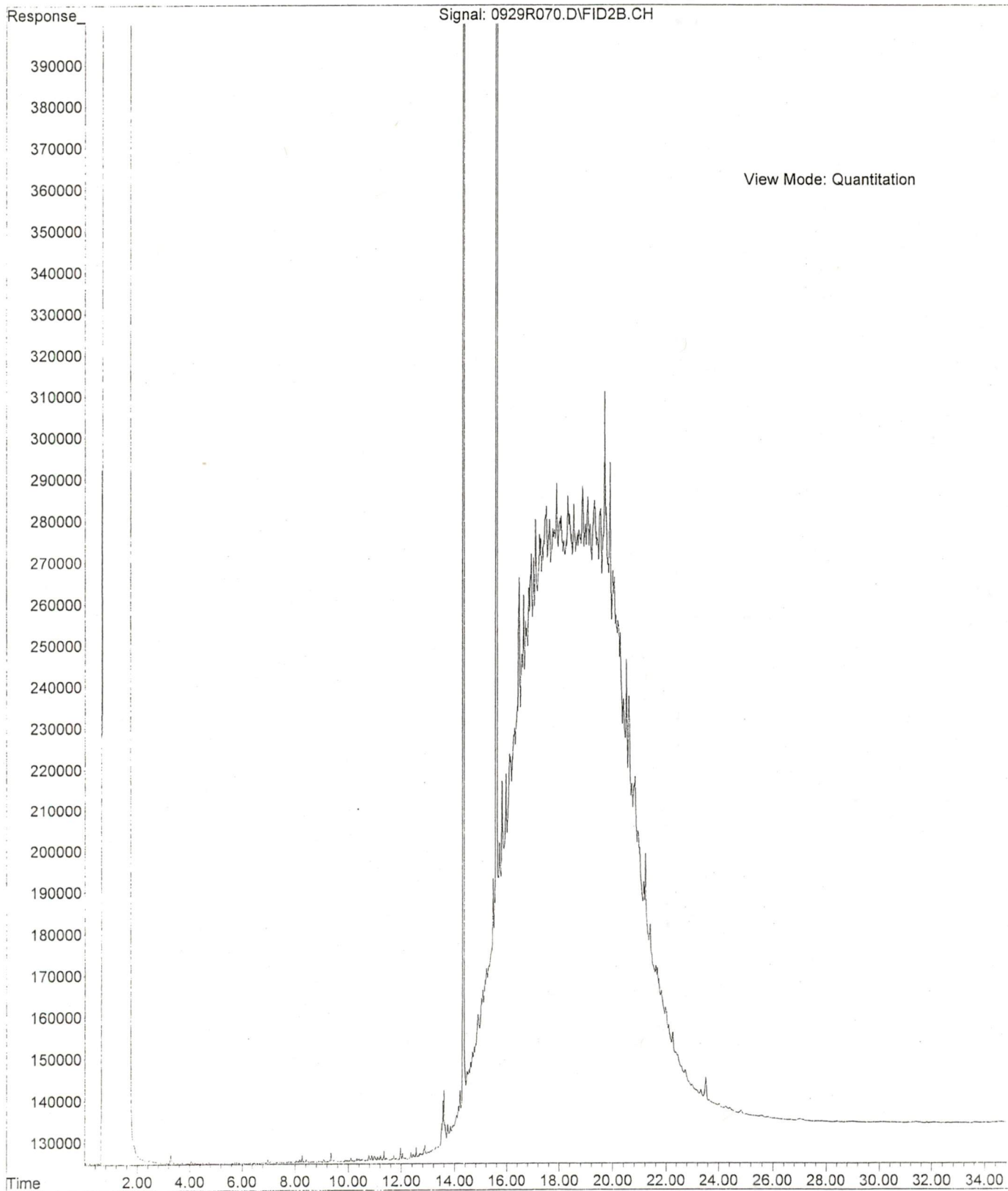
Company: <u>CDM</u> Project Number: <u>19897-45486</u> Project Name: <u>King County / Ellensburg CK</u> Project Manager: <u>Lance Peterson</u> Sampled by: <u>Lance Peterson</u>	Turnaround Request (in working days) (Check One) <input type="checkbox"/> Same Day <input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Day <input type="checkbox"/> 3 Day <input checked="" type="checkbox"/> Standard (7 working days) <input type="checkbox"/> _____ (other)	Laboratory Number: <u>09-192</u> Requested Analysis <table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td>NWTPH-HCID</td> <td>NWTPH-Gx/BTEX</td> <td>NWTPH-DX</td> <td>Volatiles by 8260B</td> <td>Halogenated Volatiles by 8260B</td> <td>Semivolatiles by 8270C</td> <td>PAHs by 8270C / SIM</td> <td>PCBs by 8082</td> <td>Pesticides by 8081A</td> <td>Herbicides by 8151A</td> <td>Total RCRA Metals (8)</td> <td>TCLP Metals</td> <td>HEM by 1664</td> <td>VPH</td> <td>EPH</td> <td>Hold</td> <td>% Moisture</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td>⊗</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td>⊗</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> <tr> <td></td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>X</td> </tr> </table>	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-DX	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH	Hold	% Moisture			X				⊗										X															X					X				⊗										X			X														X			X														X			X														X			X														X			X														X			X														X			X														X			X														X			X														X
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Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	# of Cont.	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-DX	Volatiles by 8260B	Halogenated Volatiles by 8260B	Semivolatiles by 8270C	PAHs by 8270C / SIM	PCBs by 8082	Pesticides by 8081A	Herbicides by 8151A	Total RCRA Metals (8)	TCLP Metals	HEM by 1664	VPH	EPH	Hold	% Moisture	
1	EC-S14-9/05	9/22/05	0910	soil	1			X				⊗											X
2	EC-S15-9/05		0920		1																X		
3	EC-S16-9/05		1045		1			X				⊗											X
4	EC-S17-9/05		1125		1			X															X
5	EC-S18-9/05		1155		1			X															X
6	EC-S19-9/05		1255		1			X															X
7	EC-S20-9/05		1325		1			X				⊗											X
8	EC-S21-9/05		1350		1			X				⊗											X
9	EC-S22-9/05		1420		1			X															X
10	Trip Blank			water	2			X															

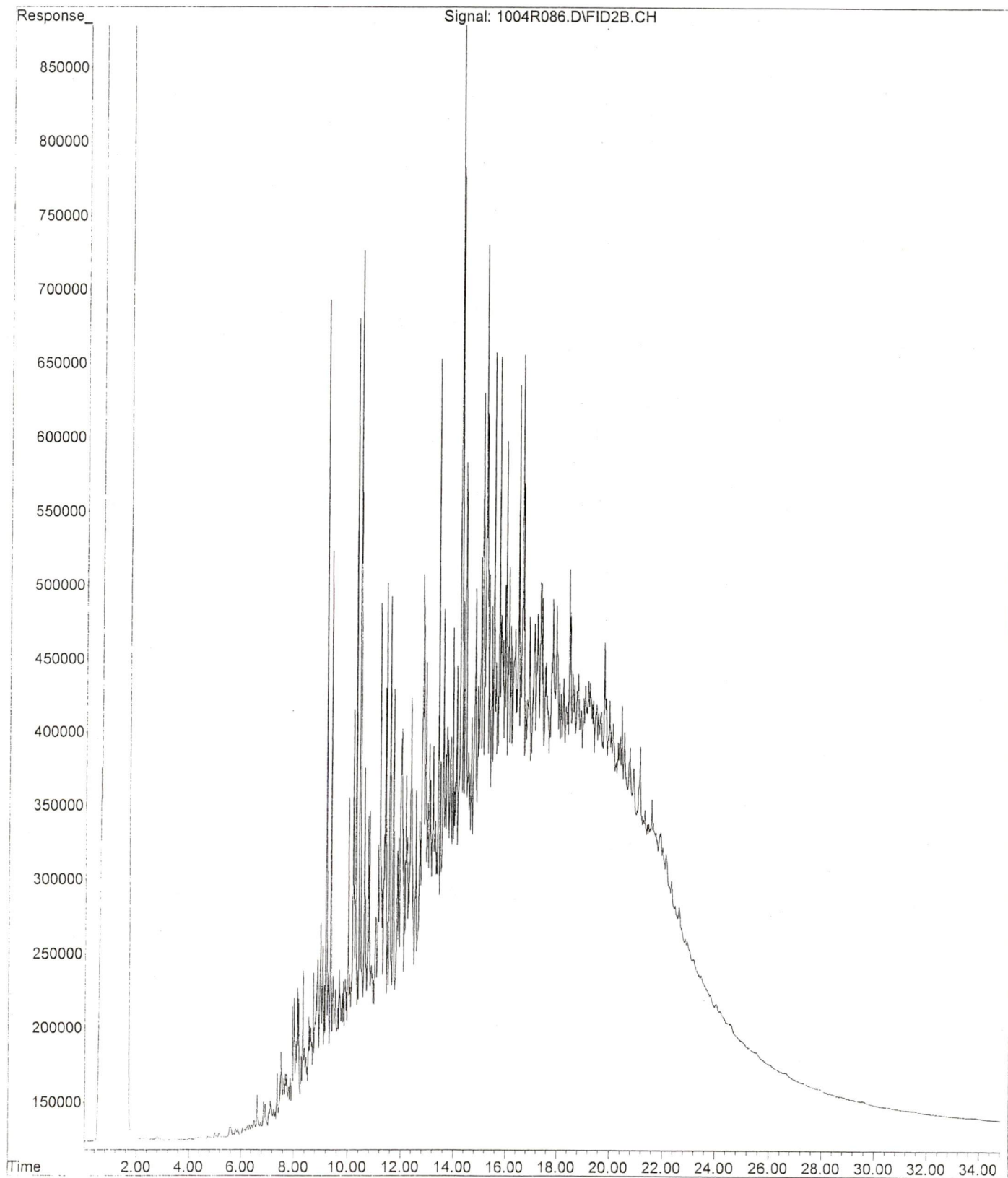
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<u>[Signature]</u>	<u>OnSite Ev.</u>	<u>9/23/05</u>	<u>1355</u>	
Reviewed by/Date	Reviewed by/Date	Chromatograms with final report <input checked="" type="checkbox"/>		

RAW DATA

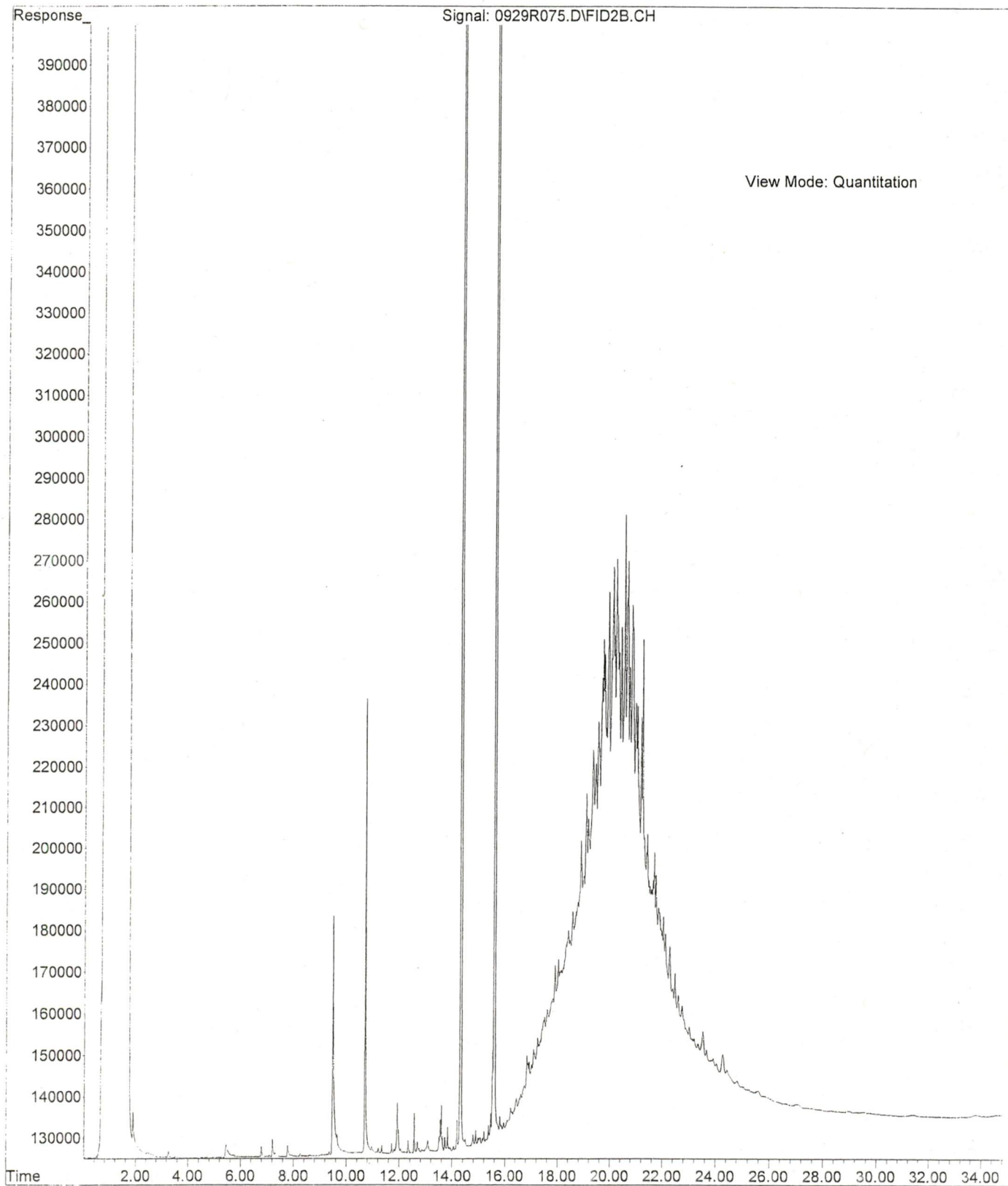
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Vial Number: 70



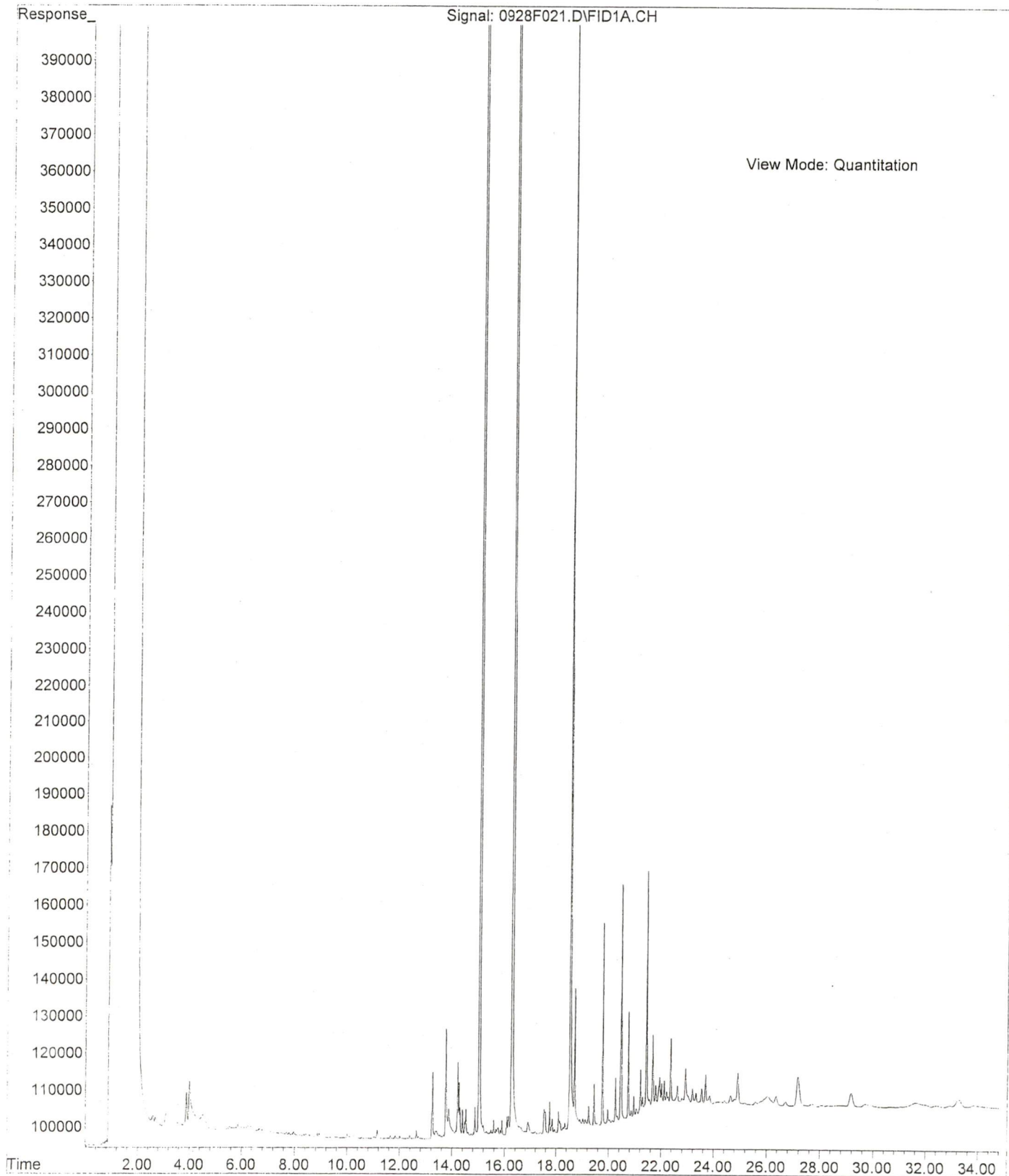
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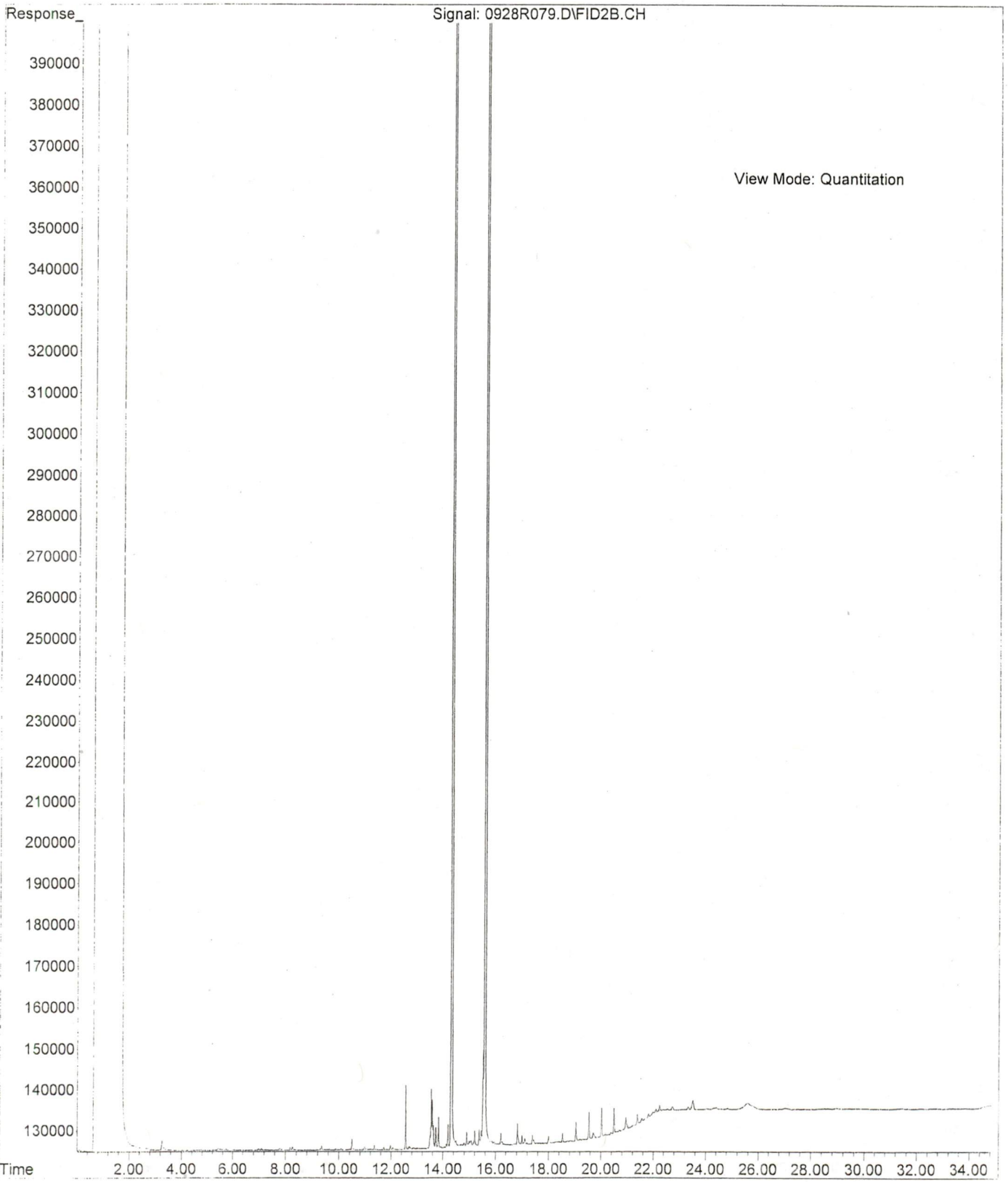
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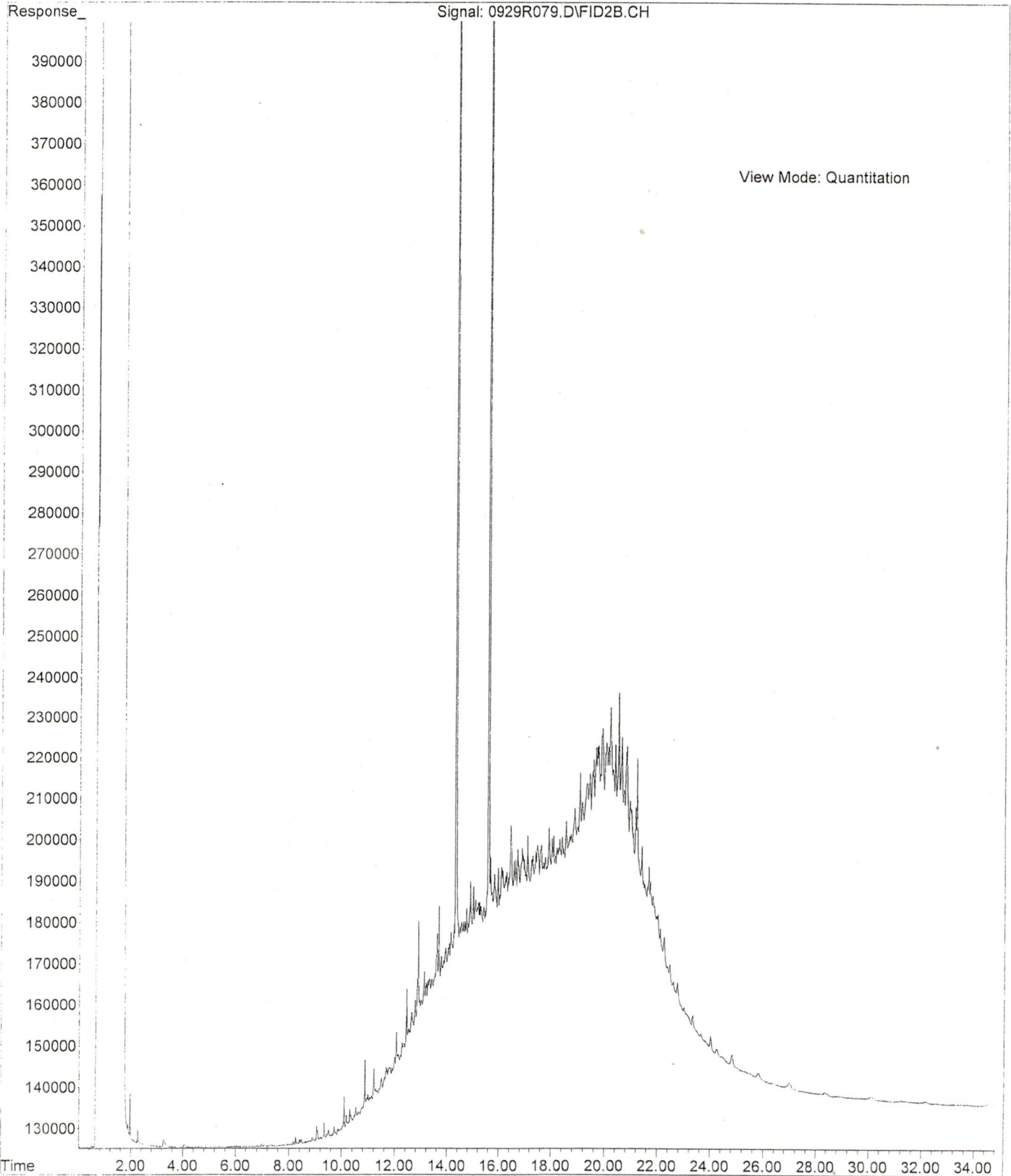
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Vial Number: 21



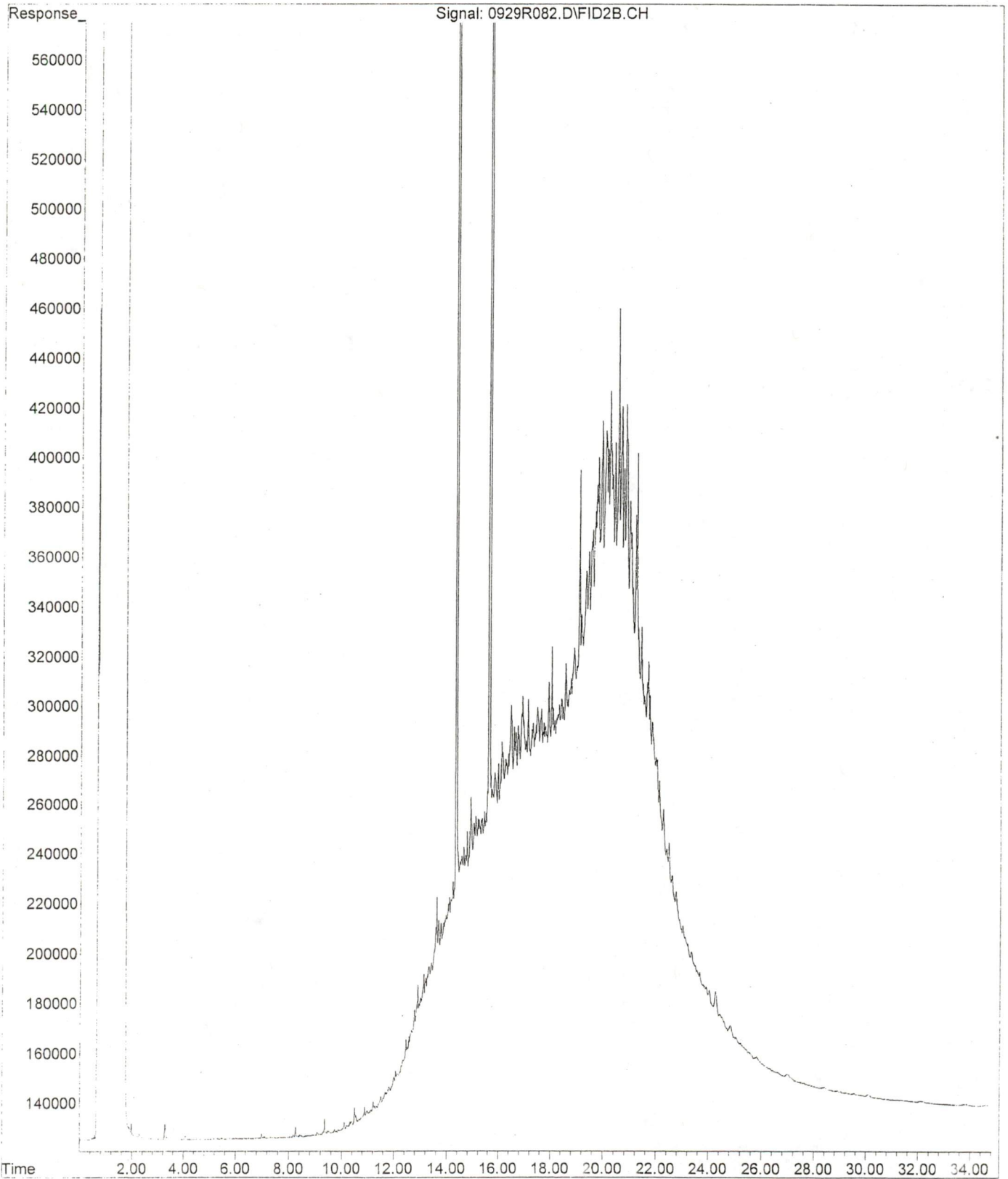
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Misc Info : 2
Vial Number: 79



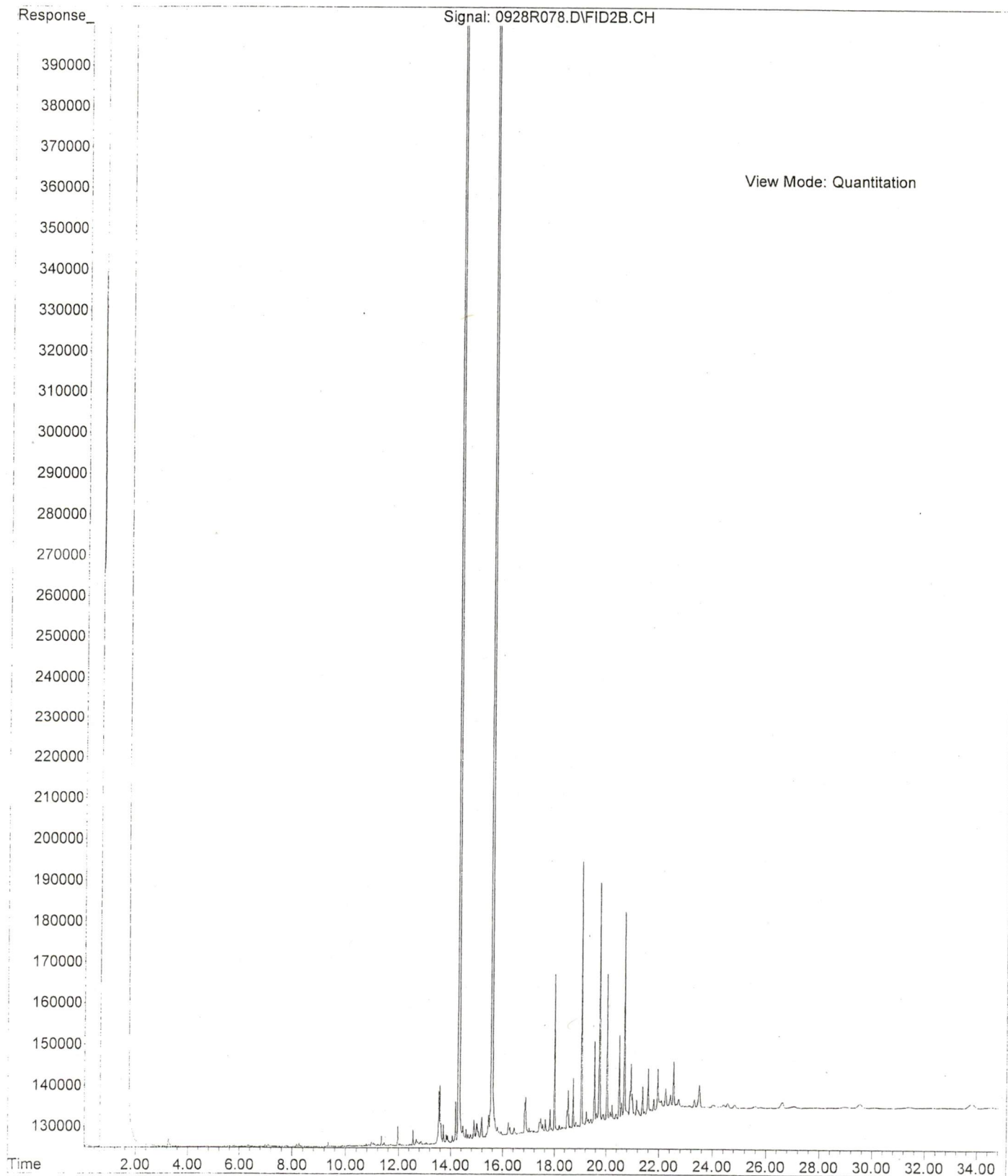
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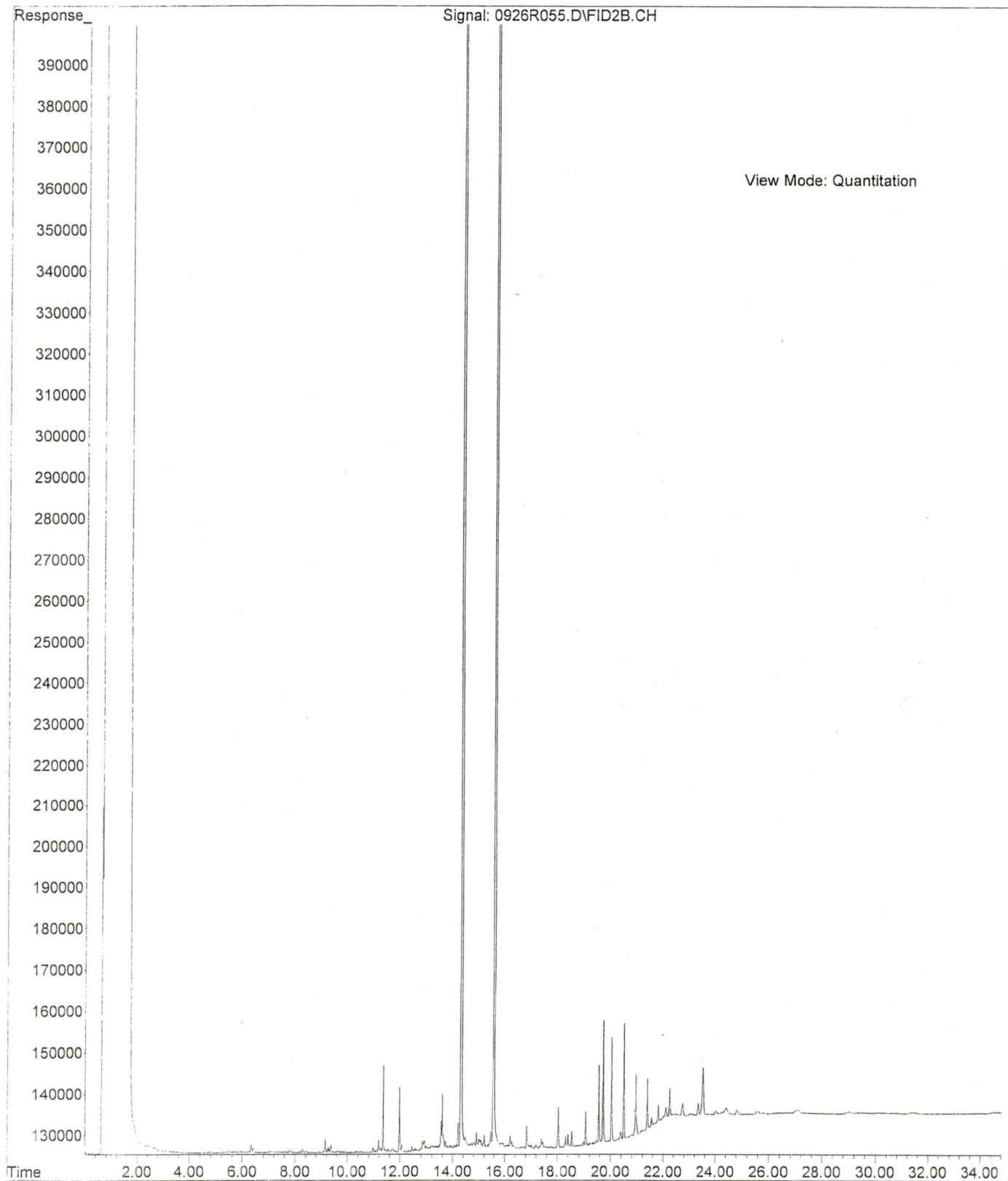
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Instrument : Teri
Sample Name: 09-192-10a
Misc Info : 2
Vial Number: 55



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Appendix
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Appendix G

Organic-Carbon Normalization Process

Appendix G

Organic Carbon Normalization Process

The analytical results for soil sample EC-S5, evaluated as a sediment sample during the September 2005 investigation, were organic-carbon normalized per the Washington State Sediment Management Standards (SMS), Washington Administrative Code (WAC) Chapter 173-204. Because non-ionic, organic chemicals partition to the organic carbon in sediments, their effective toxicity is more highly related to the organic fraction of the sediment than the concentration based on total dry weight. Data for metals and other ionic compounds do not need to be normalized because ionic or polar compounds are less likely to partition into the organic fraction of the sediment. The following equations were used to normalize sediment data to total organic carbon (TOC; Michelsen and Bragdon-Cook, 1993):

$$C_{normalized} = \frac{C_{dryweight}}{X}$$

Where:

$C_{normalized}$ = Organic carbon-normalized data in milligrams per kilogram (mg/kg)

$C_{dryweight}$ = Concentration as a function of dry weight (mg/kg)

X = Percent organic carbon in sediment, expressed as a decimal (e.g., 1 mg/kg organic carbon = 0.0001% = 0.000001 expressed as a decimal)

Sediment sample EC-S5 contained a high level of TOC at 145,000 mg/kg. This value corresponds with 14.5% or 0.145 TOC expressed as a decimal. Michelsen (1992) stated that, "natural TOC values of up to 12% to 15% have been observed in Puget Sound and other areas, particularly in depositional and/or quiescent areas where organic matter may collect." The location where EC-S5 was collected is in a wetland area where surface water discharges into Ellisport Creek. The 8.66 acres which comprise the project site is currently undeveloped, of which 5.65 acres are tide land and the remaining 3.01 acres are mostly wetland bisected by Ellisport Creek. Obtaining a 14.5% TOC value is not unexpected in a depositional environment such as the project site.

Polycyclic aromatic hydrocarbons (PAHs), a non-ionic suite of chemicals, were analyzed in the sediment sample. Analytical results were organic-carbon normalized and then compared with Washington State SMS marine sediment quality standards. Table 6 in the text presents both the dry weight analytical results and the organic-carbon normalized results. All detections of PAHs were below the SMS marine quality standards for both dry weight values and organic-carbon normalized values.

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