YEARS 2004-2005 ANNUAL REPORT FOR THE CITY OF MERCER ISLAND

Water Quality Monitoring in Five Drainage Basins: No. 6, No. 10, No. 26, No. 32, and No. 42

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King County

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Front Cover: Top photo is looking upstream at Site No. 6 from the in-stream sample collection area during the August 24, 2005 macroinvertebrate sampling event. Bottom photo is at Site No. 42 looking downstream to where the drainage enters a detention facility during the August 24, 2005 macroinvertebrate sampling event.

Years 2004-2005 Annual Report for the City of Mercer Island

Water Quality Monitoring in Five Drainage Basins: No. 6, No. 10, No. 26, No. 32, and No. 42

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City of Mercer Island

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Since its inception in 1999, many individuals have contributed their time and talents to this project. Numerous staff members have been involved in sample collection, laboratory analysis, quality assurance and data verification, data analysis, and report review. Program participants and support staff in 2004-2005 included:

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Years 2004-2005 Annual Report for the City of Mercer Island

WATER QUALITY MONITORING IN FIVE DRAINAGE BASINS:

NO. 6, NO. 10, NO. 26, NO. 32, AND NO. 42

EXECUTIVE SUMMARY

As part of the City of Mercer Island's comprehensive stormwater planning and management effort, drainage basin improvement projects have been proposed, and in some cases completed, in several of the City's 54 drainage basins. The focus of these projects is to reduce erosion in steep ravines, to facilitate silt removal, and to minimize water quality degradation in Lake Washington, the receiving waterbody. Enhanced understanding of current water quality conditions supports Mercer Island's forthcoming National Pollutant Discharge Elimination System (NPDES) permit. Since 1999, King County's Water and Land Resources Division (WLRD) has provided technical assistance to evaluate water quality conditions in five basins draining to Lake Washington. Efforts focus on drainages dominated by two commercial centers (No. 10 and No. 32) as well as two other basins with erosive ravines adjacent to residential neighborhoods (No. 6 and No. 26); in addition to a basin that drains Pioneer Park as well as a residential neighborhood (No. 42). This document provides the results of the 2004 and 2005 monitoring efforts and provides a comparison to 2003 results. Stormwater sampling and analysis is continuing in 2006.

In 2004 and 2005, water samples from four storm events each year were collected and analyzed by the King County Environmental Laboratory (KCEL) for conventional parameters, four metals, ten chlorinated herbicides, and seven organophosphate pesticides. In 2005, storm samples were also analyzed for bacteria. Some conventional parameters were also analyzed during a macroinvertebrate sampling event in 2005. Sediment samples were collected once during baseflow conditions in 2004 and 2005 and analyzed for four metals.

In support of the federal Clean Water Act, Mercer Island streams that drain to Lake Washington are expected to meet the Washington State Department of Ecology (WDOE) "AA, Extraordinary" water quality standards (WQS). The 2004–2005 data indicated continuing violations of dissolved oxygen (DO) and temperature WQS, mostly during the warmer months of the year. This was also the case in 2003.

Nutrient levels overlapped with those in five other streams that drain to Lake Washington and are located within basins that have similar urban and suburban land uses. However, the highest levels in the Mercer Island streams generally exceeded the highest levels in the five other streams.

Elevated nutrient levels can indirectly contribute to low DO conditions in a stream or lake by promoting excessive plant growth; when the plants decay, they remove oxygen from the waterbody. Turbid stormflows, which have been quantified in each basin, contribute elevated

levels of sediment and phosphorus to Lake Washington. The source of the sediments is likely erosion within the steep ravines that drain to the lake.

Total suspended solids (TSS) levels ranged widely among basins and between storm events in 2004–2005. Overall, Basin No. 26 experienced the highest TSS levels, sometimes exceeding the 244 mg/L level at which acute effects on aquatic life have been observed, and Basin No. 10 displayed the lowest TSS levels over the course of both years. This pattern is similar to the findings for 2003; however the highest TSS levels in 2004 and 2005 were lower than the highest levels in 2003.

Fecal coliform (FC) bacteria levels exceeded WQS in all basins on all sampling dates. *Escherichia coli (E. coli)* bacteria levels were also high. Possible sources of FC and *E. coli* bacteria in urban stormwater are leaks in the sewer system (e.g., leaky side sewers) and pet or wildlife wastes. Baseflow (dry weather) monitoring may help to differentiate these potential sources; microbial source tracking (e.g., DNA analyses) would pinpoint if the bacteria are from human or animal sources. The City of Mercer Island could then use this information to determine types of corrective actions.

Non-polar oil (NPO) compounds, such as gasoline were detected twice in 2004 and once in 2005. These compounds were detected once in 2003. The Hydrocarbon Identification (HCID) test detected lube oil range hydrocarbons only in Basin 10 in 2004. As was observed in 2003, copper, zinc, and chromium concentrations in storm samples in 2004-2005 were highest in commercial Basins 10 and 32; lead was not detected in any samples. Copper was the only metal that exceeded WQS in 2004–2005; the frequency of exceedance was greater than observed in 2003.

The insecticide diazinon was detected in storm samples in 2003; however it was not detected at any location in 2004–2005. The absence of detectable levels of diazinon in 2004–2005 may be a reflection of the 2003 ban of this active ingredient.

The herbicides 2, 4-D and MCPP were detected in 35% and 15% of the 2004–2005 samples respectively; they were not detected in 2003. Storm samples in all five basins contained 2, 4-D, while MCPP was detected in commercial Basins 10 and 32 and residential Basin 26; none of the detected levels exceeded the available screening thresholds for adverse impacts on aquatic life. It is not unusual to find these herbicides in other urban and suburban small streams (e.g., Little Bear, Lyon, and Swamp Creeks) (King County 2002b).

Sediment metal analysis in 2004–2005 indicated that Basin No. 10 had zinc levels slightly above freshwater sediment guidelines. These data reflect an increase in sediment zinc levels from 2003.

NPO compounds were detected in sediment from all basins in 2004-2005 and in all basins except Basin 26 in 2003. The highest NPO levels were measured in Basin 6 in 2004 and Basin 10 in 2005; these were not basins with the highest levels in storm samples.

Benthic macroinvertebrate data indicates benthic index of biotic integrity (BIBI) scores of 18 to 22 in 2004–2005, reflecting a slight improvement from 2003 when the range was 12 to 22. The improvement may reflect implementation of new stormwater management projects, but could also be due to natural variability.

Water quality concerns on Mercer Island remain complex; however understanding the complexity of these systems is increasing. Detection of water pollutants is not surprising and is typical of built-out urban cities given limited stormwater facilities designed to improve water quality and/or detain stormflows, the automobile usage that accompanies non-industrial, commercial business centers, and the home and yard care activities commonly occurring in residential neighborhoods. Recommendations for improving water quality include source control measures and environmental education to prevent and reduce the discharge of sediments, nutrients, FC and *E. coli* bacteria, copper, zinc, pesticides, and herbicides to Mercer Island streams and ultimately Lake Washington.

LIST OF ACRONYMS

BIBI	benthic index of biotic integrity
cfs	cubic feet per second
CFU	colony forming unit
CSL	cleanup screening level
E. coli	*Escherichia coli*
DO	dissolved oxygen
FC	fecal coliform
HCID	hydrocarbon identification
KCEL	King County Environmental Laboratory
kg dw	kilograms dry weight
MDL	method detection limit
MERC	Mercer Island rain gauge
mg/L	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
NPO	non-polar oil
NTU	nephelometric turbidity unit
OP	ortho-phosphorus
P	Phosphorus
QA/QC	Quality Assurance/Quality Control
RDL	reporting detection limit
SQS	sediment quality standards
STAT	statistical significance
TN	total nitrogen
TP	total phosphorus
TSA	Technical Services Agreement

TSS	total suspended solids
WAC	Washington Administrative Code
WDOE	Washington State Department of Ecology
WLRD	Water and Land Resources Division
WQS	water quality standards
WTPH	water total petroleum hydrocarbons

1.0 INTRODUCTION

The City of Mercer Island has implemented drainage basin improvement projects in several of the City's 54 drainage basins. The focus of these projects, which are part of the City's comprehensive stormwater planning and management effort, is to control erosion in steep ravines, facilitate silt removal, and minimize water quality degradation in Lake Washington, the receiving waterbody.

Another part of the comprehensive stormwater planning and management effort is a comprehensive basin review to identify and characterize drainage system problems based on available records, anecdotal information, and recent Light Distancing and Ranging (LiDAR)-based topographic information. The City began this work in 2005. The second phase, scheduled for completion in 2006, will field verify the extent of problems, identify solutions, and prioritize capital projects identified to address the problems.

Since 1999, the King County Water and Land Resources Division (WLRD) has provided technical assistance to evaluate water quality conditions in select drainage basins. The City's 2004-2005 work with WLRD focused on evaluating stormwater and sediment quality in five basins draining to Lake Washington: basins dominated by two commercial centers (No. 10 and No. 32) as well as three other basins with erosive ravines adjacent to residential neighborhoods (No. 6, No. 26, and No. 42).

This report presents the results of WLRD's efforts for 2004-2005 and provides a comparison to results from 2003. The City is interested in collecting monitoring data for a variety of parameters (Table 1) to support their Phase 2 National Pollutant Discharge Elimination System (NPDES) stormwater permit. WLRD was contracted to monitor these water quality parameters (Table 1) for compliance with state Water Quality Standards (WQS). WQS have not been developed for all parameters evaluated by this effort; as such, these data are compared to sediment and water quality guidelines or literature based values that are available. NPDES permits support the federal Clean Water Act and have included "nonpoint" pollution sources since 1987.

Table 1. Water and Sediment Quality Parameters

Water Quality					Sediment Quality	
Field Parameters	**Conventional/Miscellaneous Parameters**	**Metals (Dissolved)**	**Chlorinated Herbicides**	**Organo-phosphate Pesticides**	**Metals**	**Misc. Parameters**
Temperature	Total phosphorus (TP)	Copper (Cu)	2,4,5-T	Chlorpyrifos	Cu	NPO
Dissolved Oxygen (DO)	Ortho-phosphorus (OP)	Lead (Pb)	2,4,5-TP (Silvex)	Diazinon	Pb	
Conductivity	Total Nitrogen (TN)	Zinc (Zn)	2,4-D	Disulfoton	Zn	
pH	Hardness	Chromium (Cr)	2,4-DB	Malathion	Cr	
Turbidity	Total Suspended Solids (TSS)		Dalapon	Parathion-Ethyl		
	Fecal Coliform		Dicamba	Parathion-Methyl		
	E. coli		Dichloroprop	Phorate		
	Non polar Oil (NPO)		Dinoseb			
	Hydrocarbon Identification		MCPP			
	Benthic Macroinvertebrates		MCPA			

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The goal of WLRD's monitoring and assessment efforts on Mercer Island is to answer the following question:

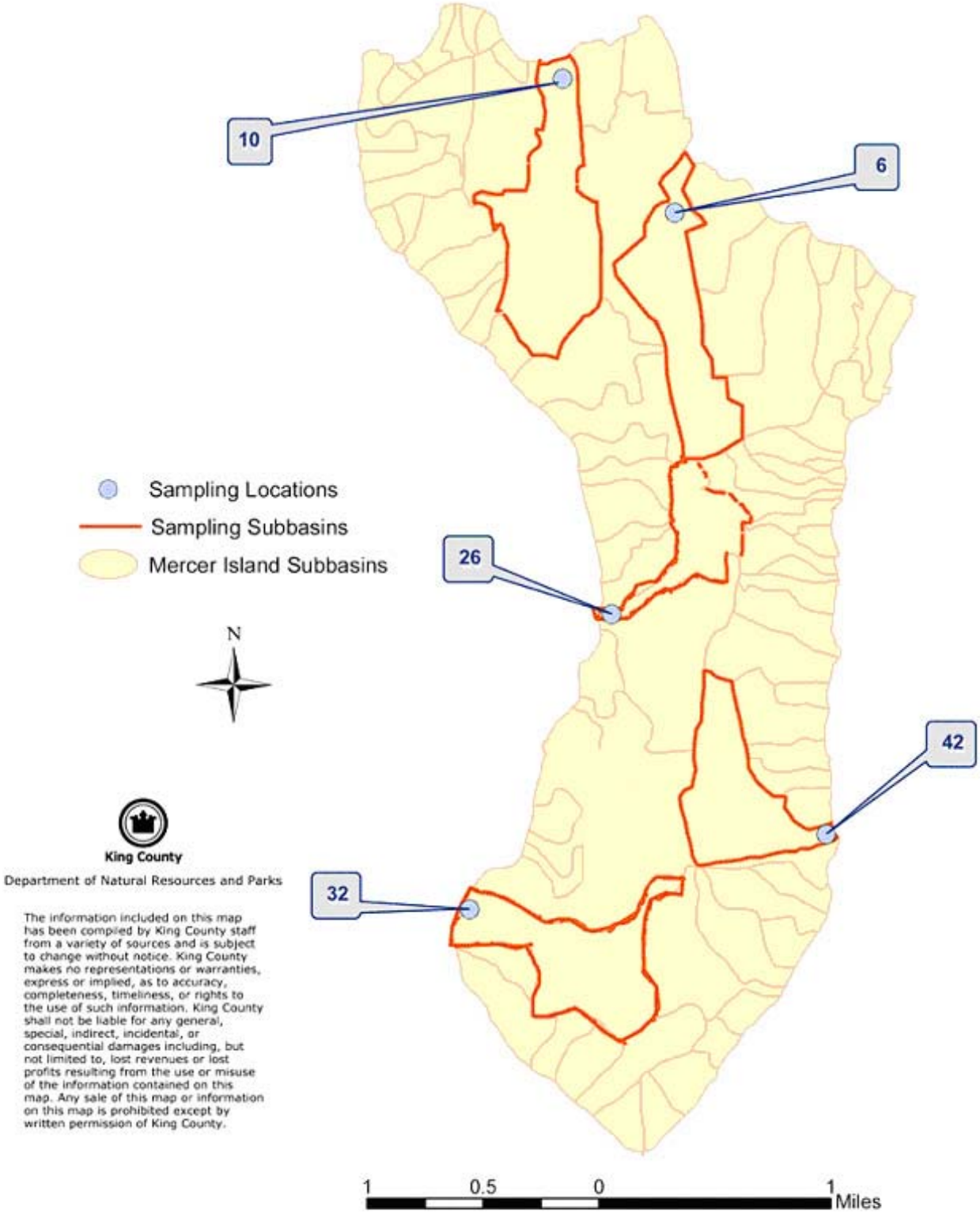
- What is the water and sediment quality within the main watercourses of five select basins, just prior to their draining to Lake Washington?

Another regional policy influencing the City of Mercer Island is the Endangered Species Act (ESA) listing of Puget Sound chinook salmon. As part of the larger Water Resources Inventory Area (WRIA) 8 effort, Mercer Island's impacts on water and sediment quality in Lake Washington become important. While island streams did not historically support chinook salmon, their deltas and beaches do provide spawning areas for beach-spawning sockeye salmon (Mercer Island 1997). On occasion, spawned-out adult chinook have also been found on beaches off the north-end of the Island, and nearshore areas have been found to serve as rearing habitat for juvenile chinook (Hans Berge, WLRD, personal communication, 2002). The information presented in this report relates to salmon recovery efforts because clean water is an important requirement for good spawning and rearing habitat for salmon.

2.0 STUDY AREA

Water and sediment quality were evaluated in five basins selected by the City of Mercer Island (Figure 1). Land use in two of the drainages is dominated by commercial centers – Basin No. 10 on the north-end of the Island and No. 32 in the south-central portion. The three other basins (Nos. 6, 26, and 42) drain erosive ravines adjacent to residential neighborhoods. The main watercourses in each basin are non-salmonid bearing creeks, which are alternately free flowing and tight-lined (channelized in concrete ditches or pipes) as they drain to Lake Washington. Sampling locations were chosen to best characterize stormwater runoff draining to Lake Washington. The following discussion provides a description of the study basins.

Figure 1. 2004-2005 Drainage Basins of Interest



2.1 DRAINAGE BASIN NO. 6

The main watercourse of drainage Basin No. 6 captures flow from neighborhoods consisting primarily of single-family residences and limited higher density housing. The creek flows above ground on the south side of Interstate 90 (I-90) through a portion of Luther Burbank Park, which drains an adjacent ravine. The creek then flows into a catch basin and drops at least 30 feet before traveling under I-90 and draining to the north into Lake Washington. Samples are collected 50 to 60 feet upstream of the pool on the east side of the debris trap, where there is visible flow. Improvements in the lower, forested portion of drainage Basin No. 6 were completed in 1998 and included placement of large woody debris in the channel to form a series of check-dams designed to reduce erosion, capture sediment, and minimize water quality degradation to Lake Washington. The Washington State Department of Transportation (WDOT) has maintained the stormwater detention pond at this site, which also captures sediment and is periodically dredged. Transfer of maintenance responsibilities for this facility from WDOT to the City of Mercer Island occurred in 2002.

2.2 DRAINAGE BASIN NO. 10

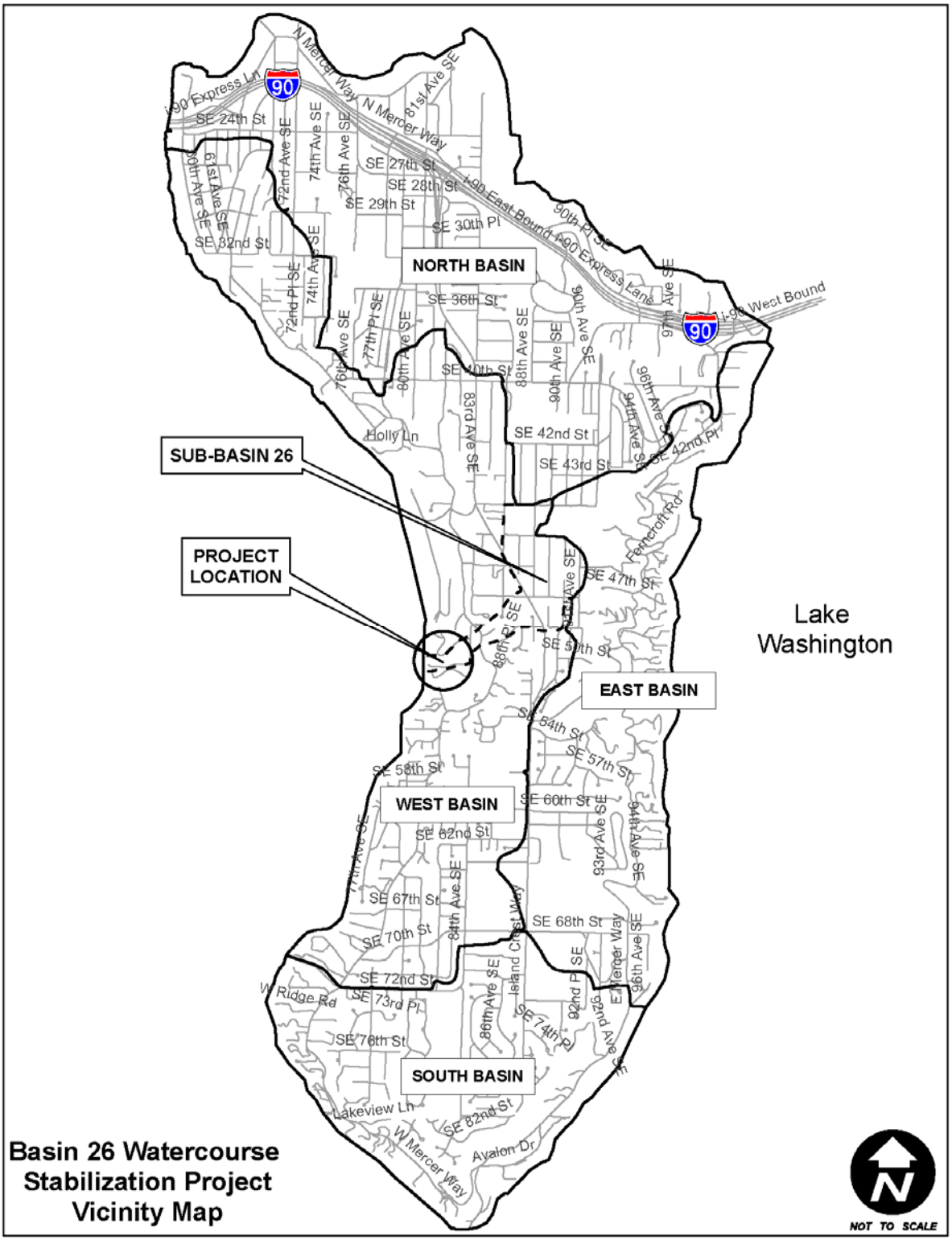
The watercourse within Basin No. 10 drains the majority of Mercer Island's business district as well as several residential neighborhoods. The headwaters flow through three city parks. Samples were collected from the south side of the SE 22nd Street crossing. Downstream from this point, the creek passes through one of two culverts and then flows north in a concrete-lined ditch to Lake Washington. The Basin No. 10 improvement project originally scheduled for mid-1999 was postponed until 2003, due to permit delays. In 2003, the project replaced two smaller culverts under SE 22nd Street with one larger and longer box culvert designed to better route large stormflows under this street and across private properties to the north.

2.3 DRAINAGE BASIN NO. 26

The main watercourse within Basin No. 26 captures flow from neighborhoods consisting primarily of single-family residences. The headwaters include Ellis Pond and its surrounding greenscape. This drainage eventually passes through a steep and confined ravine on its way to Lake Washington. Samples are collected at a public access site at the base of the hill along SE 50th Place just upstream of a wooden footbridge. Automobile parts and wooden fencing litter the creek-bed at this site. In 2002, the channel at this access point was armored using large rocks, likely by a local resident without a permit. After passing under the footbridge, the creek is heavily armored as it passes across one more property before reaching Lake Washington.

Basin improvements were constructed in September and October of 2005. Slopes were stabilized and the channel was widened and raised with stream rock. Native vegetation was planted along the streambank (Figure 2). Additional restoration work is planned in the upper reaches of the basin. The next project under consideration in this basin is located between W. Mercer Way and Island Crest Way.

Figure 2. Basin 26 Vicinity Map



Disclaimer: No warranties of any sort including accuracy, fitness or merchantability accompany this map. Map created 07/28/2005.

2.4 DRAINAGE BASIN NO. 32

The watercourse for Basin No. 32 drains the few commercial businesses located on the south end of Mercer Island. Residential neighborhoods, several schools and playfields, and a series of detention ponds also characterize this drainage. It is one of the largest basins on the island; most of the development occurred in the 1970s and 1980s. Samples are collected at the bottom of Holly Hill Drive on private property adjacent to Lake Washington. The creek flows through a natural stream channel at this point, and the mouth opens into the lake. In 2002, the creek mouth was heavily armored using large rocks; such activity, likely done without a permit by a local resident, diminishes the natural functionality of the stream-lake interface. To avoid collecting samples that are a mix of creek and backwater from the lake, samples are collected about 75 feet upstream from the mouth.

2.5 DRAINAGE BASIN NO. 42

Basin No. 42 drains the southeastern end of Mercer Island. The basin headwaters originate in Pioneer Park and adjacent residential neighborhoods. Erosive ravines are present. Overall, this basin has more open space than the other study basins. The City of Mercer Island maintains a stormwater detention pond and catch basin in this basin. After water passes through the detention facility, the flow is tight-lined to Lake Washington. Water samples are collected downstream of Pioneer Park and approximately 10 feet upstream of the stormwater detention facility. Access to the site is at the end of a private driveway shared by multiple properties. Sediment samples are collected in the detention pond

3.0 METHODS

King County's monitoring strategy for these drainage basins was developed to monitor water quality, evaluate issues of sediment transport and erosion control, and advise Mercer Island about potential water quality degradation. Samples are collected from each creek at the most downstream point before water enters the final tight-line to the lake. The creek in Basin No. 32 is the only one that flows into Lake Washington via a streambed possessing a true "mouth." Annual collection of sediment samples for chemical analyses enhances overall basin assessment by evaluating specific metals present in the streambeds that may potentially be re-suspended and delivered to Lake Washington. The following provides an overview of sampling methods used in this project.

3.1 STORM SAMPLING

The monitoring program is designed to evaluate potential impacts of stormwater, erosion, and sedimentation on water quality and system integrity. Therefore, sampling and analysis efforts are focused on storm events that are most likely to result in transport of urban stormwater and sediment. Storm sampling criteria were derived from the former King County Storm Watcher Program (King County 1995) and are based on precipitation amounts over a given time period and antecedent dry conditions. Ideally, samples are collected after storms deliver precipitation of the intensities listed in Table 2.

Table 2. Precipitation Intensity Triggers

Time Period	Precipitation Amount
6 hours	0.25 to 0.5 inch
12 hours	0.5 to 0.75 inch
24 hours	1.0 inch or greater

Dry antecedent moisture conditions are also important. Field staff from WLRD aim to collect samples following a three-day pre-storm period with an overall rainfall of 0.25 inch or less. Because antecedent dry conditions are often difficult to meet, it was deemed satisfactory to collect water samples under ideal conditions at a minimum of one event each spring and fall. Pollutant loads are typically greatest when storm flows are rising. Therefore, sampling efforts aim to collect samples from the rising limb of the hydrograph, and as near as possible to the stream's crest stage for the storm. Given both the flashy characteristics of the drainage systems and the highly residential nature of some of the sampling sites, it is not always feasible to collect samples on the rising limb of an event because this can occur quite rapidly or in the middle of the night.

3.1.1 Precipitation Measurements

Precipitation data is collected using a continuous recording tipping bucket rain gauge with an attached data logger recording in 0.01-inch increments at 5-minute intervals. The precipitation gauge is located in the May Creek Basin approximately 3.8 miles from the study area. The Mercer Island rain gauge MERC, located at the Mercer Island school district administrative offices, was also used for storm event evaluations and comparisons in 2005. Detailed records allow King County to report precipitation amounts as follows:

- The 24 hour storm period prior to sampling initiation (or 6 hours or 12 hours),
- During the sampling event, and
- During the three day, pre-storm, antecedent conditions.

3.1.2 Discharge Measurements

During the 2004 sampling events, the volume of water flowing through each basin during a sampling event was estimated using a simple float (Michaud 1991). The average channel width and depth were estimated based on a series of representative measurements and the time it took a simple float to travel a known distance was determined and recorded. This velocity measurement was repeated three times. Since surface water velocity is greater than the average rate of flow for the cross-section, the average surface velocity was multiplied by 0.85 to derive the mid-depth velocity. Discharge (cubic feet per second [cfs]) is the product of average width (ft), multiplied by average depth (ft), and multiplied by the mid-depth velocity (ft/s). During the sampling events in 2005, discharge was estimated with a hand-held Swoffer flow meter.

3.2 WATER AND SEDIMENT QUALITY SAMPLING

Several types of physical, chemical, and biological data were collected and analyzed to evaluate water and sediment quality in each basin (Table 1). The following provides an overview of the sampling and analysis efforts that were carried out in 2004 and 2005.

3.2.1 Field Parameters

Six field parameters were routinely collected (Table 1). A YSI Model 85 meter was used to monitor temperature, conductivity, and DO. A pH Tester 2 instrument and the Hach 2100P turbidity meter were also employed in the field. Water quality field parameters are monitored from the thalwegs of the main watercourses in each basin (King County 2005b).

3.2.2 Laboratory Parameters

Both water and sediment samples were collected according to Quality Assurance/Quality Control (QA/QC) protocols provided by the KCEL (King County 2005b). Specific sample collection techniques vary by parameter. As outlined in Table 1, multiple laboratory parameters were analyzed (King County 2004a). All water and sediment quality samples were processed by KCEL except chlorinated herbicides which were sent to a contract laboratory.

One field replicate sample was collected from Basin 42 during each storm event for QA/QC analysis (Table 3). A replicate sediment sample was also collected from Basin 42.

Table 3. Sampling Dates and Sample Types Collected in 2004[2]

Year 2004					
Sampling Date	**25 Mar**	**27 May**	**22 Sept**	**2 Nov**	**8 Dec**
Storm (S) and Event No. [1] or Non-storm (N)	S, No.17	S, No. 18	N	S, No.19	S, No. 20
Field Parameters Collected	X	X	X	X	X
Water Samples to Lab	X	X		X	X
Sediment Metal Analysis			X		
Field Replicate Location	10	6	26	42	32

[1] Numbering of storm sampling events began in 1999 at the outset of the Mercer Island stormwater monitoring project.

[2] Macroinvertebrate sampling was not conducted in 2004

Table 4. Sampling Dates and Sample Types Collected in 2005

Year 2005					
Sampling Date	**26 Mar**	**10 May**	**9 Sept**	**3 Nov**	**22 Dec**
Storm (S) and Event No. or Non-storm (N)	S, No. 21	S, No. 22	N	S, No. 23	S, No. 24
Field Parameters Collected	X	X	X	X	X
Water Samples to Lab	X	X		X	X
Sediment Metal Analysis			X		
Macroinvertebrate Samples[1]					
Field Replicate Location	42	42	42	42	42

[1] Collected on August 24 from Basins 6 and 42, and on September 12 from Basin 10

3.2.3 Macroinvertebrate Sampling

Macroinvertebrate samples were collected from Basins 6 and 42 under summer low flow conditions on August 24, 2005. The flows in Basins 10, 26, and 32 were too low at this time to allow for sample collection. However, field parameters (temperature, DO, pH, and conductivity) were measured at each site. On September 12, 2005, macroinvertebrate samples were collected from Basin 10. The flows in Basins 26 and 32 were still too low to allow for proper sample collection at this time. Macroinvertebrate sampling was not conducted in 2004.

Macroinvertebrate sampling followed standardized King County protocols, which require a minimum of one-inch of water to pass through the Surber sampler (King County 1999). Samples are collected from three riffles and combined into one composite sample per site. Taxonomic analyses were conducted by ABR, Inc. in Forest Grove, Oregon. The 2005 results are tabulated and a Benthic Index of Biotic Integrity (BIBI) score is calculated (Appendix D, Karr and Chu 1999; Fore et al. 1996).

4.0 RESULTS

In 2004-2005, water, sediment, and macroinvertebrate samples were collected during 12 sampling events from the five basins (Tables 3–4). Sampling covered eight storm events, two annual sediment sampling efforts, and two macroinvertebrate sampling efforts (2005 only). The following discussion provides the result of these sampling efforts.

4.1 PRECIPITATION AND SAMPLING EVENT ANALYSIS

Sediment and pollutant loads are generally higher during stormflow conditions than under baseflow conditions. Storm grab samples are collected when elevated contaminant concentrations are anticipated to move through the system and therefore provide a snapshot of worst-case conditions. Precipitation data are used to evaluate how well pre-storm, dry antecedent conditions were met, and to document storm intensity for up to 24 hours prior to sampling and the timing of sample collection relative to the storm event. Without more targeted stream gauging activities, it is unknown whether samples were collected on the rising or falling limb of a hydrograph. As previously indicated, the May Creek rain-gauge 37U was used for

storm event evaluations and comparisons. The Mercer Island rain-gauge MERC, located at the Mercer Island school district administrative offices, was also used for storm event evaluations and comparisons in 2005. Table 5 summarizes precipitation conditions associated with each sampling event.

Table 5. Precipitation Conditions Associated with Each Storm Sample Event.

Storm Event	Antecedent Conditions Met?	Antecedent Rainfall	Weather During Sample Collection
25 Mar. 2004	Yes	0.14″ previous 3 days	Light rain
27 May 2004	Yes	0.19″ previous 3 days; 1.0″ 24 hr prior to sampling	Light Rain
02 Nov. 2004	Yes	Storm triggered 6 hr (1.21″), 12 hr (1.30″), and 24 hr (1.54″) criteria	0.24″ during sample collection
08 Dec. 2004	No	0.53″ preceding 3 days; sampling triggered by 6 hr (0.57″) and 12 hr (0.59″) criteria.	0.31″ during sample collection
26 Mar. 2005	Yes	No rainfall previous 3 days	Light Rain
10 May 2005	Yes	Storm triggered 6 hr (0.58″), 12 hr (1.04″), and 24 hr (1.12″) criteria	0.13″ during sample collection
03 Nov. 2005	No	1.9″ preceding 3 days; sampling triggered by 1.0″ during 24 hr period.	No rain
22 Dec. 2005	No	0.37″ preceding 3 days; sampling triggered by sufficient rainfall during 24 hr period.	0.07″ during sample collection

4.2 BASIN DISCHARGES DURING SAMPLE COLLECTION

Discharge measurements indicate water volume flowing through each site at sample collection (Figure 3). These point discharge measurements, however, do not capture flow fluctuations that occur as a storm pulse passes. Installation of recording gauges and data loggers at each site would be necessary for continuous monitoring and assessment of flashy urban stream hydrographs. However, some site characteristics (i.e., backwatering, discharge to a floodplain) compromise the ability to measure discharge using this type of assessment.

Flow in Basins 26, 32 and 42 were generally less than 4 cfs during all storm sampling events; higher flows (4–18 cfs) were periodically observed in Basins 6 and 10. Land use in Basins 6 and 10 is primarily commercial. In 2003, the highest discharge (34.3 cfs) in all basins occurred during the November 18 storm.

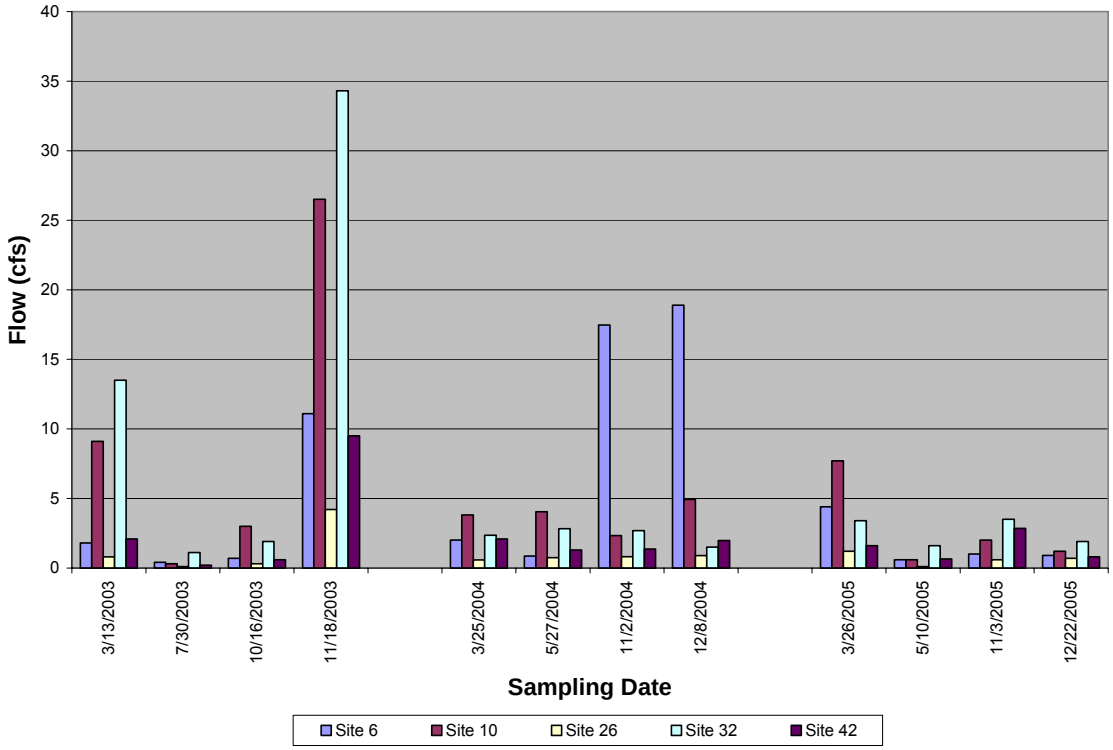


Figure 3. Stream Discharge During Sampling in 2003-2005

4.3 WATER QUALITY FIELD PARAMETERS

State WQS have been established for all surface waters in Washington. Lakes, rivers, and streams are currently rated in one of the five following classes: Lake Class; Class AA–Extraordinary; Class A–Excellent; Class B–Good; and Class C–Fair. For some parameters, different WQS apply to the different classes as set forth by Chapter 173-201A Washington Administrative Code (WAC). According to these regulations, “all lakes and their feeder streams within the state are classified Lake Class and Class AA respectively, except for those feeder streams specifically classified otherwise.” Thus, Mercer Island basins that drain into Lake Washington are rated as Class AA-Extraordinary; and the most stringent WQS apply to them. Class AA WQS exist for field-measured parameters such as temperature, DO, pH, turbidity, and fecal coliform bacteria.

In 2003, the WDOE began the first major revision of some of Washington’s WQS in a decade; however, the process is not yet completed. Therefore, the King County project manager was advised to use the 1997 WQS to evaluate the 2004 and 2005 water quality data (Mark Hicks, WDOE, Personal Communication, January 25, 2006). Replicate measurements of a given parameter at a given site were averaged.

4.3.1 Temperature

The Class AA WQS for temperature is 16°C (WAC 173-201A). The temperature WQS was exceeded during two sampling events on the warmest sampling dates in 2004 and 2005 (May 27, 2004 – 16.2ºC and August 24, 2005 – 16.5ºC). The temperature WQS was met at all other sites during all sampling events. In 2003, the temperature exceeded 16°C at all sampling sites on the warmest (July 30) sampling date.

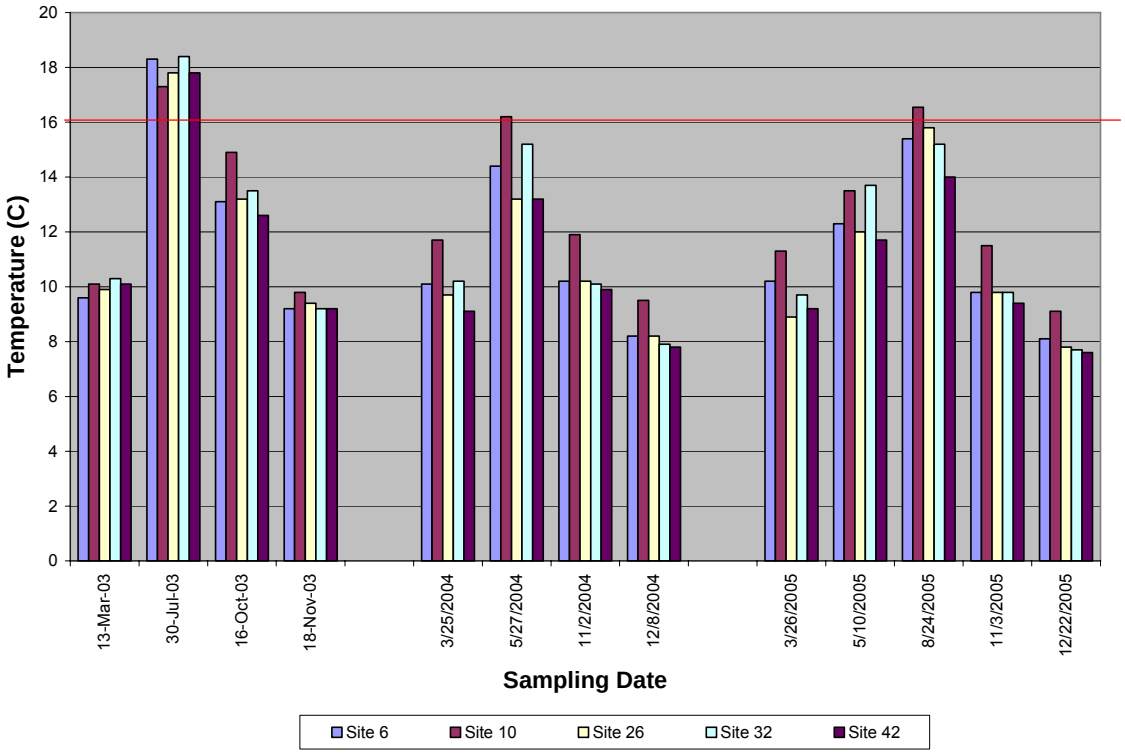


Figure 4. Water Temperature (ºC) by Basin in 2003-2005 (Red line indicates State WQS).

4.3.2 Dissolved Oxygen

The State's Class AA WQS for DO is 9.5 mg/L. DO was measured in the field as mg/L. As indicated in Figure 5, DO levels frequently violated the State WQS; at least one basin had a DO level that violated WQS during all but two sampling events (5/27/04 and 8/24/05). Reduced DO levels during the warmer months when flows are lower and temperatures are higher are somewhat common in some urban streams in the Puget Sound region; however, a number of sites violated the WQS in the cooler months. The lowest DO levels for the two-year sampling period were measured in Basins 6 and 10 on November 2, 2004. Field observations indicate that the water at the Basin 6 site was the color of coffee with cream. The water at the Basin 10 site was gray, with an oil sheen and the odor of petroleum. These findings suggest that pollutants with a high biological oxygen demand or high chemical oxygen demand may have been discharged on that date.

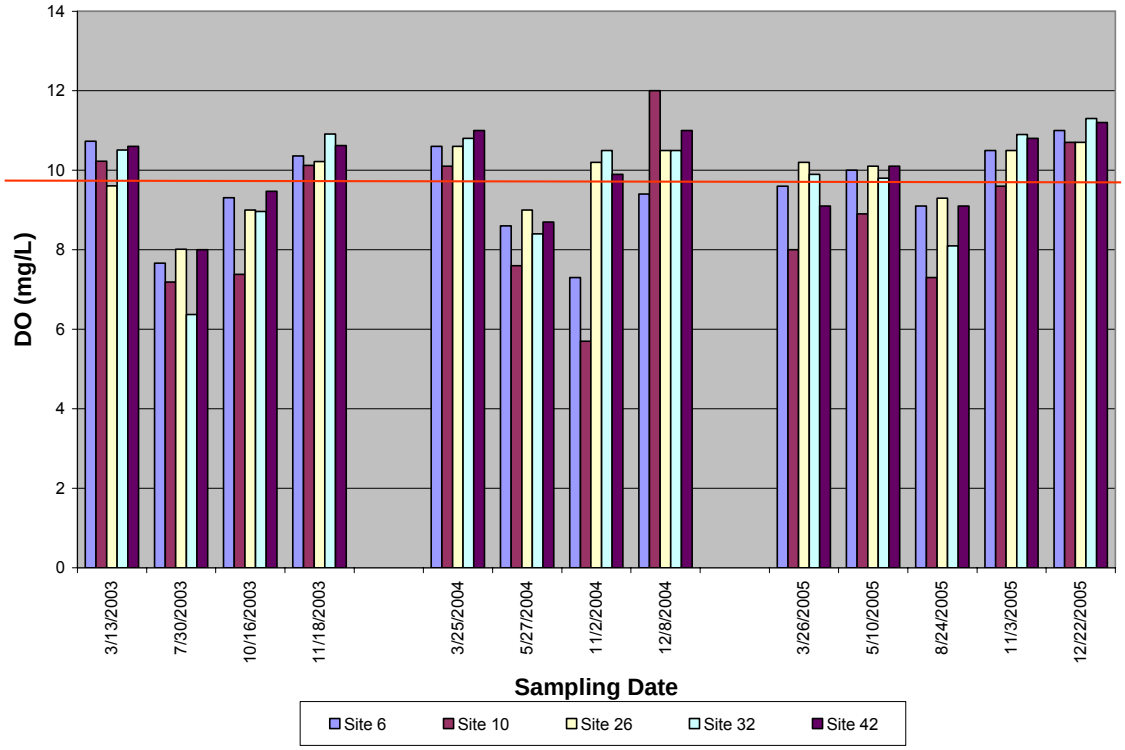


Figure 5. Dissolved Oxygen (mg/L) by Basin in 2003-2005 (Red line indicates State WQS; the sampling events on July 30, 2003 and August 24, 2005 were not storm events.)

Table 6 presents a cross-basin comparison for 2003-2005. Basin 10 had the lowest mean DO of all the basins in 2003, 2004, and 2005.

Table 6. Mean and Range of DO (mg/L) for Storm Events

	Mean 2003	Mean 2004	Mean 2005	Range 2003	Range 2004	Range 2005
6	9.52	8.98	10.28	7.6-10.7	7.3-10.6	9.1-11
10	8.73	8.85	9.3	7.2-10.2	5.7-12.0	7.3-10.7
26	9.21	10.08	10.38	8.0-10.2	9-10.6	9.3-10.7
32	9.19	10.05	10.48	6.4-10.9	8.4-10.8	8.1-11.3
42	9.67	10.15	10.3	8.0-10.6	8.7-11.0	9.1-11.2

Table 7 summarizes the frequency of exceedance of the DO WQS in 2004–2005 (stormwater events and the baseline monitoring event on August 24, 2005).

Table 7. DO (mg/L) compared to WQS in 2003 and 2004-2005

Basin No.	Samples NOT meeting WQS 2004-2005[1]	% Samples NOT meeting WQS 2004-2005[1]	Samples NOT meeting WQS 2003[2]	% Samples NOT meeting WQS 2003[2]
6	4	44.4	2	50
10	5	55.6	2	50
26	2	22.2	3	75
32	3	33.3	2	50
42	3	33.3	2	50

[1] Based on 9 samples
[2] Based on 4 samples

Overall, Basin 10, draining the most commercial portions of Mercer Island, most frequently violated the DO WQS in 2004–2005. Basin 26 met the DO standard most frequently. However, in 2003, Basin 26 most frequently violated the DO WQS.

4.3.3 pH

The pH can influence the solubility and biological availability of chemical constituents such as nutrients and metals. The pH scale ranges from 0 to 14. A pH of 7 is considered to be neutral. Substances with pH less than 7 are acidic, while substances with pH greater than 7 are basic (alkaline). Low pH can increase the solubility of some metals in water.

pH levels for all storms and all sites in 2004–2005 were within the WQS of 6.5 to 8.5 (Figure 6); pH has not previously been exceeded in these study basins from 1999 through 2003 (King County 2004b, King County 2002a).

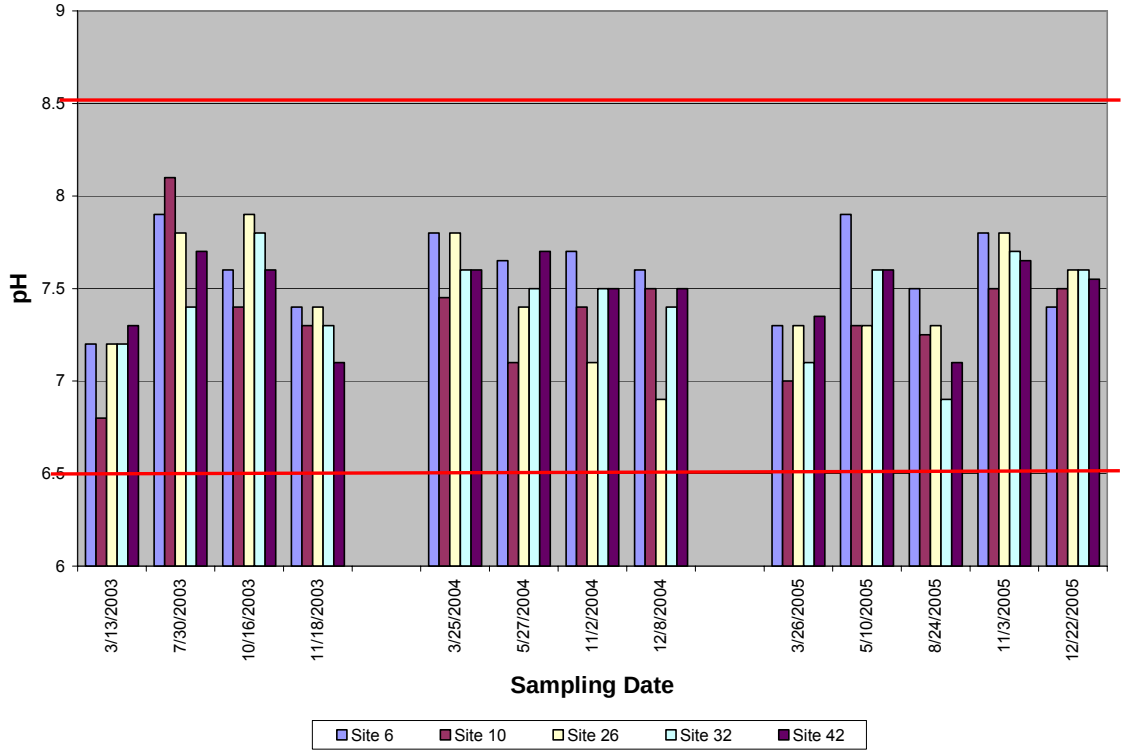


Figure 6. pH by Basin in 2003-2005 (Red lines indicates the WQS for pH of 6.5 to 8.5.)

4.3.4 Conductivity

Conductivity measures the amount of total dissolved inorganic substances in a waterbody and is standardized to 25°C (77°F). Most dissolved inorganic substances in water are present in an ionized form and contribute to the system's conductivity. Sources of dissolved ions include soil and rocks in the watershed, wastewater effluent, urban runoff, and agricultural runoff.

WQS have not been developed for conductivity. In 2005, conductivity was highest at all sites on May 10 and August 24 and lowest on March 26 (Figure 7). During summer low-flow conditions, there is generally a corresponding increase in ionic concentration and, hence, conductivity. The situation is reversed during high flow condition in the late fall, winter, and early spring months; there is a corresponding decrease in ionic concentration and, hence, conductivity.

The biological implications of alterations in conductivity remain unclear, but the literature suggests this parameter is linked to urbanization (May et al. 1997, Avolio 2003). Elevated conductivity levels can be an indicator of possible pollution sources; industrial discharges and road salt can raise conductivity. A sudden change in conductivity can indicate a direct discharge or other source of pollution entering the waterbody. High conductivity associated with a pollution source suggests the pollutant is in an ionic form.

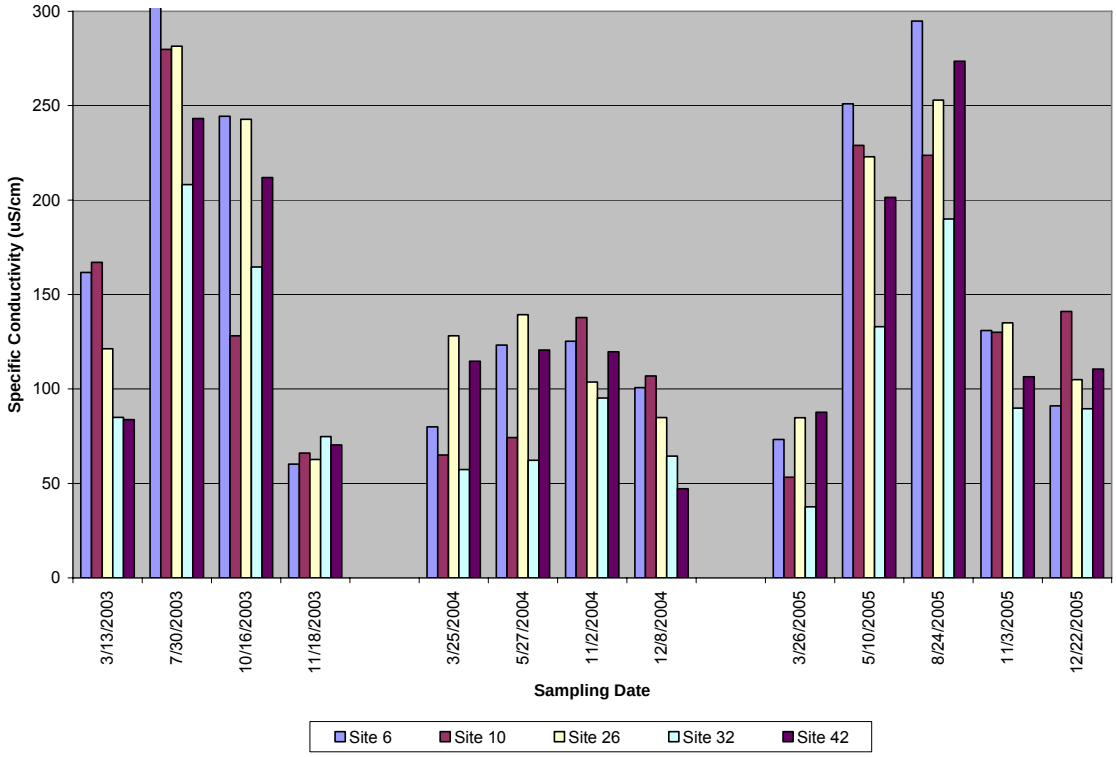


Figure 7. Conductivity (µS/cm) by Basin in 2003-2005

4.3.5 Turbidity

"Turbidity is a measure of the degree to which light is scattered by suspended particulate material and soluble colored compounds in the water. It provides an estimate of the muddiness or cloudiness of the water due to clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, plankton, and microscopic organisms" (Water on the Web 2002). Turbidity is measured in terms of nephelometric turbidity units (NTU), which refers to the type of instrument (nephelometer) used to estimate light scatter in the water column.

Washington's turbidity WQS is primarily used for assessing impacts of point discharges. When using turbidity to evaluate the impact of a pollutant source, two measurements are usually made – one upstream of a discharge point (background levels) and another downstream. The WQS requires that "turbidity shall not exceed 5 NTU over background turbidity when background turbidity is 50 NTU or less, or have more than a 10 percent increase in turbidity when the background turbidity is more than 50 NTU" (WAC 173-201A). For the Mercer Island stormwater monitoring program, designed to assess overall stormwater quality, measurements were made at only one point in a basin; therefore the WQS cannot be applied to the data presented here.

Turbidity levels ranged widely between sites and storm events in 2004–2005 (Figure 8). Basin No. 26 displayed the highest turbidity on all sampling dates except for December 8, 2004 when Basin No. 42 had the highest turbidity. In 2003, none of the stormwater samples from these two basins met the turbidity WQS (King County 2005c).

In 2003, Basin No. 26 displayed the highest overall turbidity. Turbidity for the sampling period through 2005 indicates that Basin No. 26 appears to routinely deliver significant pulses of turbid water to Lake Washington.

Overall, turbidity in stormwater in 2004–2005 was lower than that observed in 2003. The highest turbidity values were 352 NTU on December 8, 2004 and 421 NTU on March 26, 2005. By contrast, the highest turbidity value in 2003 was 1,200 NTU on November 18.

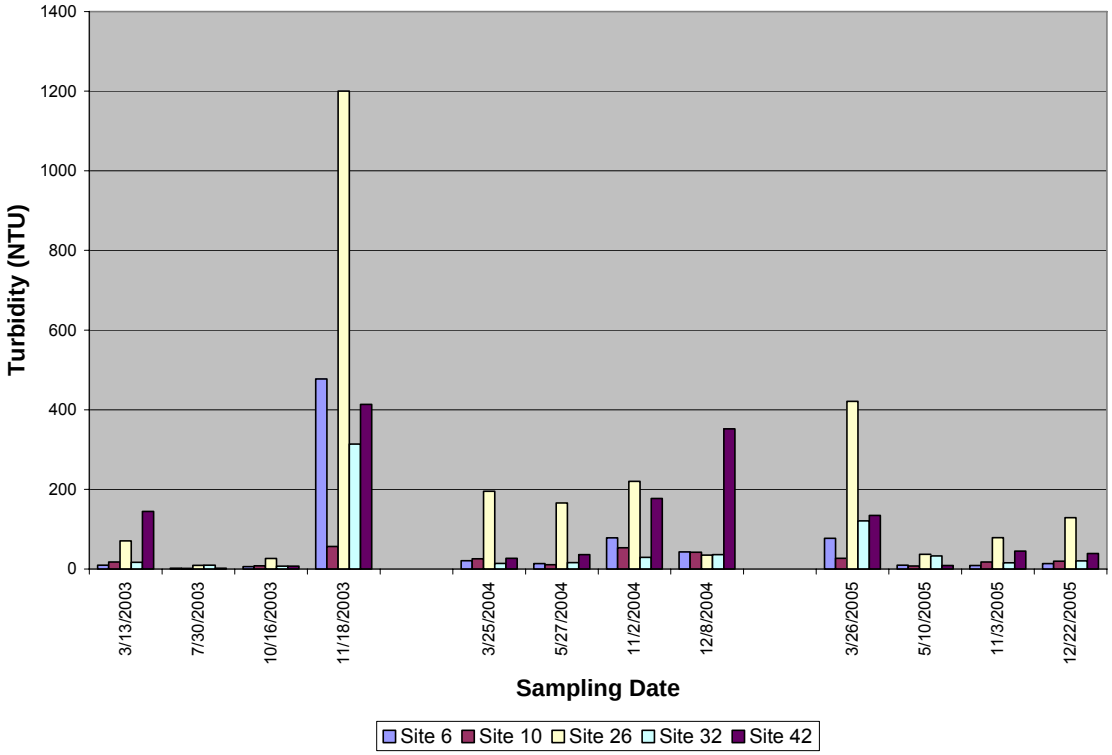


Figure 8. Turbidity (NTU) by Basin in 2003-2005

4.4 WATER QUALITY LABORATORY PARAMETERS

State WQS have been established for all surface waters in Washington and applied as set forth by WAC 173-201A. Standards for some metals are based on site-specific hardness concentration, but do not vary by the state's waterbody classification. State WQS are not available for every parameter measured. In such instances, literature-based screening thresholds are used to interpret the data. There are no criteria or appropriate guidelines for nutrients; as such these values are compared to nutrient levels in other streams that drain to Lake Washington to provide some level perspective.

Grab samples, collected during storm events, only represent a spatial and temporal snapshot of water quality and do not fully capture dynamic pollutant loads transported by storm pulses. Only acute WQS are applied to grab samples, with the limiting, conservative assumption that these samples represent the highest concentration of a given parameter; chronic WQS are not appropriate to evaluate grab samples. However, exceedances of chronic WQS which are

based on longer-term exposures (more than 24 hours) can be used to indicate potential risk to freshwater systems and suggest parameters for more focused evaluation.

All laboratory samples were processed by the KCEL or a certified laboratory contracted by KCEL. Laboratory results from the KCEL may be "qualified" by the MDL or the reporting detection limit (RDL). Values less than the MDL indicate a parameter is not present in the sample above this level. Values greater than the MDL, but less than the RDL indicate confidence that the parameter is present but at low enough levels to decrease reliability of the numerical result (King County 2004a). Values greater than the RDL are considered reliable after undergoing laboratory QA/QC. Where metal levels were below the MDLs, the MDL was conservatively assumed as the estimated concentration. A complete listing of MDLs accompanies each laboratory report in Appendix D. Duplicate measurements of a given parameter at a given site were averaged to obtain the reported measurement.

4.4.1 Total Suspended Solids

Total suspended solids (TSS) represent a physical measure of particle concentration within the water column. This measurement becomes important when trying to calculate total quantities of material in a stream or when trying to determine the loading of particulate matter into receiving waters. There are no state WQS or federal WQC for TSS. However, many species of fish are sensitive to elevated TSS; effects are associated with the physical stress of exposure. Acute effects on aquatic life have been observed when TSS levels exceed 244 mg/L (Newcombe and MacDonald 1991).

TSS levels ranged widely among basins and between storm events in 2004–2005 (Figure 9). Overall, Basin No. 26 experienced the highest TSS levels (similar to comparative turbidity findings) and Basin No. 10 displayed the lowest TSS levels over the course of both years. This pattern is similar to the findings for 2003; however the highest TSS levels in 2004 and 2005 were lower than the highest levels in 2003.

TSS levels exceeded 244 mg/L in Basins 26 and 42 on November 2, 2004, in Basin 42 on December 8, 2004, and in Basins 6 and 26 on March 26, 2005. It is possible that the steep, erosive ravines in Basins 6, 26, and 42 are a source of these elevated TSS readings.

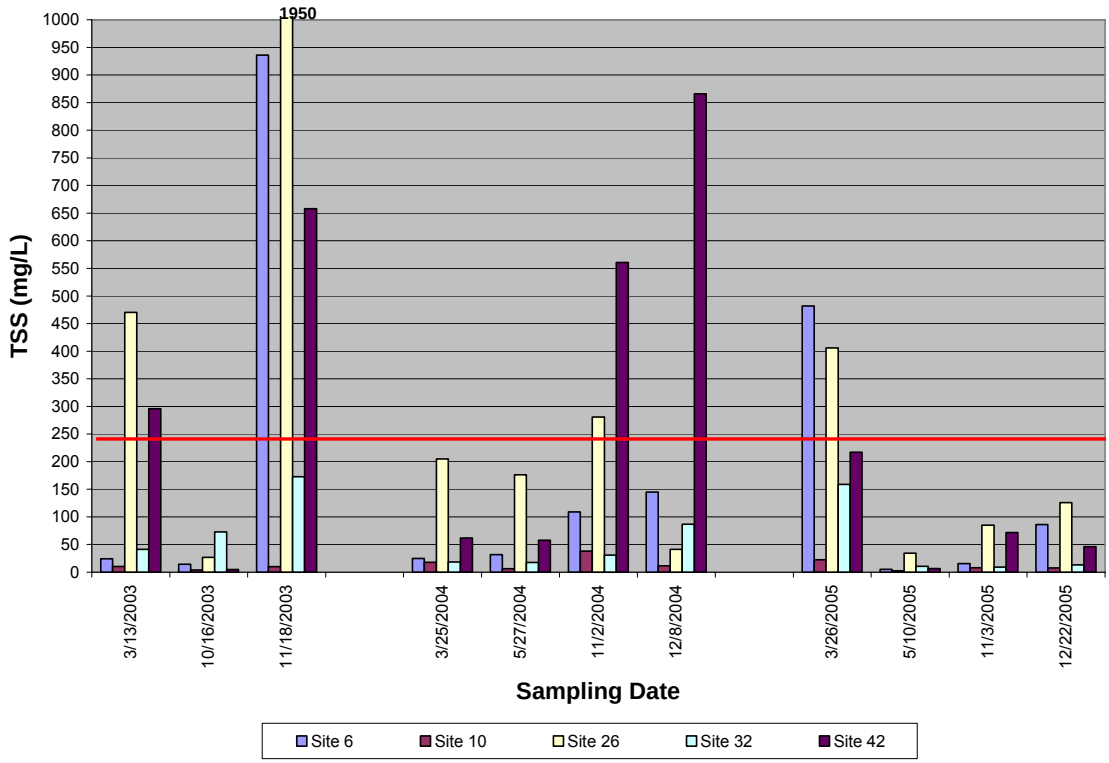


Figure 9. Total Suspended Solids (mg/L) by Basin in 2003-2005 (Red line indicates literature-based effects threshold of 244 mg/L).

4.4.2 Total Nitrogen (TN)

Phosphorus is the limiting nutrient in Lake Washington, as such; it is not as sensitive to nitrogen inputs as it would be to phosphorus loading. Common sources of total nitrogen (TN) in urban watersheds include fertilizers from lawn runoff as well as animal waste.

TN levels in 2004 ranged from 0.565 mg/L in Basin 6 on March 25 to 2.75 mg/L in Basin 42 on December 8. TN levels in 2005 (0.639 mg/L to 1.58 mg/L) and in 2003 (1.11 mg/L to 2.17 mg/L) were in the middle of the range observed in 2004.

TN levels in the five Mercer Island basins were compared to those in five other streams that discharge to Lake Washington and have similar land uses in their drainage basins (King County 2005a). These streams and the range of TN levels for each were:

- Fairweather Creek, 1.34–2.71 mg/L.
- Forbes Creek, 0.61–1.03 mg/L.
- Juanita Creek, 0.96–1.76 mg/L.
- Kelsey Creek, 0.62–1.11 mg/L.
- Lyon Creek, 1.1–1.59 mg/L.

TN levels in the Mercer Island streams were generally in the same range as concentrations observed in these other urban and suburban streams; the one exception is that the lowest value in 2004 was lower than the range of TN levels reported in the other streams.

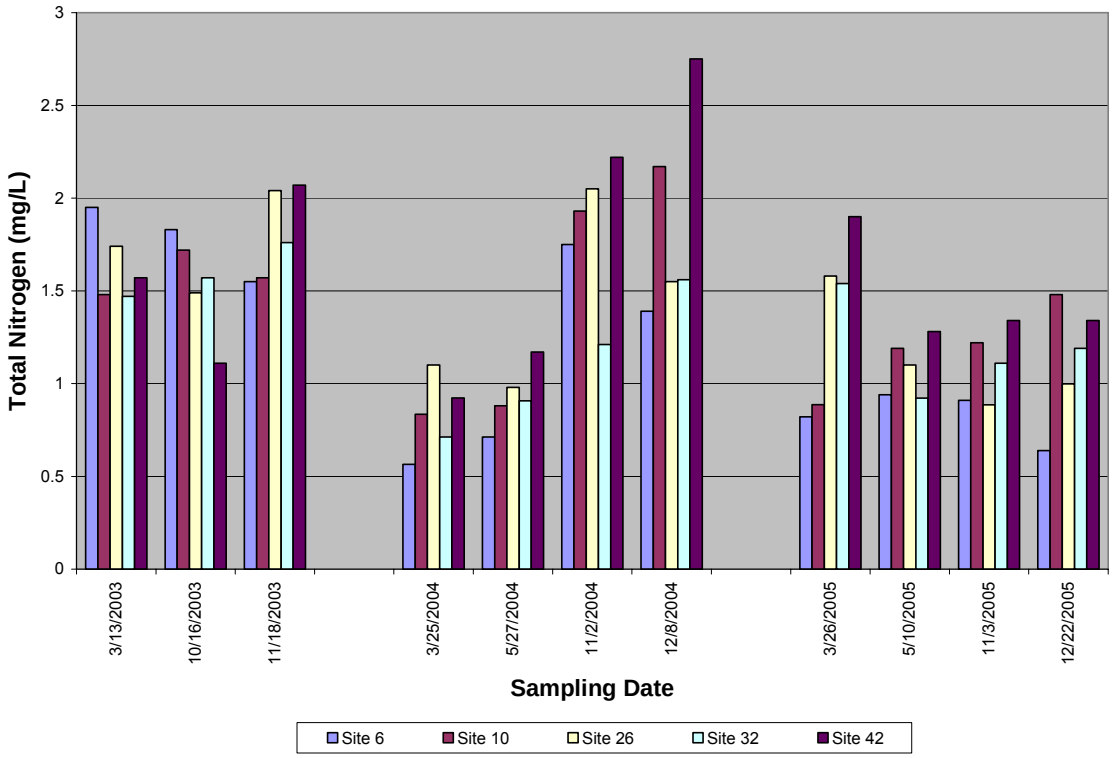


Figure 10. Total Nitrogen (mg/L) by Basin in 2003-2005

4.4.3 Phosphorus (Total Phosphorus, Ortho-phosphorus)

Phosphorus (P) is found naturally in plants, animal tissues, and soil; eroding soils and decomposing vegetation contribute phosphorus to terrestrial and aquatic ecosystems. In general, elevated phosphorus levels are linked to human activities such as poor landscape practices (phosphorus is a common fertilizer component) and animal management practices or failing septic systems. Most phosphorus reaches receiving waters during storm events and is associated with particulate material. Once phosphorus enters a waterbody, it can be recycled via plant growth and decay and release from sediments. Elevated phosphorus conditions can lead to nutrient enrichment and increased biological activity (i.e., algal blooms). In extreme cases, this can lead to oxygen depletion and system-wide eutrophication. Phosphorus is the limiting nutrient in Lake Washington and therefore the nutrient of primary concern.

Two forms of phosphorus were measured in this monitoring program: total phosphorus (TP) and ortho-phosphorus (OP). TP includes particulate phosphorus and OP. OP is dissolved phosphorus that is present in a biologically available form. Figures 11a–11e present OP concentrations as a fraction of TP concentrations by basin in 2003-2005. Table 8 indicates the percentage of OP in each basin in 2003–2005. The highest percent of OP was typically found in Basin 10 on most sampling dates in 2004–2005 (range 48.7% to 69.0%), suggesting that a

larger fraction of OP is discharged to Lake Washington from this basin than other basins. This was the case in 2003 as well.

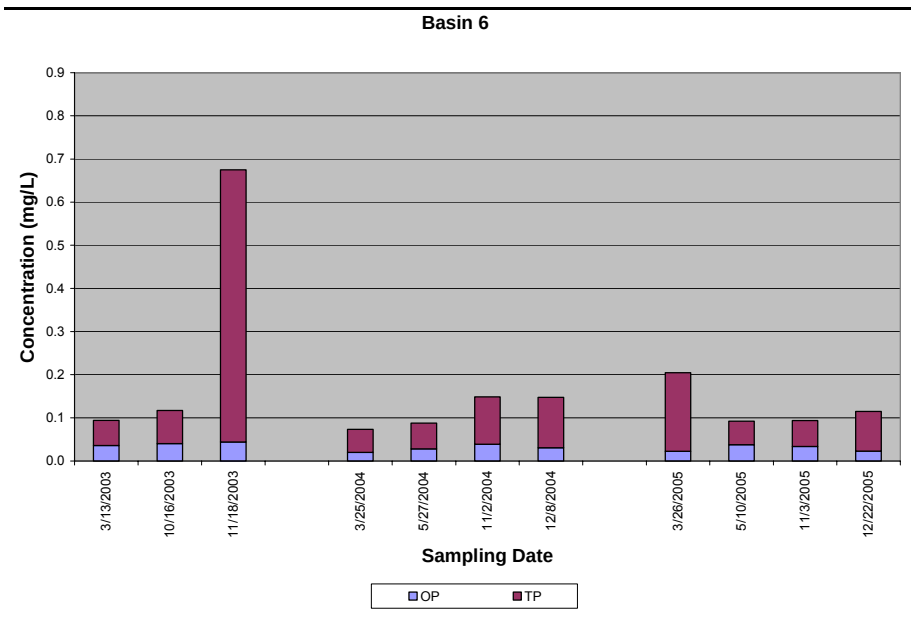


Figure 11a. OP as Fraction of TP (mg/L) in Basin 6 in 2003-2005

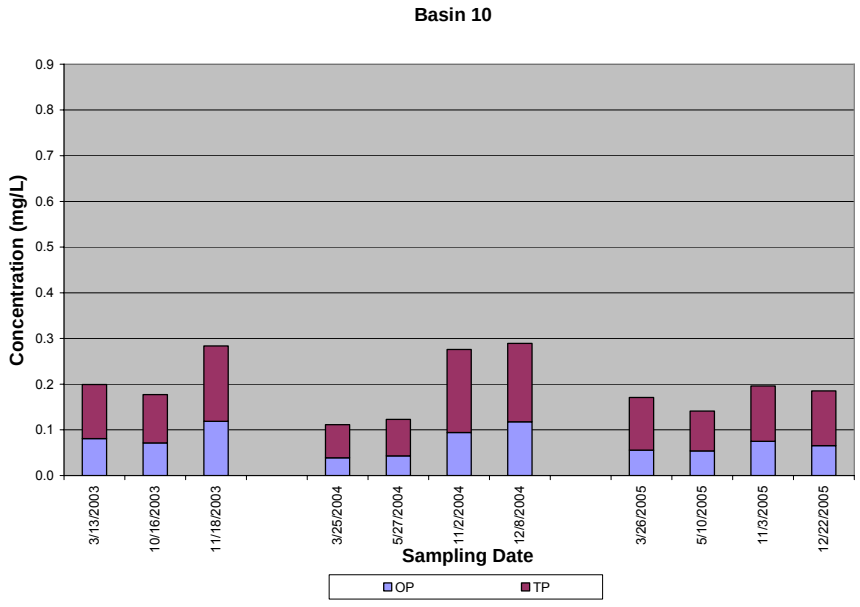


Figure 11b. OP as Fraction of TP (mg/L) in Basin 10 in 2003-2005

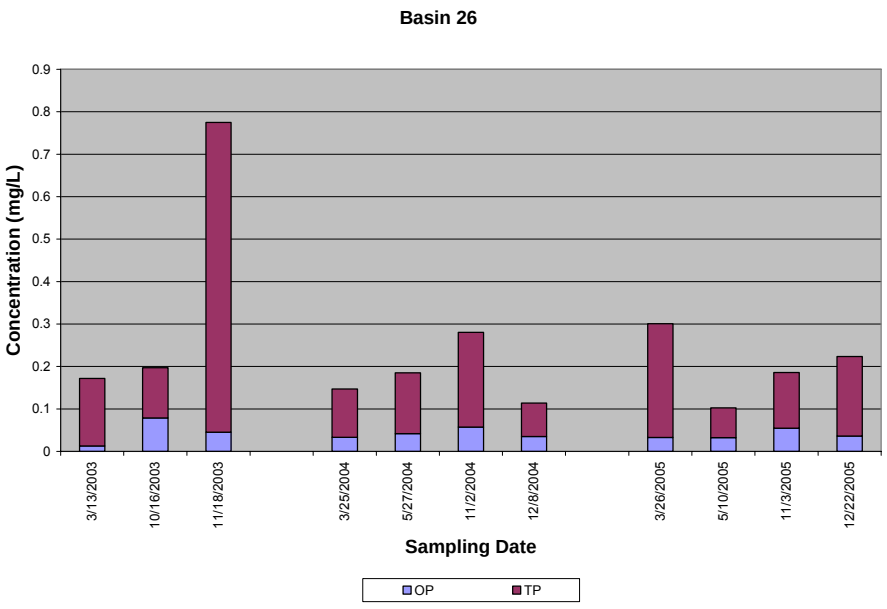


Figure 11c. OP as Fraction of TP (mg/L) in Basin 26 in 2003-2005

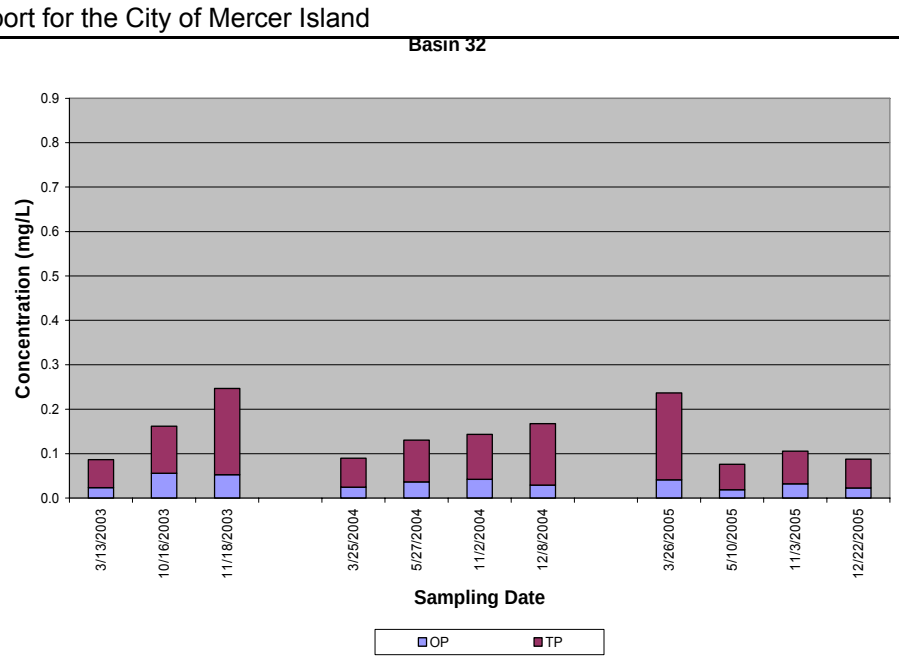


Figure 11d. OP as Fraction of TP (mg/L) in Basin 32 in 2003-2005

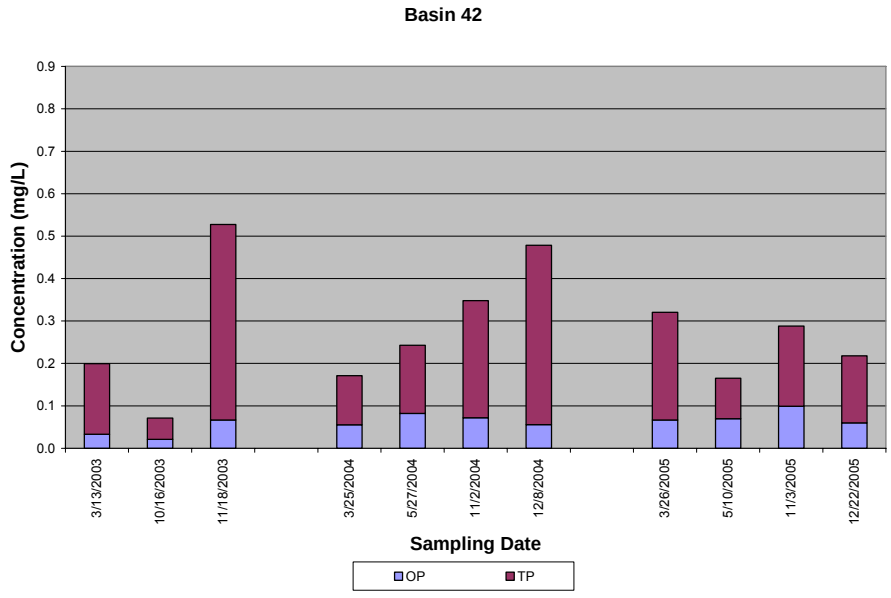


Figure 11e. OP as Fraction of TP (mg/L) in Basin 42 in 2003-2005

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Table 8. % Ortho-phosphorus by Basin in 2003 and 2004-2005

Date	Basin 6	Basin 10	Basin 26	Basin 32	Basin42
3/13/2003	61.3	68.8	8.1	38.9	20.0
10/16/2003	52.4	67.4	72.7	52.6	41.8
11/18/2003	7.0	72.1	6.2	27.2	14.0
3/25/2004	37.6	53.9	28.9	37.4	47.6
5/27/2004	46.8	54.1	29.2	38.4	50.9
11/2/2004	35.2	51.8	25.7	42.1	26.1
12/8/2004	26.2	69.0	44.1	21.4	13.1
3/26/2005	12.4	48.7	12.3	20.9	26.2
5/10/2005	68.4	62.3	46.2	32.9	73.5
11/3/2005	55.5	61.9	41.7	43.7	52.5
12/22/2005	25.1	54.6	19.4	35.1	37.9

4.4.3.1 Total Phosphorus

TP includes all forms of P, including that bound in plant and animal tissue, attached to soil particles, and dissolved. TP concentrations ranged from 0.053–0.423 mg/L in 2004 and from 0.055–0.268 mg/L in 2005. In 2003, TP concentrations ranged from 0.051–0.729 mg/L (Figures 11a–11e).

In 2003, the highest TP concentrations in all five basins were measured on November 18. These data are similar to levels detected in 2004, when the highest TP concentrations in all five basins were measured in November or December. In 2005, the highest TP concentrations were measured in March in Basins 6, 32, and 42, in May in Basin 26, and in November in Basin 10.

The highest TP concentrations were found in the same basins as the highest TSS concentrations on four of the five 2003–2005 sampling dates where TSS concentrations exceeded 244 mg/L. This implies that erosion is contributing TP to the five drainage basins and Lake Washington.

TP levels in the five Mercer Island basins were compared to those in five other King County streams (King County 2005a). The range of TP levels for each of the other streams was:

- Fairweather Creek, 0.07–0.28 mg/L.
- Forbes Creek, 0.06–0.12 mg/L.
- Juanita Creek, 0.03–0.15 mg/L.
- Kelsey Creek, 0.05–0.15 mg/L.
- Lyon Creek, 0.02–0.06 mg/L.

The highest TP levels in the Mercer Island streams were higher than the top of the range in these other urban and suburban streams (King County 2005a).

4.4.3.2 Ortho-Phosphorus

Ortho-phosphorus (OP), the soluble or bioavailable component of TP, supports biological production such as algal growth. Many forms of inorganic P are not biologically available, but can be transformed into OP. Some forms of particulate phosphorus, such as algal cells, are converted through mineralization reactions to soluble OP. Neither state WQS nor federal WQC exist for OP. In 2003, OP concentrations ranged from 0.02–0.119 mg/L; the highest concentration was observed in Basin 10 on November 18. The range of OP concentrations was similar (0.02–0.118 mg/L) in 2004; the highest concentration was observed in Basin 10 on December 8. In 2005, the lowest OP concentration was also 0.02 mg/L, but the highest concentration was 0.099 mg/L and was observed in Basin 42 on November 3 (Figure 11 and Appendix A).

OP levels in the five Mercer Island basins were compared to those in five other King County streams (King County 2005a). The range of OP levels for each of the other streams was:

- Fairweather Creek, 0.008–0.103 mg/L.
- Forbes Creek, 0.033–0.056 mg/L.
- Juanita Creek, 0.015–0.049 mg/L.
- Kelsey Creek, 0.023–0.052 mg/L.
- Lyon Creek, 0.014–0.036 mg/L.

Although there was overlap in the range of OP levels observed in the Mercer Island streams and the other urban and suburban streams, the highest OP levels in the Mercer Island streams in 2003-2005 were higher than the top of the range in the other streams except for Fairweather Creek (King County 2005a).

4.4.4 Bacteria

4.4.4.1 Fecal Coliform Bacteria

Fecal coliform (FC) bacteria are found in the gastrointestinal tracts of mammals and birds and include *Escherichia coli* (*E. coli*) and *Klebsiella* species. Although these bacteria do not cause disease in humans, their presence in large numbers in a waterbody may indicate the presence of other, disease-causing microorganisms. For waterbodies where there is not extraordinary human contact, King County WLRD uses the secondary contact value of 200 colony forming units (CFU)/100 ml as a guideline for determining which streams have violated WQS. This state WQS was exceeded on all sampling dates at all sites in 2005 except in Basin 6 on May 10 (stormwater samples were not analyzed for FC in 2004). Counts ranged from 140 CFU/100 ml in Basin 6 on May 10 to 4,000 CFU/100 ml in Basin 10 on the same date. Over the course of the year, the lowest counts were found in Basin 6 and the highest counts varied by site (Figure 12, Appendix A).

Possible sources of FC bacteria in stormwater in urban drainages are leaks in the sewer system (e.g., leaky side sewers) and pet and wildlife wastes. Follow-up baseflow monitoring would help the City of Mercer Island to determine which category is more likely. If bacteria counts are high during dry weather, then the bacteria are not coming from stormwater; rather, they may be associated with leaks in the sewer system. Follow-up microbial source tracking (e.g., DNA

analyses) would assist in determining if the bacteria are from human or animal sources. The City of Mercer Island could then use this information to determine types of corrective actions.

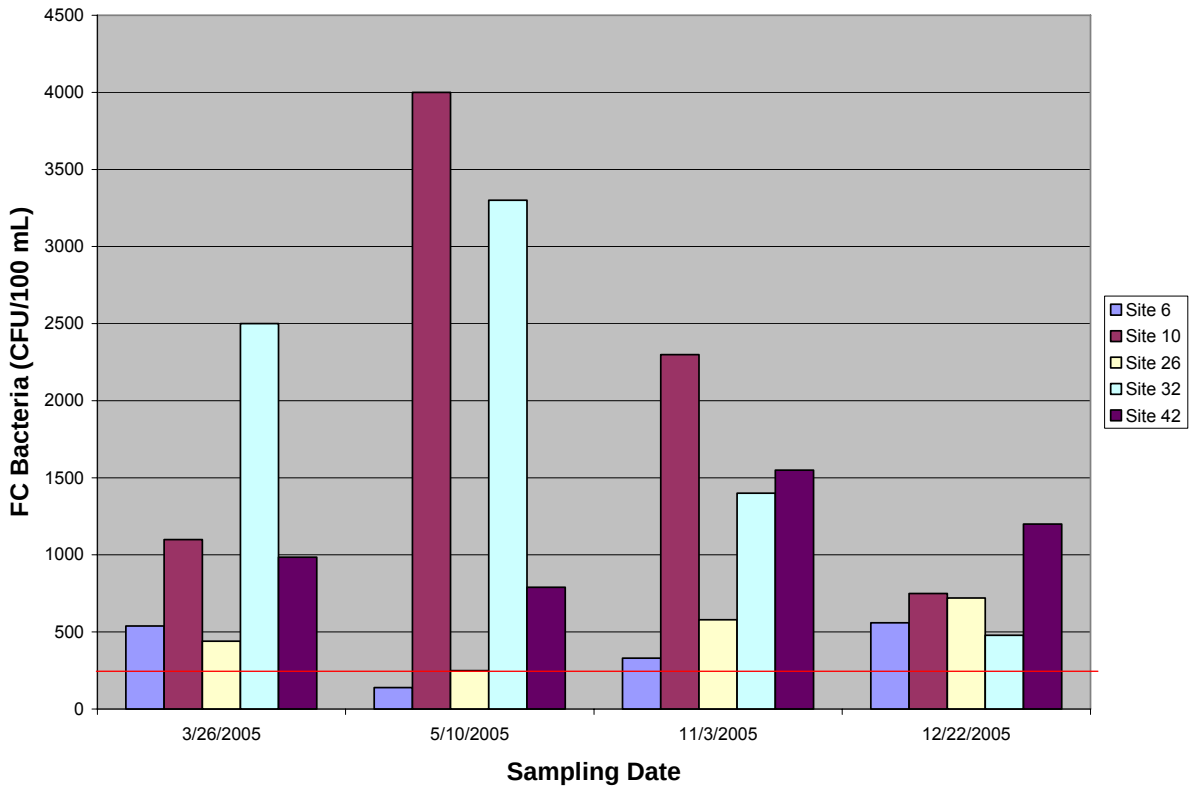

Figure 12. Fecal Coliform Bacteria (CFU/100 ml) by Basin in 2005 (Red line indicates WQS of 200 CFU/100 ml)

4.4.4.2 E. coli Bacteria

As is the case with FC bacteria, *E. coli* bacteria are found in the gastrointestinal tracts of mammals and birds. Their presence in large numbers in a waterbody may indicate the presence of other, disease-causing microorganisms. There are currently no state WQS or federal WQC for *E. coli*. Because *E. coli* are a component of FC bacteria, *E. coli* counts that exceed the state WQS for FC bacteria are considered to be elevated (Joe Clark, KCEL, personal communication).

E. coli bacteria counts were above the state WQS for FC bacteria at most sampling sites on all sampling dates in 2005 (*E. coli* was not measured in 2004) (Figure 13). Counts ranged from 130 CFU/100 ml in Basin 6 on May 10 to 2900 CFU/100 ml in Basin 10 on the same date. Over the course of the year, the lowest counts were found in Basin 6 and the highest counts varied by site, as was the case for FC bacteria counts (Figures 12–13, Appendices B and E).

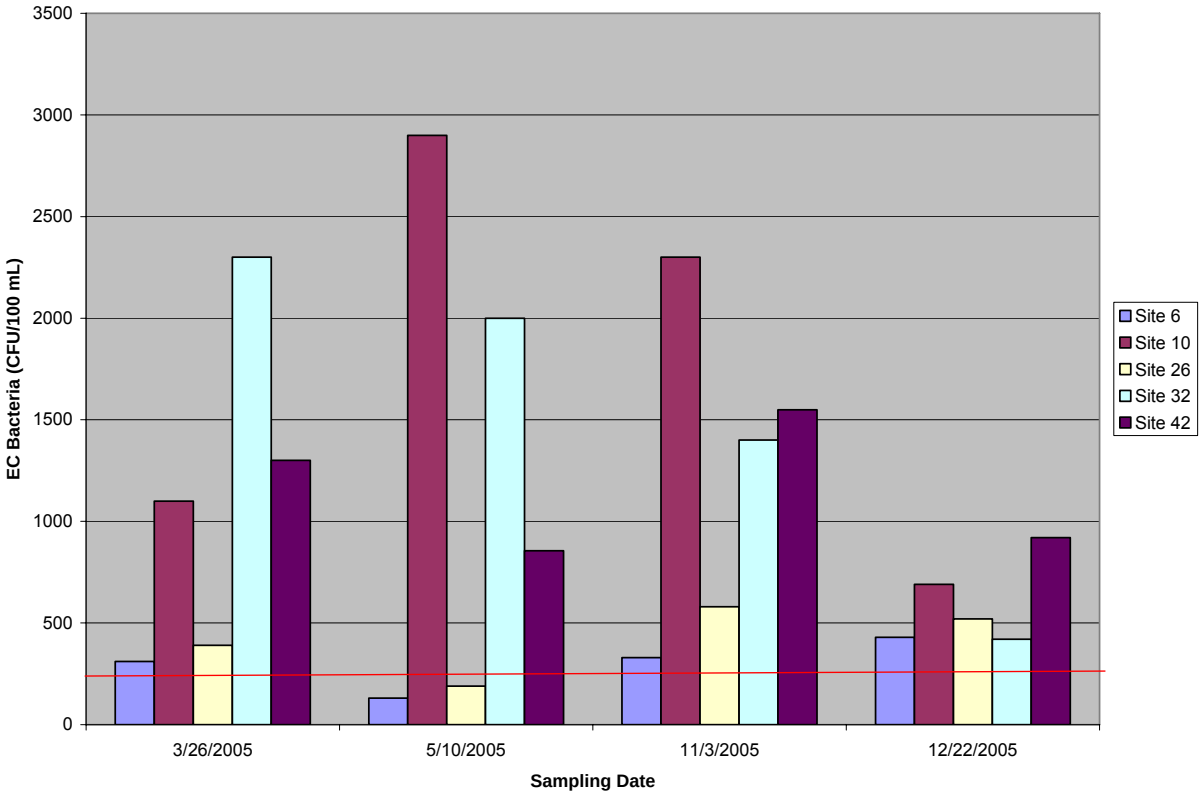

Figure 13. *E. coli* Bacteria (CFU/100 ml) by Basin in 2005 (Red line indicates FC WQS of 200 CFU/100 ml)

4.4.5 Non-Polar Oil (NPO) Compounds

Gasoline and other petroleum products are non-polar oil (NPO) compounds that are common components in stormwater runoff from both residential and commercial land uses and can have adverse effects on aquatic life and human health. Analysis of stormwater samples for (NPO) compounds began in 2003 and continued in 2004–2005.

NPO compounds were detected at concentrations above the RDL once in 2003, three times in 2004, and twice in 2005 (Table 9). Four of these six occurrences were in Basin No. 42. All other measurements in 2003 and most other measurements in 2004–2005 were below the RDL (5 mg/L), but above the MDL (2 mg/L). Five measurements in 2004 and five measurements in 2005 were below the MDL. There are currently no state WQS or federal WQC for NPO compounds.

Table 9. Concentrations of NPO Compounds (mg/L) in 2003-2005

	Non Polar Organic Compounds (mg/L)				
	Basin 6	Basin 10	Basin 26	Basin 32	Basin 42
3/13/2003	3.2 <RDL	2.7 <RDL	4.1 <RDL	3.0 <RDL	2.8 <RDL
10/162003	3.9 <RDL	4.2 <RDL	3.55 <RDL	3.9 <RDL	5.75
11/18/2003	3.5 <RDL	2.6 <RDL	2.8 <RDL	3.3 <RDL	3.1 <RDL
3/25/2004	2.4 <RDL	2.8 <RDL	<MDL	2.8 <RDL	<MDL
5/27/2004	2.85 <RDL	2.5 <RDL	2.9<RDL	3.7 <RDL	3.7 <RDL
11/2/2004	3.8 < RDL	4.2 < RDL	6.95	4.9 <RDL	7.91
12/8/2004	2.4 <RDL	<MDL	<MDL	2.7 <RDL	5.05
3/26/2005	3.6 <RDL	3.8 <RDL	4.8<RDL	5.33	5.11
5/10/2005	<MDL	2.0 <RDL	2.5<RDL	2.7<RDL	<MDL
11/3/2005	2.7 <RDL	<MDL	<MDL	<MDL	2.75<RDL
12/22/2005	2.1 <RDL	3.7 <RDL	3.3<RDL	2.9 <RDL	3.2 <RDL

RDL = 5.0 mg/L.
MDL = 2.0 mg/L.

4.4.6 WTPH Hydrocarbons in the Water Column

The WDOE's WTPH Hydrocarbon Identification (HCID) test is a qualitative and semi-quantitative screen to determine presence and type of petroleum products in water. Three groups of hydrocarbons (gasoline range – low molecular weight compounds, 7–12 carbons atoms; diesel range including motor oil – medium molecular weight compounds, 13–24 carbon atoms; and lube oil range – high molecular weight compounds, 25–30 carbon atoms) are analyzed. HCID was analyzed once each year in 2004 and 2005, during the first fall sampling event to capture first flush conditions. The only detection occurred in Basin 10 in 2004 where 7.8 mg/L high molecular weight hydrocarbons material was detected (Appendix D). None of the hydrocarbon groups was detected on the fall sampling date in 2003 (King County 2005c).

4.4.7 Metals in the Water Column

Dissolved metals were analyzed in all storm samples collected in 2004–2005. Dissolved metals represent the bioavailable form; most metal WQS or WQC are based on the dissolved fraction.

Copper, lead, zinc, and chromium, which are common in urban stormwater runoff, were analyzed. Analytical data were compared to acute and chronic state WQS (Appendix B, WAC 173-201A).

4.4.7.1 Hardness

WQS for metals were adjusted for site-specific hardness concentrations (Appendix B). The average hardness was lower in storm samples collected in 2004-2005 (Table 10) than measured in 2003 (King County 2005c); i.e., 59.4 mg/L $CaCO_3$ compared to 79.7 mg/L $CaCO_3$. Hardness levels in these streams indicate they are "soft" or "moderately hard." Hardness is

influenced by the underlying geology of a basin. Metals are generally more bioavailable and therefore more toxic in soft waters.

Table 10. Hardness (mg/L $CaCO_3$) by Basin in 2004-2005

Basin No.	Sample Size (n)	Hardness Range	Average Hardness	Standard Deviation
6	8	36.0-110.0	59.8	4.2
10	8	24.9-98.1	53.9	4.9
26	8	58.3-103	74.3	3.0
32	8	23.5-60.5	41.4	2.95
42	8	37.6-104	67.4	4.5
All Sites	40	23.5-110.0	59.4	4.1

4.4.7.2 Comparison to Standards and Criteria

Metal concentrations are summarized in Table 11. The highest concentrations of copper and zinc were found in Basin 10 or Basin 32 on each sampling date. These basins are dominated by commercial land uses. Although lead was detected infrequently and only at concentrations below the RDL, the highest frequency of detectable concentrations was in Basin 10. The highest chromium concentrations were detected in Basin 32 on all sampling dates.

Table 11. Dissolved Metals (µg/L) in Stormwater by Basin in 2003-2005

	Basin 6				Basin 10				Basin 26				Basin 32				Basin 42			
Date	**Cu**	**Pb**	**Zn**	**Cr**	**Cu**	**Pb**	**Zn**	**Cr**	**Cu**	**Pb**	**Zn**	**Cr**	**Cu**	**Pb**	**Zn**	**Cr**	**Cu**	**Pb**	**Zn**	**Cr**
3/13/03	3.43	<MDL	5.92	1.1 <RDL	5.04	0.21 <RDL	17.0	0.96 <RDL	2.89	<MDL	17.6	1.2 <RDL	4.63	<MDL	8.37	1.55	2.68	<MDL	2.4 <RDL	1.0 <RDL
10/16/03	2.85	<MDL	4.19	0.61 <RDL	4.8	0.24 <RDL	24.0	0.87 <RDL	2.11	<MDL	2.65	1.2 <RDL	1.9 <RDL	<MDL	2.87	1.2 <RDL	7.66	<MDL	6.38	2.56
11/18/03	2.55	<MDL	3.06	0.49 <RDL	**3.68**	<MDL	18.4	0.77 <RDL	2.61	<MDL	0.82 <RDL	0.92 <RDL	4.85	<MDL	4.68	1.4 <RDL	3.23	<MDL	1.9 <RDL	1.65 <RDL
3/25/04	2.29	<MDL	9.63	0.66 <RDL	3.84	<MDL	16.0	0.74 <RDL	2.54	<MDL	1.2 <RDL	1.7 <RDL	**8.14**	<MDL	22.2	6.44	2.55	<MDL	2.2 <RDL	1.7 <RDL
5/27/04	3.26	<MDL	3.24	0.81 <RDL	4.95	<MDL	15.5	1.2 <RDL	3.42	0.2 <RDL	1.2 <RDL	2.14	**13.1**	<MDL	13.8	12.1	3.45	0.22 <RDL	2.4 <RDL	2.44
11/2/04	4.09	<MDL	6.56	0.79 <RDL	2.86	0..89 <RDL	18.8	0.86 <RDL	3.23	<MDL	3.55	1.3 <RDL	**6.38**	<MDL	8.79	3.01	3.76	0.31 <RDL	3.72	1.55
12/8/04	2.63	<MDL	5.43	0.85 <RDL	5.3	0.25 <RDL	26.5	0.97 <RDL	2.06	<MDL	2.79	0.79 <RDL	4.83	<MDL	26.6	2.52	2.33	<MDL	2.99	0.89 <RDL
3/26/05	2.58	<MDL	4.88	0.6 <RDL	4.28	0.22 <RDL	19.8	0.72 <RDL	3.42	<MDL	2.1	1.6 <RDL	5.42	<MDL	13.3	3.84	4.27	0.23 <RDL	2.59	1.85 <RDL
5/10/05	1.8 <RDL	<MDL	1.8 <RDL	0.97 <RDL	3.99	0.24 <RDL	15.5	0.78 <RDL	2.05	<MDL	2.05 <RDL	0.8 <RDL	9.02	<MDL	11.1	3.02	2.75	0.24 <RDL	3.96	1.55 <RDL
11/3/05	3.04	<MDL	4.24	0.45 <RDL	5.16	<MDL	20.9	1.0 <RDL	2.28	<MDL	0.98 <RDL	0.88 <RDL	5.38	<MDL	14.3	3.51	2.86	<MDL	3.18	0.98 <RDL
12/22/05	2.0	0.28 <RDL	3.33	<MDL	6.16	0.36 <RDL	21.6	1.3 <RDL	2.11	0.25 <RDL	1.6 <RDL	1.0 <RDL	5.25	0.24 <RDL	34.6	3.14	2.41	0.34 <RDL	2.7	1.1 <RDL

Bold and underlined values exceed state WQS

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In 2003, only one (Basin 42) out of 18 samples exceeded the acute copper WQS (Table 11, Appendix A). Copper exceeded the WQS in three of 24 samples (12.5 %) in 2004; there were no exceedances in 2005. All exceedances occurred in Basin 32, which is dominated by commercial land use (Table 11). Lead, zinc, and chromium concentrations did not exceed the acute WQS in any basin in 2004-2005.

Although grab samples do not provide data appropriate for comparison to chronic WQS, metals data were compared to chronic WQS as they may prove useful for assessing possible ecological implications to aquatic life. Analysis of dissolved copper, lead, zinc, and chromium in 2003-2005 indicated potential exceedances of chronic WQS in Basins 10 and 32 (Table 12). The chronic copper WQS was exceeded three times in Basin 10 and six times in Basin 32 and once in Basin 42. As previously discussed, comparison of grab sample metals data to chronic standards can only serve as a potential warning signal for chronic level effects.

Table 12. Exceedance of Chronic State WQS for Dissolved Copper in 2003-2005

Date	Basin	Measured Conc. (µg/L)	WA. WQS[1](µg/L)
3/13/2003	42	8.7	**6.17**
11/18/2003	10	3.68	**3.58**
3/25/2004	10	3.84	**3.72**
3/25/2004	32	8.14	**3.29**
5/27/04	32	13.1	**3.99**
11/2/04	32	6.38	**5.66**
3/26/05	10	4.28	**3.46**
5/10/05	32	9.02	**7.39**
11/3/05	32	5.38	**5.03**
12/22/05	32	5.25	**5.12**

[1] Values are calculated based on site-specific hardness concentrations.

4.4.8 Chlorinated Herbicides and Organophosphate Pesticides in the Water Column

Pesticides are typically transported during storm events, especially when recently applied – most often during late spring, summer, and early fall. Ten chlorinated herbicides and seven OP pesticides were analyzed (Table 1). The herbicides 2,4–D and MCPP were detected in 35% and 15% of the 2004–2005 samples respectively (Table 13); 2,4-D was detected in all five basins and MCPP was detected in commercial Basins 10 and 32 and residential Basin 26. None of the other herbicides or OP pesticides were detected.

Although 2,4-D and MCPP were not detected in 2003, they were previously detected in 1999-2002 (King County 2004b). However, none of the 2,4-D and MCPP concentrations exceeded the available screening thresholds in 1999-2002 (King County 2004) or 2004-2005.

In 2003, diazinon was the only pesticide detected. The diazinon concentration exceeded the USEPA's draft acute WQC in one sample. In 2003, the USEPA banned the sale of lawn and garden products containing diazinon. Diazinon was not detected in any basin in 2004–2005.

The absence of detectable levels of diazinon in 2004–2005 may be a reflection of the recent ban.

Table 13. Detected Chlorinated Herbicides and Organophosphate Pesticides in 2003 and 2004–2005

Parameter	Detected in Basins 2003	Detected in Basins 2004-2005	FOD[1] % (N=15) 2003	FOD[1] % (N=40) 2004-2005	Range (µg/L) 2003	Range (µg/L) 2004-2005	Chronic Screening Threshold (µg /L)
MCPP	none	10, 26, 32	0	15	N.A.[1]	0.12-2.29	2573.5[2]
2,4-D	none	6, 10, 26, 32, 42	0	35	N.A.[1]	0.135-4.97	30[3]
Diazinon	6	none	6.7	0	0.134 (one detect only)	N.A.	0.094

1 FOD = Frequency of detection.
2 Kirby and Sheahan 1994
3 Westerdahl and Hall 1983
4 USEPA 1998
N.A. = not applicable.

4.5 SEDIMENT CHEMISTRY

Sediment sampling occurred on September 22, 2004 and September 9, 2005. Sediment was collected from depositional zones within each stream, using 7.5 cm core tubes, and analyzed for copper, lead, zinc, chromium, and NPO compounds (Table 1).

In 2004, all samples contained a relatively high amount of water which made it extremely difficult to achieve a homogeneous sample during preparation (Fritz Grothkopp, KCEL, Personal Communication, November 15, 2004). The duplicate precision for lead and chromium exceeded the 20% acceptance window for Relative Percent Difference. Therefore, the chromium and lead data are considered estimates of these metals (Table 13).

In 2005, an oil sheen was observed in Basin 32 approximately 20 feet above its discharge to Lake Washington. This was most obvious in the pool area behind the beach berm. There were also silty areas in this reach of the stream and a petroleum-like odor in the vicinity of the sampling site (Jean Power, KCEL, Personal Communication, September 9, 2005).

Metals were detected in sediment samples from all basins in 2004–2005 (Table 14). Concentrations were averaged in duplicate samples and the mean value is reported. Currently there are no freshwater sediment standards or criteria. Therefore, copper, lead, zinc, and chromium concentrations were initially compared to their levels in Puget Sound Regional Soils (Appendix C). Sediment metal concentrations that fall above these regional soil levels do not necessarily indicate a significant concern as they are not based on a biological effect; they also may not reflect local soil conditions in the study area. They do provide a general perspective of metal levels in regional soils. Levels that fall above regional soil concentrations may indicate an anthropogenic source of contamination. Sediments from Basin 10 had copper and lead levels above regional soil levels in 2005, and zinc levels were above regional soil levels in both 2004 and 2005 (Table 14). From 1999 through 2002, copper, lead, and zinc levels were at or above regional soil levels (King County 2004b). This was not the case in 2003; copper levels in Basin

No. 10 were lower than in preceding years. All other sites had metal concentrations within regional ranges.

Sediment metal concentrations were also compared to draft Washington State freshwater sediment guidelines (WDOE 2003a). The draft sediment guidelines include three significance levels, statistical significance (STAT), sediment quality standard (SQS) and a cleanup screening level (CSL). The STAT guideline is not based on an ecological effect, but a statistical difference from a control and was not used here. The SQS represents the level below which no adverse effects would be expected and the CSL represents the level above which effects would be expected. Concentrations between the SQS and the CSL represent concentrations may cause adverse effects. The terms SQS and CSL were “borrowed” from the regional sediment management program and are related only to conceptual levels of f biological effects and do not imply formally promulgated sediment standards. In 2003, sediment concentrations did not exceed the guidelines for any metal. However, in Basin 10 in 2004 zinc exceeded the SQS guideline and in 2005 exceeded the CSL guideline. This suggests that sediment zinc concentrations in Basin 10 may be causing adverse effects to aquatic life.

Gasoline and other petroleum products are common components of stormwater runoff from both residential and commercial land uses; NPO compounds were detected in sediment from all basins in 2004, 2005, and 2003 with the exception of Basin 26 in 2003 (Table 15). Concentrations in all samples were higher in 2005 (380–936 mg/kg dw) than in 2004 (120–310 mg/kg dw) or in 2003 (<120–275 mg/kg dw) and were above the range for those years. Currently there are no standards or guidelines for NPO compounds in sediment. Bioassays are typically used to determine if NPO compounds are present at levels that may impact aquatic life (Grant Yang, WDOE Northwest Regional Office, Personal Communication, April 6, 2005).

Table 14. Sediment Metal Concentrations in September of 2003, 2004, and 2005 (mg/kg dry weight)

Basin	Concentration			Regional Soils [1]	SQS[2]	CSL[3]
Copper (mg/kg dw³)						
	2003	**2004**	**2005**			
6	6.52	7.37	7.31	20	80	830
10	15.7	15.4	20.9			
26	12.0	12.4	9.62			
32	8.07	9.51	13.3			
42	12.81	10.4	11.8			
Lead (mg/kg dw³)						
	2003	**2004**	**2005**			
6	2.9	3.5	3.5	15	335	430
10	67.5	12.5	18.1			
26	5.4	4.7	5.1			
32	6.4	7.3	4.7			
42	8.1	6.7	6.6			
Zinc (mg/kg dw³)						
	2003	**2004**	**2005**			
6	35.8	33.6	38.2	4	140	160
10	141	145	260			
26	34.7	38.2	50.3			
32	41.8	54.2	40.3			
42	51.3	38.2	61.5			
Chromium (mg/kg dw³)						
Basin	**2003**	**2004**	**2005**	**Local Soils[1]**	**SQS[2]**	**CSL[2]**
6	17.4	28.9	27.3	80	95	100
10	28.7	15.1	32.2			
26	26	28.7	33.1			
32	11.9	20.5	28.1			
42	30.55	29	23.4			

Highlighted values exceed sediment guidelines.
[1] "Local soils" describes Puget Sound Regional Soils (Appendix C).
[2] "Sediment Quality Standard" - Guideline that represents the value below which no adverse effects would be expected. (WDOE 2003a)
[3] "Clean Up Screening Level -- Guideline that represents the value above which adverse effects would be expected. (WDOE 2003a)

Table 15. Sediment NPO Compounds (mg/kg dw) in 2003, 2004 and 2005

Site	Concentration		
	2003	2004	2005
6	210	310	430
10	190	230	936
26	<MDL	265	448
32	240	120	579
42	275	280	380

MDL = 120 mg/kg-dw

4.6 MACROINVERTEBRATE RESULTS

Aquatic macroinvertebrates (insects and other invertebrate animals that can be seen without a microscope) are analyzed as biological indicators of ecosystem health. They indicate the integrated effects of their surroundings, including water quality and hydrology. They indicate cumulative impacts over time, space, and different disturbance types. Macroinvertebrate communities respond to changes in water quality and quantity, habitat, sediment loading, and riparian conditions. To better compare and report results of macroinvertebrate surveys, scientists have developed the Benthic Index of Biotic Integrity (BIBI) (Karr and Chu 1999, Fore et al. 1996). Based on identification and quantification of the macroinvertebrates in a sample, ten metrics are calculated (Table 16 and Appendix F). The individual metrics measure different aspects of stream biology, including species dominance, number of organisms, presence of pollution tolerant and intolerant organisms, feeding ecology, and population structure. The BIBI is described in greater detail at the following website: http://dnr.metrokc.gov/wlr/waterres/Bugs/indicator.htm.

The ten metrics are combined to calculate a BIBI score which ranges from “50” (Excellent) to “10” (very poor). BIBI metrics are regionally calibrated across a range of systems and rely on “reference” sites containing healthy macroinvertebrate assemblages that are assumed to mimic historical communities. When interpreting BIBI scores it is important to take into account the “ecological potential” of the stream. Because of their natural physical and ecological characteristics some streams may never achieve a high BIBI score, even in a pristine state. An evaluation of the individual metrics used to calculate the BIBI often provides additional information to help determine the factors that may be influencing the BIBI score. Metrics represent the average value at each site following identification and quantification of replicate samples collected from three distinct riffles near water quality sampling sites within each basin.

Individual metrics for 2005 indicate low numbers of pollution-intolerant species, as well as few, if any, mayflies, stoneflies, or caddisflies, which are commonly found in biologically intact streams. In 2005, Basin No. 42 had the greatest numbers of pollution-intolerant, mayfly, stonefly, and caddisfly species, as well as taxa richness (total number of taxa). However, Basin No. 42 also had the largest number of “clinger” taxa in 2005. The presence of “clingers” at all sites is an observed biological response to the extremely flashy nature of drainages in these steep, urban environments. All of the study streams are dominated by a small number of taxa, indicating an unbalanced community.

Table 16. Mercer Island BIBI Scores and Supporting Metrics

Metric	Basin 6		Basin 10		Basin 26[1]		Basin 42	
	2003	2005	2003	2005	2003	2005	2003	2005
BIBI Score	16 (Very Poor)	18 (Poor)	12 (Very Poor)	18 (Poor)	22 (Poor)	N.A.	18 (Poor)	22 (Poor)
Total No. of Taxa	13	14	11	9	20	N.A.	19	22
No. of Mayfly Species	1	1	1	1	2	N.A.	2	3
No. of Stonefly Species	1	0	1	0	1	N.A.	1	2
No. of Caddisfly Species	0	0	0	0	2	N.A.	4	3
No. of Intolerant Taxa	0	0	0	0	2	N.A.	0	1
No. of Clinger Taxa	2	1	0	1	4	N.A.	6	5
No. of Long-lived Taxa	2	7	0	7	0	N.A.	0	7
Tolerant (%)	0	1.65	22.9	2.18	0.5	N.A.	4.4	2.15
Predator (%)	2.8	1.65	0.4	0.0	22.8	N.A.	5.6	7.8
Dominance (%)	78.1	88.83	88.4	90.5	63.6	N.A.	79.1	61.83

[1] Flows in Basin 32 were insufficient to collect samples in 2005 and 2003. Flows in Basin 26 were insufficient to collect samples in 2005.

BIBI scores for 2005 (sampling did not occur in 2004) ranged from 18 or "poor" (Basins 6 and 10) to 22 "poor" (Basin 42) (Table 16).

Table 16 also compares the total BIBI scores for Basin 6, 10, and 42 in 2003 (King County 2005c). The BIBI scores for Basins 6, 10, and 42 increased somewhat compared to 2003; however the relative change between years was small and may reflect the inherent variability typically observed within macroinvertebrate populations.

The BIBI scores for the five Mercer Island streams were compared with those in nine East Lake Washington tributaries and 10 West Lake Washington tributaries (EVS 2005). In 2003, the BIBI scores ranged from 10–30 in the East Lake Washington tributaries and from 10–22 in the West Lake Washington tributaries."

5.0 DISCUSSION AND RECOMMENDATIONS

Numerous parameters (Table 1) were quantified to evaluate current water quality and sediment quality conditions in five Mercer Island drainages. The 2004-2005 data indicate ongoing water quality concerns. The only parameter that met WQS at all sampling sites on all sampling dates was pH. Other water quality parameters violated WQS to varying degrees. Additionally, the low numbers of long-lived and pollution-intolerant species of invertebrate animals that were found in the sediments in 2005 and the accompanying BIBI scores in the "poor" category suggest impaired water quality. The following provides a discussion of conventional parameters, metals, bacteria, and organic compounds, and their implications. Actions are recommended to gain a more comprehensive picture of water quality conditions and to improve water quality in Mercer Island streams and Lake Washington.

5.1 CONVENTIONAL PARAMETERS

Conventional parameters exhibiting seasonal variation such as in-stream temperatures and DO pose the greatest potential for harm during the warmer, drier months. Temperatures in the five Mercer Island streams exceeded the WQS on the warmest sampling date in both 2004 (May 27) and 2005 (August 24). Low DO levels are directly linked to elevated temperatures; DO levels were below the WQS in the five drainages on these same dates. Additionally, DO levels did not meet WQS from 22–56% of the time in each drainage basin during 2004–2005. High temperatures and low DO levels can affect the health and survival of fish and other aquatic life.

Erosive processes in steep ravines continue to discharge sediment to the five streams and Lake Washington, as evidenced by TSS levels that exceeded 244 mg/L (the level at which acute effects on aquatic life have been observed) five times during 2004–2005. The highest TSS levels and highest turbidity readings occurred in Basin 26 during both years. Human actions such as land development can result in excessive sedimentation to a waterbody. Improvements to stormwater detention facilities, as have occurred in Basin 26, may be an effective way to reduce sediment loading. To better understand the frequency and duration of high TSS and high turbidity measurements, baseflow and stormwater readings could be monitored continuously at the five sampling sites or in the basins with the biggest sediment movement.

Nutrient (TN, TP, and OP) levels in stormwater samples in the five Mercer Island streams were generally within the range found in other streams that discharge to Lake Washington and that have similar land uses in their drainage basins (King County 2005a). However, the highest TP and OP levels in the Mercer Island streams were higher than the top of the range in the other streams (King County 2005a). Nitrogen and phosphorus compounds are a concern; they are found in animal wastes and fertilizers and can contribute to an overabundance of algae and other plants in lakes and streams. This, in turn, can contribute to decreased levels of DO in the waterbodies. Additionally, TP is bound to particulate matter. Therefore, erosion control actions could reduce both sediment loading and TP loading in the Mercer Island streams and Lake Washington.

5.2 METALS

The highest levels of copper, zinc, lead, and chromium in stormwater samples in 2004-2005 were found in the two commercial drainages (10 and 32); copper levels exceeded the acute WQS in Basin 32. Copper levels in stormwater discharged from these basins and Basin 42 may also be high enough to cause chronic health impacts on aquatic life, as evidenced by exceedance of chronic WQS. A more complex monitoring protocol is needed to accurately assess potential chronic conditions.

Discussions of acute and chronic metal exceedances can be used to further focus public outreach and source control messages. Some common metal sources are runoff from roads and parking lots, automobiles, pressure-treated wood, and construction/demolition activities (USEPA 2002, McGuiness et al. 1994). Source control programs, including homeowner education, are advised to encourage personal and professional choices that reduce discharge of metals to aquatic systems.

5.3 BACTERIA

With one exception, FC bacteria counts exceeded the state WQS in all five basins on all sampling dates in 2005 (the first year that this parameter was measured). Possible sources of

these bacteria are pet waste, wildlife such as ducks and geese, leaky side sewers, and cross-connections between sanitary and storm sewers. Analysis of FC bacteria counts during dry weather as well as during storm events will help to assess current conditions in Basins 6, 10, 26, 32, and 42. During dry weather, bacteria could enter Mercer Island streams and Lake Washington from sewer system conveyance leaks. If bacteria counts are elevated during dry weather, the City may want to follow up with source tracing for leaky side sewers. Improper handling of pet waste can cause it to be discharged to receiving waterbodies in stormwater runoff. If bacteria counts are elevated during both dry weather and storm events, the City may want to analyze DNA in the bacteria to determine if the bacteria are from human sources which would suggest leaky side sewers or from animal sources which would suggest pet wastes or wildlife. Microbial DNA analysis methods can also differentiate the animal species that are contributing bacteria to waterbodies. All of this additional information would assist the City of Mercer Island to determine corrective actions.

5.4 ORGANIC COMPOUNDS

Herbicides and pesticides are commonly used yard and garden products. Fifteen of 17 herbicides and pesticides that were analyzed in stormwater samples were not detected in 2004-2005 (Table 13, Appendix D); 2,4-D and MCPP were detected at levels that did not exceed the available screening thresholds. These herbicides have also been detected in Lyon, Little Bear, and Swamp Creeks, which are urban and suburban streams in King County. Three of the 2,4-D levels and two of the MCPP levels in the Mercer Island streams were higher than the highest levels measured in Lyon, Little Bear, and Swamp Creeks (King County 2002b). This may reflect the smaller size of the Mercer Island streams and consequently less dilution of the herbicides than in Lyon, Little Bear, and Swamp Creeks.

Detections of NPO and petroleum hydrocarbons were limited. When detected, the concentrations of these compounds were low. This data suggests that there is not much loading of these parameters from stormwater to Lake Washington.

However, NPO compounds were detected in sediments from the five Mercer Island basins at higher levels in 2005 than in 2003 or 2004. Continued analysis of these compounds in sediment is recommended, along with bioassays to determine if the current levels are high enough to impact aquatic biota in the sediment.

5.5 SEDIMENT METALS

Metal analysis in sediment showed that sediment from Basin 10 had copper and lead levels above regional soil concentrations for the Puget Sound region in 2005. These data reflect an increase in sediment copper levels from 2003, when the levels were below naturally occurring soil levels for the region (King County 2004b). Sediment zinc levels were above naturally occurring soil levels for the region in both 2004 and 2005 and exceeded both the SQS and CSL draft sediment guidelines in Basin 10 (Table 14, Appendix C, WDOE 2003a). This suggests that zinc concentrations in the sediments may cause adverse effects to aquatic life. Continued analysis of metals in sediment is recommended, especially in commercial basins. Educational programs to address metals in the water column could also reduce metals in sediment.

Water quality concerns on Mercer Island remain complex; yet understanding the complexity of these systems is increasing. It is not unusual to find exceedances of WQS in a dense urban area. Causes of contamination in Mercer Island drainage basins could include the lack of stormwater facilities designed to improve water quality and/or detain stormflows, automobile

usage that accompanies non-industrial, commercial business centers, and everyday activities commonly occurring in residential neighborhoods. Sedimentation and elevated turbidity were also anticipated prior to monitoring due to the steep ravines that drain and define Mercer Island.

5.6 RECOMMENDATIONS

Targeted educational efforts (King County 2003) can complement and increase the effectiveness of source control measures to reduce pollution and protect water quality in Mercer Island streams and Lake Washington, thereby supporting the City's forthcoming NPDES permit. The City of Mercer Island can take advantage of new development or redevelopment of the city center (Basin 10) to increase stormwater management activities. Furthermore, the City should continue to inform residents that individuals can contribute to improved water quality and encourage them to take the following straightforward, inexpensive actions:

- Apply pesticides, herbicides, and fertilizers sparingly and use alternative, non-chemical methods when possible.
- Do not apply pesticides, herbicides, and fertilizers near streams or Lake Washington, or during windy or rainy weather.
- Dispose of lawn and garden chemicals at hazardous waste collection centers.
- Do not pour used motor oil or household chemicals down storm drains.
- Wash cars at commercial car wash facilities where washwater is treated or recycled, or on lawns to take advantage of natural filtering.
- Collect pet waste and dispose of it properly.
- Streamside or lakeside residents should keep the banks naturally vegetated in order to maintain or improve the riparian area, prevent streambank erosion, and filter pollutants from stormwater.
- In order to prevent streambank erosion and resultant excessive discharge of sediments to streams and Lake Washington, streamside, or lakeside residents should not armor the banks with hard rock.
- Avoid piping water over the edge of steep ravines in order to prevent erosion and massive slope failures.

More information about individual actions and government best management practices can be found on the King County Water and Land Resources Division website (http://dnr.metrokc.gov/wlr).

6.0 FUTURE WORK

Mercer Island and WLRD staff will meet in the fall of 2006 to review the guidelines for this and future water quality studies. Project drivers and key questions will be discussed, as well as whether modifications are needed in the current sampling regime. For example, the City may want to include sediment bioassays of NPO compounds and monitoring of FC and *E. coli* bacteria during baseline conditions (see Discussion and Recommendations Section 5). A Scope of Work will be prepared, resulting in a 2007–2008 contract and a renewed Technical Services Agreement (TSA) with King County WLRD.

A regional policy influencing the City of Mercer Island is the ESA listing of Puget Sound chinook salmon. As part of the larger WRIA 8 effort, Mercer Island's impacts on Lake Washington become important; 54 small drainages enter Lake Washington from Mercer Island. The mouths of such catchments provide valuable feeding and rearing habitat for juvenile salmonids. The City could assess the physical conditions of these mouths to better document habitat availability and opportunities for restoration. This assessment could include: (1) documenting where there is a true mouth and associated delta and where the basins drain via a tight-line outlet; and (2) presence or absence of bank armoring with riprap. Unauthorized bank armoring has been observed at some of the sampling sites and could be occurring within other basins not sampled as part of this effort. Bank armoring concentrates storm flows and leads to increased velocity. This, in turn, can promote erosion of adjacent unarmored reaches and can further degrade the system's habitat quality and biological integrity. If the tight-line and armoring assessment were performed from the water, then information on the location of docks could also be collected. This would be useful information because docks can provide cover for salmonid predators.

The City has also expressed an interest in better understanding the stormwater monitoring results in a relative manner. For example, are the findings surprising or are they expected given urbanized land use? Comparisons of Mercer Island stream data with existing King County data from less urbanized streams and from similarly urbanized streams could be continued in the 2006 report in order to place the Mercer Island findings in a broader context.

In 2006, the City began a feasibility study on emergency well construction in order to ensure the availability of an emergency drinking water supply for Mercer Island residents in case of a natural disaster such as an earthquake. Well construction will take place in 2007–2008. The well is intended to be served by a deep aquifer that would not be impacted by a seismic event. Although the well would not have a direct connection to Lake Washington, the deep aquifer serving the well would be hydraulically influenced by Lake Washington.

The 2006 Mercer Island Annual Report summarizing the next round of sampling results is anticipated to be released in the second quarter of 2007. Collection of water samples took place on March 8, 2006 from the same five Mercer Island drainages as in 2004–2005. Two fall storms will be collected as well (weather conditions were not met for a spring sampling event). Sediment and macroinvertebrate sampling were performed under baseflow conditions in August of 2006. The 2006 report will contain an analysis of water, sediment, and macroinvertebrate data, a comparison of this data with Mercer Island data from 2004–2005 and recent data from other urban and suburban King County streams, and recommendations for the City of Mercer Island.

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APPENDIX A

Select Water Quality Parameters for Five Mercer Island Basins

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Water quality parameters measured in the field included temperature (temp), dissolved oxygen (DO), conductivity (cond), pH, and turbidity. All other parameters were collected as single grab samples, which were then analyzed by KCEL. Values less than the Method Detection limit (MDL) indicate that the parameter is not present in the sample above this level. Values greater than the MDL but less than the Reporting Detection Limit (RDL) indicate confidence that the compound is present but at low enough levels to decrease the reliability of the numerical result (King County 2002b). Values greater than the RDL are considered reliable after undergoing laboratory QA/QC. Field replicates, collected each time for QA/QC, are not reported here.

Table A-1. Select Water Quality Parameters for Basin 6

Date	13-Mar-03	16-Oct-03	18-Nov-03	25-Mar-04	27-May-04	2-Nov-04	8-Dec-04	26-Mar-05	10-May-05	3-Nov-05	22-Dec-05
Discharge (cfs)	1.79	0.67	11.09	2.01	0.86	17.46	18.89	4.4	0.6	1	0.9
Temp (°C)	10	13	9	10.1	14.4	10.2	8.2	10.2	12.3	9.8	8.1
DO (mg/l)	10.4	9.3	10.4	10.6	8.63	7.3	9.35	9.6	10	10.5	11
pH	7.2	7.6	7.4	7.8	7.6	7.7	7.6	7.3	7.9	7.8	7.4
Cond (uS/cm)	162	189	42	57.1	96.6	90	68.4	73.3	251	131	91.1
Turbidity (NTU)	9.86	6.07	477	20.9	14	77.9	43	77	9.6	8.5	13.6
Total Suspended Solids (TSS) (mg/l)	24.2	14.4	936	25	37.4	109	145	482	5.2	15.3	85.9
Non-Polar Oil (NPO) Cpds. (mg/L)	3.2 (<RDL)	3.9 (<RDL)	3.5 (<RDL)	2.4 (<RDL)	2.7 (<RDL)	3.8 (<RDL)	2.4 (<RDL)	3.6 (<RDL)	<MDL (<2)	2.7 (<RDL)	2.1 (<RDL)
FC Bacteria (CFU/100 ml)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	540	140	330	560
Total Phosphorus (TP) (mg/l)	0.0582	0.0769	0.631	0.0532	0.0597	0.11	0.117	0.182	0.0548	0.0602	0.0918
Ortho-Phosphorus (OP) (mg/l)	0.0357	0.0403	0.0439	0.02	0.0279	0.0387	0.0307	0.0226	0.0375	0.0334	0.023
Total Nitrogen (TN) (mg/l)	1.95	1.83	1.55	0.565	0.714	1.75	1.39	0.821	0.94	0.91	0.639

N.A. = not available (this parameter was measured in 2005 only).

Table A-2. Select Water Quality Parameters for Basin 10

Date	13-Mar-03	16-Oct-03	18-Nov-03	25-Mar-04	27-May-04	2-Nov-04	8-Dec-04	26-Mar-05	10-May-05	3-Nov-05	22-Dec-05
Discharge (cfs)	9.14	2.99	26.50	3.81	4.04	2.4	4.93	7.7	0.6	2	1.2
Temp (°C)	10	15	10	11.7	16.2	11.9	9.5	11.3	13.5	11.5	9.1
DO (mg/l)	10.2	7.4	10.1	10.02	7.63	5.7	10.01	8	8.9	9.6	10.7
pH	6.8	7.4	7.3	7.4	7.1	7.4	7.5	7	7.3	7.5	7.5
Cond (uS/cm)	116	103	47	47.2	61.9	103.2	106.9	53.3	229	130	141
Turbidity (NTU)	17.6	8.2	56.7	31.4	10.5	53.2	42	27	7.4	18	19.7
TSS (mg/L)	10.1	4.2	10	19.8	6.4	38	11.4	22.4	2.4	8.04	7.8
Non-Polar Oil (NPO) Cpds. (mg/L)	2.7	4.2	2.6	<MDL (<2)	2.5	4.2 (<RDL)	<MDL (<2)	3.8 (<RDL)	2 (<RDL)	<MDL (<2)	3.7 (<RDL)
FC Bacteria (CFU/100 ml)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1100	4000	2300	750
Total Phosphorus (TP) (mg/l)	0.118	0.106	0.165	0.0718	0.08	0.182	0.171	0.115	0.087	0.121	0.12
Ortho-Phosphorus (OP) (mg/l)	0.0812	0.0714	0.119	0.0385	0.0433	0.0942	0.118	0.056	0.0542	0.0749	0.0655
Total Nitrogen (TN) (mg/l)	1.48	1.72	1.57	0.834	0.88	1.93	2.17	0.887	1.19	1.22	1.48

N.A. = not available (this parameter was measured in 2005 only).

Table A-3. Select Water Quality Parameters for Basin 26

Date	13-Mar-03	16-Oct-03	18-Nov-03	25-Mar-04	27-May-04	2-Nov-04	8-Dec-04	26-Mar-05	10-May-05	3-Nov-05	22-Dec-05
Discharge (cfs)	0.81	0.27	4.17	0.58	0.74	0.81	0.89	1.2	0.1	0.6	0.7
Temp (°C)	10	13	9	9.7	13.2	10.2	8.2	8.9	12	9.8	7.8
DO (mg/l)	9.46	9.1	10.2	10.64	8.97	10.24	10.45	10.2	10.1	10.5	10.7
pH	7.2	7.9	7.4	7.8	7.4	7.1	6.9	7.3	7.3	7.8	7.6
Cond (uS/cm)	93	188	44.1	90.5	107.5	73.6	84.8	84.7	223	135	105
Turbidity (NTU)	70.7	24.4	1200	196	166	220	35	421	36.8	78.5	129
TSS (mg/L)	470	10.6	1950	205	176	281	41.2	406	34.4	84.8	126
Non-Polar Oil (NPO) Cpds. (mg/L)	4.1	2.6	2.8	<MDL (<2)	2.9 (<RDL)	6.95	<MDL (<2)	4.8 (<RDL)	2.5 (<RDL)	<MDL (<2)	3.3 (<RDL)
FC Bacteria (CFU/100 ml)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	440	200	580	720
Total Phosphorus (TP) (mg/l)	0.159	0.139	0.729	0.114	0.133	0.223	0.0791	0.268	0.0701	0.131	0.187
Ortho-Phosphorus (OP) (mg/l)	0.0129	0.101	0.0455	0.033	0.0418	0.0572	0.0349	0.0329	0.0324	0.0546	0.0363
(TN) (mg/l)	1.74	1.5	2.04	1.1	0.979	2.05	1.55	1.58	1.1	0.885	0.999

N.A. = not available (this parameter was measured in 2005 only).

Table A-4. Select Water Quality Parameters for Basin 32

Date	13-Mar-03	16-Oct-03	18-Nov-03	25-Mar-04	27-May-04	2-Nov-04	8-Dec-04	26-Mar-05	10-May-05	3-Nov-05	22-Dec-05
Discharge (cfs)	13.51	1.89	34.32	2.36	2.82	2.69	1.5	3.4	1.6	3.5	1.9
Temp (°C)	10	14	9	10.2	15.2	10.1	7.9	9.7	13.7	9.8	7.7
DO (mg/l)	10.3	9	10.9	10.79	8.42	10.5	10.52	9.9	9.8	10.9	11.3
pH	7.2	7.8	7.3	7.6	7.5	7.5	7.4	7.1	7.6	7.7	7.6
Cond (uS/cm)	61	129	52.2	41.2	50.7	68.2	64.1	37.6	133	89.9	89.6
Turbidity (NTU)	17.2	7.2	297	14.1	16.2	29.3	36	121	33	15.5	20.1
TSS (mg/L)	42.2	72.8	173	18.2	17.7	30.8	99.2	159	10.6	9.14	13
Non-Polar Oil (NPO) Cpds. (mg/L)	2.9	3.9	3.3	2.8	3.7 (<RDL)	4.9 (<RDL)	2.8 (<RDL)	5.33	2.7 (<RDL)	<MDL (<2)	2.9 (<RDL)
FC Bacteria (CFU/100 ml)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2500	3300	580	720
Total Phosphorus (TP) (mg/l)	0.061	0.106	0.194	0.0652	0.0942	0.101	0.138	0.196	0.0571	0.0735	0.065
Ortho-Phosphorus (OP) (mg/l)	0.0237	0.0558	0.0527	0.0244	0.0362	0.0425	0.0295	0.041	0.0188	0.0321	0.0228
Total Nitrogen (TN) (mg/l)	1.5	1.57	1.76	0.712	0.907	1.21	1.56	1.54	0.922	1.11	1.19

N.A. = not available (this parameter was measured in 2005 only).

Table A-5. Select Water Quality Parameters for Basin 42

Date	13-Mar-03	16-Oct-03	18-Nov-03	25-Mar-04	27-May-04	2-Nov-04	8-Dec-04	26-Mar-05	10-May-05	3-Nov-05	22-Dec-05
Discharge (cfs)	2.11	0.57	9.54	2.1	1.29	1.37	1.98	1.6	0.7	2.9	0.8
Temp (°C)	10	13	9	9.1	13.2	9.9	7.8	9.1	11.7	9.4	7.6
DO (mg/l)	10.51	9.5	10.6	10.97	8.74	9.9	10.96	9	10.1	10.9	11.2
pH	7.3	7.6	7.1	7.6	7.7	7.5	7.5	7.3	7.6	7.7	7.6
Cond (uS/cm)	58	162	49.2	79.8	93.3	85.1	47.2	86.9	201	108	110
Turbidity (NTU)	144.5	7.22	412.5	26.9	36	175	352	132	8.9	45	39.3
TSS (mg/L)	296	4.6	701	62	57.7	641	866	230	6.3	76.7	46
Non-Polar Oil (NPO) Cpds. (mg/L)	2.8	5.75	2.8	<MDL (<2)	3.7 (<RDL)	6.77	5.05	5.11	<MDL (<2)	3.1 (<RDL)	2.7 (<RDL)
FC Bacteria (CFU/100 ml)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1200	860	1700	1300
Total Phosphorus (TP) (mg/l)	0.166	0.0502	0.473	0.116	0.161	0.276	0.423	0.268	0.0963	0.194	0.159
Ortho-Phosphorus (OP) (mg/l)	0.0332	0.021	0.066	0.0552	0.082	0.072	0.041	0.0666	0.0699	0.0991	0.0605
Total Nitrogen (TN) (mg/l)	1.57	1.11	2.17	0.923	1.17	2.22	2.75	2	1.3	1.35	1.34

N.A. = not available (this parameter was measured in 2005 only).

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APPENDIX B

Metal Criteria Calculations and Comparisons to Observed Concentrations

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Washington Administrative Code (WAC) equations and standards are based on the dissolved fraction of copper, lead, zinc, and chromium. Only acute criteria exceedances are fully acceptable since samples represent a discrete point in time. The lowest effects concentrations (i.e., chronic criteria) are useful to assess possible ecological implications. If concentrations were less than the Method Detection Limit (MDL), then the MDL was compared to the state standard. This is a conservative assessment approach using state standards and calculations that were in place at the time of sampling (WDOE 1997).

Table B-1. Dissolved Copper, Lead, Zinc, and Chromium as Compared to Washington State Water Quality Standards

	Site	Cu (µg/L)	Pb (µg/L)	Zn (µg/L)	Cr (µg/L)	Hardness (mg CaCO3/L)
3/25/2004	**Site #6**	2.29	0.2	9.63	0.66	36
	Acute limit	6.498488	20.90115	48.15717	237.6714	
		pass	pass	pass	pass	
	Chronic limit	4.741222	0.814488	43.9748	77.09814	
		pass	pass	pass	pass	
3/25/2004	**Site #10**	3.84	0.2	16	0.73	27.1
	Acute limit	4.972878	15.20124	37.85827	188.3506	
		pass	pass	pass	pass	
	Chronic limit	3.71965	0.59237	34.57034	61.09898	
		fail	pass	pass	pass	
3/25/2004	**Site #26**	2.54	0.2	1.2	1.7	66.5
	Acute limit	11.58582	41.30755	80.99955	392.8765	
		pass		pass	pass	
	Chronic limit	8.00997	1.609696	73.96487	127.4451	
		pass	pass	pass	pass	
3/25/2004	**Site #32**	8.14	0.2	22.2	6.44	23.5
	Acute limit	4.347947	12.94716	33.55148	167.5983	
		fail	pass	pass	pass	
	Chronic limit	3.293118	0.504532	30.63759	54.36717	
		fail	pass	pass	pass	
3/25/2004	**Site #42**	2.55	0.2	22.2	0.74	54.6
	Acute limit	9.621594	33.22406	68.53764	334.2919	
		pass	pass	pass	pass	
	Chronic limit	6.768009	1.294694	62.58526	108.4408	
		pass	pass	pass	pass	
5/27/2004	**Site #6**	3.26	0.2	3.24	0.81	60.1
	Acute limit	10.53221	36.94451	74.34404	361.6291	
		pass	pass	pass	pass	
	Chronic limit	7.346459	1.439674	67.88738	117.3087	
		pass	pass	pass	pass	
5/27/2004	**Site #10**	3.8400	0.2000	16.0000	0.8300	34.2
	Acute limit	6.1918939	19.735686	46.109047	227.8938	
		pass	pass	pass	pass	
	Chronic limit	4.537902	0.7690714	42.104552	73.926393	
		pass	pass	pass	pass	

	Site	Cu (µg/L)	Pb (µg/L)	Zn (µg/L)	Cr (µg/L)	Hardness (mg CaCO3/L)
5/27/2004	**Site #26**	3.42	0.2	1.2	2.14	78.4
	Acute limit	13.52972	49.50125	93.12362	449.5831	
		pass	pass	pass	pass	
	Chronic limit	9.21983	1.928993	85.03598	145.8401	
		pass	pass	pass	pass	
5/27/2004	**Site #32**	13.1	0.2	13.8	12.1	29.4
	Acute limit	5.369588	16.65826	40.5636	201.3453	
		fail	pass	pass	pass	
	Chronic limit	3.987793	0.649148	37.04072	65.31435	
		fail	pass	pass	pass	
5/27/2004	**Site #42**	3.45	0.22	2.4	2.44	62.2
	Acute limit	10.87861	38.37235	76.53929	371.9456	
		pass	pass	pass	pass	
	Chronic limit	7.565257	1.495316	69.89198	120.6553	
		pass	pass	pass	pass	
11/2/2004	**Site #6**	4.09	0.2	6.56	0.79	62.4
	Acute limit	10.91156	38.50854	76.74776	372.9248	
		pass	pass	pass	pass	
	Chronic limit	7.586039	1.500622	70.08235	120.973	
		pass	pass	pass	pass	
11/2/2004	**Site #10**	2.86	0.89	18.8	0.86	60.9
	Acute limit	10.66426	37.48799	75.18169	365.5668	
		pass	pass	pass	pass	
	Chronic limit	7.42994	1.460853	68.65228	118.5861	
		pass	pass	pass	pass	
11/2/2004	**Site #26**	3.23	0.2	3.55	1.3	75.1
	Acute limit	12.99248	47.21955	89.79157	434.0245	
		pass	pass	pass	pass	
	Chronic limit	8.887183	1.840078	81.99332	140.7931	
		pass	pass	pass	pass	
11/2/2004	**Site #32**	6.38	0.2	8.79	3.01	44.3
	Acute limit	7.90143	26.34333	57.41214	281.6889	
		pass	pass	pass	pass	
	Chronic limit	5.660852	1.026562	52.42599	91.37698	
		fail	pass	pass	pass	
11/2/2004	**Site #42**	3.76	0.31	3.72	1.6	104
	Acute limit	17.65684	67.39717	118.3146	566.6507	
		pass	pass	pass	pass	
	Chronic limit	11.73775	2.626371	108.0391	183.8156	
		pass	pass	pass	pass	
12/8/2004	**Site #6**	2.63	0.2	5.43	0.85	61.7
	Acute limit	10.7962	38.03204	76.01765	369.4951	
		pass	pass	pass	pass	
	Chronic limit	7.513261	1.482054	69.41564	119.8604	
		pass	pass	pass	pass	
12/8/2004	**Site #10**	5.3	0.25	26.5	0.97	73.1
	Acute limit	12.66622	45.84009	87.76129	424.535	
		pass	pass	pass	pass	
	Chronic limit	8.684548	1.786322	80.13937	137.7148	

	Site	Cu (µg/L)	Pb (µg/L)	Zn (µg/L)	Cr (µg/L)	Hardness (mg CaCO3/L)
		pass	pass	pass	pass	
12/8/2004	**Site #26**	2.06	0.2	2.79	0.79	78.4
	Acute limit	13.52972	49.50125	93.12362	449.5831	
		pass	pass	pass	pass	
	Chronic limit	9.21983	1.928993	85.03598	145.8401	
		pass	pass	pass	pass	
12/8/2004	**Site #32**	4.83	0.2	26.6	2.52	41.1
	Acute limit	7.36251	24.23283	53.87831	264.912	
		pass	pass	pass	pass	
	Chronic limit	5.309549	0.944319	49.19907	85.9347	
		pass	pass	pass	pass	
12/8/2004	**Site #42**	2.33	0.2	2.99	0.89	92
	Acute limit	15.73059	58.96974	106.6408	512.5159	
		pass	pass	pass	pass	
	Chronic limit	10.57028	2.297966	97.37919	166.255	
		pass	pass	pass	pass	
3/26/2005	**Site #6**	2.58	0.2	4.88	0.6	46.8
	Acute limit	8.320889	28.00177	60.14578	294.6432	
		pass	pass	pass	pass	
	Chronic limit	5.932734	1.091189	54.92222	95.57922	
		pass	pass	pass	pass	
3/26/2005	**Site #10**	4.28	0.22	19.8	0.72	24.9
	Acute limit	4.59159	13.81965	35.23754	175.7326	
		pass	pass	pass	pass	
	Chronic limit	3.460048	0.538532	32.17721	57.00585	
		fail	pass	pass	pass	
3/26/2005	**Site #26**	3.42	0.2	13.3	1.6	71.9
	Acute limit	12.47022	45.01369	86.53907	418.8187	
		pass	pass	pass	pass	
	Chronic limit	8.56258	1.754119	79.02329	135.8605	
		pass	pass	pass	pass	
3/26/2005	**Site #32**	5.42	0.2	13.3	3.84	54.2
	Acute limit	9.555166	32.95463	68.11197	332.2849	
		pass	pass	pass	pass	
	Chronic limit	6.725618	1.284195	62.19655	107.7898	
		pass	pass	pass	pass	
3/26/2005	**Site #42**	4.27	0.23	2.59	1.85	37.6
	Acute limit	6.770272	21.94186	49.96461	246.2884	
		pass	pass	pass	pass	
	Chronic limit	4.920711	0.855043	45.62526	79.89341	
		pass	pass	pass	pass	
5/10/2005	**Site #6**	1.8	0.2	1.8	0.97	110
	Acute limit	18.61505	71.63206	124.0732	593.2882	
		pass	pass	pass	pass	
	Chronic limit	12.31402	2.791399	113.2976	192.4566	
		pass	pass	pass	pass	
5/10/2005	**Site #10**	3.99	0.2	15.5	0.78	98.1
	Acute limit	16.71147	63.24613	112.6022	540.1844	

	Site	Cu (µg/L)	Pb (µg/L)	Zn (µg/L)	Cr (µg/L)	Hardness (mg CaCO3/L)
		pass	pass	pass	pass	
	Chronic limit	11.16634	2.464611	102.8229	175.2302	
		pass	pass	pass	pass	
5/10/2005	**Site #26**	2.05	0.2	1.5	0.8	103
	Acute limit	17.49683	66.69264	117.3499	562.1844	
		pass	pass	pass	pass	
	Chronic limit	11.64124	2.598916	107.1583	182.3668	
		pass	pass	pass	pass	
5/10/2005	**Site #32**	9.02	0.2	11.1	3.01	60.5
	Acute limit	10.59825	37.21618	74.76308	363.5991	
		pass	pass	pass	pass	
	Chronic limit	7.388219	1.450261	68.27003	117.9478	
		fail	pass	pass	pass	
5/10/2005	**Site #42**	2.75	0.24	3.96	1.55	86.3
	Acute limit	14.81063	54.98947	101.0154	486.3601	
		pass	pass	pass	pass	
	Chronic limit	10.00809	2.142861	92.24242	157.7702	
		pass	pass	pass	pass	
11/3/2005	**Site #6**	3.04	0.2	4.24	0.45	56.5
	Acute limit	9.936745	34.50602	70.55316	343.7897	
		pass	pass	pass	pass	
	Chronic limit	6.968755	1.34465	64.42574	111.5218	
		pass	pass	pass	pass	
11/3/2005	**Site #10**	5.16	0.2	20.9	1	50.8
	Acute limit	8.989363	30.67132	64.47393	315.1139	
		pass	pass	pass	pass	
	Chronic limit	6.363417	1.195217	58.87448	102.2197	
		pass	pass	pass	pass	
11/3/2005	**Site #26**	2.28	0.2	0.98	0.88	63
	Acute limit	11.01039	38.91729	77.37258	375.8591	
		pass	pass	pass	pass	
	Chronic limit	7.648325	1.516551	70.6529	121.9248	
		pass	pass	pass	pass	
11/3/2005	**Site #32**	5.38	0.2	14.3	3.51	38.6
	Acute limit	6.939795	22.59446	51.08828	251.6403	
		pass	pass	pass	pass	
	Chronic limit	5.032325	0.880474	46.65134	81.6295	
		fail	pass	pass	pass	
11/3/2005	**Site #42**	2.86	0.2	3.18	0.98	49.3
	Acute limit	8.739055	29.66803	62.8572	307.4728	
		pass	pass	pass	pass	
	Chronic limit	6.202511	1.156121	57.39815	99.74101	
		pass	pass	pass	pass	
12/22/2005	**Site #6**	2	0.28	3.33	0.4	45
	Acute limit	8.019013	26.80687	58.17988	285.3292	
		pass	pass	pass	pass	
	Chronic limit	5.737199	1.044625	53.12705	92.55783	

	Site	Cu (µg/L)	Pb (µg/L)	Zn (µg/L)	Cr (µg/L)	Hardness (mg CaCO3/L)
		pass	pass	pass	pass	
12/22/2005	**Site #10**	6.16	0.36	21.6	1.3	62.2
	Acute limit	10.87861	38.37235	76.53929	371.9456	
		pass	pass	pass	pass	
	Chronic limit	7.565257	1.495316	69.89198	120.6553	
		pass	pass	pass	pass	
12/22/2005	**Site #26**	2.11	0.25	1.6	1	58.3
	Acute limit	10.23474	35.72376	72.45307	352.7343	
		pass	pass	pass	pass	
	Chronic limit	7.158031	1.392104	66.16064	114.4234	
		pass	pass	pass	pass	
12/22/2005	**Site #32**	5.25	0.24	34.6	3.14	39.4
	Acute limit	7.075231	23.11769	51.98401	255.9037	
		pass	pass	pass	pass	
	Chronic limit	5.121313	0.900863	47.46928	83.01251	
		fail	pass	pass	pass	
12/22/2005	**Site #42**	2.41	0.34	2.7	1.1	53.4
	Acute limit	9.422225	32.41627	67.25917	328.2626	
		pass	pass	pass	pass	
	Chronic limit	6.640699	1.263216	61.41783	106.485	
		pass	pass	pass	pass	

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APPENDIX C

Comparison between Average Crustal Metal Concentrations and Average Metal Concentrations in Puget Sound Regional Soils

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Comparison Between Average Crustal Metal Concentrations and Average Metal Concentrations in Puget Sound Regional Soils (all concentrations in mg/kg or parts per million)

Element	Puget Sound Regional Soils (a)	Average Crustal (a)
Aluminum	70,000	81,000
Antimony	<2 (<15)(b)	1
Arsenic	<15 (<100)(b)	5
Barium	500	250
Beryllium	1	6
Cadmium	<1 (<7)(b)	0.15
Calcium	25,000	36,000
Chromium	80	200
Cobalt	10	23
Copper	20	70
Iron	30,000	50,000
Lead	15	16
Magnesium	15,000	21,000
Manganese	700	1,000
Mercury	<1.5 (**)(b)	0.5
Nickel	80	80
Potassium	10,000	26,000
Selenium	<5 (**)(b)	1.09
Silver	<0.7	0.1
Sodium	20,000	28,000
Thallium	1 (**)(b)	**
Tin	<2	40
Vanadium	90	150
Zinc	80	132

(a) These data are compiled from Dexter et al., NOAA Technical Memorandum OMPA-13, 1981 (Table VIII-1) and are supplemented and slightly modified based on discussions with Crecelius (Battelle Marine Sciences Laboratory, Sequim WA).

(b) The values in parentheses are from Dexter et al., 1981. The first values in the Puget Sound Regional Soils column are from Crecelius. The notation ** indicates that data were not provided in Dexter et al. for the element listed.

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APPENDIX D

Raw Water Quality Data from 2004 and 2005 Sampling Events

By King County Water and Land Resources Division (WLRD)

Environmental Laboratory

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April 20, 2004

TO: Liz Ritzenthaler, Aquatic Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY
Samples L31536-1 to 7

Attached is the comprehensive report for the water samples delivered to the laboratory on March 25, 2004. The samples were analyzed in the Organics, Metals and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

Sample Information

Samples L31536-1 through -6 were collected on March 25, 2004 and were received at the laboratory on the same day. The conventionals laboratory analyzed samples L31536-1 through -6 for ortho-phosphorus (ORTHOP), total phosphorus, (TOTP) total nitrogen (TOTN) and total suspended solids (TSS). Sample L31536-6 also was analyzed for pH, turbidity and Winkler dissolved oxygen (WDO).

Sample Containers, Preservation and Holding Times
All of the samples were received in acceptable containers and sufficient volume was provided to perform all of the analyses required for this project, except the nutrients container for L31536-6, which was received empty. An aliquot was poured from the 1-liter container for the TSS analysis into the proper container for the nutrients analyses (ORTHOP, TOTP and TOTN) by the sample manager. The sample was preserved according to King County Environmental Laboratory (KCEL) protocols. Even though the sample was properly preserved and the analyses were done within the holding times, the ORTHOP, TOTP and TOTN results for L31356-6 were qualified with an “H”. The ORTHOP result received the text “Sample sent in improper container.” The TOTP and TOTN results received the text “Aliquot used from non-standard container.” The standard operating procedure (SOP) calls for the nutrients sample to be collected in clean, new containers. The L31356-6 aliquot was taken from a TSS container, which was clean, but not necessarily new. Because of this there is the potential for contamination and the data should be used with caution.

The samples were preserved using established protocols and were analyzed within USEPA and KCEL established holding times.

Analytical Methods

All analyses were performed within established KCEL SOPs.

Calibration and Method QC

Instrument Calibration - Where applicable, instrument calibration was performed before each analytical batch and confirmed by initial calibration verification standards and blanks. All initial and continuing calibration verification standards were within the relevant KCEL control limits. A correlation coefficient of 0.995 or greater was achieved as stated in KCEL calibration requirements. All balances have been monitored daily and calibrated yearly as recommended by the manufacturer. Ovens, incubators, and refrigerators are monitored daily, and temperatures are noted in the logbooks before and after analysis.

Method Blank - All of the method blank results associated with the analysis of each parameter were below the method detection limit.

Spike Blank - All of the spike blank results were within the acceptable range established for each reported parameter.

Laboratory Control Samples - All of the laboratory control sample results were within the acceptable range established for each reported parameter.

Sample QC
Laboratory Duplicates - All of the laboratory duplicate results were within the acceptable range established for each reported parameter.

Matrix Spike - All of the matrix spike recovery results were within the acceptable range established for each reported parameter.

Summary
Except as noted above there were no other problems associated with the preparation and analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

Metals:

Enclosed is the trace metals QC report for seven Mercer Island Water samples that were received in March 2004. The samples were analyzed by ICP-MS for total/dissolved chromium, copper, lead, zinc and for hardness, calc. Hardness was calculated from the concentrations of calcium and magnesium as determined by ICP. A quality control (QC) summary for each of the analytical batches is enclosed.

There were no anomalies associated with the preparation and the analysis of these samples.

The data have passed all other internal QA/QC checks and the data may be used without qualification.

Organics:

Oil, Non-Polar Analysis:
Oil Non-Polar analysis for these samples and QC were performed by SM5520-B, F. There were no anomalies associated with the analysis of these samples.

Herbicide Analyses:
Herbicide analysis was subcontracted to STL Seattle (Sound Analytical). The analysis for these samples and QC were performed by method SW846-8151A modified using gas chromatography-ion trap techniques. The percent recoveries of MCPP, MCPA and Silvex exceeded the lower QC limits for the matrix spike. This lower recoveries is due to the lost of some of the sample during extractions, as was noted by the extractions chemist. No corrective action was taken as there was no remaining sample volume left for reextraction. The recoveries have been flagged “N” by STL. Low level of 2,4-D was detected in sample L31536-1, L31536-4 and L31536-6. Samples L31536-4 and L31536-6 also contained low level of MCPP.

Organophosphorus Pesticides (short list) Analyses:
Organophosphorus pesticide analysis for these samples and QC were performed by method EPA 3520C/8270C using gas chromatography-mass spectrometer/Selective Ion Monitoring (SIM) techniques. The matrix spike duplicate for Ethyl Parathion exceeded the 150 % QA/QC limits. This result is typical for water matrices. The surrogate recovery for this sample was within the QA/QC limits.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification, except where noted above.

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PROJECT: 421195

COMBINED LABS-Liquid

Locator	Sample Depth	Lab ID	Conductivity	Dissolved Oxygen	Orthophosphate Phosphorus	Total Nitrogen	Total Phosphorus	Total Suspended Solids	Turbidity	pH	Antimony, Dissolved, ICP-MS	Arsenic, Dissolved, ICP-MS	Barium, Dissolved, ICP-MS	Chromium, Dissolved, ICP-MS	Copper, Dissolved, ICP-MS	Hardness, Calc	Molybdenum, Dissolved, ICP-MS	Nickel, Dissolved, ICP-MS	Vanadium, Dissolved, ICP-MS	Zinc, Dissolved, ICP-MS	2,4-D	MCPP	Oil, Petro (Non-Polar)
			umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	pH	mg/L	mg/L	mg/L	mg/L	mg/L	mg CaCO3/L	mg/L	mg/L	mg/L	mg/L	ug/L	ug/L	mg/L
MERCERISL06		L31536-1			0.02	0.57	0.053	25								36					4.97		2.4
MERCERISL06		L31536-1										0.0008	0.0047	0.0007	0.0023			0.0014	0.0012	0.0096			
MERCERISL10		L31536-2			0.039	0.83	0.072	20								26.2							
MERCERISL10		L31536-2									0.0005	0.0019	0.0058	0.0007	0.0039			0.0009	0.0012	0.0158			
MERCERISL26		L31536-3			0.033	1.1	0.114	205								66.5							
MERCERISL26		L31536-3										0.0028	0.0054	0.0017	0.0025			0.001	0.0016	0.0012			
MERCERISL32		L31536-4			0.024	0.71	0.065	18								23.5					0.28	0.21	2.8
MERCERISL32		L31536-4										0.0207	0.0049	0.0064	0.0081			0.0007	0.0006	0.0222			
MERCERISL42		L31536-5			0.055	0.92	0.116	62								54.6							
MERCERISL42		L31536-5										0.0045	0.0052	0.0017	0.0026			0.0011	0.0019	0.0022			
MERCERISLDUP		L31536-6	62.5	11	0.04	0.83	0.073	16	17	7.3						28					0.29	0.31	2.8
MERCERISLDUP		L31536-6									0.0005	0.0019	0.0061	0.0007	0.0038		0.0005	0.0009	0.0012	0.0162			

PROJECT: 421195	Locator: MERCERISL06					Locator: MERCERISL06					Locator: MERCERISL10					Locator: MERCERISL10					Locator: MERCERISL26				
	Descrip: R/D FACILITY SOUTH					Descrip: R/D FACILITY SOUTH					Descrip: SE 22ND ST, NEAR M					Descrip: SE 22ND ST, NEAR M					Descrip: FOREST AVE. AND 84				
	Sampled: Mar 25, 2004					Sampled: Mar 25, 2004					Sampled: Mar 25, 2004					Sampled: Mar 25, 2004					Sampled: Mar 25, 2004				
	Lab ID: L31536-1					Lab ID: L31536-1					Lab ID: L31536-2					Lab ID: L31536-2					Lab ID: L31536-3				
	Matrix: STORM WTR					Matrix: FILTER WTR					Matrix: STORM WTR					Matrix: FILTER WTR					Matrix: STORM WTR				
	% Solids:					% Solids:					% Solids:					% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																									
M=CV SM2130-B (03-01-011-003)																									
Turbidity																									
M=CV SM2530-B (03-01-002-003)																									
Conductivity																									
M=CV SM2540-D (03-01-009-002)																									
Total Suspended Solids	25		1	2	mg/L						19.8		1	2	mg/L						205		3.3	6.7	mg/L
M=CV SM4500-O-C (03-03-007-002)																									
Dissolved Oxygen																									
M=CV SM4500-H-B (03-01-003-004)																									
pH																									
M=CV SM4500-N-C (03-03-013-001)																									
Total Nitrogen	0.565		0.05	0.1	mg/L						0.834		0.05	0.1	mg/L						1.1		0.05	0.1	mg/L
M=CV SM4500-P-B,FMOD(03-03-013-001)																									
Total Phosphorus	0.0532		0.01	0.01	mg/L						0.0718		0.01	0.01	mg/L						0.114		0.01	0.01	mg/L
M=CV SM4500-P-F (03-03-032-002)																									
Orthophosphate Phosphorus	0.02		0	0.005	mg/L						0.0385		0	0.005	mg/L						0.033		0	0.005	mg/L
M=MT EPA 200.8 (06-03-004&004A-001)																									
Chromium, Dissolved, ICP-MS						0.00066	<RDL	4E-04	0.002	mg/L						0.00073	<RDL	4E-04	0.002	mg/L					
Chromium, Total, ICP-MS																									
Copper, Dissolved, ICP-MS						0.00229		4E-04	0.002	mg/L						0.00389		4E-04	0.002	mg/L					
Copper, Total, ICP-MS																									
Lead, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L					
Lead, Total, ICP-MS																									
Zinc, Dissolved, ICP-MS						0.00963		5E-04	0.003	mg/L						0.0158		5E-04	0.003	mg/L					
Zinc, Total, ICP-MS																									
M=MT SM2340B,ED19 (06-02-004-002)																									
Hardness, Calc	36		0.2	1.25	mg CaCO3/L						26.2		0.2	1.25	mg CaCO3/L						66.5		0.2	1.25	mg CaCO3/L
M=OR EPA 3520C/8270C (7-3-04-001)																									
Chlorpyrifos		<MDL	0.03	0.05	ug/L							<MDL	0.03	0.049	ug/L							<MDL	0.03	0.05	ug/L
Diazinon		<MDL	0.04	0.05	ug/L							<MDL	0.04	0.049	ug/L							<MDL	0.04	0.05	ug/L
Disulfoton		<MDL	0.03	0.05	ug/L							<MDL	0.03	0.049	ug/L							<MDL	0.03	0.05	ug/L
Malathion		<MDL	0.05	0.05	ug/L							<MDL	0.05	0.049	ug/L							<MDL	0.05	0.05	ug/L
Parathion-Ethyl		<MDL	0.05	0.05	ug/L							<MDL	0.04	0.049	ug/L							<MDL	0.05	0.05	ug/L
Parathion-Methyl		<MDL	0.04	0.05	ug/L							<MDL	0.04	0.049	ug/L							<MDL	0.04	0.05	ug/L
Phorate		<MDL	0.03	0.05	ug/L							<MDL	0.03	0.049	ug/L							<MDL	0.03	0.05	ug/L
M=OR SM5520-B,F (07-03-016-000)																									
Oil, Petro (Non-Polar)	2.4	<RDL	2	5	mg/L							<MDL	2	5	mg/L							<MDL	2	5	mg/L
M=OR SW-846 8151A GCMS MODIFIED																									
2,4,5-T		<MDL	0.02	0.093	ug/L							<MDL	0.02	0.092	ug/L							<MDL	0.02	0.09	ug/L
2,4,5-TP (Silvex)		<MDL	0.05	0.139	ug/L							<MDL	0.05	0.138	ug/L							<MDL	0.05	0.135	ug/L
2,4-D	4.97		0.02	0.093	ug/L							<MDL	0.02	0.092	ug/L							<MDL	0.02	0.09	ug/L
2,4-DB		<MDL	0.03	0.093	ug/L							<MDL	0.03	0.092	ug/L							<MDL	0.03	0.09	ug/L
Dalapon		<MDL	0.02	0.093	ug/L							<MDL	0.02	0.092	ug/L							<MDL	0.02	0.09	ug/L
Dicamba		<MDL	0.03	0.093	ug/L							<MDL	0.03	0.092	ug/L							<MDL	0.03	0.09	ug/L
Dichloroprop		<MDL	0.03	0.093	ug/L							<MDL	0.03	0.092	ug/L							<MDL	0.03	0.09	ug/L
Dinoseb		<MDL	0.05	0.139	ug/L							<MDL	0.05	0.138	ug/L							<MDL	0.05	0.135	ug/L
MCPA		<MDL	0.03	0.139	ug/L							<MDL	0.03	0.138	ug/L							<MDL	0.03	0.135	ug/L
MCPP		<MDL	0.02	0.093	ug/L							<MDL	0.02	0.092	ug/L							<MDL	0.01	0.09	ug/L

PROJECT: 421195	Locator: MERCERISL32					Locator: MERCERISL32					Locator: MERCERISL42					Locator: MERCERISL42					Locator: MERCERISLDUP				
	Descrip: CREEK NEAR HOLLYHI					Descrip: CREEK NEAR HOLLYHI					Descrip: E. MERCER WAY					Descrip: E. MERCER WAY					Descrip: FIELD REPLICATE				
	Sampled: Mar 25, 2004					Sampled: Mar 25, 2004					Sampled: Mar 25, 2004					Sampled: Mar 25, 2004					Sampled: Mar 25, 2004				
	Lab ID: L31536-4					Lab ID: L31536-4					Lab ID: L31536-5					Lab ID: L31536-5					Lab ID: L31536-6				
	Matrix: STORM WTR					Matrix: FILTER WTR					Matrix: STORM WTR					Matrix: FILTER WTR					Matrix: STORM WTR				
	% Solids:					% Solids:					% Solids:					% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																									
M=CV SM2130-B (03-01-011-003)																									
Turbidity																					17		0.5	2	NTU
M=CV SM2530-B (03-01-002-003)																									
Conductivity																					62.5		0.5	10	umhos/cm
M=CV SM2540-D (03-01-009-002)																									
Total Suspended Solids	18.2		0.5	1	mg/L						62		1.1	2.2	mg/L						16		1	2	mg/L
M=CV SM4500-O-C (03-03-007-002)																									
Dissolved Oxygen																					10.5		0.5	1	mg/L
M=CV SM4500-H-B (03-01-003-004)																									
pH																					7.34				pH
M=CV SM4500-N-C (03-03-013-001)																									
Total Nitrogen	0.712		0.05	0.1	mg/L						0.923		0.05	0.1	mg/L						0.834	H	0.05	0.1	mg/L
M=CV SM4500-P-B,FMOD(03-03-013-001)																									
Total Phosphorus	0.0652		0.01	0.01	mg/L						0.116		0.01	0.01	mg/L						0.0731	H	0.01	0.01	mg/L
M=CV SM4500-P-F (03-03-032-002)																									
Orthophosphate Phosphorus	0.0244		0	0.005	mg/L						0.0552		0	0.01	mg/L						0.0397	H	0	0.005	mg/L
M=MT EPA 200.8 (06-03-004&004A-001)																									
Chromium, Dissolved, ICP-MS						0.00644		4E-04	0.002	mg/L						0.0017	<RDL	4E-04	0.002	mg/L					
Chromium, Total, ICP-MS																									
Copper, Dissolved, ICP-MS						0.00814		4E-04	0.002	mg/L						0.00255		4E-04	0.002	mg/L					
Copper, Total, ICP-MS																									
Lead, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L					
Lead, Total, ICP-MS																									
Zinc, Dissolved, ICP-MS						0.0222		5E-04	0.003	mg/L						0.0022	<RDL	5E-04	0.003	mg/L					
Zinc, Total, ICP-MS																									
M=MT SM2340B,ED19 (06-02-004-002)																									
Hardness, Calc	23.5		0.2	1.25	mg CaCO3/L						54.6		0.2	1.25	mg CaCO3/L						28		0.2	1.25	mg CaCO3/L
M=OR EPA 3520C/8270C (7-3-04-001)																									
Chlorpyrifos		<MDL	0.04	0.051	ug/L							<MDL	0.03	0.05	ug/L							<MDL	0.03	0.05	ug/L
Diazinon		<MDL	0.04	0.051	ug/L							<MDL	0.04	0.05	ug/L							<MDL	0.04	0.05	ug/L
Disulfoton		<MDL	0.03	0.051	ug/L							<MDL	0.03	0.05	ug/L							<MDL	0.03	0.05	ug/L
Malathion		<MDL	0.05	0.051	ug/L							<MDL	0.05	0.05	ug/L							<MDL	0.05	0.05	ug/L
Parathion-Ethyl		<MDL	0.05	0.051	ug/L							<MDL	0.05	0.05	ug/L							<MDL	0.05	0.05	ug/L
Parathion-Methyl		<MDL	0.04	0.051	ug/L							<MDL	0.04	0.05	ug/L							<MDL	0.04	0.05	ug/L
Phorate		<MDL	0.03	0.051	ug/L							<MDL	0.03	0.05	ug/L							<MDL	0.03	0.05	ug/L
M=OR SM5520-B,F (07-03-016-000)																									
Oil, Petro (Non-Polar)	2.8	<RDL	2	5	mg/L							<MDL	2	5	mg/L						2.8	<RDL	2	5	mg/L
M=OR SW-846 8151A GCMS MODIFIED																									
2,4,5-T		<MDL	0.02	0.089	ug/L							<MDL	0.02	0.08	ug/L							<MDL	0.02	0.09	ug/L
2,4,5-TP (Silvex)		<MDL	0.05	0.134	ug/L							<MDL	0.04	0.12	ug/L							<MDL	0.05	0.135	ug/L
2,4-D	0.28		0.02	0.089	ug/L							<MDL	0.02	0.08	ug/L						0.289		0.02	0.09	ug/L
2,4-DB		<MDL	0.03	0.089	ug/L							<MDL	0.03	0.08	ug/L							<MDL	0.03	0.09	ug/L
Dalapon		<MDL	0.02	0.089	ug/L							<MDL	0.02	0.08	ug/L							<MDL	0.02	0.09	ug/L
Dicamba		<MDL	0.03	0.089	ug/L							<MDL	0.03	0.08	ug/L							<MDL	0.03	0.09	ug/L
Dichloroprop		<MDL	0.03	0.089	ug/L							<MDL	0.03	0.08	ug/L							<MDL	0.03	0.09	ug/L
Dinoseb		<MDL	0.05	0.134	ug/L							<MDL	0.04	0.12	ug/L							<MDL	0.05	0.135	ug/L
MCPA		<MDL	0.03	0.134	ug/L							<MDL	0.03	0.12	ug/L							<MDL	0.03	0.135	ug/L
MCPP	0.208		0.01	0.089	ug/L							<MDL	0.01	0.08	ug/L						0.313		0.01	0.09	ug/L

PROJECT: 421195	Locator: MERCERISLDUP					Locator: KCO				
	Descrip: FIELD REPLICATE					Descrip: King County Locato				
	Sampled: Mar 25, 2004					Sampled: Mar 25, 2004				
	Lab ID: L31536-6					Lab ID: L31536-7				
	Matrix: FILTER WTR					Matrix: BLANK WTR				
	% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS										
M=CV SM2130-B (03-01-011-003)										
Turbidity										
M=CV SM2530-B (03-01-002-003)										
Conductivity										
M=CV SM2540-D (03-01-009-002)										
Total Suspended Solids										
M=CV SM4500-O-C (03-03-007-002)										
Dissolved Oxygen										
M=CV SM4500-H-B (03-01-003-004)										
pH										
M=CV SM4500-N-C (03-03-013-001)										
Total Nitrogen										
M=CV SM4500-P-B,FMOD(03-03-013-001)										
Total Phosphorus										
M=CV SM4500-P-F (03-03-032-002)										
Orthophosphate Phosphorus										
M=MT EPA 200.8 (06-03-004&004A-001)										
Chromium, Dissolved, ICP-MS	0.00074	<RDL	4E-04	0.002	mg/L					
Chromium, Total, ICP-MS							<MDL	4E-04	0.002	mg/L
Copper, Dissolved, ICP-MS	0.00378		4E-04	0.002	mg/L					
Copper, Total, ICP-MS							<MDL	4E-04	0.002	mg/L
Lead, Dissolved, ICP-MS		<MDL	2E-04	0.001	mg/L					
Lead, Total, ICP-MS							<MDL	2E-04	0.001	mg/L
Zinc, Dissolved, ICP-MS	0.0162		5E-04	0.003	mg/L					
Zinc, Total, ICP-MS							<MDL	5E-04	0.003	mg/L
M=MT SM2340B,ED19 (06-02-004-002)										
Hardness, Calc										
M=OR EPA 3520C/8270C (7-3-04-001)										
Chlorpyrifos										
Diazinon										
Disulfoton										
Malathion										
Parathion-Ethyl										
Parathion-Methyl										
Phorate										
M=OR SM5520-B,F (07-03-016-000)										
Oil, Petro (Non-Polar)										
M=OR SW-846 8151A GCMS MODIFIED										
2,4,5-T										
2,4,5-TP (Silvex)										
2,4-D										
2,4-DB										
Dalapon										
Dicamba										
Dichloroprop										
Dinoseb										
MCPA										
MCPP										

July 6, 2004

TO: Liz Ritzenthaler, Aquatic Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY
Samples L31583-1 to 7

Attached is the comprehensive report for the water samples delivered to the laboratory on May 27, 2004. The samples were analyzed in the Organics, Metals and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

Sample Information
Samples L31583-1 through -6 were collected on May 27, 2004 and were received at the laboratory on the same day. The conventionals laboratory analyzed samples L22835-1 through -5 for ortho-phosphorus, total phosphorus (TOTP), total nitrogen (TOTN), and total suspended solids (TSS). Sample L31583-6 also was analyzed for Winkler dissolved oxygen (WDO), pH, conductivity and turbidity.

Sample Containers, Preservation and Holding Times
All of the samples were received in acceptable containers and sufficient volume was provided to perform all of the analyses required for this project. The samples were preserved using established protocols and were analyzed within USEPA and King County Environmental Laboratory (KCEL) established holding times.

Analytical Methods
All analyses were performed within established KCEL SOPs.

Calibration and Method QC
Instrument Calibration - Where applicable, instrument calibration was performed before each analytical batch and confirmed by initial calibration verification standards and blanks. All initial and continuing calibration verification standards were within the relevant KCEL control limits. A correlation coefficient of 0.995 or greater was achieved as stated in KCEL calibration requirements. All balances have been monitored daily and calibrated yearly as recommended by the manufacturer. Ovens, incubators, and refrigerators are monitored daily, and temperatures are noted in the logbooks before and after analysis.

Method Blank - All of the method blank results associated with the analysis of each parameter were below the method detection limit.

Spike Blank - All of the spike blank results were within the acceptable range established for each reported parameter.

Laboratory Control Samples - All of the laboratory control sample results were within the acceptable range established for each reported parameter.

Sample QC
Laboratory Duplicates - All of the laboratory duplicate results were within the acceptable range established for each reported parameter.

Matrix Spike - All of the matrix spike recovery results were within the acceptable range established for each reported parameter.

Summary
There were no anomalies associated with the preparation and analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

Metals:

Enclosed is the trace metals report for seven Mercer Island Water samples that were received in May, 2004. The samples were analyzed by ICP-MS for total/dissolved chromium, copper, lead, zinc and for hardness, calc. Hardness was calculated from the concentrations of calcium and magnesium as determined by ICP. A quality control (QC) summary for each of the analytical batches is enclosed.

There were no anomalies associated with the preparation and the analysis of these samples.

The data have passed all other internal QA/QC checks and the data may be used without qualification.

Organics:

Oil, Non-Polar Analysis:
Oil Non-Polar analysis for these samples and QC were performed by SM5520-B, F. There were no anomalies associated with the analysis of these samples.

Herbicide Analyses:
Herbicide analysis was subcontracted to STL Seattle (Sound Analytical). The analysis for these samples and QC were performed by method SW846-8151A modified using gas chromatography-ion trap techniques.
Low level 2,4-D is detected in sample L31583-4, and low level of MCPP is detected in sample L31583-6.

Organophosphorus Pesticides (short list) Analyses:
Organophosphorus pesticide analysis for these samples and QC were performed by method EPA 3520C/8270C using gas chromatography-mass spectrometer/Selective Ion Monitoring (SIM) techniques. There were no anomalies associated with the analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification, except where noted above.

PROJECT: 421195CY

COMBINED LABS-Liquid

Locator	Sample Depth	Lab ID	Conductivity umhos/cm	Dissolved Oxygen mg/L	Orthophosphate Phosphorus mg/L	pH pH	Total Nitrogen mg/L	Total Phosphorus mg/L	Total Suspended Solids mg/L	Turbidity NTU	Antimony, Dissolved, ICP-MS ug/L	Arsenic, Dissolved, ICP-MS ug/L	Barium, Dissolved, ICP-MS ug/L	Chromium, Dissolved, ICP-MS ug/L	Copper, Dissolved, ICP-MS ug/L	Hardness, Calc mg CaCO3/L	Lead, Dissolved, ICP-MS ug/L	Molybdenum, Dissolved, ICP-MS ug/L	Nickel, Dissolved, ICP-MS ug/L	Vanadium, Dissolved, ICP-MS ug/L	Zinc, Dissolved, ICP-MS ug/L	2,4-D ug/L	MCPP ug/L	Oil, Petro (Non-Polar) mg/L
MERCERISL06		L31583-1			0.0279		0.714	0.0597	37.4			0.94	7.49	0.83	3.3	60.3			2.13	1.9	3.22			2.7
MERCERISL10		L31583-2			0.0433		0.88	0.08	6.4		0.8	2.81	6.03	1.2	4.95	34.2		1.1	1	1.5	15.5			2.5
MERCERISL26		L31583-3			0.0418		0.979	0.143	176			2.84	6.36	2.14	3.42	78.4	0.2		1.3	2	1.2			2.9
MERCERISL32		L31583-4			0.0362		0.907	0.0942	17.7			26.3	5.98	12.1	13.1	29.4		0.61	0.82	1	13.8	0.804		3.7
MERCERISL42		L31583-5			0.082		1.17	0.161	57.7			4.82	6.02	2.44	3.45	62.2	0.22		1.4	2.47	2.4			3.7
MERCERISLDUP		L31583-6	123	9.7	0.0281	7.71	0.729	0.0599	26.3	14.2		0.87	7.58	0.79	3.22	59.8			2.11	1.81	3.25		2.29	3

PROJECT: 421195CY	Locator: MERCERISL06					Locator: MERCERISL06					Locator: MERCERISL10					Locator: MERCERISL10				
Descrip:	R/D FACILITY SOUTH					R/D FACILITY SOUTH					SE 22ND ST, NEAR M					SE 22ND ST, NEAR M				
Sampled:	May 27, 2004					May 27, 2004					May 27, 2004					May 27, 2004				
Lab ID:	L31583-1					L31583-1					L31583-2					L31583-2				
Matrix:	STORM WTR					FILTER WTR					STORM WTR					FILTER WTR				
% Solids:						% Solids:					% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																				
M=CV SM2130-B (03-01-011-003)																				
Turbidity																				
M=CV SM2510-B (03-01-002-003)																				
Conductivity																				
M=CV SM2540-D (03-01-009-002)																				
Total Suspended Solids	37.4		1	2	mg/L						6.4		0.5	1	mg/L					
M=CV SM4500-O-C (03-03-007-002)																				
Dissolved Oxygen																				
M=CV SM4500-H-B (03-01-003-004)																				
pH																				
M=CV SM4500-N-C (03-03-013-001)																				
Total Nitrogen	0.714		0.05	0.1	mg/L						0.88		0.05	0.1	mg/L					
M=CV SM4500-P-B,FMOD(03-03-013-001)																				
Total Phosphorus	0.0597		0.01	0.01	mg/L						0.08		0.01	0.01	mg/L					
M=CV SM4500-P-F (03-03-012-002)																				
Orthophosphate Phosphorus	0.0279		0	0.005	mg/L						0.0433		0	0.01	mg/L					
M=MT EPA 200.8 (06-03-004&004A-001)																				
Antimony, Dissolved, ICP-MS							<MDL	5E-04	0.003	mg/L						0.0008	<RDL	5E-04	0.003	mg/L
Antimony, Total, ICP-MS																				
Arsenic, Dissolved, ICP-MS						0.00094	<RDL	5E-04	0.003	mg/L						0.00281		5E-04	0.003	mg/L
Arsenic, Total, ICP-MS																				
Barium, Dissolved, ICP-MS						0.00749		2E-04	0.001	mg/L						0.00603		2E-04	0.001	mg/L
Barium, Total, ICP-MS																				
Beryllium, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Beryllium, Total, ICP-MS																				
Cadmium, Dissolved, ICP-MS							<MDL	1E-04	5E-04	mg/L							<MDL	1E-04	5E-04	mg/L
Cadmium, Total, ICP-MS																				
Chromium, Dissolved, ICP-MS						0.00083	<RDL	4E-04	0.002	mg/L						0.0012	<RDL	4E-04	0.002	mg/L
Chromium, Total, ICP-MS																				
Cobalt, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Cobalt, Total, ICP-MS																				
Copper, Dissolved, ICP-MS						0.0033		4E-04	0.002	mg/L						0.00495		4E-04	0.002	mg/L
Copper, Total, ICP-MS																				
Lead, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Lead, Total, ICP-MS																				
Molybdenum, Dissolved, ICP-MS							<MDL	5E-04	0.003	mg/L						0.0011	<RDL	5E-04	0.003	mg/L
Molybdenum, Total, ICP-MS																				
Nickel, Dissolved, ICP-MS						0.00213		3E-04	0.002	mg/L						0.001	<RDL	3E-04	0.002	mg/L
Nickel, Total, ICP-MS																				
Selenium, Dissolved, ICP-MS							<MDL	0.002	0.008	mg/L							<MDL	0.002	0.008	mg/L
Selenium, Total, ICP-MS																				
Silver, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Silver, Total, ICP-MS																				
Thallium, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Thallium, Total, ICP-MS																				
Vanadium, Dissolved, ICP-MS						0.0019		3E-04	0.002	mg/L						0.0015	RDL	3E-04	0.002	mg/L
Vanadium, Total, ICP-MS																				
Zinc, Dissolved, ICP-MS						0.00322		5E-04	0.003	mg/L						0.0155		5E-04	0.003	mg/L
Zinc, Total, ICP-MS																				
M=MT SM2340B.ED19 (06-02-004-002)																				
Hardness, Calc	60.3		0.2	1.25	mg CaCO3/L						34.2		0.2	1.25	mg CaCO3/L					
M=OR EPA 3520C/8270C (7-3-04-001)																				
Chlorpyrifos		<MDL	0.03	0.05	ug/L							<MDL	0.03	0.05	ug/L					
Diazinon		<MDL	0.04	0.05	ug/L							<MDL	0.04	0.05	ug/L					
Disulfoton		<MDL	0.03	0.05	ug/L							<MDL	0.03	0.05	ug/L					
Malathion		<MDL	0.05	0.05	ug/L							<MDL	0.05	0.05	ug/L					
Parathion-Ethyl		<MDL	0.05	0.05	ug/L							<MDL	0.05	0.05	ug/L					
Parathion-Methyl		<MDL	0.04	0.05	ug/L							<MDL	0.04	0.05	ug/L					
Phorate		<MDL	0.03	0.05	ug/L							<MDL	0.03	0.05	ug/L					
M=OR SM5520-B,F (07-03-036-000)																				
Oil, Petro (Non-Polar)	2.7	<RDL	2	5	mg/L						2.5	<RDL	2	5	mg/L					
M=OR SW-846 8151A GCMS MODIFIED																				
2,4,5-T		<MDL	0.03	0.08	ug/L							<MDL	0.03	0.08	ug/L					
2,4,5-TP (Silvex)		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L					
2,4-D		<MDL	0.01	0.08	ug/L							<MDL	0.01	0.08	ug/L					
2,4-DB		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L					
Dalapon		<MDL	0.03	0.08	ug/L							<MDL	0.03	0.08	ug/L					
Dicamba		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L					
Dichloroprop		<MDL	0.04	0.08	ug/L							<MDL	0.04	0.08	ug/L					
Dinoseb		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L					
MCPA		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L					
MCPP		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L					

PROJECT: 421195CY	Locator: MERCERISL26					Locator: MERCERISL26					Locator: MERCERISL32					Locator: MERCERISL32				
Descrip:	FOREST AVE. AND 84					FOREST AVE. AND 84					CREEK NEAR HOLLY HI					CREEK NEAR HOLLY HI				
Sampled:	May 27, 2004					May 27, 2004					May 27, 2004					May 27, 2004				
Lab ID:	L31583-3					L31583-3					L31583-4					L31583-4				
Matrix:	STORM WTR					FILTER WTR					STORM WTR					FILTER WTR				
% Solids:						% Solids:					% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																				
M=CV SM2130-B (03-01-011-003)																				
Turbidity																				
M=CV SM2510-B (03-01-002-003)																				
Conductivity																				
M=CV SM2540-D (03-01-009-002)																				
Total Suspended Solids											17.7		0.5	1	mg/L					
M=CV SM4500-O-C (03-03-007-002)																				
Dissolved Oxygen																				
M=CV SM4500-H-B (03-01-003-004)																				
pH																				
M=CV SM4500-N-C (03-03-013-001)																				
Total Nitrogen											0.907		0.05	0.1	mg/L					
M=CV SM4500-P-B,FMOD(03-03-013-001)																				
Total Phosphorus											0.0942		0.01	0.01	mg/L					
M=CV SM4500-P-F (03-03-012-002)																				
Orthophosphate Phosphorus											0.0362		0	0.005	mg/L					
M=MT EPA 200.8 (06-03-004&004A-001)																				
Antimony, Dissolved, ICP-MS							<MDL	5E-04	0.003	mg/L							<MDL	5E-04	0.003	mg/L
Antimony, Total, ICP-MS																				
Arsenic, Dissolved, ICP-MS						0.00284		5E-04	0.003	mg/L						0.0263		5E-04	0.003	mg/L
Arsenic, Total, ICP-MS																				
Barium, Dissolved, ICP-MS						0.00636		2E-04	0.001	mg/L						0.00598		2E-04	0.001	mg/L
Barium, Total, ICP-MS																				
Beryllium, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Beryllium, Total, ICP-MS																				
Cadmium, Dissolved, ICP-MS							<MDL	1E-04	5E-04	mg/L							<MDL	1E-04	5E-04	mg/L
Cadmium, Total, ICP-MS																				
Chromium, Dissolved, ICP-MS						0.00214		4E-04	0.002	mg/L						0.0121		4E-04	0.002	mg/L
Chromium, Total, ICP-MS																				
Cobalt, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Cobalt, Total, ICP-MS																				
Copper, Dissolved, ICP-MS						0.00342		4E-04	0.002	mg/L						0.0131		4E-04	0.002	mg/L
Copper, Total, ICP-MS																				
Lead, Dissolved, ICP-MS						0.0002	<RDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Lead, Total, ICP-MS																				
Molybdenum, Dissolved, ICP-MS							<MDL	5E-04	0.003	mg/L						0.00061	<RDL	5E-04	0.003	mg/L
Molybdenum, Total, ICP-MS																				
Nickel, Dissolved, ICP-MS						0.0013	<RDL	3E-04	0.002	mg/L						0.00082	<RDL	3E-04	0.002	mg/L
Nickel, Total, ICP-MS																				
Selenium, Dissolved, ICP-MS							<MDL	0.002	0.008	mg/L							<MDL	0.002	0.008	mg/L
Selenium, Total, ICP-MS																				
Silver, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Silver, Total, ICP-MS																				
Thallium, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L
Thallium, Total, ICP-MS																				
Vanadium, Dissolved, ICP-MS						0.002		3E-04	0.002	mg/L						0.001	<RDL	3E-04	0.002	mg/L
Vanadium, Total, ICP-MS																				
Zinc, Dissolved, ICP-MS						0.0012	<RDL	5E-04	0.003	mg/L						0.0138		5E-04	0.003	mg/L
Zinc, Total, ICP-MS																				
M=MT SM2340B.ED19 (06-02-004-002)																				
Hardness, Calc											29.4		0.2	1.25	mg CaCO3/L					
M=OR EPA 3520C/8270C (7-3-04-001)																				
Chlorpyrifos												<MDL	0.03	0.048	ug/L					
Diazinon												<MDL	0.04	0.048	ug/L					
Disulfoton												<MDL	0.03	0.048	ug/L					
Malathion												<MDL	0.05	0.048	ug/L					
Parathion-Ethyl												<MDL	0.04	0.048	ug/L					
Parathion-Methyl												<MDL	0.04	0.048	ug/L					
Phorate												<MDL	0.03	0.048	ug/L					
M=OR SM5520-B,F (07-03-036-000)																				
Oil, Petro (Non-Polar)											3.7	<RDL	2	5	mg/L					
M=OR SW-846 8151A GCMS MODIFIED																				
2,4,5-T												<MDL	0.03	0.08	ug/L					
2,4,5-TP (Silvex)												<MDL	0.02	0.08	ug/L					
2,4-D											0.804		0.01	0.08	ug/L					
2,4-DB												<MDL	0.02	0.08	ug/L					
Dalapon												<MDL	0.03	0.08	ug/L					
Dicamba												<MDL	0.02	0.08	ug/L					
Dichloroprop												<MDL	0.04	0.08	ug/L					
Dinoseb												<MDL	0.02	0.08	ug/L					
MCPA												<MDL	0.02	0.08	ug/L					
MCPP												<MDL	0.02	0.08	ug/L					

PROJECT: 421195CY	Locator: MERCERISL42					Locator: MERCERISL42					Locator: MERCERISLDUP					Locator: MERCERISLDUP					Locator: KCO				
Descrip:	E. MERCER WAY					E. MERCER WAY					FIELD REPLICATE					FIELD REPLICATE					King County Locato				
Sampled:	May 27, 2004					May 27, 2004					May 27, 2004					May 27, 2004					May 27, 2004				
Lab ID:	L31583-5					L31583-5					L31583-6					L31583-6					L31583-7				
Matrix:	STORM WTR					FILTER WTR					STORM WTR					FILTER WTR					BLANK WTR				
% Solids:						% Solids:					% Solids:					% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																									
M=CV SM2130-B (03-01-011-003)																									
Turbidity											14.2		0.5	2	NTU										
M=CV SM2510-B (03-01-002-003)																									
Conductivity											123		0.5	10	umhos/cm										
M=CV SM2540-D (03-01-009-002)																									
Total Suspended Solids	57.7		1.7	3.3	mg/L						26.3		0.5	1	mg/L										
M=CV SM4500-O-C (03-03-007-002)																									
Dissolved Oxygen											9.7		0.5	1	mg/L										
M=CV SM4500-H-B (03-01-003-004)																									
pH											7.71				pH										
M=CV SM4500-N-C (03-03-013-001)																									
Total Nitrogen	1.17		0.05	0.1	mg/L						0.729		0.05	0.1	mg/L										
M=CV SM4500-P-B,FMOD(03-03-013-001)																									
Total Phosphorus	0.161		0.01	0.01	mg/L						0.0599		0.01	0.01	mg/L										
M=CV SM4500-P-F (03-03-012-002)																									
Orthophosphate Phosphorus	0.082		0	0.005	mg/L						0.0281		0	0.01	mg/L										
M=MT EPA 200.8 (06-03-004&004A-001)																									
Antimony, Dissolved, ICP-MS							<MDL	5E-04	0.003	mg/L							<MDL	5E-04	0.003	mg/L					
Antimony, Total, ICP-MS																						<MDL	5E-04	0.003	mg/L
Arsenic, Dissolved, ICP-MS						0.00482		5E-04	0.003	mg/L						0.00087	<RDL	5E-04	0.003	mg/L					
Arsenic, Total, ICP-MS																						<MDL	5E-04	0.003	mg/L
Barium, Dissolved, ICP-MS						0.00602		2E-04	0.001	mg/L						0.00758		2E-04	0.001	mg/L					
Barium, Total, ICP-MS																						<MDL	2E-04	0.001	mg/L
Beryllium, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L					
Beryllium, Total, ICP-MS																						<MDL	2E-04	0.001	mg/L
Cadmium, Dissolved, ICP-MS							<MDL	1E-04	5E-04	mg/L							<MDL	1E-04	5E-04	mg/L					
Cadmium, Total, ICP-MS																						<MDL	1E-04	5E-04	mg/L
Chromium, Dissolved, ICP-MS						0.00244		4E-04	0.002	mg/L						0.00079	<RDL	4E-04	0.002	mg/L					
Chromium, Total, ICP-MS																						<MDL	4E-04	0.002	mg/L
Cobalt, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L					
Cobalt, Total, ICP-MS																						<MDL	2E-04	0.001	mg/L
Copper, Dissolved, ICP-MS						0.00345		4E-04	0.002	mg/L						0.00322		4E-04	0.002	mg/L					
Copper, Total, ICP-MS																						<MDL	4E-04	0.002	mg/L
Lead, Dissolved, ICP-MS						0.00022	<RDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L					
Lead, Total, ICP-MS																						<MDL	2E-04	0.001	mg/L
Molybdenum, Dissolved, ICP-MS							<MDL	5E-04	0.003	mg/L							<MDL	5E-04	0.003	mg/L					
Molybdenum, Total, ICP-MS																						<MDL	5E-04	0.003	mg/L
Nickel, Dissolved, ICP-MS						0.0014	<RDL	3E-04	0.002	mg/L						0.00211		3E-04	0.002	mg/L					
Nickel, Total, ICP-MS																						<MDL	3E-04	0.002	mg/L
Selenium, Dissolved, ICP-MS							<MDL	0.002	0.008	mg/L							<MDL	0.002	0.008	mg/L					
Selenium, Total, ICP-MS																						<MDL	0.002	0.008	mg/L
Silver, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L					
Silver, Total, ICP-MS																						<MDL	2E-04	0.001	mg/L
Thallium, Dissolved, ICP-MS							<MDL	2E-04	0.001	mg/L							<MDL	2E-04	0.001	mg/L					
Thallium, Total, ICP-MS																						<MDL	2E-04	0.001	mg/L
Vanadium, Dissolved, ICP-MS						0.00247		3E-04	0.002	mg/L						0.00181		3E-04	0.002	mg/L					
Vanadium, Total, ICP-MS																						<MDL	3E-04	0.002	mg/L
Zinc, Dissolved, ICP-MS						0.0024	<RDL	5E-04	0.003	mg/L						0.00325		5E-04	0.003	mg/L					
Zinc, Total, ICP-MS																						<MDL	5E-04	0.003	mg/L
M=MT SM2340B.ED19 (06-02-004-002)																									
Hardness, Calc	62.2		0.2	1.25	mg CaCO3/L						59.8		0.2	1.25	mg CaCO3/L										
M=OR EPA 3520C/8270C (7-3-04-001)																									
Chlorpyrifos		<MDL	0.03	0.049	ug/L							<MDL	0.03	0.05	ug/L										
Diazinon		<MDL	0.04	0.049	ug/L							<MDL	0.04	0.05	ug/L										
Disulfoton		<MDL	0.03	0.049	ug/L							<MDL	0.03	0.05	ug/L										
Malathion		<MDL	0.05	0.049	ug/L							<MDL	0.05	0.05	ug/L										
Parathion-Ethyl		<MDL	0.04	0.049	ug/L							<MDL	0.04	0.05	ug/L										
Parathion-Methyl		<MDL	0.04	0.049	ug/L							<MDL	0.04	0.05	ug/L										
Phorate		<MDL	0.03	0.049	ug/L							<MDL	0.03	0.05	ug/L										
M=OR SM5520-B,F (07-03-036-000)																									
Oil, Petro (Non-Polar)	3.7	<RDL	2	5	mg/L						3	<RDL	2	5	mg/L										
M=OR SW-846 8151A GCMS MODIFIED																									
2,4,5-T		<MDL	0.03	0.08	ug/L							<MDL	0.03	0.08	ug/L										
2,4,5-TP (Silvex)		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L										
2,4-D		<MDL	0.01	0.08	ug/L							<MDL	0.01	0.08	ug/L										
2,4-DB		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L										
Dalapon		<MDL	0.03	0.08	ug/L							<MDL	0.03	0.08	ug/L										
Dicamba		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L										
Dichloroprop		<MDL	0.04	0.08	ug/L							<MDL	0.04	0.08	ug/L										
Dinoseb		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L										
MCPA		<MDL	0.02	0.08	ug/L							<MDL	0.02	0.08	ug/L										
MCPP		<MDL	0.02	0.08	ug/L						2.29		0.02	0.08	ug/L										

December 9, 2004

TO: Fran Solomon, Senior Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY
Samples L32141-1 to 7

Attached is the comprehensive report for the water samples delivered to the laboratory on November 2, 2004. The samples were analyzed in the Organics, Metals and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

There were no anomalies associated with the preparation and analysis of these samples.

Metals:
There were no anomalies associated with the preparation and the analysis of these samples.

Organics:

Oil, Non-Polar Analysis:
There were no anomalies associated with the analysis of these samples.

Herbicide Analyses:
There were no anomalies associated with the analysis of these samples.

Organophosphorus Pesticides (short list) Analyses:
Surrogate recoveries for sample L32141-2, and its matrix spike and matrix spike duplicate exceeded the QA/QC limits due to matrix interference. Spike recoveries for Parathion – Ethyl in the matrix spike/matrix spike duplicate also exceeded the QA/QC limits. No target compounds were detected in any of the samples. No corrective action was taken.

WTPH-HCID Analyses:
There were no anomalies associated with the analysis of these samples.

WTPH-DX Analyses:
There were no anomalies associated with the analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification, except where noted above.

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PROJECT: 421195

COMBINED LABS-Liquid

Locator	Sample Depth	Lab ID	Conductivity umhos/cm	Dissolved Oxygen mg/L	Orthophosphate Phosphorus mg/L	Total Nitrogen mg/L	Total Phosphorus mg/L	Total Suspended Solids mg/L	Turbidity NTU	pH pH	Arsenic, Dissolved, ICP-MS mg/L	Chromium, Dissolved, ICP-MS mg/L	Copper, Dissolved, ICP-MS mg/L	Hardness, Calc mg CaCO3/L	Lead, Dissolved, ICP-MS mg/L	Zinc, Dissolved, ICP-MS mg/L	2,4-D ug/L	Lube Oil Range (>C24) mg/L	Oil, Petro (Non-Polar) mg/L
MERCERISL06		L32141-1			0.0387	1.75	0.11	109			0.001	0.00079	0.00409	62.4		0.00656			3.8
MERCERISL10		L32141-2			0.0942	1.93	0.182	38			0.0022	0.00086	0.00286	60.9	0.00089	0.0188	0.514	7.8	4.2
MERCERISL26		L32141-3			0.0572	2.05	0.223	281			0.0018	0.0013	0.00323	75.1		0.00355			6.95
MERCERISL32		L32141-4			0.0425	1.21	0.101	30.8			0.0087	0.00301	0.00638	44.3		0.00879			4.9
MERCERISL42		L32141-5			0.0706	2.24	0.272	641			0.0018	0.0016	0.00393	121	0.00035	0.00355			6.77
MERCERISLDUP		L32141-6	120	10.5	0.0733	2.2	0.279	480	122	7.46	0.0018	0.0015	0.00359	87	0.00027	0.00388			9.04

PROJECT: 421195	Locator:	MERCERISL06				Locator:	MERCERISL10				Locator:	MERCERISL26				Locator:	MERCERISL32				Locator:	MERCERISL42				Locator:	MERCERISLDUP				Locator:	KCO			
	Descrip:	R/D FACILITY SOUTH				Descrip:	SE 22ND ST, NEAR M				Descrip:	FOREST AVE. AND 84				Descrip:	CREEK NEAR HOLLYHI				Descrip:	E. MERCER WAY				Descrip:	FIELD REPLICATE				Descrip:	King County Locato			
	Sampled:	Nov 02, 2004				Sampled:	Nov 02, 2004				Sampled:	Nov 02, 2004				Sampled:	Nov 02, 2004				Sampled:	Nov 02, 2004				Sampled:	Nov 02, 2004				Sampled:	Nov 02, 2004			
	Lab ID:	L32141-1				Lab ID:	L32141-2				Lab ID:	L32141-3				Lab ID:	L32141-4				Lab ID:	L32141-5				Lab ID:	L32141-6				Lab ID:	L32141-7			
	Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	BLANK WTR			
	% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:			
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																																		
M=CV SM2130-B (03-01-011-003)																																		
Turbidity																										122		0.5	2	NTU					
M=CV SM2510-B (03-01-002-003)																																		
Conductivity																										120		0.5	10	umhos/cm					
M=CV SM2540-D (03-01-009-002)																																		
Total Suspended Solids	109		1.7	3.3	mg/L	38		1.7	3.3	mg/L	281		5	10	mg/L	30.8		1.3	2.5	mg/L	641		6.7	13	mg/L	480		5	10	mg/L					
M=CV SM4500-0-C (03-03-007-002)																																		
Dissolved Oxygen																										10.5		0.5	1	mg/L					
M=CV SM4500-H-B (03-01-003-004)																																		
pH																										7.46				pH					
M=CV SM4500-N-C (03-03-013-001)																																		
Total Nitrogen	1.75		0.05	0.1	mg/L	1.93		0.05	0.1	mg/L	2.05		0.05	0.1	mg/L	1.21		0.05	0.1	mg/L	2.24		0.05	0.1	mg/L	2.2		0.05	0.1	mg/L					
M=CV SM4500-P-B,FMOD(03-03-013-001)																																		
Total Phosphorus	0.11		0.005	0.01	mg/L	0.182		0.005	0.01	mg/L	0.223		0.005	0.01	mg/L	0.101		0.005	0.01	mg/L	0.272		0.005	0.01	mg/L	0.279		0.005	0.01	mg/L					
M=CV SM4500-P-F (03-03-012-002)																																		
Orthophosphate Phosphorus	0.0387		0.002	0.005	mg/L	0.0942		0.002	0.005	mg/L	0.0572		0.002	0.005	mg/L	0.0425		0.002	0.005	mg/L	0.0706		0.002	0.005	mg/L	0.0733		0.002	0.005	mg/L					
M=MT EPA 200.8 (06-03-004&004A-001)																																		
Arsenic, Dissolved, ICP-MS	0.001	<RDL	0.0005	0.0025	mg/L	0.0022	<RDL	0.0005	0.0025	mg/L	0.0018	<RDL	0.0005	0.0025	mg/L	0.0087		0.0005	0.0025	mg/L	0.0018	<RDL	0.0005	0.0025	mg/L	0.0018	<RDL	0.0005	0.0025	mg/L					
Chromium, Dissolved, ICP-MS	0.00079	<RDL	0.0004	0.002	mg/L	0.00086	<RDL	0.0004	0.002	mg/L	0.0013	<RDL	0.0004	0.002	mg/L	0.00301		0.0004	0.002	mg/L	0.0016	<RDL	0.0004	0.002	mg/L	0.0015	<RDL	0.0004	0.002	mg/L					
Chromium, Total, ICP-MS																																<MDL	0.0004	0.002	mg/L
Copper, Dissolved, ICP-MS	0.00409		0.0004	0.002	mg/L	0.00286		0.0004	0.002	mg/L	0.00323		0.0004	0.002	mg/L	0.00638		0.0004	0.002	mg/L	0.00393		0.0004	0.002	mg/L	0.00359		0.0004	0.002	mg/L					
Copper, Total, ICP-MS																																<MDL	0.0004	0.002	mg/L
Lead, Dissolved, ICP-MS		<MDL	0.0002	0.001	mg/L	0.00089	<RDL	0.0002	0.001	mg/L		<MDL	0.0002	0.001	mg/L		<MDL	0.0002	0.001	mg/L	0.00035	<RDL	0.0002	0.001	mg/L	0.00027	<RDL	0.0002	0.001	mg/L					
Lead, Total, ICP-MS																																<MDL	0.0002	0.001	mg/L
Zinc, Dissolved, ICP-MS	0.00656		0.0005	0.0025	mg/L	0.0188		0.0005	0.0025	mg/L	0.00355		0.0005	0.0025	mg/L	0.00879		0.0005	0.0025	mg/L	0.00355		0.0005	0.0025	mg/L	0.00388		0.0005	0.0025	mg/L					
Zinc, Total, ICP-MS																																<MDL	0.0005	0.0025	mg/L
M=MT SM2340B.ED19 (06-02-004-002)																																		
Hardness, Calc	62.4		0.2	1.25	mg CaCO3/L	60.9		0.2	1.25	mg CaCO3/L	75.1		0.2	1.25	mg CaCO3/L	44.3		0.2	1.25	mg CaCO3/L	121		0.2	1.25	mg CaCO3/L	87		0.2	1.25	mg CaCO3/L					
M=OR EPA 3520C/8270C (7-3-04-001)																																		
Chlorpyrifos		<MDL	0.032	0.0472	ug/L		<MDL	0.032	0.0472	ug/L		<MDL	0.032	0.0472	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0472	ug/L		<MDL	0.032	0.0476	ug/L					
Diazinon		<MDL	0.041	0.0472	ug/L		<MDL	0.041	0.0472	ug/L		<MDL	0.041	0.0472	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0472	ug/L		<MDL	0.041	0.0476	ug/L					
Disulfoton		<MDL	0.025	0.0472	ug/L		<MDL	0.025	0.0472	ug/L		<MDL	0.025	0.0472	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.025	0.0472	ug/L		<MDL	0.026	0.0476	ug/L					
Malathion		<MDL	0.045	0.0472	ug/L		<MDL	0.045	0.0472	ug/L		<MDL	0.045	0.0472	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.045	0.0472	ug/L		<MDL	0.046	0.0476	ug/L					
Parathion-Ethyl		<MDL	0.042	0.0472	ug/L		<MDL	0.042	0.0472	ug/L		<MDL	0.042	0.0472	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.042	0.0472	ug/L		<MDL	0.043	0.0476	ug/L					
Parathion-Methyl		<MDL	0.034	0.0472	ug/L		<MDL	0.034	0.0472	ug/L		<MDL	0.034	0.0472	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0472	ug/L		<MDL	0.034	0.0476	ug/L					
Phorate		<MDL	0.031	0.0472	ug/L		<MDL	0.031	0.0472	ug/L		<MDL	0.031	0.0472	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0472	ug/L		<MDL	0.031	0.0476	ug/L					
M=OR SM5520-B,F (07-03-016-000)																																		
Oil, Petro (Non-Polar)	3.8	<RDL	2	5	mg/L	4.2	<RDL	2	5	mg/L	6.95		2	5	mg/L	4.9	<RDL	2	5	mg/L	6.77		2	5	mg/L	9.04		2	5	mg/L					
M=OR SW-846 8151A GCMS MODIFIED																																		
2,4,5-T		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L					
2,4,5-TP (Silvex)		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L					
2,4-D		<MDL	0.014	0.08	ug/L	0.514		0.014	0.08	ug/L		<MDL	0.014	0.08	ug/L		<MDL	0.014	0.08	ug/L		<MDL	0.014	0.08	ug/L		<MDL	0.014	0.08	ug/L					
2,4-DB		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L					
Dalapon		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L					
Dicamba		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L					
Dichloroprop		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L					
Dinoseb		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L					
MCPA		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L					
MCPP		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L					
M=OR WDOE NWTPH-DX (7-3-06-001)																																		
Lube Oil Range (>C24)						7.8		0.19	0.19	mg/L																								
M=OR WDOE NWTPH-HCID (7-3-05-001)																																		
Diesel Range (>C12 Thru C24)		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L					
Gasoline Range (C7 Thru C12)		<MDL	0.094	0.094	mg/L		<MDL	0.094	0.094	mg/L		<MDL	0.094	0.094	mg/L		<MDL	0.095	0.095	mg/L		<MDL	0.094	0.094	mg/L		<MDL	0.095	0.095	mg/L					
Lube Oil Range (>C24)		<MDL	0.47	0.47	mg/L		P	0.47	0.47	mg/L		<MDL	0.47	0.47	mg/L		<MDL	0.48	0.48	mg/L		<MDL	0.47	0.47	mg/L		<MDL	0.48	0.48	mg/L					

January 18, 2005

TO: Fran Solomon, Senior Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY, Mercer Island Sediments
Samples L33957-1- 7

Attached is the comprehensive report for the sediment samples delivered to the laboratory on December 8, 2004. The samples were analyzed in the Organics, Metals and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

There were no anomalies associated with the preparation and analysis of these samples. The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

Metals:

The data have passed all QA/QC checks and the data may be used without qualification

Organics:

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

If you have any questions or need additional information, please call me at 684-2327.

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PROJECT: 421195

COMBINED LABS-Liquid

Locator	Sample Depth	Lab ID	Conductivity	Dissolved Oxygen	Orthophosphate Phosphorus	Total Nitrogen	Total Phosphorus	Total Suspended Solids	Turbidity	pH	Arsenic, Dissolved, ICP-MS	Barium, Dissolved, ICP-MS	Chromium, Dissolved, ICP-MS	Copper, Dissolved, ICP-MS	Hardness, Calc	Lead, Dissolved, ICP-MS	Molybdenum, Dissolved, ICP-MS	Nickel, Dissolved, ICP-MS	Vanadium, Dissolved, ICP-MS	Zinc, Dissolved, ICP-MS	2,4-D	Oil, Petro (Non-Polar)
			umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	pH	ug/L	ug/L	ug/L	ug/L	mg CaCO3/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L
MERCERISL06		L33957-1			0.0307	1.39	0.117	145			0.96	8.03	0.85	2.63	61.7		52.1	2.98	1.5	5.43		2.4
MERCERISL10		L33957-2			0.118	2.17	0.171	11.4			2.4	13.6	0.97	5.3	73.1	0.25	0.53	2.92	1.67	26.5		
MERCERISL26		L33957-3			0.0349	1.55	0.0791	41.2			1.5	8.51	0.79	2.06	78.4			1.3	1.66	2.79	1.11	
MERCERISL32		L33957-4			0.0286	1.55	0.131	99.2			8.15	8.76	2.59	4.71	41			0.91	0.56	25.5		2.8
MERCERISL42		L33957-5			0.0555	2.75	0.423	866			2	4.81	0.89	2.33	92			1.1	2.12	2.99		5.05
MERCERISLDUP		L33957-6	86.4	11.5	0.0303	1.57	0.118	74	40.4	7.2	7.81	8.95	2.45	4.94	41.1			0.93	0.53	27.6		2.6

PROJECT: 421195	Locator:	MERCERISL06				Locator:	MERCERISL10			
	Descrip:	R/D FACILITY SOUTH				Descrip:	SE 22ND ST, NEAR M			
	Sampled:	Dec 08, 2004				Sampled:	Dec 08, 2004			
	Lab ID:	L33957-1				Lab ID:	L33957-2			
	Matrix:	STORM WTR				Matrix:	STORM WTR			
	% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS										
M=CV SM2130-B (03-01-011-003)										
Turbidity										
M=CV SM2510-B (03-01-002-003)										
Conductivity										
M=CV SM2540-D (03-01-009-002)										
Total Suspended Solids	145		2.5	5	mg/L	11.4		1	2	mg/L
M=CV SM4500-0-C (03-03-007-002)										
Dissolved Oxygen										
M=CV SM4500-H-B (03-01-003-004)										
pH										
M=CV SM4500-N-C (03-03-013-001)										
Total Nitrogen	1.39		0.05	0.1	mg/L	2.17		0.05	0.1	mg/L
M=CV SM4500-P-B,FMOD(03-03-013-001)										
Total Phosphorus	0.117		0.005	0.01	mg/L	0.171		0.005	0.01	mg/L
M=CV SM4500-P-F (03-03-012-002)										
Orthophosphate Phosphorus	0.0307		0.002	0.005	mg/L	0.118		0.002	0.005	mg/L
M=MT EPA 200.8 (06-03-004&004A-001)										
Antimony, Dissolved, ICP-MS		<MDL	0.5	2.5	ug/L		<MDL	0.5	2.5	ug/L
Antimony, Total, ICP-MS										
Arsenic, Dissolved, ICP-MS	0.96	<RDL	0.5	2.5	ug/L	2.4	<RDL	0.5	2.5	ug/L
Arsenic, Total, ICP-MS										
Barium, Dissolved, ICP-MS	8.03		0.2	1	ug/L	13.6		0.2	1	ug/L
Barium, Total, ICP-MS										
Beryllium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Beryllium, Total, ICP-MS										
Cadmium, Dissolved, ICP-MS		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L
Cadmium, Total, ICP-MS										
Chromium, Dissolved, ICP-MS	0.85	<RDL	0.4	2	ug/L	0.97	<RDL	0.4	2	ug/L
Chromium, Total, ICP-MS										
Cobalt, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Cobalt, Total, ICP-MS										
Copper, Dissolved, ICP-MS	2.63		0.4	2	ug/L	5.3		0.4	2	ug/L
Copper, Total, ICP-MS										
Lead, Dissolved, ICP-MS		<MDL	0.2	1	ug/L	0.25	<RDL	0.2	1	ug/L
Lead, Total, ICP-MS										
Molybdenum, Dissolved, ICP-MS	52.1		0.5	2.5	ug/L	0.53	<RDL	0.5	2.5	ug/L
Molybdenum, Total, ICP-MS										
Nickel, Dissolved, ICP-MS	2.98		0.3	1.5	ug/L	2.92		0.3	1.5	ug/L
Nickel, Total, ICP-MS										
Selenium, Dissolved, ICP-MS		<MDL	1.5	7.5	ug/L		<MDL	1.5	7.5	ug/L
Selenium, Total, ICP-MS										
Silver, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Silver, Total, ICP-MS										
Thallium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Thallium, Total, ICP-MS										
Vanadium, Dissolved, ICP-MS	1.5	RDL	0.3	1.5	ug/L	1.67		0.3	1.5	ug/L
Vanadium, Total, ICP-MS										
Zinc, Dissolved, ICP-MS	5.43		0.5	2.5	ug/L	26.5		0.5	2.5	ug/L
Zinc, Total, ICP-MS										
M=MT SM2340B.ED19 (06-02-004-002)										
Hardness, Calc	61.7		0.2	1.25	mg CaCO3/L	73.1		0.2	1.25	mg CaCO3/L
M=OR EPA 3520C/8270C (7-3-04-001)										
Chlorpyrifos		<MDL	0.032	0.0472	ug/L		<MDL	0.032	0.0472	ug/L
Diazinon		<MDL	0.041	0.0472	ug/L		<MDL	0.041	0.0472	ug/L
Disulfoton		<MDL	0.025	0.0472	ug/L		<MDL	0.025	0.0472	ug/L
Malathion		<MDL	0.045	0.0472	ug/L		<MDL	0.045	0.0472	ug/L
Parathion-Ethyl		<MDL	0.042	0.0472	ug/L		<MDL	0.042	0.0472	ug/L
Parathion-Methyl		<MDL	0.034	0.0472	ug/L		<MDL	0.034	0.0472	ug/L
Phorate		<MDL	0.031	0.0472	ug/L		<MDL	0.031	0.0472	ug/L
M=OR SM5520-B,F (07-03-016-000)										
Oil, Petro (Non-Polar)	2.4	<RDL	2	5	mg/L		<MDL	2	5	mg/L
M=OR SW-846 8151A GCMS MODIFIED										
2,4,5-T		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L
2,4,5-TP (Silvex)		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L
2,4-D		<MDL	0.014	0.08	ug/L		<MDL	0.014	0.08	ug/L
2,4-DB		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L
Dalapon		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L
Dicamba		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L
Dichloroprop		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L
Dinoseb		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L
MCPA		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L
MCPP		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L

PROJECT: 421195	Locator:	MERCERISL26				Locator:	MERCERISL32			
	Descrip:	FOREST AVE. AND 84				Descrip:	CREEK NEAR HOLLYHI			
	Sampled:	Dec 08, 2004				Sampled:	Dec 08, 2004			
	Lab ID:	L33957-3				Lab ID:	L33957-4			
	Matrix:	STORM WTR				Matrix:	STORM WTR			
	% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS										
M=CV SM2130-B (03-01-011-003)										
Turbidity										
M=CV SM2510-B (03-01-002-003)										
Conductivity										
M=CV SM2540-D (03-01-009-002)										
Total Suspended Solids	41.2		1	2	mg/L	99.2		2	4	mg/L
M=CV SM4500-0-C (03-03-007-002)										
Dissolved Oxygen										
M=CV SM4500-H-B (03-01-003-004)										
pH										
M=CV SM4500-N-C (03-03-013-001)										
Total Nitrogen	1.55		0.05	0.1	mg/L	1.55		0.05	0.1	mg/L
M=CV SM4500-P-B,FMOD(03-03-013-001)										
Total Phosphorus	0.0791		0.005	0.01	mg/L	0.131		0.005	0.01	mg/L
M=CV SM4500-P-F (03-03-012-002)										
Orthophosphate Phosphorus	0.0349		0.002	0.005	mg/L	0.0286		0.002	0.005	mg/L
M=MT EPA 200.8 (06-03-004&004A-001)										
Antimony, Dissolved, ICP-MS		<MDL	0.5	2.5	ug/L		<MDL	0.5	2.5	ug/L
Antimony, Total, ICP-MS										
Arsenic, Dissolved, ICP-MS	1.5	<RDL	0.5	2.5	ug/L	8.15		0.5	2.5	ug/L
Arsenic, Total, ICP-MS										
Barium, Dissolved, ICP-MS	8.51		0.2	1	ug/L	8.76		0.2	1	ug/L
Barium, Total, ICP-MS										
Beryllium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Beryllium, Total, ICP-MS										
Cadmium, Dissolved, ICP-MS		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L
Cadmium, Total, ICP-MS										
Chromium, Dissolved, ICP-MS	0.79	<RDL	0.4	2	ug/L	2.59		0.4	2	ug/L
Chromium, Total, ICP-MS										
Cobalt, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Cobalt, Total, ICP-MS										
Copper, Dissolved, ICP-MS	2.06		0.4	2	ug/L	4.71		0.4	2	ug/L
Copper, Total, ICP-MS										
Lead, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Lead, Total, ICP-MS										
Molybdenum, Dissolved, ICP-MS		<MDL	0.5	2.5	ug/L		<MDL	0.5	2.5	ug/L
Molybdenum, Total, ICP-MS										
Nickel, Dissolved, ICP-MS	1.3	<RDL	0.3	1.5	ug/L	0.91	<RDL	0.3	1.5	ug/L
Nickel, Total, ICP-MS										
Selenium, Dissolved, ICP-MS		<MDL	1.5	7.5	ug/L		<MDL	1.5	7.5	ug/L
Selenium, Total, ICP-MS										
Silver, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Silver, Total, ICP-MS										
Thallium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Thallium, Total, ICP-MS										
Vanadium, Dissolved, ICP-MS	1.66		0.3	1.5	ug/L	0.56	<RDL	0.3	1.5	ug/L
Vanadium, Total, ICP-MS										
Zinc, Dissolved, ICP-MS	2.79		0.5	2.5	ug/L	25.5		0.5	2.5	ug/L
Zinc, Total, ICP-MS										
M=MT SM2340B.ED19 (06-02-004-002)										
Hardness, Calc	78.4		0.2	1.25	mg CaCO3/L	41		0.2	1.25	mg CaCO3/L
M=OR EPA 3520C/8270C (7-3-04-001)										
Chlorpyrifos		<MDL	0.032	0.0472	ug/L		<MDL	0.032	0.0476	ug/L
Diazinon		<MDL	0.041	0.0472	ug/L		<MDL	0.041	0.0476	ug/L
Disulfoton		<MDL	0.025	0.0472	ug/L		<MDL	0.026	0.0476	ug/L
Malathion		<MDL	0.045	0.0472	ug/L		<MDL	0.046	0.0476	ug/L
Parathion-Ethyl		<MDL	0.042	0.0472	ug/L		<MDL	0.043	0.0476	ug/L
Parathion-Methyl		<MDL	0.034	0.0472	ug/L		<MDL	0.034	0.0476	ug/L
Phorate		<MDL	0.031	0.0472	ug/L		<MDL	0.031	0.0476	ug/L
M=OR SM5520-B,F (07-03-016-000)										
Oil, Petro (Non-Polar)		<MDL	2	5	mg/L	2.8	<RDL	2	5	mg/L
M=OR SW-846 8151A GCMS MODIFIED										
2,4,5-T		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L
2,4,5-TP (Silvex)		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L
2,4-D	1.11		0.014	0.08	ug/L		<MDL	0.014	0.08	ug/L
2,4-DB		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L
Dalapon		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L
Dicamba		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L
Dichloroprop		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L
Dinoseb		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L
MCPA		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L
MCPP		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L

PROJECT: 421195	Locator:	MERCERISL42				Locator:	MERCERISLDUP			
	Descrip:	E. MERCER WAY				Descrip:	FIELD REPLICATE			
	Sampled:	Dec 08, 2004				Sampled:	Dec 08, 2004			
	Lab ID:	L33957-5				Lab ID:	L33957-6			
	Matrix:	STORM WTR				Matrix:	STORM WTR			
	% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS										
M=CV SM2130-B (03-01-011-003)										
Turbidity						40.4		0.5	2	NTU
M=CV SM2510-B (03-01-002-003)										
Conductivity						86.4		0.5	10	umhos/cm
M=CV SM2540-D (03-01-009-002)										
Total Suspended Solids	866		10	20	mg/L	74		2	4	mg/L
M=CV SM4500-0-C (03-03-007-002)										
Dissolved Oxygen						11.5		0.5	1	mg/L
M=CV SM4500-H-B (03-01-003-004)										
pH						7.2				pH
M=CV SM4500-N-C (03-03-013-001)										
Total Nitrogen	2.75		0.05	0.1	mg/L	1.57		0.05	0.1	mg/L
M=CV SM4500-P-B,FMOD(03-03-013-001)										
Total Phosphorus	0.423		0.025	0.05	mg/L	0.118		0.005	0.01	mg/L
M=CV SM4500-P-F (03-03-012-002)										
Orthophosphate Phosphorus	0.0555		0.002	0.005	mg/L	0.0303		0.002	0.005	mg/L
M=MT EPA 200.8 (06-03-004&004A-001)										
Antimony, Dissolved, ICP-MS		<MDL	0.5	2.5	ug/L		<MDL	0.5	2.5	ug/L
Antimony, Total, ICP-MS										
Arsenic, Dissolved, ICP-MS	2	<RDL	0.5	2.5	ug/L	7.81		0.5	2.5	ug/L
Arsenic, Total, ICP-MS										
Barium, Dissolved, ICP-MS	4.81		0.2	1	ug/L	8.95		0.2	1	ug/L
Barium, Total, ICP-MS										
Beryllium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Beryllium, Total, ICP-MS										
Cadmium, Dissolved, ICP-MS		<MDL	0.1	0.5	ug/L		<MDL	0.1	0.5	ug/L
Cadmium, Total, ICP-MS										
Chromium, Dissolved, ICP-MS	0.89	<RDL	0.4	2	ug/L	2.45		0.4	2	ug/L
Chromium, Total, ICP-MS										
Cobalt, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Cobalt, Total, ICP-MS										
Copper, Dissolved, ICP-MS	2.33		0.4	2	ug/L	4.94		0.4	2	ug/L
Copper, Total, ICP-MS										
Lead, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Lead, Total, ICP-MS										
Molybdenum, Dissolved, ICP-MS		<MDL	0.5	2.5	ug/L		<MDL	0.5	2.5	ug/L
Molybdenum, Total, ICP-MS										
Nickel, Dissolved, ICP-MS	1.1	<RDL	0.3	1.5	ug/L	0.93	<RDL	0.3	1.5	ug/L
Nickel, Total, ICP-MS										
Selenium, Dissolved, ICP-MS		<MDL	1.5	7.5	ug/L		<MDL	1.5	7.5	ug/L
Selenium, Total, ICP-MS										
Silver, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Silver, Total, ICP-MS										
Thallium, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L
Thallium, Total, ICP-MS										
Vanadium, Dissolved, ICP-MS	2.12		0.3	1.5	ug/L	0.53	<RDL	0.3	1.5	ug/L
Vanadium, Total, ICP-MS										
Zinc, Dissolved, ICP-MS	2.99		0.5	2.5	ug/L	27.6		0.5	2.5	ug/L
Zinc, Total, ICP-MS										
M=MT SM2340B.ED19 (06-02-004-002)										
Hardness, Calc	92		0.2	1.25	mg CaCO3/L	41.1		0.2	1.25	mg CaCO3/L
M=OR EPA 3520C/8270C (7-3-04-001)										
Chlorpyrifos		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0472	ug/L
Diazinon		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0472	ug/L
Disulfoton		<MDL	0.026	0.0476	ug/L		<MDL	0.025	0.0472	ug/L
Malathion		<MDL	0.046	0.0476	ug/L		<MDL	0.045	0.0472	ug/L
Parathion-Ethyl		<MDL	0.043	0.0476	ug/L		<MDL	0.042	0.0472	ug/L
Parathion-Methyl		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0472	ug/L
Phorate		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0472	ug/L
M=OR SM5520-B,F (07-03-016-000)										
Oil, Petro (Non-Polar)	5.05		2	5	mg/L	2.6	<RDL	2	5	mg/L
M=OR SW-846 8151A GCMS MODIFIED										
2,4,5-T		<MDL	0.032	0.08	ug/L		<MDL	0.032	0.08	ug/L
2,4,5-TP (Silvex)		<MDL	0.019	0.08	ug/L		<MDL	0.019	0.08	ug/L
2,4-D		<MDL	0.014	0.08	ug/L		<MDL	0.014	0.08	ug/L
2,4-DB		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L
Dalapon		<MDL	0.033	0.08	ug/L		<MDL	0.033	0.08	ug/L
Dicamba		<MDL	0.024	0.08	ug/L		<MDL	0.024	0.08	ug/L
Dichloroprop		<MDL	0.041	0.08	ug/L		<MDL	0.041	0.08	ug/L
Dinoseb		<MDL	0.021	0.08	ug/L		<MDL	0.021	0.08	ug/L
MCPA		<MDL	0.015	0.08	ug/L		<MDL	0.015	0.08	ug/L
MCPP		<MDL	0.016	0.08	ug/L		<MDL	0.016	0.08	ug/L

PROJECT: 421195	Locator:	KCO				
	Descrip:	King County Locato				
	Sampled:	Dec 08, 2004				
	Lab ID:	L33957-7				
	Matrix:	BLANK WTR				
	% Solids:					
Parameters	Value	Qual	MDL	RDL	Units	
		- Wet Weight Basis				
COMBINED LABS						
M=CV SM2130-B (03-01-011-003)						
Turbidity						
M=CV SM2510-B (03-01-002-003)						
Conductivity						
M=CV SM2540-D (03-01-009-002)						
Total Suspended Solids						
M=CV SM4500-0-C (03-03-007-002)						
Dissolved Oxygen						
M=CV SM4500-H-B (03-01-003-004)						
pH						
M=CV SM4500-N-C (03-03-013-001)						
Total Nitrogen						
M=CV SM4500-P-B,FMOD(03-03-013-001)						
Total Phosphorus						
M=CV SM4500-P-F (03-03-012-002)						
Orthophosphate Phosphorus						
M=MT EPA 200.8 (06-03-004&004A-001)						
Antimony, Dissolved, ICP-MS						
Antimony, Total, ICP-MS		<MDL	0.5	2.5	ug/L	
Arsenic, Dissolved, ICP-MS						
Arsenic, Total, ICP-MS		<MDL	0.5	2.5	ug/L	
Barium, Dissolved, ICP-MS						
Barium, Total, ICP-MS		<MDL	0.2	1	ug/L	
Beryllium, Dissolved, ICP-MS						
Beryllium, Total, ICP-MS		<MDL	0.2	1	ug/L	
Cadmium, Dissolved, ICP-MS						
Cadmium, Total, ICP-MS		<MDL	0.1	0.5	ug/L	
Chromium, Dissolved, ICP-MS						
Chromium, Total, ICP-MS		<MDL	0.4	2	ug/L	
Cobalt, Dissolved, ICP-MS						
Cobalt, Total, ICP-MS		<MDL	0.2	1	ug/L	
Copper, Dissolved, ICP-MS						
Copper, Total, ICP-MS		<MDL	0.4	2	ug/L	
Lead, Dissolved, ICP-MS						
Lead, Total, ICP-MS		<MDL	0.2	1	ug/L	
Molybdenum, Dissolved, ICP-MS						
Molybdenum, Total, ICP-MS		<MDL	0.5	2.5	ug/L	
Nickel, Dissolved, ICP-MS						
Nickel, Total, ICP-MS		<MDL	0.3	1.5	ug/L	
Selenium, Dissolved, ICP-MS						
Selenium, Total, ICP-MS		<MDL	1.5	7.5	ug/L	
Silver, Dissolved, ICP-MS						
Silver, Total, ICP-MS		<MDL	0.2	1	ug/L	
Thallium, Dissolved, ICP-MS						
Thallium, Total, ICP-MS		<MDL	0.2	1	ug/L	
Vanadium, Dissolved, ICP-MS						
Vanadium, Total, ICP-MS		<MDL	0.3	1.5	ug/L	
Zinc, Dissolved, ICP-MS						
Zinc, Total, ICP-MS		<MDL	0.5	2.5	ug/L	
M=MT SM2340B.ED19 (06-02-004-002)						
Hardness, Calc						
M=OR EPA 3520C/8270C (7-3-04-001)						
Chlorpyrifos						
Diazinon						
Disulfoton						
Malathion						
Parathion-Ethyl						
Parathion-Methyl						
Phorate						
M=OR SM5520-B,F (07-03-016-000)						
Oil, Petro (Non-Polar)						
M=OR SW-846 8151A GCMS MODIFIED						
2,4,5-T						
2,4,5-TP (Silvex)						
2,4-D						
2,4-DB						
Dalapon						
Dicamba						
Dichloroprop						
Dinoseb						
MCPA						
MCPP						

March 26, 2005

TO: Fran Solomon, Senior Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY
Samples L34239-1 to 7

Attached is the comprehensive report for the water samples delivered to the laboratory on March 26, 2005. The samples were analyzed in the Organics, Metals, Microbiology and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

There were no anomalies associated with the preparation and analysis of these samples.

Metals:
There were no anomalies associated with the preparation and the analysis of these samples.

Microbiology:
There were no anomalies associated with the preparation and the analysis of these samples.

Organics:

Oil, Non-Polar Analysis:
There were no anomalies associated with the analysis of these samples.

Herbicide Analyses:
There were no anomalies associated with the analysis of these samples.

Organophosphorus Pesticides (short list) Analyses:
There were no anomalies associated with the analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification, except where noted above.

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PROJECT: 421195								
COMBINED LABS-Liquid								
	Locator	MERCERISL06	MERCERISL10	MERCERISL26	MERCERISL32	MERCERISL42	MERCERISLDUP	Field Blank
Sample	Date	3/26/2005	3/26/2005	3/26/2005	3/26/2005	3/26/2005	3/26/2005	3/26/2005
	Lab ID	L34239-1	L34239-2	L34239-3	L34239-4	L34239-5	L34239-6	L34239-7
Conductivity	umhos/cm						**93**	
Dissolved Oxygen	mg/L						**11.1**	
Orthophosphate Phosphorus	mg/L	**0.0226**	**0.056**	**0.0329**	**0.041**	**0.0666**	**0.0666**	
Total Nitrogen	mg/L	**0.821**	**0.887**	**1.58**	**1.54**	**2**	**1.8**	
Total Phosphorus	mg/L	**0.182**	**0.115**	**0.268**	**0.196**	**0.268**	**0.239**	
Total Suspended Solids	mg/L	**482**	**22.4**	**406**	**159**	**230**	**204**	
Turbidity	NTU						**113**	
pH	pH						**7.64**	
Escherichia coli	CFU/100ml	**310**	**1100**	**390**	**2300**	**1500**	**1100**	
Fecal Coliform	CFU/100ml	**540**	**1100**	**440**	**2500**	**1200**	**770**	
Chromium, Dissolved, ICP-MS	ug/L	**0.6**	**0.72**	**1.6**	**3.84**	**1.8**	**1.9**	
Copper, Dissolved, ICP-MS	ug/L	**2.58**	**4.28**	**3.42**	**5.42**	**4.18**	**4.35**	
Hardness, Calc	mg CaCO3/L	**46.8**	**24.9**	**71.9**	**54.2**	**52.5**	**22.6**	
Lead, Dissolved, ICP-MS	ug/L		**0.22**				**0.23**	
Zinc, Dissolved, ICP-MS	ug/L	**4.88**	**19.8**	**2.1**	**13.3**	**2.54**	**2.63**	
2,4-D	ug/L		**0.266**		**0.485**	**0.291**	**0.421**	
Oil, Petro (Non-Polar)	mg/L	**3.6**	**3.8**	**4.8**	**5.33**	**5.11**	**4.4**	
Conductivity, Field	umhos/cm	**73.3**	**53.3**	**84.7**	**37.6**	**86.9**	**88.3**	
Discharge Rate of Stream	cfs	**4.4**	**7.7**	**1.2**	**3.4**	**1.6**	**1.6**	
Dissolved Oxygen, Field	mg/L	**9.6**	**8**	**10.2**	**9.9**	**9**	**9.1**	
Sample Start Time	hr	**1250**	**1315**	**1015**	**1045**	**1145**	**1155**	**1215**
Sample Temperature, Field	deg C	**10.2**	**11.3**	**8.9**	**9.7**	**9.1**	**9.2**	
Turbidity, Field	NTU	**77**	**27**	**421**	**121**	**132**	**137**	
pH, Field	pH	**7.3**	**7**	**7.3**	**7.1**	**7.3**	**7.4**	

PROJECT: 421195	Locator:	MERCERISL06				Locator:	MERCERISL10				Locator:	MERCERISL26				Locator:	MERCERISL32				Locator:	MERCERISL42				Locator:	MERCERISLDUP				Locator:	KCO			
	Descrip:	R/D FACILITY SOUTH				Descrip:	SE 22ND ST, NEAR M				Descrip:	FOREST AVE. AND 84				Descrip:	CREEK NEAR HOLLYHI				Descrip:	E. MERCER WAY				Descrip:	FIELD REPLICATE				Descrip:	King County Locato			
	Sampled:	Mar 26, 2005				Sampled:	Mar 26, 2005				Sampled:	Mar 26, 2005				Sampled:	Mar 26, 2005				Sampled:	Mar 26, 2005				Sampled:	Mar 26, 2005				Sampled:	Mar 26, 2005			
	Lab ID:	L34239-1				Lab ID:	L34239-2				Lab ID:	L34239-3				Lab ID:	L34239-4				Lab ID:	L34239-5				Lab ID:	L34239-6				Lab ID:	L34239-7			
	Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	BLANK WTR			
	% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																																		
M=CV SM2130-B (03-01-011-003)																																		
Turbidity																										113		0.5	2	NTU					
M=CV SM2510-B (03-01-002-003)																																		
Conductivity																										93		0.5	10	umhos/cm					
M=CV SM2540-D (03-01-009-002)																																		
Total Suspended Solids	482		2.5	5	mg/L	22.4		1	2	mg/L	406		10	200	mg/L	159		2.5	5	mg/L	230		5	10	mg/L	204		5	10	mg/L					
M=CV SM4500-0-C (03-03-007-002)																																		
Dissolved Oxygen																										11.1		0.5	1	mg/L					
M=CV SM4500-H-B (03-01-003-004)																																		
pH																										7.64				pH					
M=CV SM4500-N-C (03-03-013-001)																																		
Total Nitrogen	0.821		0.05	0.1	mg/L	0.887		0.05	0.1	mg/L	1.58		0.05	0.1	mg/L	1.54		0.05	0.1	mg/L	2		0.05	0.1	mg/L	1.8		0.05	0.1	mg/L					
M=CV SM4500-P-B,FMOD(03-03-013-001)																																		
Total Phosphorus	0.182		0.005	0.01	mg/L	0.115		0.005	0.01	mg/L	0.268		0.025	0.05	mg/L	0.196		0.025	0.05	mg/L	0.268		0.025	0.05	mg/L	0.239		0.025	0.05	mg/L					
M=CV SM4500-P-F (03-03-012-002)																																		
Orthophosphate Phosphorus	0.0226		0.002	0.005	mg/L	0.056		0.002	0.005	mg/L	0.0329		0.002	0.005	mg/L	0.041		0.002	0.005	mg/L	0.0666		0.002	0.005	mg/L	0.0666		0.002	0.005	mg/L					
M=ES NONE																																		
Conductivity, Field	73.3		0.5	10	umhos/cm	53.3		0.5	10	umhos/cm	84.7		0.5	10	umhos/cm	37.6		0.5	10	umhos/cm	86.9		0.5	10	umhos/cm	88.3		0.5	10	umhos/cm					
Discharge Rate of Stream	4.4				cfs	7.7				cfs	1.2				cfs	3.4				cfs	1.6				cfs	1.6				cfs					
Dissolved Oxygen, Field	9.6		0.5	1	mg/L	8		0.5	1	mg/L	10.2		0.5	1	mg/L	9.9		0.5	1	mg/L	9		0.5	1	mg/L	9.1		0.5	1	mg/L					
Field Personnel	JP				none	JP				none	JP				none	JP				none	JP				none	JP				none					
pH, Field	7.3				pH	7				pH	7.3				pH	7.1				pH	7.3				pH	7.4				pH					
Sample Function																										FREP@L34239-5				none					
Sample Start Time	1250				hr	1315				hr	1015				hr	1045				hr	1145				hr	1155				hr	1215				hr
Sample Temperature, Field	10.2				deg C	11.3				deg C	8.9				deg C	9.7				deg C	9.1				deg C	9.2				deg C					
Turbidity, Field	77		0.5	2	NTU	27		0.5	2	NTU	421		0.5	2	NTU	121		0.5	2	NTU	132		0.5	2	NTU	137		0.5	2	NTU					
M=MC METRO MC SOP 6.5.1																																		
Escherichia coli	310				CFU/100ml	1100				CFU/100ml	390				CFU/100ml	2300				CFU/100ml	1500				CFU/100ml	1100				CFU/100ml					
M=MC SM-9222 D ed.17																																		
Fecal Coliform	540				CFU/100ml	1100				CFU/100ml	440				CFU/100ml	2500				CFU/100ml	1200				CFU/100ml	770				CFU/100ml					
M=MT EPA 200.8 (06-03-004&004A-001)																																		
Chromium, Dissolved, ICP-MS	0.6	<RDL	0.4	2	ug/L	0.72	<RDL	0.4	2	ug/L	1.6	<RDL	0.4	2	ug/L	3.84		0.4	2	ug/L	1.8	<RDL	0.4	2	ug/L	1.9	<RDL	0.4	2	ug/L					
Chromium, Total, ICP-MS																																<MDL	0.4	2	ug/L
Copper, Dissolved, ICP-MS	2.58		0.4	2	ug/L	4.28		0.4	2	ug/L	3.42		0.4	2	ug/L	5.42		0.4	2	ug/L	4.18		0.4	2	ug/L	4.35		0.4	2	ug/L					
Copper, Total, ICP-MS																																<MDL	0.4	2	ug/L
Lead, Dissolved, ICP-MS		<MDL	0.2	1	ug/L	0.22	<RDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L	0.23	<RDL	0.2	1	ug/L					
Lead, Total, ICP-MS																																<MDL	0.2	1	ug/L
Zinc, Dissolved, ICP-MS	4.88		0.5	2.5	ug/L	19.8		0.5	2.5	ug/L	2.1	<RDL	0.5	2.5	ug/L	13.3		0.5	2.5	ug/L	2.54		0.5	2.5	ug/L	2.63		0.5	2.5	ug/L					
Zinc, Total, ICP-MS																																<MDL	0.5	2.5	ug/L
M=MT SM2340B.ED19 (06-02-004-002)																																		
Hardness, Calc	46.8		0.2	1.25	mg CaCO3/L	24.9		0.2	1.25	mg CaCO3/L	71.9		0.2	1.25	mg CaCO3/L	54.2		0.2	1.25	mg CaCO3/L	52.5		0.2	1.25	mg CaCO3/L	22.6		0.2	1.25	mg CaCO3/L					
M=OR SM5520-B,F (07-03-016-000)																																		
Oil, Petro (Non-Polar)	3.6	<RDL	2	5	mg/L	3.8	<RDL	2	5	mg/L	4.8	<RDL	2	5	mg/L	5.33		2	5	mg/L	5.11		2	5	mg/L	4.4	<RDL	2	5	mg/L					
M=OR SW-846 8151A GCMS MODIFIED																																		
2,4,5-T		<MDL	0.032	0.0787	ug/L		<MDL	0.032	0.0787	ug/L		<MDL	0.032	0.0787	ug/L		<MDL	0.033	0.0806	ug/L		<MDL	0.032	0.0794	ug/L		<MDL	0.032	0.0787	ug/L					
2,4,5-TP (Silvex)		<MDL	0.019	0.0787	ug/L		<MDL	0.019	0.0787	ug/L		<MDL	0.019	0.0787	ug/L		<MDL	0.019	0.0806	ug/L		<MDL	0.019	0.0794	ug/L		<MDL	0.019	0.0787	ug/L					
2,4-D		<MDL	0.014	0.0787	ug/L	0.266		0.014	0.0787	ug/L		<MDL	0.014	0.0787	ug/L	0.485		0.014	0.0806	ug/L	0.291		0.014	0.0794	ug/L	0.421		0.014	0.0787	ug/L					
2,4-DB		<MDL	0.023	0.0787	ug/L		<MDL	0.023	0.0787	ug/L		<MDL	0.023	0.0787	ug/L		<MDL	0.024	0.0806	ug/L		<MDL	0.023	0.0794	ug/L		<MDL	0.023	0.0787	ug/L					
Dalapon		<MDL	0.033	0.0787	ug/L		<MDL	0.033	0.0787	ug/L		<MDL	0.033	0.0787	ug/L		<MDL	0.033	0.0806	ug/L		<MDL	0.033	0.0794	ug/L		<MDL	0.033	0.0787	ug/L					
Dicamba		<MDL	0.024	0.0787	ug/L		<MDL	0.024	0.0787	ug/L		<MDL	0.024	0.0787	ug/L		<MDL	0.024	0.0806	ug/L		<MDL	0.024	0.0794	ug/L		<MDL	0.024	0.0787	ug/L					
Dichloroprop		<MDL	0.041	0.0787	ug/L		<MDL	0.041	0.0787	ug/L		<MDL	0.041	0.0787	ug/L		<MDL	0.042	0.0806	ug/L		<MDL	0.041	0.0794	ug/L		<MDL	0.041	0.0787	ug/L					
Dinoseb		<MDL	0.021	0.0787	ug/L		<MDL	0.021	0.0787	ug/L		<MDL	0.021	0.0787	ug/L		<MDL	0.021	0.0806	ug/L		<MDL	0.021	0.0794	ug/L		<MDL	0.021	0.0787	ug/L					
MCPA		<MDL	0.015	0.0787	ug/L		<MDL	0.015	0.0787	ug/L		<MDL	0.015	0.0787	ug/L		<MDL	0.015	0.0806	ug/L		<MDL	0.015	0.0794	ug/L		<MDL	0.015	0.0787	ug/L					
MCPP		<MDL	0.016	0.0787	ug/L		<MDL	0.016	0.0787	ug/L		<MDL	0.016	0.0787	ug/L		<MDL	0.016	0.0806	ug/L		<MDL	0.016	0.0794	ug/L		<MDL	0.016	0.0787	ug/L					

June 24, 2005

TO: Fran Solomon, Senior Ecologist

WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY
Samples L35191-1 to 7

Attached is the comprehensive report for the water samples delivered to the laboratory on May 10, 2005. The samples were analyzed in the Organics, Metals, Microbiology and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

There were no anomalies associated with the preparation and analysis of these samples.

Metals:
There were no anomalies associated with the preparation and the analysis of these samples.

Microbiology:
There were no anomalies associated with the preparation and the analysis of these samples.

Organics:

Oil, Non-Polar Analysis:
There were no anomalies associated with the analysis of these samples.

Herbicide Analyses:
There were no anomalies associated with the analysis of these samples.

Organophosphorus Pesticides (short list) Analyses:
There were no anomalies associated with the analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification, except where noted above.

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PROJECT: 421195

COMBINED LABS-Liquid

Locator	Sample Depth	Lab ID	Conductivity	Dissolved Oxygen	Orthophosphate Phosphorus	Total Nitrogen	Total Phosphorus	Total Suspended Solids	Turbidity	pH	Escherichia coli	Fecal Coliform	Chromium, Dissolved, ICP-MS	Copper, Dissolved, ICP-MS	Hardness, Calc	Lead, Dissolved, ICP-MS	Zinc, Dissolved, ICP-MS	2,4-D	MCPP	Oil, Petro (Non-Polar)	Conductivity, Field	Discharge Rate of Stream	Dissolved Oxygen, Field	Sample Start Time	Sample Temperature, Field	Turbidity, Field	pH, Field
			umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	pH	CFU/100ml	CFU/100ml	ug/L	ug/L	mg CaCO3/L	ug/L	ug/L	ug/L	ug/L	mg/L	umhos/cm	cfs	mg/L	hr	deg C	NTU	pH
MERCERISL06		L35191-1			0.0375	0.94	0.0548	5.2			130	140	0.97	1.8	110		1.8				251	0.6	10	1139	12.3	9.6	7.9
MERCERISL10		L35191-2			0.0542	1.19	0.087	2.4			2900	4000	0.78	3.99	98.1		15.5	1.51	0.949	2	229	0.6	8.9	1102	13.5	7.4	7.3
MERCERISL26		L35191-3			0.0324	1.1	0.0701	34.4			190	250	0.8	2.05	103		1.5	0.175	0.12	2.5	223	0.1	10.1	916	12	36.8	7.3
MERCERISL32		L35191-4			0.0188	0.922	0.0571	10.6			2000	3300	3.02	9.02	60.5		11.1	0.135		2.7	133	1.6	9.8	955	13.7	33	7.6
MERCERISL42		L35191-5			0.0699	1.3	0.0963	6.3			910	860	1.5	2.73	86.8	0.23	4.36				201	0.7	10.1	1024	11.7	8.9	7.6
MERCERISLDUP		L35191-6	193	10.2	0.0699	1.26	0.0939	6.8	6.74	7.81	800	720	1.6	2.76	85.8	0.25	3.56				202	0.6	10.1	1026	11.7	8.7	7.6
KCO		L35191-7																						1104			

PROJECT: 421195	Locator:	MERCERISL06				Locator:	MERCERISL10				Locator:	MERCERISL26				Locator:	MERCERISL32				Locator:	MERCERISL42				Locator:	MERCERISLDUP				Locator:	KCO			
	Descrip:	R/D FACILITY SOUTH				Descrip:	SE 22ND ST, NEAR M				Descrip:	FOREST AVE. AND 84				Descrip:	CREEK NEAR HOLLYHI				Descrip:	E. MERCER WAY				Descrip:	FIELD REPLICATE				Descrip:	King County Locato			
	Sampled:	May 10, 2005				Sampled:	May 10, 2005				Sampled:	May 10, 2005				Sampled:	May 10, 2005				Sampled:	May 10, 2005				Sampled:	May 10, 2005				Sampled:	May 10, 2005			
	Lab ID:	L35191-1				Lab ID:	L35191-2				Lab ID:	L35191-3				Lab ID:	L35191-4				Lab ID:	L35191-5				Lab ID:	L35191-6				Lab ID:	L35191-7			
	Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	BLANK WTR			
	% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:			
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																																			
M=CV SM2130-B (03-01-011-003)																																			
Turbidity																										6.74		0.5	2	NTU					
M=CV SM2510-B (03-01-002-003)																																			
Conductivity																										193		0.5	10	umhos/cm					
M=CV SM2540-D (03-01-009-002)																																			
Total Suspended Solids	5.2		0.5	1	mg/L	2.4		0.5	1	mg/L	34.4		1	2	mg/L	10.6		1	2	mg/L	6.3		0.5	1	mg/L	6.8		0.5	1	mg/L					
M=CV SM4500-0-C (03-03-007-002)																																			
Dissolved Oxygen																										10.2		0.5	1	mg/L					
M=CV SM4500-H-B (03-01-003-004)																																			
pH																										7.81				pH					
M=CV SM4500-N-C (03-03-013-002)																																			
Total Nitrogen	0.94		0.05	0.1	mg/L	1.19		0.05	0.1	mg/L	1.1		0.05	0.1	mg/L	0.922		0.05	0.1	mg/L	1.3		0.05	0.1	mg/L	1.26		0.05	0.1	mg/L					
M=CV SM4500-P-B,FMOD(03-03-013-002)																																			
Total Phosphorus	0.0548		0.005	0.01	mg/L	0.087		0.005	0.01	mg/L	0.0701		0.005	0.01	mg/L	0.0571		0.005	0.01	mg/L	0.0963		0.005	0.01	mg/L	0.0939		0.005	0.01	mg/L					
M=CV SM4500-P-F (03-03-012-003)																																			
Orthophosphate Phosphorus	0.0375		0.002	0.005	mg/L	0.0542		0.002	0.005	mg/L	0.0324		0.002	0.005	mg/L	0.0188		0.002	0.005	mg/L	0.0699		0.002	0.005	mg/L	0.0699		0.002	0.005	mg/L					
M=ES NONE																																			
Conductivity, Field	251		0.5	10	umhos/cm	229		0.5	10	umhos/cm	223		0.5	10	umhos/cm	133		0.5	10	umhos/cm	201		0.5	10	umhos/cm	202		0.5	10	umhos/cm					
Discharge Rate of Stream	0.6				cfs	0.6				cfs	0.1				cfs	1.6				cfs	0.7				cfs	0.6				cfs					
Dissolved Oxygen, Field	10		0.5	1	mg/L	8.9		0.5	1	mg/L	10.1		0.5	1	mg/L	9.8		0.5	1	mg/L	10.1		0.5	1	mg/L	10.1		0.5	1	mg/L					
Field Personnel	JD/KL				none	JP/KL				none	JP/KL				none	JP/KL				none	JP/KL				none	JP/KL				none					
pH, Field	7.9				pH	7.3				pH	7.3				pH	7.6				pH	7.6				pH	7.6				pH					
Sample Function																										FREP@L35191-5				none					
Sample Start Time	1139				hr	1102				hr	916				hr	955				hr	1024				hr	1026				hr	1104				hr
Sample Temperature, Field	12.3				deg C	13.5				deg C	12				deg C	13.7				deg C	11.7				deg C	11.7				deg C					
Turbidity, Field	9.6		0.5	2	NTU	7.4		0.5	2	NTU	36.8		0.5	2	NTU	33		0.5	2	NTU	8.9		0.5	2	NTU	8.7		0.5	2	NTU					
M=MC METRO MC SOP 6.5.1																																			
Escherichia coli	130				CFU/100ml	2900				CFU/100ml	190				CFU/100ml	2000				CFU/100ml	910				CFU/100ml	800				CFU/100ml					
M=MC SM-9222 D ed.17																																			
Fecal Coliform	140				CFU/100ml	4000				CFU/100ml	250				CFU/100ml	3300				CFU/100ml	860				CFU/100ml	720				CFU/100ml					
M=MT EPA 200.8 (06-03-004&004A-001)																																			
Chromium, Dissolved, ICP-MS	0.97	<RDL	0.4	2	ug/L	0.78	<RDL	0.4	2	ug/L	0.8	<RDL	0.4	2	ug/L	3.02		0.4	2	ug/L	1.5	<RDL	0.4	2	ug/L	1.6	<RDL	0.4	2	ug/L					
Chromium, Total, ICP-MS																																<MDL	0.4	2	ug/L
Copper, Dissolved, ICP-MS	1.8	<RDL	0.4	2	ug/L	3.99		0.4	2	ug/L	2.05		0.4	2	ug/L	9.02		0.4	2	ug/L	2.73		0.4	2	ug/L	2.76		0.4	2	ug/L					
Copper, Total, ICP-MS																																<MDL	0.4	2	ug/L
Lead, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L	0.23	<RDL	0.2	1	ug/L	0.25	<RDL	0.2	1	ug/L					
Lead, Total, ICP-MS																																<MDL	0.2	1	ug/L
Zinc, Dissolved, ICP-MS	1.8	<RDL	0.5	2.5	ug/L	15.5		0.5	2.5	ug/L	1.5	<RDL	0.5	2.5	ug/L	11.1		0.5	2.5	ug/L	4.36		0.5	2.5	ug/L	3.56		0.5	2.5	ug/L					
Zinc, Total, ICP-MS																																<MDL	0.5	2.5	ug/L
M=MT SM2340B.ED19 (06-02-004-002)																																			
Hardness, Calc	110		0.2	1.25	mg CaCO3/L	98.1		0.2	1.25	mg CaCO3/L	103		0.2	1.25	mg CaCO3/L	60.5		0.2	1.25	mg CaCO3/L	86.8		0.2	1.25	mg CaCO3/L	85.8		0.2	1.25	mg CaCO3/L					
M=OR EPA 3520C/8270C (7-3-04-001)																																			
Chlorpyrifos		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L					
Diazinon		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L					
Disulfoton		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L					
Malathion		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L					
Parathion-Ethyl		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L					
Parathion-Methyl		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L					
Phorate		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L					
M=OR SM5520-B,F (07-03-016-000)																																			
Oil, Petro (Non-Polar)		<MDL	2	5	mg/L	2	<RDL	2	5	mg/L	2.5	<RDL	2	5	mg/L	2.7	<RDL	2	5	mg/L		<MDL	2	5	mg/L		<MDL	2	5	mg/L					
M=OR SW-846 8151A GCMS MODIFIED																																			
2,4,5-T		<MDL	0.033	0.0806	ug/L		<MDL	0.032	0.0781	ug/L		<MDL	0.032	0.0794	ug/L		<MDL	0.032	0.0787	ug/L		<MDL	0.032	0.0781	ug/L		<MDL	0.032	0.08	ug/L					
2,4,5-TP (Silvex)		<MDL	0.019	0.0806	ug/L		<MDL	0.018	0.0781	ug/L		<MDL	0.019	0.0794	ug/L		<MDL	0.019	0.0787	ug/L		<MDL	0.018	0.0781	ug/L		<MDL	0.019	0.08	ug/L					
2,4-D		<MDL	0.014	0.0806	ug/L	1.51		0.014	0.0781	ug/L	0.175		0.014	0.0794	ug/L	0.135		0.014	0.0787	ug/L		<MDL	0.014	0.0781	ug/L		<MDL	0.014	0.08	ug/L					
2,4-DB		<MDL	0.024	0.0806	ug/L		<MDL	0.023	0.0781	ug/L		<MDL	0.023	0.0794	ug/L		<MDL	0.023	0.0787	ug/L		<MDL	0.023	0.0781	ug/L		<MDL	0.024	0.08	ug/L					
Dalapon		<MDL	0.033	0.0806	ug/L		<MDL	0.032	0.0781	ug/L		<MDL	0.033	0.0794	ug/L		<MDL	0.033	0.0787	ug/L		<MDL	0.032	0.0781	ug/L		<MDL	0.033	0.08	ug/L					
Dicamba		<MDL	0.024	0.0806	ug/L		<MDL	0.024	0.0781	ug/L		<MDL	0.024	0.0794	ug/L		<MDL	0.024	0.0787	ug/L		<MDL	0.024	0.0781	ug/L		<MDL	0.024	0.08	ug/L					
Dichloroprop		<MDL	0.042	0.0806	ug/L		<MDL	0.04	0.0781	ug/L		<MDL	0.041	0.0794	ug/L		<MDL	0.041	0.0787	ug/L		<MDL	0.04	0.0781	ug/L		<MDL	0.041	0.08	ug/L					
Dinoseb		<MDL	0.021	0.0806	ug/L		<MDL	0.021	0.0781	ug/L		<MDL	0.021	0.0794	ug/L		<MDL	0.021	0.0787	ug/L		<MDL	0.021	0.0781	ug/L		<MDL	0.021	0.08	ug/L					
MCPA		<MDL	0.015	0.0806	ug/L		<MDL	0.015	0.0781	ug/L		<MDL	0.015	0.0794	ug/L		<MDL	0.015	0.0787	ug/L		<MDL	0.015	0.0781	ug/L		<MDL	0.015	0.08	ug/L					
MCPP		<MDL	0.016	0.0806	ug/L	0.949		0.016	0.0781	ug/L	0.12		0.016	0.0794	ug/L		<MDL	0.016	0.0787	ug/L		<MDL	0.016	0.0781	ug/L		<MDL	0.016	0.08	ug/L					

December 13, 2005

TO: Fran Solomon, Senior Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY
Samples L37135-1 to 7

Attached is the comprehensive report for the water samples delivered to the laboratory on November 3, 2005. The samples were analyzed in the Organics, Metals, Microbiology and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:
There were no anomalies associated with the preparation and analysis of these samples.

Metals:
There were no anomalies associated with the preparation and the analysis of these samples.

Microbiology:
There were no anomalies associated with the preparation and the analysis of these samples.

Organics:

Oil, Non-Polar Analysis:
There were no anomalies associated with the analysis of these samples.

Herbicide Analyses:
There were no anomalies associated with the analysis of these samples.

Organophosphorus Pesticides (short list) Analyses:
There were no anomalies associated with the analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification, except where noted above.

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PROJECT: 421195

COMBINED LABS-Liquid

Locator	Sample Depth	Lab ID	Conductivity	Dissolved Oxygen	Orthophosphate Phosphorus	Total Nitrogen	Total Phosphorus	Total Suspended Solids	Turbidity	pH	Fecal Coliform	Chromium, Dissolved, ICP-MS	Copper, Dissolved, ICP-MS	Hardness, Calc	Zinc, Dissolved, ICP-MS	2,4-D	MCPP	Oil, Petro (Non-Polar)	Conductivity, Field	Discharge Rate of Stream	Dissolved Oxygen, Field	Sample Start Time	Sample Temperature, Field	Turbidity, Field	pH, Field
			umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	NTU	pH	CFU/100ml	ug/L	ug/L	mg CaCO3/L	ug/L	ug/L	ug/L	mg/L	umhos/cm	cfs	mg/L	hr	deg C	NTU	pH
MERCERISL06		L37135-1			0.0334	0.91	0.0602	15.3			330	0.45	3.04	56.5	4.24			2.7	131	1	10.5	1500	9.8	8.5	7.8
MERCERISL10		L37135-2			0.0749	1.22	0.121	8.04			2300	1	5.16	50.8	20.9	0.16			130	2	9.6	1440	11.5	18	7.5
MERCERISL26		L37135-3			0.0546	0.885	0.131	84.8			580	0.88	2.28	63	0.98				135	0.6	10.5	1106	9.8	78.5	7.8
MERCERISL32		L37135-4			0.0321	1.11	0.0735	9.14			1400	3.51	5.38	38.6	14.3	0.68	0.57		89.9	3.5	10.9	1205	9.8	15.5	7.7
MERCERISL42		L37135-5			0.0991	1.35	0.194	76.7			1700	1	2.87	51.5	3.3			3.1	108	2.9	10.9	1310	9.4	45	7.7
MERCERISLDUP		L37135-6	109	10.5	0.0993	1.32	0.184	67.1	37.6	7.48	1400	0.96	2.85	47.1	3.05			2.4	105	2.8	10.7	1325	9.4	41.2	7.6
KCO		L37135-7																				1320			

PROJECT: 421195	Locator:	MERCERISL06				Locator:	MERCERISL10				Locator:	MERCERISL26				Locator:	MERCERISL32				Locator:	MERCERISL42				Locator:	MERCERISLDUP				Locator:	KCO			
	Descrip:	R/D FACILITY SOUTH				Descrip:	SE 22ND ST, NEAR M				Descrip:	FOREST AVE. AND 84				Descrip:	CREEK NEAR HOLLYHI				Descrip:	E. MERCER WAY				Descrip:	FIELD REPLICATE				Descrip:	King County Locato			
	Sampled:	Nov 03, 2005				Sampled:	Nov 03, 2005				Sampled:	Nov 03, 2005				Sampled:	Nov 03, 2005				Sampled:	Nov 03, 2005				Sampled:	Nov 03, 2005				Sampled:	Nov 03, 2005			
	Lab ID:	L37135-1				Lab ID:	L37135-2				Lab ID:	L37135-3				Lab ID:	L37135-4				Lab ID:	L37135-5				Lab ID:	L37135-6				Lab ID:	L37135-7			
	Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	BLANK WTR			
	% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:			
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																																		
M=CV SM2130-B (03-01-011-003)																																		
Turbidity																										37.6		0.5	2	NTU				
M=CV SM2510-B (03-01-002-003)																																		
Conductivity																										109		0.5	10	umhos/cm				
M=CV SM2540-D (03-01-009-002)																																		
Total Suspended Solids	15.3		1	2	mg/L	8.04		0.9	1.9	mg/L	84.8		1.6	3.2	mg/L	9.14		1.2	2.5	mg/L	76.7		1.8	3.6	mg/L	67.1		2.4	4.8	mg/L				
M=CV SM4500-0-C (03-03-007-002)																																		
Dissolved Oxygen																										10.5		0.5	1	mg/L				
M=CV SM4500-H-B (03-01-003-004)																																		
pH																										7.48				pH				
M=CV SM4500-N-C (03-03-013-002)																																		
Total Nitrogen	0.91		0.05	0.1	mg/L	1.22		0.05	0.1	mg/L	0.885		0.05	0.1	mg/L	1.11		0.05	0.1	mg/L	1.35		0.05	0.1	mg/L	1.32		0.05	0.1	mg/L				
M=CV SM4500-P-B,FMOD(03-03-013-002)																																		
Total Phosphorus	0.0602		0.005	0.01	mg/L	0.121		0.005	0.01	mg/L	0.131		0.005	0.01	mg/L	0.0735		0.005	0.01	mg/L	0.194		0.005	0.01	mg/L	0.184		0.005	0.01	mg/L				
M=CV SM4500-P-F (03-03-012-003)																																		
Orthophosphate Phosphorus	0.0334		0.002	0.005	mg/L	0.0749		0.002	0.005	mg/L	0.0546		0.002	0.005	mg/L	0.0321		0.002	0.005	mg/L	0.0991		0.002	0.005	mg/L	0.0993		0.002	0.005	mg/L				
M=ES Hydrolab (02-01-005-002)																																		
Conductivity, Field	131		0.5	10	umhos/cm	130		0.5	10	umhos/cm	135		0.5	10	umhos/cm	89.9		0.5	10	umhos/cm	108		0.5	10	umhos/cm	105		0.5	10	umhos/cm				
Dissolved Oxygen, Field	10.5		0.5	1	mg/L	9.6		0.5	1	mg/L	10.5		0.5	1	mg/L	10.9		0.5	1	mg/L	10.9		0.5	1	mg/L	10.7		0.5	1	mg/L				
pH, Field	7.8				pH	7.5				pH	7.8				pH	7.7				pH	7.7				pH	7.6				pH				
Sample Temperature, Field	9.8				deg C	11.5				deg C	9.8				deg C	9.8				deg C	9.4				deg C	9.4				deg C				
Turbidity, Field	8.5		0.5	2	NTU	18		0.5	2	NTU	78.5		0.5	2	NTU	15.5		0.5	2	NTU	45		0.5	2	NTU	41.2		0.5	2	NTU				
M=ES NONE																																		
Discharge Rate of Stream	1		0.05	0.1	cfs	2		0.05	0.1	cfs	0.6		0.05	0.1	cfs	3.5		0.05	0.1	cfs	2.9		0.05	0.1	cfs	2.8		0.05	0.1	cfs				
Field Personnel	JO				none	JO				none	JO				none	JO				none	JO				none	JO				none				
Sample Function																										FREP@L37135-5				none				
Sample Start Time	1500				hr	1440				hr	1106				hr	1205				hr	1310				hr	1325				hr	1320				hr
M=MC SM-9222 D ed.17																																		
Fecal Coliform	330				CFU/100ml	2300				CFU/100ml	580				CFU/100ml	1400				CFU/100ml	1700				CFU/100ml	1400				CFU/100ml				
M=MT EPA 200.8 (06-03-004&004A-001)																																		
Chromium, Dissolved, ICP-MS	0.45	<RDL	0.4	2	ug/L	1	<RDL	0.4	2	ug/L	0.88	<RDL	0.4	2	ug/L	3.51		0.4	2	ug/L	1	<RDL	0.4	2	ug/L	0.96	<RDL	0.4	2	ug/L				
Chromium, Total, ICP-MS																																<MDL	0.4	2	ug/L
Copper, Dissolved, ICP-MS	3.04		0.4	2	ug/L	5.16		0.4	2	ug/L	2.28		0.4	2	ug/L	5.38		0.4	2	ug/L	2.87		0.4	2	ug/L	2.85		0.4	2	ug/L				
Copper, Total, ICP-MS																																<MDL	0.4	2	ug/L
Lead, Dissolved, ICP-MS		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L		<MDL	0.2	1	ug/L				
Lead, Total, ICP-MS																																<MDL	0.2	1	ug/L
Zinc, Dissolved, ICP-MS	4.24		0.5	2.5	ug/L	20.9		0.5	2.5	ug/L	0.98	<RDL	0.5	2.5	ug/L	14.3		0.5	2.5	ug/L	3.3		0.5	2.5	ug/L	3.05		0.5	2.5	ug/L				
Zinc, Total, ICP-MS																																<MDL	0.5	2.5	ug/L
M=MT SM2340B.ED19 (06-02-004-002)																																		
Hardness, Calc	56.5		0.2	1.25	mg CaCO3/L	50.8		0.2	1.25	mg CaCO3/L	63		0.2	1.25	mg CaCO3/L	38.6		0.2	1.25	mg CaCO3/L	51.5		0.2	1.25	mg CaCO3/L	47.1		0.2	1.25	mg CaCO3/L				
M=OR EPA 3520C/8270C (7-3-04-001)																																		
Chlorpyrifos		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.032	0.0476	ug/L				
Diazinon		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.041	0.0476	ug/L				
Disulfoton		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.0476	ug/L				
Malathion		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.046	0.0476	ug/L				
Parathion-Ethyl		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.043	0.0476	ug/L				
Parathion-Methyl		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.034	0.0476	ug/L				
Phorate		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.031	0.0476	ug/L				
M=OR SM5520-B,F (07-03-016-000)																																		
Oil, Petro (Non-Polar)	2.7	<RDL	2	5	mg/L		<MDL	2	5	mg/L		<MDL	2	5	mg/L		<MDL	2	5	mg/L	3.1	<RDL	2	5	mg/L	2.4	<RDL	2	5	mg/L				
M=OR SW-846 8151A GCMS MODIFIED																																		
2,4,5-T		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L				
2,4,5-TP (Silvex)		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L				
2,4-D		<MDL	0.014	0.2	ug/L	0.16	<RDL	0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L	0.68		0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L				
2,4-DB		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L				
Dalapon		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L				
Dicamba		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L				
Dichloroprop		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L				
Dinoseb		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L				
MCPA		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L				
MCPP		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L	0.57		0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L				
M=OR WDOE NWTPH-HCID (7-3-05-001)																																		
Diesel Range (>C12 Thru C24)		<MDL	0.61	0.61	mg/L		<MDL	0.61	0.61	mg/L		<MDL	0.6	0.6	mg/L		<MDL	0.61	0.61	mg/L		<MDL	0.61	0.61	mg/L		<MDL	0.61	0.61	mg/L				
Gasoline Range (C7 Thru C12)		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L		<MDL	0.24	0.24	mg/L				
Lube Oil Range (>C24)		<MDL	0.61	0.61	mg/L		<MDL	0.61	0.61	mg/L		<MDL	0.6	0.6	mg/L		<MDL	0.61	0.61	mg/L		<MDL	0.61	0.61	mg/L		<MDL	0.61	0.61	mg/L				

January 23, 2006

TO: Fran Solomon, Senior Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY
Mercer Island Stormwater Monitoring,
Samples L37459-1 to 7

Attached is the comprehensive report for the water samples delivered to the laboratory on December 22, 2005. The samples were analyzed in the Organics, Metals, Microbiology and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:
There were no anomalies associated with the preparation and analysis of these samples.

Metals:
There were no anomalies associated with the preparation and the analysis of these samples.

Microbiology:
There were no anomalies associated with the preparation and the analysis of these samples.

Organics:

Oil, Non-Polar Analysis:
There were no anomalies associated with the analysis of these samples.

Herbicide Analyses:
There were no anomalies associated with the analysis of these samples.

Organophosphorus Pesticides (short list) Analyses:
There were no anomalies associated with the analysis of these samples.

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification, except where noted above.

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PROJECT: 421195								
COMBINED LABS-Liquid								
	Locator	MERCERISL06	MERCERISL10	MERCERISL26	MERCERISL32	MERCERISL42	MERCERISLDUP	KCO
Sample	Date	12/22/2005	12/22/2005	12/22/2005	12/22/2005	12/22/2005	12/22/2005	12/22/2005
	Lab ID	L37459-1	L37459-2	L37459-3	L37459-4	L37459-5	L37459-6	L37459-7
Conductivity	umhos/cm						**123**	
Dissolved Oxygen	mg/L						**11.3**	
Orthophosphate Phosphorus	mg/L	**0.023**	**0.0655**	**0.0363**	**0.0228**	**0.0605**	**0.0593**	
pH	pH						**7.52**	
Total Nitrogen	mg/L	**0.639**	**1.48**	**0.999**	**1.19**	**1.34**	**1.34**	
Total Phosphorus	mg/L	**0.0918**	**0.12**	**0.187**	**0.065**	**0.159**	**0.157**	
Total Suspended Solids	mg/L	**85.9**	**7.8**	**126**	**13**	**46**	**46**	
Turbidity	NTU						**36.7**	
Escherichia coli	CFU/100ml	**430**	**690**	**520**	**420**	**140**	**1700**	
Fecal Coliform	CFU/100ml	**560**	**750**	**720**	**480**	**1300**	**1100**	
Chromium, Dissolved, ICP-MS	ug/L		**1.3**	**1**	**3.14**	**1.1**	**1.1**	
Copper, Dissolved, ICP-MS	ug/L	**2**	**6.16**	**2.11**	**5.25**	**2.43**	**2.39**	
Hardness, Calc	mg CaCO3/L	**45**	**62.2**	**58.3**	**39.4**	**53**	**53.7**	
Lead, Dissolved, ICP-MS	ug/L	**0.28**	**0.36**	**0.25**	**0.24**	**0.34**	**0.34**	
Zinc, Dissolved, ICP-MS	ug/L	**3.33**	**21.6**	**1.6**	**34.6**	**3.1**	**2.2**	
Oil, Petro (Non-Polar)	mg/L	**2.1**	**3.7**	**3.3**	**2.9**	**2.7**	**3.6**	
Conductivity, Field	umhos/cm	**91.1**	**141**	**105**	**89.6**	**110**	**111**	
Discharge Rate of Stream	cfs	**0.9**	**1.2**	**0.7**	**1.9**	**0.8**	**0.8**	
Dissolved Oxygen, Field	mg/L	**11**	**10.7**	**10.7**	**11.3**	**11.2**	**11.2**	
Sample Start Time	hr	**953**	**1018**	**828**	**849**	**910**	**915**	**925**
Sample Temperature, Field	deg C	**8.1**	**9.1**	**7.8**	**7.7**	**7.6**	**7.6**	
Turbidity, Field	NTU	**13.6**	**19.7**	**129**	**20.1**	**39.3**	**38.7**	
pH, Field	pH	**7.4**	**7.5**	**7.6**	**7.6**	**7.6**	**7.5**	

PROJECT: 421195	Locator:	MERCERISL06				Locator:	MERCERISL10				Locator:	MERCERISL26				Locator:	MERCERISL32				Locator:	MERCERISL42				Locator:	MERCERISLDUP				Locator:	KCO			
	Descrip:	R/D FACILITY SOUTH				Descrip:	SE 22ND ST, NEAR M				Descrip:	FOREST AVE. AND 84				Descrip:	CREEK NEAR HOLLYHI				Descrip:	E. MERCER WAY				Descrip:	FIELD REPLICATE				Descrip:	King County Locato			
	Sampled:	Dec 22, 2005				Sampled:	Dec 22, 2005				Sampled:	Dec 22, 2005				Sampled:	Dec 22, 2005				Sampled:	Dec 22, 2005				Sampled:	Dec 22, 2005				Sampled:	Dec 22, 2005			
	Lab ID:	L37459-1				Lab ID:	L37459-2				Lab ID:	L37459-3				Lab ID:	L37459-4				Lab ID:	L37459-5				Lab ID:	L37459-6				Lab ID:	L37459-7			
	Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	STORM WTR				Matrix:	BLANK WTR			
	% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:					% Solids:				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis					- Wet Weight Basis			
COMBINED LABS																																			
M=CV SM2130-B (03-01-011-003)																																			
Turbidity																										36.7		0.5	2	NTU					
M=CV SM2510-B (03-01-002-003)																																			
Conductivity																										123		0.5	10	umhos/cm					
M=CV SM2540-D (03-01-009-002)																																			
Total Suspended Solids	85.9		1	2	mg/L	7.8		1	2	mg/L	126		5	10	mg/L	13		1	2	mg/L	46		5	10	mg/L	46		5	10	mg/L					
M=CV SM4500-0-C (03-03-007-003)																																			
Dissolved Oxygen																										11.3		0.5	1	mg/L					
M=CV SM4500-H-B (03-01-003-004)																																			
pH																										7.52				pH					
M=CV SM4500-N-C (03-03-013-002)																																			
Total Nitrogen	0.639		0.05	0.1	mg/L	1.48		0.05	0.1	mg/L	0.999		0.05	0.1	mg/L	1.19		0.05	0.1	mg/L	1.34		0.05	0.1	mg/L	1.34		0.05	0.1	mg/L					
M=CV SM4500-P-B,FMOD(03-03-013-002)																																			
Total Phosphorus	0.0918		0.005	0.01	mg/L	0.12		0.005	0.01	mg/L	0.187		0.005	0.01	mg/L	0.065		0.005	0.01	mg/L	0.159		0.005	0.01	mg/L	0.157		0.005	0.01	mg/L					
M=CV SM4500-P-F (03-03-012-003)																																			
Orthophosphate Phosphorus	0.023		0.002	0.005	mg/L	0.0655		0.002	0.005	mg/L	0.0363		0.002	0.005	mg/L	0.0228		0.002	0.005	mg/L	0.0605		0.002	0.005	mg/L	0.0593		0.002	0.005	mg/L					
M=ES Hydrolab (02-01-005-002)																																			
Conductivity, Field	91.1		0.5	10	umhos/cm	141		0.5	10	umhos/cm	105		0.5	10	umhos/cm	89.6		0.5	10	umhos/cm	110		0.5	10	umhos/cm	111		0.5	10	umhos/cm					
Dissolved Oxygen, Field	11		0.5	1	mg/L	10.7		0.5	1	mg/L	10.7		0.5	1	mg/L	11.3		0.5	1	mg/L	11.2		0.5	1	mg/L	11.2		0.5	1	mg/L					
pH, Field	7.4				pH	7.5				pH	7.6				pH	7.6				pH	7.6				pH	7.5				pH					
Sample Temperature, Field	8.1				deg C	9.1				deg C	7.8				deg C	7.7				deg C	7.6				deg C	7.6				deg C					
Turbidity, Field	13.6		0.5	2	NTU	19.7		0.5	2	NTU	129		0.5	2	NTU	20.1		0.5	2	NTU	39.3		0.5	2	NTU	38.7		0.5	2	NTU					
M=ES NONE																																			
Discharge Rate of Stream	0.9		0.05	0.1	cfs	1.2		0.05	0.1	cfs	0.7		0.05	0.1	cfs	1.9		0.05	0.1	cfs	0.8		0.05	0.1	cfs	0.8		0.05	0.1	cfs					
Field Personnel	JD,JP				none	JD,JP				none	JD,JP				none	JD,JP				none	JD,JP				none	JD,JP				none					
Sample Function																										FREP@L37459-5				none					
Sample Start Time	953				hr	1018				hr	828				hr	849				hr	910				hr	915				hr	925				hr
M=MC METRO MC SOP 6.5.1																																			
Escherichia coli	430				CFU/100ml	690				CFU/100ml	520				CFU/100ml	420				CFU/100ml	140				CFU/100ml	1700				CFU/100ml					
M=MC SM-9222 D ed.17																																			
Fecal Coliform	560				CFU/100ml	750				CFU/100ml	720				CFU/100ml	480				CFU/100ml	1300				CFU/100ml	1100				CFU/100ml					
M=MT EPA 200.8 (06-03-004&004A-001)																																			
Chromium, Dissolved, ICP-MS		<MDL	0.4	2	ug/L	1.3	<RDL	0.4	2	ug/L	1	<RDL	0.4	2	ug/L	3.14		0.4	2	ug/L	1.1	<RDL	0.4	2	ug/L	1.1	<RDL	0.4	2	ug/L					
Chromium, Total, ICP-MS																																<MDL	0.4	2	ug/L
Copper, Dissolved, ICP-MS	2	<RDL	0.4	2	ug/L	6.16		0.4	2	ug/L	2.11		0.4	2	ug/L	5.25		0.4	2	ug/L	2.43		0.4	2	ug/L	2.39		0.4	2	ug/L					
Copper, Total, ICP-MS																																<MDL	0.4	2	ug/L
Lead, Dissolved, ICP-MS	0.28	<RDL	0.2	1	ug/L	0.36	<RDL	0.2	1	ug/L	0.25	<RDL	0.2	1	ug/L	0.24	<RDL	0.2	1	ug/L	0.34	<RDL	0.2	1	ug/L	0.34	<RDL	0.2	1	ug/L					
Lead, Total, ICP-MS																																<MDL	0.2	1	ug/L
Zinc, Dissolved, ICP-MS	3.33		0.5	2.5	ug/L	21.6		0.5	2.5	ug/L	1.6	<RDL	0.5	2.5	ug/L	34.6		0.5	2.5	ug/L	3.1		0.5	2.5	ug/L	2.2	<RDL	0.5	2.5	ug/L					
Zinc, Total, ICP-MS																																<MDL	0.5	2.5	ug/L
M=MT SM2340B.ED19 (06-02-004-002)																																			
Hardness, Calc	45		0.2	1.25	mg CaCO3/L	62.2		0.2	1.25	mg CaCO3/L	58.3		0.2	1.25	mg CaCO3/L	39.4		0.2	1.25	mg CaCO3/L	53		0.2	1.25	mg CaCO3/L	53.7		0.2	1.25	mg CaCO3/L					
M=OR EPA 3520C/8270C (7-3-04-001)																																			
Chlorpyrifos		<MDL	0.033	0.049	ug/L		<MDL	0.033	0.049	ug/L		<MDL	0.033	0.0481	ug/L		<MDL	0.032	0.0476	ug/L		<MDL	0.033	0.049	ug/L		<MDL	0.033	0.049	ug/L					
Diazinon		<MDL	0.042	0.049	ug/L		<MDL	0.042	0.049	ug/L		<MDL	0.041	0.0481	ug/L		<MDL	0.041	0.0476	ug/L		<MDL	0.042	0.049	ug/L		<MDL	0.042	0.049	ug/L					
Disulfoton		<MDL	0.026	0.049	ug/L		<MDL	0.026	0.049	ug/L		<MDL	0.026	0.0481	ug/L		<MDL	0.026	0.0476	ug/L		<MDL	0.026	0.049	ug/L		<MDL	0.026	0.049	ug/L					
Malathion		<MDL	0.047	0.049	ug/L		<MDL	0.047	0.049	ug/L		<MDL	0.046	0.0481	ug/L		<MDL	0.046	0.0476	ug/L		<MDL	0.047	0.049	ug/L		<MDL	0.047	0.049	ug/L					
Parathion-Ethyl		<MDL	0.044	0.049	ug/L		<MDL	0.044	0.049	ug/L		<MDL	0.043	0.0481	ug/L		<MDL	0.043	0.0476	ug/L		<MDL	0.044	0.049	ug/L		<MDL	0.044	0.049	ug/L					
Parathion-Methyl		<MDL	0.035	0.049	ug/L		<MDL	0.035	0.049	ug/L		<MDL	0.035	0.0481	ug/L		<MDL	0.034	0.0476	ug/L		<MDL	0.035	0.049	ug/L		<MDL	0.035	0.049	ug/L					
Phorate		<MDL	0.032	0.049	ug/L		<MDL	0.032	0.049	ug/L		<MDL	0.032	0.0481	ug/L		<MDL	0.031	0.0476	ug/L		<MDL	0.032	0.049	ug/L		<MDL	0.032	0.049	ug/L					
M=OR SM5520-B,F (07-03-016-000)																																			
Oil, Petro (Non-Polar)	2.1	<RDL	2	5	mg/L	3.7	<RDL	2	5	mg/L	3.3	<RDL	2	5	mg/L	2.9	<RDL	2	5	mg/L	2.7	<RDL	2	5	mg/L	3.6	<RDL	2	5	mg/L					
M=OR SW-846 8151A GCMS MODIFIED																																			
2,4,5-T		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L		<MDL	0.032	0.2	ug/L					
2,4,5-TP (Silvex)		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L		<MDL	0.019	0.2	ug/L					
2,4-D		<MDL	0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L		<MDL	0.014	0.2	ug/L					
2,4-DB		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L					
Dalapon		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L		<MDL	0.033	0.4	ug/L					
Dicamba		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L		<MDL	0.024	0.2	ug/L					
Dichloroprop		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L		<MDL	0.041	0.2	ug/L					
Dinoseb		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L		<MDL	0.021	0.2	ug/L					
MCPA		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L		<MDL	0.015	0.2	ug/L					
MCPP		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L		<MDL	0.016	0.2	ug/L					

APPENDIX E

Raw Sediment Quality Data from 2004 and 2005 Sampling Events

By King County Water and Land Resources Division (WLRD)

Environmental Laboratory

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November 15, 2004

TO: Fran Solomon, Senior Ecologist

WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY, Mercer Island Sediments
Samples L33285-1- 6

Attached is the comprehensive report for the sediment samples delivered to the laboratory on September 22, 2004. The samples were analyzed in the Organics, Metals and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

There were no anomalies associated with the preparation and analysis of these samples. The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

Metals:

The data have passed all QA/QC checks and the data may be used without qualification with the following exceptions. The duplicate precision for chromium and lead exceeded the 20% acceptance window for Relative Percent Difference (RPD). All samples contained a relatively high amount of water which made it extremely difficult to achieve a homogeneous sample during preparation. The chromium and lead results were qualified with an “E” to indicate an estimated value. The matrix spike recovery for zinc was outside the established control limits of 25%. Samples were spiked prior to analysis at levels specified by the method. The QC acceptance criteria are based on the assumption that the spike level is at least 25% of the indigenous sample concentration. In this case, the level of target analyte originally present in the sample may have been too high to accurately determine the spike with the precession of the method. Therefore, the zinc results were qualified with an “L".

Organics:

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

If you have any questions or need additional information, please call me at 684-2327.

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PROJECT: 421195

COMBINED LABS-Solid

Locator	Sample Depth	Lab ID	Total Solids *	Chromium, Total, ICP	Copper, Total, ICP	Lead, Total, ICP	Zinc, Total, ICP	Oil, Petro (Non-Polar)
			%	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
MERCERISL06		L33285-1	75.2	28.9	7.37	3.5	33.6	310
MERCERISL10		L33285-2	83.3	15.1	15.4	12.5	145	230
MERCERISL26		L33285-3	77.5	26.5	11	4	34.3	270
MERCERISL32		L33285-4	89.6	20.5	9.51	7.3	54.2	120
MERCERISL42		L33285-5	74.9	29	10.4	6.7	38.2	280
MERCERISLDUP		L33285-6	73.5	30.9	13.7	5.4	42	260

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October 25, 2005

TO: Fran Solomon, Senior Ecologist
WLRD, Scientific and Technical Support

FROM: Fritz Grothkopp, Laboratory Project Manager
WLRD, Environmental Laboratory

SUBJECT: Attached Report for Project 421195CY, Mercer Island Sediments
Samples L36787-1- 7, collected September 9, 2005

Attached is the comprehensive report for the sediment samples delivered to the laboratory on September 9, 2005. The samples were analyzed in the Organics, Metals and Conventionals sections of the laboratory. QA/QC data summaries are included for your information.

Conventionals:

There were no anomalies associated with the preparation and analysis of these samples. The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

Metals:

The data have passed all QA/QC checks and the data may be used without qualification

Organics:

The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification.

If you have any questions or need additional information, please call me at 684-2327.

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PROJECT:
421195

COMBINED LABS-Solid

Locator	Sample Depth	Lab ID	Total Solids *	Chromium, Total, ICP	Copper, Total, ICP	Lead, Total, ICP	Zinc, Total, ICP	Oil, Petro (Non-Polar)	Sample Start Time *
			%	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	hr
MERCERISL06		L36787-1	75.1	27.3	7.31	3.5	38.2	430	1350
MERCERISL10		L36787-2	81	32.2	20.9	18.1	260	936	1410
MERCERISL42		L36787-3	77.1	33.1	9.62	5.1	50.3	401	1255
MERCERISL26		L36787-4	76.5	28.1	13.3	4.7	40.3	448	1115
MERCERISL32		L36787-5	88.6	20.1	12.6	6.8	67.5	579	1145
MERCERISLDUP		L36787-6	73.3	26.6	10.9	6.4	55.4	359	1305

PROJECT: 421195	Locator:	MERCERISL06				Locator:	MERCERISL10				Locator:	MERCERISL26				Locator:	MERCERISL32				Locator:	MERCERISL42				Locator:	MERCERISLDUP			
	Descrip:	R/D FACILITY SOUTH				Descrip:	SE 22ND ST, NEAR M				Descrip:	FOREST AVE. AND 84				Descrip:	CREEK NEAR HOLLYHI				Descrip:	E. MERCER WAY				Descrip:	FIELD REPLICATE			
	Sampled:	Sep 22, 2004				Sampled:	Sep 22, 2004				Sampled:	Sep 22, 2004				Sampled:	Sep 22, 2004				Sampled:	Sep 22, 2004				Sampled:	Sep 22, 2004			
	Lab ID:	L33285-1				Lab ID:	L33285-2				Lab ID:	L33285-3				Lab ID:	L33285-4				Lab ID:	L33285-5				Lab ID:	L33285-6			
	Matrix:	FRSHWTRSED				Matrix:	FRSHWTRSED				Matrix:	FRSHWTRSED				Matrix:	FRSHWTRSED				Matrix:	FRSHWTRSED				Matrix:	FRSHWTRSED			
	% Solids:	75.2				% Solids:	83.3				% Solids:	77.5				% Solids:	89.6				% Solids:	74.9				% Solids:	73.5			
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis			
COMBINED LABS																														
M=CV SM2540-G (03-01-007-002)																														
Total Solids *	75.2		0.005	0.01	%	83.3		0.005	0.01	%	77.5		0.005	0.01	%	89.6		0.005	0.01	%	74.9		0.005	0.01	%	73.5		0.005	0.01	%
M=MT EPA3050A/6010B (06-02-004-002)																														
Chromium, Total, ICP	28.9	E	0.32	1.62	mg/Kg	15.1	E	0.3	1.5	mg/Kg	26.5	E	0.31	1.57	mg/Kg	20.5	E	0.27	1.33	mg/Kg	29	E	0.32	1.6	mg/Kg	30.9	E	0.34	1.7	mg/Kg
Copper, Total, ICP	7.37		0.25	1.3	mg/Kg	15.4		0.24	1.2	mg/Kg	11		0.26	1.26	mg/Kg	9.51		0.21	1.06	mg/Kg	10.4		0.25	1.28	mg/Kg	13.7		0.27	1.36	mg/Kg
Lead, Total, ICP	3.5	<RDL,E	2	9.71	mg/Kg	12.5	E	1.8	9.03	mg/Kg	4	<RDL,E	1.9	9.48	mg/Kg	7.3	<RDL,E	1.6	7.98	mg/Kg	6.7	<RDL,E	1.9	9.59	mg/Kg	5.4	<RDL,E	2	10.2	mg/Kg
Zinc, Total, ICP	33.6	L	0.32	1.62	mg/Kg	145	L	0.3	1.5	mg/Kg	34.3	L	0.31	1.57	mg/Kg	54.2	L	0.27	1.33	mg/Kg	38.2	L	0.32	1.6	mg/Kg	42	L	0.34	1.7	mg/Kg
M=OR SM5520-B,D,F (07-03-017-000)																														
Oil, Petro (Non-Polar)	310	<RDL	130	332	mg/Kg	230	<RDL	120	300	mg/Kg	270	<RDL	130	323	mg/Kg	120	<RDL	110	279	mg/Kg	280	<RDL	130	334	mg/Kg	260	<RDL	140	340	mg/Kg
* Not converted to dry weight basis for this parameter																														

APPENDIX F

Laboratory Results from 24 August 2005 Macroinvertebrate Sampling

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2005 Mercer Island Stormwater Monitoring

Benthic Macroinvertebrate Sample Processing and Data Analysis
Summary Report

Prepared for

King County Department of Natural Resources, Land & Water Resources
Environmental Laboratory
322 West Ewing Street
Seattle, WA 98119-9830

Prepared by

Michael Cole, Ph.D.
ABR, Inc.—Environmental Research & Services
PO Box 249
Forest Grove, OR 97116

March 8, 2006

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INTRODUCTION

ABR, Inc. was contracted in 2005 by King County to perform freshwater benthic macroinvertebrate analysis services for the King County Department of Natural Resources. In November of 2005, ABR received 5 benthic samples from the "Mercer Island Stormwater Monitoring" project. Sample processing included subsampling and identification following standard laboratory protocols and a thorough quality control plan, as described herein. Taxonomic data were then analyzed using the Puget Sound Lowlands Benthic Index of Biotic Integrity.

METHODS

Upon arrival at our laboratory, we ensured that all samples were properly labeled and preserved. Each sample was assigned a unique internal tracking number (for this project, 05-467.2-XXX) that accompanied the project and sample information provided by the client. All of this information was entered into the project's sample log that was maintained in the laboratory.

ABR used five trained and tested laboratory technicians, Adam Harris and Nick Haxton, to sort macroinvertebrates from raw field samples for this project. Each sample was processed using strict laboratory sample handling and labeling protocols **(Cole, M. B. 2005. Macroinvertebrate Sample Handling and Sorting Procedures. Unpublished internal ABR training and reference document).** A Caton gridded tray was used to subsample approximately 525 organisms from each sample. Using this subsampling procedure, each sample was distributed evenly across a 30-square wiremesh tray. Individual squares were randomly selected and the contents removed and placed into a Petri dish. Macroinvertebrates were removed from the sample material under a dissecting microscope. This process was repeated until a total count of 525-550 organisms was achieved. The remainder of the sample (the unsorted fraction) was then inspected for large or rare taxa that were not encountered during the subsampling procedure; these "large/rare" taxa were recorded on the laboratory bench sheet as such and placed in a separate vial. The following products resulted from the sample sorting procedure:

1) 525-550 macroinvertebrates sorted into a series (4-7) of small vials by order, class, and/or phylum.
2) A separate vial containing organisms found during the large-rare search
3) Sorted residue – material from which the 525-550 organisms were sorted.
4) Unsorted fraction – portion of the original sample that was not sorted.

All macroinvertebrate samples will be saved by ABR for a minimum of six years or returned to the client, at their request. More than 10% of all sample residues were inspected by the laboratory manager, Adam Harris, to determine whether macroinvertebrate sorts were attaining 95% efficacy. Sorted residues will be saved until quality control results are reviewed and approved by the client. Unsorted samplefractions will be held by ABR for six months following project completion and acceptance of data by the client or returned to the client upon their request.

Macroinvertebrate identification also followed strict protocols (Cole, M. B. 2001. Macroinvertebrate Sample Identification Standard Operating Procedures, Unpublished ABR training and reference manual). All identification work will followed taxonomic standards established by the Northwest Biological Assessment Workgroup and Jeff Adams of the Xerces Society and used the same levels of resolution as used in the 2003 dataset to allow for direct comparison of results between years. A voucher collection was assembled using representative specimens of every taxon identified. A list of taxonomic literature sources used to aid in the identification of project specimens is provided at the end of this report.

All raw data were entered into Excel spreadsheets and crosschecked against paper copies of the data for errors and omissions before the data are analyzed. Electronic data were also checked for outliers and other errors using summary statistics and graphic analyses. Data were analyzed using the most up-to-date version of the Benthic Index of Biotic Integrity for Puget Sound Lowland Streams. Back up copies of all raw data were produced electronically and on paper. An Excel file accompanying this summary report, entitled **"05-467.2_Mercer_Island_data.xls",** contains all of the raw macroinvertebrate taxonomic data, quality control results, voucher specimen record numbers, metric scores, and B-IBI total scores.

RESULTS

Quality Control

One of the five samples (20%) was checked for sorting efficacy and passed with a greater than 95% sorting efficacy. ABR's senior scientist and taxonomist, Dr. Michael Cole, encountered no unusual or rare taxa that were difficult to identify. As such, no specimens were sent to outside specialists. Taxa identified for this project that had not been identified in 2004 by ABR for King County were added to ABR's King County projects voucher specimen collection. This collection will be permanently archived in ABR's master reference collection.

2005 IBI Scores

2005 Mercer Island B-IBI scores ranged from 18 to 34 and averaged 24.4. Sample sites Mercer Isl 6 and Mercer Isl 10 received the lowest B-IBI scores of 18 each. Mercer Isl 42 received an intermediate B-IBI score of 22, while the sample sites Unnamed UPD and Ruth UPD, received the highest scores of 34 and 30, respectively.

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		Site		MERCER ISL 42		MERCER ISL 6		MERCER ISL 10	
		ABR Sample ID		05-467.2-151		05-467.2-152		05-467.2-155	
		Sample date		8/24/2005		8/24/2005		9/12/2005	
		Number of grids used (max = 30)		30		5		17	
		Sorting Efficacy QC Result				PASS			
		Taxon	**Voucher**	Count	Unique?	Count	Unique?	Count	Unique?
Non-insect taxa		Turbellaria	*2135*					11	
		Nematoda	*2198*	4		5		9	
		Oligochaeta		49		33		348	
	Erpobdellidae	Erpobdellidae - immature	*2171*						
		Helobdella stagnalis	*2352*						
	Hirudinidae	Hirudinidae	*2548*						
	Glossiphoniidae	Glossiphoniidae - immature	*2170*						
	Piscicolidae	*Piscicola salmositica*	*2112*						
		Hydra							
	Margaritiferidae	Margaritifera falcata	*2176*						
	Pisidiidae	Pisidiidae	*2023*	1				16	
	Ancylidae	*Ferrissia*	*2022*						
	Lymnaeidae	Fossaria	*2174*	1		1			
		Stagnicola	*2175*						
	Planorbidae	Planorbidae	*2024*	3				8	
		Ostracoda	*2136*						
		Copepoda	*2137*						
		Hyalella azteca	*2025*						
	Pleuroceridae	Juga	*2178*						
	Physidae	Physidae	*2057*			1		3	
	Corophiidae	*Americorophium spinicorne*	*2167*						
	Crangonyctidae	*Crangonyx*	*2128*			6			
	Gammaridae	*Gammarus*	*2139*						
		Rammelogammarus	*2169*						
	Asellidae	*Caecidotea*	*2177*						
	Sphaeromatidae	*Gnorimosphaeroma sp.*	*2168*						
	Astacidae	*Pacifastacus*	*2197*						
	Acari	Acari	*2139*	2		2			
Odonata	Gomphidae	Gomphidae - early instar	*2140*						
		Octogomphus	*2058*						
	Coenagrionidae	*Coenagrion/Enallagma*	*2127*						
	Corduligasteridae	Cordulegaster	*2053*						
Lepidoptera		Pyralidae							
Ephemeroptera	Ameletidae	*Ameletus*	*2056*						

	Baetidae	*Acentrella turbida*	*2059*			
		Baetis flavistriga	*2093*			
		Baetis tricaudatus	*2006*	57	42	82
		Centroptilum	*2106*			
		Diphetor hageni	*2007*			
		Procloeon	*2115*			
		Pseudocloeon	*2126*			
	Ephemerellidae	*Attenella* - early instar	*2033*			
		Caudatella - early instar	*2159*			
		Drunella doddsi	*2055*			
		Drunella flavelinea				
		Drunella grandis	*2179*			
		Drunella spinifera	*2003*			
		Ephemerella aurivillii	*2512*			
		Ephemerella excrucians	*2010*			
		Ephemerella - early instar	*2134*			
		Serratella tibialis	*2032*			
		Timpanoga hecuba	*2180*			
	Heptageniidae	*Cinygma*	*2008*	14		
		Cinygmula	*2009*			
		Epeorus grandis	*2141*			
		Epeorus longimanus	*2181*			
		Heptageniidae - dam/e.i.				
		Ironodes	*2142*			
		Nixe	*2121*			
		Leucrocuta	*2134*			
		Rhithrogena	*2031*			
	Leptophlebiidae	*Paraleptophlebia memoralis*	*2471*	3		
		Paraleptophlebia debillis	*2470*			
		Paraleptophlebia bicornuta				
		Paraleptophlebia - early instar				
Plecoptera	Capniidae	Capniidae	*2014*			
		Mesocapnia	*2063*			
	Chloroperlidae	Chloroperlidae - early instar		1		
		Kathroperla	*2084*			
		Paraperla	*2050*			
		Suwallia	*2117*			
		Sweltsa	*2011*			
	Leuctridae	*Despaxia augusta*	*2108*			
		Leuctridae - early instar	2054			
		Leuctra				

		Moselia infuscata	*2083*			
	Nemouridae	*Malenka*	*2143*			
		Soyedina	*2046*			
		Visoka cataractae				
		Zapada cinctipes	*2012*	26		
		Zapada Oregonensis Gr.	2013			
	Peltoperlidae	*Yoraperla*	*2043*			
	Perlidae	*Calineuria californica*	*2035*			
		Doroneuria	*2077*			
		Hesperoperla pacifica	*2070*			
		Perlidae - early instar				
	Perlodidae	*Isoperla*	*2104*			
		Perlodidae - early instar				
		Kogotus	*2156*			
		Skwala	*2034*			
	Pteronarcyidae	*Pteronarcella badia*	*2182*			
		Pteronarcys	*2183*			
Megaloptera	Sialidae	*Sialis*	*2044*			
Trichoptera	Apataniidae	*Apatania*	*2173*			
		Pedomoecus sierra	*2110*			
	Brachycentridae	*Brachycentrus americanus*	*2184*			
		Micrasema	*2041*			
	Calamoceratidae	*Heteroplectron californicum*	*2042*			
	Glossosomatidae	*Glossosoma*	*2047*			
		Agapetus				
	Hydropsychidae	*Arctopsyche grandis*	*2185*			
		Arctopsychinae - early instar, pupa or damaged				
		Cheumatopsyche	2094			
		Hydropsyche	*2019*			
		Parapsyche almota	*2078*			
		Parapsyche elsis	*2166*			
	Hydroptilidae	*Hydroptila*	*2021*			
	Lepidostomatidae	*Lepidostoma*	*2020*			
	Leptoceridae	Leptoceridae - early instar	*2119*			
		Mystacides	*2137*			
	Limnephilidae	*Cryptochia*	*2186*			
		Dicosmoecus gilvipes	*2187*			
		Ecclisocosmoecus				
		Ecclisomyia	*2157*			
		Hydatophylax hesperus	*2040*			

		Limnephilidae - early instar or pupa	*2079 - P*			
		Onocosmoecus unicolor	*2109*			
		Psychoglypha	*2123*			
	Odontoceridae	*Parthina*	*2516*			
	Philopotamidae	*Dolophilodes*	*2116*			
		Wormaldia	*2066*			
	Polycentropodidae	Polycentropodidae - early instar				
		Nuereclipsis	*2473*			
	Rhyacophilidae	*Rhyacophila* - early instar or pupa	*2048-P*			
		Rhyacophila Angelita Gr.	*2514-P*			
		Rhyacophila arnaudi	*2036*	1		
		Rhyacophila Betteni Gr.	*2051*	1		
		Rhyacophila blarina	*2018*			
		Rhyacophila Brunnea Gr.	*2015*			
		Rhyacophila coloradensis	*2535*			
		Rhyacophila grandis	*2016*	4		
		Rhyacophila Hyalinata Gr.	*2162*			
		Rhyacophila narvae	*2017*			
		Rhyacophila Rotunda Gr.	*2172*			
		Rhyacophila Sibirica Gr.	*2479*			
		Rhyacophila valuma	*2087*			
	Uenoidae	*Neophylax pupa/early instar*				
		Neophylax rickeri	*2482*			
		Neophylax splendens	*2485*			
		Neothremma	*2097*			
Coleoptera	Dytiscidae	Dytiscidae - larva		3	1	
		Oreodytes - adults	*2030*			
	Elmidae	*Ampumixis dispar*	*2138*			
		Cleptelmis	*L - 2028/A - 2073*			
		Elmidae - early instar				
		Heterlimnius	*L - 2027/ A - 2074*			
		Lara avara	*2081*			
		Narpus	*2061*			
		Optioservus	*L - 2026/ A - 2075*			
		Zaitzevia	*A - 2029*			
	Haliplidae	*Brychius*	*2062*			
	Hydraenidae	*Hydraena*				
	Hydrophilidae	Hydrophilidae - early instar	*2129*			
		Hydrophilidae - adult	*2499*			

Diptera	Ceratopogonidae	Ceratopogoninae	*2144*		2			
		Forcipomyiinae	*2190*					
	Blephariceridae	*Agathon*	*2495*					
		Philorus	*2537*					
	Dixidae	*Dixa*	*2145*	10	2			
	Empididae	*Chelifera*	*2146*	10	7			
		Clinocera	*2191*					
		Empididae - early instar or pupa						
		Hemerodromia	*2192*					
		Oreogeton	*2193*					
	Muscidae	*Limnophora*	2128	1				
	Pelecorhynchidae	*Glutops*	*2147*					
	Psychodidae	*Maruina*	*2148*					
		Pericoma	*2149*					
		Psychoda	*2194*					
	Ptychopteridae	*Ptychoptera*	*2195*					
	Simuliidae	*Prosimulium*	*2150*					
		Simulium	*2151*	49	345	1		
	Stratiomyidae	Stratiomyidae - early instar	*2125*					
	Tabanidae	*Tabanus*	*2152*					
	Tipulidae	*Antocha*	*2153*					
		Dicranota	*2154*	1				
		Hexatoma	*2155*		1			
		Limnophila	*2037*	7				
		Limonia	*2158*					
		Pedicia	*2133*					
		Pilaria	*2130*					
		Tipula	*2196*					
		Tipulidae - pupa						
	Thaumaliidae	*Thaumalea*						
	Chironomidae	Chironomidae		124	98	27		
		Totals		372	546	505		
		B-IBI METRIC CALCULATIONS						
		METRIC VALUES						
		Taxa richness		22	0	14	0	9	0
		E richness		3	0	1	0	1	0
		P richness		2	0	0	0	0	0
		T richness		3	0	0	0	0	0
		INTOLERANT taxa richness		1		0		0	

Clinger richness	5	1	1
LL richness	7	7	7
% tolerant	2.15	1.65	2.18
% predator	7.80	1.65	0.00
% dominance (3)	61.83	88.83	90.50
SITE SCORE CALCULATION			
Taxa richness	3	1	1
E richness	1	1	1
P richness	1	1	1
T richness	1	1	1
INTOLERANT taxa richness	1	1	1
Clinger richness	1	1	1
LL richness	5	5	5
% tolerant	5	5	5
% predator	1	1	1
% dominance (3)	3	1	1
SITE SCORE	**22**	**18**	**18**