

HERITAGE PARK WATER AND SEDIMENT QUALITY ASSESSMENT

CAPITOL LAKE
OLYMPIA, WASHINGTON



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Administration*

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Preface

Thurston County is under contract with Washington State Department of General Administration to monitor overall water quality conditions in Capitol Lake, provide technical assistance on Capitol Lake water quality issues, and to assess the water and sediment quality along the Heritage Park shoreline as it relates to human health concerns. This report contains the results of the Heritage Park water and sediment quality assessment. Also included in this report is additional sampling data obtained by the City of Olympia during the lake draw down in July and August 2002. The type of data obtained is chemical and bacterial contaminant levels in the water and sediment. Because the objective was to assess potential human health risks associated with water or sediment contact, biological testing was not included.

Washington Administrative Code, Chapter 173-204, Sediment Management Standards, establishes chemical standards for marine sediment. However, these regulations do not establish criteria for freshwater sediments. Section 340 of Chapter 173-204 provides the Washington Department of Ecology the authority to determine, on a case-by-case basis, the criteria, methods, and procedures necessary to meet the intent of the chapter.

A report entitled “Development of Freshwater Sediment Quality Values (SQV) for use in Washington State, Phase I Task 6”, September 2002, describes Ecology’s most recent effort toward adoption of freshwater sediment criteria for possible use in Ecology’s sediment management program. The report includes a compilation, description, and evaluation of existing freshwater SQV sets in North America. Sediment quality exceedances of any individual chemical parameter in the SQV set would predict that adverse biological effects will occur in freshwater sediments. The present analysis considers only ecological effects, not human health effects; SQVs based on human health effects could be different from those based on ecological effects. In the report it is recommended that both chemical **and** biological testing be used to evaluate freshwater sediment quality for the appropriate regulatory response. This report is the first step toward identifying, developing and using freshwater SQVs for regulatory decision-making in Washington State.

Since there are currently no established freshwater sediment standards in the State of Washington and since the primary project objective was to identify potential human health risks, it was determined that the sediment chemical data would be evaluated using a calculated cancer-risk assessment. This assessment was conducted by the Washington Department of Health, Office of Environmental Health Assessments, at the request of Thurston County project staff. A summary of the assessment is discussed in the body of the following report and the details of the assessment are included in Appendix A.

was draining to a grate in the vicinity of the swimming pool. The discharge point for this grate is unknown.

There are seven known contaminated sites in this catchment area. Most of the contamination was caused by leaking underground fuel storage tanks. Contaminants include diesel fuel, gasoline, heavy oil and waste oil. The sites and contaminants are described in Appendix C. Contamination from these sites could potentially be migrating with the shallow groundwater, and either infiltrate into or move along the outside of the storm pipe which discharges to the lake.

Fountain Outfall

The catchment area for the "Fountain" outfall is the smallest of the three systems in the study. The storm system extends across Heritage Park in a northeasterly direction and collects runoff from 5th Avenue on the north and south sides of 5th Avenue at Sylvester Street. It also includes a drainage system around the fountain. Again, there are two grates that have unknown discharge points; one is southeast of the wading pool area and the other is northwest of the wading pool.

Current land use and businesses in this catchment area are an office building, several small businesses, including a restaurant and import store, city streets, and Heritage Park and the public fountain. Potential contaminants from these current land uses include metals and petroleum contamination from vehicles and fecal contamination from pets and wildlife.

There are two known contaminated sites in this area. Contaminants include lead, gasoline and weathered gasoline (volatile organic compounds). The sources were leaking fuel tanks at former gas station sites in the vicinity of where the fountain is now located.

Task 4: Sediment and Storm Water Sampling

Sampling Methods

Lake sediment samples were collected in May 2002 near the three main outfalls described above. All sediment samples were taken with a petite Ponar dredge. The sediment samples were analyzed for fecal coliform bacteria (APHA method 9221), semi volatile organic compounds (EPA method 8270) and lead (EPA method 6010). These parameters reflect the types of contamination expected from current activities in the catchments or known contaminated sites in these areas.

Because the 7th Avenue and Columbia Street outfalls discharge below the lake surface and several feet from shore, the sediment samples were collected by boat at two locations for each site. At each of these two sites, one sample was taken as close to the outfall as could be estimated based on the knowledge of city staff and maps. Another sample was

taken several feet closer towards the shore, in line with the approximate location of the outfall pipe. Both samples were mixed in a stainless steel beaker and spooned into a sample jar, so there was a composite sample for each site. Discreet fecal coliform samples were collected from each dredge drop. Therefore, there are two fecal coliform results for the Columbia Street outfall and the 7th Avenue outfall.

Only one sediment sample was collected for the Fountain outfall. Since the Fountain outfall is flush with the bulkhead and could be located, only one sample was necessary. The sample was collected approximately two to three feet from the bulkhead where fine sediment could be acquired from between the rip-rap rocks.

In July 2002, in order to make repairs to the earthquake damaged Deschutes Parkway, the lake was lowered several feet. The outfall pipes were exposed at that time, and measurements were taken of the actual distance of the outfalls from the shoreline. The measured distance of the 7th Avenue outfall from the shoreline is 30 feet. The sediment samples were collected at an estimated distance of 35 and 55 feet from shore. Based on the visual appearance of the sample collected at the 35-foot distance, it appears that this was very close to the mouth of the outfall. The measured distance of the Columbia Street outfall is 20 feet from the stairs. The sediment samples for this site were collected approximately 40 and 75 feet from shore. Because the Columbia Street samples were collected farther from the mouth of the outfall, the results probably do not reflect the highest contaminants levels likely present closer to the mouth of the pipe.

Water samples were collected from inside the nearest manhole upstream from each outfall, and were analyzed for volatile organic compounds (EPA 8260). The sampling sites are shown on the map as blue stars. Volatile organic compounds (VOC's) are associated with gasoline, fuel oils and industrial solvents, all of which were contaminants identified at several sites within the 7th Avenue and Fountain storm system areas. Because volatile organic compounds readily evaporate, they do not stay in the sediments. Therefore, it made sense to sample for VOCs in water from the storm system. The locations of the manholes where the samples were collected are as follows:
Columbia Street Outfall – Manhole in Columbia St. just south of Amanda Smith Way.
7th Avenue Outfall – Shear gate between the lake and Water St.
Fountain Outfall – Manhole between the lake and 5th Ave. south of Sylvester St.

Results

Table 1 on the following page shows the results of the “in-lake” sediment and stormwater sampling described above. The laboratory reports are located in Appendix B. There was only one volatile organic compound detected in the stormwater, 4-isopropyltoluene. That compound is found in volatile oils from over 100 different plants. It is used in the flavoring and fragrance industry and the manufacture of synthetic resins. It is also an additive found in American cigarettes. The quantity measured was very low and is therefore an estimate, but the compound was definitely present. The presence of isopropyltoluene is most likely associated with stormwater runoff.

All of the semi-volatile organic compounds detected in the lake sediments, with the exception of bis(2-ethylhexyl) phthalate, are associated with fuels (oils, gasoline and diesel) and fuel combustion. Bis(2-ethylhexyl) phthalate is used as a plasticizer and as a denaturant for alcohol. The sediment near the 7th Avenue outfall had the highest contaminant concentrations of the three sites sampled.

Table 1. Sediment and Stormwater Sample Results

Contaminant	Outfall Sites				
	Columbia		7th Avenue		Fountain
Water Samples					
Volatile Organics (ppb)					
4-Isopropyltoluene	0.2J, 0.3J lab duplicate		0.4U		0.4U
In-Lake Sediment Samples					
	In	Out	In	Out	Single Sample
Fecal Coliform bacteria (organisms/100 grams)	80	240	350	500	240
Lead (mg/Kg dry wt. basis)	31.2		118		33.3
Semi-Volatile Organics (ppm)					
Fluorene	0.090U		0.10		0.15U
Phenanthrene	0.090U		0.098U		0.79
Anthracene	0.580		1.80		0.15
Fluoranthrene	1.50		4.50		1.90
Pyrene	1.20		3.50		1.90
Benzo(a)anthracene	0.42		1.30		0.69
Chrysene	0.78		2.30		1.10
Bis(2-ethylhexyl) phthalate	0.92		8.00		12.0
Benzo(b)fluoranthrene	1.20		4.40		2.0
Benzo(k)fluoranthrene	0.45		1.40		0.15U
Benzo(a)pyrene	0.64		1.60		0.98
Indeno(1,2,3-cd)pyrene	0.58		1.00		0.15U
Benzo(g,h,i)perylene	0.58		0.92		0.53

U = Compound was analyzed for, but not detected, at the specified detection limit.

J = Estimated value – Compound positively identified, but below specified detection limit.

In = Closest to outfall.

Out = Farthest from outfall.

Dave McBride, a toxicologist with Washington Department of Health, provided a risk assessment for human contact with the semi-volatile compounds measured in the lake sediments. The risk assessment method and worksheets from Dave McBride are included in Appendix A. The calculations for the risk assessment were used to examine cancer risks associated with exposure to the sediments. The assumed hypothetical exposure to the sediments was that a person would have contact with the sediments 150 days per year for 30 years and would be completely covered with the sediment. Based on those exposure assumptions, the maximum hypothetical cancer rates are not of concern for either dermal contact or sediment ingestion or a combination of the two. In summary,

sediment contaminant concentrations do not appear to be a health concern for people coming in contact with the sediments. (McBride, 2002)

Lead concentrations in the sediments were higher than the statewide and regional 90th percentile natural background values at the 7th Avenue site. Natural background concentrations of lead in surficial soil throughout Washington State range from 11 mg/kg to 24 mg/kg. (WDOE, 1994 Publication #94-115) Near the 7th Avenue site, sediment concentrations of lead were 118 mg/kg. The lead concentrations in the sediments near the Columbia Street and Fountain outfalls were much closer to natural soil background levels, with 31.2 mg/kg and 33.3 mg/kg respectively.

The fecal coliform levels in the sediment samples were moderately high at all three sites. There are no fecal coliform standards for freshwater **sediments**. Sediment sample results ranged from 80 to 500 colonies/100 ml, with a geometric mean of 240 and four of the five samples greater than 100 colonies/100 mL.

Bacteria in the sediments can be resuspended into the water column by bathers or other disturbances, and result in exposure to water containing fecal coliform bacteria at levels above the water quality standard. The standard for lake water states that fecal coliform shall both not exceed a geometric mean value of 50 colonies/100 mL, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 mL (WAC 173-201A). The fecal coliform bacteria organism is used as an indicator of the potential presence of illness-causing viruses and bacteria called pathogens (such as E coli, hepatitis and Salmonella). People swimming or playing in water can be exposed to pathogens when those pathogens enter the body through small cuts, abrasions or mucus membranes. (WDOE, 2002 Publication #02-10-010)

City of Olympia Sampling

During the draw down of Capitol Lake in July and August, staff from the City of Olympia conducted a shoreline inventory of all discharges into the lake. Twenty-one discharges were identified and mapped. Eight outfalls had water discharging during this dry weather survey, which was believed to be baseflow from groundwater infiltration of the storm system. Water samples from those eight discharges were analyzed for fecal coliform bacteria and ammonia. Four of those eight were also analyzed for total petroleum hydrocarbons (TPH) and semi-volatile organic compounds. Three of those four were analyzed for lead. The other discharges were not flowing at the time. Appendix E contains a map of the sites, a summary of the results, and the laboratory reports.

Lead was not detected in any of the water samples. The 7th Avenue outfall (site H10) was the only site to have detectable levels of total petroleum hydrocarbons or any semi-volatile compounds. The total petroleum hydrocarbon detected was in the motor oil range at 0.17 parts per million. The one semi-volatile organic compound present was di-n-butyl phthalate, detected at 0.31 parts per billion. This chemical is associated with

Introduction

Thurston County Environmental Health Division is under contract with the Washington Department of General Administration to do several water quality related activities on Capitol Lake. Those activities are as follows:

- 1) Conduct ambient water quality monitoring in Capitol Lake,
- 2) Provide technical assistance on water quality issues,
- 3) Identify stormwater outfalls at Heritage Park
- 4) Sample sediments along the Heritage Park shoreline, and
- 5) Sample water quality along the Heritage Park shoreline.

Tasks 3, 4 and 5 are related activities aimed at determining whether the water and sediment quality in the nearshore area along Heritage Park poses a risk to the public who may utilize that area for some form of water contact recreation. Stairs down to the shoreline of Capitol Lake in the middle of Heritage Park allow the public access to the water. While this is not a bathing beach, some degree of water contact in this area may be expected from activities such as wading or boat launching.

This document is a report of the activities and findings for tasks 3, 4, and 5. In addition, the City of Olympia conducted sampling during the period of lake draw down in July and August 2002, which supplemented this effort. The data is included in Appendix E.

Task 3: Identify Stormwater Outfalls at Heritage Park

The purpose of this task was to locate all stormwater outfalls discharging to the lake along the Heritage Park shoreline, identify the catchment area draining to those storm systems, and identify businesses, land uses, and known contaminated sites within those catchments that have the potential to contribute pollutants to the lake via the storm sewer systems.

In the fall of 2001, maps of stormwater and sewer pipes in the downtown area of Olympia were acquired from the City of Olympia in order to identify the location of outfalls in the Heritage Park area and to determine the catchment areas for those outfalls. A total of nineteen outfalls to the lake were identified along the Heritage Park shoreline. These outfalls are shown on the attached map as pale blue lines. A field investigation was done to identify any businesses or land use activities or known contaminated sites within those catchments that had the potential to contribute pollutants to the lake if they washed into the storm systems. For the downtown Olympia area, known contaminated sites, the type of contaminant found, and the status of the clean-up effort were researched. The type of contaminant was noted to help determine what analysis to conduct on the lake sediment samples to be collected later. This information is shown on the map at the end of this report. A summary of contaminated sites is included in Appendix C.

Three storm systems were identified as having the greatest potential for transporting contaminants to the lake. The outfalls will be referred to in this report as “Columbia Street”, “7th Avenue” and “fountain” outfalls, and are described below. The outfall location and catchment areas are color coded on the attached map: The fountain outfall and its catchment area are yellow, 7th Avenue outfall and its catchment area are blue, and Columbia Street outfall and its catchment area are pink.

The outfalls were photographed in July 2002 when the lake level was lowered for Deschutes Parkway repairs. The photographs are included in Appendix D. The photograph locations are shown on the attached map as green squares. Two additional drainages were also photographed. One was a concrete pipe located south of the Columbia outfall and approximately 30 feet from the shoreline. This pipe was discharging during dry weather. The second was a seep about 30 feet south of the previous outfall. This seep had a sheen. There was no pipe associated with this seepage and its origin is unknown. The City of Olympia sampled both of these outfalls and the results are reported on page 7.

Columbia Street Outfall

The Columbia Street outfall discharges to the lake just north of the steps to the lakeshore at Heritage Park. The catchment area for this storm system extends four blocks south along Columbia Street to Union Street. The catchment area includes the portion of Amanda Smith Way that slopes towards Columbia Street from Capitol Way. There is an overflow pipe from the Columbia Street storm system to the 7th Avenue pipe where the Columbia Street pipe bends west toward the lake. Businesses and land use in the catchment area include city streets, parking lots, apartment buildings, offices, a bank, parking garages, and a Puget Sound Energy power substation on the north side of Talcott Street. Based on the current land uses, vehicles are most likely to be the largest contributor of contaminants. There are no known contaminated sites in this catchment area.

7th Avenue Outfall

The 7th Avenue storm system has the largest catchment area of the three discharges sampled in this study. The outfall discharges to Capitol Lake at a point nearly directly east of the end of 7th Avenue. The catchment area includes 7th Avenue, from the lake east to Adams Street, and a twelve square block area south of 7th Avenue that is bounded on the east by Adams Street and on the west by Capitol Way. There are several street grates in this catchment whose discharge points are unknown. Some of those grates are located behind the Best Western Hotel on Capitol Way and 9th Avenue, and in a parking lot behind the American Legion building north of 7th Avenue and east of Water Street.

Current land uses in this catchment area include retail businesses, houses, office buildings, apartments, a church, a hotel, city streets, and parking lots. During a field investigation, use of a power washer was observed at the Best Western. Water from it

latex adhesives, cellulose plastics and dye solvents, and is a common environmental contaminant. Fecal coliform concentrations in the 7th Avenue discharge were above expected baseflow values, ranging from 180 to 1,250 organisms per 100 ml. Ammonia concentrations were also above typical baseflow values, ranging from 0.545 parts per million to 0.610 parts per million.

H13, located just south of the Columbia Street outfall, had elevated ammonia concentrations at 0.310 parts per million and 0.731 parts per million.

The ammonia concentration at site H21 was very high (2.54 parts per million). This discharge is a seepage located south of H13 and is in the vicinity of the Heritage Park stairs to the shoreline. Ammonia concentrations this high could indicate sewage leakage, however the fecal coliform bacteria level was low. Ammonia levels should generally not exceed 0.02 mg/L in freshwater (WDOE, 1992, Publication #91-78).

Task 5: Heritage Park Water Sampling

Water samples were taken along the shoreline of Heritage Park in June, August, and September 2002 at five sites where the public has access to the lake. These sampling sites are identified on the map as dark blue triangles. Samples were collected by wading out into the lake and reaching out with a 5-foot-long sampling pole. Samples were analyzed for both fecal coliform bacteria and E. coli bacteria.

Table 2 shows the results from the bacteria sampling. The current state water quality standard for bacteria in lakes is that fecal coliform bacteria shall both not exceed a geometric mean value of 50 colonies/100 mL, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 mL (WAC 173-201A). The Washington Department of Ecology is proposing to change the bacteria standard from fecal coliform to E. coli bacteria. For primary contact recreation use, the proposed water standard is 100 E. coli bacteria colonies / 100 mL.

During these dry, summer conditions, the results were within the current, and proposed, bacteria standard on each of the three days sampled.

Table 2. Heritage Park Shoreline Sampling

Sampling Site	HP1		HP2		HP3		HP4		HP5	
	F.C.	E.C.	F.C.	E.C.	F.C.	E.C.	F.C.	E.C.	F.C.	E.C.
June 25, 2002	<5	<5	<5	<5	<5	<5	5	5	<5	<5
August 28, 2002	70	70	<5	<5	30	30	<5	<5	10	10
September 17, 2002	<5	<5	10	10	<5	<5	<5	<5	30	30

F.C. = Fecal Coliform (f.c./100ml)

E.C. = E. coli (e.c./100ml)

During the shoreline sampling events, the following observations were made:

- Large accumulations of aquatic weeds, wood debris, and garbage were floating on the lake surface at the waters edge and deposited on the shoreline;
- Bird droppings were seen all along the concrete retaining wall;
- Ducks, crows, and seagulls were always present on the lake, near the shoreline, and in the park;
- Dead stickleback fish were floating along the lakeshore;
- Dogs were observed in the park and in the water.

Water clarity was measured in the north basin of Capitol Lake during ambient water quality monitoring (GA contract task 1). Table 3 lists the water clarity results from the north basin for the period between May and September 2002. Thurston County Health Department bathing beach policy states that the water clarity should be at least four feet for recreational waters. Water clarity in the mid-north basin was at least four feet in each of the months it was measured.

Table 3 - Capitol Lake – North Basin Water Clarity

Month/year	05/02	06/02	07/02	08/02	09/02
Water Clarity (meters)	2.5M (8.2 ft.)	2.0M (6.6 ft.)	No monitoring, lake draw down.	1.7M (5.5 ft.)	1.4M (4.6 ft.)

Summary

Lake sediments had detectable levels of petroleum-related compounds, lead, and the plasticizer, phthalate.

Sediments around the 7th Avenue stormwater outfall had the highest petroleum-related contaminants and lead levels of the three sites sampled. Ammonia and fecal coliform concentrations above expected baseflow concentrations were also identified in the water being discharged at this outfall.

A risk assessment of human exposure to the semi-volatile organic compounds contained in the sediments showed a low increased cancer risk.

High ammonia concentrations were also seen in the water from one other stormwater outfall and a near-shore seep.

The 2002 water clarity measurements in the north basin met the visibility standard included in the County public swimming area policy. The fecal coliform results from

samples taken in the near-shore area of Heritage Park met the state water quality standard for lakes.

Observations of accumulated aquatic plants, wood, garbage, dead fish, and other floating debris confirm that this area of the lake has poor water circulation.

Conclusions

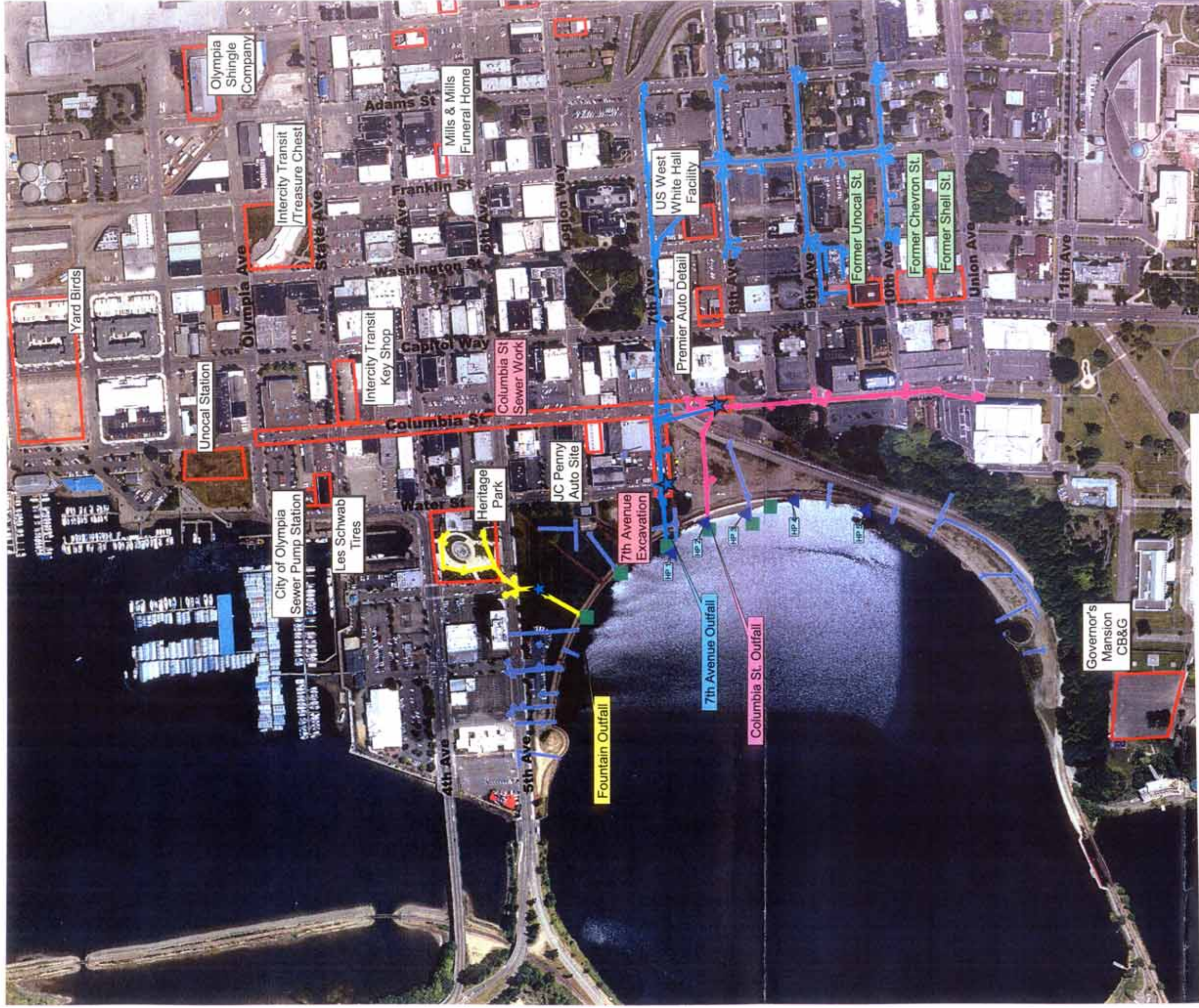
Based on sample results, it appears there is a low human health risk associated with incidental contact with the lake water and sediments along the Heritage Park shoreline for activities such as boat launching, wading, or fishing.

However, there are several factors which make this area an unsuitable location for a public swimming area. These factors include the following:

- 19 stormwater outfalls discharging to the lake in the Heritage Park area;
- High levels of ammonia in three discharges, indicating possible sewage or other sources of contamination;
- Poor water circulation in the area, as evident by the floating debris and garbage accumulated along the shoreline;
- Moderately high fecal coliform bacteria levels in the sediments;
- The high intensity of land use and traffic in the catchments for these stormwater outfalls poses a risk of accidental spills of fuels or other contaminants and accidental sewer connections. In such instances contaminants could quickly reach the lake. It also means that during rain events stormwater and stormwater contaminants are being discharged to the lake, some of which are retained in the sediments, as seen in the sediment sample results.

The City of Olympia and Thurston County should further investigate, when possible, the sources of ammonia in the two storm sewer systems and seepage with elevated levels (7th Avenue storm sewer system, outfall H13 and seep H21). The 7th Avenue system should also be investigated for possible bacterial contamination sources.

Footnote: The City of Olympia staff began evaluating the 7th Avenue storm system in Fall 2002. The majority of the system was televised in February 2003 to review the system integrity and connections. The need for additional follow-up work will be determined based on the information being gathered.



Errata:

There are 2 known errors on this map:

1. The "Columbia St Sewer Work" contaminated site (red) should stop at 7th Avenue on the southern end.
2. There is a storm sewer line that should be displayed (in blue) which extends north up an alley from the 7th Avenue system toward Legion Way in the city block between Water St. and Columbia St.

**Capitol Lake / Heritage Park Area
Stormwater Systems
And Known Contaminated Sites**

0 200 400 600 800 1000 1200 Feet

- Photos taken
- Water Sampling: VOC's
- Lake Samples
- Contaminated Sites
- Stormwater Drains
- Fountain Storm Sewer
- Columbia St. Storm Sewer
- 7th Avenue Storm Sewer
- Other Drains

- Petroleum Contamination (gas, diesel, heating oil)**
- Mixed Contaminants (petroleum plus organic compounds)**
- NFA - no further action (site has been remediated to a satisfactory level)**



Thurston County, Washington
 100 - May 2007 Environmental Health
 with GIS from Thurston Geomatics Centre

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Appendices

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Appendix A

Washington Department of Health Risk Assessment

Department of Health
Office of Environmental Health Assessments
February 27, 2003

TO: Sue Davis

FROM: Dave McBride, toxicologist

SUBJECT: Capitol Lake Sediments

Explanation of tables

In evaluating the sediment data from Capitol Lake, several assumptions were made to predict possible human health risks from exposure to sediments. In this evaluation, two exposure pathways, dermal absorption and sediment ingestion were assessed and then combined to give a "total" risk from exposure to sediments. The following outlines the assumptions made in determining exposure and calculating a potential risk posed by contaminants found in the sediments.

Sediment Concentrations

Three sites near Capitol Lake were sampled and assessed for various Polycyclic Aromatic Hydrocarbons (PAHs). The detection frequencies at the three sites (Columbia, 7th Ave., and Fountain) were 11, 11.7 and 9.7 percent respectively. (Detection frequency refers to the percentage of chemical compounds found to be present in the samples out of the all the chemical compounds included in the analyses.) Concentrations of detected chemicals ranged from 0.10 to 12.0 ppm. Washington State does not have human health sediment criteria to which these values can be compared. For regulatory purposes, the Washington State Department of Ecology (Ecology) can use Sediment Management Standards (SMS), established for marine sediments in WAC 173-204, to determine possible impact to the environment. These standards are expressed on an organic carbon normalized basis. The Capitol Lake sediment data was not organic carbon normalized. However, an average organic carbon value for sediments can be approximated by using a value of 2% total organic carbon (TOC). Expressing the sediment data based on 2% TOC results in an exceedance of the SMS in samples taken from the 7th Ave. and Fountain locations as shown in Table 1. Combining the sediment concentration data from the three sites as shown in Table 2 indicates that the average concentration for three contaminants exceed Ecology's SMS. Exceedance of the SMS does not imply a potential threat to public health. Again, this data is based on detected data only and on a very small sample size. The average concentrations of the detected data from these three sites were then used in evaluating exposure and potential risks to humans.

Dermal Exposure

The equation and assumptions used to estimate dermal absorption of a chemical through contact with sediments given a recreational setting is shown in Table 3a. The parameters used to calculate an average daily intake (dose) are listed. In this evaluation, several parameters were changed from EPA's standard assumptions to calculate worse case scenario. Specifically, the equation used EPA's standard assumptions for the averaging time, body weight of a child and adult, and exposure duration. The skin area available for contact with sediments was changed to reflect total body exposure rather than arms, hands, legs and feet. This increased the surface area measurements used in calculating exposure from 5,000 cm² to 18,000 cm² for adults and from 2,500 cm² to 6,600 cm² for children. Doing so increased the exposed surface area about three fold. Soil absorption factors and soil to skin adherence factors were taken from EPA's Risk Assessment Guidance Part E. The sediment concentrations from Table 2 were used in this evaluation. The exposure scenario used to calculate risk is: a person who is using the lake 150 days per year for 30 years from childhood to an adult, who gets covered in sediment with concentrations of the various PAHs shown in Table 2 over their entire body each use. Doses are calculated for the child and the adult and then combined to give an average daily intake over a lifetime (the exposure period is 30 years but the effects of carcinogens are averaged over a 70 year lifetime).

In Table 3b, the dose or average daily intake of the various PAHs was matched with the appropriate cancer slope factors (CSF). Multiplying the dose by the CSF calculates an estimated risk for that chemical. This risk is believed to be the upper bound risk, the true risk may be less than this or may be zero. Once a risk is calculated for each chemical, a combined risk is estimated for the total risk via dermal exposure by adding the individual values. It should be noted that an additional measure of safety was added by applying CSF to five chemicals that do not have CSF (believe not to cause cancer). A CSF based on Benzo(a)pyrene was used in this case. The resulting effect is likely to over estimate the actual risk. The purpose of this evaluation is to determine whether, under a worse case scenario, cancer risks are of concern. Here the resulting dermal exposure risk is calculated to be 7.5×10^{-5} or 7.5 cancers in a population of 100,000. This risk is believed to be the upper bound risk, the true risk may be less than this or may be zero.

Sediment Ingestion

The equation and assumptions used to estimate exposure of a chemical through sediment ingestion during contact with sediments given a recreational setting is shown in Table 4a. The parameters used to calculate the average daily dose through sediment ingestion are listed. As with the dermal exposure, several parameters were changed from EPA's standard assumptions to calculate worse case scenario. Specifically, the equation used EPA's standard assumptions for the averaging time, body weight of a child and adult, and exposure duration. Sediment ingestion rates of 100 and 200 mg per event for adults and children respectively, were applied. The sediment concentrations from Table 2 were used in this evaluation. The exposure scenario used to calculate risk is: a person who is using the lake 150 days per year for 30 years from childhood to an adult, who ingests 100 (adult rate) or 200 mg (child rate) of sediment each time they use the lake which contains concentrations of the various PAHs shown in Table 2. Doses are calculated for the child

and the adult and then combined to give an average daily intake over a lifetime (again, the exposure period is 30 years but the effects of carcinogens are averaged over a 70 year lifetime).

In Table 4b, the dose or average daily intake from ingestion of chemicals in sediments of the various PAHs were matched with the appropriate cancer slope factors (CSF). Multiplying the dose by the CSF calculates an estimated risk for that chemical. This risk is believed to be the upper bound risk, the true risk may be less than this or may be zero. Once a risk is calculated for each chemical, a combined risk is estimated for the total risk via sediment ingestion exposure by adding the individual risks. It should be noted that an additional measure of safety was added by applying CSF to five chemicals that do not have CSF (believe not to cause cancer). A CSF based on Benzo(a)pyrene was used in this case. The resulting effect is likely to over estimate the actual risk. The purpose of this evaluation is to determine whether, under a worse case scenario, cancer risks are of concern. Here the resulting sediment ingestion exposure risk is calculated to be 6.8×10^{-5} or 6.8 cancers in a population of 100,000. This risk is believed to be the upper bound risk, the true risk may be less than this or may be zero.

Combined Exposures/Risks

Tables 3c and 4c show the combined risks associated with exposure via dermal absorption and ingestion of sediments containing the various PAHs. The combined risk is simply the addition of the risks associated with the two different pathways. The resulting "total" risk is calculated to be 1.4×10^{-4} , or 1.4 cancers in a population of 10,000. This risk is believed to be the upper bound risk, the true risk may be less than this or may be zero.

It should be noted that worse case exposure scenario was applied here. In addition, 5 PAHs that do not have CSF (not believed to cause cancer) were included in this evaluation to be overly protective. If the risks were calculating without including these chemicals, the total risk would be 7.7×10^{-5} , or 7.7 cancers in a population of 100,000. This risk is believed to be the upper bound risk, the true risk may be less than this or may be zero.

Given the exposure scenario presented and the resulting risks calculated from those exposures, it does not appear that they are any concern over the levels of contaminants in the sediment samples. The maximum hypothetical cancer rates are not of concern for either dermal contact or sediment ingestion or a combination of the two (around the 1 in one hundred thousand range). Although the sediment concentrations were comparable to Cascade Pole for some of the PAHs, the difference is that at Cascade Pole, dioxins and furans drove the risk values that were not sampled for, or expected, here.

In summary, sediment contaminant concentrations do not appear to be of health concern for swimmers or waders coming in contact with lake sediments. Attached is an excel spreadsheet containing four worksheets (Tables 1 through 4).

Table 1

Thurston County Sediment Data from Capital Lake

July-02

Site	Compound	Concentration (ppm dry weight)	Organic Carbon normalized (ppm oc - assuming 2% TOC)	SMS (ppm oc)	
Columbia det. freq. 11%	Anthracene	0.58	29	220	
	Benzo(a)anthracene	0.42	21	110	
	Benzo(a)pyrene	0.64	32	99	
	Benzo(b)fluoranthrene	1.20	60	230	
	Benzo(g,h,i)perylene	0.58	29	31	
	Benzo(k)fluoranthrene	0.45	22.5	230	
	Bis(2-ethylhexyl) phthalate	0.92	46	47	
	Chrysene	0.78	39	110	
	Fluoranthrene	1.50	75	160	
	Indeno(1,2,3-cd)pyrene	0.58	29	34	
	Pyrene	1.20	60	1000	
	7th Ave. det. freq. 11.7%	Anthracene	1.80	90	220
		Benzo(a)anthracene	1.30	65	110
		Benzo(a)pyrene	1.60	80	99
Benzo(b)fluoranthrene		4.40	220	230	
Benzo(g,h,i)perylene		0.92	46	31	
Benzo(k)fluoranthrene		1.40	70	230	
Bis(2-ethylhexyl) phthalate		8.00	400	47	
Chrysene		2.30	115	110	
Fluoranthrene		4.50	225	160	
Fluorene		0.10	5	23	
Indeno(1,2,3-cd)pyrene		1.00	50	34	
Pyrene		3.50	175	1000	
Fountain det. freq. 9.7%		Anthracene	0.15	7.5	220
		Benzo(a)anthracene	0.69	34.5	110
	Benzo(a)pyrene	0.98	49	99	
	Benzo(b)fluoranthrene	2.00	100	230	
	Benzo(g,h,i)perylene	0.53	26.5	31	
	Bis(2-ethylhexyl) phthalate	12.00	600	47	
	Chrysene	1.10	55	110	
	Fluoranthrene	1.90	95	160	
	Phenanthrene	0.79	39.5	100	
	Pyrene	1.90	95	1000	

Table 2

Thurston County Sediment Data from Capital Lake - Summary

July-02

Compound	sample size	Concentration (ppm dry weight)	Organic Carbon normalized (ppm oc - assuming 2% TOC)	SMS (ppm oc)
Anthracene	3	0.84	42	220
Benzo(a)anthracene	3	0.80	40	110
Benzo(a)pyrene	3	1.07	53.5	99
Benzo(b)fluoranthrene	3	2.53	126.5	230
Benzo(g,h,i)perylene	3	0.68		31
Benzo(k)fluoranthrene	2	0.92	46	230
Bis(2-ethylhexyl) phthalate	3	6.97		47
Chrysene	3	1.39	69.5	110
Fluoranthrene	3	2.63	131.5	160
Fluorene	1	0.10	5	23
Indeno(1,2,3-cd)pyrene	2	0.79		34
Pyrene	3	2.20	110	1000

Table 3a. Thurston County Sediment Data - Dermal Contact Calculations 8/13/02 updated 2/3/03
Evaluation for Carcinogenic Effects

Daily Absorbed Dose = (CS x CF x SA x AF x ABS x EF x ED)/(BW x AT) by age group*
 Dose (Average daily Intake) = sum of child and adult absorbed doses

Compound	Ave. Daily Intake	Dose child	Dose adult	CS	SA child	SA adult	CF	EF	ED child	ED adult	BW child	BW adult	AT	ABS	AF child	AF adult
Anthracene	6.15E-01	3.38E-07	2.77E-07	0.84	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Benzo(a)anthracene	5.86E-01	3.22E-07	2.64E-07	0.80	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Benzo(a)pyrene	7.84E-01	4.31E-07	3.53E-07	1.07	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Benzo(b)fluoranthrene	1.85E+00	1.02E-06	8.34E-07	2.53	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Benzo(g,h,i)perylene	4.98E-01	2.74E-07	2.24E-07	0.68	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Benzo(k)fluoranthrene	6.74E-01	3.71E-07	3.03E-07	0.92	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Bis(2-ethylhexyl) phthalate	5.11E+00	2.81E-06	2.30E-06	6.97	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Chrysene	1.02E+00	5.60E-07	4.58E-07	1.39	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Fluoranthrene	1.93E+00	1.06E-06	8.67E-07	2.63	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Fluorene	7.33E-02	4.03E-08	3.30E-08	0.10	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Indeno(1,2,3-cd)pyrene	5.79E-01	3.18E-07	2.60E-07	0.79	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07
Pyrene	1.61E+00	8.87E-07	7.25E-07	2.20	6600.00	18000.00	0.000001	150	6	24	15	70	25550	0.13	0.2	0.07

where:

- AT = Averaging time (70 years x 365 days/year -days)
- BW = Body weight (15 kg for child age 0-6 years, 70 kg for adult)
- CF = Conversion factor - units (10-6 kg/mg)
- ED = Exposure duration (30 years - 6 years as a child, 24 as an adult)
- EF = Exposure frequency (150 events/year)
- SA = Skin surface area available for contact (6600 cm2/event for child age 0-6, 18000 cm2/event for adult)
- CS = Contaminant concentration in sediment (mg/kg)
- ABS = Absorption factor (unitless)
- AF = soil to skin adherence factor (mg/cm2)

Table 3b

Table 3b. Lifetime risk from dermal absorption = Average Daily Intake (Dose) x CSF*

Compound	Ave. Daily Intake	CSF	Risk
Anthracene**	6.15E-07	7.3	4.5E-06
Benzo(a)anthracene	5.86E-07	7.3	4.3E-06
Benzo(a)pyrene	7.84E-07	7.3	5.7E-06
Benzo(b)fluoranthrene	1.85E-06	7.3	1.4E-05
Benzo(g,h,i)perylene**	4.98E-07	7.3	3.6E-06
Benzo(k)fluoranthrene	6.74E-07	7.3	4.9E-06
Bis(2-ethylhexyl) phthalate	5.11E-06	0.014	7.1E-08
Chrysene	1.02E-06	7.3	7.4E-06
Fluoranthrene**	1.93E-06	7.3	1.4E-05
Fluorene**	7.33E-08	7.3	5.3E-07
Indeno(1,2,3-cd)pyrene	5.79E-07	7.3	4.2E-06
Pyrene**	1.61E-06	7.3	1.2E-05
Dermal risk			7.5E-05

where:

CSF = Cancer Slope Factor

Table 3c. Combined lifetime risks from both sediment ingestion and dermal absorption

Pathway	Risk
Dermal	7.5E-05
Ingestion	6.8E-05
Combined	1.4E-04 (sediment ingestion and dermal absorption)

see sediment ingestion calculations

Resulting total risk value includes hypothetical calculations for PAHs that do not have a CSF designated with **. They are assumed to have a CSF equal to BAP
 * source - Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A) EPA/540/1-89/002
 and Risk Assessment, Sediments Operable Unit, Cascade Pole Site, Port of Olympia, Washington Oct. 1992 Landau Associates, Inc.

Table 4a. Thurston County Sediment Data - Sediment Ingestion Calculations 8/13/02 updated 2/3/03

Evaluation for Carcinogenic Effects

Daily intake = $(IR \times CS \times CF \times EF \times ED) / (BW \times AT)^*$

Dose (Average Daily Intake) = sum of child and adult Intakes

Compound	Ave. Daily Intake	Dose child	Dose adult	IR child	IR adult	CS	CF	EF	ED child	ED adult	BW child	BW adult	AT
Anthracene	5.64E-07	3.95E-07	1.69E-07	200	100	0.84	0.000001	150	6	24	15	70	25550
Benzo(a)anthracene	5.37E-07	3.76E-07	1.61E-07	200	100	0.80	0.000001	150	6	24	15	70	25550
Benzo(a)pyrene	7.18E-07	5.03E-07	2.15E-07	200	100	1.07	0.000001	150	6	24	15	70	25550
Benzo(b)fluoranthrene	1.70E-06	1.19E-06	5.09E-07	200	100	2.53	0.000001	150	6	24	15	70	25550
Benzo(g,h,i)perylene	4.56E-07	3.19E-07	1.37E-07	200	100	0.68	0.000001	150	6	24	15	70	25550
Benzo(k)fluoranthrene	6.17E-07	4.32E-07	1.85E-07	200	100	0.92	0.000001	150	6	24	15	70	25550
Bis(2-ethylhexyl) phthalate	4.68E-06	3.27E-06	1.40E-06	200	100	6.97	0.000001	150	6	24	15	70	25550
Chrysene	9.33E-07	6.53E-07	2.80E-07	200	100	1.39	0.000001	150	6	24	15	70	25550
Fluoranthrene	1.76E-06	1.24E-06	5.29E-07	200	100	2.63	0.000001	150	6	24	15	70	25550
Fluorene	6.71E-08	4.70E-08	2.01E-08	200	100	0.10	0.000001	150	6	24	15	70	25550
Indeno(1,2,3-cd)pyrene	5.30E-07	3.71E-07	1.59E-07	200	100	0.79	0.000001	150	6	24	15	70	25550
Pyrene	1.48E-06	1.03E-06	4.43E-07	200	100	2.20	0.000001	150	6	24	15	70	25550

where:

AT = Averaging time (70 years x 365 days/year)

BW = Body weight (15 kg for child age 0-6 years, 70 kg for adult)

CF = Conversion factor - units (10⁻⁶ kg/mg)

ED = Exposure duration (30 years - 6 years as a child, 24 as an adult)

EF = Exposure frequency (150 days/year)

IR = Ingestion rate (200 mg sediment/day for child 0-6 years, 100 mg for adult)

CS = Contaminant concentration in sediment (mg/kg)

Table 4b. Lifetime risk from sediment ingestion = Average Daily Intake (Dose) x CSF*

Compound	Ave. Daily Intake	CSF	RISK
Anthracene**	5.64E-07	7.3	4.1E-06
Benzo(a)anthracene	5.37E-07	7.3	3.9E-06
Benzo(a)pyrene	7.18E-07	7.3	5.2E-06
Benzo(b)fluoranthrene	1.70E-06	7.3	1.2E-05
Benzo(g,h,i)perylene**	4.56E-07	7.3	3.3E-06
Benzo(k)fluoranthrene	6.17E-07	7.3	4.5E-06
Bis(2-ethylhexyl) phthalate	4.68E-06	0.014	6.5E-08
Chrysene	9.33E-07	7.3	6.8E-06
Fluoranthrene**	1.76E-06	7.3	1.3E-05
Fluorene**	6.71E-08	7.3	4.9E-07
Indeno(1,2,3-cd)pyrene	5.30E-07	7.3	3.9E-06
Pyrene**	1.48E-06	7.3	1.1E-05
	Ingestion risk		6.8E-05

where:

CSF = Cancer Slope Factor

Table 4c. Combined lifetime risks from both sediment ingestion and dermal absorption

Pathway	Risk
Ingestion	6.8E-05
Dermal	7.5E-05
Combined	1.4E-04

see dermal absorption calculations (sediment ingestion and dermal absorption)

Resulting total risk value includes hypothetical calculations for PAHs that do not have a CSF designated with **. They are assumed to have a CSF equal to BAP * source - Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A) EPA/540/1-89/002 and Risk Assessment, Sediments Operable Unit, Cascade Pole Site, Port of Olympia, Washington Oct. 1992 Landau Associates, Inc.

Appendix B

Laboratory Reports



AQUATIC RESEARCH INCORPORATED
LABORATORY & CONSULTING SERVICES
 3927 AURORA AVENUE NORTH, SEATTLE, WA 98103
 PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	TCH020-77	PAGE 1
REPORT DATE:	06/24/02	
DATE SAMPLED:	05/20,21/02	DATE RECEIVED: 05/22/02
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM THURSTON COUNTY HEALTH / CAPITOL LAKE		

CASE NARRATIVE

Three soil samples were received by the laboratory in good condition. The samples were analyzed according to the chain-of-custody. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while QA/QC data is contained on subsequent pages. Organics reports follow.

SAMPLE DATA - DRY WEIGHT BASIS

SAMPLE ID	LEAD (mg/kg)	SOLIDS (%)
COLUMBIA SED	31.2	36.05%
7TH AVE SED	118	33.08%
FOUNTAIN SED	33.3	20.56%





AQUATIC RESEARCH INCORPORATED

LABORATORY & CONSULTING SERVICES

3927 AURORA AVENUE NORTH, SEATTLE, WA 98103

PHONE: (206) 632-2715 FAX: (206) 632-2417

CASE FILE NUMBER:	TCH020-77	PAGE 2
REPORT DATE:	06/24/02	
DATE SAMPLED:	05/20,21/02	DATE RECEIVED: 05/22/02
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM THURSTON COUNTY HEALTH / CAPITOL LAKE		

QA/QC DATA

QC PARAMETER	LEAD (mg/kg)
METHOD	EPA6010
DATE ANALYZED	06/21/02
DETECTION LIMIT	10.0
DUPLICATE	-
SAMPLE ID	COLUMBIA SED
ORIGINAL	31.2
DUPLICATE	32.0
RPD	2.63%
SPIKE SAMPLE	
SAMPLE ID	COLUMBIA SED
ORIGINAL	31.2
SPIKED SAMPLE	180
SPIKE ADDED	139
% RECOVERY	107.30%
QC CHECK	
FOUND	1.55
TRUE	1.61
% RECOVERY	96.27%
BLANK	<0.200
BLANK SPK RECOVERY	102%

RPD - RELATIVE PERCENT DIFFERENCE.

NA - NOT APPLICABLE OR NOT AVAILABLE.

NC - NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.

OR - RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

Steven Lazoff
Steven Lazoff

Laboratory Director



Aquatic Research Inc.
3927 Aurora Ave. N., Seattle, WA 98103 | (206) 632-2715

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **5/29/02-MB**
Sample ID No.: **Method Blank**
Date Collected: **n/a**
Date Received: **n/a**
Date Analyzed: **05/29/02**
Date of Report: **05/30/02**
Data File Path: **C:\HPCHEM\1\DATA\VOA\020 0301003.D**

Matrix: **Water**
Sample Wt/Vol. (gm/ml): **25**
Dilution Factor: **1**
Analyst: **T. Meadows**
Supervisor's Initials: **SL**

CAS#	Name of Compound	Amount (ppb)	Flag
108-86-1	Bromobenzene	0.4	U
74-97-5	Bromochloromethane	0.4	U
74-83-9	Bromomethane	0.4	U
104-51-8	n-Butylbenzene	0.4	U
135-98-8	sec-Butylbenzene	0.4	U
98-06-6	tert-Butylbenzene	0.4	U
56-23-5	Carbon tetrachloride	0.4	U
108-90-7	Chlorobenzene	0.4	U
75-00-3	Chloroethane	0.4	U
74-87-3	Chloromethane	0.4	U
95-49-8	2-Chlorotoluene	0.4	U
106-43-4	4-Chlorotoluene	0.4	U
96-12-8	1,2-Dibromo-3-Chloroprop	0.4	U
106-93-4	1,2-Dibromoethane	0.4	U
74-95-3	Dibromomethane	0.4	U
95-50-1	1,2-Dichlorobenzene	0.4	U
541-73-1	1,3-Dichlorobenzene	0.4	U
106-46-7	1,4-Dichlorobenzene	0.4	U
75-71-8	Dichlorodifluoromethane	0.4	U
75-34-3	1,1-Dichloroethane	0.4	U
107-06-2	1,2-Dichloroethane	0.4	U
75-35-4	1,1-Dichloroethene	0.4	U
156-59-4	cis-1,2-Dichloroethene	0.4	U
156-60-5	trans-1,2-Dichloroethene	0.4	U
78-87-5	1,2-Dichloropropane	0.4	U
142-28-9	1,3-Dichloropropane	0.4	U
590-20-7	2,2-Dichloropropane	0.4	U
563-58-6	1,1-Dichloropropene	0.4	U
10061-01	cis-1,3-Dichloropropene	0.4	U
10061-02	trans-1,3-Dichloropropene	0.4	U
87-68-3	Hexachlorobutadiene	0.4	U
98-82-8	Isopropylbenzene	0.4	U
99-87-6	4-Isopropyltoluene	0.4	U
75-09-2	Methylene chloride	0.9	U
91-20-3	Naphthalene	0.4	U
103-65-1	n-Propylbenzene	0.4	U
100-42-5	Styrene	0.4	U

CAS#	Name of Compound	Amount (ppb)	Flag
630-20-6	1,1,1,2-Tetrachloroethane	0.4	U
79-34-5	1,1,2,2-Tetrachloroethane	0.4	U
127-18-4	Tetrachloroethene	0.4	U
87-61-6	1,2,3-Trichlorobenzene	0.4	U
120-82-1	1,2,4-Trichlorobenzene	0.4	U
71-55-6	1,1,1-Trichloroethane	0.4	U
79-00-5	1,1,2-Trichloroethane	0.4	U
79-01-6	Trichloroethene	0.4	U
75-69-4	Trichlorofluoromethane	0.4	U
96-18-4	1,2,3-Trichloropropane	0.4	U
95-63-6	1,2,4-Trimethylbenzene	0.4	U
108-67-8	1,3,5-Trimethylbenzene	0.4	U
75-01-4	Vinyl chloride	0.4	U

BTEX

CAS#	Name of Compound	Amount (ppb)	Flag
71-43-2	Benzene	0.4	U
108-88-3	Toluene	0.4	U
100-41-4	Ethylbenzene	0.4	U
	p/m-Xylene	0.4	U
95-47-6	o-Xylene	0.4	U

TRihalOMETHANES (THM)

CAS#	Name of Compound	Amount (ppb)	Flag
67-66-3	Chloroform	0.4	U
75-27-4	Bromodichloromethane	0.4	U
124-48-1	Dibromochloromethane	0.4	U
75-25-2	Bromoform	0.4	U

KETONES, CS2, 2-CEVE

CAS#	Name of Compound	Amount (ppb)	Flag
67-64-1	Acetone	0.4	U
78-93-3	2-Butanone	0.4	U
591-78-6	2-Hexanone	0.4	U
108-10-1	4-Methyl-2-Pentanone	0.4	U
75-15-0	Carbon Disulfide	0.4	U
110-75-8	2-Chloroethylvinylether	0.4	U

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
Dibromofluoromethane	78%	86-118	80-120%
Toluene-d8	104%	88-110	81-117%



Aquatic Research Inc.
3927 Aurora Ave. N., Seattle, WA 98103 | (206) 632-2715

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **5/29/02-MB** Matrix: Water
Sample ID No.: **Method Blank** Sample Wt/Vol. (gm/ml) **25**
Date Collected: **n/a** Dilution Factor: **1**
Date Received: **n/a**
Date Analyzed: **05/29/02** Analyst: **T. Meadows**
Date of Report: **05/30/02** Supervisor's Initials: *SL*
Data File Path: **C:\HPCHEM\1\DATA\VOA\020 0301003.D**

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
107-13-1	Acrylonitrile	0.4	U	126-98-7	Methacrylonitrile	0.4	U
107-05-1	Allyl Chloride	0.4	U	96-33-3	Methyl Acrylate	0.4	U
109-69-3	1-Chlorobutane	0.4	U	1634-04-	Methyl-t-Butyl Ether	0.4	U
110-57-6	trans-1,4-Dichloro-2-Buten	0.4	U	80-62-6	Methyl methacrylate	0.4	U
60-29-7	Diethyl Ether	0.4	U	98-95-3	Nitrobenzene	0.4	U
97-63-2	Ethyl Methacrylate	0.4	U	79-46-9	2-Nitropropane	0.4	U
67-72-1	Hexachloroethane	0.4	U	76-01-7	Pentachloroethane	0.4	U
74-88-4	Iodomethane	0.4	U	108-05-4	Vinyl Acetate	0.4	U

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppb Amounts are in µg/L or µg/KG dry weight.

Tentatively Identified Compounds

R.T. CAS# Compound Rel. Conc.

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.



Aquatic Research Inc.
3927 Aurora Ave. N., Seattle, WA 98103 | (206) 632-2715

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **5/29/02-LCS** Matrix: **Water**
Sample ID No.: **Laboratory Control Spike** Sample Wt/Vol. (gm/ml) **25.0**
Date Collected: **05/21/02** Dilution Factor: **1**
Date Received: **05/22/02**
Date Analyzed: **05/29/02** Analyst: **T. Meadows**
Date of Report: **05/30/02** Supervisor's Initials: **SL**
Data File Path: **C:\HPCHEM\1\DATA\VOA\020 0401004.D**

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
Dibromofluoromethane	70%	86-118	80-120%
Toluene-d8	91%	88-110	81-117%
4-Bromofluorobenzene	71%	86-115	74-121%

Spike Recoveries	%Rec.	QC limits	
		Water	Soil
1,1-Dichloroethene	97%	50-150	50-150%
Benzene	97%	50-150	50-150%
Trichloroethene	89%	50-150	50-150%
Toluene	106%	50-150	50-150%
Chlorobenzene	90%	50-150	50-150%



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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A2	Matrix:	Water
Sample ID No.:	Columbia Water	Sample Wt/Vol. (gm/ml)	25
Date Collected:	05/21/02	Dilution Factor:	1
Date Received:	05/22/02	Analyst:	T. Meadows
Date Analyzed:	05/29/02	Supervisor's Initials:	SC
Date of Report:	05/30/02		
Data File Path:	C:\HPCHEM\1\DATA\VOA\020 0501005.D		

CAS#	Name of Compound	Amount (ppb)	Flag
108-86-1	Bromobenzene	0.4	U
74-97-5	Bromochloromethane	0.4	U
74-83-9	Bromomethane	0.4	U
104-51-8	n-Butylbenzene	0.4	U
135-98-8	sec-Butylbenzene	0.4	U
98-06-6	tert-Butylbenzene	0.4	U
56-23-5	Carbon tetrachloride	0.4	U
108-90-7	Chlorobenzene	0.4	U
75-00-3	Chloroethane	0.4	U
74-87-3	Chloromethane	0.4	U
95-49-8	2-Chlorotoluene	0.4	U
106-43-4	4-Chlorotoluene	0.4	U
96-12-8	1,2-Dibromo-3-Chloroprop	0.4	U
106-93-4	1,2-Dibromoethane	0.4	U
74-95-3	Dibromomethane	0.4	U
95-50-1	1,2-Dichlorobenzene	0.4	U
541-73-1	1,3-Dichlorobenzene	0.4	U
106-46-7	1,4-Dichlorobenzene	0.4	U
75-71-8	Dichlorodifluoromethane	0.4	U
75-34-3	1,1-Dichloroethane	0.4	U
107-06-2	1,2-Dichloroethane	0.4	U
75-35-4	1,1-Dichloroethene	0.4	U
156-59-4	cis-1,2-Dichloroethene	0.4	U
156-60-5	trans-1,2-Dichloroethene	0.4	U
78-87-5	1,2-Dichloropropane	0.4	U
142-28-9	1,3-Dichloropropane	0.4	U
590-20-7	2,2-Dichloropropane	0.4	U
563-58-6	1,1-Dichloropropene	0.4	U
10061-01	ds-1,3-Dichloropropene	0.4	U
10061-02	trans-1,3-Dichloropropene	0.4	U
87-68-3	Hexachlorobutadiene	0.4	U
98-82-8	Isopropylbenzene	0.4	U
99-87-6	4-Isopropyltoluene	0.2	J
75-09-2	Methylene chloride	0.8	B
91-20-3	Naphthalene	0.4	U
103-65-1	n-Propylbenzene	0.4	U
100-42-5	Styrene	0.4	U

CAS#	Name of Compound	Amount (ppb)	Flag
630-20-6	1,1,1,2-Tetrachloroethane	0.4	U
79-34-5	1,1,2,2-Tetrachloroethane	0.4	U
127-18-4	Tetrachloroethene	0.4	U
87-61-6	1,2,3-Trichlorobenzene	0.4	U
120-82-1	1,2,4-Trichlorobenzene	0.4	U
71-55-6	1,1,1-Trichloroethane	0.4	U
79-00-5	1,1,2-Trichloroethane	0.4	U
79-01-6	Trichloroethene	0.4	U
75-69-4	Trichlorofluoromethane	0.4	U
96-18-4	1,2,3-Trichloropropane	0.4	U
95-63-6	1,2,4-Trimethylbenzene	0.4	U
108-67-8	1,3,5-Trimethylbenzene	0.4	U
75-01-4	Vinyl chloride	0.4	U

BTEX			
71-43-2	Benzene	0.4	U
108-88-3	Toluene	0.4	U
100-41-4	Ethylbenzene	0.4	U
	p/m-Xylene	0.4	U
95-47-6	o-Xylene	0.4	U

TRihalOMETHANES (THM)			
67-66-3	Chloroform	0.4	U
75-27-4	Bromodichloromethane	0.4	U
124-48-1	Dibromochloromethane	0.4	U
75-25-2	Bromoform	0.4	U

KETONES, CS2, 2-CEVE			
67-64-1	Acetone	0.4	U
78-93-3	2-Butanone	0.4	U
591-78-6	2-Hexanone	0.4	U
108-10-1	4-Methyl-2-Pentanone	0.4	U
75-15-0	Carbon Disulfide	0.4	U
110-75-8	2-Chloroethylvinylether	0.4	U

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
Dibromofluoromethane	89%	86-118	80-120%
Toluene-d8	100%	88-110	81-117%



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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A2	Matrix:	Water
Sample ID No.:	Columbia Water	Sample Wt/Vol. (gm/ml)	25
Date Collected:	05/21/02	Dilution Factor:	1
Date Received:	05/22/02	Analyst:	T. Meadows
Date Analyzed:	05/29/02	Supervisor's Initials:	<i>SL</i>
Date of Report:	05/30/02		
Data File Path:	C:\HPCHEM\1\DATA\VOA\020 0501005.D		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
107-13-1	Acrylonitrile	0.4	U	126-98-7	Methacrylonitrile	0.4	U
107-05-1	Allyl Chloride	0.4	U	96-33-3	Methyl Acrylate	0.4	U
109-69-3	1-Chlorobutane	0.4	U	1634-04-	Methyl-t-Butyl Ether	0.4	U
110-57-6	trans-1,4-Dichloro-2-Buten	0.4	U	80-62-6	Methyl methacrylate	0.4	U
60-29-7	Diethyl Ether	0.4	U	98-95-3	Nitrobenzene	0.4	U
97-63-2	Ethyl Methacrylate	0.4	U	79-46-9	2-Nitropropane	0.4	U
67-72-1	Hexachloroethane	0.4	U	76-01-7	Pentachloroethane	0.4	U
74-88-4	Iodomethane	0.4	U	108-05-4	Vinyl Acetate	0.4	U

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppb Amounts are in µg/L or µg/KG dry weight.

Tentatively Identified Compounds

<u>R.T.</u>	<u>CAS#</u>	<u>Compound</u>	<u>Rel. Conc.</u>
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The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.



Aquatic Research Inc.
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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **TCH02077A2 Dup** Matrix: **Water**
Sample ID No.: **Columbia Water Duplicate** Sample Wt/Vol. (gm/ml) **25**
Date Collected: **05/21/02** Dilution Factor: **1**
Date Received: **05/22/02**
Date Analyzed: **05/29/02** Analyst: **T. Meadows**
Date of Report: **05/30/02** Supervisor's Initials: **SL**
Data File Path: **C:\HPCHEM\1\DATA\VOA\020 0601006.D**

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
108-86-1	Bromobenzene	0.4	U	630-20-6	1,1,1,2-Tetrachloroethane	0.4	U
74-97-5	Bromochloromethane	0.4	U	79-34-5	1,1,2,2-Tetrachloroethane	0.4	U
74-83-9	Bromomethane	0.4	U	127-18-4	Tetrachloroethene	0.4	U
104-51-8	n-Butylbenzene	0.4	U	87-61-6	1,2,3-Trichlorobenzene	0.4	U
135-98-8	sec-Butylbenzene	0.4	U	120-82-1	1,2,4-Trichlorobenzene	0.4	U
98-06-6	tert-Butylbenzene	0.4	U	71-55-6	1,1,1-Trichloroethane	0.4	U
56-23-5	Carbon tetrachloride	0.4	U	79-00-5	1,1,2-Trichloroethane	0.4	U
108-90-7	Chlorobenzene	0.4	U	79-01-6	Trichloroethene	0.4	U
75-00-3	Chloroethane	0.4	U	75-69-4	Trichlorofluoromethane	0.4	U
74-87-3	Chloromethane	0.4	U	96-18-4	1,2,3-Trichloropropane	0.4	U
95-49-8	2-Chlorotoluene	0.4	U	95-63-6	1,2,4-Trimethylbenzene	0.4	U
106-43-4	4-Chlorotoluene	0.4	U	108-67-8	1,3,5-Trimethylbenzene	0.4	U
96-12-8	1,2-Dibromo-3-Chloroprop	0.4	U	75-01-4	Vinyl chloride	0.4	U
106-93-4	1,2-Dibromoethane	0.4	U				
74-95-3	Dibromomethane	0.4	U				
95-50-1	1,2-Dichlorobenzene	0.4	U				
541-73-1	1,3-Dichlorobenzene	0.4	U				
106-46-7	1,4-Dichlorobenzene	0.4	U				
75-71-8	Dichlorodifluoromethane	0.4	U				
75-34-3	1,1-Dichloroethane	0.4	U				
107-06-2	1,2-Dichloroethane	0.4	U				
75-35-4	1,1-Dichloroethene	0.4	U				
156-59-4	cis-1,2-Dichloroethene	0.4	U				
156-60-5	trans-1,2-Dichloroethene	0.4	U				
78-87-5	1,2-Dichloropropane	0.4	U				
142-28-9	1,3-Dichloropropane	0.4	U				
590-20-7	2,2-Dichloropropane	0.4	U				
563-58-6	1,1-Dichloropropene	0.4	U				
10061-01	cis-1,3-Dichloropropene	0.4	U				
10061-02	trans-1,3-Dichloropropene	0.4	U				
87-68-3	Hexachlorobutadiene	0.4	U				
98-82-8	Isopropylbenzene	0.4	U				
99-87-6	4-Isopropyltoluene	0.3	J				
75-09-2	Methylene chloride	0.6	B				
91-20-3	Naphthalene	0.4	U				
103-65-1	n-Propylbenzene	0.4	U				
100-42-5	Styrene	0.4	U				

BTEX			
71-43-2	Benzene	0.4	U
108-88-3	Toluene	0.4	U
100-41-4	Ethylbenzene	0.4	U
	p/m-Xylene	0.4	U
95-47-6	o-Xylene	0.4	U

TRihalOMETHANES (THM)			
67-66-3	Chloroform	0.4	U
75-27-4	Bromodichloromethane	0.4	U
124-48-1	Dibromochloromethane	0.4	U
75-25-2	Bromoform	0.4	U

KETONES, CS2, 2-CEVE			
67-64-1	Acetone	0.4	U
78-93-3	2-Butanone	0.4	U
591-78-6	2-Hexanone	0.4	U
108-10-1	4-Methyl-2-Pentanone	0.4	U
75-15-0	Carbon Disulfide	0.4	U
110-75-8	2-Chloroethylvinylether	0.4	U

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
Dibromofluoromethane	83%	86-118	80-120%
Toluene-d8	108%	88-110	81-117%



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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **TCH02077A2 Dup** Matrix: **Water**
Sample ID No.: **Columbia Water Duplicate** Sample Wt/Vol. (gm/ml) **25**
Date Collected: **05/21/02** Dilution Factor: **1**
Date Received: **05/22/02**
Date Analyzed: **05/29/02** Analyst: **T. Meadows**
Date of Report: **05/30/02** Supervisor's Initials: **SL**
Data File Path: **C:\HPCHEM\1\DATA\VOA\020 0601006.D**

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
107-13-1	Acrylonitrile	0.4	U	126-98-7	Methacrylonitrile	0.4	U
107-05-1	Allyl Chloride	0.4	U	96-33-3	Methyl Acrylate	0.4	U
109-69-3	1-Chlorobutane	0.4	U	1634-04-	Methyl-t-Butyl Ether	0.4	U
110-57-6	trans-1,4-Dichloro-2-Buten	0.4	U	80-62-6	Methyl methacrylate	0.4	U
60-29-7	Diethyl Ether	0.4	U	98-95-3	Nitrobenzene	0.4	U
97-63-2	Ethyl Methacrylate	0.4	U	79-46-9	2-Nitropropane	0.4	U
67-72-1	Hexachloroethane	0.4	U	76-01-7	Pentachloroethane	0.4	U
74-88-4	Iodomethane	0.4	U	108-05-4	Vinyl Acetate	0.4	U

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppb Amounts are in µg/L or µg/KG dry weight.

Tentatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc.
------	------	----------	------------

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.



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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **TCH02077A4**
Sample ID No.: **7th Ave. Water**
Date Collected: **05/21/02**
Date Received: **05/22/02**
Date Analyzed: **05/29/02**
Date of Report: **05/30/02**
Data File Path: **C:\HPCHEM\1\DATA\VOA\020 0701007.D**

Matrix: **Water**
Sample Wt/Vol. (gm/ml): **25**
Dilution Factor: **1**
Analyst: **T. Meadows**
Supervisor's Initials: **SL**

CAS#	Name of Compound	Amount (ppb)	Flag
108-86-1	Bromobenzene	0.4	U
74-97-5	Bromochloromethane	0.4	U
74-83-9	Bromomethane	0.4	U
104-51-8	n-Butylbenzene	0.4	U
135-98-8	sec-Butylbenzene	0.4	U
98-06-6	tert-Butylbenzene	0.4	U
56-23-5	Carbon tetrachloride	0.4	U
108-90-7	Chlorobenzene	0.4	U
75-00-3	Chloroethane	0.4	U
74-87-3	Chloromethane	0.4	U
95-49-8	2-Chlorotoluene	0.4	U
106-43-4	4-Chlorotoluene	0.4	U
96-12-8	1,2-Dibromo-3-Chloroprop	0.4	U
106-93-4	1,2-Dibromoethane	0.4	U
74-95-3	Dibromomethane	0.4	U
95-50-1	1,2-Dichlorobenzene	0.4	U
541-73-1	1,3-Dichlorobenzene	0.4	U
106-46-7	1,4-Dichlorobenzene	0.4	U
75-71-8	Dichlorodifluoromethane	0.4	U
75-34-3	1,1-Dichloroethane	0.4	U
107-06-2	1,2-Dichloroethane	0.4	U
75-35-4	1,1-Dichloroethene	0.4	U
156-59-4	cis-1,2-Dichloroethene	0.4	U
156-60-5	trans-1,2-Dichloroethene	0.4	U
78-87-5	1,2-Dichloropropane	0.4	U
142-28-9	1,3-Dichloropropane	0.4	U
590-20-7	2,2-Dichloropropane	0.4	U
563-58-6	1,1-Dichloropropene	0.4	U
10061-01	cis-1,3-Dichloropropene	0.4	U
10061-02	trans-1,3-Dichloropropene	0.4	U
87-68-3	Hexachlorobutadiene	0.4	U
98-82-8	Isopropylbenzene	0.4	U
99-87-6	4-Isopropyltoluene	0.4	U
75-09-2	Methylene chloride	0.8	B
91-20-3	Naphthalene	0.4	U
103-65-1	n-Propylbenzene	0.4	U
100-42-5	Styrene	0.4	U

CAS#	Name of Compound	Amount (ppb)	Flag
630-20-6	1,1,1,2-Tetrachloroethane	0.4	U
79-34-5	1,1,2,2-Tetrachloroethane	0.4	U
127-18-4	Tetrachloroethene	0.4	U
87-61-6	1,2,3-Trichlorobenzene	0.4	U
120-82-1	1,2,4-Trichlorobenzene	0.4	U
71-55-6	1,1,1-Trichloroethane	0.4	U
79-00-5	1,1,2-Trichloroethane	0.4	U
79-01-6	Trichloroethene	0.4	U
75-69-4	Trichlorofluoromethane	0.4	U
96-18-4	1,2,3-Trichloropropane	0.4	U
95-63-6	1,2,4-Trimethylbenzene	0.4	U
108-67-8	1,3,5-Trimethylbenzene	0.4	U
75-01-4	Vinyl chloride	0.4	U

BTEX			
71-43-2	Benzene	0.4	U
108-88-3	Toluene	0.4	U
100-41-4	Ethylbenzene	0.4	U
	p/m-Xylene	0.4	U
95-47-6	o-Xylene	0.4	U

TRihalOMETHANES (THM)			
67-66-3	Chloroform	0.4	U
75-27-4	Bromodichloromethane	0.4	U
124-48-1	Dibromochloromethane	0.4	U
75-25-2	Bromoform	0.4	U

KETONES, CS2, 2-CEVE			
67-64-1	Acetone	0.4	U
78-93-3	2-Butanone	0.4	U
591-78-6	2-Hexanone	0.4	U
108-10-1	4-Methyl-2-Pentanone	0.4	U
75-15-0	Carbon Disulfide	0.4	U
110-75-8	2-Chloroethylvinylether	0.4	U

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
Dibromofluoromethane	89%	86-118	80-120%
Toluene-d8	105%	88-110	81-117%



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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A4	Matrix:	Water
Sample ID No.:	7th Ave. Water	Sample Wt/Vol. (gm/ml)	25
Date Collected:	05/21/02	Dilution Factor:	1
Date Received:	05/22/02	Analyst:	T. Meadows
Date Analyzed:	05/29/02	Supervisor's Initials:	SL
Date of Report:	05/30/02		
Data File Path:	C:\HPCHEM\1\DATA\VOA\020 0701007.D		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
107-13-1	Acrylonitrile	0.4	U	126-98-7	Methacrylonitrile	0.4	U
107-05-1	Allyl Chloride	0.4	U	96-33-3	Methyl Acrylate	0.4	U
109-69-3	1-Chlorobutane	0.4	U	1634-04-	Methyl-t-Butyl Ether	0.4	U
110-57-6	trans-1,4-Dichloro-2-Buten	0.4	U	80-62-6	Methyl methacrylate	0.4	U
60-29-7	Diethyl Ether	0.4	U	98-95-3	Nitrobenzene	0.4	U
97-63-2	Ethyl Methacrylate	0.4	U	79-46-9	2-Nitropropane	0.4	U
67-72-1	Hexachloroethane	0.4	U	76-01-7	Pentachloroethane	0.4	U
74-88-4	Iodomethane	0.4	U	108-05-4	Vinyl Acetate	0.4	U

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppb Amounts are in µg/L or µg/KG dry weight.

Tentatively Identified Compounds

<u>R.T.</u>	<u>CAS#</u>	<u>Compound</u>	<u>Rel. Conc.</u>
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The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.



Aquatic Research Inc.
3927 Aurora Ave. N., Seattle, WA 98103 | (206) 632-2715

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **TCH02077A4 MS** Matrix: **Water**
Sample ID No.: **7th Ave. Water Matrix Spike** Sample Wt/Vol. (gm/ml) **25.0**
Date Collected: **05/21/02** Dilution Factor: **1**
Date Received: **05/22/02**
Date Analyzed: **05/29/02** Analyst: **T. Meadows**
Date of Report: **05/30/02** Supervisor's Initials: **SL**
Data File Path: **C:\HPCHEM\1\DATA\VOA\020 0801008.D**

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
Dibromofluoromethane	80%	86-118	80-120% ✓
Toluene-d8	102%	88-110	81-117% ✓
4-Bromofluorobenzene	85%	86-115	74-121% ✓

Spike Recoveries	%Rec.	QC limits	
		Water	Soil
1,1-Dichloroethene	101%	50-150	50-150% ✓
Benzene	110%	50-150	50-150% ✓
Trichloroethene	108%	50-150	50-150% ✓
Toluene	101%	50-150	50-150% ✓
Chlorobenzene	105%	50-150	50-150% ✓



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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A6	Matrix:	Water
Sample ID No.:	Fountain Water	Sample Wt/Vol. (gm/ml)	25
Date Collected:	05/21/02	Dilution Factor:	1
Date Received:	05/22/02	Analyst:	T. Meadows
Date Analyzed:	05/29/02	Supervisor's Initials:	SL
Date of Report:	05/30/02	Data File Path:	C:\HPCHEM\1\DATA\VOA\020 1001010.D

CAS#	Name of Compound	Amount (ppb)	Flag
108-86-1	Bromobenzene	0.4	U
74-97-5	Bromochloromethane	0.4	U
74-83-9	Bromomethane	0.4	U
104-51-8	n-Butylbenzene	0.4	U
135-98-8	sec-Butylbenzene	0.4	U
98-06-6	tert-Butylbenzene	0.4	U
56-23-5	Carbon tetrachloride	0.4	U
108-90-7	Chlorobenzene	0.4	U
75-00-3	Chloroethane	0.4	U
74-87-3	Chloromethane	0.4	U
95-49-8	2-Chlorotoluene	0.4	U
106-43-4	4-Chlorotoluene	0.4	U
96-12-8	1,2-Dibromo-3-Chloroprop	0.4	U
106-93-4	1,2-Dibromoethane	0.4	U
74-95-3	Dibromomethane	0.4	U
95-50-1	1,2-Dichlorobenzene	0.4	U
541-73-1	1,3-Dichlorobenzene	0.4	U
106-46-7	1,4-Dichlorobenzene	0.4	U
75-71-8	Dichlorodifluoromethane	0.4	U
75-34-3	1,1-Dichloroethane	0.4	U
107-06-2	1,2-Dichloroethane	0.4	U
75-35-4	1,1-Dichloroethene	0.4	U
156-59-4	cis-1,2-Dichloroethene	0.4	U
156-60-5	trans-1,2-Dichloroethene	0.4	U
78-87-5	1,2-Dichloropropane	0.4	U
142-28-9	1,3-Dichloropropane	0.4	U
590-20-7	2,2-Dichloropropane	0.4	U
563-58-6	1,1-Dichloropropene	0.4	U
10061-01	cis-1,3-Dichloropropene	0.4	U
10061-02	trans-1,3-Dichloropropene	0.4	U
87-68-3	Hexachlorobutadiene	0.4	U
98-82-8	Isopropylbenzene	0.4	U
99-87-6	4-Isopropyltoluene	0.4	U
75-09-2	Methylene chloride	0.5	B
91-20-3	Naphthalene	0.4	U
103-65-1	n-Propylbenzene	0.4	U
100-42-5	Styrene	0.4	U

CAS#	Name of Compound	Amount (ppb)	Flag
630-20-6	1,1,1,2-Tetrachloroethane	0.4	U
79-34-5	1,1,2,2-Tetrachloroethane	0.4	U
127-18-4	Tetrachloroethene	0.4	U
87-61-6	1,2,3-Trichlorobenzene	0.4	U
120-82-1	1,2,4-Trichlorobenzene	0.4	U
71-55-6	1,1,1-Trichloroethane	0.4	U
79-00-5	1,1,2-Trichloroethane	0.4	U
79-01-6	Trichloroethene	0.4	U
75-69-4	Trichlorofluoromethane	0.4	U
96-18-4	1,2,3-Trichloropropane	0.4	U
95-63-6	1,2,4-Trimethylbenzene	0.4	U
108-67-8	1,3,5-Trimethylbenzene	0.4	U
75-01-4	Vinyl chloride	0.4	U

BTEX			
71-43-2	Benzene	0.4	U
108-88-3	Toluene	0.4	U
100-41-4	Ethylbenzene	0.4	U
	p/m-Xylene	0.4	U
95-47-6	o-Xylene	0.4	U

TRIALOMETHANES (THM)			
67-66-3	Chloroform	0.4	U
75-27-4	Bromodichloromethane	0.4	U
124-48-1	Dibromochloromethane	0.4	U
75-25-2	Bromoform	0.4	U

KETONES, CS2, 2-CEVE			
67-64-1	Acetone	0.4	U
78-93-3	2-Butanone	0.4	U
591-78-6	2-Hexanone	0.4	U
108-10-1	4-Methyl-2-Pentanone	0.4	U
75-15-0	Carbon Disulfide	0.4	U
110-75-8	2-Chloroethylvinylether	0.4	U

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
Dibromofluoromethane	84%	86-118	80-120%
Toluene-d8	105%	88-110	81-117%



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VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8260
Measurement of Purgeable Organic Compounds by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A6	Matrix:	Water
Sample ID No.:	Fountain Water	Sample Wt/Vol. (gm/ml)	25
Date Collected:	05/21/02	Dilution Factor:	1
Date Received:	05/22/02	Analyst:	T. Meadows
Date Analyzed:	05/29/02	Supervisor's Initials:	SL
Date of Report:	05/30/02		
Data File Path:	C:\HPCHEM\1\DATA\VOA\020 1001010.D		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
107-13-1	Acrylonitrile	0.4	U	126-98-7	Methacrylonitrile	0.4	U
107-05-1	Allyl Chloride	0.4	U	96-33-3	Methyl Acrylate	0.4	U
109-69-3	1-Chlorobutane	0.4	U	1634-04-	Methyl-t-Butyl Ether	0.4	U
110-57-6	trans-1,4-Dichloro-2-Buten	0.4	U	80-62-6	Methyl methacrylate	0.4	U
60-29-7	Diethyl Ether	0.4	U	98-95-3	Nitrobenzene	0.4	U
97-63-2	Ethyl Methacrylate	0.4	U	79-46-9	2-Nitropropane	0.4	U
67-72-1	Hexachloroethane	0.4	U	76-01-7	Pentachloroethane	0.4	U
74-88-4	Iodomethane	0.4	U	108-05-4	Vinyl Acetate	0.4	U

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppb Amounts are in µg/L or µg/KG dry weight.

Tentatively Identified Compounds

<u>R.T.</u>	<u>CAS#</u>	<u>Compound</u>	<u>Rel. Conc.</u>
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The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.



Aquatic Research Inc.
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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	6/5/02-MB	Matrix:	Soil
Sample ID No.:	Method Blank	Sample Wt. (gm)	30.0
Date Collected:	n/a	Final Volume (ml)	10.0
Date Received:	n/a	Dilution Factor:	1
Date Extracted:	06/05/02	% Solids:	100.00%
Date Analyzed:	06/14/02	Analyst:	T. Meadows
Date of Report:	06/20/02	Supervisor's Initials:	SL
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020614\0401004.D		

CAS#	Name of Compound	Amount (ppm)	Flag	CAS#	Name of Compound	Amount (ppm)	Flag
	N-nitrosodiethylamine	0.033	U	86-73-7	Fluorene	0.033	U
	Pentachloroethane	0.033	U	84-66-2	Diethyl phthalate	0.033	U
62-53-3	Aniline	0.033	U	100-01-6	4-Nitroaniline	0.033	U
108-95-2	Phenol	0.033	U	121-14+2	2,4-Dinitrotoluene	0.033	U
111-44-4	Bis(2-chloroethyl) ether	0.033	U	7005-72-3	4-Chlorophenyl phenyl ether	0.033	U
95-57-8	2-Chlorophenol	0.033	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.033	U
541-73-1	1,3-Dichlorobenzene	0.033	U		N-Nitrosodiphenyl amine	0.033	U
106-46-7	1,4-Dichlorobenzene	0.033	U	101-55-3	4-Bromophenyl phenyl ether	0.033	U
95-50-1	1,2-Dichlorobenzene	0.033	U	319-84-6	a-BHC	0.033	U
100-51-6	Benzyl Alcohol	0.033	U	118-74-1	Hexachlorobenzene	0.033	U
95-48-7	2-Methyl phenol	0.033	U	319-85-7	b-BHC	0.033	U
108-60-1	Bis(2-chloroisopropyl) ether	0.033	U	87-86-5	Pentachlorophenol	0.033	U
	Acetophenone	0.033	U	58-89-9	g-BHC (Lindane)	0.033	U
67-72-1	Hexachloroethane	0.033	U	85-01-8	Phenanthrene	0.033	U
621-64-7	N-Nitroso-n-propyl amine	0.033	U	120-12-7	Anthracene	0.033	U
106-44-5	4-Methyl phenol	0.033	U	319-86-8	d-BHC	0.033	U
98-95-3	Nitrobenzene	0.033	U	84-74-2	Di-n-butyl phthalate	0.033	U
	N-nitrosopiperidine	0.033	U	76-44-8	Heptachlor	0.033	U
78-59-1	Isophorone	0.033	U	309-00-2	Aldrin	0.033	U
88-75-5	2-Nitrophenol	0.033	U	1024-57-3	Heptachlor epoxide	0.033	U
105-67-9	2,4-Dimethylphenol	0.033	U	206-44-0	Fluoranthrene	0.033	U
111-91-1	Bis(2-chloroethoxy) methane	0.033	U	129-00-0	Pyrene	0.033	U
120-83-2	2,4-Dichlorophenol	0.033	U	959-98-8	Endosulfan I	0.033	U
120-82-1	1,2,4-Trichlorobenzene	0.033	U	72-55-9	4,4'-DDE	0.033	U
91-20-3	Naphthalene	0.033	U	60-57-1	Dieldrin	0.033	U
106-47-8	4-Chloroaniline	0.033	U	72-20-8	Endrin	0.033	U
87-68-3	Hexachlorobutadiene	0.033	U	33213-65-	Endosulfan II	0.033	U
	N-nitrosodi-n-butylamine	0.033	U	72-54-8	4,4'-DDD	0.033	U
59-50-7	4-Chloro-3-methyl phenol	0.033	U	7421-92-4	Endrin aldehyde	0.033	U
91-57-6	2-Methyl naphthalene	0.033	U	85-68-7	Butyl benzenyl phthalate	0.033	U
	1,2,4,5-Tetrachlorobenzene	0.033	U	1031-07-8	Endosulfan sulfate	0.033	U
77-47-4	Hexachlorocyclopentadiene	0.033	U	50-29-3	4,4'-DDT	0.033	U
88-06-2	2,4,6-Trichlorophenol	0.033	U	56-55-3	Benzo(a)anthracene	0.033	U
95-95-4	2,4,5-Trichlorophenol	0.033	U	218-01-9	Chrysene	0.033	U
91-58-7	2-Chloronaphthalene	0.033	U	91-94-1	3,3'-Dichlorobenzidine	0.033	U
88-74-4	2-Nitroaniline	0.033	U	72-43-5	Methoxychlor	0.033	U
131-11-3	Dimethyl phthalate	0.033	U	117-81-7	Bis(2-ethylhexyl) phthalate	0.033	U
208-96-8	Acenaphthylene	0.033	U	117-84-0	Di-n-octyl phthalate	0.033	U
606-20-2	2,6-Dinitrotoluene	0.033	U	205-97-2	Benzo(b)fluoranthrene	0.033	U



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	6/5/02-MB	Matrix:	Soil
Sample ID No.:	Method Blank	Sample Wt. (gm)	30.0
Date Collected:	n/a	Final Volume (ml)	10.0
Date Received:	n/a	Dilution Factor:	1
Date Extracted:	06/05/02	% Solids:	100.00%
Date Analyzed:	06/14/02	Analyst:	T. Meadows
Date of Report:	06/20/02	Supervisor's Initials:	SL
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020614\0401004.D		

CAS#	Name of Compound	Amount (ppm)	Flag	CAS#	Name of Compound	Amount (ppm)	Flag
99-09-2	3-Nitroaniline	0.033	U	207-08-9	Benzo(k)fluoranthrene	0.033	U
83-32-9	Acenaphthene	0.033	U	50-32-8	Benzo(a)pyrene	0.033	U
51-28-5	2,4-Dinitrophenol	0.033	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.033	U
132-64-9	Dibenzofuran	0.033	U	53-70-3	Dibenzo(a,h)anthracene	0.033	U
100-02-7	4-Nitrophenol	0.033	U	91-24-2	Benzo(g,h,i)perylene	0.033	U
	2,3,4,6-Tetrachlorophenol	0.033	U		Carbazole	0.033	U
65-85-0	Benzoic Acid	0.033	U	92-87-5	Benzidine	0.033	U
	Azobenzene	0.033	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

<u>R.T.</u>	<u>CAS#</u>	<u>Compound</u>	<u>Rel. Conc.</u>
-------------	-------------	-----------------	-------------------

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	107%	75-125	65-135%
Phenol-d5	65%	75-125	65-135%
Nitrobenzene-d5	88%	75-125	65-135%
2-Fluorobiphenyl	97%	75-125	65-135%
2,4,6-Tribromophenol	0%	75-125	65-135%
p-Terphenyl-d14	95%	75-125	65-135%



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A1	Matrix:	Soil
Sample ID No.:	Columbia Sed	Sample Wt. (gm)	30.9
Date Collected:	05/13/02	Final Volume (ml)	10.0
Date Received:	05/16/02	Dilution Factor:	1
Date Extracted:	06/22/02	% Solids:	36.05%
Date Analyzed:	06/14/02	Analyst:	T. Meadows
Date of Report:	06/20/02	Supervisor's Initials:	SL
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020614\0501005.D		

CAS#	Name of Compound	Amount (ppm)	Flag	CAS#	Name of Compound	Amount (ppm)	Flag
	N-nitrosodiethylamine	0.090	U	86-73-7	Fluorene	0.090	U
	Pentachloroethane	0.090	U	84-66-2	Diethyl phthalate	0.090	U
62-53-3	Aniline	0.090	U	100-01-6	4-Nitroaniline	0.090	U
108-95-2	Phenol	0.090	U	121-14 + 2	2,4-Dinitrotoluene	0.090	U
111-44-4	Bis(2-chloroethyl) ether	0.090	U	7005-72-3	4-Chlorophenyl phenyl ether	0.090	U
95-57-8	2-Chlorophenol	0.090	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.090	U
541-73-1	1,3-Dichlorobenzene	0.090	U		N-Nitrosodiphenyl amine	0.090	U
108-46-7	1,4-Dichlorobenzene	0.090	U	101-55-3	4-Bromophenyl phenyl ether	0.090	U
95-50-1	1,2-Dichlorobenzene	0.090	U	319-84-6	a-BHC	0.090	U
100-51-6	Benzyl Alcohol	0.090	U	118-74-1	Hexachlorobenzene	0.090	U
95-48-7	2-Methyl phenol	0.090	U	319-85-7	b-BHC	0.090	U
108-60-1	Bis(2-chloroisopropyl) ether	0.090	U	87-86-5	Pentachlorophenol	0.090	U
	Acetophenone	0.090	U	58-89-9	g-BHC (Lindane)	0.090	U
67-72-1	Hexachloroethane	0.090	U	85-01-8	Phenanthrene	0.090	U
621-64-7	N-Nitroso-n-propyl amine	0.090	U	120-12-7	Anthracene	0.580	
106-44-5	4-Methyl phenol	0.090	U	319-86-8	d-BHC	0.090	U
98-95-3	Nitrobenzene	0.090	U	84-74-2	Di-n-butyl phthalate	0.090	U
	N-nitrosopiperidine	0.090	U	76-44-8	Heptachlor	0.090	U
78-59-1	Isophorone	0.090	U	309-00-2	Aldrin	0.090	U
88-75-5	2-Nitrophenol	0.090	U	1024-57-3	Heptachlor epoxide	0.090	U
105-67-9	2,4-Dimethylphenol	0.090	U	206-44-0	Fluoranthrene	1.50	
111-91-1	Bis(2-chloroethoxy) methane	0.090	U	129-00-0	Pyrene	1.20	
120-83-2	2,4-Dichlorophenol	0.090	U	959-98-8	Endosulfan I	0.090	U
120-82-1	1,2,4-Trichlorobenzene	0.090	U	72-55-9	4,4'-DDE	0.090	U
91-20-3	Naphthalene	0.090	U	60-57-1	Dieldrin	0.090	U
106-47-8	4-Chloroaniline	0.090	U	72-20-8	Endrin	0.090	U
87-68-3	Hexachlorobutadiene	0.090	U	33213-65-	Endosulfan II	0.090	U
	N-nitrosodi-n-butylamine	0.090	U	72-54-8	4,4'-DDD	0.090	U
59-50-7	4-Chloro-3-methyl phenol	0.090	U	7421-92-4	Endrin aldehyde	0.090	U
91-57-6	2-Methyl naphthalene	0.090	U	85-68-7	Butyl benzenyl phthalate	0.090	U
	1,2,4,5-Tetrachlorobenzene	0.090	U	1031-07-8	Endosulfan sulfate	0.090	U
77-47-4	Hexachlorocyclopentadiene	0.090	U	50-29-3	4,4'-DDT	0.090	U
88-06-2	2,4,6-Trichlorophenol	0.090	U	56-55-3	Benzo(a)anthracene	0.42	
95-95-4	2,4,5-Trichlorophenol	0.090	U	218-01-9	Chrysene	0.78	
91-58-7	2-Chloronaphthalene	0.090	U	91-94-1	3,3'-Dichlorobenzidine	0.090	U
88-74-4	2-Nitroaniline	0.090	U	72-43-5	Methoxychlor	0.090	U
131-11-3	Dimethyl phthalate	0.090	U	117-81-7	Bis(2-ethylhexyl) phthalate	0.92	
208-96-8	Acenaphthylene	0.090	U	117-84-0	Di-n-octyl phthalate	0.090	U
606-20-2	2,6-Dinitrotoluene	0.090	U	205-97-2	Benzo(b)fluoranthrene	1.20	



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A1	Matrix:	Soil
Sample ID No.:	Columbia Sed	Sample Wt. (gm)	30.9
Date Collected:	05/13/02	Final Volume (ml)	10.0
Date Received:	05/16/02	Dilution Factor:	1
Date Extracted:	05/22/02	% Solids:	36.05%
Date Analyzed:	06/14/02	Analyst:	T. Meadows
Date of Report:	06/20/02	Supervisor's Initials:	SL
Data File Path:	C:\HPCHEM\1\DATA\VOA\020614\0501005.D		

CAS#	Name of Compound	Amount (ppm)	Flag	CAS#	Name of Compound	Amount (ppm)	Flag
99-09-2	3-Nitroaniline	0.090	U	207-08-9	Benzo(k)fluoranthrene	0.45	
83-32-9	Acenaphthene	0.090	U	50-32-8	Benzo(a)pyrene	0.64	
51-28-5	2,4-Dinitrophenol	0.090	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.58	
132-64-9	Dibenzofuran	0.090	U	53-70-3	Dibenzo(a,h)anthracene	0.090	U
100-02-7	4-Nitrophenol	0.090	U	91-24-2	Benzo(g,h,i)perylene	0.58	
	2,3,4,6-Tetrachlorophenol	0.090	U		Carbazole	0.090	U
65-85-0	Benzoic Acid	0.090	U	92-87-5	Benzidine	0.090	U
	Azobenzene	0.090	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc. (mg/Kg)
24.11	13287-23-5	8-methyl Heptadecane	1.7
28.60	57-88-5	Cholesterol	2.1

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	102%	75-125	65-135%
Phenol-d5	62%	75-125	65-135%
Nitrobenzene-d5	89%	75-125	65-135%
2-Fluorobiphenyl	105%	75-125	65-135%
2,4,6-Tribromophenol	91%	75-125	65-135%
p-Terphenyl-d14	87%	75-125	65-135%



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A1 MS	Matrix:	Soil
Sample ID No.:	Columbia Sed Matrix Spike	Sample Wt. (gm)	30.4
Date Collected:	05/13/02	Final Volume (ml)	10
Date Received:	05/16/02	Dilution Factor:	1
Date Analyzed:	06/14/02	% Solids:	36.05%
Date of Report:	06/20/02	Analyst:	T. Meadows
		Supervisor's Initials:	JL
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020614\	0601006.D	

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	101%	75-125%	65-135% ✓
Phenol-d5	85%	75-125%	65-135% ✓
Nitrobenzene-d5	87%	75-125%	65-135% ✓
2-Fluorobiphenyl	86%	75-125%	65-135% ✓
2,4,6-Tribromophenol	107%	75-125%	65-135% ✓
p-Terphenyl-d14	91%	75-125%	65-135% ✓

Matix Spike Recoveries	%Rec.	QC limits	
		Water	Soil
Phenol	66%	50-150%	50-150% ✓
2-Chlorophenol	69%	50-150%	50-150%
1,4-Dichlorobenzene	49%	50-150%	50-150%
N-Nitroso-n-propyl amine	77%	50-150%	50-150%
1,2,4-Trichlorobenzene	45%	50-150%	50-150%
4-Chloro-3-methyl phenol	46%	50-150%	50-150%
Acenaphthene	61%	50-150%	50-150%
4-Nitrophenol	0%	50-150%	50-150%
2,4-Dinitrotoluene	11%	50-150%	50-150%
Pentachlorophenol	31%	50-150%	50-150%
Pyrene	20%	50-150%	50-150%



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Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A1 MSD	Matrix:	Soil
Sample ID No.:	Columbia Sed Matrix Spike Duplicate	Sample Wt. (gm)	30.8
Date Collected:	05/13/02	Final Volume (ml)	10
Date Received:	05/16/02	Dilution Factor:	1
Date Analyzed	06/14/02	% Solids:	36.05%
Dat of Report:	06/20/02	Analyst:	T. Meadows
		Supervisor's Initials:	SL
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020614\	0701007.D	

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	98%	75-125%	65-135%
Phenol-d5	92%	75-125%	65-135%
Nitrobenzene-d5	92%	75-125%	65-135%
2-Fluorobiphenyl	95%	75-125%	65-135%
2,4,6-Tribromophenol	117%	75-125%	65-135%
p-Terphenyl-d14	119%	75-125%	65-135%

Matix Spike Recoveries	%Rec.	QC limits	
		Water	Soil
Phenol	69%	50-150%	50-150%
2-Chlorophenol	70%	50-150%	50-150%
1,4-Dichlorobenzene	53%	50-150%	50-150%
N-Nitroso-n-propyl amine	75%	50-150%	50-150%
1,2,4-Trichlorobenzene	46%	50-150%	50-150%
4-Chloro-3-methyl phenol	57%	50-150%	50-150%
Acenaphthene	53%	50-150%	50-150%
4-Nitrophenol	0%	50-150%	50-150%
2,4-Dinitrotoluene	51%	50-150%	50-150%
Pentachlorophenol	44%	50-150%	50-150%
Pyrene	5%	50-150%	50-150%



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A3	Matrix:	Soil
Sample ID No.:	7th Ave. Sed.	Sample Wt. (gm)	30.8
Date Collected:	05/13/02	Final Volume (ml)	10.0
Date Received:	05/16/02	Dilution Factor:	1
Date Extracted:	05/22/02	% Solids:	33.08%
Date Analyzed:	06/18/02	Analyst:	T. Meadows
Date of Report:	06/20/02	Supervisor's Initials:	SC
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020618\0701008.D		

CAS#	Name of Compound	Amount (ppm)	Flag
	N-nitrosodiethylamine	0.098	U
	Pentachloroethane	0.098	U
82-53-3	Aniline	0.098	U
108-95-2	Phenol	0.098	U
111-44-4	Bis(2-chloroethyl) ether	0.098	U
95-57-8	2-Chlorophenol	0.098	U
541-73-1	1,3-Dichlorobenzene	0.098	U
106-46-7	1,4-Dichlorobenzene	0.098	U
95-50-1	1,2-Dichlorobenzene	0.098	U
100-51-6	Benzyl Alcohol	0.098	U
95-48-7	2-Methyl phenol	0.098	U
108-60-1	Bis(2-chloroisopropyl) ether	0.098	U
	Acetophenone	0.098	U
67-72-1	Hexachloroethane	0.098	U
621-64-7	N-Nitroso-n-propyl amine	0.098	U
106-44-5	4-Methyl phenol	0.098	U
98-95-3	Nitrobenzene	0.098	U
	N-nitrosopiperidine	0.098	U
78-59-1	Isophorone	0.098	U
88-75-5	2-Nitrophenol	0.098	U
105-67-9	2,4-Dimethylphenol	0.098	U
111-91-1	Bis(2-chloroethoxy) methane	0.098	U
120-83-2	2,4-Dichlorophenol	0.098	U
120-82-1	1,2,4-Trichlorobenzene	0.098	U
91-20-3	Naphthalene	0.098	U
106-47-8	4-Chloroaniline	0.098	U
87-68-3	Hexachlorobutadiene	0.098	U
	N-nitrosodi-n-butylamine	0.098	U
59-50-7	4-Chloro-3-methyl phenol	0.098	U
91-57-6	2-Methyl naphthalene	0.098	U
	1,2,4,5-Tetrachlorobenzene	0.098	U
77-47-4	Hexachlorocyclopentadiene	0.098	U
88-06-2	2,4,6-Trichlorophenol	0.098	U
95-95-4	2,4,5-Trichlorophenol	0.098	U
91-58-7	2-Chloronaphthalene	0.098	U
88-74-4	2-Nitroaniline	0.098	U
131-11-3	Dimethyl phthalate	0.098	U
208-96-8	Acenaphthylene	0.098	U
606-20-2	2,6-Dinitrotoluene	0.098	U

CAS#	Name of Compound	Amount (ppm)	Flag
86-73-7	Fluorene	0.10	
84-66-2	Diethyl phthalate	0.098	U
100-01-6	4-Nitroaniline	0.098	U
121-14+2	2,4-Dinitrotoluene	0.098	U
7005-72-3	4-Chlorophenyl phenyl ether	0.098	U
534-52-1	2-Methyl-4,6-dinitrophenol	0.098	U
	N-Nitrosodiphenyl amine	0.098	U
101-55-3	4-Bromophenyl phenyl ether	0.098	U
319-84-6	a-BHC	0.098	U
118-74-1	Hexachlorobenzene	0.098	U
319-85-7	b-BHC	0.098	U
87-86-5	Pentachlorophenol	0.098	U
58-89-9	g-BHC (Lindane)	0.098	U
85-01-8	Phenanthrene	0.098	U
120-12-7	Anthracene	1.80	
319-86-8	d-BHC	0.098	U
84-74-2	Di-n-butyl phthalate	0.098	U
76-44-8	Heptachlor	0.098	U
309-00-2	Aldrin	0.098	U
1024-57-3	Heptachlor epoxide	0.098	U
206-44-0	Fluoranthrene	4.50	
129-00-0	Pyrene	3.50	
959-98-8	Endosulfan I	0.098	U
72-55-9	4,4'-DDE	0.098	U
60-57-1	Dieldrin	0.098	U
72-20-8	Endrin	0.098	U
33213-65-	Endosulfan II	0.098	U
72-54-8	4,4'-DDD	0.098	U
7421-92-4	Endrin aldehyde	0.098	U
85-68-7	Butyl benzenyl phthalate	0.098	U
1031-07-8	Endosulfan sulfate	0.098	U
50-29-3	4,4'-DDT	0.098	U
56-55-3	Benzo(a)anthracene	1.30	
218-01-9	Chrysene	2.30	
91-94-1	3,3'-Dichlorobenzidine	0.098	U
72-43-5	Methoxychlor	0.098	U
117-81-7	Bis(2-ethylhexyl) phthalate	8.00	
117-84-0	Di-n-octyl phthalate	0.098	U
205-97-2	Benzo(b)fluoranthrene	4.40	



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Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A3	Matrix:	Soil
Sample ID No.:	7th Ave. Sed.	Sample Wt. (gm)	30.8
Date Collected:	05/13/02	Fnal Volume (ml)	10.0
Date Received:	05/16/02	Dilution Factor:	1
Date Extracted:	05/22/02	% Solids:	33.08%
Date Analyzed:	06/18/02	Analyst:	T. Meadows
Date of Report:	06/20/02	Supervisor's Initials:	JL
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020618\0701008.D		

CAS#	Name of Compound	Amount (ppm)	Flag	CAS#	Name of Compound	Amount (ppm)	Flag
99-09-2	3-Nitroaniline	0.098	U	207-08-9	Benzo(k)fluoranthrene	1.40	
83-32-9	Acenaphthene	0.098	U	50-32-8	Benzo(a)pyrene	1.60	
51-28-5	2,4-Dinitrophenol	0.098	U	193-39-5	Indeno(1,2,3-cd)pyrene	1.00	
132-64-9	Dibenzofuran	0.098	U	53-70-3	Dibenzo(a,h)anthracene	0.098	U
100-02-7	4-Nitrophenol	0.098	U	91-24-2	Benzo(g,h,i)perylene	0.92	
	2,3,4,6-Tetrachlorophenol	0.098	U		Carbazole	0.098	U
65-85-0	Benzoic Acid	0.098	U	92-87-5	Benzidine	0.098	U
	Azobenzene	0.098	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc. (mg/Kg)
19.45	10544-50-0	Sulfur	8.6
28.02	630-02-4	Octacosane	12.3
29.63	629-62-9	Pentadecane	23.3
31.31	7225-64-1	9-octyl Heptadecane	8.5

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	109%	75-125	65-135% ✓
Phenol-d5	111%	75-125	65-135% ✓
Nitrobenzene-d5	83%	75-125	65-135% ✓
2-Fluorobiphenyl	101%	75-125	65-135% ✓
2,4,6-Tribromophenol	98%	75-125	65-135% ✓
p-Terphenyl-d14	102%	75-125	65-135% ✓



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Soil by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: TCH02077A5
Sample ID No.: Fountain Sed
Date Collected: 05/13/02
Date Received: 05/16/02
Date Extracted: 05/22/02
Date Analyzed: 06/18/02
Date of Report: 06/20/02
Data File Path: C:\HPCHEM\1\DATA\SVOA\020618\0801009.D

Matrix: Soil
Sample Wt. (gm): 32.7
Final Volume (ml): 10.0
Dilution Factor: 1
% Solids: 20.56%
Analyst: T. Meadows
Supervisor's Initials: *SL*

CAS#	Name of Compound	Amount (ppm)	Flag	CAS#	Name of Compound	Amount (ppm)	Flag
	N-nitrosodiethylamine	0.15	U	86-73-7	Fluorene	0.15	U
	Pentachloroethane	0.15	U	84-66-2	Diethyl phthalate	0.15	U
62-53-3	Aniline	0.15	U	100-01-6	4-Nitroaniline	0.15	U
108-95-2	Phenol	0.15	U	121-14+2	2,4-Dinitrotoluene	0.15	U
111-44-4	Bis(2-chloroethyl) ether	0.15	U	7005-72-3	4-Chlorophenyl phenyl ether	0.15	U
95-57-8	2-Chlorophenol	0.15	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.15	U
541-73-1	1,3-Dichlorobenzene	0.15	U		N-Nitrosodiphenyl amine	0.15	U
106-46-7	1,4-Dichlorobenzene	0.15	U	101-55-3	4-Bromophenyl phenyl ether	0.15	U
95-50-1	1,2-Dichlorobenzene	0.15	U	319-84-6	a-BHC	0.15	U
100-51-6	Benzyl Alcohol	0.15	U	118-74-1	Hexachlorobenzene	0.15	U
95-48-7	2-Methyl phenol	0.15	U	319-85-7	b-BHC	0.15	U
108-60-1	Bis(2-chloroisopropyl) ether	0.15	U	87-86-5	Pentachlorophenol	0.15	U
	Acetophenone	0.15	U	58-89-9	g-BHC (Lindane)	0.15	U
67-72-1	Hexachloroethane	0.15	U	85-01-8	Phenanthrene	0.79	
621-64-7	N-Nitroso-n-propyl amine	0.15	U	120-12-7	Anthracene	0.15	
106-44-5	4-Methyl phenol	0.15	U	319-86-8	d-BHC	0.15	U
98-95-3	Nitrobenzene	0.15	U	84-74-2	Di-n-butyl phthalate	0.15	U
	N-nitrosopiperidine	0.15	U	76-44-8	Heptachlor	0.15	U
78-59-1	Isophorone	0.15	U	309-00-2	Aldrin	0.15	U
88-75-5	2-Nitrophenol	0.15	U	1024-57-3	Heptachlor epoxide	0.15	U
105-67-9	2,4-Dimethylphenol	0.15	U	206-44-0	Fluoranthrene	1.90	
111-91-1	Bis(2-chloroethoxy) methane	0.15	U	129-00-0	Pyrene	1.90	
120-83-2	2,4-Dichlorophenol	0.15	U	959-98-8	Endosulfan I	0.15	U
120-82-1	1,2,4-Trichlorobenzene	0.15	U	72-55-9	4,4'-DDE	0.15	U
91-20-3	Naphthalene	0.15	U	60-57-1	Dieldrin	0.15	U
106-47-8	4-Chloroaniline	0.15	U	72-20-8	Endrin	0.15	U
87-68-3	Hexachlorobutadiene	0.15	U	33213-65-	Endosulfan II	0.15	U
	N-nitrosodi-n-butylamine	0.15	U	72-54-8	4,4'-DDD	0.15	U
59-50-7	4-Chloro-3-methyl phenol	0.15	U	7421-92-4	Endrin aldehyde	0.15	U
91-57-6	2-Methyl naphthalene	0.15	U	85-68-7	Butyl benzenyl phthalate	0.15	U
	1,2,4,5-Tetrachlorobenzene	0.15	U	1031-07-8	Endosulfan sulfate	0.15	U
77-47-4	Hexachlorocyclopentadiene	0.15	U	50-29-3	4,4'-DDT	0.15	U
88-06-2	2,4,6-Trichlorophenol	0.15	U	56-55-3	Benzo(a)anthracene	0.69	
95-95-4	2,4,5-Trichlorophenol	0.15	U	218-01-9	Chrysene	1.10	
91-58-7	2-Chloronaphthalene	0.15	U	91-94-1	3,3'-Dichlorobenzidine	0.15	U
88-74-4	2-Nitroaniline	0.15	U	72-43-5	Methoxychlor	0.15	U
131-11-3	Dimethyl phthalate	0.15	U	117-81-7	Bis(2-ethylhexyl) phthalate	12.0	
208-96-8	Acenaphthylene	0.15	U	117-84-0	Di-n-octyl phthalate	0.15	U
606-20-2	2,6-Dinitrotoluene	0.15	U	205-97-2	Benzo(b)fluoranthrene	2.0	



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Gas Chromatography/Mass Spectrometry

Case File Number:	TCH02077A5	Matrix:	Soil
Sample ID No.:	Fountain Sed	Sample Wt. (gm)	32.7
Date Collected:	05/13/02	Final Volume (ml)	10.0
Date Received:	05/16/02	Dilution Factor:	1
Date Extracted:	05/22/02	% Solids:	20.56%
Date Analyzed:	06/18/02	Analyst:	T. Meadows
Date of Report:	06/20/02	Supervisor's Initials:	SL
Data File Path:	C:\HPCHEM\1\DATA\ISVOA\020618\0801009.D		

CAS#	Name of Compound	Amount (ppm)	Flag	CAS#	Name of Compound	Amount (ppm)	Flag
99-09-2	3-Nitroaniline	0.15	U	207-08-9	Benzo(k)fluoranthrene	0.15	U
83-32-9	Acenaphthene	0.15	U	50-32-8	Benzo(a)pyrene	0.98	
51-28-5	2,4-Dinitrophenol	0.15	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.15	U
132-64-9	Dibenzofuran	0.15	U	53-70-3	Dibenzo(a,h)anthracene	0.15	U
100-02-7	4-Nitrophenol	0.15	U	91-24-2	Benzo(g,h,i)perylene	0.53	
	2,3,4,6-Tetrachlorophenol	0.15	U		Carbazole	0.15	U
65-85-0	Benzolic Acid	0.15	U	92-87-5	Benzidine	0.15	U
	Azobenzene	0.15	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc. (mg/Kg)
19.20	10544-50-0	Sulfur	19.3
25.78	7098-21-7	Tritetracontane	7.8
29.81	83-47-6	gamma-Sitosterol	7.9

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	104%	75-125	65-135%
Phenol-d5	107%	75-125	65-135%
Nitrobenzene-d5	116%	75-125	65-135%
2-Fluorobiphenyl	109%	75-125	65-135%
2,4,6-Tribromophenol	113%	75-125	65-135%
p-Terphenyl-d14	108%	75-125	65-135%

Appendix C

Description of Contaminated Sites

Contaminated Sites within Stormwater Drainages to Heritage Park

7th Ave. Outfall

Chevron 1002 Capitol Way. Former Chevron gas station; now a parking lot. Located just north of the former Shell station. From **1992 to 1996**, test pits were sampled and ten groundwater monitoring wells were installed.

Contaminant found: BTEX & TPH-gasoline in soil and groundwater.

Source: Underground storage tanks.

No clean up has occurred at this site. Monitoring of groundwater monitoring wells show that the total depth of contaminants has decreased from 14 feet to 4 feet between 1996 and 2001. The contaminants are thought to be moving through the soils and off site. Monitoring continues at this site.

J. C. Penney's Automotive Center / BAP Auto 601 Columbia St. SW – Gasoline/Waste Oil Underground Storage Tank Removal in **1999**.

Contaminants found: Gasoline and heavy oil range TPH and BTEX in stockpiles of excavated materials.

Source: Gasoline and waste oil underground storage tanks.

Horizontal migration of contaminated soils plume substantially contained to soils present within the boundaries of the subject property and small portion of adjacent alley way. 376.86 tons of soil removed. 100 gallons of oily liquids were pumped from the tank. 385 gallons hazardous materials (gas/carburetor cleaner/waste oil sludges) removed.

Washington Department of Ecology requires no further action.

Premier Auto Detailing 722 Capitol Way Soil clean-up in **May 2002**.

Contaminant found: TPH-diesel, BTEX

Source: Underground Storage Tanks

Cleanup included two onsite areas, two public right of way areas, one greyhound right of way area. Monitoring is ongoing.

7th Ave Storm Sewer Upgrade Exploration and evaluation of subsurface soil and ground water conditions beneath 7th Avenue prior to storm sewer pipe replacement in **April, 2000**

Contaminants found: Gasoline and diesel range hydrocarbons at two soil boring locations greater than cleanup levels. PAHs (Polynuclear Aromatic Hydrocarbons) greater than cleanup levels from one boring. Diesel range hydrocarbons and two PAHs in excess of cleanup levels in a water sample from one boring.

Source: Unknown but soil may have been placed as fill between 1884 & 1924, or contamination was from an off- or on-site source sometime after the site was filled.

Lack of contamination in a ground water sample obtained from a boring closest to Capitol Lake suggests that the contamination may not be moving toward the lake. (Geotechnical Engineering and Environmental Services, 2000) The City of Olympia installed a new storm sewer pipe inside the old pipe as the upgrade.

Shell 1018 Capitol Way. Former Shell gas station. Removal of six steel underground storage tanks consisting of 4 gasoline tanks, one waste oil tank and one heating oil tank removed approximately 1981.

Contaminant found: TPH-gasoline, BTEX in soil; TPH-gasoline, BTEX, lead in groundwater.

Source: Underground storage tanks.

In **August, 1996**, 3500 tons of soil was excavated from the site. 2500 tons of soil was transported to an appropriate landfill. The remaining soil was used as backfill. Monitoring continues at this site.

US West – Whitehall 714 S. Washington – Removal of 6000 gallon diesel tank and the decommissioning of an in-place 1000 gallon diesel underground storage tank in **1991**.

Contaminants found: TPH– diesel range greater than cleanup levels in one soil sample.

Source: 1000 gallon diesel underground storage tank located beneath generator room in north portion of building.

Vertical extent of petroleum hydrocarbon contamination in soil is unknown but should be limited to 8' below ground surface due to shallow groundwater present.

Washington Department of Ecology requires no further action.

Unocal (Washington State Grange) Capitol Way & 10th Ave. Removal of two underground gasoline storage tanks, one heating oil and one waste oil tank. Subsurface Vapor Extraction.

Contaminant found: TPHs & BTEXs

Source: Underground storage tanks.

Removed 3500 cubic yards of petroleum contaminated soil from site in July 1990. During construction of new building during **Aug 1990 – Sept 1991**, found gas like contamination while installing pilings. Based on sampling, installed monitoring wells for vapor collection and monitoring. Petroleum levels have decreased over time to under the cleanup standards. Monitoring continues at this site.

Fountain Outfall

Heritage Park (Historic gas stations and machine shop) Western 2/3 of the block bounded by 4th and 5th, Water and Sylvester Streets. Found in **1995** during site investigation.

Contaminant found: TPH (oil & diesel), BTEX

Source: Underground storage tanks. Potential off site source is a former service station, currently a parking lot across Sylvester Street.

There is a northerly flow of groundwater. The groundwater divide shifts toward Capital Lake during low tides and then moves north toward 4th Ave. during high tides. Contamination previously observed in Sylvester Street right of way may be carried to Heritage Park site by shifting groundwater divide. Monitoring wells installed, installation and operation of the remediation system, groundwater monitoring conducted.

Ecology recommends to city of Olympia additional soil investigations and groundwater monitoring.

Olympia Gateway Corridor Sampling conducted **March 2001** to determine if contamination is likely to be encountered during construction of new bridge.

Creative Nails – 301 West 4th Ave. – Reportedly former location of gas station from ~1930 to early 1950's.

Contaminant found: TPH (gasoline range) in soil and groundwater. BTEX with Benzene above MTCA Method A cleanup criteria. Toluene, ethylbenzene, and xylenes detected below MTCA Method A cleanup criteria. Lead detected in groundwater above MTCA

Creative Nails continued

Method A cleanup criteria. VOC's (weathered gasoline) detected below MTCA Method A and B in groundwater.

Sources: May have been leaking storage tanks.

This site was ranked a "4" on a scale of 1 to 5 (with 1 being the worst) under the Washington Ranking Method by Gerald Tousley, Thurston County Environmental Health. This site is awaiting clean up.

MTCA – Model Toxics Control Act

TPH – Total Petroleum Hydrocarbons

VOC – Volatile Organic Carbon

BTEX – Benzene, Toluene, Ethylbenzene, Zylene

Appendix D

Outfall Photographs



7th Avenue outfall 7/23/02



7th Avenue outfall 7/23/02



7th Avenue outfall 7/23/02

Right: outfall south
of Columbia Street
outfall



Left: Columbia Street
outfall 7/23/02

Below: Columbia
Street outfall 7/23/02





Above: Seepage with a sheen along Heritage Park



Left: Fountain system outfall



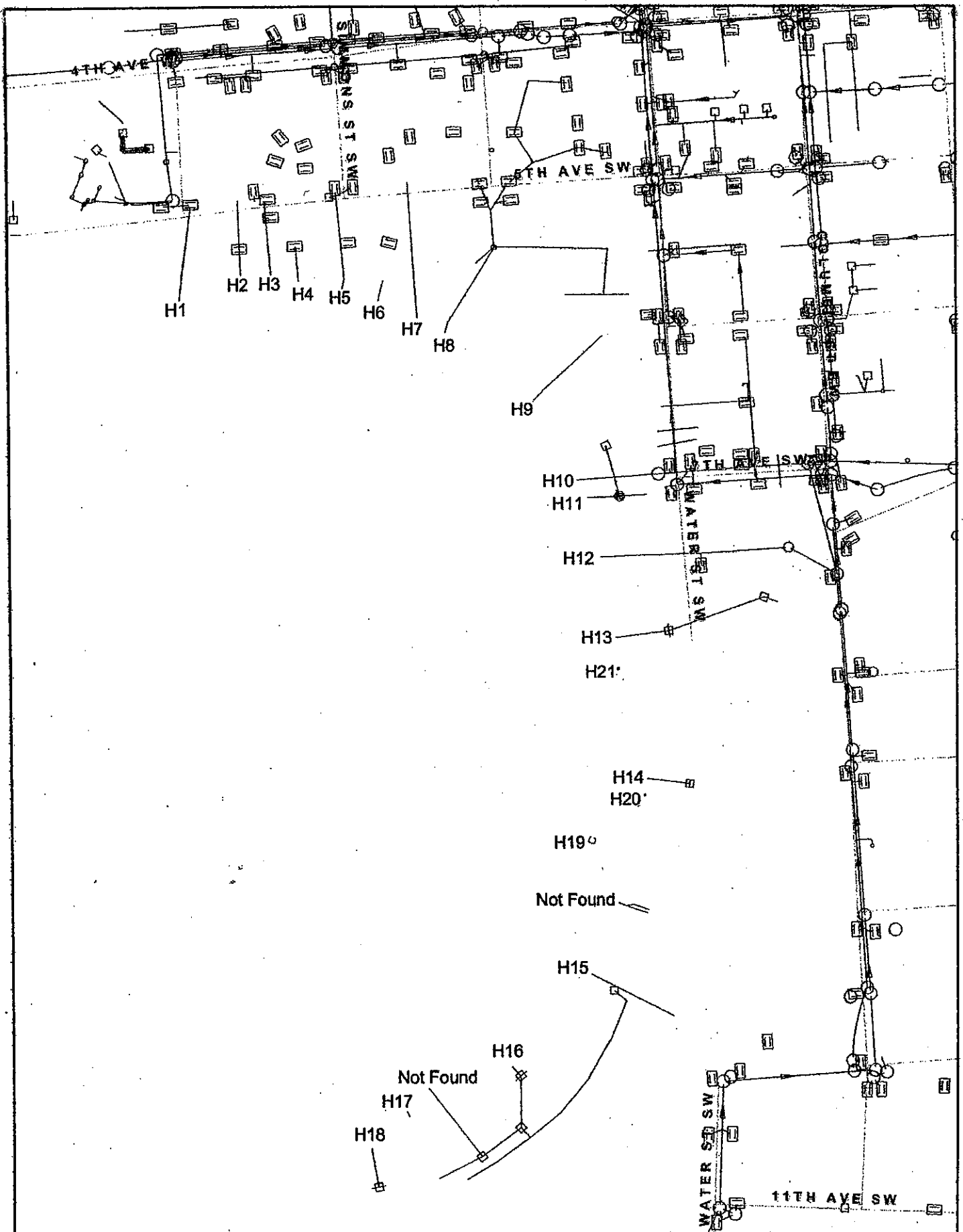
Right: Flowing pipe, from small drainage system within Heritage Park between 7th and Fountain outfalls.



Below: Fountain system outfall
7/25/03

Appendix E

City of Olympia Water Sampling Data



Capital Lake Water Quality Survey (CR67)

Heritage Park WQ Samples		7/29/02	8/6/02	8/13/02	8/20/02	8/27/02	9/3/02	9/10/02	9/17/02	9/24/02	10/1/02	10/8/02	10/15/02	10/22/02	10/29/02	11/5/02	11/12/02	11/19/02	11/26/02	12/3/02	12/10/02	12/17/02	12/24/02	1/7/03	1/14/03	1/21/03	1/28/03	2/4/03	2/11/03	2/18/03	2/25/03	3/4/03	3/11/03	3/18/03	3/25/03	4/1/03	4/8/03	4/15/03	4/22/03	4/29/03	5/6/03	5/13/03	5/20/03	5/27/03	6/3/03	6/10/03	6/17/03	6/24/03	7/1/03	7/8/03	7/15/03	7/22/03	7/29/03	8/5/03	8/12/03	8/19/03	8/26/03	9/2/03	9/9/03	9/16/03	9/23/03	9/30/03	10/7/03	10/14/03	10/21/03	10/28/03	11/4/03	11/11/03	11/18/03	11/25/03	12/2/03	12/9/03	12/16/03	12/23/03	12/30/03	1/6/04	1/13/04	1/20/04	1/27/04	2/3/04	2/10/04	2/17/04	2/24/04	3/2/04	3/9/04	3/16/04	3/23/04	3/30/04	4/6/04	4/13/04	4/20/04	4/27/04	5/4/04	5/11/04	5/18/04	5/25/04	6/1/04	6/8/04	6/15/04	6/22/04	6/29/04	7/6/04	7/13/04	7/20/04	7/27/04	8/3/04	8/10/04	8/17/04	8/24/04	8/31/04	9/7/04	9/14/04	9/21/04	9/28/04	10/5/04	10/12/04	10/19/04	10/26/04	11/2/04	11/9/04	11/16/04	11/23/04	11/30/04	12/7/04	12/14/04	12/21/04	12/28/04	1/4/05	1/11/05	1/18/05	1/25/05	2/1/05	2/8/05	2/15/05	2/22/05	2/29/05	3/6/05	3/13/05	3/20/05	3/27/05	4/3/05	4/10/05	4/17/05	4/24/05	5/1/05	5/8/05	5/15/05	5/22/05	5/29/05	6/5/05	6/12/05	6/19/05	6/26/05	7/3/05	7/10/05	7/17/05	7/24/05	7/31/05	8/7/05	8/14/05	8/21/05	8/28/05	9/4/05	9/11/05	9/18/05	9/25/05	10/2/05	10/9/05	10/16/05	10/23/05	10/30/05	11/6/05	11/13/05	11/20/05	11/27/05	12/4/05	12/11/05	12/18/05	12/25/05	1/1/06	1/8/06	1/15/06	1/22/06	1/29/06	2/5/06	2/12/06	2/19/06	2/26/06	3/5/06	3/12/06	3/19/06	3/26/06	4/2/06	4/9/06	4/16/06	4/23/06	4/30/06	5/7/06	5/14/06	5/21/06	5/28/06	6/4/06	6/11/06	6/18/06	6/25/06	7/2/06	7/9/06	7/16/06	7/23/06	7/30/06	8/6/06	8/13/06	8/20/06	8/27/06	9/3/06	9/10/06	9/17/06	9/24/06	10/1/06	10/8/06	10/15/06	10/22/06	10/29/06	11/5/06	11/12/06	11/19/06	11/26/06	12/3/06	12/10/06	12/17/06	12/24/06	1/7/07	1/14/07	1/21/07	1/28/07	2/4/07	2/11/07	2/18/07	2/25/07	3/4/07	3/11/07	3/18/07	3/25/07	4/1/07	4/8/07	4/15/07	4/22/07	4/29/07	5/6/07	5/13/07	5/20/07	5/27/07	6/3/07	6/10/07	6/17/07	6/24/07	7/1/07	7/8/07	7/15/07	7/22/07	7/29/07	8/5/07	8/12/07	8/19/07	8/26/07	9/2/07	9/9/07	9/16/07	9/23/07	9/30/07	10/7/07	10/14/07	10/21/07	10/28/07	11/4/07	11/11/07	11/18/07	11/25/07	12/2/07	12/9/07	12/16/07	12/23/07	12/30/07	1/6/08	1/13/08	1/20/08	1/27/08	2/3/08	2/10/08	2/17/08	2/24/08	3/2/08	3/9/08	3/16/08	3/23/08	3/30/08	4/6/08	4/13/08	4/20/08	4/27/08	5/4/08	5/11/08	5/18/08	5/25/08	6/1/08	6/8/08	6/15/08	6/22/08	6/29/08	7/6/08	7/13/08	7/20/08	7/27/08	8/3/08	8/10/08	8/17/08	8/24/08	8/31/08	9/7/08	9/14/08	9/21/08	9/28/08	10/5/08	10/12/08	10/19/08	10/26/08	11/2/08	11/9/08	11/16/08	11/23/08	11/30/08	12/7/08	12/14/08	12/21/08	12/28/08	1/4/09	1/11/09	1/18/09	1/25/09	2/1/09	2/8/09	2/15/09	2/22/09	2/29/09	3/6/09	3/13/09	3/20/09	3/27/09	4/3/09	4/10/09	4/17/09	4/24/09	5/1/09	5/8/09	5/15/09	5/22/09	5/29/09	6/5/09	6/12/09	6/19/09	6/26/09	7/3/09	7/10/09	7/17/09	7/24/09	7/31/09	8/7/09	8/14/09	8/21/09	8/28/09	9/4/09	9/11/09	9/18/09	9/25/09	10/2/09	10/9/09	10/16/09	10/23/09	10/30/09	11/6/09	11/13/09	11/20/09	11/27/09	12/4/09	12/11/09	12/18/09	12/25/09	1/1/10	1/8/10	1/15/10	1/22/10	1/29/10	2/5/10	2/12/10	2/19/10	2/26/10	3/5/10	3/12/10	3/19/10	3/26/10	4/2/10	4/9/10	4/16/10	4/23/10	4/30/10	5/7/10	5/14/10	5/21/10	5/28/10	6/4/10	6/11/10	6/18/10	6/25/10	7/2/10	7/9/10	7/16/10	7/23/10	7/30/10	8/6/10	8/13/10	8/20/10	8/27/10	9/3/10	9/10/10	9/17/10	9/24/10	10/1/10	10/8/10	10/15/10	10/22/10	10/29/10	11/5/10	11/12/10	11/19/10	11/26/10	12/3/10	12/10/10	12/17/10	12/24/10	12/31/10	1/7/11	1/14/11	1/21/11	1/28/11	2/4/11	2/11/11	2/18/11	2/25/11	3/4/11	3/11/11	3/18/11	3/25/11	4/1/11	4/8/11	4/15/11	4/22/11	4/29/11	5/6/11	5/13/11	5/20/11	5/27/11	6/3/11	6/10/11	6/17/11	6/24/11	7/1/11	7/8/11	7/15/11	7/22/11	7/29/11	8/5/11	8/12/11	8/19/11	8/26/11	9/2/11	9/9/11	9/16/11	9/23/11	9/30/11	10/7/11	10/14/11	10/21/11	10/28/11	11/4/11	11/11/11	11/18/11	11/25/11	12/2/11	12/9/11	12/16/11	12/23/11	12/30/11	1/6/12	1/13/12	1/20/12	1/27/12	2/3/12	2/10/12	2/17/12	2/24/12	3/2/12	3/9/12	3/16/12	3/23/12	3/30/12	4/6/12	4/13/12	4/20/12	4/27/12	5/4/12	5/11/12	5/18/12	5/25/12	6/1/12	6/8/12	6/15/12	6/22/12	6/29/12	7/6/12	7/13/12	7/20/12	7/27/12	8/3/12	8/10/12	8/17/12	8/24/12	8/31/12	9/7/12	9/14/12	9/21/12	9/28/12	10/5/12	10/12/12	10/19/12	10/26/12	11/2/12	11/9/12	11/16/12	11/23/12	11/30/12	12/7/12	12/14/12	12/21/12	12/28/12	1/4/13	1/11/13	1/18/13	1/25/13	2/1/13	2/8/13	2/15/13	2/22/13	2/29/13	3/6/13	3/13/13	3/20/13	3/27/13	4/3/13	4/10/13	4/17/13	4/24/13	5/1/13	5/8/13	5/15/13	5/22/13	5/29/13	6/5/13	6/12/13	6/19/13	6/26/13	7/3/13	7/10/13	7/17/13	7/24/13	7/31/13	8/7/13	8/14/13	8/21/13	8/28/13	9/4/13	9/11/13	9/18/13	9/25/13	10/2/13	10/9/13	10/16/13	10/23/13	10/30/13	11/6/13	11/13/13	11/20/13	11/27/13	12/4/13	12/11/13	12/18/13	12/25/13	1/1/14	1/8/14	1/15/14	1/22/14	1/29/14	2/5/14	2/12/14	2/19/14	2/26/14	3/5/14	3/12/14	3/19/14	3/26/14	4/2/14	4/9/14	4/16/14	4/23/14	4/30/14	5/7/14	5/14/14	5/21/14	5/28/14	6/4/14	6/11/14	6/18/14	6/25/14	7/2/14	7/9/14	7/16/14	7/23/14	7/30/14	8/6/14	8/13/14	8/20/14	8/27/14	9/3/14	9/10/14	9/17/14	9/24/14	10/1/14	10/8/14	10/15/14	10/22/14	10/29/14	11/5/14	11/12/14	11/19/14	11/26/14	12/3/14	12/10/14	12/17/14	12/24/14	12/31/14	1/7/15	1/14/15	1/21/15	1/28/15	2/4/15	2/11/15	2/18/15	2/25/15	3/4/15	3/11/15	3/18/15	3/25/15	4/1/15	4/8/15	4/15/15	4/22/15	4/29/15	5/6/15	5/13/15	5/20/15	5/27/15	6/3/15	6/10/15	6/17/15	6/24/15	7/1/15	7/8/15	7/15/15	7/22/15	7/29/15	8/5/15	8/12/15	8/19/15	8/26/15	9/2/15	9/9/15	9/16/15	9/23/15	9/30/15	10/7/15	10/14/15	10/21/15	10/28/15	11/4/15	11/11/15	11/18/15	11/25/15	12/2/15	12/9/15	12/16/15	12/23/15	12/30/15	1/6/16	1/13/16	1/20/16	1/27/16	2/3/16	2/10/16	2/17/16	2/24/16	3/2/16	3/9/16	3/16/16	3/23/16	3/30/16	4/6/16	4/13/16	4/20/16	4/27/16	5/4/16	5/11/16	5/18/16	5/25/16	6/1/16	6/8/16	6/15/16	6/22/16	6/29/16	7/6/16	7/13/16	7/20/16	7/27/16	8/3/16	8/10/16	8/17/16	8/24/16	8/31/16	9/7/16	9/14/16	9/21/16	9/28/16	10/5/16	10/12/16	10/19/16	10/26/16	11/2/16	11/9/16	11/16/16	11/23/16	11/30/16	12/7/16	12/14/16	12/21/16	12/28/16	1/4/17	1/11/17	1/18/17	1/25/17	2/1/17	2/8/17	2/15/17	2/22/17	2/29/17	3/6/17	3/13/17	3/20/17	3/27/17	4/3/17	4/10/17	4/17/17	4/24/17	5/1/17	5/8/17	5/15/17	5/22/17	5/29/17	6/5/17	6/12/17	6/19/17	6/26/17	7/3/17	7/10/17	7/17/17	7/24/17	7/31/17	8/7/17	8/14/17	8/21/17	8/28/17	9/4/17	9/11/17	9/18/17	9/25/17	10/2/17	10/9/17	10/16/17	10/23/17	10/30/17	11/6/17	11/13/17	11/20/17	11/27/17	12/4/17	12/11/17	12/18/17	12/25/17	1/1/18	1/8/18	1/15/18	1/22/18	1/29/18	2/5/18	2/12/18	2/19/18	2/26/18	3/5/18	3/12/18	3/19/18	3/26/18	4/2/18	4/9/18	4/16/18	4/23/18	4/30/18	5/7/18	5/14/18	5/21/18	5/28/18	6/4/18	6/11/18	6/18/18	6/25/18	7/2/18	7/9/18	7/16/18	7/23/18	7/30/18	8/6/18	8/13/18	8/20/18	8/27/18	9/3/18	9/10/18	9/17/18	9/24/18	10/1/18	10/8/18	10/15/18	10/22/18	10/29/18	11/5/18	11/12/18	11/19/18	11/26/18	12/3/18	12/10/18	12/17/18	12/24/18	12/31/18	1/7/19	1/14/19	1/21/19	1/28/19	2/4/19	2/11/19	2/18/19	2/25/19	3/4/19	3/11/19	3/18/19	3/25/19	4/1/19	4/8/19	4/15/19	4/22/19	4/29/19	5/6/19	5/13/19	5/20/19	5/27/19	6/3/19	6/10/19	6/17/19	6/24/19	7/1/19	7/8/19	7/15/19	7/22/19	7/29/19	8/5/19	8/12/19	8/19/19	8/26/19	9/2/19	9/9/19	9/16/19	9/23/19	9/30/19	10/7/19	10/14/19	10/21/19	10/28/19	11/4/19	11/11/19	11/18/19	11/25/19	12/2/19	12/9/19	12/16/19	12/23/19	12/30/19	1/6/20	1/13/20	1/20/20	1/27/20	2/3/20	2/10/20	2/17/20	2/24/20	3/2/20	3/9/20	3/16/20	3/23/20	3/30/20	4/6/20	4/13/20	4/20/20	4/27/20	5/4/20	5/11/20	5/18/20	5/25/20	6/1/20	6/8/20	6/15/20	6/22/20	6/29/20	7/6/20	7/13/20	7/20/20	7/27/20	8/3/20	8/10/20	8/17/20	8/24/20	8/31/20	9/7/20	9/14/20	9/21/20	9/28/20
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SEMI_VOLATILE_TPH_LEAD_RESULTS

- H10:** 36"HDPE pipe draining from 7th Ave. (note: sample taken at manhole located at the corner of Columbia/7th) dry-weather baseflow estimated at 30gpm
- H14:** 12"Concrete pipe draining small area – baseflow estimated at 5gpm
- H19:** 8" vertical pipe beyond island in south area of the park – baseflow estimated at 300gpm
- H20:** Seep/Spring located 36' south of H14 – baseflow estimated at 10-20gpm

ID #	LEAD(mg/l)	NWTPH-DX DIESEL(mg/l)	MOTOR OIL(mg/l)
H10	<0.0010	<0.05	0.17
H14	<0.0010	<0.05	<0.10
H19	<0.0010	<0.05	<0.10
H20	Not Sampled	<0.05	<0.10

ID #	Semi-Volatile Organics all other values below detection limits
H10	Di-n-butyl phthalate 0.31 ppb

SUMMARY OF WQ SAMPLES TAKEN

ID #	Description	Fecal Coliform (# org/100mL)	Ammonia (mg/L)	Nitrate/Nitrite (mg/L-N)
H9	12" concrete	<5	0.295	
H10	7 th Avenue 36" HDPE	<5		
		25	0.610	0.728
		475	0.600	
		1250	0.545	
		180		
H13	8" concrete	30	0.731	
		1	0.310	0.074
H14	12" concrete	<5	0.019	
		<5		
H15	36" concrete	20		
		68	<0.017	
H19	8" vertical pipe	<5	<0.017	
H20	Seep S of H14	<5	0.065	
H21	Seep S of H13	<20	2.54	

OLY00201:OLY0301



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CASE FILE NUMBER:	OLY002-01	PAGE 1
REPORT DATE:	08/23/02	
DATE SAMPLED:	07/29/02	DATE RECEIVED: 07/31/02
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER		
SAMPLES FROM CITY OF OLYMPIA		

CASE NARRATIVE

Four water samples were delivered to the laboratory in good condition. The samples were analyzed according to the chain of custody. Samples for total metals were digested according to EPA procedures. No difficulties were encountered in the preparation or analysis of these samples. Sample data follows while Q/VQC data is contained on subsequent pages. Organics data follows as a separate report.

SAMPLE DATA

SAMPLE ID	NWTPH-DX		
	LEAD (mg/l)	DIESEL (mg/l)	MOTOR OIL (mg/l)
H10	<0.0010	<0.05	0.17
H14	<0.0010	<0.05	<0.10
H19	<0.0010	<0.05	<0.10
H20		<0.05	<0.10



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CASE FILE NUMBER: OLY002-01 **PAGE 2**
REPORT DATE: 08/23/02
DATE SAMPLED: 07/29/02 **DATE RECEIVED:** 07/31/02
FINAL REPORT, LABORATORY ANALYSIS OF SELECTED PARAMETERS ON WATER
SAMPLES FROM CITY OF OLYMPIA

QA/QC DATA WATER

QC PARAMETER	LEAD (mg/l)	DIESEL (mg/l)	MOTOR OIL (mg/l)
METHOD	EPA 239.2	NWTPH-DX	NWTPH-DX
DATE ANALYZED	08/06/02	08/13/02	08/13/02
DETECTION LIMIT	0.0010	0.05	0.10
DUPLICATE			
SAMPLE ID	H10		
ORIGINAL	<0.0010		
DUPLICATE	<0.0010		
RPD	NC	NA	NA
SPIKE SAMPLE			
SAMPLE ID	H10		
ORIGINAL	<0.0010		
SPIKED SAMPLE	0.0102		
SPIKE ADDED	0.0125		
% RECOVERY	81.60%	NA	NA
QC CHECK			
FOUND	0.0241	0.26	0.55
TRUE	0.0250	0.25	0.50
% RECOVERY	98.40%	104.80%	110.80%
BLANK			
	<0.0010	<0.05	<0.10
BLANK SPIKE %R	115.0%		

RPD - RELATIVE PERCENT DIFFERENCE
 NA - NOT APPLICABLE OR NOT AVAILABLE
 NC - NOT CALCULABLE DUE TO ONE OR MORE VALUES BEING BELOW THE DETECTION LIMIT.
 OR - RECOVERY NOT CALCULABLE DUE TO SPIKE SAMPLE OUT OF RANGE OR SPIKE TOO LOW RELATIVE TO SAMPLE CONCENTRATION.

SUBMITTED BY:

 Steven Lazoff
 Laboratory Director



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: 8/5/02-MB
Sample ID No.: ~~Method Blank~~
Date Collected: n/a
Date Received: n/a
Date Extracted: 08/05/02
Date Analyzed: 08/22/02
Date of Report: 08/23/02
Data File Path: C:\HPCHEM1\DATA\SVOA\020822\0401006.D

Matrix: Water
Sample Vol. (ml): 1000
Final Volume (ml): 2.0
Dilution Factor: 1
Analyst: T. Meadows
Supervisor's Initials: SL

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
	N-nitrosodiethylamine	0.20	U	86-73-7	Fluorene	0.20	U
	Pentachloroethane	0.20	U	84-66-2	Diethyl phthalate	0.20	U
62-53-3	Aniline	0.20	U	100-01-6	4-Nitroaniline	0.20	U
108-95-2	Phenol	0.20	U	121-14+2	2,4-Dinitrotoluene	0.20	U
111-44-4	Bis(2-chloroethyl) ether	0.20	U	7005-72-3	4-Chlorophenyl phenyl ether	0.20	U
95-57-8	2-Chlorophenol	0.20	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.20	U
541-73-1	1,3-Dichlorobenzene	0.20	U		N-Nitrosodiphenyl amine	0.20	U
106-46-7	1,4-Dichlorobenzene	0.20	U	101-55-3	4-Bromophenyl phenyl ether	0.20	U
95-50-1	1,2-Dichlorobenzene	0.20	U	319-84-6	a-BHC	0.20	U
100-51-6	Benzyl Alcohol	0.20	U	118-74-1	Hexachlorobenzene	0.20	U
95-48-7	2-Methyl phenol	0.20	U	319-85-7	b-BHC	0.20	U
108-60-1	Bis(2-chloroisopropyl) ether	0.20	U	87-86-5	Pentachlorophenol	0.20	U
	Acetophenone	0.20	U	58-89-9	g-BHC (Lindane)	0.20	U
67-72-1	Hexachloroethane	0.20	U	85-01-8	Phenanthrene	0.20	U
621-64-7	N-Nitroso-n-propyl amine	0.20	U	120-12-7	Anthracene	0.20	U
106-44-5	4-Methyl phenol	0.20	U	319-86-8	d-BHC	0.20	U
98-95-3	Nitrobenzene	0.20	U	84-74-2	Di-n-butyl phthalate	0.20	U
	N-nitrosopiperidine	0.20	U	76-44-8	Heptachlor	0.20	U
78-59-1	Isophorone	0.20	U	309-00-2	Aldrin	0.20	U
88-75-5	2-Nitrophenol	0.20	U	1024-57-3	Heptachlor epoxide	0.20	U
105-67-9	2,4-Dimethylphenol	0.20	U	208-44-0	Fluoranthrene	0.20	U
111-91-1	Bis(2-chloroethoxy) methane	0.20	U	129-00-0	Pyrene	0.20	U
120-83-2	2,4-Dichlorophenol	0.20	U	959-98-8	Endosulfan I	0.20	U
120-82-1	1,2,4-Trichlorobenzene	0.20	U	72-55-9	4,4'-DDE	0.20	U
91-20-3	Naphthalene	0.20	U	60-57-1	Dieldrin	0.20	U
106-47-8	4-Chloroaniline	0.20	U	72-20-8	Endrin	0.20	U
87-68-3	Hexachlorobutadiene	0.20	U	33213-65-	Endosulfan II	0.20	U
	N-nitrosodi-n-butylamine	0.20	U	72-54-8	4,4'-DDD	0.20	U
59-50-7	4-Chloro-3-methyl phenol	0.20	U	7421-92-4	Endrin aldehyde	0.20	U
91-57-6	2-Methyl naphthalene	0.20	U	85-68-7	Butyl benzenyl phthalate	0.20	U
	1,2,4,5-Tetrachlorobenzene	0.20	U	1031-07-8	Endosulfan sulfate	0.20	U
77-47-4	Hexachlorocyclopentadiene	0.20	U	50-29-3	4,4'-DDT	0.20	U
88-06-2	2,4,6-Trichlorophenol	0.20	U	56-55-3	Benzo(a)anthracene	0.20	U
95-95-4	2,4,5-Trichlorophenol	0.20	U	218-01-9	Chrysene	0.20	U
91-58-7	2-Chloronaphthalene	0.20	U	91-94-1	3,3'-Dichlorobenzidine	0.20	U
88-74-4	2-Nitroaniline	0.20	U	72-43-5	Methoxychlor	0.20	U
131-11-3	Dimethyl phthalate	0.20	U	117-81-7	Bis(2-ethylhexyl) phthalate	0.88	
208-98-8	Acenaphthylene	0.20	U	117-84-0	Di-n-octyl phthalate	0.20	U
606-20-2	2,6-Dinitrotoluene	0.20	U	205-97-2	Benzo(b)fluoranthrene	0.20	U
99-09-2	3-Nitroaniline	0.20	U	207-08-9	Benzo(k)fluoranthrene	0.20	U
83-32-9	Acenaphthene	0.20	U	50-32-8	Benzo(a)pyrene	0.20	U



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	8/5/02-MB	Matrix:	Water
Sample ID No.:	Method Blank	Sample Vol. (ml)	1000
Date Collected:	n/a	Final Volume (ml)	2.0
Date Received:	n/a	Dilution Factor:	1
Date Extracted:	08/05/02	Analyst:	T. Meadows
Date Analyzed:	08/22/02	Supervisor's Initials:	SL
Date of Report:	08/23/02		
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020822\0401006.D		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
51-28-5	2,4-Dinitrophenol	0.20	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.20	U
132-64-9	Dibenzofuran	0.20	U	53-70-3	Dibenzo(a,h)anthracene	0.20	U
100-02-7	4-Nitrophenol	0.20	U	91-24-2	Benzo(g,h,i)perylene	0.20	U
	2,3,4,6-Tetrachlorophenol	0.20	U		Carbazole	0.20	U
65-85-0	Benzolo Acid	0.20	U	92-87-5	Benzidine	0.20	U
	Azobenzene	0.20	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

<u>R.T.</u>	<u>CAS#</u>	<u>Compound</u>	<u>Rel. Conc.</u>
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The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	107%	75-125	65-135%
Phenol-d5	80%	75-125	65-135%
Nitrobenzene-d5	123%	75-125	65-135%
2-Fluorobiphenyl	79%	75-125	65-135%
2,4,6-Tribromophenol	102%	75-125	65-135%
p-Terphenyl-d14	100%	75-125	65-135%

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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	8/5/02-LCS	Matrix:	Water
Sample ID No.:	Laboratory Control Spk	Sample Vol. (ml)	1000
Date Collected:	n/a	Final Volume (ml)	2.0
Date Received:	n/a	Dilution Factor:	1
Date Analyzed	08/22/02	Analyst:	T. Meadows
Dat of Report:	08/23/02	Supervisor's Initials: <i>SL</i>	
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020822\	0601007.D	

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	101%	75-125%	65-135%
Phenol-d5	52%	75-125%	65-135%
Nitrobenzene-d5	106%	75-125%	65-135%
2-Fluorobiphenyl	110%	75-125%	65-135%
2,4,6-Tribromophenol	112%	75-125%	65-135%
p-Terphenyl-d14	99%	75-125%	65-135%

Matrix Spike Recoveries	%Rec.	QC limits	
		Water	Soil
Phenol	75%	50-150%	50-150%
2-Chlorophenol	81%	50-150%	50-150%
1,4-Dichlorobenzene	79%	50-150%	50-150%
N-Nitroso-n-propyl amine	111%	50-150%	50-150%
1,2,4-Trichlorobenzene	73%	50-150%	50-150%
4-Chloro-3-methyl phenol	84%	50-150%	50-150%
Acenaphthene	101%	50-150%	50-150%
4-Nitrophenol	0%	50-150%	50-150%
2,4-Dinitrotoluene	93%	50-150%	50-150%
Pentachlorophenol	4%	50-150%	50-150%
Pyrene	101%	50-150%	50-150%



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: OLY00201A1
Sample ID No.: ~~1110~~
Date Collected: 07/29/02
Date Received: 07/31/02
Date Extracted: 08/05/02
Date Analyzed: 08/22/02
Date of Report: 08/23/02
Data File Path: C:\HPCHEM\1\DATA\SVOA\020822\0701008.D

Matrix: Water
Sample Vol. (ml): 990
Final Volume (ml): 2.0
Dilution Factor: 1
Analyst: T. Meadows
Supervisor's Initials: SL

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
	N-nitrosodiethylamine	0.20	U	86-73-7	Fluorene	0.20	U
	Pentachloroethane	0.20	U	84-66-2	Diethyl phthalate	0.20	U
62-53-3	Aniline	0.20	U	100-01-6	4-Nitroaniline	0.20	U
108-95-2	Phenol	0.20	U	121-14+2	2,4-Dinitrotoluene	0.20	U
111-44-4	Bis(2-chloroethyl) ether	0.20	U	7005-72-3	4-Chlorophenyl phenyl ether	0.20	U
95-57-8	2-Chlorophenol	0.20	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.20	U
541-73-1	1,3-Dichlorobenzene	0.20	U		N-Nitrosodiphenyl amine	0.20	U
106-46-7	1,4-Dichlorobenzene	0.20	U	101-55-3	4-Bromophenyl phenyl ether	0.20	U
95-50-1	1,2-Dichlorobenzene	0.20	U	319-84-6	a-BHC	0.20	U
100-51-6	Benzyl Alcohol	0.20	U	118-74-1	Hexachlorobenzene	0.20	U
95-48-7	2-Methyl phenol	0.20	U	319-85-7	b-BHC	0.20	U
108-80-1	Bis(2-chloroisopropyl) ether	0.20	U	87-86-5	Pentachlorophenol	0.20	U
	Acetophenone	0.20	U	58-89-9	g-BHC (Lindane)	0.20	U
67-72-1	Hexachloroethane	0.20	U	85-01-8	Phenanthrene	0.20	U
621-64-7	N-Nitroso-n-propyl amine	0.20	U	120-12-7	Anthracene	0.20	U
106-44-5	4-Methyl phenol	0.20	U	319-86-8	d-BHC	0.20	U
98-95-3	Nitrobenzene	0.20	U	84-74-2	Di-n-butyl phthalate	0.20	
	N-nitrosopiperidine	0.20	U	76-44-8	Heptachlor	0.20	U
78-59-1	Isophorone	0.20	U	309-00-2	Aldrin	0.20	U
88-75-5	2-Nitrophenol	0.20	U	1024-57-3	Heptachlor epoxide	0.20	U
105-67-9	2,4-Dimethylphenol	0.20	U	206-44-0	Fluoranthrene	0.20	U
111-91-1	Bis(2-chloroethoxy) methane	0.20	U	129-00-0	Pyrene	0.20	U
120-83-2	2,4-Dichlorophenol	0.20	U	959-98-8	Endosulfan I	0.20	U
120-82-1	1,2,4-Trichlorobenzene	0.20	U	72-55-9	4,4'-DDE	0.20	U
91-20-3	Naphthalene	0.20	U	60-57-1	Dieldrin	0.20	U
106-47-8	4-Chloroaniline	0.20	U	72-20-8	Endrin	0.20	U
87-68-3	Hexachlorobutadiene	0.20	U	33213-65-	Endosulfan II	0.20	U
	N-nitrosodi-n-butylamine	0.20	U	72-54-8	4,4'-DDD	0.20	U
59-50-7	4-Chloro-3-methyl phenol	0.20	U	7421-92-4	Endrin aldehyde	0.20	U
91-57-6	2-Methyl naphthalene	0.20	U	85-68-7	Butyl benzenyl phthalate	0.20	U
	1,2,4,5-Tetrachlorobenzene	0.20	U	1031-07-8	Endosulfan sulfate	0.20	U
77-47-4	Hexachlorocyclopentadiene	0.20	U	50-29-3	4,4'-DDT	0.20	U
88-06-2	2,4,6-Trichlorophenol	0.20	U	56-55-3	Benzo(a)anthracene	0.20	U
95-95-4	2,4,5-Trichlorophenol	0.20	U	218-01-9	Chrysene	0.20	U
91-58-7	2-Chloronaphthalene	0.20	U	91-94-1	3,3'-Dichlorobenzidine	0.20	U
88-74-4	2-Nitroaniline	0.20	U	72-43-5	Methoxychlor	0.20	U
131-11-3	Dimethyl phthalate	0.20	U	117-81-7	Bis(2-ethylhexyl) phthalate	1.85	
208-96-8	Acenaphthylene	0.20	U	117-84-0	Di-n-octyl phthalate	0.20	U
606-20-2	2,6-Dinitrotoluene	0.20	U	205-97-2	Benzo(b)fluoranthrene	0.20	U
99-09-2	3-Nitroaniline	0.20	U	207-08-9	Benzo(k)fluoranthrene	0.20	U
83-32-9	Acenaphthene	0.20	U	50-32-8	Benzo(a)pyrene	0.20	U



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	OLY00201A1	Matrix:	Water
Sample ID No.:	1116	Sample Vol. (ml)	990
Date Collected:	07/29/02	Final Volume (ml)	2.0
Date Received:	07/31/02	Dilution Factor:	1
Date Extracted:	08/05/02	Analyst:	T. Meadows
Date Analyzed:	08/22/02	Supervisor's initials:	SL
Date of Report:	08/23/02		
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020822\0701008.D		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
51-28-5	2,4-Dinitrophenol	0.20	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.20	U
132-64-9	Dibenzofuran	0.20	U	53-70-3	Dibenzo(a,h)anthracene	0.20	U
100-02-7	4-Nitrophenol	0.20	U	91-24-2	Benzo(g,h,i)perylene	0.20	U
	2,3,4,6-Tetrachlorophenol	0.20	U		Carbazole	0.20	U
85-85-0	Benzoic Acid	0.20	U	92-87-6	Benzidine	0.20	U
	Azobenzene	0.20	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc.
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The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	76%	75-125	65-135%
Phenol-d5	75%	75-125	65-135%
Nitrobenzene-d5	103%	75-125	65-135%
2-Fluorobiphenyl	90%	75-125	65-135%
2,4,6-Tribromophenol	111%	75-125	65-135%
p-Terphenyl-d14	112%	75-125	65-135%



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **OLY00201A2**
Sample ID No.: **TT14**
Date Collected: **07/29/02**
Date Received: **07/31/02**
Date Extracted: **08/05/02**
Date Analyzed: **08/22/02**
Date of Report: **08/23/02**
Data File Path: **C:\HPCHEM\1\DATA\ISVOA\020822\0801009.D**

Matrix: **Water**
Sample Vol. (ml): **960**
Final Volume (ml): **2.0**
Dilution Factor: **1**
Analyst: **T. Meadows**
Supervisor's Initials: **SL**

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
	N-nitrosodiethylamine	0.21	U	86-73-7	Fluorene	0.21	U
	Pentachloroethane	0.21	U	84-66-2	Diethyl phthalate	0.21	U
62-53-3	Aniline	0.21	U	100-01-6	4-Nitroaniline	0.21	U
108-95-2	Phenol	0.21	U	121-14+2	2,4-Dinitrotoluene	0.21	U
111-44-4	Bis(2-chloroethyl) ether	0.21	U	7005-72-3	4-Chlorophenyl phenyl ether	0.21	U
95-57-8	2-Chlorophenol	0.21	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.21	U
541-73-1	1,3-Dichlorobenzene	0.21	U		N-Nitrosodiphenyl amine	0.21	U
106-46-7	1,4-Dichlorobenzene	0.21	U	101-55-3	4-Bromophenyl phenyl ether	0.21	U
95-50-1	1,2-Dichlorobenzene	0.21	U	319-84-6	a-BHC	0.21	U
100-51-6	Benzyl Alcohol	0.21	U	118-74-1	Hexachlorobenzene	0.21	U
95-48-7	2-Methyl phenol	0.21	U	319-85-7	b-BHC	0.21	U
108-60-1	Bis(2-chloroisopropyl) ether	0.21	U	87-86-5	Pentachlorophenol	0.21	U
	Acetophenone	0.21	U	58-89-9	g-BHC (Lindane)	0.21	U
67-72-1	Hexachloroethane	0.21	U	85-01-8	Phenanthrene	0.21	U
621-84-7	N-Nitroso-n-propyl amine	0.21	U	120-12-7	Anthracene	0.21	U
106-44-5	4-Methyl phenol	0.21	U	319-86-8	d-BHC	0.21	U
98-95-3	Nitrobenzene	0.21	U	84-74-2	Di-n-butyl phthalate	0.21	U
	N-nitrosopiperidine	0.21	U	76-44-8	Heptachlor	0.21	U
78-59-1	Isochlorone	0.21	U	309-00-2	Aldrin	0.21	U
88-75-5	2-Nitrophenol	0.21	U	1024-57-3	Heptachlor epoxide	0.21	U
105-87-9	2,4-Dimethylphenol	0.21	U	206-44-0	Fluoranthrene	0.21	U
111-91-1	Bis(2-chloroethoxy) methane	0.21	U	129-00-0	Pyrene	0.21	U
120-83-2	2,4-Dichlorophenol	0.21	U	959-98-8	Endosulfan I	0.21	U
120-82-1	1,2,4-Trichlorobenzene	0.21	U	72-55-9	4,4'-DDE	0.21	U
91-20-3	Naphthalene	0.21	U	60-57-1	Dieldrin	0.21	U
106-47-8	4-Chloroaniline	0.21	U	72-20-8	Endrin	0.21	U
87-68-3	Hexachlorobutadiene	0.21	U	33213-65-	Endosulfan II	0.21	U
	N-nitrosodi-n-butylamine	0.21	U	72-54-8	4,4'-DDD	0.21	U
59-50-7	4-Chloro-3-methyl phenol	0.21	U	7421-92-4	Endrin aldehyde	0.21	U
91-57-6	2-Methyl naphthalene	0.21	U	85-68-7	Butyl benzenyl phthalate	0.21	U
	1,2,4,5-Tetrachlorobenzene	0.21	U	1031-07-8	Endosulfan sulfate	0.21	U
77-47-4	Hexachlorocyclopentadiene	0.21	U	50-29-3	4,4'-DDT	0.21	U
88-06-2	2,4,6-Trichlorophenol	0.21	U	58-55-3	Benzo(a)anthracene	0.21	U
95-95-4	2,4,5-Trichlorophenol	0.21	U	218-01-9	Chrysene	0.21	U
91-58-7	2-Chloronaphthalene	0.21	U	91-94-1	3,3'-Dichlorobenzidine	0.21	U
88-74-4	2-Nitroaniline	0.21	U	72-43-5	Methoxychlor	0.21	U
131-11-3	Dimethyl phthalate	0.21	U	117-81-7	Bis(2-ethylhexyl) phthalate	0.82	
208-98-8	Acenaphthylene	0.21	U	117-84-0	Di-n-octyl phthalate	0.21	U
606-20-2	2,6-Dinitrotoluene	0.21	U	205-97-2	Benzo(b)fluoranthrene	0.21	U
99-09-2	3-Nitroaniline	0.21	U	207-08-9	Benzo(k)fluoranthrene	0.21	U
83-32-9	Acenaphthene	0.21	U	50-32-8	Benzo(a)pyrene	0.21	U



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	OLY00201A2	Matrix:	Water
Sample ID No.:	114	Sample Vol. (ml)	960
Date Collected:	07/29/02	Final Volume (ml)	2.0
Date Received:	07/31/02	Dilution Factor:	1
Date Extracted:	08/05/02	Analyst:	T. Meadows
Date Analyzed:	08/22/02	Supervisor's Initials:	SL
Date of Report:	08/23/02		
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020822\0801009.D		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
51-28-5	2,4-Dinitrophenol	0.21	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.21	U
132-64-9	Dibenzofuran	0.21	U	53-70-3	Dibenzo(a,h)anthracene	0.21	U
100-02-7	4-Nitrophenol	0.21	U	91-24-2	Benzo(g,h,i)perylene	0.21	U
	2,3,4,6-Tetrachlorophenol	0.21	U		Carbazole	0.21	U
65-85-0	Benzic Acid	0.21	U	92-87-5	Benzidine	0.21	U
	Azobenzene	0.21	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: ppm Amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

R.T.	CAS#	Compound	Rel. Conc.
------	------	----------	------------

The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	92%	75-125	65-135%
Phenol-d5	59%	75-125	65-135%
Nitrobenzene-d5	104%	75-125	65-135%
2-Fluorobiphenyl	95%	75-125	65-135%
2,4,6-Tribromophenol	103%	75-125	65-135%
p-Terphenyl-d14	97%	75-125	65-135%



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: OLY00201A3
Sample ID No.: ~~446~~
Date Collected: 07/29/02
Date Received: 07/31/02
Date Extracted: 08/05/02
Date Analyzed: 08/22/02
Date of Report: 08/23/02
Data File Path: C:\HPCHEM\1\DATA\SWOA\020822\0901010.D

Matrix: Water
Sample Vol. (ml): 980
Final Volume (ml): 2.0
Dilution Factor: 1
Analyst: T. Meadows
Supervisor's Initials: SC

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
	N-nitrosodiethylamine	0.20	U	86-73-7	Fluorene	0.20	U
	Pentachloroethane	0.20	U	84-66-2	Diethyl phthalate	0.20	U
62-53-3	Aniline	0.20	U	100-01-6	4-Nitroaniline	0.20	U
108-95-2	Phenol	0.20	U	121-14+2	2,4-Dinitrotoluene	0.20	U
111-44-4	Bis(2-chloroethyl) ether	0.20	U	7005-72-3	4-Chlorophenyl phenyl ether	0.20	U
95-57-8	2-Chlorophenol	0.20	U	534-52-1	2-Methyl-4,6-dinitrophenol	0.20	U
541-73-1	1,3-Dichlorobenzene	0.20	U		N-Nitrosodiphenyl amine	0.20	U
106-46-7	1,4-Dichlorobenzene	0.20	U	101-55-3	4-Bromophenyl phenyl ether	0.20	U
95-50-1	1,2-Dichlorobenzene	0.20	U	319-84-6	a-BHC	0.20	U
100-51-6	Benzyl Alcohol	0.20	U	118-74-1	Hexachlorobenzene	0.20	U
95-48-7	2-Methyl phenol	0.20	U	319-85-7	b-BHC	0.20	U
108-60-1	Bis(2-chloroisopropyl) ether	0.20	U	87-86-5	Pentachlorophenol	0.20	U
	Acetophenone	0.20	U	58-89-9	g-BHC (Lindane)	0.20	U
67-72-1	Hexachloroethane	0.20	U	85-01-8	Phenanthrene	0.20	U
621-64-7	N-Nitroso-n-propyl amine	0.20	U	120-12-7	Anthracene	0.20	U
106-44-5	4-Methyl phenol	0.20	U	319-86-8	d-BHC	0.20	U
98-95-3	Nitrobenzene	0.20	U	84-74-2	Di-n-butyl phthalate	0.20	U
	N-nitrosopiperidine	0.20	U	76-44-8	Heptachlor	0.20	U
78-59-1	Isophorone	0.20	U	309-00-2	Aldrin	0.20	U
88-75-5	2-Nitrophenol	0.20	U	1024-57-3	Heptachlor epoxide	0.20	U
105-67-9	2,4-Dimethylphenol	0.20	U	206-44-0	Fluoranthrene	0.20	U
111-91-1	Bis(2-chloroethoxy) methane	0.20	U	129-00-0	Pyrene	0.20	U
120-83-2	2,4-Dichlorophenol	0.20	U	959-98-8	Endosulfan I	0.20	U
120-82-1	1,2,4-Trichlorobenzene	0.20	U	72-55-9	4,4'-DDE	0.20	U
91-20-3	Naphthalene	0.20	U	60-57-1	Dieldrin	0.20	U
106-47-8	4-Chloroaniline	0.20	U	72-20-8	Endrin	0.20	U
87-68-3	Hexachlorobutadiene	0.20	U	33213-65-	Endosulfan II	0.20	U
	N-nitrosodi-n-butylamine	0.20	U	72-54-6	4,4'-DDD	0.20	U
59-50-7	4-Chloro-3-methyl phenol	0.20	U	7421-92-4	Endrin aldehyde	0.20	U
91-57-6	2-Methyl naphthalene	0.20	U	85-68-7	Butyl benzenyl phthalate	0.20	U
	1,2,4,5-Tetrachlorobenzene	0.20	U	1031-07-8	Endosulfan sulfate	0.20	U
77-47-4	Hexachlorocyclopentadiene	0.20	U	50-29-3	4,4'-DDT	0.20	U
88-06-2	2,4,6-Trichlorophenol	0.20	U	56-55-3	Benzo(a)anthracene	0.20	U
95-95-4	2,4,5-Trichlorophenol	0.20	U	218-01-9	Chrysene	0.20	U
91-58-7	2-Chloronaphthalene	0.20	U	91-94-1	3,3'-Dichlorobenzidine	0.20	U
88-74-4	2-Nitroaniline	0.20	U	72-43-5	Methoxychlor	0.20	U
131-11-3	Dimethyl phthalate	0.20	U	117-81-7	Bis(2-ethylhexyl) phthalate	0.87	
208-96-8	Acenaphthylene	0.20	U	117-84-0	Di-n-octyl phthalate	0.20	U
606-20-2	2,6-Dinitrotoluene	0.20	U	205-97-2	Benzo(b)fluoranthrene	0.20	U
99-09-2	3-Nitroaniline	0.20	U	207-08-9	Benzo(k)fluoranthrene	0.20	U
63-32-9	Acenaphthene	0.20	U	50-32-8	Benzo(a)pyrene	0.20	U



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	OLY00201A3	Matrix:	Water
Sample ID No.:	119	Sample Vol. (ml)	980
Date Collected:	07/29/02	Final Volume (ml)	2.0
Date Received:	07/31/02	Dilution Factor:	1
Date Extracted:	08/05/02	Analyst:	T. Meadows
Date Analyzed:	08/22/02	Supervisor's Initials:	SL
Date of Report:	08/23/02		
Data File Path:	C:\HPCHEM\1\DATA\SVOA\020822\0901010.D		

CAS#	Name of Compound	Amount (ppb)	Flag	CAS#	Name of Compound	Amount (ppb)	Flag
51-28-5	2,4-Dinitrophenol	0.20	U	193-39-5	Indeno(1,2,3-cd)pyrene	0.20	U
132-64-9	Dibenzofuran	0.20	U	53-70-3	Dibenzo(a,h)anthracene	0.20	U
100-02-7	4-Nitrophenol	0.20	U	91-24-2	Benzo(g,h,i)perylene	0.20	U
	2,3,4,6-Tetrachlorophenol	0.20	U		Carbazole	0.20	U
65-85-0	Benzoic Acid	0.20	U	92-87-5	Benzidine	0.20	U
	Azobenzene	0.20	U				

FLAGS:

- U Indicates compound was analyzed for, but not detected at the specified detection limit.
- B Blank contaminated with this analyte.
- J Estimated value - compound positively identified, but below specified detection limit.
- E Estimated value - compound exceeded calibration range.
- D Compound analyzed at a secondary dilution factor of _____ from data file: _____
- PP Compound Purges Poorly, requiring elevated detection limit.

NOTE: All amounts are in mg/L or mg/KG dry weight.

Tentatively Identified Compounds

<u>R.T.</u>	<u>CAS#</u>	<u>Compound</u>	<u>Rel. Conc.</u>
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The above compounds have been tentatively identified as present. In general, specific identities of isomers of alkanes/alkenes is not possible to resolve.

Surrogate Recoveries	%Rec.	QC limits	
		Water	Soil
2-Fluorophenol	74%	75-125	65-135%
Phenol-d5	66%	75-125	65-135%
Nitrobenzene-d5	107%	75-125	65-135%
2-Fluorobiphenyl	90%	75-125	65-135%
2,4,6-Tribromophenol	108%	75-125	65-135%
p-Tolylphenyl-d14	100%	75-125	65-135%



Aquatic Research Inc.
3927 Aurora Ave. N., Seattle, WA 98103 | (206) 632-2715

SEMI-VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 8270
Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number: **OLY00201A4**
Sample ID No.: **OLY00201A4**
Date Collected: **07/29/02**
Date Received: **07/31/02**
Date Extracted: **08/05/02**
Date Analyzed: **08/22/02**
Date of Report: **08/23/02**
Data File Path: **C:\HPCHEM\1\DATA\SVOA\020822\1001011.D**

Matrix: **Water**
Sample Vol. (ml): **930**
Final Volume (ml): **2.0**
Dilution Factor: **1**

Analyst: **T. Meadows**
Supervisor's Initials: **SL**

CAS#	Name of Compound	Amount (ppb)	Flag
	Nitrosodiethylamine	0.22	U
	Pentachloroethane	0.22	U
62-53-3	Aniline	0.22	U
108-95-2	Phenol	0.22	U
111-44-4	Bis(2-chloroethyl) ether	0.22	U
95-57-8	2-Chlorophenol	0.22	U
541-73-1	1,3-Dichlorobenzene	0.22	U
106-46-7	1,4-Dichlorobenzene	0.22	U
95-50-1	1,2-Dichlorobenzene	0.22	U
100-51-6	Benzyl Alcohol	0.22	U
95-48-7	2-Methyl phenol	0.22	U
108-60-1	Bis(2-chloroisopropyl) ether	0.22	U
	Acetophenone	0.22	U
67-72-1	Pentachloroethane	0.22	U
621-64-7	Nitroso-n-propyl amine	0.22	U
106-44-5	2-Methyl phenol	0.22	U
98-96-3	Toluene	0.22	U
	Nitrosopiperidine	0.22	U
78-59-1	Chloroform	0.22	U
88-76-5	2-Chlorophenol	0.22	U
105-67-9	1,2-Dimethylphenol	0.22	U
111-91-1	Bis(2-chloroethoxy) methane	0.22	U
120-83-2	2,4-Dichlorophenol	0.22	U
120-82-1	1,4-Dichlorobenzene	0.22	U
91-20-3	Phthalene	0.22	U
106-47-8	4-Nitroaniline	0.22	U
87-68-3	1,2-Dichlorobutadiene	0.22	U
	Nitrosodi-n-butylamine	0.22	U
59-50-7	2,4-Dichloro-3-methyl phenol	0.22	U
91-57-6	1-Methyl naphthalene	0.22	U
	1,2,4,5-Tetrachlorobenzene	0.22	U
77-47-4	1,2-Dichlorocyclopentadiene	0.22	U
88-06-2	2,4,6-Trichlorophenol	0.22	U
95-95-4	2,4,6-Trichlorophenol	0.22	U
91-58-7	1-Methylnaphthalene	0.22	U
88-74-4	Aniline	0.22	U
131-11-3	Diethyl phthalate	0.22	U
208-96-8	1,2-Naphthylene	0.22	U
606-20-2	2,4-Dinitrotoluene	0.22	U
99-09-2	Aniline	0.22	U
83-32-9	1,2-Naphthene	0.22	U

CAS#	Name of Compound	Amount (ppb)	Flag
86-73-7	Fluorene	0.22	U
84-66-2	Diethyl phthalate	0.22	U
100-01-6	4-Nitroaniline	0.22	U
121-14+2	2,4-Dinitrotoluene	0.22	U
7005-72-3	4-Chlorophenyl phenyl ether	0.22	U
534-52-1	2-Methyl-4,6-dinitrophenol	0.22	U
	N-Nitrosodiphenyl amine	0.22	U
101-55-3	4-Bromophenyl phenyl ether	0.22	U
319-84-6	a-BHC	0.22	U
118-74-1	Hexachlorobenzene	0.22	U
319-85-7	b-BHC	0.22	U
87-86-5	Pentachlorophenol	0.22	U
58-89-9	g-BHC (Lindane)	0.22	U
85-01-8	Phenanthrene	0.22	U
120-12-7	Anthracene	0.22	U
319-86-8	d-BHC	0.22	U
84-74-2	Di-n-butyl phthalate	0.22	U
76-44-8	Heptachlor	0.22	U
309-00-2	Aldrin	0.22	U
1024-57-3	Heptachlor epoxide	0.22	U
206-44-0	Fluoranthrene	0.22	U
129-00-0	Pyrene	0.22	U
959-98-8	Endosulfan I	0.22	U
72-55-9	4,4'-DDE	0.22	U
60-57-1	Dieldrin	0.22	U
72-20-8	Endrin	0.22	U
33213-65-	Endosulfan II	0.22	U
72-54-8	4,4'-DDD	0.22	U
7421-92-4	Endrin aldehyde	0.22	U
85-68-7	Butyl benzenyl phthalate	0.22	U
1031-07-8	Endosulfan sulfate	0.22	U
50-29-3	4,4'-DDT	0.22	U
56-55-3	Benzo(a)anthracene	0.22	U
218-01-9	Chrysene	0.22	U
91-94-1	3,3'-Dichlorobenzidine	0.22	U
72-43-5	Methoxychlor	0.22	U
117-81-7	Bis(2-ethylhexyl) phthalate	1.08	
117-84-0	Di-n-octyl phthalate	0.22	U
205-97-2	Benzo(b)fluoranthrene	0.22	U
207-08-9	Benzo(k)fluoranthrene	0.22	U
50-32-8	Benzo(a)pyrene	0.22	U



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SEMI-VOLATILE ORGANIC CHEMICAL REPORT

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Measurement of Extractable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Case File Number:	OLY00201A4	Matrix:	Water
Sample ID No.:	None	Sample Vol. (ml)	930
Date Collected:	07/29/02	Final Volume (ml)	2.0
Date Received:	07/31/02	Dilution Factor:	1
Date Extracted:	08/05/02	Analyst:	T. Meadows
Date Analyzed:	08/22/02	Supervisor's Initials:	SL
Date of Report:	08/23/02		
Data File Path:	C:\HPCHEM1\DATA\SVOA\020822\1001011.D		

CAS#	Name of Compound	Amount (ppb)	Flag
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	2,3,4,6-Tetrachlorophenol	0.22	U
65-85-0	Benzolic Acid	0.22	U
	Azobenzene	0.22	U

CAS#	Name of Compound	Amount (ppb)	Flag
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53-70-3	Dibenzo(a,h)anthracene	0.22	U
91-24-2	Benzo(g,h,i)perylene	0.22	U
	Carbazole	0.22	U
92-87-5	Benzidine	0.22	U

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Tentatively Identified Compounds

<u>R.T.</u>	<u>CAS#</u>	<u>Compound</u>	<u>Rel. Conc.</u>
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p-Terphenyl-d14	103%	75-125	65-135%

