Port of Seattle

Annual Stormwater Monitoring Report

for

Seattle-Tacoma International Airport

for the period July 1, 1999 through June 30, 2000

September 2000

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Port of Seattle

AR 045669

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AR 045670

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1 EXECUTIVE SUMMARY

This Annual Stormwater Monitoring Report has been prepared pursuant to Special Condition S2.E of the NPDES permit for the Port of Seattle's Seattle-Tacoma International Airport (STIA). The Port took a total of 39 grab and 38 composite stormwater samples in the past year, bringing the 6-year totals to over 350 samples for each type. A total of 20 storms were sampled. The Port complied with all sampling and reporting requirements.

In summary, STIA stormwater quality, especially airfield runoff continues to have constituent concentrations lower than comparable regional studies. Moreover, results continue to demonstrate that typical concentrations in airfield outfall discharges are much lower than from the landside subbasin outfalls. This difference is most likely due to higher vehicular use in the landside areas and a higher degree of biofiltration present in the airfield subbasins. Nonetheless, overall STIA results are generally lower than results from other studies for roadways and commercial areas.

Final rounds of source tracing revealed sources of toxicity present in the SDN1 samples, where most whole effluent toxicity (WET) samples tested in 1998-99 did not meet Ecology performance standards. Forensic sampling and analysis techniques, namely metals chelation, indicated that zinc was the most likely toxicant, and was associated with runoff from two cargo buildings with galvanized metal rooftops. The Port is investigating how to remedy this situation, potentially through the use of media filtration treatment. Samples from the three other principal outfalls passed Ecology's performance standards.

The ongoing source tracing in SDE4 has not revealed any significant sources of fecal contamination associated with baseflow, dry-weather discharges or storm runoff. SDE4 discharges have exhibited sporadically elevated fecal coliform levels. In addition to the conventional methods used to date, this year, the source-tracing project also used the microbial source tracing (MST) technique developed at the University of Washington. This MST method isolates *E. coli* bacteria DNA in the samples and compares it to isolates from specific sources already characterized in the regional database. The Port plans to issue a separate report for this study at the conclusion of the project.

The Port eliminated several potential sources of contaminants in SDS1 and SDN1 runoff by re-routing drainage to the IWS. Several samples and observations in the past year showed sporadic, limited contamination associated with aircraft and ground service equipment (GSE) servicing. These BMPs are a direct result of the stormwater monitoring program.

Two short periods of winter weather triggered runway and other ground surface deicing at STIA in the past year. The Port monitored stormwater discharges during these events to characterize the presence, magnitude and duration of ground deicing chemicals in runoff. Key locations in receiving waters were continuously monitored for dissolved oxygen (DO) and other parameters before, during and after these events. The data did not indicate a distinct effect on DO in the receiving waters that could be discerned from the highly variable background conditions established through 3 months of monitoring prior to the events. The Port is preparing a report on this study, the second in two years.

Because of increasing interests in assessing aquatic effects of STIA discharges, the Port plans to study relocating several sampling locations for certain subbasins. Doing so increases the potential for samples to better reflect the influence of all factors prior to discharge to the respective receiving streams. Because most current sampling locations are in-pipe or well above the receiving waters, it may not be appropriate to compare STIA stormwater data to Washington State water quality standards. Nonetheless, toxicity testing in the past 2 years has shown no indications of toxicity present in samples from the three key outfalls that serve 67% of the total STIA storm drainage.

2 INTRODUCTION

The STIA stormwater monitoring program has been in place since 1993 pursuant to the National Pollutant Discharge Elimination System (NPDES) permit. The first permit was renewed and reissued on February 20, 1998, becoming effective March 1, 1998 (permit number WA-002465-1.) In early 1999, a major permit modification issued by Ecology reduced sampling frequency based upon a permit appeal settlement (WDOE 1999.) The Port will begin the next permit renewal process in 2001.

The Port conducts the required monitoring activities according to the specific guidelines and criteria of the Ecology-approved Procedure Manual for Stormwater Monitoring (POS, 1999a). This report summarizes and discusses results from the sixth year of sampling conducted in the 12-month period July 1999 through June 2000, the conclusions, and potential new initiatives to be undertaken. Results summarized in this report include data already submitted to Ecology in Discharge Monitoring Reports (DMRs) plus additional results from other samples unrelated to DMR reporting. The Port has previously submitted five Annual Reports (1995, 1996, 1997a, 1998a, 1999b)

This report satisfies Special Condition S2.E of the National Pollutant Discharge Elimination System (NPDES) permit for the Port of Seattle's (Port) Sea-Tac International Airport (STIA). Special Condition S2.E of the permit states: "On or before October 1 of each year, the Permittee shall submit a report to the Department summarizing the results of the stormwater monitoring conducted pursuant to Special Condition S2.B or S3.E of this permit during the preceding twelve (12) month period from July 1 through June 30. The report shall present the analytical data, the Port's conclusions as to what is being learned from the data, and any new initiatives to be undertaken as part of the Stormwater Pollution Prevention Plan for Airport Operations required in Special Condition S12."

Additionally, Special Condition S2B of the permit requires that: "The permittee shall include the following data for each storm event in the Annual Stormwater Monitoring Summary Report...: date, duration, the number of dry hours preceding the storm event, total rainfall during the storm event (inches), maximum flow rate during the rain event (gallons per minute), and the total flow from the rain event (gallons). The permittee shall also include a monthly summary of daily rainfall...". All of the information required under Special Condition S2B appears in Appendix A.

3 BACKGROUND

3.1 Sea-Tac International Airport

Seattle-Tacoma International Airport (STIA) lies about mid-way between the cities of Seattle and Tacoma, Washington. The airport was built in the 1940s and has expanded throughout the years to become the 18th busiest airport in the U.S. The highly urbanized cities of SeaTac, Des Moines, and Burien surround the airport.

STIA storm drainage discharges through 14 individual outfalls, four that drain to Miller Creek, eight that drain to Des Moines Creek, and two that drain to a City of SeaTac system. These outfalls drain a total of 963 acres which contain about 44% impervious surfaces. Only 17% of this total area (165 acres) drains to Miller Creek, while the remaining 798 acres drains to Des Moines Creek. Another 370 acres, mostly the impervious surfaces of terminal gate and ramp areas, drain to the Industrial Waste System (IWS) and the Industrial Waste Treatment Plant (IWTP.) Three large lagoons detain and equalize runoff flowing to the IWTP which removes suspended solids and petroleum products using the dissolved air flotation unit process. The IWTP discharges directly to Puget Sound via a separate outfall that combines with the Midway sewage treatment plant. IWTP sampling results are not included in nor required to be addressed in this report.

The Port is examining future stormwater management needs in the Preliminary Comprehensive Stormwater Management plan (CSMP) which is part of the Master Plan Update. Issues addressed in this plan include the potential retrofit of existing development to meet state and local guidelines for stormwater quantity and quality BMPs (POS, 2000).

3.2 STIA Storm Drainage Subbasins

The NPDES permit refers to outfalls by number; however, this report refers to subbasins and their outfalls by location names (see Table 1). The Port codes STIA storm drainage subbasin names according to location, for example, "SDS1" means "storm drain south number 1". In addition, the Port identifies all manholes according to an alphanumeric scheme, some of which are referred to in this report. For convenience and consistency, many of these locations were renamed and renumbered in 1999, though physical monitoring locations have not been moved. Drainage area estimates are included in Appendix A. Figure 1 shows the individual stormwater drainage subbasins and the STIA stormwater management boundaries.

STIA stormwater subbasins fall into the general categories listed in Table 1. These categories group subbasins together that have similar land use and other characteristics. These categories include "landside," "airfield," and other non-specific, low-activity areas. Previous reports showed that concentrations of TPH, TSS and other constituents were different for the landside and airfield categories (POS, 1996, 1997a.)

Outfalls SDS3, SDS4, SDN3, and SDN4 drain the principal subbasins of the airfield. These four outfalls drain a total of 626 acres (45% impervious) of the Aircraft Movement Area (AMA), which includes the airport runways, taxiways, and other open space of the "airfield." These four airfield subbasins represent approximately 65 percent of the total STIA storm drainage area. Previously an airfield outfall, SDN2 now discharges to the Industrial Waste System (IWS) via two pump stations constructed as BMPs in 1997.

Four subbasins (SDE4, SDN1, EY, and TY) compose the 165 acres (60% impervious) of "landside" areas of the airport, primarily draining public roads, parking, passenger vehicle areas and rooftops. Although 11 percent of the total impervious area of SDE4 drains portions of Taxiways A and B, the "landside" designation is appropriate because roads, parking, and other vehicle areas on the landside of the airport dominate the total impervious area of SDE4.

Table 1 Outfall Nomenclature

Outfall #	Port Name	Category	Creek	Proximity to receiving water
002	SDE4	landside	Des Moines	Combines w/Bow Lake & City flows before daylighting in East Branch
003	SDS1	none	Des Moines	Direct outfall to East Branch
004	SDS2	none	Des Moines	Flows through swale, NW Ponds then into W. Branch
005	SDS3	airfield	Des Moines	Flows through swale, NW Ponds then into W. Branch
006	SDN1	landside	Miller	Flows through 1000'+ natural channel and Lake Reba detention Pond
007	SDN2	Drains to IWS[1]	Miller	Same as SDN1
008	SDN3	airfield	Miller	Same as SDN1
009	SDS4	airfield	Des Moines	Direct outfall near confluence of East and West Branches
010	SDS7[2]	none	Des Moines	Combines w/City streets commercial area, via swale & NW Ponds
011	SDN4	airfield	Miller	Same as SDN1
012	EY	landside	Gilliam	Via City drains to stream
013	TY	landside	Gilliam	Via City drains to stream
014	SDS6[2]	none	Des Moines	Same as SDS7
015	SDS5[2]	none	Des Moines	Same as SDS7

Table notes:

1. Two pump stations divert all runoff from the former SDN2 subbasin to the IWS. Discharges to SDN2 only occur when rainfall intensity exceeds the 0.20 inches per hour design for these pump stations. These two pump stations were constructed in 1997 as SWPPP BMPs.
2. Outfalls 010, 014 and 015 were previously named "SDW3", "B" and "D", respectively

In previous reports, the SDS1 subbasin was included in the "terminal" category. However, several stormwater BMPs were undertaken in 1996-97 near the terminal, removing 1.5 acres of ramp areas from SDS1. Other BMPs disconnected yet more ramp area that occasionally drained to SDS1 when intense rainfall surcharged certain structures. As a result, SDS1 now drains mostly rooftops, plus a minor area of ramp. Therefore, the "terminal" category is no longer appropriate for SDS1. In addition, recently expanded drainage from South 188th Street was added to SDS1 in 1998-99, increasing the total offsite (non-Port) area to 5.1 acres, nearly 50% of the total SDS1 area.[1] Four other outfalls (SDS2, SDW3, B, and D) drain 110 acres, mostly open spaces (11% impervious) in the southwest portion of STIA.

3.3 Sampling locations

The Port monitors stormwater discharges at 14 locations, one for each subbasin within the boundary of the permit. Figure 1 shows the location of the outfalls and monitoring locations.

Four monitoring locations (subbasins SDE4, SDN1, EY, and TY) are upstream from the final discharge point where the outfall actually "daylights". Runoff contributions from other, non-STIA sources that are outside the Port's jurisdiction enter these storm drains and therefore necessitate monitoring at the first location, often a manhole, upstream of the majority of offsite inputs. Table 2 lists these offsite influences. However, offsite runoff is inextricable for sampling stations for SDE4, SDS1, SDS2, and SDS3. Considering that the offsite area for outfalls SDS1 and SDS2 is primarily roadways, the contribution from non-Port entities is substantial.

To remove unfavorable biases from highway SR518 runoff, the sampling location for SDN1 was moved upstream to its current location in 1997. Therefore, outfall SDN1 has two datasets, one for the period prior to January 1997 that includes results influenced by SR518 runoff, and the other for the more-representative

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[1] In 1998-99 the City of SeaTac added drainage area to SDS1 through the widening of about 800 linear feet of S. 188th Street, adding curb, gutter, piping and a number of storm drain inlets. This section of roadway previously drained sheetwise off the shoulder to grassed ditches. Prior to these improvements, only one inlet drained a much smaller portion of this public roadway that is outside the Port's jurisdiction.

location at "SDN1up" for the ensuing period. See the discussion for Figure 11 and Figure 12 in Section 4.5.3.

It is important to note that because of their distance from receiving waters, certain current sampling locations do not integrate all possible factors that could influence water quality prior to discharging to the streams. Only two of STIA's current outfalls (SDS1 and SDS4) discharge directly to the receiving waters. These two outfalls are sampled at these "daylight", or end-of-pipe locations.

In contrast, because of factors in addition to those mentioned above, all other outfalls are sampled at points well-removed from the biotic community. See Table 1. As a result, the sampling results do not reflect the complex, interactions with chemical, physical, and biological elements that can enhance water quality prior to where STIA stormwater actually enters receiving waters.

For example, drainage from all four Miller Creek outfalls (SDN1, SDN2, SDN3, and SDN4) passes through additional piping and more than 1000 linear feet of open, natural channels, and the Lake Reba detention pond prior to entering Miller Creek. The potential influences of these factors, especially considering that the detention pond is a constructed BMP, are not accounted for in the current sampling scheme required by the permit. These issues should be addressed in the NPDES permit renewal.

3.4 Storm sampling procedures and analytes

The Port's Procedure Manual for Stormwater Monitoring (POS 1999a) describes the criteria for sampling storm events, and describes all relevant sampling, programming, and handling necessary to comply with requirements of the permit. Table 4 lists required sampling frequencies, constituent analytes, methods, and detection limits. The Port reports data on DMRs only where results from storms and samples meet representativeness criteria of the manual. In addition to data provided in the DMRs, results from samples not meeting these criteria or those taken for other purposes are also included in this report. Using automatic samplers, the Port generally takes a grab sample then a flow-weighted composite sample during rainstorms of 0.20 inches or greater that are preceded by less than 0.1inch of rainfall in the previous 24 hours.

Table 2 Offsite Influences Affecting STIA Monitoring Locations[1]

Outfall (manhole)[2]	Total Area (ac)	Offsite Area (ac)	Percent Offsite	Comment
SDE4 (SDE4-65)	149	0.6	<1%	Offsite area of SR99, may be greater than 0.6 acre
SDS1 (outfall)	10.7	5.1	47%	Offsite area of S. 188th St. includes area added by City in Fall 1998
SDS2 (outfall)	13.2	2.9+	>21%	Offsite 16th Ave S., S. 188th St, and possible non-Port commercial area.
SDS3 (outfall)	462	3	< 1%	Approximate offsite area of S. 188th St.
SDN1 (manhole SDN1-56)	24+	9.9+	>40%	Former SDN1 location includes public road runoff. Runoff from additional 49 acres of non-POS area enters below this point prior to entering Lake Reba
SDN1up (SDN1-41)	13.8	0	0%	Air Cargo Road is about 50% of SDN1.

Table notes

1. All area estimates are as of 27 October 1998 and subject to change.
2. Though manhole number designations were changed in 1999, sampling locations remained the same as in previous years.

Table 3 Analytes, Methods and Detection Limits

			Applicable Subbasins			
Analyte	Method[a]	Detection limit (MDL) mg/l	SDE4, SDS3, SDN1, SDN4	EY TY, SDN2	SDS1, SDN2	SDS1, SDS2, SDN3, SDS4, SDS5, SDS6, SDS7
pH[e]	150.1	0.1	X	X	X	X
FOG (Oil and Grease)	413.1	1.0	(f)	(f)	(f)	(f)
TPH (IR)	418.1 mod[b]	1.0	(f)	(f)	(f)	(f)
TPH (GC)	NWTPH-Dx	0.15	X	X	X	X
Fecal coliforms (MPN)	9221 E	2	X	n/a	n/a	X
TSS (total suspended solids)	160.2	0.5	X	X	X	X
Turbidity	180.1	0.1	X	n/a	X	X
BOD_5	405.1	4	X	n/a	X	n/a
Total Glycols[c]	GC FID	4	X	n/a	X	X
Total Recoverable copper, lead, zinc[d]	200	Cu: 2 µg/l Pb: 2 µg/l Zn: 5 µg/l	X	n/a	n/a	n/a

(a) Method refers to EPA-600/4-79-020, March 1979. Fecal coliform method refers to 18th edition of Standard Methods for the Examination of Water and Wastewater (APHA, 1995), or as revised.

(b) Washington State Department of Ecology method WTPH-418.1 Modified.

(c) Analyzed by Gas Chromatograph, Flame Ionization Detector

(d) Lead and copper by atomic absorption (AA) furnace, zinc by ICP.

(e) pH is not required by permit, but is used as a reference parameter

(f) FOG and TPH (IR) methods replaced by NWTPH-Dx March 1, 1998.

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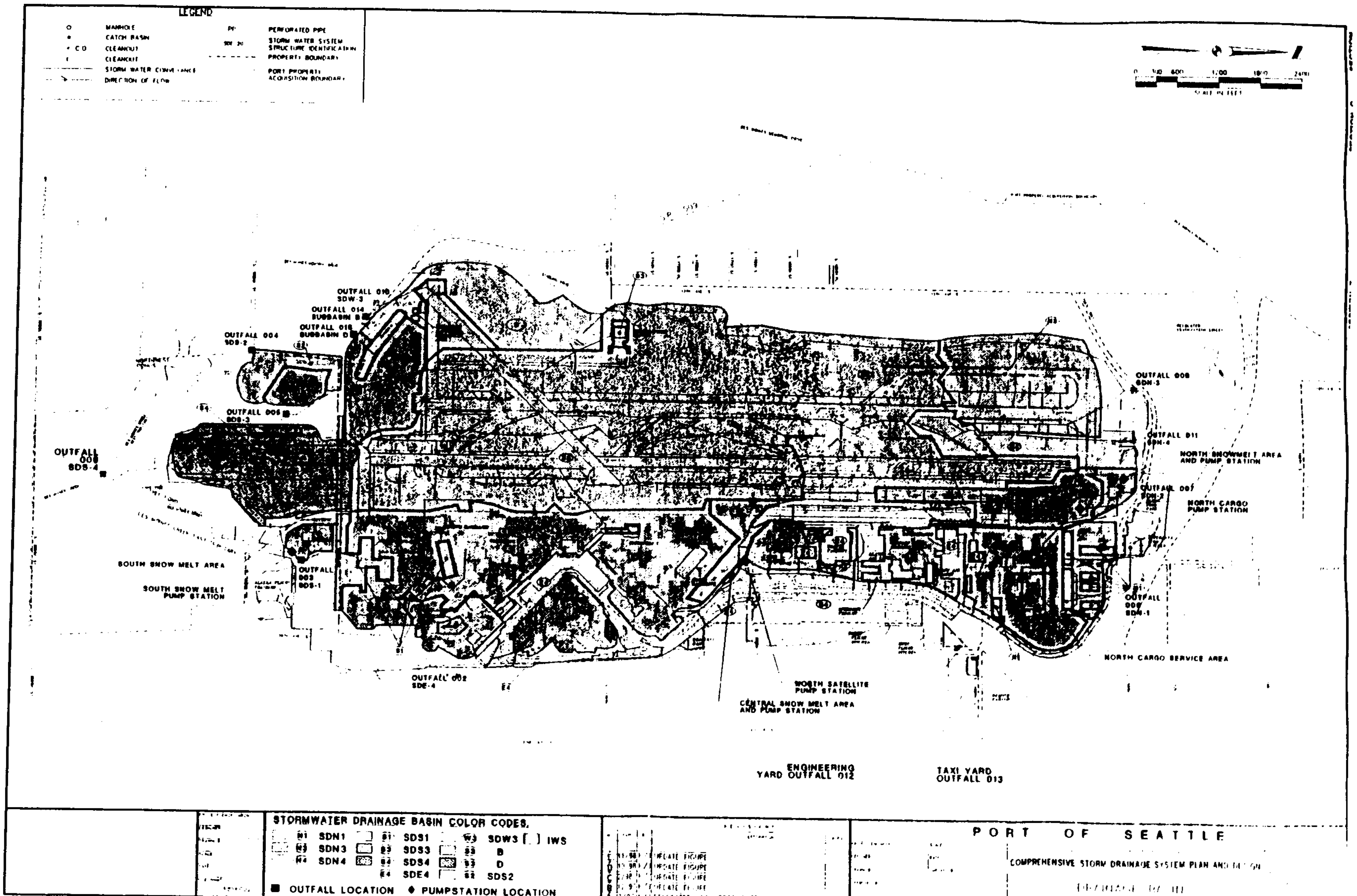
LEGEND
MANHOLE
CATCH BASIN
CLEANOUT
CLEANOUT
STORM WATER CONVEYANCE
DIRECTION OF FLOW
PERFORATED PIPE
STORM WATER SYSTEM STRUCTURE IDENTIFICATION
PROPERTY BOUNDARY
PORT PROPERTY ACQUISITION BOUNDARY
SCALE IN FEET
OUTFALL 010 SDW-3
OUTFALL 014 SUBBASIN B
OUTFALL 015 SUBBASIN D
OUTFALL 004 SDS-2
OUTFALL 005 SDS-3
OUTFALL 006 SDS-4
SOUTH SNOW MELT AREA
SOUTH SNOW MELT PUMP STATION
OUTFALL 003 SDS-1
OUTFALL 002 SDE-4
OUTFALL 008 SDN-3
OUTFALL 011 SDN-4
NORTH SNOWMELT AREA AND PUMP STATION
OUTFALL 007
NORTH CARGO PUMP STATION
OUTFALL 009 SDN-1
NORTH CARGO SERVICE AREA
NORTH SATELLITE PUMP STATION
CENTRAL SNOW MELT AREA AND PUMP STATION
ENGINEERING YARD OUTFALL 012
TAXI YARD OUTFALL 013
STORMWATER DRAINAGE BASIN COLOR CODES.
SDN1
SDN3
SDN4
SDS1
SDS3
SDS4
SDE4
SDW3
IWS
B
D
SDS2
OUTFALL LOCATION
PUMPSTATION LOCATION
UPDATE FIGURE
UPDATE FIGURE
UPDATE FIGURE
UPDATE FIGURE
RELOCATED AND ADDED OUTFALL LOCATIONS
PORT OF SEATTLE
COMPREHENSIVE STORM DRAINAGE SYSTEM PLAN AND

4 SAMPLING RESULTS

4.1 General

This chapter presents and discusses data separately for results from grab samples, composite samples, and deicing event (glycol) samples. These types of samples employ different protocols that represent different temporal periods of the particular stormwater discharge event (i.e., grab samples versus composite samples) and should be addressed separately.

The required hydraulic and hydrologic data are included in Appendix A. Samples were validated according to the representativeness criteria described in the Port's Procedure Manual for Stormwater Monitoring (Port 1999a). Appendix B tabulates and summarizes analytical results for each outfall. Data previously submitted to Ecology in the monthly DMRs represent samples collected strictly from those storms and sampling routines that fully met the criteria of the Procedure Manual. In addition to this DMR data, this report summarizes all other data collected at the storm drain outfalls covered under the NPDES permit (Table 1).

4.2 Data Presentation Methods

This report compares the Port's stormwater data to others' stormwater data listed as reference comparators in Table 4. Most reference comparators discussed in this report were the lowest results from two City of Bellevue studies. These comprehensive, local studies had similar sampling protocols to the Port's. However, the samples in the 1995 Bellevue study were taken at instream stations and therefore reflect receiving water conditions during stormflows, as opposed to just outfall discharges. Nonetheless, contrasting STIA *outfall* discharges to this *instream* comparator results in more conservative conclusions. This report uses the Portland NPDES data for copper because it better represents commercial and industrial outfall discharges *before* mixing with receiving waters. Again, the reader should consider the nature of the STIA sampling locations discussed in Section 3.3.

Comparator data and outfall sampling results appear on box plots that illustrate the central tendency, spread, and skew of the Port's data (Figures 2 through 9). The bold line within a box represents the median value, while the bottom and top of a box show the 25th and 75th percentiles, respectively. In other words, the interquartile range (central 50 percent) of the data fall within values highlighted by the box. SPSS software was used to generate the box plots (SPSS 1999).

When summarizing data to compare typical values, outliers usually represent unusual conditions, atypical of what could be expected under usual circumstances. In a box plot, the "whiskers" show the largest values that are not considered outliers. SPSS box plots show two types of outliers: those more than 1.5 box-lengths from the 75th percentile plotted with the symbol "o", and those more than 3.0 boxlengths with a star symbol ("*"). In most cases, the boxplots show the outliers, but in some cases the scales selected prevent plotting all outliers. All data are tabulated in Appendix B.

4.3 Storm events sampled

The 1999-2000 sampling season began on July 1, 1999 and ended June 30, 2000. During this 12 month period, 36.8 inches of rain fell at STIA, which is 4% below the 60+ year average. The 9.6 inches of rainfall in November 1999 was about 50% more than the average of 6 inches. Unlike the 1998-99 period, influenced by the very wet La Nina weather pattern, rainfall in the past year was much more typical and no new records were set. See Figure 2.

In the 12 months ending June 2000, the Port sampled 19 rainfall events. Rainfall during these events ranged from 0.1 to 1.76 inches. These events were preceded by less than a day to up to 2 weeks of dry weather. There were no qualifying sample events in the month of September 1999. Appendix A summarizes daily rainfall and storms sampled.

Table 4 Stormwater Quality Comparators[a]

		Study						
Constituent	**Units**	**NURP, 1983**	**BURP, 1984**	**Metro, 1982**	**Bellevue, 1995[b]**	**Highway Runoff[c] 1981**	**Portland NPDES[d] 1993**	**WA State Standard[e]**
pH	std units		**5.2 - 7.4**		7.2 - 7.8			6.5 - 8.5
TPH	mg/l				**3.7**		6.5	*no standard*
Fecal coliforms	mpn per 100 ml	1000 to 21000	*980*		**201**			50
BOD_5	mg/l	9	**6.6**				20	*no standard*
TSS	mg/l	100	**50**		82.3	106	119	*no standard*
Turb	mg/l		19		**29.4**			based on background
glycols	mg/l	*not analyzed in any of these studies*						*no standard*
Cu (TR)[f]	μg/l	34		20	10.4	43	**40**	10.3[f]
Pb (TR)[f]	μg/l	144	170	210	**263**	466[c]	25	39[f]
Zn (TR)[f]	μg/l	160	120	110	**161.4**	638	376	72[f]
statistic reported:		median	mean[g], *median*	mean	log-normal median	mean	median	metals standards[f] at hardness =56 mg/l

(a) Comparative Values in bold. Blank space means no data available, reported, or applicable.

(b) Bellevue, 1995 data are for instream samples from the "Sturtevant Creek, downstream" site.

(c) Highway runoff from an I5 location in Seattle with 57,000 ADT, 43 to 54 storm samples in 1980-81 (Chui, Mar, and Horner, 1982). Because this study was conducted prior to the phase-out of leaded gasoline, lead results were higher than other later studies.

(d) City of Portland 1993 NPDES Part 2 Municipal Application. Median of 10 samples from I2 "industrial" outfall.

(e) Standards are for class AA waters, see WAC 173-201A.

(f) Total recoverable metals. WA State acute standards expressed as total recoverable, calculated at 56 mg/l hardness using Ecology's "TSDCALC8.XLW" spreadsheet. This hardness value is the median of seven instream samples collected in Miller and Des Moines Creeks in 1999.

(g) For Turb, Cu, Pb, and Zn, BURP 1984 data was mean of grab samples, therefore Bellevue, 1995 data are more representative comparators because they represent median of composite samples.

Unlike the 1998-99 season, in the past year there was only a single summer storm event associated with higher than typical constituent concentrations. In previous years, thunderstorms producing intense rainfall after protracted dry periods of a month or more caused elevated levels of certain constituents. These meteorological factors resulted in the unusual combination of a lengthy accumulation period and a high scour from the intense rainfall. Several fall 1998 storms followed this pattern. These factors are important to take into account when considering how representative a particular sample result is given the naturally occurring, and perhaps infrequent seasonal influences.

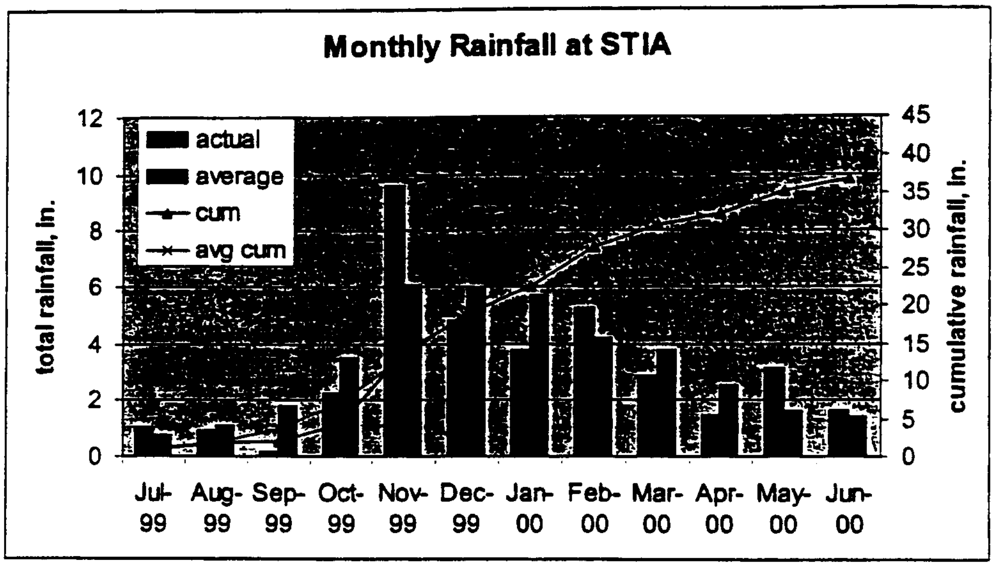

Figure 2 Rainfall Summary

4.4 Grab Sample Results

The following discussion includes results from 39 grab samples collected in the past year, bringing the 6-year total to 399 total grab samples.

4.4.1 Total Petroleum Hydrocarbons (TPH)

The results from the current year presented in Figure 2 continue to demonstrate that concentrations of petroleum-type constituents in STIA stormwater are consistently less than in stormwater from other urban areas.

The TPH method was changed from an infrared absorbance (IR) method (WTPH 418.1) to a gas-chromatographic (GC) method (NWTPH-Dx.) in 1998. Only results from the new method are discussed below. A previous Annual Report (POS, 1998a) demonstrated that data from the old and new methods are comparable. The results indicate the following:

- STIA stormwater overall continues to have less petroleum-type constituents than typical urban runoff. During the past 3 years, more than 95 percent of the 161 STIA results were less than the Bellevue, 1995 median (instream samples) of 3.7 milligrams per liter (mg/l). All 39 samples in the past year were below the Bellevue median. The overall STIA TPH median dropped from 0.4 to 0.3 mg/l because of low results in the past year. On the whole, TPH was not detected in 58 (36%) of a total of 161 samples taken since March 1998.

- Airfield stormwater (SDS3, SDS4, SDN3, and SDN4) continues to contain far less TPH than runoff from the landside subbasins (SDE4, SDN1, and TY.) To date, median airfield TPH is 0.08 mg/l compared to the 1.0 to 2.5 mg/l median levels for the four landside outfalls. TPH was not detected in 43 (67 percent) of the 64 airfield outfall samples analyzed by the new method in the past three years. The maximum TPH value of these 64 airfield outfall samples was 0.5 mg/l, which is one half the detection limit of the previous TPH (IR) method of 1.0 mg/l. Current results are similar, with no new maxima. See Figure 3.

- Because most of the TPH detected in landside runoff is motor oil, it is likely attributable to cars and trucks. Figure 2 and the tabular data in Appendix B show that motor oil represents the majority of the TPH at these outfalls (SDE4, SDN1, and TY.)

- The IWS effectively isolates aviation-related fuel spills and drips from the storm drains. For all outfalls, measurements of diesel fractions, which would represent certain constituents of aviation fuel (JP4, JP5, etc.) are typically below detection limits (90% of the 161 samples), with a historical maximum of 0.8 mg/l. Considering that subbasins SDE4 and SDS3 are contiguous with aircraft service (IWS) areas where fueling takes place, sample results for these two outfalls show low incidence of TPH. Up to 90% of the 30 samples from SDE4 had TPH less than the 3.7 mg/l comparative value for urban areas. More than 60% of the total of 30 SDS3 samples had non-detectable TPH.

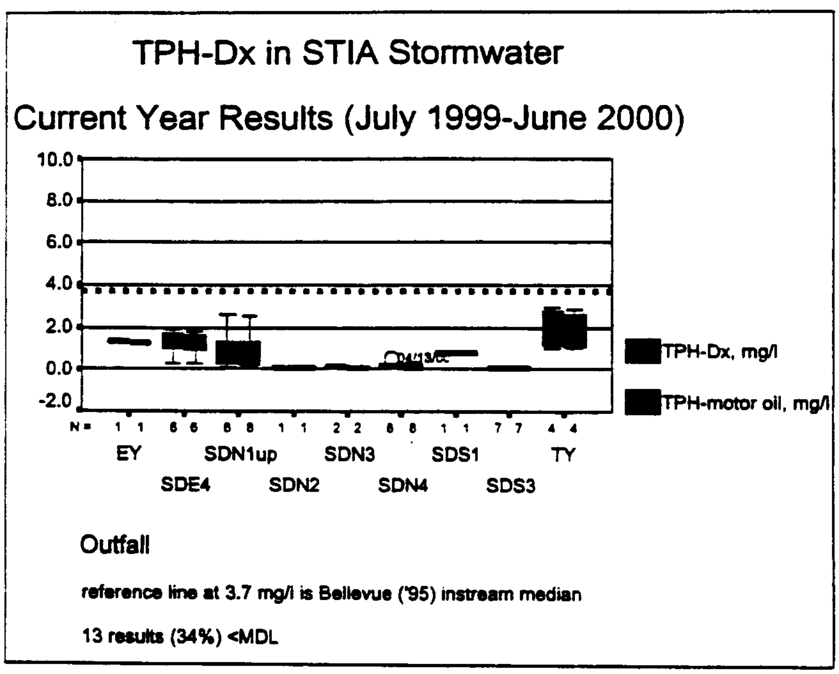

Figure 3 TPH for current year

4.4.2 Fecal Coliforms

Overall, the median value for fecal coliforms in 302 samples to date is 42 per 100 ml, with more than two thirds of the results less than 200 per 100 ml. Relative to the comparative values (Table 4), these overall results indicate that STIA stormwater contains fewer fecal coliforms than typical urban stormwater. More than 81 percent of the 126 airfield subbasin samples taken to date showed fecal coliforms less than the Bellevue (1995) comparative value of 201 per 100 ml (see Figure 4). Current year results from a total of 32 samples from six outfalls continue this pattern, where 81 percent were less than the comparative value.

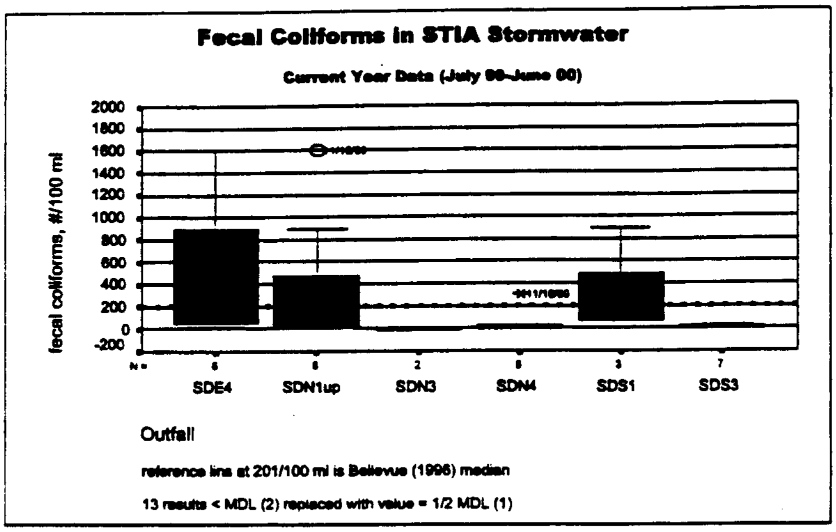

Figure 4 Fecal Coliforms for Current year

There are numerous sources of fecal coliforms including fecal waste products of birds and all mammals. Urban stormwater often contains fecal coliforms at sporadically elevated levels. Human sources, such as septage or sanitary sewage are not always implicated as contaminants. Importantly, all fecal coliform test methods often overestimate true fecal numbers, plus they are susceptible to interference from non-pathogenic coliform bacteria including Klebsiella species (U.S. EPA, 1986). Fecal coliforms are a presumptive indicator, meaning that if present, pathogens are presumed present as well, which may not always be the case.

To remove these sources of uncertainty and to better serve public health, the U.S. EPA stated in 1986 that *E. coli* and enterococcus-based methods and standards should be used by the states (U.S. EPA, 1986) as a means of measuring the presence of pathogens. Ecology is considering these changes in the triennial review of water quality standards process (WDOE, 1998, 2000b).

A method called the Microbial Source Tracing (MST) technique matches "fingerprints" isolated from *E. Coli* bacteria DNA with those previously characterized from known human and animal sources. The University of Washington's School of Environmental Health developed this technique which has been used in several surface water studies in the region. Using the MST technique, the limited sampling for the Des Moines Creek Basin Plan showed that some of the fecal contamination in the lower watershed was attributable to human septage and that animal sources exist as well (KCDNR, 1997). Human sources were less prevalent upstream nearer the airport, where dog and avian sources together comprised up to 34% of the results. This study had limited statistical power due to limited number of samples, plus a number of the isolates were unmatched with known sources. The Port is using the MST technique to identify potential sources in airport runoff. See Section 4.7.3.

In past reports, the Port showed that sporadically elevated numbers of fecal coliforms were found principally in the landside subbasin SDE4. Of the six current year results for SDE4, only two samples showed elevated results, while the remaining four were less than 200 per 100 ml, well within the typical range for STIA and other regional stormwater (see Table 4). Nonetheless, the Port is continuing the source tracing study intended to identify potential sources of contamination. Preliminary results, included in Section 4.7.3, do not indicate sanitary sewage as a source in storm or baseflows. Uncontaminated baseflow samples indicate that there is no continuous source of fecal coliform bacteria, whether arising from human, animal or other sources. Investigations are targeted for completion by the end of the year.

4.5 Composite Sample Results

In the past year, the Port took a total of 38 flow-weighted composite samples, bringing the six-year total to 354 for all outfalls. The discussion of these composite sample results are segregated from grab samples because grab samples represent only instantaneous values. Composite sample results, especially those from samples that comprise the entire hydrograph, represent an average value or event-mean concentration (EMC) existing over a longer time period. There were no non-representative composite sample results for the past year. All composite samples analyzed met representativeness criteria of the Procedure Manual.

4.5.1 Suspended Solids and Turbidity

STIA outfalls continue to discharge typically less total suspended solids (TSS) and turbidity than urban areas. In the six-year sampling history at STIA, more than 80 percent of the 327 TSS samples and 281 turbidity samples were below the comparative values of 50 mg/l, and 29 NTUs, respectively. As shown in Figure 5 and Figure 6, the majority of results for the past year continue to be consistently low.

The four airfield outfalls (SDS3, SDS4, SDN3, and SDN4) continue to produce less TSS and turbidity than the two principal landside subbasins (SDE4 and SDN1). In the past six years, 86 percent of the 121 TSS results from the airfield outfalls were less than one-half the regional comparative median value. Because these airfield outfalls represent about 61 percent of the total SDS area, the data show that the majority of STIA runoff is much lower in suspended material than runoff from comparable regional urban areas.

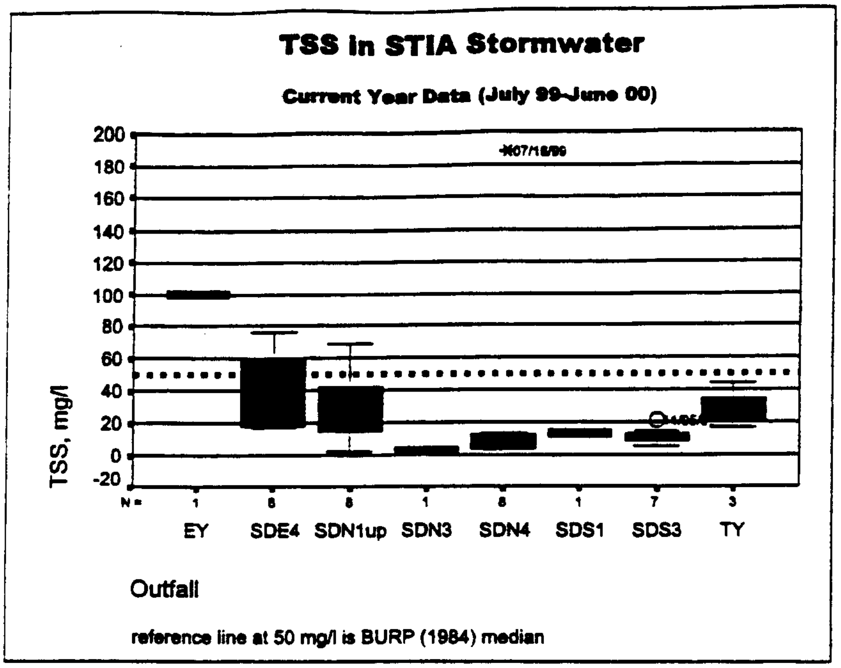

Figure 5 TSS for Current Year

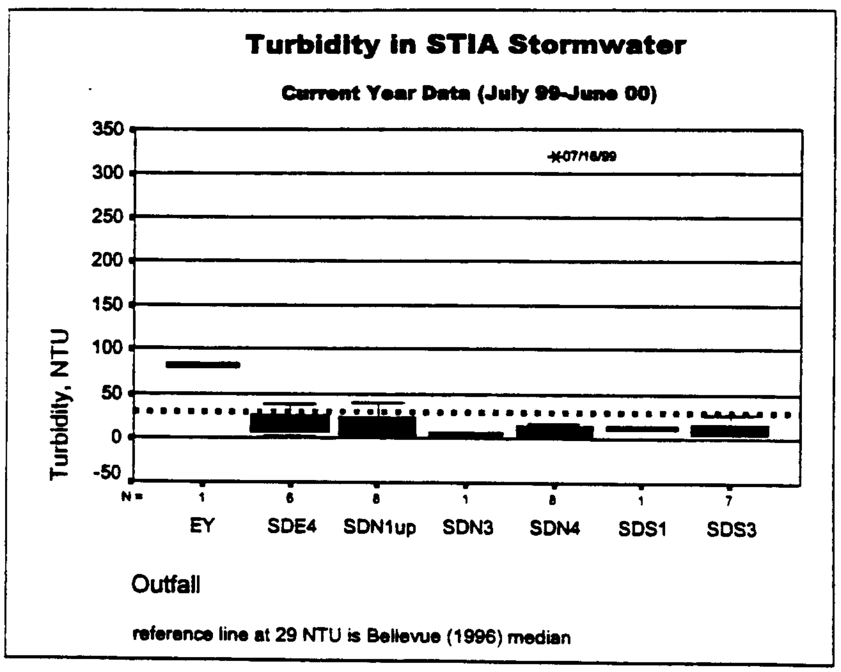

Figure 6 Turbidity for Current Year

Unlike the previous reporting period, in the past year, there was only one storm event associated with higher than typical TSS and turbidity, which occurred at SDN4 on July 17, 1999. This one-time occurrence was due to vehicle activity disturbing a small area of soils on a nearby Port construction project. The erosion control BMPs already in place were adjusted to better prevent recurrence. The next storm sample at SDN4 did not exhibit unusual TSS or turbidity.

The Port's construction erosion and sediment control program provides effective erosion and sediment controls. The stormwater batch treatment system used over the past two seasons for the third runway embankment project was highly effective. Discharges from this system always met water quality standards for turbidity in Miller Creek, and in fact, were typically much cleaner than background conditions in the creek upstream from the project (Tobiason et al., 2000).

4.5.2 Biochemical Oxygen Demand (BOD_5)

Results for the past year continue to indicate overall low levels of BOD_5 in STIA stormwater. In 32 samples analyzed in the past year, the median BOD_5 was 5.6 mg/l, and 57 percent of all samples were below the 6.6 mg/l regional urban comparator (BURP, 1984, see Table 4). The 95^{th} percentile of the samples associated with routine, non-ground deicing operations was 22 mg/l. See Figure 7.

Principal sources of elevated BOD_5 concentrations in the past were associated primarily with infrequent and short-lived winter weather episodes and ground surface deicing. During these events, acetate-based ground surface deicing chemicals are the primary sources of BOD_5. The Port discontinued the use of urea and glycol-based ground surface deicers in 1996. There have been only a few isolated indications of limited BOD_5 contributions to stormwater from aircraft deicing glycols. The Port has rerouted drainage from a limited area near the South Satellite that can receive infrequent aircraft deicing/anti-icing fluids

(ADAFs) when and if applied to aircraft at gates S3 and S4. See Section 4.7.3. All other known direct sources of glycols have been eliminated from the storm drains through numerous BMPs (POS, 1998c).

In the past year, two limited periods of winter weather occurred: January 11-12, 2000 and January 18-19, 2000. Section 4.6 discusses these in more detail. The minor snowfall from the first event did not require plowing or storage of snow in the snowmelt BMP areas. There was no snowfall associated with the second event. During both of these events, there were no discharges from outfall SDN2, which could drain the north snowmelt BMP area in the event of an IWS pump station bypass[2]. Compared to past years, snowfall and chemical usage, including aircraft glycols, was far less (POS 1998b, POS 1997b.) One sample taken during the first event had an elevated BOD_5 concentration of 646 mg/l. Both events were monitored at key receiving stream stations as part of the second-year Dissolved Oxygen Study (in press).

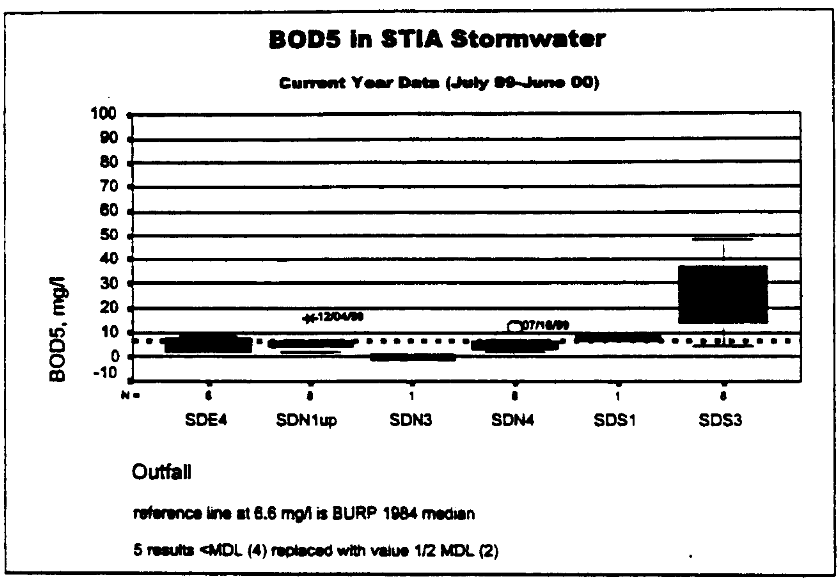

Figure 7 BOD_5 for Current Year

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[2] The entire drainage area of outfall SDN2 was re-routed to the IWS in 1997 as a result of two BMPs.

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4.5.3 Metals

All data reported below are for total recoverable metals. It is important to note that Washington State Water Quality Standards (WAC 173-201A) apply to the receiving waters, not to the discharges from a particular outfall. See the discussion in Section 3.3 concerning the STIA monitoring locations relative to the receiving streams.

The Washington State water quality standards for copper, lead, and zinc are based on the dissolved fraction of the metal. Because of complex water chemistry, only a portion of the dissolved fraction is actually bioavailable (Hall et al., 1997). Thus, direct comparisons of dissolved metals with standards may result in "false positives" where a sample is not actually toxic. Limited results for dissolved metals analyzed in source tracing studies appear in Appendix F. The comparisons offered below are based on the total recoverable metal using the non-specific partitioning coefficients provided in the water quality standards and Ecology's TSDCALC8 workbook. The application of site-specific coefficients for these calculations would be more appropriate.

4.5.3.1 Copper

Overall, in 257 samples in the past six years, the median copper value for all outfalls is 0.025 mg/l. Airfield and landside outfall data in this case are similar, with medians ranging from 0.014 to 0.031 mg/l. See Figure 8. Generally, STIA data are less than the 0.040 mg/l median for copper from the City of Portland's sampling results (City of Portland, 1993.) This comparison is more representative of outfall discharges than the Bellevue, 1995 median of 0.01 mg/l which was for *instream* stormwater samples. However, note that the comparators listed in Table 4 show that urban runoff typically exceeds standards for copper.

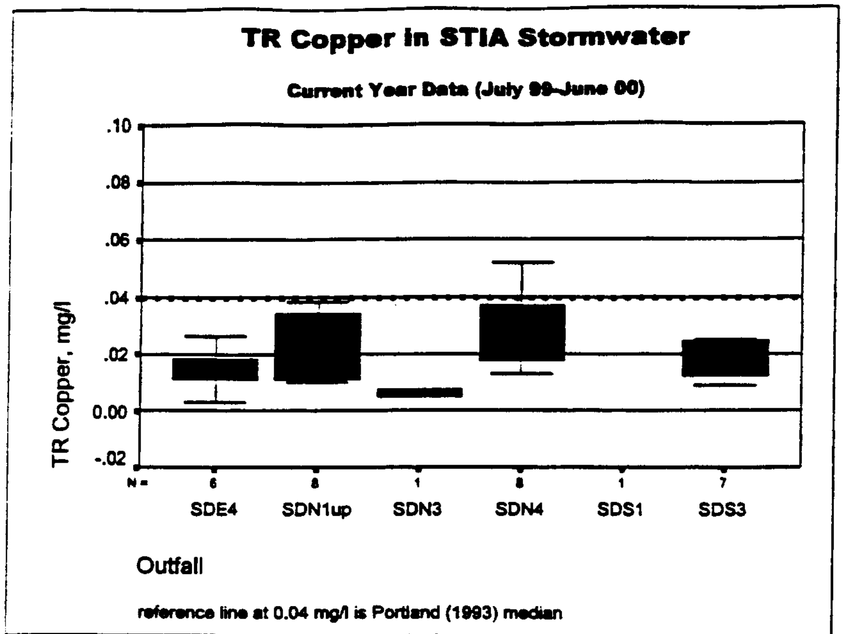

Figure 8 Total Recoverable Copper for Current Year

4.5.3.2 Lead and zinc

Samples from airfield outfalls continue to contain less lead and zinc concentrations than typical urban sources. In the six-year permit sampling history, over 75 percent of the 257 results for copper, lead and zinc in all STIA outfalls were below the median for comparable regional data for commercial areas. For the four airfield outfalls, which comprise more than 65% of the total SDS, nearly all (more than 97%) of the 120 sample results to date for lead and zinc were less than the comparators.

These comparisons have added significance given that the commercial/industrial comparators cited (see Table 4) are the most conservative data available. Plus, the lead and zinc comparators reflect *instream* sample concentrations after outfall discharges were mixed with receiving waters. Thus, metals in the vast majority of STIA stormwater, especially airfield runoff, are far lower than those measured in other local and regional studies. Current results continue these patterns, See Figure 9 and Figure 10.

Much of the airfield outfall lead and zinc data are below water quality standards. All but one of 120 lead results in the past six years are below the standard of 0.039 mg/l calculated at a hardness of 56 mg/l (Table 4.) In fact, lead was not detected in 49% of these 120 total samples. Airfield zinc was similar in that more than 85% of the 120 results are less than the standard of 0.072 mg/l at 56 mg/l hardness[3]. See Figure 9 and Figure 10.

It should also be noted that lead and zinc concentrations measured in airfield outfall samples were far lower than those in the landside outfall samples were. The overall median lead and zinc values for principal airfield outfalls SDS3 and SDN4 were nearly 5 times less than for the landside outfalls SDE4 and SDN1. See Figure 9 and Figure 10. This difference is likely due to the amount of passenger and service vehicle usage in the landside areas.

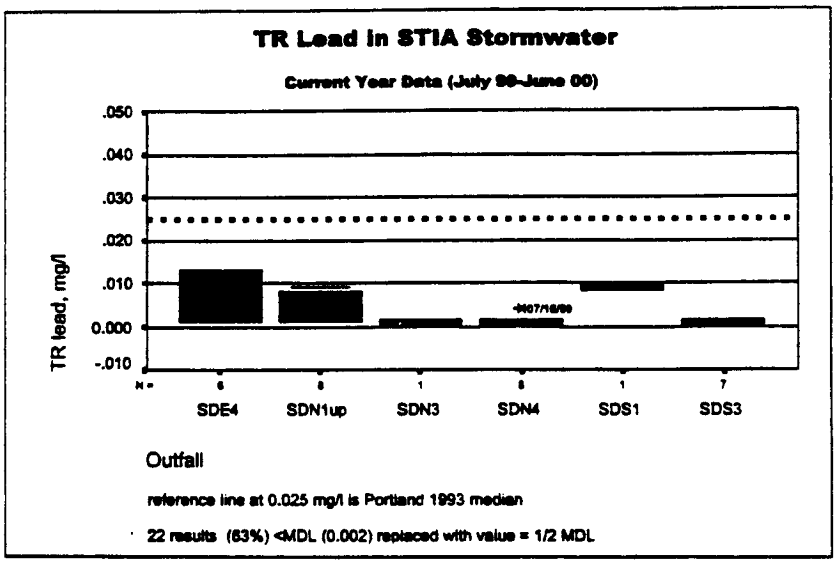

Figure 9 Total Recoverable Lead for Current Year

[3] In two storms in 1999, hardness values in seven Miller and Des Moines Creek instream composite samples ranged from 41 to 74 mg/l with a median of 56 mg/l.

The landside subbasins experience considerable vehicle traffic where tire wear is a likely source of zinc (EPA 1993). Roads and parking areas constitute more than 50 percent of the impervious surfaces draining to SDE4 and SDN1. The lower results for the airfield outfall samples are most likely attributable to the fact that airfield runoff flows through grass areas prior to draining to the piping system. Certain portions of landside subbasins SDE4 and SDN1 will be assessed for appropriate BMP retrofits, such as biofiltration, according to the recent CSMP (POS, 2000).

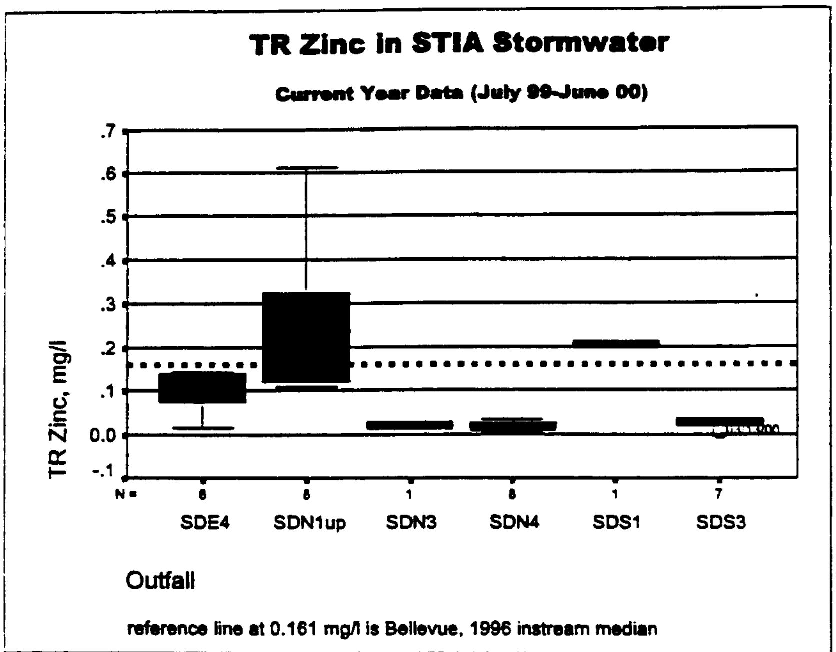

Figure 10 Total Recoverable Zinc for Current Year

4.5.3.3 outliers

There were no copper, lead or zinc outliers that were associated with elevated TSS and/or turbidity as was discussed in last year's Annual Report. However, there was a new maximum copper value from the SDS1 sample of July 2, 1999, which is above the scale in the figure below. This copper result is believed

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attributable to an inappropriate connection near the South Satellite that drains to SDS1. The Port implemented a BMP for this situation in September 2000, rerouting the drainage to the IWS. See Section 4.7.3.

4.5.3.4 Comparison of SDN1 sampling Stations

Copper and zinc in SDN1 samples from the current station continue to show lower median values than samples from the previous station sampled until the end of 1996. This difference is attributable to removing the bias imparted by SR 518 runoff that was inextricably combined in samples from the previous location[4]. See Figure 11 and Figure 12. Therefore, the current station, "SDN1up" continues to provide results that are more representative of STIA runoff. Characterization of SDN1 runoff should therefore be limited to the data beginning in 1997 that excludes the high bias imparted by runoff from non-Port entities. Data for the two stations have been segregated and discussed separately in this report and the past three Annual Reports (POS 1999b, 1998a, 1997a.).

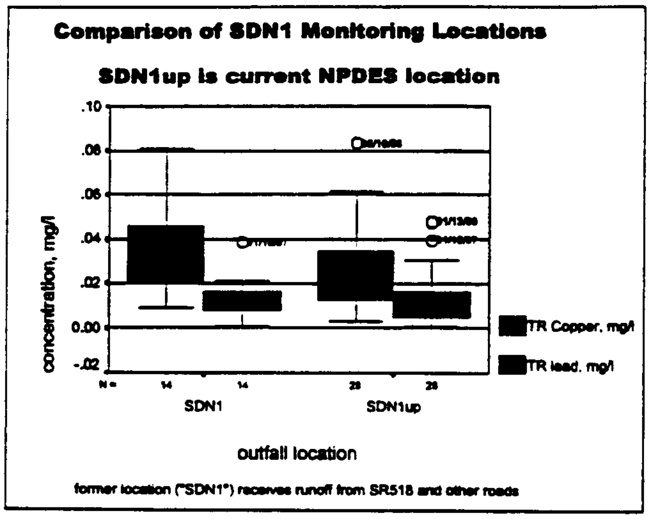

Figure 11

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[4] In October 1996, the Port changed the sampling location for SDN1 from manhole SDN1-27 (now SDN1-56) to manhole SDN1-22 (now SDN1-41), upgradient from 10.5 acres of public road runoff. Ecology approved this action. Past annual reports compare data from both locations.

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Note that despite removing the bias from non-POS road runoff, SDN1 exhibits higher zinc concentrations than other outfalls. The Port has traced the source of this zinc to galvanized metal rooftops and is investigating several BMPs. See Section 4.7.3.

It is important to note that the SDN1 dataset for either location represents in-pipe water quality and not in a receiving environment with a biotic community. The sampling location, for reasons mentioned in Section 3.4, is several thousand linear feet above the final discharge to Miller Creek. Considerable chemical, physical and biological factors exist between the sampling points and this final discharge point. These include open, natural channels and the Lake Reba detention pond system common to the other three north-end outfalls (SDN2, SDN3, and SDN4) See the discussion of outfall monitoring locations in Section 3.3

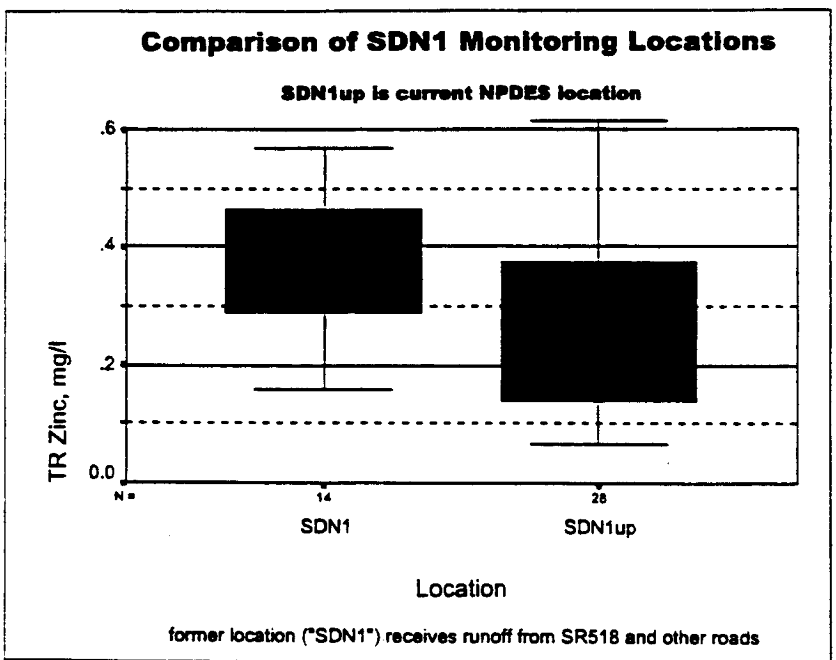

Figure 12

4.6 Deicing Event Samples

The permit requires sampling and analysis for glycols during "deicing events". The Port conducts this sampling according to the Ecology-approved Procedure Manual (POS, 1999a.) The glycol data discussed below encompass mostly composite samples collected during periods of aircraft deicing, representing average values during a storm event discharge. Some of the data are from grab samples as required for outfalls SDS1 and SDN2.

4.6.1 Background.

In 1995-1997, as recommended by the SWPPP, the Port implemented seven BMPs that rerouted drainage to the IWS from certain areas in four SDS subbasins: SDE4, SDS1, SDS3, and SDN2 (POS 1998c). Several limited areas within these subbasins were subject to aircraft servicing, including periodic ADAF (glycol) application. Two of these BMPs use multiple pump stations that have performed as intended over the past three years.

Two of these pump stations divert runoff from the entire SDN2 subbasin to the IWS. In the past year, there were only two storms (December 15, 1999 and May 10, 2000) that resulted in bypasses from these pump stations to the SDN2 outfall. Both bypasses were of very short duration compared to the length of the rainfall event. As intended in the station design, these bypasses to SDN2 represented only a fraction of the peak flows of the hydrograph.

The Port's Annual Glycol Reports (POS 2000a) detail ADAF (glycol) application at STIA. These reports summarize data reported by the airlines for the volumes of both ethylene and propylene glycol applied and number of aircraft treated each day. The Federal Aviation Administration (FAA) authorizes only ethylene and propylene glycols for aircraft deicing and anti-icing. Port tenants perform all glycol application at STIA (applied by airlines or their ground service providers).

Importantly, to ensure public safety, aircraft pilots make the ultimate decision on whether to apply glycols or not.

4.6.2 Results

Glycols have been present infrequently, usually limited to the rare, one to two day winter weather episodes, amounting to just a few days annually. In the past year, glycols were analyzed in a total of 33 samples from six outfalls. The majority of samples were collected at the regular sampling locations (SDE4, SDS3, and SDN4.) Total glycol concentrations ranged from non-detectable to a maximum of 801 mg/l in an SDS1 grab sample. Twenty four of these 33 results (73 percent) were below the detection limit of 2 mg/l. The total number of aircraft deiced in the dry period before sampling events ranged from 3 to 261, with a median of 31. Data appear in Figure 13 and are summarized in tabular form in Appendix C. These results continue to indicate that glycols are typically absent in STIA stormwater discharges.

In the past year, two limited periods of winter weather occurred: January 11-12, 2000 and January 18-19, 2000. During the first event, the minor snowfall of 2 to 3 inches did not require plowing because it melted rapidly with the ensuing rainfall. The second event had no snow but was associated with heavy frost formation on ground surfaces during clear night skies. In both events, deicing/anti-icing chemicals were applied to ground surfaces during brief periods of 24 hours or less.

These were the only periods in the winter of 1999-2000 when the Port applied chemicals to ground surfaces (primarily runways and taxiways.) Storms following both events were sampled at various outfalls. In addition to this NPDES sampling, both of these events were also monitored for the Dissolved Oxygen

Study (POS, in press.) There were no discharges from outfall SDN2 during either of these events[5].

Snowfall and chemical usage in the past year, including aircraft glycols, was less than in previous years. During the January 11-12 event, glycol results were 12 mg/l, 801 mg/l and 364 mg/l at outfalls SDE4, SDS1, and SDS3, respectively. The SDS1 result was from a grab sample while the others were flow-weighted composite samples.

Last year's annual report identified a clogged IWS drain inlet that may overflow to SDS3. Because of the proximity to certain gates of the C-Concourse, these overflows could be a potential source of glycols found sporadically in SDS3 samples. The Port corrected this problem this year and the IWS drain inlet now functions properly.

An elevated glycol result of 801 mg/l in the SDS1 sample of January 12, 2000 was associated with substantial aircraft deicing that took place nearby. Several small area drains near gates S3 and S4 at the South Satellite receive limited runoff from a small area between the nearby IWS flush gutters and the building. Only the forward sections of larger aircraft may overhang this area, resulting in the potential for ADAFs to enter the drains and SDS1 system. See Section 4.7.3. Though it is not certain that ADAFs were applied specifically to aircraft at the S3 and S4 gates, it is likely that the glycol result of 801 mg/l was attributable to at least one of the 15 aircraft deiced at the South Satellite on January 11-12, 2000. The Port has implemented an appropriate BMP by rerouting this drainage to the IWS (September 2000).

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[5] The entire drainage area of outfall SDN2 was re-routed to the IWS in 1997 as a result of two BMPs.

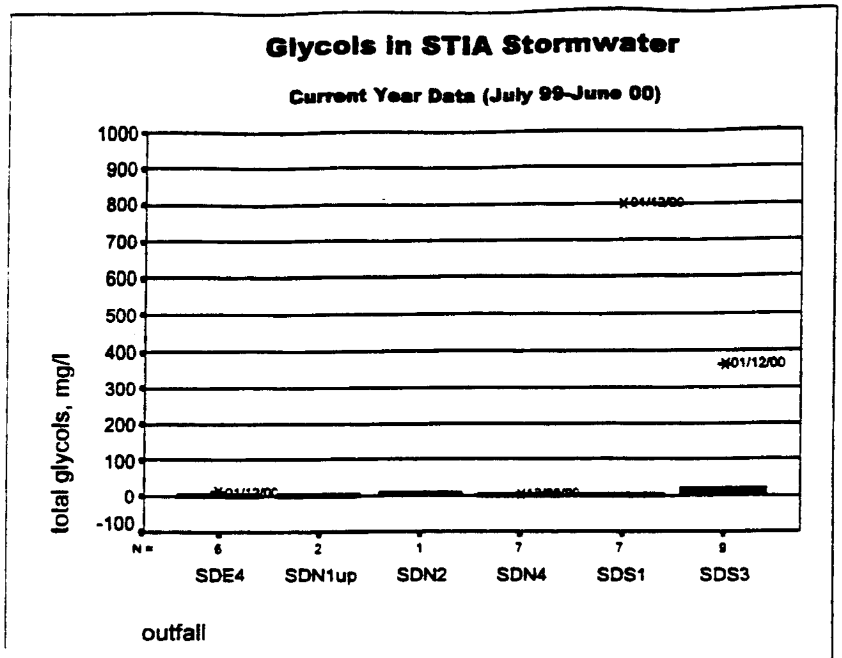

Figure 13 Glycol results for Current Year

The Port has completed all sampling requirements of Special Condition S2B4 for deicing events at outfalls SDS1 (003) and SDN2 (007). This permit condition was added when the current permit became effective on March 1, 1998. Previous annual reports have discussed how the data signify that the BMPs have been effective and the intent of this monitoring requirement is satisfied. As allowed for in Special Condition S2B4, the Port has requested Ecology's approval to cease this monitoring (POS, 1999e, POS, 2000b).

4.7 Other Results

The following results were obtained from samples taken for purposes other than to satisfy permit condition S2B.

4.7.1 Field Quality Control Samples

The Port routinely collects duplicate and equipment blank samples during NPDES sampling events according to the Procedure Manual. Appendix E summarizes these results. The field equipment blanks taken in the past year indicate that sampling techniques and equipment do not contribute a high bias to sample results reported, notably for metals. These results support the efficacy of the Port's "clean" sampling methods that were developed for stormwater monitoring, in particular for the WET testing source tracing (POS, 1999d).

4.7.2 WET samples

As required by permit condition S10, The Port completed two rounds of whole effluent toxicity (WET) testing at the four principal outfalls (SDE4, SDS3, SDN1 and SDN4) in the previous year (1998-99). The final report summarizing these WET testing results was submitted to Ecology in May 2000 (POS, 2000c).

WET testing bioassays used the two required aquatic test species: *Daphnia pulex* (a daphnid or waterflea), and *Pimephales promelas* (fathead minnow.) Results did not indicate toxic conditions in the stormwater discharges sampled at outfalls SDE4, SDS3, and SDN4. Furthermore these results met the performance standards for WET according to Ecology guidelines[6]. In contrast, results from outfall SDN1 exhibited toxicity, where most samples did not meet the performance standards. Final testing of SDN1 runoff in late 1999 showed that the toxicity was attributable to metals, most likely zinc, leaching from galvanized metal rooftops. The final WET testing report discusses the source tracing data that lead to this conclusion. Appendix D contains the source tracing data for SDN1 samples collected in later 1999. The Port is currently investigating how to remedy this source of zinc.

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[6] Performance standards for acute WET tests: the average survival in 100% effluent must be at least 80%, and no single sample must have less than 65% survival (WAC 173-205)

4.7.3 Source Tracing Studies

Because certain sampling results have indicated the possibility of contamination, the Port has conducted source tracing studies aimed at identifying and characterizing potential contaminant sources. Through past efforts, the Port has already discovered and eliminated several other sources of stormwater contamination in subbasins SDE4, SDN1, and SDS4 that are discussed in previous Annual Reports[7].

As discussed in the WET testing section above, during the past year, the Port investigated and found the likely source of toxicity exhibited in SDN1 samples. These results from SDN1 are included in Appendix D, and were elaborated further in the final WET characterization report submitted to Ecology in May 2000. Other source tracing investigations are summarized below.

4.7.3.1 SDE4 Source Tracing

The Port began studying fecal coliforms in SDE4 discharges in 1998 and continues to investigate causes of sporadic elevated results using several forensic techniques. The discussions below focus on results from storm samples, baseflow samples, microbial source tracing, measures of contamination, and potential source characterization. Sample results from the past year are summarized in Appendix F

4.7.3.1.1 Stormflow samples

To date, the median of the 46 NPDES storm event grab samples from SDE4 is 280 per 100 ml, which is similar to median values at other STIA outfalls. See Appendix B. Consistent with past annual reports, source-tracing findings summarized below do not implicate sanitary sewage or other domestic

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[7] See POS 1997, 1998. Inappropriate connections to the stormdrains were found and eliminated in subbasins SDE4, SDN1, and SDS4.

wastewater as a cause of sporadic elevated numbers of fecal coliforms. Many other studies have shown that fecal coliforms in stormwater can be highly variable with frequent highly elevated numbers. The BURP (1984) study found a fecal coliform median of 980 per 100 ml in 326 *instream* stormwater samples. Fecal coliforms were often several thousand or more in the 200 stormwater samples taken at instream and outfall locations during the comprehensive Bellevue (1995) study, which concluded that the high concentrations were probably due to animal wastes. Again, the fecal coliform test is subject to interference from non-pathogenic bacteria. See the discussion below.

In the routine NPDES stormwater grab samples taken at SDE4 the Port has also analyzed certain chemical indicators of potential contamination. See Appendix E. Fecal coliforms were low (<50/100 ml) in two samples where fluoride concentrations suggested the presence of domestic water. Concentrations of ammonia and surfactants were also low in these samples. In addition, the ammonia to potassium ratios were also well below the 0.9 value generally indicative of wastewater[8]. These particular indicators have shown that the only sporadically high fecal coliforms found in these samples were not associated with the presence of wastewater. Consistent with conclusions in last year's annual report, these findings point toward the absence of sanitary sewage draining into the SDE4 system.

4.7.3.1.2 Baseflow samples

Two rounds of baseflow sampling showed very low counts in SDE4 samples, indicating the general absence of baseflow contamination. Importantly, these findings demonstrate, as did last year's baseflow results, that there were no continuous discharges of contamination. Thus, these results eliminate the possibility of direct cross connections with the sanitary sewer. This conclusion is

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[8] See Lalor, Pitt, and Field, (1993)

further supported by the sporadic nature of the elevated results in storm samples which also indicate a direct cross connection with sanitary is unlikely.

No obvious inappropriate drainage connections were found after reviewing site plans and inspecting field conditions for a number of SDE4 manholes in August 1998. Sanitary sewer lines run parallel to SDE4 drain lines in several areas, but in most cases the sewer lines are below the storm drain lines. Thus, the potential for sanitary sewer leakage into SDE4 is limited. The field review identified a minor source of wash water from the rental car wash attributable to track-out by vehicles. This source was corrected by an asphalt berm added by POS maintenance as a BMP in early 1999, diverting the runoff to the IWS. Another inappropriate connection with rental car wash effluent was found and corrected in 1997. It is unlikely that these sources were associated with the elevated fecal coliform numbers.

4.7.3.1.3 Microbial source tracing (MST)

The Port conducted seven rounds of microbial source tracing (MST) routines in the first 6 months of 2000 and plans to complete the remaining half of the MST study by the end of the year. This MST technique uses a special method of RNA fingerprinting developed by Professor Mansour Samadpour of the University of Washington's School of Environmental Health. Several other local and regional studies used this technique and attributed some of the fecal contamination in surface waters to multiple sources, including domestic animals and septage (Trial et al., 1993, King County 1995, Herrera, 1999). Ecology recognizes the MST method as "...an excellent method for determining some of the sources of fecal contamination in a watershed" (Sargeant, 1999.)

Using the MST technique, King County (1997) attributed up to 64% of the results in the lower Des Moines Creek basin to human septage. In upstream samples taken nearer the airport, human septage sources comprised 10% or less of the results, while avian and dog sources together represented up to 34%. However, the two rounds of MST analysis in this King County study provide limited statistical power and resulted in 36% to 59% unmatched results, which may also be due to the limited number of "fingerprints" available in the database at that time. Nonetheless, the study indicated that human sources were prevalent in lower basin areas suggesting that aging septic systems should be addressed.

Sampling and MST work at STIA also aims to characterize potential sources present in SDS3 runoff and in Des Moines Creek near South 200th Street. This instream location was also sampled during the limited MST work done for the Des Moines Creek Basin Plan (King County 1997). The Port's results to date show very low counts in SDS3 runoff, which are consistent with the 6-years' sampling summarized in Section 4.4.2. Four baseflow samples at SDS3 showed non-detectable fecal coliforms. Instream results have varied more, with less than 100 per 100 ml in four baseflow samples, but up to 2000 or more in two of six storm samples. The MST technique will characterize potential sources indicated for samples from these stations. The Port plans to issue a separate report at the conclusion of this study.

4.7.3.1.4 Measures of contamination

Another part of this study examines the potential relationships among several indicators of bacterial contamination. Most fecal coliform bacteria are not pathogenic, but are used to indicate contamination from mammalian, avian, and human fecal waste products. Washington state water quality standards (WAC 173-201A) are based on fecal coliforms. Importantly, this metric does not distinguish actual sources, whether human, animal, or interference (false positives) from other non-pathogenic coliform bacteria such as Klebsiella sepcies. For example, recent studies in Colorado showed that Klebsiella significantly interfered with fecal coliform results, causing the potential for false exceedances of permit criteria for a WWTP and implying higher than necessary disinfectant usage (Elmund et al., 1999).

For many years, various proponents, including EPA, have suggested that other metrics which correlate better with actual measures of disease are more appropriate (U.S. EPA, 1986). In 1986, the U.S. EPA stated that *E. coli* and enterococci-based standards would serve public health better than fecal coliforms and that states should change standards, effluent limits and test methods accordingly (U.S. EPA, 1986). The U.S. EPA issued an implementation guidance document this year (U.S. EPA, 2000). Ecology's triennial review of water quality standards, currently in progress, generally concurs with EPA, and as of May 2000 Ecology is considering *E. coli* and Enterococcus as alternative standards (WDOE, 1998, 2000).

The Port's study has not yet examined *E. coli* numbers, but has analyzed enterococcus in one round of sampling done in May, 2000, the results of which appear in Figure 14. Some of these samples correlated well, but notably, the samples from the routine SDE4 monitoring location had much lower enterococcus numbers than fecal coliforms.

4.7.3.1.5 Local source characterization

Another aspect of the Port's MST study examines and characterizes specific potential sources of fecal contamination that could contribute to SDE4. The regional *E. coli* database already contains thousands of genetic "fingerprints" that are unique for humans and various species of mammals and birds. The Port's study has already collected 16 local fecal material samples (mostly from birds) that have been genetically typed and used to build the database with local populations of *E. coli* to increase the chance for matching with *E. coli* from STIA stormwater.

During source sampling, a large colony of pigeons was discovered roosting on the rooftops of the A-concourse. The guano deposits here indicate that this colony has inhabited the area for a considerable time. Because this colony is near aircraft gates, these birds are being trapped and removed to eliminate the safety hazard posed for aircraft operations. The guano deposits will be removed when the entire A-concourse is demolished and removed this fall in preparation for new concourse construction.

This study also collected samples of local municipal wastewater (MWW) generated by STIA and aircraft wastewater (AWW), known as "biffy" waste. *E. coli* from these samples have been genetically typed to build the database with local human sources. Samples of MWW and AWW taken to date have shown very high fecal coliform counts ranging from 39,000 to 48,000,000 per 100 ml (membrane filter method; APHA, 1995). Importantly, the presence of high counts in the AWW samples indicates that the toilet chemical added by the airlines has limited sanitizing effects. This aspect should be considered in spill response.

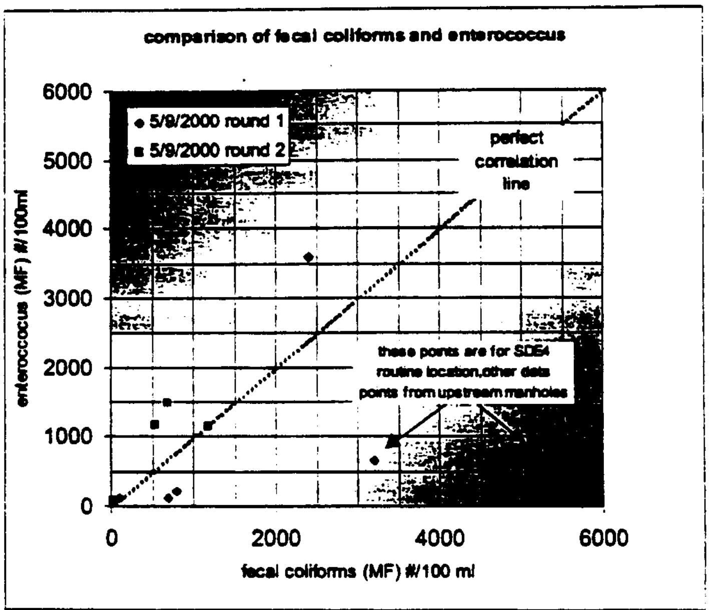

Figure 14 indicator correlation

4.7.3.2 *Observations for SDS1 discharges*

Several SDS1 stormwater samples and observations in 1999 indicated limited, but not severe contamination from unusual sources. In addition to the two events mentioned in the last annual report, foam was again observed below the outfall during initial runoff from storms sampled on July 2 and September 23, 1999. Inconsistent analytical results and generally low levels of certain indicators signify sporadic, low-level contamination, most likely from washwater. Table 5 below summarizes stormwater sampling results from last year and the current year. Baseflow was generally low or absent and did not exhibit foam. Dry-weather discharges were not observed.

Fluoride concentrations near 0.1 mg/l indicated that the stormwater runoff contained less than about 10% domestic water[9] (potentially wash water). In addition, the ammonia to potassium ratios were also well below the 0.9 value generally indicative of wastewater[10]. But, the surfactants and phosphate results indicated detergents/soaps to a limited degree.

Neither the July or September event samples showed significant surfactants, though the July samples showed a higher percentage of polyphosphates that could be attributable to soaps and/or detergents[11]. The sporadic indications in these analytical results may be because the slug of contaminants had passed before the samples were collected, while the foam persisted. Foam was not observed during visits to the SDS1 outfall on 19 other occasions in the past year, including storms and dry weather (see Appendix G).

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[9] Local domestic water is treated with fluoride to a nominal target of 1 mg/l concentration (SPU, 1999)

[10] See Lalor, Pitt, and Field, 1993

[11] The difference between total dissolved phosphorus (TDP) and soluble reactive phosphorus (SRP) can be attributable to the presence of polyphosphates, a common and significant component of synthetic detergents (Sawyer and McCarty, 1978).

Nonetheless, certain visual observations and the analytical results, especially the March 12, 1999 sample, indicate the presence of detergents and/or soaps. The July 2 composite sample also showed the highest historical value for copper at SDS1 and the zinc concentration was near the 75^{th} percentile. These results denote that the contaminants were only discharged sporadically in limited quantities during stormflows and were not due to dry-weather discharges of process water.

Dye and flow tracing performed on October 13, 1999 confirmed that a number of small area drains under the overhang of the South Satellite connect to the SDS1 system. Most of these inlets are sheltered from runoff or blow in. However, several inlets near gates S3 and S4 receive runoff from a limited ramp area that is between the nearby IWS flush gutter and these small area drains. Aircraft and/or GSE servicing near these gates is believed responsible for the 1999 foam observations and the elevated glycols found in the January 12, 2000 sample at SDS1 (801 mg/l, see Section 4.6.2). It is highly unlikely that runoff from South 188^{th} Street was associated with these observations because no vehicle washing or other commercial operations exist in this additional drainage area of SDS1 downstream of Port property. The Port recently eliminated these sources of potential stormwater contamination in SDS1 by rerouting the drainage from the South Satellite area drains to the IWS.

4.7.3.3 Observations in SDS3 discharge on November 6, 1999

The runoff at outfall SDS3 from the November 6, 1999 storm event produced considerable greenish foam below the outfall. Field investigations that day revealed that this anomaly was attributable to the hydromulch that had been applied the previous day to an area of about 20 acres of the recently completed taxiway construction project in the SDS3 subbasin. Because this hydromulch had not fully cured, the rainfall washed some of the conventional green dye and tackfier used in the mix into the SDS3 system. The results from this sample did not indicate unusual levels of BOD_5, TSS or other constituents measured (see

Appendix B). Normally, the Port applies hydromulch as an erosion control BMP so that it has sufficient time to cure, achieving full effectiveness prior to forecasted rainfall. The Port has discontinued the use of the particular hydromulch product and now uses a faster curing mix.

4.7.3.4 Inappropriate connection in SDN1

During the source tracing study conducted relative to the WET testing results, the Port also found an inappropriate connection to the stormdrain in the SDN1 subbasin. A slot drain serving several loading docks E9-E13 along the east side of the number 2 AFCO (previously "Avia") building connects to manhole SDN1-19 via a 6" PVC pipe. This drain was temporarily plugged immediately after finding it. A permanent plug was installed recently. Drainage from the surrounding area now flows to the adjacent slot drain, which was verified as already connected to the IWS.

4.8 Outfall Inspections

Appendix G summarizes the visual observations made at outfalls during the past year. The number of instances exceeds the minimum of 3 wet season inspections required by the permit and reflected in the SWPPP (POS 1998c.) Most outfalls were visited more than 20 times in the past year during routine monitoring equipment deployment and maintenance. Indications of potential problems were limited to 3 occasions at outfalls SDS1 and SDS3 as discussed earlier in this report. The annual dry-weather inspection was conducted during September 1999. Visual observations recorded during these inspections did not indicate problems associated with baseflows or other dry-weather flow.

Table 5 SDS1 Source Tracing Sample Results (mg/l)

Storm event	type	ph	Fecals (MPN)	TPH-Dx	Turb (NTU)	BOD_5	NH_3	Surf	glycols	TDP	SRP	F^-	K^+	NH3/ K+	Cond (µmhos)	hard	SRP/ TDP	note
12-Mar-99	grab					123	0.012	3.92	48.7									1, 2
20-Jun-99	Grab 1	6.7	>1600	1.56				0.470	<4.0	0.145	0.075						52%	2,3
20-Jun-99	Grab 2							0.689	<4.0	0.175	0.085						58%	2,3
7/2/99	Comp	7.3	900	0.8	13	7.7	0.35	0.12	<4	1.1	0.06	0.07	1.54	0.23	48	25	5%	2,4
7/2/99	grab 1	6.8				13.4	0.19	0.18	<4	1.3	0.062	0.09	1.57	0.12	68	30.1	5%	2,3
7/2/99	grab 2	6.9				9.7	0.26	0.10	<4	0.77	0.055	0.06	1.77	0.15	40	19.7	7%	2,3
9/23/99	grab 1		82		21	58.8	3.33	0.84		0.183	0.101	0.16	9.17	0.36	260		55%	2,3
9/23/99	grab 2		78		8.3	76.5	0.005	0.72		0.314	0.091	0.15	3.88	0.001	213		29%	2,3

Yellow shaded results indicate atypical stormwater constituents.

Notes for table:

1. quarterly deice grab sample
2. Foam observed below outfall
3. Source tracing sample
4. Routine annual NPDES flow-weighted composite sample

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5 CONCLUSIONS

Storm sample results from the past year continue to support the conclusions reached in previous annual reports that STIA stormwater compares favorably to other comparable regional data, even with instream stormwater data. Constituents and concentrations of concern at STIA have been generally associated with specific activities or locations, and usually not routine runoff.

The Port has implemented various BMPs to address specific findings of the stormwater monitoring program. The data generally indicate that these BMPs have been effective. Still, the Port continues to investigate other issues to resolve problems indicated by the data.

Sampling locations for certain outfalls are in-pipe or are well above the final discharge point to receiving waters. Because these locations do not account for the influence of other factors prior to discharge, namely detention, it is not appropriate to compare the STIA data to water quality standards. Addressing the suggestions below may lead to more appropriate locations for assessing the relevance of STIA discharges with respect to water quality standards.

In addition to completing all required routine stormwater sampling, the Port accomplished the following pro-active measures in the past year.

1. Corrected an inappropriate drainage connection from a loading dock drain to the SDN1 storm drainage system.
2. Corrected a clogged IWS drain inlet that may overflow to the SDS3 storm drainage system.
3. Confirmed the likely source of toxicity exhibited in SDN1 WET tests.
4. Discovered the source of infrequent contamination in SDS1 samples. This drainage from several area drains under the South Satellite overhangs near gates S3 and S4 was re-routed to the IWS in September 2000.

5. Completed the first half of the SDE4 MST fecal coliform source tracing project.
6. Completed a second year of receiving water and outfall monitoring to assess dissolved oxygen during runway deicing events

The past year's monitoring efforts lead to these suggestions:

1. Complete the investigation of possible sources of fecal coliforms in SDE4 discharges,
2. Study how the Port could consolidate sampling locations. Instead of four locations for outfalls SDN1-SDN4, sample at a single point at the Lake Reba detention facility outlet that integrates discharges from all four outfalls. This location would be more representative of discharges where they enter the receiving waters. This location also accounts for the stormwater's contact with natural channels and detention prior to ultimate discharge to Miller Creek. These factors are not represented in the current sampling locations. Examine the benefits provided and risks engendered by sampling at this new location. Consider a similar approach for several Des Moines Creek outfalls (SDS5-SDS7).
3. Test several stormwater treatment technologies, including media filtration, to determine if they are a technically and cost effective BMP to consider for alleviating roof runoff water quality problems.

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APPENDICES

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APPENDIX A STORM EVENT HYDROLOGIC AND HYDRAULIC DATA

Table 1

Monthly Summary of Daily Rainfall at STIA
source: NWS rain gage (POS rain gage for July 99

day	Jul-	Aug-	Sep-	Oct-	Nov-	Dec-	Jan-	Feb-	Mar-	Apr-	May-00	Jun-
1	0	0	0	0	0	0.23	0.27	1.34	0	0	0.16	0
2	0.3	0	0	0	0	0.34	0	0	0.37	0	0.02	0
3	0.02	0.21	0	0	0.06	0	0.27	0	0.34	0	0.24	0
4	0	0.06	0	0	0	0.19	0.31	0	0.39	0	0.14	0
5	0	0.07	0.02	0	0.29	0.15	0	0.06	0	0.02	0.05	0.01
6	0	0.25	0	0.01	0.38	0.39	0.03	0	0	0.12	0	0.1
7	0	0.07	0	0.21	0	0	0.21	0.34	0	0	0	0.05
8	0	0.01	0	0.65	0.26	0.3	0.31	0.74	0.04	0	0.12	0.15
9	0	0	0	0.01	0.84	0.15	0.2	0.01	0.05	0	0.74	0.1
10	0	0	0	0	0.54	0.01	0.19	0	0.1	0	0.61	0.06
11	0	0	0	0.09	1.06	0.04	0.05	0	0.03	0	0	0.55
12	0	0	0	0.01	1.51	0.86	0.22	0	0	0	0	0.56
13	0	0.02	0	0.02	0.3	0.12	0.1	0.01	0.46	0.35	0	0
14	0	0	0	0	0.01	0.14	0.29	0.5	0.03	0.14	0	0
15	0	0.17	0	0	0.08	1.4	0	0.01	0.04	0.13	0	0
16	0.51	0	0	0	0.47	0.09	0.28	0	0.22	0	0	0
17	0.19	0	0	0	0.14	0.33	0.01	0	0.05	0	0	0
18	0	0	0.01	0	0	0	0	0	0.18	0	0.4	0.01
19	0	0	0	0	0.28	0.08	0.08	0	0	0	0	0
20	0	0	0	0	0.8	0	0.15	0	0	0	0	0
21	0	0	0	0	0.09	0	0.19	0.19	0	0.1	0.09	0
22	0	0	0	0	0.17	0	0.02	0.61	0.44	0.01	0	0
23	0	0	0.07	0.03	0.02	0	0	0	0	0.1	0	0
24	0	0	0.08	0	0.32	0	0	0	0	0	0	0.01
25	0	0	0	0.14	1.03	0	0.1	0.27	0	0.34	0	0
26	0	0	0	0	0.13	0	0	0.25	0	0	0.18	0
27	0	0	0	0.3	0.3	0	0	0.17	0.06	0.07	0.17	0
28	0	0	0	0.25	0	0	0	0.1	0.01	0.1	0.07	0
29	0	0.06	0	0.06	0.2	0	0	0.65	0.01	0	0.08	0
30	0	0	0	0.38	0.31	0	0.03	0	0	0	0.02	0.01
31	0	0	0	0.1	0	0	0.46	0	0	0	0.04	0
total	1.02	0.92	0.18	2.26	9.59	4.82	3.77	5.25	2.82	1.48	3.13	1.61
NWS avg	0.79	1.1	1.79	3.48	6.05	5.92	5.7	4.21	3.75	2.51	1.66	1.44
actual	1.02	1.94	2.12	4.38	13.97	18.79	22.56	27.81	30.63	32.11	35.24	36.85
avg cum	0.79	1.89	3.68	7.16	13.21	19.13	24.83	29.04	32.79	35.3	36.96	38.4

12-month	36.85
12-month NWS avg	38.4
Departure from avg	-4%

Drainage Basin	Current (1998) Perv. (acres)	Current (1998) Imperv. (acres)	Current (1998) Total (acres)	total percent of each Creek perv	total percent of each Creek imperv	total percent of each Creek total	total percent of SDS perv	total percent of SDS imperv	total percent of SDS total	total percent of Airfield perv	total percent of Airfield imperv	total percent of Airfield total
Miller Creek SDS												
SDN-1 (above monitoring point)	3.3	10.2	13.5	3%	16%	8%	0.6%	2.4%	1.4%			
SDN-1 (POS below mon. pt.)	0.42	5.0	5.4	0.4%	8%	3%	0.1%	1.2%	0.6%			
SDN-1 (offsite below mon. pt.)	34	12	46	33%	19%	28%	6.3%	2.8%	4.8%			
SDN-2	0.0	0.0	0.0	0%	0%	0%	0.0%	0.0%	0.0%	0%	0%	0%
SDN-3	43	27	70	42%	44%	42%	8.0%	6.3%	7.3%	12%	9%	10.9%
SDN-4	23	7.7	30	22%	12%	18%	4.2%	1.8%	3.1%	7%	3%	4.7%
Des Moines Creek SDS												
SDE-4	52	97	149	12%	27%	19%	9.7%	22.7%	15.5%	na	6.1%	2.6%
SDS-1	1.5	9.2	10.7	0.3%	2.5%	1%	0.3%	2.2%	1.1%			
SDS-2	12.2	1.0	13.2	3%	0.3%	2%	2.3%	0.2%	1.4%			
SDS-3	238	224	462	55%	62%	58%	44.5%	52.4%	48.0%	69%	76%	72%
SDS-4	43	21	63	10%	6%	8%	8.0%	4.9%	6.6%	12%	7%	9.9%
W-3	7.0	7.0	14.0	2%	1.9%	2%	1.3%	1.6%	1.5%			
B	48.2	1.4	49.6	11%	0.4%	6%	9.0%	0.3%	5.1%			
D	30.7	3.2	33.9	7%	0.9%	4%	6.7%	0.7%	3.5%			

Drainage Basin	Perv. (acres)	Imperv. (acres)	Total (acres)
Other SDS			
Taxi Yard	0.00	0.78	0.78
Engineering Yard	0.28	1.20	1.48
IWS			
Primary drainage	6.3	286	292
'97 North Snowmelt pump stn	6.4	0.24	6.6
'97 Central Snowmelt pump stn	0.05	0.70	0.75
'97 South Snowmelt pump stn	0.0	0.34	0.34
'97 North Cargo pump stn	6.5	33.3	39.8
'96 North Satellite pump stn	0.31	13.4	13.8
'97 IWS-510 Diversion from SDS1	0.42	16.1	16.5

TOTALS		Perv. (acres)	Imperv. (acres)	Total (acres)
Miller Creek SDS		103	62	165
	% of SDS	19%	14%	17%
	% of total	19%	8%	12%
Des Moines Creek SDS		432	364	796
	% of SDS	81%	85%	83%
	% of total	78%	47%	60%
Other SDS (EY, TY)		0.3	2.0	2.3
	% of SDS	0.1%	0.5%	0.2%
	% of total	0.1%	0.3%	0.2%
total airfield (S3, S4, N3, N4, +17ac E4)		346	297	643
	% of SDS	65%	69%	67%
	% of total	62%	38%	48%
total SDS		535	428	963
	% of total	96%	55%	72%
IWS		20	350	370
	% of total	4%	45%	28%
Total drainage		555	778	1333

Note: "airfield" category includes 17 acres of taxiway in SDE4 subbasin drainage

AR 045728

Summary of Storms Sampled 7/1/99 - 6/30/00

Storm Date	Depth, In.	Dur, hr	Max Int, In/hr	24hrant, In	48hrant, In	Dryant, hr	Dryant, Days	Load Factor	Event Type	Comment
4/21/00	0.1	7	0.04						Other Storm	
4/13/00	0.34	12	0.08	0	0	74	3.1	5.9	NPDES Storm	
3/22/00	0.43	8	0.14	0	0	86	3.6	12.0	NPDES Storm	
3/13/00	0.47	9	0.13	0	0	49	2.0	6.4	NPDES Storm	
2/25/00	0.28	6	0.09	0	0	70	2.9	6.3	NPDES Storm	
2/21/00	0.28	36	0.06	0	0	72	3.0	4.3	NPDES Storm	
2/7/00	1.18	25	0.12	0	0.05	31	1.3	3.7	NPDES Storm	
1/31/00	1.76	29	0.15	0.07	0.07	9	0.4	1.3	NPDES Storm	
1/12/00	0.37	48	0.04	0.07	0.31	10	0.4	0.4	NPDES Storm	runway deice event, concurrent DO Study/instream
1/7/00	0.38	12	0.12	0.01	0.05	23	1.0	2.8	NPDES Storm	
12/17/99	0.34	11	0.08	0	1.15	26	1.1	2.1	NPDES Storm	
12/15/99	1.26	13	0.32	0.15	0.32	8	0.3	2.6	Other Storm	
12/8/99	0.49	27	0.09	0	0.36	40	1.7	3.6	NPDES Storm	
12/4/99	0.24	10	0.1	0	0	60	2.5	6.0	NPDES Storm	
11/27/99	0.32	16	0.07	0.02	0.62	22	0.9	1.5	NPDES Storm	
11/24/99	0.33	16	0.05	0	0.15	26	1.1	1.3	NPDES Storm	
11/16/99	0.6	15	0.07	0.01	0.08	23	1.0	1.6	NPDES Storm	
11/5/99	0.68	12	0.11	0	0.05	44	1.8	4.8	NPDES Storm	WET & source trace at SDN1
9/23/99	0.07	2	0.05	0	0	124	5.2	6.2	Other Storm	
7/16/99	0.7	34	0.11	0	0	300	12.5	33.0	NPDES Storm	
7/2/99	0.3	6	0.11	0	0	103	4.3	11.3	NPDES Storm	
Count	21	21	21	21	21	21	21	21		
Median	0.37000	12	0.09	0	0.0500000	40	1.7	3.7		
Average	0.52	17	0.10	0.02	0.15	57	2.4	5.6		

load factor = maxint (in/hr)*dryant(hrs)
Event Type defined in Procedure Manual for Stormwater Monitoring
"dur" = rainfuall duration in hours
"24hrant" and "48hrant" is the total rainfall in the 24 and 48 hours preceding the event respectively
"dryant" is the duration of the antecedent dry period to the last measurable (0.01 in.) rainfall

POS EMIS

Estimated Peak Runoff Rates (gpm) for Storm Events Monitored 7/1/99 - 6/30/00

Storm Date	Peak RI, In./hr	002 SDE-4	003 SDS-1	004 SDS-2	005 SDS-3	006 SDN-1	007 SDN-2	008 SDN-3	009 SDS-4	010 SDS-7	011 SDN-4	012 EY	013 TY	014 SDS-6	015 SDS-5
4/21/00	0.04	1,810	160	71	4,700	180		630	530	150	230	21	13	239	190
4/13/00	0.08	3,630	310	140	9,400	360		1,270	1,060	290	450	42	25	478	380
3/22/00	0.14	6,350	550	250	16,500	630		2,220	1,860	510	790	73	44	837	670
3/13/00	0.13	5,900	510	230	15,400	590		2,060	1,730	470	730	68	41	777	620
2/25/00	0.09	4,080	350	160	10,600	410		1,430	1,200	330	510	47	29	538	430
2/21/00	0.06	2,720	230	110	7,100	270		950	800	220	340	31	19	359	290
2/7/00	0.12	5,440	470	210	14,200	540		1,900	1,590	440	680	63	38	718	570
1/31/00	0.15	6,810	590	270	17,700	680		2,380	1,990	550	850	78	48	897	720
1/12/00	0.04	1,810	160	71	4,700	180		630	530	150	230	21	13	239	190
1/7/00	0.12	5,440	470	210	14,200	540		1,900	1,590	440	680	63	38	718	570
12/17/99	0.08	3,630	310	140	9,400	360		1,270	1,060	290	450	42	25	478	380
12/15/99	0.32	14,520	1,250	570	37,800	1,450		5,070	4,250	1,160	1,810	167	102	1,914	1,530
12/8/99	0.09	4,080	350	160	10,600	410		1,430	1,200	330	510	47	29	538	430
12/4/99	0.1	4,540	390	180	11,800	450		1,590	1,330	360	560	52	32	598	480
11/27/99	0.07	3,180	270	120	8,300	320		1,110	930	250	400	37	22	419	330
11/24/99	0.05	2,270	200	89	5,900	230		790	660	180	280	26	16	299	240
11/16/99	0.07	3,180	270	120	8,300	320		1,110	930	250	400	37	22	419	330
11/5/99	0.11	4,990	430	200	13,000	500		1,740	1,460	400	620	57	35	658	520
9/23/99	0.05	2,270	200	89	5,900	230		790	660	180	280	26	16	299	240
7/16/99	0.11	4,990	430	200	13,000	500		1,740	1,460	400	620	57	35	658	520
7/2/99	0.11	4,990	430	200	13,000	500		1,740	1,460	400	620	57	35	658	520
A = total Basin Area, ac		149.0	10.7	13.2	462.0	13.5		70.0	63.4	14.0	30.2	1.5	0.8	49.6	33.9
Ai = Impervious area, ac		97.0	9.2	1.0	224.0	10.2		27.0	20.8	7.0	7.6	1.2	0.8	1.3	3.2
Ap = pervious area, ac		52.0	1.5	12.2	238.0	3.3		43.0	42.6	7.0	22.6	0.3	0.0	48.2	30.7
Cr = (0.90(Ai)+0.25(Ap))/A		0.67	0.81	0.30	0.57	0.74		0.50	0.46	0.58	0.41	0.77	0.90	0.27	0.31

Rainfall data from Port of Seattle and/or National Weather Service Rain gage at Sea-Tac Airport
Peak runoff rates based upon "rational method": Q=CIA.

Estimated Runoff Volumes (gal) for Storm Events Monitored 7/1/99 - 6/30/00

Storm Date	Depth, In.	002 SDE-4	003 SDS-1	004 SDS-2	005 SDS-3	006 SDN-1	007 SDN-2	008 SDN-3	009 SDS-4	010 SDS-7	011 SDN-4	012 EY	013 TY	014 SDS-6	015 SDS-5
4/21/00	0.1	0	0	11,000	0	0		0	0	22,000	34,000	4,000	2,000	36,000	29,000
4/13/00	0.34	496,000	15,000	37,000	1,075,000	60,000		94,000	112,000	75,000	116,000	11,000	7,000	123,000	98,000
3/22/00	0.43	862,000	26,000	47,000	1,870,000	105,000		162,000	196,000	94,000	146,000	14,000	9,000	155,000	124,000
3/13/00	0.47	1,056,000	32,000	51,000	2,291,000	128,000		199,000	241,000	103,000	160,000	15,000	9,000	169,000	135,000
2/25/00	0.28	306,000	10,000	31,000	664,000	37,000		58,000	68,000	62,000	95,000	9,000	6,000	101,000	81,000
2/21/00	0.28	306,000	10,000	31,000	664,000	37,000		58,000	68,000	62,000	95,000	9,000	6,000	101,000	81,000
2/7/00	1.18	3,316,000	104,000	127,000	7,391,000	399,000		815,000	950,000	258,000	401,000	38,000	23,000	424,000	339,000
1/31/00	1.76	5,346,000	176,000	189,000	12,753,000	640,000		1,681,000	1,733,000	385,000	597,000	56,000	34,000	632,000	505,000
1/12/00	0.37	607,000	19,000	40,000	1,316,000	74,000		114,000	138,000	81,000	126,000	12,000	8,000	133,000	107,000
1/7/00	0.38	646,000	20,000	41,000	1,402,000	79,000		122,000	147,000	84,000	129,000	12,000	8,000	137,000	109,000
12/17/99	0.34	496,000	15,000	37,000	1,075,000	60,000		94,000	112,000	75,000	116,000	11,000	7,000	123,000	98,000
12/15/99	1.26	3,580,000	113,000	136,000	8,063,000	431,000		916,000	1,046,000	276,000	428,000	40,000	25,000	453,000	362,000
12/8/99	0.49	1,160,000	35,000	53,000	2,518,000	141,000		218,000	266,000	108,000	167,000	16,000	10,000	176,000	141,000
12/4/99	0.24	204,000	7,000	26,000	443,000	25,000		39,000	45,000	53,000	82,000	8,000	5,000	87,000	69,000
11/27/99	0.32	428,000	13,000	35,000	928,000	52,000		81,000	96,000	70,000	109,000	11,000	7,000	115,000	92,000
11/24/99	0.33	461,000	14,000	36,000	1,000,000	56,000		87,000	104,000	73,000	112,000	11,000	7,000	119,000	95,000
11/16/99	0.6	1,550,000	46,000	65,000	3,169,000	188,000		256,000	375,000	132,000	204,000	19,000	12,000	216,000	172,000
11/5/99	0.68	1,778,000	53,000	73,000	3,684,000	215,000		315,000	442,000	149,000	231,000	22,000	13,000	245,000	195,000
9/23/99	0.07	0	0	0	0	0		0	0	0	0	0	0	0	0
7/16/99	0.7	1,835,000	55,000	76,000	3,816,000	222,000		330,000	460,000	154,000	238,000	22,000	14,000	252,000	201,000
7/2/99	0.3	365,000	11,000	33,000	791,000	44,000		69,000	82,000	66,000	102,000	10,000	6,000	106,000	86,000
A = total Basin Area, ac		149.0	10.7	13.2	462.0	13.5		70.0	63.4	14.0	30.2	1.5	0.8	49.6	33.9
Ai = impervious area, ac		97.0	9.2	1.0	224.0	10.2		27.0	20.8	7.0	7.6	1.2	0.8	1.3	3.2
Ap = pervious area, ac		52.0	1.5	12.2	238.0	3.3		43.0	42.6	7.0	22.6	0.3	0.0	48.2	30.7
Cr = (0.90(Ai)+0.25(Ap))/A		0.67	0.81	0.30	0.57	0.74		0.50	0.46	0.58	0.41	0.77	0.90	0.27	0.31
Max runoff, gal/in		4,045,708	290,531	358,412	12,544,409	366,557		1,900,668	1,721,462	380,134	820,002	40,729	21,179	1,346,759	920,466
Cr Est runoff, gal/in		2,723,386	235,004	107,252	7,089,492	271,660		951,692	797,466	218,577	339,133	31,361	19,061	358,955	286,594

Only certain outfalls sampled during a particular event
Rainfall data from National Weather Service and/or Port of Seattle rain gage at Sea-Tac Airport.
Runoff volumes based upon basin-specific estimation models.
SDN2 volumes gaged by flowmeter during pump station bypass sampling events.
Note: equations built into embedded functions above apply for rainfall from 0.1" to 2.0".

APPENDIX B TABULAR NPDES SAMPLE DATA SUMMARIES

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All Grab Sample Data			storm caharcteristics										concentration, mg/l							
outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground dsico?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MD	Fecals (MPN)	comments
SDE4	SDE4 111394	1995	11/11/94	1	0.29	14				40	NPDES	No		2.0	1.1				1100	
SDE4	SDE4 111994	1995	11/19/94	1	0.42	24			0.06	82	NPDES	No								
SDE4	SDE4 010795	1995	1/7/95	1	0.21	62			0	262	NPDES	No	7	3.0	2.0				45	
SDE4	SDE4 041095	1995	4/10/95	1	0.29	10			0	90	NPDES	No	6.5	0.95	1.1				200	
SDE4	SDE4 050295	1995	5/2/95	2	0.42	29				30	NPDES	No								
SDE4	SDE4 072095	1996	7/20/95	1	0.41	30			0		NPDES	No	6.9	5.7	3.0				4000	
SDE4	SDE4 081795	1996	8/18/95	1	1.34	12			0.01		NPDES	No								
SDE4	SDE4 102595	1996	10/25/95	1	0.29	6			0.01		NPDES	No	7.1	5.9	0.5				300	
SDE4	SDE4 020496 GRAB	1996	2/3/96	1	1.0	6					NPDES	Yes	7.0	17	0.8				22	
SDE4	SDE4 032296 GRAB	1996	3/22/96	1	0.21				0		SIIpAg	No	7.1	2.8	3.0				20	
SDE4	SDE4 041696 GRAB	1996	4/15/96	1	0.40	10			0.08		NPDES	No	6.39	2.6	3.39				17	
SDE4	SDE4 071796 GRAB	1997	7/17/96	1	0.27	31			0		NPDES	No							220	
SDE4	SDE4 080396 GRAB	1997	8/3/96	1	0.29	1.2			0	76	NPDES	No	7.31	3.1	2.64	TPH-Dx replaced FOG and TPH IR on March 1, 1998			1000	
SDE4	SDE4 121096 GRAB	1997	12/10/96	2	0.11	4			0	72	NPDES	No	6.91	2.8	1.8				80	backup data in case short on data for 96 Q4
SDE4	SDE4 121896 GRAB	1997	12/18/96	1	0.36	37			0	100	NPDES	No	6.45	3.2	1.07				220	
SDE4	SDE4 011097 GRAB	1997	1/10/97	1	1.21	23			0	164	NPDES	No	7.06	9	10				1600	
SDE4	SDE4 012797 GRAB	1997	1/27/97	1	0.41	26			0	100	SIIpAg	No	6.17	0.8	6				80	
SDE4	SDE4 030697 GRAB	1997	3/6/97	1	0.36	20			0.24	42	NPDES	No	6.33	400*	3.00				1600	FOG result not representative, laboratory error, see letter of May 15, 1997
SDE4	SDE4 053097	1997	5/30/97	1	1.04	30			0.04	14	NPDES	No		1.1	1.2					backup FOG/TPH for March 1997 Lab errors (SDE4 030697 grab)
SDE4	SDE4 081097 GRAB	1997	8/10/97	1	0.36	26			0	130	NPDES	No	6	1.0	1.40				190	
SDE4	SDE4 102097 GRAB	1998	10/20/97	1	0.47	10.8			0.06	26	NPDES	No	6.6	0.8	2.00				1600	
SDE4	SDE4 121597 GRAB	1998	12/15/97	1	1	33			0	87	NPDES	No	6.56	1.8	2.3				60	
SDE4	SDE4 030198 GRAB	1998	3/1/98	1	0.86	80			0.07	6	NPDES	No	7.15		1.8	1.88	0.045	1.84	1600*	fecal coliform result not representative: exceeded holding time by 9+ hours
SDE4	SDE4 040798 GRAB	1998	4/7/98	2	0.03	0.5			0.04	87	NPDES	No	7.03		2.4	3.4	0.025	3.4	110	NON-"STORM"
SDE4	SDE4 041098 GRAB	1998	4/9/98	2	0.06	17			0	62	NPDES	No	6.06		2.27	3.1	0.06	3.06	500	NON-"STORM"
SDE4	SDE4 042398 GRAB	1998	4/23/98	1	0.40	20			0	204	NPDES	No	6		3.9	2.5	0.025	2.40	500	
SDE4	SDE4 050898 GRAB	1998	5/8/98	2	0.12	6			0	360	NPDES	No	7.03		1.8	2.83	0.09	2.40	1600	NON-"STORM"
SDE4	SDE4 061498 GRAB	1998	6/14/98	1	0.21	6			0.01	125	NPDES	No	6.83		2.6	3.04	0.1	2.94	80	
SDE4	SDE4 062498 GRAB	1998	6/24/98	1	0.43	4			0	200	NPDES	No	6.04		1.8	2.77	0.04	1.83	300	
SDE4	SDE4 071498 GRAB	1998	7/14/98	2	0.13	10	0.04	0	0	204	NPDES	No	6.72		2.9	6.86	0.025	6.84	1600	nonstorm
SDE4	SDE4 081898 GRAB	1998	8/18/98	1	0.31	10	0.29	0	0	702	NPDES	No	6.62		0.126	0.21	0.04	0.17	500	thunderstorm, 0.29 in/hr
SDE4	SDE4 081998 GRAB	1998	8/19/98	2	0.19	20	0.10	0	0	498	NPDES	No	7.42			2.11	0.025	2.06	500	nonstorm
SDE4	SDE4 092498 GRAB	1998	9/24/98	1	0.47	23	0.20	0	0	140	NPDES	No	6.78			1.19	0.025	1.17	1600	
SDE4	SDE4 100398 GRAB	1998	10/3/98	1	0.4	3	0.22	0	0.07	38	NPDES	No	6.07		2.2	4.04	0.025	4.02	1600	
SDE4	SDE4 110398 GRAB	1998	11/3/98	1	1.62	30	0.40	0	0.06	36	NPDES	No	6.86			2.86	0.025	2.83	1600	
SDE4	SDE4 111098 GRAB	1998	11/10/98	1	2.34	66	0.10	0	0	73	NPDES	No	6			1.46	0.025	1.44	240	
SDE4	SDE4 121098 GRAB	1998	12/10/98	2	0.14	4	0.03	0	0	40	NPDES	No	6.62			0.86	0.025	0.86	220	nonstorm
SDE4	SDE4 121798 GRAB	1998	12/17/98	2	0.11	4	0.03	0	0.02	33	NPDES	No	6.47			3.57	0.025	3.56	500	nonstorm
SDE4	SDE4 122498 GRAB	1998	12/24/98	1	1.18	30	0.10	0	0	153	NPDES	Yes	7.70			6.86	0.025	6.84		fecals not analyzed due to holiday lab closure
SDE4	SDE4 012099 GRAB	1999	1/20/99	1	0.42	20	0.09	0.01	0.96	22	NPDES	No	6.86			3.03	0.03	3	170	CONCURRENT WET TEST
SDE4	SDE4 021099 GRAB	1999	2/10/99	1	0.6	32	0.06	0.01	0.36	20	NPDES	No	10.7			0.27	0.025	0.25	1	
SDE4	SDE4 030899 GRAB	1999	3/8/99	1	0.39	15	0.06	0	0	86	NPDES	No	6.9			3.06	0.025	3.04	30	
SDE4	SDE4 031299 GRAB	1999	3/12/99	1	0.63	23	0.07	0	0	71	NPDES	No	6.94	TPH-Dx replaced FOG and TPH IR on March 1, 1998		1.09	0.025	1.07	500	
SDE4	SDE4 032499 GRAB	1999	3/24/99	1	0.29	19	0.09	0	0.19	40	NPDES	No	6.32			3.17	0.06	3.11	500	CONCURRENT WET TEST
SDE4	SDE4 032799 GRAB	1999	3/27/99	1	0.24	6	0.07	0	0.06	26	NPDES	No	6.49			2.63	0.06	2.56	80	
SDE 4	SDE4 070200 grab	2000	7/2/00	1	0.3	6	0.11	0	0	165	NPDES	No	6.50			1.47	0.025	1.47	500	
SDE 4	SDE4 111600 GRAB	2000	11/16/00	1	0.6	19	0.07	0.01	0.06	23	NPDES	No	6.75			0.99	0.025	0.97	1600	
SDE 4	SDE4 112400 GRAB	2000	11/24/00	1	0.33	18	0.06	0	0.15	26	NPDES	No	6.86			1.73	0.06	1.66	21	
SDE 4	SDE4 120400 grab	2000	12/4/00	1	0.24	10	0.1	0	0	66	NPDES	No	6.77			0.97	0.04	0.93	50	
SDE 4	SDE4 031300 grab	2000	3/13/00	1	0.47	6	0.13	0	0	46	NPDES	No	6.67			1.06	0.025	1.04	170	
SDE 4	SDE4 041300 GRAB	2000	4/13/00	1	0.34	12	0.09	0	0	74	NPDES	No	6.80			0.31	0.025	0.29	130	
SDE4	SDE4 082099 GRAB	1999	8/20/99	1	0.21	30	0.03	0	0	40	NPDES	No	6.66			2.04	0.025	2.02	1600	
SDS1	SDS1 101994	1995	10/19/94	1	0.2	32				120	NPDES	No	6.70	1.1	0.5				10	
SDS1	SDS1 111994	1995	11/19/94	1	0.42	24			0.06	82	NPDES	No								
SDS1	SDS1 021695	1995	2/15/95	1	1.1	80			0	80	NPDES	Yes	6.6	3.4	5.3				4.9	
SDS1	SDS1 050295	1995	5/2/95	2	0.42	29				30	NPDES	No								
SDS1	SDS1 051195	1995	5/11/95	1	0.2	6			0.12		NPDES	No	7.4	10	0.6					
SDS1	SDS1 080495	1995	8/4/95	1	0.7	26			0	384	NPDES	No	6.4	6.6	5.4				60	
SDS1	SDS1 080795	1996	8/6/95	1	0.6	6			0		NPDES	No	7.2	3.3	0.5				4	

AR 045734

All Grab Sample Data

outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground deice?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments
			storm characteristics										concentration, mg/l							
SDS1	SDS1 101995	1996	10/15/95	1	0.36	12			0		NPDES	No	7.1	1.2	0.8	TPH-Dx replaced FOG and TPH (IR) on March 1, 1998			200	
SDS1	SDS1 011396 GRAB	1996	1/13/96	1	0.37	20			0		NPDES	No	7.1	0.5	1.8				0.5	
SDS1	SDS1 041696 GRAB	1996	4/15/96	1	0.40	16			0.08		NPDES	No	6.85	2.5	0.32				4	
SDS1	SDS1 042296 GRAB	1996	4/22/96	1	2.83	8			0		StipAg	No	7.54	1.9	0.58				23	
SDS1	SDS1 070396 GRAB	1997	7/3/96	1	0.23	12			0		NPDES	No	5.86	0.5	0.36				6*	Fecals exceeded 30 hour holding time, results not representative
SDS1	SDS1 071796 GRAB	1997	7/17/96	1	0.27	31			0		NPDES	No							1600	fecals make up for 7/3/96
SDS1	SDS1 080296 GRAB	1997	8/2/96	1	1.01	27			0	325	StipAg	No	6.30	0.5	0.42				130	
SDS1	SDS1 120496 GRAB	1997	12/4/96	1	0.82	7.5			0.16	44	NPDES	No	6.61	2.4	0.36				1600	
SDS1	SDS1 011097 GRAB	1997	1/10/97	1	1.21	23			0	154	NPDES	No	6.82	0.5	2.0				300	
SDS1	SDS1 041397 GRAB	1997	4/13/97	1	0.31	12			0.04		NPDES	No	7.15	0.5	2.0				23	
SDS1	SDS1 081797 GRAB	1997	8/16/97	1	0.30	20			0	136	NPDES	No	7	0.5	0.55				1600	
SDS1	SDS1 102097 GRAB	1998	10/20/97	1	0.47	10.8			0.08	20	NPDES	No	6.80	0.5	0.54				80	
SDS1	SDS1 111997 GRAB	1998	11/19/97	1	0.66	30			0.12	24	NPDES	No			0.83				1600	
SDS1	SDS1 121897 GRAB	1998	12/18/97	1	1	33			0	87	NPDES	No	6.80	0.5	1.5				23	
SDS1	SDS1 030698 GRAB	1998	3/6/98	1	0.66	27			0	132	NPDES	No	6.22		0.06	0.72	0.10	0.56	1	FULLFILS QUARTERLY DEICING SAMPLE RQMT PLUS ANNUAL SAMPLE RQMT
SDS1	SDS1 121798	1999	12/17/98	2	0.11	4	0.03	0	0.02	33	NPDES	No		TPH-Dx replaced FOG and TPH (IR) on March 1, 1998						[illegible]
SDS1	SDS1 031299 GRAB	1999	3/12/99	1	0.63	23	0.07	0	0	71	NPDES	No								quarterly deice grab sample in first 60 minutes
SDS1	SDS1 062099 GRAB 1	1999	6/20/99	1	0.21	30	0.03	0	0	46	NPDES	No	6.86			1.86	0.025	1.54	1600	foam observed below outfall
SDS1	SDS1 070200 GRAB 1	2000	7/2/00	1	0.3	6	0.11	0	0	100	NPDES	No	6.82			0.78	0.025	0.78	900	foam observed below outfall
SDS1	SDS1 070200 GRAB 2	2000	7/2/00	1	0.3	6	0.11	0	0	100	Source Trac	No	6.85							foam observed below outfall
SDS1	SDS1 082300 grab 1	2000		2								No							82	foam observed below outfall
SDS1	SDS1 082300 grab 2	2000		2								No							76	foam observed below outfall
SDS1	SDS1 062099 GRAB 2	1999	6/20/99	1	0.21	30	0.03	0	0	46	NPDES	No								FOAM OBSERVED BELOW OUTFALL
SDS2	SDS2 051095	1995	5/9/95	1	0.12	7.5			0	102	NPDES	No	7.2	3.4	0.6	TPH-Dx replaced FOG and TPH (IR) on March 1, 1998			440	
SDS2	SDS2 081195	1995	8/11/95	1	0.2	6			0.12		NPDES	No	7.4	1.4	0.5				700	
SDS2	SDS2 081095	1995	8/10/95	1	0.3	10			0	90	NPDES	No	7.1	1.8	0.6				1400	
SDS2	SDS2 090595	1996	9/5/95	1							NPDES	No	6.7	2.2	0.5				2000	
SDS2	SDS2 112396 GRAB	1997	11/23/96	1	0.63	34.1			0	72	NPDES	Yes	6.71	0.5	0.125				23	
SDS2	SDS2 120496 GRAB	1997	12/4/96	1	0.82	7.5			0.16	44	NPDES	No	6.80	0.5	0.125				8	
SDS2	SDS2 011097 GRAB	1997	1/10/97	1	1.21	23			0	154	StipAg	No	6.77	0.5	0.125				230	
SDS2	SDS2 021197 GRAB	1997	2/11/97	1	0.40	10			0	206	StipAg	No	6.70	4	0.125				11	LAST FOR STIP AG
SDS2	SDS2 111198 GRAB	1999	11/11/98	1	0.86	62	0.16	0	0.05	31	NPDES	No				0.66	0.025	0.086	110	
SDS2	SDS2 080799 GRAB	1999	8/6/99	1	0.26	22	0.08	0	0	76	NPDES	No	7.40			0.31	0.025	0.28	800	ANNUAL SAMPLE
SDS3	SDS3 080894	1995	8/8/94	1	0.09	22				96	NPDES	No								
SDS3	SDS3 081394	1995	8/13/94	1	0.15	6				110	NPDES	No	7.14	0.3	0.8	TPH-Dx replaced FOG and TPH (IR) on March 1, 1998			20	
SDS3	SDS3 101394	1995	10/13/94	1	0.32	14			0	400	NPDES	No		1.4	0.6				1	
SDS3	SDS3 111094 grab	1995	11/10/94	1	0.42	24			0.06	62	NPDES	No		0.6	0.6				2	
SDS3	SDS3 010795	1995	1/7/95	1	0.21	62			0	202	NPDES	No	7.2	0.06	0.6				1	
SDS3	SDS3 041295	1995	4/10/95	1	0.29	18			0	98	NPDES	No	7.3	0.06	0.5				1	
SDS3	SDS3 060295	1995	6/2/95	2	0.42	20				30	NPDES	No								
SDS3	SDS3 072095	1996	7/20/95	1	0.41	30			0		NPDES	No	7.7	0.06	0.5				1.8	
SDS3	SDS3 101695	1996	10/15/95	1	0.35	12			0		NPDES	No	7.4	1.4	0.6				1	
SDS3	SDS3 011396 GRAB	1996	1/13/96	1	0.37	20			0		NPDES	No	7.4	0.5	0.5				0.5	
SDS3	SDS3 032296 grab	1996	3/22/96	1	0.21				0		StipAg	No	7.5	0.5	0.8				13	
SDS3	SDS3 041696 GRAB	1996	4/15/96	1	0.40	16			0.08		NPDES	No	7.30	1.2	0.31				1	
SDS3	SDS3 071796 GRAB	1997	7/17/96	1	0.27	31			0		NPDES	No							1	fecals make up for 7/3/96 > hold time
SDS3	SDS3 080296 GRAB	1997	8/2/96	1	1.01	27			0	325	NPDES	No	7.36	0.5	0.3				8	
SDS3	SDS3 080396 GRAB	1997	8/3/96	1	0.29	1.2			0	76	NPDES	No	6.90	0.5	0.125				1600	
SDS3	SDS3 102196 GRAB	1997	10/21/96	1	0.66	4.1			0	94	NPDES	No	6.87	0.5	0.125				130	
SDS3	SDS3 112396 GRAB	1997	11/23/96	1	0.63	34.1			0	72	StipAg	Yes	7.20	0.5	0.125				1	
SDS3	SDS3 011097 GRAB	1997	1/10/97	1	1.21	23			0	154	NPDES	No	6.87	3	0.54				30	
SDS3	SDS3 030697 GRAB	1997	3/3/97	1	0.30	20			0.24	42	NPDES	No	7.22	0.5	0.125				1	
SDS3	SDS3 060397 GRAB	1997	6/3/97	1	0.29	16			0	76	NPDES	No	7.40	0.5	3.7				130	
SDS3	SDS3 102097 GRAB	1998	10/20/97	1	0.47	10.8			0.08	20	NPDES	No	7.13	0.5	0.125				13	
SDS3	SDS3 012098 GRAB	1998	1/20/98	1	0.2	14			0	107	NPDES	No	7.20	1.1	0.125				1	
SDS3	SDS3 030198 GRAB	1998	3/1/98	1	0.86	86			0.07	6	NPDES	No	7.06		0.125	0.10	0.06	0.11	1	
SDS3	SDS3 030698 GRAB	1998	3/6/98	1	0.66	27			0	132	NPDES	No			0.125	0.075	0.025	0.05	1	backup monthly sample in case 3/1/98 sample didn't qualify under new permit
SDS3	SDS3 042398 GRAB	1998	4/23/98	1	0.40	20			0	204	NPDES	No	7.30		0.125	0.075	0.025	0.06	1	

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All Grab Sample Data				storm characteristics									concentration, mg/l							
outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground dolce?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Focals (MPN)	comments
SDS3	SDS3 050699 GRAB	1999	5/6/99	2	0.12	6			0	380	NPDES	No	7.07		0.34	0.33	0.025	0.31	17	NON-"STORM"
SDS3	SDS3 061499 GRAB	1999	6/14/99	1	0.21	8			0.01	125	NPDES	No	7.23		0.29	0.18	0.06	0.13	70	CONSIDERABLE POLLEN IN SAMPLE
SDS3	SDS3 081099 GRAB	1999	8/10/99	1	0.28	10			0	286	NPDES	No	7.51		0.125	0.075	0.025	0.05	4	
SDS3	SDS3 071499 GRAB	1999	7/14/99	2	0.13	16	0.04	0	0	264	NPDES	No	7.32		0.38	0.2	0.025	0.18	30	nonstorm
SDS3	SDS3 081899 GRAB	1999	8/18/99	1	0.31	10	0.25	0	0	782	NPDES	No	7.78		0.125	0.18	0.025	0.17	500	thunderstorm, 0.25 in/hr
SDS3	SDS3 081899 GRAB	1999	8/18/99	2	0.19	20	0.16	0	0	498	NPDES	No	7.71			0.16	0.025	0.13	300	nonstorm
SDS3	SDS3 082499 GRAB	1999	8/24/99	1	0.47	23	0.28	0	0	146	NPDES	No	7.14			0.21	0.025	0.18	800	
SDS3	SDS3 100399 GRAB	1999	10/3/99	1	0.4	3	0.22	0	0.07	36	NPDES	No	6.88		0.56	0.63	0.025	0.51	80	
SDS3	SDS3 102799 GRAB	1999	10/27/99	1	0.64	9	0.19	0	0	72	NPDES	No	7.34			0.07	0.025	0.046	13	
SDS3	SDS3 111199 GRAB	1999	11/11/99	1	0.88	82	0.18	0	0.05	31	NPDES	No	7.1			0.38	0.025	0.33	30	
SDS3	SDS3 121099 GRAB	1999	12/10/99	2	0.14	4	0.03	0	0	49	NPDES	No	7.27			0.086	0.03	0.055	16	nonstorm
SDS3	SDS3 121799 GRAB	1999	12/17/99	2	0.11	4	0.03	0	0.02	33	NPDES	No	7.08			0.078	0.025	0.05	24	nonstorm
SDS3	SDS3 122499 GRAB	1999	12/24/99	1	1.18	38	0.16	0	0	163	NPDES	Yes	7.62			0.47	0.025	0.45		focals not analyzed due to holiday lab closure
SDS3	SDS3 010800 GRAB	1999	1/8/00	1	0.27	21	0.05	0	0	64	NPDES	No	7.66			0.086	0.03	0.055	1	
SDS3	SDS3 011300 grab	1999	1/13/00	1	1.07	22	0.16	0	0	85	NPDES	No	7.6			0.28	0.025	0.24	23	
SDS3	SDS3 020300 GRAB	1999	2/3/00	1	0.28	18	0.07	0	0.01	27	NPDES	No	7.44			0.08	0.025	0.086	2	
SDS3	SDS3 030600 GRAB	1999	3/6/00	1	0.28	15	0.06	0	0	96	NPDES	No	7.01			0.075	0.025	0.05	1	
SDS3	SDS3 031200 GRAB	1999	3/12/00	1	0.63	23	0.07	0	0	71	NPDES	No	7.23			0.35	0.025	0.33	1800	
SDS3	SDS3 032400 GRAB	1999	3/24/00	1	0.28	19	0.06	0	0.16	40	NPDES	No	7.26			0.075	0.025	0.06	6	
SDS 3	SDS3 070200 GRAB	2000	7/2/00	1	0.3	6	0.11	0	0	103	NPDES	No	7.18			0.075	0.025	0.06	23	
SDS 3	SDS3 110500 GRAB	2000	11/5/00	1	0.88	12	0.11	0	0.05	44	NPDES	No	7.53			0.075	0.025	0.05	18	
SDS 3	SDS3 111600 GRAB	2000	11/16/00	1	0.6	15	0.07	0.01	0.08	23	NPDES	No	7.89			0.075	0.025	0.05	13	
SDS 3	sds3 120400 GRAB	2000	12/4/00	1	0.24	10	0.1	0	0	60	NPDES	No	7.17			0.075	0.025	0.06	1	
SDS 3	SDS3 120800 GRAB	2000	12/8/00	1	0.49	27	0.09	0	0.36	40	NPDES	No	7.30			0.075	0.025	0.05	1	
SDS 3	SDS3 031300 grab	2000	3/13/00	1	0.47	9	0.13	0	0	49	NPDES	No	7.36			0.075	0.025	0.05	4	
SDS 3	SDS3 041300 GRAB	2000	4/13/00	1	0.34	12	0.08	0	0	74	NPDES	No	7.80			0.075	0.025	0.05	8	
SDS3	SDS3 082099 GRAB	1999	8/20/99	1	0.21	38	0.83	0	0	48	NPDES	No	7.38			0.08	0.025	0.055	220	
SDS4	SDS4 081494	1995	8/13/94	1	0.15	9				110	NPDES	No	7.14	3	0.5				132	
SDS4	SDS4 101394	1995	10/13/94	1	0.32	14			0	480	NPDES	No	7.02	1.2	0.6				70	
SDS4	SDS4 111994	1995	11/19/94	1	0.42	24			0.06	52	NPDES	No								
SDS4	SDS4 011295	1995	1/11/95	1	0.3	60			0.04	24	NPDES	No	7.8	0.6	0.5				82	
SDS4	SDS4 021695	1995	2/15/95	1	1.1	56			0	80	NPDES	Yes								
SDS4	SDS4 051295	1995	5/11/95	1	0.2	8			0.12		NPDES	No	7.5	1.8	0.5				16	
SDS4	SDS4 080795	1996	8/6/95	1	0.4	8			0		NPDES	No	7.6	2.7	0.5				18	
SDS4	SDS4 101695	1996	10/15/95	1	0.36	12			0		NPDES	No	7.7	1.7	0.5				27.5	
SDS4	SDS4 011496 GRAB	1996	1/13/96	1	0.37	20			0		NPDES	No	7.4	0.5	0.6				440	
SDS4	SDS4 020596	1996	2/3/96	2	1.8	8					SES	Yes								
SDS4	SDS4 041696 GRAB	1996	4/15/96	1	0.49	16			0.09		NPDES	No	7.63	2.7	0.125				350	
SDS4	SDS4 042296 GRAB	1996	4/22/96	1	2.83	9			0		StipAg	No	7.15	0.5	0.125				1800	
SDS4	SDS4 070396 GRAB	1997	7/3/96	1	0.23	12			0		NPDES	No	6.87	0.5	0.76				[illegible]	Focals exceeded 30 hour holding time, results not representative
SDS4	SDS4 071796 GRAB	1997	7/17/96	1	0.27	31			0		NPDES	No							800	focals make up for 7/4/96 grab that exceeded holding time
SDS4	SDS4 100396 GRAB	1997	10/4/96	1	0.50	8.1			0.08	18	NPDES	No	6.74	0.5	0.125				800	
SDS4	SDS4 120496 GRAB	1997	12/4/96	1	0.82	7.5			0.18	44	NPDES	No	6.78	0.5	0.125				80	
SDS4	SDS4 011097 GRAB	1997	1/10/97	1	1.21	23			0	154	NPDES	No	7.38	4	0.28				1600	
SDS4	SDS4 012797 GRAB	1997	1/27/97	1	0.41	26			0	108	StipAg	No	7.45	3	0.125				30	
SDS4	SDS4 041997 GRAB	1997	4/19/97	1	1.18	26			0	94	NPDES	No	7.4	0.5	0.6				90	
SDS4	SDS4 082497 GRAB	1998	8/25/97	1	0.2	10.5			0.07	98	NPDES	No	7.77	0.5	0.125				70	
SDS4	SDS4 111797 GRAB	1998	11/16/97	1	0.47	12.6			0	222	NPDES	No	7.46	0.5	0.125				29	
SDS4	SDS4 012898 GRAB	1998	1/29/98	1	0.2	14			0	107	NPDES	No	7.21	0.5	0.125				4	MATCHING COMPOSITE NOT RFPRESENTATIVF, NOT REPORTED
SDS4	SDS4 030898 GRAB	1998	3/8/98	1	0.98	27			0	132	NPDES	No	7.8	0.5	0.125				1	EXTRA GRAB (HAS MAKEUP COMP FOR 880W)
SDS4	SDS4 111098 GRAB	1999	11/10/98	1	2.34	66	0.18	0	0	73	NPDES	No	7.09			0.075	0.025	0.05	300	78% RPD in lab dupe
SDS4	SDS4 050799 GRAB	1999	5/6/99	1	0.25	22	0.06	0	0	78	NPDES	No	7.46			0.11	0.08	0.09	800	ANNUAL SAMPLE
SDS7	SDW3 051095	1995	5/9/95	1	0.12	7.5			0	102	NPDES	No	7.3	0.5	0.5				1700	
SDS7	SDW3 051195	1995	5/11/95	1	0.2	8			0.12		NPDES	No	7.4	1.1	0.5				73	
SDS7	SDW3 081095	1995	8/10/95	1	0.3	10			0	96	NPDES	No	7	0.6	0.5				1000	
SDS7	SDW3 081795	1996	8/18/95	1	1.34	12			0.01		NPDES	No	7.2	2.8	0.6				30000	
SDS7	SDW3 112396 GRAB	1997	11/23/96	1	0.63	34.1			0	72	NPDES	Yes	7.41	0.6	0.26				50	composite failed
SDS7	SDW3 011097 GRAB	1997	1/10/97	1	1.21	23			0	154	StipAg	No	6.7	0.5					148	
SDS7	SDW3 021197 GRAB	1997	2/11/97	1	0.48	18			0	205	StipAg	No	6.75	0.6	0.125				17	grab makes up for 12/4/96 missed grab
SDS7	SDW3 022697 GRAB	1997	2/26/97	1	0.24	25			0	107	StipAg	No	6.13	0.7	0.125				1	grab makes up for 1/21/97 missed grab
SDS7	SDW3 110498 GRAB	1999	11/3/98	1	1.62	30	0.48	0	0.08	35	NPDES	No				3.79	0.025	3.77	500	

TPH-Dx replaced FOG and TPH (IR) on March 1, 1999

TPH-Dx replaced FOG and TPH (IR) on March 1, 1999

TPH-Dx replaced FOG and TPH (IR) on March 1, 1999

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All Grab Sample Data

outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground dolce?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments
			storm caharcteristics										concentration, mg/l							
SD87	SDW3 021599 GRAB	1999	2/15/99	1	0.45	26	0.08	0	0	50	NPDES	No				0.14	0.025	0.12	80	1999 annual sample
SD87	SDW3 021999 GRAB	1999	2/19/99	1	0.6	32	0.08	0.01	0.36	20	NPDES	No				0.19	0.025	0.11	1	1999 annual sample
SD87	SDW3 031299 GRAB	1999	3/12/99	1	0.83	23	0.07	0	0	71	NPDES	No				0.14	0.03	0.11	2	1999 annual sample-no comp
SD87	SDW3 032499 GRAB	1999	3/24/99	1	0.20	19	0.08	0	0.16	40	NPDES	No	7.86			0.075	0.025	0.05	1	1999 annual sample
SD86	B 120496 GRAB	1997	12/4/96	1	0.82	7.5			0.16	44	NPDES	No	6.51	0.5	0.125				2	
SD86	B 012797 GRAB	1997	1/27/97	1	0.41	26			0	109	NPDES	No	7.11	0.5	0.125				4	
SD86	B 041097 GRAB	1997	4/10/97	1	1.10	26			0	84	NPDES	No	6.65	0.5	0.5				30	pairs with 3/6/97 composite for 97 spring qtr
SD86	B 110498 GRAB	1998	11/3/98	1	1.62	36	0.46	0	0.08	35	NPDES	No	7.18			0.15	0.025	0.13	1000	
SD86	B 111298 GRAB	1998	11/11/98	1	0.98	62	0.15	0	0.05	31	NPDES	No	7.42			0.075	0.025	0.06	220	
SD86	B 080798 GRAB	1998	8/6/98	1	0.29	22	0.06	0	0	76	NPDES	No	6.87			0.19	0.025	0.17	1000	ANNUAL SAMPLE
SD85	D 120496 GRAB	1997	12/4/96	1	0.82	7.5			0.16	44	NPDES	No	6.78	1.2	0.126				70	composite for this storm not representative, equipment malfunction
SD85	D 011797 GRAB	1997	1/16/97	1	1.21	23			0	184	NPDES	No	6.95	3.9	0.47				380	no composite sample for this event, equipment malfunction
SD85	D 012797 GRAB	1997	1/27/97	1	0.41	26			0	109	NPDES	No	7.11	13	0.125				170	makeup for 96Q4 (3 unsuccessful attempts)
SD85	D 021197 GRAB	1997	2/11/97	1	0.48	18			0	208	NPDES	No	6.64	7.1	0.29				30	
SD85	D 030697 GRAB	1997	3/6/97	1	0.36	20			0.24	42	NPDES	No	7.03	0.5	0.125				2	
SD85	D 061797 GRAB	1997	6/16/97	1	0.36	26			0	138	NPDES	No	6.87	0.5	0.125				1800	
SD85	D 011398 GRAB	1998	1/13/98	1	1.07	22	0.16	0	0	66	NPDES	No				0.09	0.025	0.086	1600	
SD85	D 060898 GRAB	1998	6/8/98	1	0.29	22	0.08	0	0	70	NPDES	No	7.01			0.075	0.025	0.05	800	ANNUAL SAMPLE
SDN1	SDN1 081494	1995	8/13/94	1	0.16	6				116	NPDES	No	6.88	3.3	0.5				4000	
SDN1	SDN1 101994	1995	10/19/94	1	0.2	32				120	NPDES	No	6.83	1.0	0.5				100	
SDN1	SDN1 111994	1995	11/19/94	1	0.42	24			0.05	82	NPDES	No								
SDN1	SDN1 011295	1995	1/11/95	1	0.3	80			0.04	24	NPDES	No	7.4	2.0	6.1				1000	
SDN1	SDN1 021695	1996	2/15/95	1	1.1	56			0	60	NPDES	Yes								
SDN1	SDN1 030595	1995	3/4/95	1	0.16	24			0	159	SlpAg	No								
SDN1	SDN1 030995	1995	3/9/95	1	2.16	114			0	60	SlpAg	No								
SDN1	SDN1 040595	1995	4/4/95	1	0.17	4			0	270	SlpAg	No								
SDN1	SDN1 040795	1995	4/6/95	1	0.61	20			0.04	60	NPDES	No	7.8	0.6	0.5				88	
SDN1	SDN1 080795	1996	8/6/95	1	0.4	6			0		NPDES	No	7.9	21	6.0				42	
SDN1	SDN1 110795	1996	11/6/95	1	3.09	40			0.06		NPDES	No	6.7	10	3.4				20	
SDN1	SDN1 020496 GRAB	1996	2/3/96	1	1.6	8					NPDES	Yes	7.4	7.3	7.5				100	
SDN1	SDN1 033196 GRAB	1996	3/31/96	1	0.64	8			0.01		SlpAg	No	6.8	0	4.1				340	also NPDES/Slp Ag
SDN1	SDN1 042296 GRAB	1996	4/22/96	1	2.83	8			0		NPDES	No	7.20	1	0.25				0	
SDN1	SDN1 062396 GRAB	1996	6/23/96	1	0.46	10			0		SlpAg	No	6.82	2	0.82				23	also NPDES/Slp Ag
SDN1	SDN1 070396 GRAB	1997	7/3/96	1	0.23	12			0		NPDES	No	6.17	2.8	1.6				[illegible]	Fecals exceeded 30 hour holding time, results not representative
SDN1	SDN1 071796 grab	1997	7/17/96	1	0.27	31			0		NPDES	No							900	fecals make up for 7/4/96 grab that exceeded holding time
SDN1	SDN1 110496 GRAB	1997	11/3/96	2	0.14	2			0	120	source trace	Yes	5.88	2.5	1.3				240	paired up/down sample
SDN1	SDN1 011097 GRAB	1997	1/10/97	1	1.21	23			0	164	NPDES	No	5.10		3.0				161	paired up/down sample
SDN1up	SDN1up 100496 GRAB	1997	10/4/96	1	0.58	8.1			0.08	18	NPDES	No	7.23	0.5	0.8				800	paired up/down sample
SDN1up	SDN1up 110496 GRAB	1997	11/3/96	2	0.14	2			0	120	source trace	Yes	4.98	0.5	0.38				23	paired up/down sample
SDN1up	SDN1up 011097 GRAB	1997	1/10/97	1	1.21	23			0	164	NPDES	No	4.97	0.6	2.1				23	paired up/down sample
SDN1up	SDN1 041397 grab	1997	4/13/97	1	0.31	12			0.04		NPDES	No	4.57	0.5	1.08				33	
SDN1up	SDN1 090397 GRAB	1997	9/3/97	1	0.26	10			0	70	NPDES	No	3.40	0.5	4.3				17	
SDN1up	SDN1 102097 grab	1998	10/20/97	1	0.47	10.8			0.08	20	NPDES	No	6.64	0.5	0.125				80	
SDN1up	SDN1 121597 GRAB	1998	12/15/97	1	1	33			0	87	NPDES	No	7.34	0.5	1.8				11	
SDN1up	SDN1 030198 GRAB	1998	3/1/98	1	0.98	86			0.07	8	NPDES	No	6.33		0.48	0.88	0.03	0.98	2	
SDN1up	SDN1 030998 GRAB	1998	3/9/98	1	0.88	27			0	132	NPDES	No	6.88		0.47	0.78	0.08	0.72	1	backup monthly sample in case 3/1/98 sample didn't qualify under new permit
SDN1up	SDN1 040798 GRAB	1998	4/7/98	2	0.03	0.5			0.04	87	NPDES	No	5.98		0.34	0.88	0.05	0.94	1	NON-"STORM"
SDN1up	SDN1 041098 GRAB	1998	4/9/98	2	0.09	17			0	82	NPDES	No	6.26		1.10	1.4	0.79	0.61	2	NON-"STORM"
SDN1up	SDN1 042398 GRAB	1998	4/23/98	1	0.46	20			0	264	NPDES	No	6.35		1.2	0.97	0.025	0.85	170	
SDN1up	SDN1 050898 GRAB	1998	5/8/98	2	0.12	8			0	387	NPDES	No	4.04		0.8	0.88	0.08	0.48	80	NON-"STORM"
SDN1up	SDN1 051498 GRAB	1998	5/14/98	1	0.21	8			0.01	125	NPDES	No	6.21		0.98	0.41	0.025	0.38	80	CONSIDERABLE POLLEN IN SAMPLE
SDN1up	SDN1 061098 GRAB	1998	6/10/98	1	0.28	10			0	288	NPDES	No	6.46		0.78	1.03	0.025	1.01	240	
SDN1up	SDN1 071498 GRAB	1998	7/14/98	2	0.13	18	0.04	0	0	264	NPDES	No	5.46		1.0	2.55	0.46	3.00	240	nonstorm
SDN1up	SDN1 081098 GRAB	1998	8/10/98	1	0.31	10	0.25	0	0	792	NPDES	No	6.36		0.126	0.84	0.03	0.61	800	thunderstorm, 0.25 in/hr
SDN1up	SDN1 081898 GRAB	1998	8/18/98	2	0.18	20	0.18	0	0	438	NPDES	No	6.85			2.40	0.025	2.45	1000	nonstorm
SDN1up	SDN1 092498 GRAB	1998	9/24/98	1	0.47	23	0.26	0	0	148	NPDES	No	6.73			1.82	0.025	1.8	80	
SDN1up	SDN1 100398 GRAB	1998	10/3/98	1	0.4	3	0.22	0	0.07	38	NPDES	No	6.80		2.1	1.85	0.03	1.92	170	
SDN1up	SDN1 102798 GRAB	1998	10/27/98	1	0.84	8	0.18	0	0	72	NPDES	No	6.88			2.01	0.025	1.80	130	

TPH-Dx replaced FOG and TPH (IR) on March 1, 1998

AR 045737

All Grab Sample Data			storm caharcteristics										concentration, mg/l							
outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground deice?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments
SDN1up	SDN1 110499 GRAB	1999	11/3/99	1	1.62	30	0.48	0	0.08	36	NPDES	No	5.87			0.37	0.025	0.35	500	
SDN1up	SDN1 111199 GRAB	1999	11/11/99	1	0.99	62	0.15	0	0.05	31	NPDES	No	7.09			0.98	0.025	0.94	80	
SDN1up	SDN1 121099 GRAB	1999	12/10/99	2	0.14	4	0.03	0	0	40	NPDES	No	7.4			0.91	0.025	0.88	1800	nonstorm
SDN1up	SDN1 121799 GRAB	1999	12/17/99	2	0.11	4	0.03	0	0.02	33	NPDES	No	7.23			3.18	0.025	3.14	500	nonstorm
SDN1up	SDN1 122499 GRAB	1999	12/24/99	1	1.18	30	0.18	0	0	183	NPDES	Yes	7.88			4.95	0.025	4.93		fecals not analyzed due to holiday lab closure
SDN1up	SDN1 010900 GRAB	1999	1/9/00	1	0.27	21	0.05	0	0	64	NPDES	No	6.67			3.51	0.03	3.49	23	
SDN1up	SDN1 011300 GRAB	1999	1/13/00	1	1.07	22	0.18	0	0	85	NPDES	No	7.27			2.81	0.03	2.78	1600	
SDN1up	SDN1 020300 GRAB	1999	2/3/00	1	0.28	18	0.07	0	0.01	27	NPDES	No	7.32			1.4	0.025	1.38	30	
SDN1up	SDN1 030600 GRAB	1999	3/6/00	1	0.29	16	0.06	0	0	98	NPDES	No	6.98			1.04	0.025	1.02	7	
SDN1up	SDN1 031200 GRAB	1999	3/12/00	1	0.83	23	0.07	0	0	71	NPDES	No	6.71			0.99	0.025	0.97	1	
SDN1up	SDN1 032400 GRAB	1999	3/24/00	1	0.28	18	0.09	0	0.19	40	NPDES	No	6.82			1.09	0.025	1.07	8	
SDN1up	SDN1 032700 GRAB	1999	3/27/00	1	0.24	6	0.07	0	0.09	26	NPDES	No	6.38			0.86	0.025	0.84	2	
SDN1up	SDN1 070200 GRAB	2000	7/3/00	1	0.3	6	0.11	0	0	103	NPDES	No	7.33			0.6	0.025	0.58	80	
SDN1up	SDN1 110600 GRAB	2000	11/6/00	1	0.69	12	0.11	0	0.06	44	NPDES	No	6.61			1.17	0.025	1.16	42	
SDN1up	SDN1 111600 GRAB	2000	11/16/00	1	0.6	15	0.07	0.01	0.08	23	NPDES	No	7.62			2.59	0.025	2.57	1600	
SDN1up	SDN1 120400 grab	2000	12/4/00	1	0.24	10	0.1	0	0	60	NPDES	No	6.21			1.53	0.046	1.49	4	
SDN1up	SDN1 121700 grab	2000	12/17/00	1	0.34	11	0.08	0	1.18	28	NPDES	No	7.54			0.87	0.025	0.85	900	
SDN1up	SDN1 031300 grab	2000	3/13/00	1	0.47	8	0.13	0	0	40	NPDES	No	6.2			0.12	0.025	0.1	1	
SDN1up	SDN1 032200 grab	2000	3/22/00	1	0.43	8	0.14	0	0	66	NPDES	No	5.98			0.31	0.025	0.29	1	
SDN1up	SDN1 041300 GRAB	2000	4/13/00	1	0.34	12	0.08	0	0	74	NPDES	No	6.94			0.23	0.1	0.13	1	
SDN1UP	SDN1 082099 GRAB	1999	8/20/99	1	0.21	30	0.03	0	0	40	NPDES	No	5.85			4.87	0.025	4.85	1600	
SDN2	SDN2 090894	1995	9/8/94	1	0.89	22				83	NPDES	No	6.82	1.8	0.8				3	
SDN2	SDN2 101394	1995	10/13/94	1	0.32	14			0	480	NPDES	No		1.1	0.6				2	
SDN2	SDN2 111394	1995	11/11/94	1	0.28	14				48	NPDES	No		0.5	0.6				30	
SDN2	SDN2 111994	1995	11/19/94	1	0.42	24			0.06	52	NPDES	No								
SDN2	SDN2 011295	1995	1/11/95	1	0.3	60			0.04	24	NPDES	No	8	2.3	0.5				4	
SDN2	SDN2 030595	1995	3/4/95	1	0.18	24			0	158	StipAg	No								
SDN2	SDN2 040795	1995	4/6/95	1	0.61	28			0.04	60	StipAg	No								
SDN2	SDN2 041295	1995	4/10/95	1	0.29	18			0	90	NPDES	No	7.6	4	6.2				1	
SDN2	SDN2 080795	1996	8/6/95	1	0.4	6			0		NPDES	No	7	2.6	0.5				15	
SDN2	SDN2 101695	1996	10/15/95	1	0.35	12			0		NPDES	No	7.3	1.9	0.6				1	
SDN2	SDN2 021796 GRAB	1996	2/17/96	1	1.29	12			0		NPDES	No	7.6	0.5	0.5				10	
SDN2	SDN2 032996 GRAB	1996	3/29/96	2	0.13	8			0.01	120	StipAg	No								nonstorm
SDN2	SDN2 033196 GRAB	1996	3/31/96	1	0.64	0			0.01		StipAg	No	6.7	0.5	0.6				10	xtra NPDES/Stip Ag
SDN2	SDN2 041996	1996	4/18/96	2	0.09	20			0.56	16	StipAg	No								nonstorm (0.02" storm)
SDN2	SDN2 042296 GRAB	1996	4/22/96	1	2.83	8			0		NPDES	No	7.17	0.5	0.125				50	
SDN2	SDN2 062396 GRAB	1996	6/23/96	1	0.46	10			0		StipAg	No	6.83	1	0.46				2	xtra NPDES/Stip Ag
SDN2	SDN2 071796 grab	1997	7/17/96	1	0.27	31			0		NPDES	No							4	xtra fecals analyzed
SDN2	SDN2 090396 GRAB	1997	9/3/96	1	0.29	1.2			0	78	NPDES	No	7.24	1.6	0.29				900	some composite aliquots in grab
SDN2	SDN2 102196 GRAB	1997	10/21/96	1	0.69	4.1			0	64	NPDES	No	6.45	0.8	0.32				2	
SDN2	SDN2 011697 GRAB	1997	1/16/97	1	1.21	23			0	164	NPDES	No	7.49	4.3	0.39				11	
SDN2	SDN2 041697 GRAB	1997	4/16/97	1	1.16	26			0	64	NPDES	No	6.91	0.6	0.07				4	
SDN2	SDN2 082497 GRAB	1998	8/25/97	1	0.2	10.5			0.07	88	NPDES	No	7.09	1.2	0.43				800	no composite, equipment malfunction
SDN2	SDN2 110499 GRAB	1999	11/3/99	1	1.62	30	0.48	0	0.08	36	NPDES	No				1.09	0.035	1.07		North Cargo Pump Station bypass
SDN2	SDN2 112599 GRAB	1999	11/25/99	2	3.45	52	0.32	0.28	0.31	0	NPDES	No				0.13	0.025	0.11		North Cargo Pump Station bypass
SDN2	SDN2 012000 GRAB	1999	1/20/00	2	1.16	33	0.1	0	0.02	33	NPDES	No				0.17	0.025	0.19		pump station bypass, STORM<<DESIGN, MAINT NOTIFIED (O&M IN PROGRESS)
SDN 2	SDN2 121900 grab	2000	12/15/00	2	1.26	13	0.32	0.15	0.32	0	NPDES	No				0.075	0.025	0.05		North Cargo Pump Station bypass
SDN2	SDN2 082499 GRAB	1999	8/24/99	1	1.12	24	0.35	0.03	0.08	10	NPDES	No				0.29	0.025	0.24		30 min. North Cargo Pump Station bypass
SDN3	SDN3 090894	1995	9/8/94	1	0.89	22				83	NPDES	No	8.4	1.1	0.5				2200	
SDN3	SDN3 102094	1995	10/25/94	1	1.98	44				114	NPDES	No		2.9	0.6				2	
SDN3	SDN3 111094	1995	11/10/94	1	0.42	24			0.05	52	NPDES	No								
SDN3	SDN3 010795	1995	1/7/95	1	0.21	62			0	252	NPDES	No	7.8	0.55	0.6				1	
SDN3	SDN3 021095	1995	2/15/95	1	1.1	96			0	86	NPDES	Yes								
SDN3	SDN3 030595	1995	3/4/95	1	0.18	24			0	158	StipAg	No								
SDN3	SDN3 030995	1995	3/8/95	1	2.18	114			0	88	StipAg	No								
SDN3	SDN3 040595	1995	4/4/95	1	0.17	4			0	270	StipAg	No								
SDN3	SDN3 080495	1995	8/4/95	1	0.7	28			0	384	NPDES	No	7	2.5	0.5				40	
SDN3	SDN3 071096	1996	7/8/95	1	0.61	13			0		NPDES	No	7	3.3	0.6				800	
SDN3	SDN3 110796	1996	11/8/95	1	3.89	48			0.09		NPDES	No	7.2	2.1	0.6				4	
SDN3	SDN3 011496 GRAB	1996	1/13/96	1	0.37	20			0		NPDES	No	7.2	0.5	0.6				1	
SDN3	SDN3 033096 GRAB	1996	3/29/96	2	0.13	8			0.01	120	StipAg	No								nonstorm, insuff flow to enable sampler
SDN3	SDN3 033196 GRAB	1996	3/31/96	1	0.64	0			0.01		StipAg	No	6.8	1.4	0.5				1	xtra NPDES/Stip Ag

TPH-Dx replaced FOG and TPH (IR) on March 1, 1999

TPH-Dx replaced FOG and TPH (IR) on March 1, 1999

TPH-Dx replaced FOG and TPH (IR) on March 1, 1999

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All Grab Sample Data

outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground deice?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments
			storm characteristics										concentration, mg/l							
SDN3	SDN3 041296 GRAB	1996	4/11/96	2	0.21	40			0	110	StlpAg	No								nonstorm
SDN3	SDN3 041596 GRAB	1996	4/15/96	1	0.40	16			0.09		NPDES	No	7.61	2	0.125				80	
SDN3	SDN3 041996	1996	4/19/96	2	0.09	20			0.58	10	StlpAg	No								nonstorm
SDN3	SDN3 042296 GRAB	1996	4/22/96	1	2.83	8			0		StlpAg	No	7.12	0.5	0.125				118	sim NPDES/Stlp Ag
SDN3	SDN3 090296 GRAB	1997	9/2/96	1	1.01	27			0	325	NPDES	No	7.41	0.5	0.3				800	delayed hydrograph, very dry antecedent
SDN3	SDN3 112396 GRAB	1997	11/23/96	1	0.63	34.1			0	72	NPDES	Yes	7.32	0.5	0.125				14	insufficient sample for composite
SDN3	SDN3 120496 GRAB	1997	12/4/96	1	0.82	7.5			0.10	44	NPDES	No	6.40	0.5	0.125				14	
SDN3	SDN3 121896 GRAB	1997	12/18/96	1	0.36	37			0	103	NPDES	No	6.32	0.5	0.125				7	
SDN3	SDN3 011097 GRAB	1997	1/10/97	1	1.21	23			0	164	NPDES	No	6.60	1.4	0.125				4	
SDN3	SDN3 030597 GRAB	1997	3/5/97	1	0.30	20			0.24	42	NPDES	No	7.10	06*	0.125				1	FOG result not representative, laboratory error, see letter of May 15, 1997
SDN3	SDN3 093097	1997	9/30/97	1	1.04	30			0.04	14	NPDES	No		0.5	0.125					BACKUP fog/tph for March lab errors on SDN3 030597 grab
SDN3	SDN3 092197 GRAB	1997	9/21/97	1	0.27	11.0		0.01	0.02	24	NPDES	No	7.61	0.5	0.125				80	
SDN3	SDN3 102097 GRAB	1998	10/20/97	1	0.47	10.8			0.06	26	NPDES	No	6.72	0.5	0.125				1600	
SDN3	SDN3 121997 GRAB	1998	12/19/97	1	1	33			0	87	NPDES	No	7.20	1.5	0.125				90	HAD QC DUPLICATE ALSO: GOOD DUPLICATION
SDN3	SDN3 111898 GRAB	1999	11/18/98	1	2.34	60	0.18	0	0	73	NPDES	No	6.52			0.075	0.025	0.05	240	
SDN3	SDN3 012099 GRAB	1999	1/20/99	1	0.42	20	0.09	0.01	0.06	22	NPDES	No				0.08	0.025	0.056	1	
SDN 3	SDN3 071800 grab	2000	7/18/00	1	0.7	34	0.11	0	0	300	NPDES	No	7.07			0.2	0.07	0.13	2	
SDN 3	SDN3 120800 GRAB	2000	12/8/00	1	0.40	27	0.08	0	0.30	40	NPDES	No	7.07			0.075	0.025	0.05	1	
SDN3	SDN3 062298 GRAB	1998	6/20/98	1	0.21	38	0.03	0	0	40	NPDES	No	7.5			0.13	0.025	0.11	240	
SDN4	SDN4 090396 GRAB	1997	9/3/96	1	0.29	1.2			0	76	NPDES	No	6.63	1.2	0.125				290	taken in 2 BOTTLES: FOG/TPH, and fecals
SDN4	SDN4 120496 GRAB	1997	12/4/96	1	0.82	7.5			0.10	44	NPDES	No	6.57	0.5	0.125				1	
SDN4	SDN4 011097 GRAB	1997	1/10/97	1	1.21	23			0	164	NPDES	No	7.34	1.6	0.125				4	
SDN4	SDN4 030597 GRAB	1997	3/5/97	1	0.30	20			0.24	42	NPDES	No	6.66	0.5	0.125				1	
SDN4	SDN4 080397 GRAB	1997	8/3/97	1	0.26	16			0	76	NPDES	No	6.07	0.5	0.125				13	
SDN4	SDN4 102097 GRAB	1998	10/20/97	1	0.47	10.8			0.06	26	NPDES	No	6.44	0.5	0.125				7	
SDN4	SDN4 121597 GRAB	1998	12/15/97	1	1	33			0	87	NPDES	No	7.81	0.5	0.125				6	
SDN4	SDN4 030198 GRAB	1998	3/1/98	1	0.90	80			0.07	8	NPDES	No	7.80		0.125	0.08	0.025	0.066	1	
SDN4	SDN4 030998 GRAB	1998	3/9/98	1	0.90	27			0	132	NPDES	No	7.02		0.125	0.075	0.025	0.05	1	backup monthly sample in case 3/1/98 sample didn't qualify under new permit
SDN4	SDN4 042398 GRAB	1998	4/23/98	1	0.40	20			0	204	NPDES	No	7.06		0.125	0.075	0.025	0.05	1	
SDN4	SDN4 052398 GRAB	1998	5/24/98	1	0.56	11			0	67	NPDES	No	6.94		0.125	0.13	0.08	0.06	6	
SDN4	SDN4 062498 GRAB	1998	6/24/98	1	0.43	4			0	266	NPDES	No	6.26		0.125	0.075	0.025	0.06	130	
SDN4	SDN4 081698 GRAB	1999	8/16/98	1	0.31	10	0.25	0	0	792	NPDES	No	7.06		0.125	0.136	0.056	0.06	170	thunderstorm, 0.25 in/hr
SDN4	SDN4 082498 GRAB	1999	8/24/98	1	0.47	23	0.29	0	0	140	NPDES	No	7.13			0.075	0.025	0.06	60*	FECALS EXCEED HOLDING TIME
SDN4	SDN4 100398 GRAB	1999	10/3/98	1	0.4	3	0.22	0	0.07	30	NPDES	No	7.04		0.20	0.075	0.025	0.06	30	
SDN4	SDN4 102798 GRAB	1999	10/27/98	1	0.64	6	0.19	0	0	72	NPDES	No	7.9			0.075	0.025	0.06	2	
SDN4	SDN4 110498 GRAB	1999	11/3/98	1	1.62	30	0.48	0	0.08	30	NPDES	No	6.26			0.075	0.025	0.05	17	
SDN4	SDN4 111398 GRAB	1999	11/11/98	1	0.90	62	0.15	0	0.06	31	NPDES	No	6.61			0.075	0.025	0.06	17	
SDN4	SDN4 121098 GRAB	1999	12/10/98	2	0.14	4	0.03	0	0	40	NPDES	No	7.16			0.08	0.025	0.056	1600	nonstorm
SDN4	SDN4 121798 GRAB	1999	12/17/98	2	0.11	4	0.03	0	0.02	33	NPDES	No	7.3			0.08	0.025	0.066	0	nonstorm
SDN4	SDN4 122498 GRAB	1999	12/24/98	1	1.10	30	0.10	0	0	103	NPDES	Yes	7.80			0.075	0.025	0.05		fecals not analyzed due to holiday lab closure
SDN4	SDN4 011099 GRAB	1999	1/8/99	1	0.27	21	0.05	0	0	64	NPDES	No	7.13			0.08	0.025	0.066	23	
SDN4	SDN4 011399 GRAB	1999	1/13/99	1	1.07	22	0.10	0	0	65	NPDES	No	7.00			0.095	0.03	0.056	1600	
SDN4	SDN4 020399 GRAB	1999	2/3/99	1	0.20	19	0.07	0	0.01	27	NPDES	No	7.16			0.08	0.025	0.066	1	
SDN4	SDN4 031299 GRAB	1999	3/12/99	1	0.63	23	0.07	0	0	71	NPDES	No	7.20			0.075	0.025	0.05	1	
SDN 4	SDN4 071800 grab	2000	7/18/00	1	0.7	34	0.11	0	0	300	NPDES	No	6.96			0.20	0.025	0.27	8	
SDN 4	SDN4 110900 GRAB	2000	11/5/00	1	0.90	12	0.11	0	0.05	44	NPDES	No	7.73			0.18	0.025	0.16	30	
SDN 4	SDN4 111600 GRAB	2000	11/16/00	1	0.6	15	0.07	0.01	0.08	23	NPDES	No	7.63			0.08	0.025	0.056	300	
SDN 4	SDN4 120800 GRAB	2000	12/8/00	1	0.40	27	0.08	0	0.36	40	NPDES	No	7.46			0.075	0.025	0.05	1	
SDN 4	SDN4 121700 grab	2000	12/17/00	1	0.34	11	0.08	0	1.15	26	NPDES	No	7.67			0.075	0.025	0.05		
SDN 4	SDN4 013100 grab	2000	1/31/00	1	1.76	29	0.15	0.07	0.07	8	NPDES	No	6.07			0.075	0.025	0.06	4	
SDN 4	SDN4 031300 grab	2000	3/13/00	1	0.47	9	0.13	0	0	48	NPDES	No	7.48			0.21	0.025	0.10	4	
SDN 4	SDN4 041300 GRAB	2000	4/13/00	1	0.34	12	0.09	0	0	74	NPDES	No	7.36			0.52	0.17	0.35	33	
SDN4	SDN4 032799 GRAB	1999	3/27/99	1	0.24	9	0.07	0	0.09	29	NPDES	No	7.02			0.075	0.025	0.05	1	
EY	EY 081494	1995	8/13/94	1	0.15	8				118	NPDES	No	6.93	2.2						
EY	EY 101394	1995	10/13/94	1	0.32	14			0	480	NPDES	No	6.90	2.1						
EY	EY 030995	1995	3/8/95	1	2.16	114			0	80	NPDES	No	6.6	0.5						
EY	EY 080495	1995	8/4/95	1	0.7	29			0	384	NPDES	No	5.5	6.5						
EY	EY 072695	1996	7/26/95	1	0.41	30			0		NPDES	No	5.9	4.1						
EY	EY 101095	1996	10/15/95	1	0.35	12			0		NPDES	No	6.5	0.55						

TPH-Dx replaced FOG and TPH (IR) on March 1, 1998

TPH-Dx replaced FOG and TPH (IR) on March 1, 1998

TPH-Dx replaced FOG and TPH (IR) on March 1, 1998

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All Grab Sample Data

outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground deice?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments
			storm characteristics										concentration, mg/l							
EY	EY 021796 GRAB	1996	2/17/96	1	1.29	12			0		NPDES	No	7.7	0.5		TPH-Dx replaced FOG and TPH (IR) on March 1, 1999				
EY	EY 042296 GRAB	1996	4/22/96	1	2.03	8			0		NPDES	No	7.19	0.5						
EY	EY 052296 GRAB	1996	5/21/96	1	0.31	30			0.02		StipAg	No	6.06	1						
EY	EY 062396 GRAB	1996	6/23/96	1	0.46	10			0		StipAg	No	6.16	0.5						
EY	EY 070396 GRAB	1997	7/3/96	1	0.23	12			0		NPDES	No	6.20	0.5						
EY	EY 102196 GRAB	1997	10/21/96	1	0.60	4.1			0	64	NPDES	No	5.8	0.5						
EY	EY 021197 GRAB	1997	2/11/97	1	0.40	18			0	205	NPDES	No	5.63	1.9						
EY	EY 030597 GRAB	1997	3/5/97	1	0.30	20			0.24	42	NPDES	No	5.11	0.5						
EY	EY 080397 GRAB	1997	8/3/97	1	0.26	18			0	78	NPDES	No	5.54	0.8						
EY	EY 110697 GRAB	1998	11/6/97	1	0.18	4.4			0.01	72	NPDES	No	6.28	0.5						
EY	EY 012098 GRAB	1998	1/20/98	1	0.2	14			0	107	NPDES	No	6.19	0.6						
EY	EY 052498 GRAB	1998	5/24/98	1	0.98	11			0	87	NPDES	No				0.2	0.025	0.18		
EY	EY 011399 GRAB	1999	1/13/99	1	1.07	22	0.16	0	0	85	NPDES	No				1.78	0.03	1.78		
Eng.Yard	EY 013100 grab	2000	1/31/00	1	1.78	29	0.15	0.07	0.07	9	NPDES	No				1.34	0.026	1.32		
EY	EY 082099 GRAB	1999	8/20/99	1	0.21	36	0.03	0	0	48	NPDES	No				0.78	0.025	0.76		
TY	TY 090994	1995	9/9/94	1	0.99	22				83	NPDES	No	7.01	3.8		TPH-Dx replaced FOG and TPH (IR) on March 1, 1999				
TY	TY 101994	1995	10/19/94	1	0.2	32				120	NPDES	No	6.52	1.3						
TY	TY 030495	1995	3/4/95	1	0.18	24			0	158	NPDES	No	6.9	5.7						
TY	TY 060495	1995	6/4/95	1	0.7	28			0	304	NPDES	No	6.6	7.6						
TY	TY 081695	1996	8/16/95	1	1.34	12			0.01		NPDES	No	6.8	2.3						
TY	TY 090595	1996	9/5/95	1							NPDES	No		1.0						
TY	TY 101595-1	1996	10/15/95	1	0.35	12			0		NPDES	No	6.7	10						
TY	TY 032296 GRAB	1996	3/22/96	1	0.21				0		StipAg	No	6.8	3.8						
TY	TY 041596 GRAB	1996	4/15/96	1	0.40	18			0.09		NPDES	No	6.09	3.7						
TY	TY 042296 GRAB	1996	4/22/96	1	2.03	8			0		NPDES	No	7.31	2						
TY	TY 070396 GRAB	1997	7/3/96	1	0.23	12			0		NPDES	No	6.15	1.4						
TY	TY 071796 grab	1997	7/17/96	1	0.27	31			0		StipAg	No	6.91	1.9						
TY	TY 080296 GRAB	1997	8/2/96	1	1.01	27			0	325	StipAg	No	6.43	1.6						
TY	TY 100496 GRAB	1997	10/4/96	1	0.50	8.1			0.08	18	NPDES	No	7.18	1.4	1.34					
TY	TY 021197 GRAB	1997	2/11/97	1	0.40	18			0	206	NPDES	No	5.72	8.1						
TY	TY 030597 GRAB	1997	3/5/97	1	0.30	20			0.24	42	NPDES	No	5.98 (4P)							FOG result not representative, laboratory error, see letter of May 15, 1997
TY	TY 080397 GRAB	1997	8/3/97	1	0.26	18			0	78	NPDES	No	6.07	1.4						
TY	TY 111097 GRAB	1998	11/10/97	1	0.47	12.8			0	222	NPDES	No	6.07	0.5						
TY	TY 012098 GRAB	1998	1/20/98	1	0.2	14			0	107	NPDES	No	6.31	1						MATCHING COMPOSITE NOT REPRESENTATIVE, NOT REPORTED
TY	TY 030998 GRAB	1998	3/9/98	1	0.96	27			0	132	NPDES	No	6.83	0.8	1.2	1.41	0.06	1.32		EXTRA GRAB (HAS MAKEUP COMP FOR 98QW)
TY	TY 061098 GRAB	1998	6/10/98	1	0.28	10			0	208	NPDES	No			1.2	1.06	0.025	1.09		
TY	TY 020399 GRAB	1999	2/3/99	1	0.28	19	0.07	0	0.61	27	NPDES	No				4.34	0.029	4.32		
TaxiYard	TY 070299 GRAB	2000	7/2/99	1	0.3	6	0.11	0	0	103	NPDES	No				1.25	0.025	1.25		
TaxiYard	TY 022100 grab	2000	2/21/00	1	0.28	36	0.08	0	0	72	NPDES	No				1.03	0.025	1.01		
TaxiYard	TY 022500 grab	2000	2/25/00	1	0.26	6	0.09	0	0	70	NPDES	No				2.92	0.025	2.9		
TaxiYard	TY 031300 grab	2000	3/13/00	1	0.47	9	0.13	0	0	49	NPDES	No				2.6	0.025	2.4		
TY	TY 082099 GRAB	1999	8/20/99	1	0.21	36	0.03	0	0	48	NPDES	No				0.77	0.025	0.75		
			total from "storm"	380																
			total "nonstorm"	38																
											All outfalls	count	320	104	202	101	101	101	302	
												max	10.7	21	10	8.7	0.8	8.8	30000	
												95th	7.8	8	4	3.7	0.1	3.8	1800	
												75th	7.4	3	1.1	1.9	0.03	1.9	330	
												median	7.0	1	0.5	0.3	0.03	0.3	42	
												25th	6.6	0.5	0.1	0.1	0.03	0.1	4	
												min	3.5	0.5	0.1	0.1	0.03	0.0	0.5	
												sd	0.7	3	2	1.4	0.1	1.4	1810.0	
												CV, %	11%	143%	149%	134%	214%	130%	417%	
												# non-detected		80	110	68	149	57	49	
												% non-detected		46%	54%	38%	90%	32%	16%	
																			60%	

<MDL, value shown is 1/2 MDL

> value shown

lined-out values are outliers or non-representative data trimmed from data analysis

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All Grab Sample Data

outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground dolce?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments
					storm caharcteristics								concentration, mg/l							
											SDE4 (002)	count	40	17	20	30	30	30	46	
												max	10.7	17	10	9	0.8	9	4000	
												95th	8.0	11	7.5	5.3	0.10	6	1600	
												75th	7.0	4	3.1	3.1	0.04	3.0	1475	
												median	6.7	3	2.3	2.5	0.03	2.3	280	
												25th	6.6	1.6	1.7	1.5	0.03	1.4	80	
												min	6.0	0.5	0.1	0.7	0.03	0.2	1	
												sd	0.8	4	2	1.7	0.1	1.7	800	
												CV, %	11%	106%	77%	68%	238%	71%	110%	
												# non-detected		3	2	0	26	0	1	
												% non-detected		18%	7%	0%	87%	0%	2%	
																0.0				
											SDS1 (003)	count	21	17	18	3	3	3	22	
												max	7.5	10	5.4	1.6	0.2	1.5	1600	
												95th	7.4	6.5	5.3	1.5	0.1	1.6	1600	
												75th	7.1	2.6	1.6	1.2	0.1	1.2	763	
												median	6.7	1.1	0.6	0.8	0.0	0.8	79	
												25th	6.2	0.5	0.5	0.8	0.0	0.7	13	
												min	6.4	0.5	0.3	0.7	0.0	0.6	1	
												sd	0.6	3	1.6	0.5	0.1	0.6	665	
												CV, %	9%	120%	111%	40%	111%	54%	147%	
												# non-detected		8	4	0	2	0	2	
												% non-detected		47%	21%	0%	67%	0%	9%	
											SDS2 (004)	count	8	8	8	2	2	2	10	
												max	7.9	4	0.9	0.3	0.03	0.3	2600	
												95th	7.4	3.6	0.5	0.3	0.03	0.3	2000	
												75th	7.2	2.5	0.5	0.3	0.03	0.2	870	
												median	6.8	1.6	0.3	0.2	0.03	0.2	330	
												25th	6.7	0.5	0.1	0.1	0.03	0.1	46	
												min	6.7	0.5	0.1	0.1	0.03	0.1	8	
												sd	0.3	1	0.2	0.2	0.00	0.2	820	
												CV, %	5%	70%	84%	83%	0%	90%	120%	
												# non-detected		3	8	1	2	1	0	
												% non-detected		38%	100%	50%	100%	50%	0%	
											SDS3 (006)	count	40	18	28	30	30	30	49	
												max	7.8	9	3.7	0.53	0.06	0.6	1600	
												95th	7.7	3.5	0.96	0.42	0.04	0.4	740	
												75th	7.5	1.2	0.80	0.20	0.03	0.2	30	
												median	7.3	0.5	0.33	0.08	0.03	0.1	6	
												25th	7.2	0.5	0.13	0.08	0.03	0.1	1	
												min	6.8	0.5	0.13	0.07	0.03	0.0	1	
												sd	0.2	2	0.06	0.13	0.01	0.1	344	
												CV, %	3%	149%	151%	60%	30%	90%	200%	
												# non-detected		13	20	18	29	18	18	
												% non-detected		68%	71%	60%	97%	60%	37%	
											SDS4 (009)	count	21	19	19	2	2	2	21	
												max	7.8	4	0.70	0.11	0.06	0.1	1600	
												95th	7.8	3.1	0.53	0.11	0.06	0.1	1600	
												75th	7.5	2.3	0.50	0.10	0.05	0.1	440	
												median	7.4	0.5	0.20	0.08	0.04	0.1	80	
												25th	7.1	0.5	0.13	0.08	0.03	0.1	20	
												min	6.7	0.5	0.13	0.08	0.03	0.1	1	
												sd	0.3	1	0.2	0.0	0.02	0.0	404	
												CV, %	4%	88%	95%	27%	50%	0%	140%	
												# non detected		11	17	1	1	2	1	
												% non detected		58%	89%	50%	50%	100%	5%	

All Grab Sample Data			storm characteristics										concentration, mg/l							comments
outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in	dryant, hr	Obj	ground dolce?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	
											SD37	count	9	8	7	5	5	5	13	
											(010)	max	7.7	10	6.6	3.8	0.03	3.8	30000	
												95th	7.6	7.3	4.8	3.1	0.03	3.0	13020	
												75th	7.4	1.6	0.5	0.1	0.03	0.1	500	
												median	7.2	0.6	0.5	0.1	0.03	0.1	73	
												25th	6.8	0.5	0.2	0.1	0.03	0.1	2	
												min	6.1	0.6	0.1	0.1	0.03	0.1	1	
												sd	0.5	3	2.4	1.8	0.00	1.8	8254	
												CV, %	7%	157%	103%	102%	0%	107%	320%	
												# non-detected		5	5	1	5	1	3	
												% non-detected		63%	71%	20%	100%	20%	23%	
											SD36	count	8	3	3	3	3	3	6	
											(014)	max	7.4	1	0.6	0.2	0.03	0.2	1800	
												95th	7.4	0.6	0.5	0.2	0.03	0.2	1800	
												75th	7.2	0.6	0.3	0.2	0.03	0.2	1255	
												median	7.0	0.5	0.1	0.2	0.03	0.1	125	
												25th	6.8	0.5	0.1	0.1	0.03	0.1	11	
												min	6.5	0.5	0.1	0.1	0.03	0.1	2	
												sd	0.4	0	0.2	0.1	0.00	0.1	707	
												CV, %	6%	0%	87%	42%	0%	57%	130%	
												# non-detected		3	3	1	3	1	0	
												% non-detected		100%	100%	33%	100%	33%	0%	
											SD55	count	7	6	6	2	2	2	8	
											(018)	max	7.1	13	0.5	0.1	0.03	0.1	1800	
												95th	7.1	11.5	0.4	0.1	0.03	0.1	1800	
												75th	7.0	6.3	0.2	0.1	0.03	0.1	776	
												median	7.0	2.8	0.1	0.1	0.03	0.1	280	
												25th	6.8	0.7	0.1	0.1	0.03	0.1	82	
												min	6.8	0.5	0.1	0.1	0.03	0.1	2	
												sd	0.2	5	0.1	0.0	0.00	0.0	874	
												CV, %	3%	113%	88%	9%	0%	7%	125%	
												# non-detected		2	4	2	2	2	0	
												% non-detected		33%	67%	100%	100%	100%	0%	
											SDN1	count	13	12	13	0	0	0	13	
											(006)	max	7.8	21	7.5				4000	
							(former location downstream at SDN1-27, ends 1996)					95th	7.7	18.3	6.4				2200	
												75th	7.4	7.8	4.1				340	
												median	6.9	2.7	1.8				181	
												25th	6.2	2.0	0.8				42	
												min	6.2	0.6	0.3				6	
												sd	0.8	8	2.4				1083	
												CV, %	12%	113%	88%				211%	
												# non-detected		1	3				0	
												% non-detected		8%	23%				0%	
											SDN1up	count	55	19	31	35	35	35	54	
											(006)	max	8.1	21	7.5	5.0	0.79	5.0	4000	
								(upstream location at SDN1-22, begins 1997)				95th	7.7	16.5	5.4	3.9	0.21	3.9	1800	
												75th	7.2	3.1	2.1	2.0	0.03	2.0	315	
												median	6.6	1.8	1.1	1.8	0.03	1.0	64	
												25th	6.0	0.5	0.5	0.7	0.03	0.6	13	
												min	3.5	0.5	0.1	0.1	0.03	0.1	1	
												sd	1.0	6	1.9	1.2	0.15	1.2	880	
												CV, %	15%	149%	105%	80%	223%	84%	193%	
												# non-detected		9	6	0	30	0	6	
												% non-detected		47%	19%	0%	86%	0%	11%	

All Grab Sample Data

outfall	POS ID	reported	stormdate	storm characteristics: event	depth, in.	dur, hr	maxint. in/hr	24hrant. in.	48hrant. in.	dryant, hr	Obj	ground data?	concentration, mg/l: ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments
											SDN2	count	14	16	16	5	5	5	17	
											(007)	max	8.0	4	8.2	1.1	0.04	1.1	900	
										(pumped to IWS as of late 1997)		95th	7.7	4.1	2.0	0.9	0.03	0.9	580	
												75th	7.4	2.0	0.6	0.3	0.03	0.2	16	
												median	7.1	1.2	0.5	0.2	0.03	0.2	4	
												25th	6.9	0.6	0.4	0.1	0.03	0.1	2	
												min	6.5	0.5	0.1	0.1	0.03	0.1	1	
												sd	0.4	1	1.2	0.4	0.00	0.4	240	
												CV, %	6%	79%	158%	122%	17%	130%	262%	
												# non-detected		6	8	1	5	1	2	
												% non-detected		38%	50%	20%	100%	20%	12%	
											SDN3	count	22	19	20	5	5	5	24	
											(008)	max	7.8	3	0.90	0.20	0.07	0.1	2200	
												95th	7.7	2.8	0.50	0.18	0.06	0.1	1400	
												75th	7.4	1.6	0.50	0.13	0.03	0.1	143	
												median	7.2	0.8	0.13	0.08	0.03	0.1	14	
												25th	6.7	0.5	0.13	0.08	0.03	0.1	2	
												min	6.3	0.5	0.13	0.08	0.03	0.1	1	
												sd	0.4	1	0.10	0.06	0.02	0.0	564	
												CV, %	6%	79%	80%	40%	50%	40%	213%	
												# non-detected		10	19	3	4	3	6	
												% non-detected		53%	95%	60%	80%	60%	25%	
											SDN4	count	34	7	14	27	27	27	32	
											(011)	max	8.3	2	0.20	0.62	0.17	0.4	1600	
												95th	8.0	1.5	0.18	0.27	0.07	0.2	885	
												75th	7.8	0.8	0.13	0.08	0.03	0.1	30	
												median	7.5	0.5	0.13	0.08	0.03	0.1	8	
												25th	7.1	0.5	0.13	0.08	0.03	0.1	1	
												min	6.0	0.5	0.13	0.08	0.03	0.1	1	
												sd	0.7	0	0.0	0.1	0.03	0.1	382	
												CV, %	9%	60%	30%	84%	88%	92%	201%	
												# non-detected		5	13	21	25	23	10	
												% non-detected		71%	93%	78%	93%	85%	31%	
											EY	count	17	17	0	4	4	4	0	
											(012)	max	7.7	7		1.8	0.03	1.8		
												95th	7.3	4.8		1.7	0.03	1.7		
												75th	6.6	1.9		1.6	0.03	1.4		
												median	6.2	0.8		1.1	0.03	1.0		
												25th	5.8	0.6		0.8	0.03	0.8		
												min	5.1	0.6		0.2	0.03	0.2		
												sd	0.7	2		0.7	0.00	0.7		
												CV, %	11%	120%		67%	10%	68%		
												# non-detected		11		0	4	0		
												% non-detected		65%		0%	100%	0%		
											TY	count	19	19	3	8	8	8	0	
											(013)	max	7.9	10	1.3	6.6	0.09	6.6		
												95th	7.4	8.7	1.3	5.3	0.07	5.2		
												75th	6.9	3.9	1.3	3.3	0.03	3.3		
												median	6.5	1.9	1.2	2.0	0.03	1.9		
												25th	6.1	1.4	1.2	1.2	0.03	1.2		
												min	5.5	0.5	1.2	1.0	0.03	1.0		
												sd	0.6	4	0.1	1.7	0.02	1.7		
												CV, %	9%	122%	6%	68%	69%	70%		
												# non-detected		2	0	0	7	0		
												% non detected		11%	0%	0%	88%	0%		

All Grab Sample Data			storm caharcteristics										concentration, mg/l									
outfall	POS ID	reported	stormdate	event	depth, in.	dur, hr	maxint, in/hr	24hrant, in.	48hrant, in.	dryant, hr	Obj	ground deice?	ph	FOG	TPH (IR)	TPH-Dx	TPH-D	TPH-MO	Fecals (MPN)	comments		
											Airfield	count	123	64	81	64	64	64	126			
											SDS3, SDS4, SDN3, SDN4	max	9.3	8.3	3.7	0.9	0.17	0.9	2200			
												95th	7.8	3.0	0.5	0.4	0.1	0.3	1000			
												75th	7.6	1.4	0.5	0.2	0.0	0.1	80			
												median	7.3	0.5	0.13	0.08	0.03	0.05	14			
												25th	7.1	0.5	0.13	0.08	0.03	0.05	1			
												min	6.3	0.5	0.13	0.07	0.03	0.06	0.5			
												sd	0.5	1.3	0.42	0.11	0.02	0.10	431			
												CV, %	6%	109%	131%	82%	[illegible]	100%	233%			
												# non-detected		63	13	43	43	43	10			
												% non-detected		[illegible]	16%	67%	67%	67%	8%			
																			0.01			

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All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EO	PG	total glycols	Cu	Pb	Zn	comments
SDE4	SDE4 111394	1995	11/11/94	0.29	14				40	NPDES		no	59	40	7	2.5	2.5	5	0.021	0.008	0.195	
SDE4	SDE4 111094	1995	11/10/94	0.42	24			0.05	52	NPDES		no			6	2.5	2.5	5				
SDE4	SDE4 010795	1995	1/7/95	0.21	62			0	252	NPDES		no	10	27	26				0.031	0.014	0.337	
SDE4	SDE4 030895	1995	3/8/95	2.10	114			0	80	other		no							0.013	0.004	0.132	
SDE4	SDE4 041095	1995	4/10/95	0.29	18			0	80	NPDES		no	10	10	6	2.5	2.5	5	0.020	0.011	0.283	
SDE4	SDE4 072895	1996	7/28/95	0.41	30			0		NPDES		no	41	30	29				0.121	0.023	0.779	Zn is outlier
SDE4	SDE4 081795	1996	8/18/95	1.34	12			0.01		NPDES		no				2.5	7.9	7.9				
SDE4	SDE4 102595	1996	10/25/95	0.29	6			0.01		NPDES		no	14	27	27				0.033	0.021	0.204	
SDE4	SDE4 020396	1996	2/3/96	1.6	6					NPDES		yes	210	100	74	14	12	26	0.054	0.104	0.279	
SDE4	SDE4 032296	1996	3/22/96	0.21				0		SlipAg		no	44	10	12	2.5	2.5	5	0.057	0.026	0.361	
SDE4	SDE4 041596	1996	4/15/96	0.49	10			0.09		NPDES		no	53	11	6.54	2.5	2.5	5	0.070	0.009	0.320	
SDE4	SDE4 061796	1996	6/17/96	0.34	15			0		SES		no							0.027	0.011	0.110	two metals results only
SDE4	SDE4 052296	1996	5/21/96	0.31	30			0.02		SES		no	6.8		22				0.046	0.010	0.243	
SDE4	SDE4 080396	1997	8/3/96	0.29	1.2			0	76	NPDES		no	40	15	7.08	2.5	2.5	5	0.053	0.026	0.130	
SDE4	SDE4 122196	1997	12/10/96	0.30	37			0	103	NPDES		no	42	24	11.7	2.5	2.5	5	0.030	0.029	0.171	
SDE4	SDE4 011097	1997	1/10/97	1.21	22			0	154	NPDES		no	140	1.5	12.8	2.5	2.5	5	0.042	0.070	0.180	
SDE4	SDE4 012797	1997	1/27/97	0.41	30			0	100	SlipAg		no	40	20	2	2.5	40.4	40.4	0.031	0.040	0.140	
SDE4	SDE4 030697	1997	3/6/97	0.39	20			0.24	42	NPDES		no	30	14	4.38	2.5	2.5	5	0.023	0.023	0.080	
SDE4	SDE4 080397	1997	8/3/97	0.29	10			0	76	NPDES	EMC	no	70	10	0.24	1	1	2	0.036	0.033	0.122	
SDE4	SDE4 102097	1998	10/20/97	0.47	10.8			0.08	30	NPDES	EMC	no	34	41	4.02	1	1	2	0.200	0.010	0.100	
SDE4	SDE4 121697	1998	12/16/97	1	33			0	87	NPDES	SMC	no	60	30	2	1	1	2	0.024	0.031	0.102	
SDE4	SDE4 030198	1998	3/1/98	0.99	90			0.07	6	NPDES	SMC	no	263	76	6.4	1	1	2	0.003	0.005	0.190	
SDE4	SDE4 030898	1999	3/8/98	0.88	27			0	132	NPDES	SMC	no				1	1	2				taken for aircraft deicing only, GRAR / All LTI (No Liquid Detected)
SDE4	SDE4 042398	1999	4/23/98	0.40	20			0	204	NPDES	SMC	no	64	27	20.8	1	1	2	0.076	0.042	0.312	
SDE4	SDE4 061498	1999	6/14/98	0.21	6			0.01	126	NPDES	EMC	no	60	21	11.1	1	1	2	0.002	0.030	0.200	
SDE4	SDE4 082498	1999	8/24/98	0.43	4			0	200	NPDES	EMC	no	33	28	4.08				0.024	0.013	0.086	
SDE4	SDE4 092898	1999	9/24/98	0.47	23	0.20	0	0	140	NPDES	EMC	no	64	70	2	1	1	2	0.037	0.020	0.084	
SDE4	SDE4 100398	1999	10/3/98	0.4	3	0.22	0	0.07	36	NPDES	EMC	no	67	20	6.40	1	1	2	0.040	0.030	0.270	
SDE4	SDE4 102798	1999	10/27/98	0.94	9	0.10	0	0	72	NPDES	SMC	no	46	20	4.76	1	1	2	0.008	0.001	0.041	
SDE4	SDE4 111098	1999	11/10/98	2.34	60	0.10	0	0	73	NPDES	SMC	no	80	62	8.8	1	1	2	0.032	0.031	0.163	composited WET sample
SDE4	SDE4 122498	1999	12/24/98	1.10	30	0.10	0	0	153	NPDES	SMC	yes	200	140	330	13.4	30.9	44.3	0.080	0.008	0.151	
SDE4	SDE4 012299	1999	1/20/99	0.42	20	0.09	0.01	0.05	22	NPDES	EMC	no	82	82	5.02	1	1	2	0.023	0.013	0.100	composited WET sample
SDE4	SDE4 021099	1999	2/10/99	0.8	32	0.09	0.01	0.35	20	NPDES	SMC	no	131	64	4.20	1	1	2	0.003	0.001	0.003	
SDE4	SDE4 022399	1999	2/22/99	0.90	34	0.14	0.02	0.04	9	NPDES	EMC	no	53	44	2	1	1	2	0.018	0.022	0.100	composited WET sample
SDE4	SDE4 030899	1999	3/8/99	0.20	15	0.05	0	0	80	NPDES	EMC	no	40	31	0.72	1	4.70	5.70	0.010	0.010	0.118	
SDE4	SDE4 031399	1999	3/12/99	0.83	23	0.07	0	0	71	NPDES	EMC	no	57	67	5.10	1	1	2	0.010	0.023	0.113	
SDE4	SDE4 032499	1999	3/24/99	0.20	10	0.08	0	0.15	40	NPDES	EMC	no	41	32	5.00	1	1	2	0.020	0.017	0.134	composited WET sample
SDE4	SDE4 032899	1999	3/27/99	0.24	0	0.07	0	0.09	20	NPDES	EMC	no	9.8	7.9	2	1	1	2	0.012	0.001	0.100	
SDE 4	SDE4 070299	2000	7/2/99	0.3	0	0.11	0	0	103	NPDES	EMC	no	46	30	6.04				0.020	0.013	0.141	
SDE 4	SDE4 110599	2000	11/5/99	0.80	12	0.11	0	0.05	44	NPDES	SMC	no	22	10	2	1	1	2	0.012	0.008	0.082	
SDE 4	SDE4 111799	2000	11/10/99	0.8	15	0.07	0.01	0.00	23	NPDES	EMC	no	17	25	2	1	1	2	0.011	0.005	0.077	
SDE 4	SDE4 120499	2000	12/4/99	0.24	10	0.1	0	0	90	NPDES	EMC	no	10	9.4	7.54	1	1	2	0.014	0.013	0.084	
SDE 4	SDE4 011300	2000	1/12/00	0.37	40	0.04	0.07	0.31	10	NPDES	SMC	yes				4.5	7.47	12				runway deice
SDE 4	SDE4 031300	2000	3/13/00	0.47	0	0.13	0	0	49	NPDES	SMC	no	70	14	5.02	1	1	2	0.003	0.001	0.015	
SDE 4	SDE4 041300	2000	4/13/00	0.34	12	0.08	0	0	74	NPDES	SMC	no	50	2.2	0.00	1	1	2	0.010	0.001	0.130	
SDS1	SDS1 101094	1995	10/10/94	0.2	32				120	NPDES		no	2.5	11	12				0.004	0.008	0.234	
SDS1	SDS1 111094	1995	11/10/94	0.42	24			0.05	52	NPDES		no			40	14	2.5	14				
SDS1	SDS1 021595	1995	2/15/95	1.1	58			0	80	NPDES		yes	0.7	40	92	260	15	275	0.010	0.008	0.125	
SDS1	SDS1 061195	1995	6/11/95	0.2	0			0.12		NPDES		no	34	25	3				0.119	0.045	0.304	
SDS1	SDS1 060495	1995	6/4/95	0.7	20			0	304	NPDES		no	14	30	15				0.115	0.017	0.290	
SDS1	SDS1 080795	1996	8/6/95	0.4	0			0		NPDES		no	20	0.8	13				0.000	0.010	0.211	
SDS1	SDS1 101595	1996	10/15/95	0.35	12			0		NPDES		no	0.8	3.0	5				0.042	0.005	0.110	
SDS1	SDS1 011496	1996	1/13/96	0.37	20			0		NPDES		no	3.2	4	10	2.5	2.5	5	0.010	0.008	0.104	
SDS1	SDS1 041596	1996	4/15/96	0.49	10			0.09		NPDES		no	74	10	23.9	2.5	2.5	5	0.117	0.008	0.255	
SDS1	SDS1 042296	1996	4/22/96	2.83	0			0		SlipAg		no	17	0.3	0.20	2.5	2.5	5	0.012	0.000	0.082	
SDS1	SDS1 052196	1996	5/21/96	0.31	30			0.02		SES		no	7.0		29				0.036	0.010	0.100	
SDS1	SDS1 070496	1997	7/3/96	0.23	12			0		NPDES		no	17	6	11.2	2.5	2.5	5	0.030	0.013	0.100	
SDS1	SDS1 080296	1997	8/2/96	1.01	27			0	325	SlipAg		no	15	7.2	12.5				0.102	0.015	0.209	
SDS1	SDS1 120496	1997	12/4/96	0.82	7.5			0.16	44	NPDES		no	22	21	40.5	2.5	24	29	0.070	0.001	[illegible]	

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All Composite Sample Data

outfall	POS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
			Storm Characteristics										concentration, mg/l									
SDS1	SDS1 011097	1997	1/10/97	1.21	23			0	154	NPDES		no	37	17	79	2.5	33.4	33.4	0.041	0.027	0.112	
SDS1	SDS1 041397	1997	4/13/97	0.31	12			0.04		NPDES		no	49	27	21.2	2.5	2.5	5	0.071	0.041	0.253	
SDS1	SDS1 081797	1997	8/18/97	0.36	20			0	136	NPDES	EMC	no	25	16	4.5	1	1	2	0.030	0.027	0.119	
SDS1	SDS1 102097	1998	10/20/97	0.47	10.8			0.08	20	NPDES	EMC	no	12	40	7.18	1	1	2	0.030	0.011	0.152	
SDS1	SDS1 112097	1998	11/18/97	0.05	30			0.12	24	NPDES	EMC	no			2	1	1	2	0.013	0.004	0.082	
SDS1	SDS1 121697	1998	12/16/97	1	33			0	87	NPDES	EMC	no	1.0	0.2	0.44	1	1	2	0.013	0.003	0.080	
SDS1	SDS1 030699	1999	3/6/99	0.86	27			0	132	NPDES	SMC	no	6	12		1	0.1	7.1	0.022	0.005	0.076	FULFILLS ANNUAL SAMPLE RQMT
SDS1	SDS1 102799	1999	10/27/99	0.84	9	0.10	0	0	72	NPDES	SMC	no	11	13	6.3	1	1	2	0.020	0.001	0.110	
SDS 1	SDS1 070200	2000	7/2/00	0.3	0	0.11	0	0	103	NPDES	EMC	no	13	13	7.88	1	1	2	0.300	0.009	0.200	
SDS2	SDS2 081095	1995	8/9/95	0.17	7.8			0	102	NPDES		no	16	15	11							
SDS2	SDS2 081195	1995	8/11/95	0.2	8			0.12		NPDES		no	7.8	0.1	4							
SDS2	SDS2 081095	1995	8/10/95	0.3	10			0	96	NPDES		no	18	0.2	8							
SDS2	SDS2 090596	1996	9/5/96							NPDES		no	82	29	6							
SDS2	SDS2 120496	1997	12/4/96	0.82	7.8			0.10	44	NPDES		no	37	20	2							
SDS2	SDS2 011797	1997	1/10/97	1.21	23			0	154	StipAg		no	10	10	2							
SDS2	SDS2 021197	1997	2/11/97	0.40	10			0	206	StipAg		no	32	30	3							LAST FOR STIP AG
SDS2	SDS2 111399	1999	11/11/99	0.98	62	0.15	0	0.06	31	NPDES	SMC	no	20	31	2				0.000	0.000	0.213	
SDS2	SDS2 080700	1999	8/8/00	0.25	22	0.08	0	0	79	NPDES	EMC	no	66	20					0.007	0.001	0.004	ANNUAL SAMPLE
SDS3	SDS3 090894	1995	9/8/94	0.09	22				93	NPDES		no				2.5	2.5	5				
SDS3	SDS3 081494	1995	8/13/94	0.16	9				118	NPDES		no	4.5	6.8	8				0.041	0.004	0.031	
SDS3	SDS3 101394	1995	10/13/94	0.32	14			0	400	NPDES		no	6.7	12	22				0.063	0.003	0.079	
SDS3	SDS3 111094	1995	11/10/94	0.42	24			0.06	62	NPDES		no	2.3	4.9	10	2.5	2.5	5	0.027	0.004	0.100	
SDS3	SDS3 010795	1995	1/7/95	0.21	62			0	282	NPDES		no	2	3.7	6				0.010	0.002	0.050	
SDS3	SDS3 030895	1995	3/8/95	2.10	114			0	90	other		no							0.005	0.001	0.020	
SDS3	SDS3 041295	1995	4/10/95	0.29	10			0	80	NPDES		no	1	1.9	4	2.5	2.5	5	0.041	0.002	0.044	
SDS3	SDS3 072095	1996	7/20/95	0.41	30			0		NPDES		no	20	16	6				0.007	0.005	0.060	
SDS3	SDS3 101595	1996	10/15/95	0.35	12			0		NPDES		no	2.2	3	5				0.032	0.002	0.037	
SDS3	SDS3 011496	1996	1/13/96	0.37	20			0		NPDES		no	1.8	2.1	6	2.5	2.5	5	0.020	0.002	0.054	
SDS3	SDS3 032296	1996	3/22/96	0.21				0		StipAg		no	4.1	2.9	6	2.5	2.5	5	0.020	0.002	0.054	
SDS3	SDS3 041696	1996	4/15/96	0.40	10			0.09		NPDES		no	20	6.6	0.36	2.5	2.5	5	0.040	0.017	0.074	
SDS3	SDS3 052296	1996	5/21/96	0.31	30			0.02		SEB		no	2.6		14				0.030	0.001	0.030	
SDS3	SDS3 080296	1997	8/2/96	1.01	27			0	325	NPDES		no	10	13	9.6				0.115	0.000	0.007	
SDS3	SDS3 080396	1997	8/3/96	0.79	1.2			0	70	NPDES		no	33	10	11.4				0.000	0.010	0.002	
SDS3	SDS3 102196	1997	10/21/96	0.68	4.1			0	84	NPDES		no	4.8	4.2	2	2.5	2.5	5	0.026	0.003	0.022	
SDS3	SDS3 112396	1997	11/23/96	0.63	34.1			0	72	StipAg		yes	16	9.2	34.2	10	10	20	0.030	0.014	0.081	Cu data entry error corrected
SDS3	SDS3 011097	1997	1/10/97	1.21	23			0	154	NPDES		no	5.0	0.7	9.70	2.5	2.5	5	0.020	0.002	0.042	
SDS3	SDS3 030597	1997	3/5/97	0.39	20			0.24	42	NPDES		no	3.4	2.5	2	2.5	2.5	5	0.010	0.002	0.037	
SDS3	SDS3 080397	1997	8/3/97	0.20	10			0	76	NPDES	EMC	no	10	6	2.8				0.054	0.004	0.030	
SDS3	SDS3 102097	1998	10/20/97	0.47	10.8			0.08	20	NPDES	EMC	no	3.0	5.3	15.9				0.020	0.003	0.037	
SDS3	SDS3 012098	1998	1/20/98	0.2	14			0	107	NPDES	EMC	no	3.0	5.4	13.5	5.4	4.2	9.6	0.020	0.002	0.065	
SDS3	SDS3 030198	1998	3/1/98	0.90	86			0.07	0	NPDES	SMC	no	21	13	0.2	1	1	2	0.034	0.007	0.046	
SDS3	SDS3 030698	1998	3/6/98	0.86	27			0	132	NPDES	SMC	no	3.2	5.2	30.3	23	8.7	31.7	0.037	0.007	0.034	Backup monthly sample in case 3/1/98 sample didn't qualify under new permit
SDS3	SDS3 042398	1998	4/23/98	0.46	20			0	204	NPDES	SMC	no	7.3	4	0.4	1	1	2	0.001	0.001	0.004	
SDS3	SDS3 051498	1998	5/14/98	0.21	8			0.01	125	NPDES	EMC	no	14	9.5	0.32	1	1	2	0.070	0.003	0.110	
SDS3	SDS3 081098	1998	8/10/98	0.20	10			0	200	NPDES	EMC	no	6	42	8.3				0.000	0.002	0.000	
SDS3	SDS3 081798	1998	8/16/98	0.31	10	0.25	0	0	792	NPDES	EMC	no	51	10	10.4				0.130	0.000	0.000	Thunderstorm, 0.75 in/hr
SDS3	SDS3 092598	1999	9/24/98	0.47	23	0.20	0	0	146	NPDES	EMC	no	224	100	6.14	1	2.7	3.7	0.000	0.012	0.043	GLYCOLS MAY BE HIGH BIASED. DIFF. WAS <MDL
SDS3	SDS3 100398	1999	10/3/98	0.4	3	0.22	0	0.07	38	NPDES	EMC	no	43	23	4.2	1	1	2	0.065	0.000	0.104	
SDS3	SDS3 102798	1999	10/27/98	0.64	9	0.19	0	0	72	NPDES	SMC	no	95	84	4.74	1	4.2	8.2	0.004	0.001	0.003	
SDS3	SDS3 110498	1999	11/3/98	1.52	39	0.16	0	0.98	35	NPDES	SMC	no	310	95	8.78	4.7	1	5.7	0.003	0.043	0.149	
SDS3	SDS3 111398	1999	11/11/98	0.90	62	0.15	0	0.05	31	NPDES	SMC	no	24	29	17.8	10.5	1	11.5	0.022	0.004	0.109	concurrent WI 1 sample
SDS3	SDS3 122598	1999	12/24/98	1.19	39	0.10	0		153	NPDES	SMC	yes	18	16	450	31.5	81.0	113	0.047	0.002	0.134	
SDS3	SDS3 010999	1999	1/9/99	0.27	21	0.06	0		64	NPDES	EMC	no	3.7	6.2	21.8	8.4	14	22.4	0.010	0.001	0.039	
SDS3	SDS3 011499	1999	1/13/99	1.07	22	0.10	0		65	NPDES	EMC	no	72	16	7.84	1	10	11	0.022	0.004	0.030	concurrent WI 1 and WEIR
SDS3	SDS3 020399	1999	2/3/99	0.29	19	0.07	0	0.01	27	NPDES	SMC	no	8.2	11	0.88	1	2.00	3.00	0.010	0.001	0.077	
SDS3	SDS3 021499	1999	2/13/99	0.28	8	0.04	0	0	102	other	EMC	yes			80				0.049	0.001	0.074	for DEI study
SDS3	SDS3 030899	1999	3/8/99	0.28	15	0.05	0	0	98	NPDES	EMC	no	0.2	14	220	0.57	151	157.5	0.024	0.002	0.053	

All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	Int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
SDS3	SDS3 031300	1999	3/13/00	0.63	23	0.07	0	0	71	NPDES	SMC	no	7.8	15	15	1	6.21	7.21	0.022	0.001	0.036	
SDS3	SDS3 032500	1999	3/24/00	0.30	19	0.09	0	0.19	40	NPDES	EMC	no	8.7	3.8	2	1	1	2	0.019	0.001	0.027	
SDS 3	SDS3 070200	2000	7/2/00	0.3	0	0.11	0	0	103	NPDES	EMC	no	11	14	4.7				0.025	0.001	0.020	
SDS 3	SDS3 110600	2000	11/5/00	0.80	12	0.11	0	0.05	44	NPDES	SMC	no	21	20	15.2	1	1	2	0.025	0.001	0.031	
SDS 3	SDS3 111000	2000	11/10/00	0.8	16	0.07	0.01	0.00	23	NPDES	SMC	no	10	10	12.3	1	6.09	7.1	0.023	0.001	0.023	
SDS 3	SDS3 120600	2000	12/4/00	0.24	10	0.1	0	0	66	NPDES	EMC	no	6.4	6.3	40.4	3	18	21	0.013	0.001	0.031	
SDS 3	SDS3 130600	2000	12/9/00	0.49	27	0.09	0	0.30	40	NPDES	EMC	no	5	8	25.8	1	22.8	23.8	0.012	0.001	0.023	
SDS 3	SDS3 011300	2000	1/12/00	0.37	40	0.04	0.07	0.31	10	NPDES	SMC	yes			840	0.47	356	364				runway deice
SDS 3	SDS3 031300	2000	3/13/00	0.47	9	0.13	0	0	40	NPDES	SMC	no	11	8.5	15.5	1	9.06	10.06	0.009	0.001	0.009	
SDS 3	SDS3 041400	2000	4/13/00	0.34	12	0.09	0	0	74	NPDES	SMC	no	16	7.2	10.1	1	1	2	0.024	0.001	0.020	
SDS4	SDS4 081404	1995	8/13/94	0.15	6				110	NPDES		no	2.8	1.3	8				0.020	0.004	0.000	
SDS4	SDS4 101304	1995	10/13/94	0.32	14			0	400	NPDES		no	5.7	6.8	10				0.030	0.001	0.047	
SDS4	SDS4 111994	1995	11/19/94	0.42	24			0.05	57	NPDES		no			5	2.5	2.5	5				
SDS4	SDS4 011295	1995	1/11/95	0.3	80			0.04	24	NPDES		no	3.5	8.4	3				0.017	0.003	0.018	
SDS4	SDS4 021695	1995	2/15/95	1.1	58			0	88	NPDES		yes			98	2.5	2.5	5				
SDS4	SDS4 051295	1995	5/11/95	0.2	0			0.12		NPDES		no	7.7	8.3	4				0.008	0.001	0.010	
SDS4	SDS4 080795	1995	8/8/95	0.4	8			0		NPDES		no	4.2	3.7	5				0.020	0.002	0.010	
SDS4	SDS4 101695	1996	10/15/95	0.36	12			0		NPDES		no	6.8	4.2	6				0.072	0.001	0.072	
SDS4	SDS4 011496	1996	1/13/96	0.37	20			0		NPDES		no	20	6	6	2.5	2.5	5	0.010	0.001	0.019	
SDS4	SDS4 041696	1996	4/15/96	0.40	10			0.00		NPDES		no	20	14	4.04	2.5	2.5	5	0.041	0.006	0.031	
SDS4	SDS4 042296	1996	4/22/96	2.03	9			0		SlipAg		no	10	6.8	6.44	2.5	2.5	5	0.033	0.001	0.017	
SDS4	SDS4 052296	1996	5/21/96	0.31	30			0.02		SES		no	4.8		10				0.030	0.001	0.010	
SDS4	SDS4 070496	1997	7/3/96	0.23	12			0		NPDES		no	20	11	6	2.5	2.5	5	0.024	0.001	0.020	
SDS4	SDS4 100496	1997	10/4/96	0.84	8.1			0.08	16	NPDES		no	4040*	0000*	0.04				0.40*	0.040*	0.000*	results not typical due to POS construction (34R safety SS), BMP implemented.
SDS4	SDS4 120496	1997	12/4/96	0.82	7.5			0.10	44	NPDES		no	11	8.5	2	2.5	2.5	5	0.023	0.002	0.032	
SDS4	SDS4 011797	1997	1/10/97	1.21	23			0	154	NPDES		no	17	2.2	3.92				0.031	0.002	0.024	
SDS4	SDS4 012797	1997	1/27/97	0.41	20			0	100	SlipAg		no	12	0.1	4.3				0.017	0.001	0.009	
SDS4	SDS4 041097	1997	4/10/97	1.10	20			0	94	NPDES		no	42	12	4.44	2.5	2.5	5	0.030	0.003	0.030	
SDS4	SDS4 082497	1997	8/25/97	0.2	10.5			0.07	99	NPDES	EMC	no	100	90	5.30				0.032	0.004	0.044	
SDS4	SDS4 111797	1998	11/18/97	0.47	12.8			0	222	NPDES	SMC	no	31	34	4.94				0.018	0.002	0.030	
SDS4	SDS4 030999	1999	3/9/99	0.88	27			0	132	NPDES	SMC	no	3.8	6.7	2	1	1	2	0.010	0.001	0.012	makeup comp for 98Qr non rep samp, has extra grab
SDS4	SDS4 111899	1999	11/18/99	2.34	86	0.10	0	0	73	NPDES	SMC	no	2.1	2.8	2	1	1	2	0.020	0.001	0.018	
SDS4	SDS4 021300	1999	2/13/00	0.20	6	0.04	0	0	102	other	EMC	yes			10.8				0.009	0.001	0.030	for DO study
SDS4	SDS4 080799	1999	8/8/99	0.25	22	0.08	0	0	79	NPDES	EMC	no	38	12					0.023	0.001	0.008	ANNUAL SAMPLE
SDS7	SDW3 051095	1995	5/9/95	0.12	7.8			0	102	NPDES		no	80	310	19							
SDS7	SDW3 051195	1995	5/11/95	0.2	0			0.12		NPDES		no	20	25	4							
SDS7	SDW3 081095	1995	8/10/95	0.3	10			0	98	NPDES		no	5.7	2.3	5							
SDS7	SDW3 081795	1996	8/16/95	1.34	12			0.01		NPDES		no	80	20	6							
SDS7	SDW3 120496	1997	12/4/96	0.82	7.5			0.10	44	NPDES		no	7.2	2.0	2							grab missed
SDS7	SDW3 011097	1997	1/10/97	1.21	23			0	154	SlipAg		no	7.1	1	4.10							
SDS7	SDW3 012797	1997	1/27/97	0.41	20			0	100	SlipAg		no	3.2	3.2	0.7							no grab sample taken
SDS7	SDW3 021197	1997	2/11/97	0.40	10			0	205	SlipAg		no	2.2	1.0	2							
SDS7	SDW3 021900	1999	2/18/00	0.6	32	0.00	0.01	0.35	20	NPDES	EMC	no	8.0	13					0.001	0.001	0.003	1999 annual sample
SDS7	SDW3 032500	1999	3/24/00	0.20	19	0.00	0	0.15	40	NPDES	EMC	no	12	7.3					0.000	0.001	0.010	1999 annual sample
SDS 8	B 120496	1997	12/4/96	0.82	7.5			0.10	44	NPDES		no	91	110	2				0.020	0.000	0.041	
SDS8	B 011797	1997	1/10/97	1.21	23			0	154	NPDES		no	37	40	6.00				0.010	0.007	0.034	no grab sample for this event, equipment malfunction
SDS8	B 012897	1997	1/27/97	0.41	20			0	100	NPDES		no	23	35	3.70				0.015	0.002	0.070	
SDS8	B 030897	1997	3/5/97	0.39	20			0.24	47	NPDES		no	13	23	2				0.007	0.001	0.017	had QC dups. no grab sample (no liquid detected) pairs with 4/10/97 grab
SDS8	B 111399	1999	11/11/99	0.90	62	0.15	0	0.05	31	NPDES	EMC	no	70	120	2				0.013	0.007	0.124	
SDS8	B 080799	1999	8/8/99	0.25	22	0.08	0	0	79	NPDES	EMC	no	8.8	14					0.008	0.001	0.008	ANNUAL SAMPLE
SDS5	D 012897	1997	1/27/97	0.41	20			0	100	NPDES		no	30	35	11.3				0.010	0.004	0.023	makeup for 96Q4 (1 unsuccessful attempts)
SDS5	D 021297	1997	2/11/97	0.40	18			0	205	NPDES		no	30	40	3				0.000	0.001	0.003	
SDS5	D 030597	1997	3/5/97	0.39	20			0.24	42	NPDES		no	34	25	2				0.071	0.006	0.072	
SDS5	D 011499	1999	1/13/99	1.07	22	0.10	0	0	85	NPDES	SMC	no	51	60	7				0.014	0.003	0.129	
SDS5	D 080799	1999	8/8/99	0.25	22	0.08	0	0	79	NPDES	EMC	no	50	14					0.005	0.001	0.000	ANNUAL SAMPLE

All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	Int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
SDN1	SDN1 081494	1995	8/13/94	0.15	9				110	NPDES		no	21.5	6.4	194				0.004	0.008	1.030	
SDN1	SDN1 101994	1995	10/19/94	0.2	32				120	NPDES		no	13	10	8				0.034	0.008	0.416	
SDN1	SDN1 111994	1995	11/19/94	0.42	24			0.05	52	NPDES		no			6	2.5	2.5	5				
SDN1	SDN1 011295	1995	1/11/95	0.3	80			0.04	24	NPDES		no	22	30	4				0.020	0.010	0.705	
SDN1	SDN1 021695	1995	2/16/95	1.1	80			0	80	NPDES		yes			31	6.1	2.5	8.1				
SDN1	SDN1 030595	1995	3/4/95	0.18	24			0	156	Stlp Ag		no	1	3.5	4	2.5	2.5	5				
SDN1	SDN1 030895	1995	3/8/95	2.10	114			0	80	Stlp Ag		no	14	17	6	2.5	2.5	5				
SDN1	SDN1 040595	1995	4/4/95	0.17	4			0	270	Stlp Ag		no	6	7.0	5	2.5	2.5	5				
SDN1	SDN1 040795	1995	4/6/95	0.01	20			0.04	80	NPDES		no	10	0.2	40	2.5	2.5	5	0.009	0.001	0.280	
SDN1	SDN1 080795	1996	8/6/95	0.4	8			0		NPDES		no	90	10	27				0.005	0.009	0.464	
SDN1	SDN1 110795	1996	11/8/95	3.00	48			0.09		NPDES		no	15	14	8				0.023	0.013	0.378	
SDN1	SDN1 020496	1996	2/3/96	1.8	8					NPDES		yes	130	150	15	2.5	2.5	5	0.019	0.021	0.700	
SDN1	SDN1 041696	1996	4/15/96	0.49	10			0.09		Stlp Ag		no	47	7.1	2	2.5	2.5	5				
SDN1	SDN1 042296	1996	4/22/96	2.83	8			0		NPDES		no	31	0.6	0.8	2.5	2.5	5	0.010	0.011	0.100	
SDN1	SDN1 051396	1996	5/13/96	0.80	20			0.07	12	Stlp Ag		no	14	15	4.22	2.5	2.5	5				
SDN1	SDN1 052296	1996	5/21/96	0.31	30			0.02		Stlp Ag		no	11	7.3	10.2	2.5	2.5	5	0.027	0.007	0.280	also NPDES/Stlp Ag
SDN1	SDN1 082396	1996	8/23/96	0.40	10			0		Stlp Ag		no	30	8.3	20	2.5	2.5	5	0.008	0.013	0.800	also NPDES/Stlp Ag
SDN1	SDN1 082396 A	1996	8/23/96	0.40	10			0		SES		no	27		10				0.001	0.010	0.800	
SDN1	SDN1 070496	1997	7/3/96	0.23	12			0		NPDES		no	61	10	10.7	2.5	2.5	5	0.040	0.010	0.355	
SDN1	SDN1 071796	1997	7/17/96	0.27	31			0		Stlp Ag		no	10	2.1	26.1	2.5	2.5	5				
SDN1	SDN1 080296	1997	8/2/96	1.01	27			0	325	Stlp Ag		no	35	20	14.2	2.5	2.5	5				
SDN1	SDN1 080396	1997	8/3/96	0.29	1.2			0	70	Stlp Ag		no	40.3	10	8.80	2.5	2.5	5				
SDN1	SDN1 081496	1997	8/13/96	0.72	40			0	144	Stlp Ag		no	80	22	10.3	2.5	2.5	5				
SDN1	SDN1 081896	1997	8/18/96	0.30	20			0.02	30	Stlp Ag		no	3.8	7	2	2.5	2.5	5				
SDN1	SDN1 011097	1997	1/10/97	1.21	23			0	164	NPDES		no	90	30	23.0				0.030	0.030	0.343	paired up/down sample
SDN1	SDN1 041397	1997	4/13/97	0.31	12			0.04		NPDES		no	34	10	17				0.042	0.013	0.433	downstream location of SDN1-27
SDN1up	SDN1up 100496	1997	10/4/96	0.50	8.1			0.06	10	NPDES		no	21	6.7	2				0.025	0.010	0.219	paired up/down sample
SDN1up	SDN1up 011097	1997	1/10/97	1.21	23			0	164	NPDES		no	62	20	9.04				0.030	0.040	0.301	paired up/down sample
SDN1up	SDN1 080397	1997	8/3/97	0.20	10			0	70	NPDES	EMC	no	77	30	17.0				0.030	0.027	0.211	
SDN1up	SDN1 102097	1998	10/20/97	0.47	10.8			0.08	20	NPDES	EMC	no	10	20	4				0.019	0.017	0.222	
SDN1up	SDN1 121597	1998	12/15/97	1	33			0	87	NPDES	SMC	no	22	21	4.00	1	1	2	0.017	0.013	0.101	
SDN1up	SDN1 030198	1998	3/1/98	0.90	80			0.07	8	NPDES	SMC	no	104	30	4.02				0.010	0.007	0.084	
SDN1up	SDN1 042398	1998	4/23/98	0.40	20			0	264	NPDES	SMC	no	20	12	12.0				0.082	0.006	0.401	
SDN1up	SDN1 051498	1998	5/14/98	0.21	8			0.01	125	NPDES	EMC	no	43	21	8.8				0.053	0.010	0.540	
SDN1up	SDN1 081098	1998	8/10/98	0.20	10			0	200	NPDES	EMC	no	34	71	9.04				0.000	0.000	0.300	
SDN1up	SDN1 081698	1999	8/16/98	0.31	10	0.25	0	0	782	NPDES	EMC	no	182	63	30.0				0.083	0.030	0.800	thunderstorm, 0.25 in/hr
SDN1up	SDN1 100398	1999	10/3/98	0.4	3	0.22	0	0.07	30	NPDES	EMC	no	87	21	4.22				0.010	0.017	0.247	
SDN1up	SDN1 102798	1999	10/27/98	0.04	9	0.10	0	0	72	NPDES	SMC	no	85	44	0.02				0.008	0.001	0.080	
SDN1up	SDN1 110498	1999	11/3/98	1.02	30	0.40	0	0.00	35	NPDES	SMC	no	32	17	2				0.014	0.011	0.127	
SDN1up	SDN1 111398	1999	11/11/98	0.90	82	0.15	0	0.05	31	NPDES	EMC	no	53	40	2				0.024	0.025	0.407	concurrent WE I sample
SDN1up	SDN1 122598	1999	12/24/98	1.10	30	0.10	0	0	153	NPDES	SMC	yes	100	95	110	13.8	12.3	26.1	0.003	0.004	0.122	
SDN1up	SDN1 011499	1999	1/13/99	1.07	22	0.10	0	0	86	NPDES	EMC	no	70	31	2				0.024	0.040	0.102	concurrent WF I sample
SDN1up	SDN1 020499	1999	2/3/99	0.20	10	0.07	0	0.01	27	NPDES	EMC	no	45	22	5.04				0.020	0.000	0.233	
SDN1up	SDN1 030899	1999	3/8/99	0.20	15	0.05	0	0	90	NPDES	EMC	no	40	24					0.015	0.000	0.170	
SDN1up	SDN1 032499	1999	3/24/99	0.20	10	0.08	0	0.15	40	NPDES	EMC	no	61	40	4.00				0.015	0.010	0.175	concurrent WF I sample
SDN1up	SDN1 032899	1999	3/27/99	0.24	9	0.07	0	0.00	20	NPDES	FMC	no	8.7	8.4	2				0.012	0.001	0.210	
SDN1up	SDN1 070299	2000	7/2/99	0.3	8	0.11	0	0	103	NPDES	EMC	no	80	25	4.20				0.030	0.008	0.230	
SDN1up	SDN1 110699	2000	11/5/99	0.80	12	0.11	0	0.05	44	NPDES	SMC	no	20	20	4.14				0.011	0.000	0.12	
SDN1up	SDN1 111099	2000	11/10/99	0.8	15	0.07	0.01	0.00	23	NPDES	SMC	no	20	41	4.08	1	1	2	0.011	0.007	0.100	
SDN1up	SDN1 120599	2000	12/4/99	0.24	10	0.1	0	0	90	NPDES	EMC	no	10	0.4	10				0.01	0.001	0.151	
SDN1up	SDN1 121799	2000	12/17/99	0.34	11	0.08	0	1.15	28	NPDES	EMC	no	25	10	5.54				0.013	0.005	0.122	
SDN1up	SDN1 031300	2000	3/13/00	0.47	8	0.12	0	0	40	NPDES	SMC	no	13	3.1	6.00				0.034	0.001	0.013	
SDN1up	SDN1 032200	2000	3/22/00	0.43	8	0.14	0	0	80	NPDES	SMC	no	1.9	0.63	2				0.020	0.001	0.203	
SDN1up	SDN1 041300	2000	4/13/00	0.34	12	0.06	0	0	74	NPDES	EMC	no	40	15	0.54	1	1	2	0.035	0.001	0.41	
SDN2	SDN2 080994	1995	8/9/94	0.69	22				93	NPDES		no	2.2	4.1	11				0.070	0.007	0.027	
SDN2	SDN2 101394	1995	10/13/94	0.32	14			0	480	NPDES		no	0.5	0.1	80				0.050	0.005	0.087	
SDN2	SDN2 111394	1995	11/11/94	0.28	14				48	NPDES		no	2	5.4	7				0.013	0.004	0.010	
SDN2	SDN2 111994	1995	11/19/94	0.42	24			0.05	52	NPDES		no			10	2.5	2.5	5				
SDN2	SDN2 011295	1995	1/11/95	0.3	80			0.04	24	NPDES		no	7.5	14	4				0.034	0.022	0.078	
SDN2	SDN2 030595	1996	3/4/95	0.18	24			0	158	Stlp Ag		no	2.4	2.1	12	30	2.5	30				

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All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
SDN2	SDN2 030695	1995	3/6/95	2.10	114			0	88	other		no							0.012	0.003	0.020	
SDN2	SDN2 040795	1995	4/8/95	0.01	20			0.04	66	Stip/Ag		no	7.2	4.0	15	2.5	2.5	5				
SDN2	SDN2 041295	1995	4/10/95	0.20	10			0	58	NPDES		no	5.8	4.9	30	2.5	19	19	0.025	0.003	0.000	
SDN2	SDN2 080795	1995	8/8/95	0.4	9			0		NPDES		no	0.8	5.1	9				0.020	0.010	0.049	
SDN2	SDN2 101895	1995	10/18/95	0.35	12			0		NPDES		no	1.25	1.0	6				0.010	0.002	0.024	
SDN2	SDN2 021798	1998	2/17/98	1.20	12			0		NPDES		no	1	2	6	6.3	11	17.3	0.008	0.006	0.027	
SDN2	SDN2 041598	1998	4/15/98	0.40	10			0.00		Stip/Ag		no	15	11	7	2.5	2.5	5				
SDN2	SDN2 042298	1998	4/22/98	2.83	8			0		NPDES		no	6.3	2.8	6.84	2.5	2.5	5	0.013	0.003	0.017	
SDN2	SDN2 051398	1998	5/13/98	0.90	20			0.07	12	Stip/Ag		no	5.8	6.3	4.86	2.5	2.5	5				
SDN2	SDN2 052298	1998	5/21/98	0.31	30			0.02		Stip/Ag		no	10	2	6.00	2.5	2.5	5	0.014	0.002	0.076	also NPDES/Stip Ag
SDN2	SDN2 062398 A	1998	6/23/98	0.40	10			0		SES		no	40		24				0.070	0.072	0.130	
SDN2	SDN2 062398	1998	6/23/98	0.40	10			0		Stip/Ag		no	33	7.5	10.3	2.5	2.5	5	0.005	0.012	0.076	also NPDES/Stip Ag
SDN2	SDN2 080996	1997	8/9/96	0.20	1.2			0	76	NPDES		no	10	10	12.3				0.033	0.008	0.042	
SDN2	SDN2 102196	1997	10/21/96	0.88	4.1			0	64	NPDES		no	4.2	2.9	4.5	2.5	2.5	5	0.010	0.007	0.020	
SDN2	SDN2 011097	1997	1/10/97	1.21	23			0	154	NPDES		no	0.8	1.5	120	2.5	88.9	88.9	0.010	0.011	0.040	
SDN2	SDN2 041097	1997	4/10/97	1.10	20			0	64	NPDES		no	17	0.5	2	2.5	2.5	5	0.042	0.019	0.003	
SDN2	SDN2 062499	1999	6/24/99	1.12	24	0.30	0.83	0.00	16	NPDES	EMC	no	10									30 MIN PUMP STATION BYPASS
SDN3	SDN3 090894	1995	9/8/94	0.80	22				83	NPDES		no	2.1	5.1	5				0.032	0.002	0.003	
SDN3	SDN3 102594	1995	10/25/94	1.96	44				114	NPDES		no	0.2	6	4							
SDN3	SDN3 111094	1995	11/10/94	0.42	24			0.06	82	NPDES		no			4	2.5	2.5	5				
SDN3	SDN3 010795	1995	1/7/95	0.21	62			0	282	NPDES		no	0.87	1.0	2				0.003	0.001	0.052	
SDN3	SDN3 021695	1995	2/16/95	1.1	50			0	88	NPDES		yes			90	2.5	2.5	5				
SDN3	SDN3 030495	1995	3/4/95	0.18	24			0	150	Stip/Ag		no	1	2.3	3	2.5	2.5	5				
SDN3	SDN3 030995	1995	3/9/95	2.10	114			0	88	Stip/Ag		no	5	12	3	2.5	2.5	5				
SDN3	SDN3 040495	1995	4/4/95	0.17	4			0	270	Stip/Ag		no	1	1.0	3	2.5	2.5	5				
SDN3	SDN3 060495	1996	6/4/95	0.7	20			0	304	NPDES		no	16	25	6				0.011	0.001	0.120	
SDN3	SDN3 071095	1996	7/10/95	0.81	13			0		NPDES		no	21	24	7				0.030	0.004	0.100	
SDN3	SDN3 110795	1996	11/8/95	3.90	40			0.09		NPDES		no	15	10	3				0.010	0.001	0.080	
SDN3	SDN3 011496	1996	1/13/96	0.37	20			0		NPDES		no	3.0	4.7	6	2.5	2.5	5	0.010	0.002	0.047	
SDN3	SDN3 020496	1996	2/3/96	1.8	0					Stip/Ag		yes		0.7		2.5	2.5	5				storm after runway deice
SDN3	SDN3 040198	1998	3/31/98	0.04	0			0.01		Stip/Ag		no	11	10	6	2.5	2.5	5	0.010	0.002	0.101	also NPDES/Stip Ag
SDN3	SDN3 041598	1998	4/15/98	0.49	10			0.00		NPDES		no	27	22	2	2.5	2.5	5	0.010	0.003	0.121	
SDN3	SDN3 042298	1998	4/22/98	2.83	8			0		Stip/Ag		no	15	0.5	6.00	2.5	2.5	5	0.010	0.001	0.083	also NPDES/Stip Ag
SDN3	SDN3 051398	1998	5/13/98	0.90	20			0.07	12	Stip/Ag		no	10	10	2	2.5	2.5	5				
SDN3	SDN3 052298	1998	5/21/98	0.31	30			0.02		Stip/Ag		no	10	5.2	2	2.5	2.5	5				
SDN3	SDN3 062398 A	1998	6/23/98	0.46	10			0		SES		no	7.3		6				0.004	0.000	0.061	
SDN3	SDN3 080396	1997	8/2/96	1.01	27			0	325	NPDES		no	20	20	2				0.037	0.004	0.150	delayed hydrograph, very dry antecedent
SDN3	SDN3 120496	1997	12/4/96	0.82	7.5			0.16	44	NPDES		no	16	14	2	2.5	2.5	5	0.016	0.002	0.033	
SDN3	SDN3 122196	1997	12/10/96	0.38	37			0	103	NPDES		no	2.8	4.6	4	2.5	2.5	5	0.011	0.001	0.045	
SDN3	SDN3 011797	1997	1/16/97	1.21	23			0	154	NPDES		no	12	13	4.92				0.012	0.001	0.042	
SDN3	SDN3 030597	1997	3/5/97	0.30	20			0.24	42	NPDES		no	10	10	2	0.2	2.5	0.2	0.011	0.001	0.032	
SDN3	SDN3 082197	1997	8/21/97	0.27	11.6		0.01	0.02	24	NPDES	EMC	no	2.2	10	2				0.014	0.001	0.049	
SDN3	SDN3 111797	1998	11/16/97	0.47	12.6			0	222	NPDES	EMC	no	12	42	2				0.010	0.002	0.049	
SDN3	SDN3 121097	1998	12/10/97	1	33			0	87	NPDES	SMC	no	11	20	2	1	1	2	0.011	0.002	0.040	HAD QC DUPLICATE GOOD DUPLICATION
SDN3	SDN3 122498	1999	12/24/98	1.10	30	0.10	0	0	153	NPDES	SMC	yes	12	0	222	1	14.2	16.2	0.017	0.001	0.080	
SDN3	SDN3 021399	1999	2/13/99	0.26	8	0.04	0	0	102	other	EMC	yes			17.6				0.020	0.010	0.0[illegible]	for DO study
SDN3	SDN3 120999	2000	12/9/99	0.49	27	0.09	0	0.30	48	NPDES	EMC	no	2.6	4.6	0.008				0.080	0.001	0.02[illegible]	
SDN4	SDN4 090396	1997	9/3/96	0.25	1.2			0	70	NPDES		no	8	3	14.1				0.130	0.001	0.047	
SDN4	SDN4 120496	1997	12/4/96	0.82	7.5			0.16	44	NPDES		no	7	4.6	0.40	2.5	2.5	5	0.034	0.007	0.023	
SDN4	SDN4 011097	1997	1/10/97	1.21	23			0	154	NPDES		no	11	1.7	17.1				0.030	0.001	0.075	
SDN4	SDN4 030597	1997	3/5/97	0.30	20			0.24	42	NPDES		no	3.8	2.5	2	2.5	2.5	5	0.021	0.001	0.010	
SDN4	SDN4 080397	1997	8/3/97	0.20	10			0	70	NPDES	EMC	no	2.2	2.6	3.12				0.052	0.001	0.020	
SDN4	SDN4 102097	1998	10/20/97	0.47	10.6			0.09	29	NPDES	EMC	no	2.6	6	7.38	1	1	2	0.030	0.007	0.024	
SDN4	SDN4 121097	1998	12/15/97	1	33			0	87	NPDES	SMC	no	2.6	3.9	4.00	1	1	2	0.020	0.001	0.027	
SDN4	SDN4 030198	1998	3/1/98	0.96	88			0.07	0	NPDES	SMC	no	17	10	7	1	1	2	0.031	0.001	0.029	
SDN4	SDN4 030999	1999	3/9/99	0.80	27			0	132	NPDES	SMC	no	3.2	0.1	4.00	1	1	2	0.049	0.001	0.018	backup monthly sample in case 3/1/99 sample didn't qualify under new permit
SDN4	SDN4 042399	1999	4/23/99	0.46	20			0	204	NPDES	EMC	no	2	3.5	5.44				0.001	0.001	0.020	
SDN4	SDN4 052599	1999	5/24/99	0.56	11			0	87	NPDES	EMC	no	3.7	5.5	5.2			2	0.030	0.001	0.027	
SDN4	SDN4 062499	1999	6/24/99	0.43	4			0	200	NPDES	EMC	no	4	4	4.54	1	1	2	0.047	0.001	0.016	

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All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hr ant, in.	48hr ant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
SDN4	SDN4 081099	1999	8/10/99	0.31	10	0.26	0	0	782	NPDES	EMC	no	94	96	8				0.007	0.003	0.022	Thunderstorm, 0.25 in/hr
SDN4	SDN4 092599	1999	9/29/99	0.47	23	0.20	0	0	140	NPDES	EMC	no	70	43	0.74	1	2.2	3.2	0.043	0.001	0.010	GLYCOLS MAY BE HIGH BIASED, DUPE WAS <MDL
SDN4	SDN4 100399	1999	10/3/99	0.4	3	0.22	0	0.07	30	NPDES	EMC	no	27	23	2	1	1	2	0.061	0.001	0.045	
SDN4	SDN4 110499	1999	11/3/99	1.02	30	0.40	0	0.00	35	NPDES	SMC	no	10	5.8	2	1	1	2	0.047	0.001	0.070	
SDN4	SDN4 111399	1999	11/11/99	0.90	62	0.16	0	0.05	31	NPDES	EMC	no	22	15	2	1	1	2	0.025	0.001	0.127	concurrent WE1 sample
SDN4	SDN4 122599	1999	12/24/99	1.19	30	0.10	0	0	153	NPDES	SMC	yes	12	12	100	7	27.3	34.3	0.023	0.001	0.075	
SDN4	SDN4 011400	1999	1/13/00	1.07	22	0.10	0	0	88	NPDES	EMC	no	7	0.2	2	1	1	2	0.020	0.001	0.034	concurrent WF1 sample
SDN4	SDN4 020400	1999	2/3/00	0.20	10	0.07	0	0.01	27	NPDES	EMC	no	3.8	4.8	2	1	1	2	0.015	0.001	0.024	
SDN4	SDN4 021300	1999	2/13/00	0.20	5	0.04	0	0	102	other	EMC	yes			30				0.030	0.001	0.020	for DO study
SDN4	SDN4 031300	1999	3/13/00	0.83	23	0.07	0	0	71	NPDES	EMC	no	2.9	7	2	1	1	2	0.019	0.001	0.025	
SDN4	SDN4 032800	1999	3/27/00	0.24	9	0.07	0	0.00	20	NPDES	EMC	no	4.3	3.8	2	1	1	2	0.022	0.001	0.014	
SDN4	SDN4 071700	2000	7/16/00	0.7	34	0.11	0	0	300	NPDES	EMC	no	100	320	12.8				0.052	0.004	0.017	
SDN4	SDN4 110600	2000	11/5/00	0.80	12	0.11	0	0.00	44	NPDES	SMC	no	12	17	6.04	1	1	2	0.017	0.001	0.023	
SDN4	SDN4 111000	2000	11/10/00	0.8	15	0.07	0.01	0.00	23	NPDES	SMC	no	5.3	7.2	4.80	1	1	2	0.029	0.001	0.033	
SDN4	SDN4 120900	2000	12/9/00	0.49	27	0.00	0	0.30	40	NPDES	SMC	no	2.0	6.2	6.4	1	2.1	3.1	0.010	0.001	0.031	
SDN4	SDN4 121700	2000	12/17/00	0.34	11	0.00	0	1.15	20	NPDES	EMC	no	4.2	8.1	2	1	1	2	0.02	0.001	0.015	
SDN4	SDN4 013100	2000	1/31/00	1.70	20	0.15	0.07	0.07	0	NPDES	SMC	no	0.2	5.1	2	1	1	2	0.013	0.001	0.017	
SDN4	SDN4 021400	2000	2/13/00	0.47	0	0.13	0	0	40	NPDES	EMC	no	14	0	4.04	1	1	2	0.03	0.001	0.0025	
SDN4	SDN4 041300	2000	4/13/00	0.34	12	0.08	0	0	74	NPDES	SMC	no	4.7	4.5	0.82	1	1	2	0.044	0.001	0.010	
EY	EY 091404	1995	9/13/94	0.15	9				110	NPDES		no	24.0									
EY	EY 101394	1995	10/13/94	0.32	14			0	400	NPDES		no	25									
EY	EY 030895	1995	3/8/95	2.10	114			0	80	NPDES		no	3.2									
EY	EY 060495	1995	6/4/95	0.7	20			0	304	NPDES		no	25									
EY	EY 072095	1996	7/20/95	0.41	30			0		NPDES		no	88									
EY	EY 101695	1996	10/15/95	0.36	12			0		NPDES		no	12									
EY	EY 021796	1996	2/17/96	1.29	12			0		NPDES		no	24									
EY	EY 042296	1996	4/22/96	2.83	8			0		NPDES		no	30									
EY	EY 052296	1996	5/21/96	0.31	30			0.02		SlipAg		no	20									
EY	EY 052396	1996	5/23/96	0.40	10			0		SlipAg		no	262									
EY	EY 070496	1997	7/3/96	0.23	12			0		NPDES		no	10									
EY	EY 102196	1997	10/21/96	0.00	4.1			0	84	NPDES		no	12	4.3								
EY	EY 021297	1997	2/11/97	0.40	10			0	200	NPDES		no	8.6									
EY	EY 030597	1997	3/5/97	0.39	20			0.24	42	NPDES		no	17									
EY	EY 081797	1997	8/16/97	0.36	20			0	135	NPDES	EMC	no	72									
EY	EY 110897	1998	11/8/97	0.10	4.4			0.01	72	NPDES	EMC	no	10									
EY	EY 013098	1998	1/29/98	0.2	14			0	107	NPDES	EMC	no	12									
EY	EY 052598	1998	5/24/98	0.50	11			0	87	NPDES	EMC	no	20									
EY	EY 011499	1999	1/13/99	1.07	22	0.16	0	0	85	NPDES	EMC	no	70									
EY	EY 052499	1999	5/24/99	1.12	24	0.35	0.03	0.00	10	NPDES	SMC	no	120									
EY	EY 013100	2000	1/31/00	1.70	20	0.15	0.07	0.07	0	NPDES	SMC	no	80	71					0.0196	0.0283	0.179	metals data optional
TY	TY 080994	1995	8/9/94	0.89	22				83	NPDES		no	4									
TY	TY 101994	1995	10/19/94	0.2	32				120	NPDES		no	10									
TY	TY 030495	1995	3/4/95	0.10	24			0	190	NPDES		no	10			2.5	2.5	5				
TY	TY 060495	1995	6/4/95	0.7	20			0	304	NPDES		no	22									
TY	TY 081795	1996	8/16/95	1.34	12			0.01		NPDES		no	20									
TY	TY 080595	1996	8/5/95							NPDES		no										
TY	TY 101595-1	1996	10/15/95	0.35	12			0		NPDES		no	400									
TY	TY 032296	1996	3/22/96	0.21				0		NPDES		no		17								
TY	TY 041596	1996	4/15/96	0.40	10			0.09		NPDES		no	30									
TY	TY 042296	1996	4/22/96	2.83	8			0		NPDES		no	23									
TY	TY 070496	1997	7/3/96	0.23	12			0		NPDES		no	20									
TY	TY 071096	1997	7/17/96	0.27	31			0		SlipAg		no	13									
TY	TY 080296	1997	8/2/96	1.01	27			0	325	SlipAg		no	33									
TY	TY 100496	1997	10/4/96	0.59	8.1			0.06	10	NPDES		no	17	4								
TY	TY 021297	1997	2/11/97	0.40	10			0	205	NPDES		no	20									
TY	TY 030597	1997	3/5/97	0.39	20			0.24	42	NPDES		no	100									possible Insert (PMF*) failure indicated by elevated TOX and TSS
TY	TY 080397	1997	8/3/97	0.20	10			0	76	NPDES	SMC	no	73									
TY	TY 111797	1998	11/16/97	0.47	12.0			0	222	NPDES	SMC	no	20									

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All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
TY	TY 030000	1999	3/8/99	0.80	27			0	132	NPDES	SMC	no	15									MAKEUP COMPOSITE FOR 80QW, HAS EXTRA GRAB
TY	TY 001000	1999	8/10/99	0.20	10			0	200	NPDES	EMC	no	20									
TY	TY 020300	1999	2/3/99	0.20	19	0.07	0	0.01	27	NPDES	SMC	no	20									
TY	TY 07020	2000	7/2/00	0.3	6	0.11	0	0	103	NPDES	EMC	no	24									
TY	TY 020000	2000	2/7/00	1.10	25	0.12			31	NPDES	EMC	no	17									
TY	TY 031300	2000	3/13/00	0.47	0	0.13	0	0	40	NPDES	SMC	no	45									

not detected: value is 1/2 MDL
EG is ethylene glycol, PG is propylene glycol
> value indicated
lined-out values are non-representative data trimmed from data analysis

purpose	type	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn
All outfalls	count	327	281	281	173	173	173	257	257	257
	max	400	320	640	280	364	384	0.380	0.104	1.030
	95th	102	71	77	12	23	34	0.085	0.030	0.303
	75th	30	25	12	2.5	2.5	5.0	0.030	0.011	0.100
	median	17	13	8.0	2.5	2.5	5.0	0.020	0.004	0.060
	25th	7.4	5.0	4.0	1.0	1.0	2.0	0.010	0.001	0.020
	min	0.8	0.8	0.0	1.0	1.0	2.0	0.001	0.000	0.003
	sd	50	30	50.1	20.1	30.3	37.5	0.034	0.016	0.130
	CV, %	151%	161%	300%	440%	400%	317%	101%	150%	110%
	# non-detected	5	0	80	152	130	133	1	78	5
	% non-detected	2%	0%	19%	88%	80%	77%	0.4%	30%	1.9%
		0.82	0.80					0.756	0.957	0.761
SD64 (002)	count	30	30	40	37	37	37	41	41	41
	max	253	190	330	14	40	40	0.280	0.104	0.770
	95th	214	80	31	6	10	30	0.070	0.070	0.337
	75th	60	43	11	2.5	2.5	5.0	0.042	0.020	0.204
	median	40	27	6.7	1.0	1.0	2.0	0.030	0.010	0.141
	25th	33.5	10.0	4.7	1.0	1.0	2.0	0.010	0.008	0.100
	min	0.8	1.5	2.0	1.0	1.0	2.0	0.003	0.001	0.003
	sd	50	30	62.0	2.0	0.3	10.7	0.030	0.023	0.130
	CV, %	91%	100%	200%	130%	210%	100%	104%	100%	72%
	# non-detected	0	0	7	34	31	31	0	5	0
	% non-detected	0%	0%	18%	92%	84%	84%	0%	12%	0%
SD61 (003)	count	21	20	22	16	16	16	22	22	22
	max	74	40	92	200	33	275	0.300	0.000	0.304
	95th	40	40	77	70	30	94	0.110	0.045	0.200
	75th	25	22	23	2.0	3.4	6.0	0.080	0.019	0.211
	median	14	13	12.3	2.5	2.5	6.0	0.030	0.010	0.122
	25th	7.0	7.0	8.0	1.0	1.0	2.0	0.022	0.005	0.100
	min	1.0	3.0	2.0	1.0	1.0	2.0	0.012	0.001	0.082
	sd	10	12	23.0	64.4	8.0	67.4	0.077	0.020	0.070
	CV, %	91%	74%	114%	240%	154%	273%	117%	120%	47%
	# non-detected	0	0	2	14	12	11	0	1	0
	% non-detected	0%	0%	9%	88%	75%	69%	0%	5%	0%
SD62 (004)	count	8	8	8	0	0	0	2	2	7
	max	85	30	11				0.008	0.008	0.213
	95th	80	30	10				0.008	0.005	0.200
	75th	37	20	6				0.008	0.006	0.170
	median	20	20	3.5				0.008	0.003	0.130
	25th	10.0	15.0	2.0				0.007	0.002	0.101
	min	7.0	0.1	2.0				0.007	0.001	0.084
	sd	19	11	3.3				0.001	0.003	0.105
	CV, %	85%	50%	71%				17%	90%	78%
	# non-detected	0	0	3				0	1	0
	% non-detected	0%	0%	38%				0%	50%	0%

All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	PDS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EO	PG	total glycols	Cu	Pb	Zn	comments
										BD83	count		45	44	47	34	34	34	47	47	47	
										(008)	max		310	100	840	32	355	384	0.130	0.043	0.194	
											95th		88	81	170	20	100	129	0.088	0.014	0.145	
											75th		20	15	18	4.3	9.8	11.4	0.051	0.004	0.083	
											median		9	9	9.0	2.5	2.5	5.0	0.029	0.002	0.043	
											25th		4.1	6.1	8.2	1.0	1.3	3.7	0.023	0.001	0.031	
											min		1.0	0.7	2.0	1.0	1.0	2.0	0.004	0.001	0.003	
											sd		50	20	114.0	6.0	86.4	87.0	0.020	0.007	0.047	
											CV, %		224%	105%	202%	140%	302%	257%	71%	150%	74%	
											# non-detected		1	0	3	24	10	16	0	14	0	
											% non-detected		2%	0%	6%	71%	53%	47%	0%	30%	0%	
										BD84	count		20	19	23	10	10	10	21	21	21	
										(009)	max		104	85	90	3	3	6	0.041	0.005	0.047	
											95th		45	40	18	3	3	6	0.039	0.004	0.044	
											75th		22	12	7	2.5	2.5	6.0	0.032	0.002	0.032	
											median		12	7	5.0	2.5	2.5	6.0	0.023	0.001	0.020	
											25th		4.7	4.0	4.2	2.5	2.5	5.0	0.018	0.001	0.010	
											min		2.1	1.3	2.0	1.0	1.0	2.0	0.000	0.001	0.000	
											sd		23	21	19.2	0.6	0.6	1.3	0.010	0.001	0.012	
											CV, %		123%	162%	100%	29%	29%	29%	30%	77%	50%	
											# non-detected		0	0	3	10	10	10	0	0	0	
											% non-detected		0%	0%	13%	100%	100%	100%	0%	29%	0%	
										BD87	count		10	10	8	0	0	0	2	2	2	
										(010)	max		80	310	15				0.008	0.001	0.010	
											95th		74	102	12				0.008	0.001	0.010	
											75th		18	10	8				0.004	0.001	0.006	
											median		9	5	4.0				0.003	0.001	0.006	
											25th		8.1	2.4	3.5				0.002	0.001	0.004	
											min		2.2	1.0	2.0				0.001	0.001	0.002	
											sd		20	80	4.2				0.003	0.000	0.005	
											CV, %		130%	240%	74%				90%	0%	65%	
											# non-detected		0	0	2				1	2	0	
											% non-detected		0%	0%	25%				50%	100%	0%	
										BD96	count		6	6	5	0	0	0	6	6	6	
										(014)	max		91	130	6				0.029	0.007	0.124	
											95th		78	122	5				0.025	0.006	0.103	
											75th		35	93	3				0.017	0.005	0.036	
											median		20	30	2.0				0.014	0.002	0.031	
											25th		15.5	20.0	2.0				0.008	0.001	0.020	
											min		8.0	14.0	2.0				0.008	0.001	0.000	
											sd		30	40	1.0				0.008	0.003	0.047	
											CV, %		89%	87%	53%				57%	97%	101%	
											# non-detected		0	0	3				0	1	0	
											% non-detected		0%	0%	60%				0%	17%	0%	
										BD85	count		5	5	4	0	0	0	5	5	5	
										(015)	max		58	49	11				0.021	0.008	0.129	
											95th		57	47	10				0.020	0.008	0.109	
											75th		51	40	5				0.016	0.004	0.071	
											median		30	35	2.5				0.014	0.003	0.027	
											75th		30.0	25.0	2.0				0.008	0.001	0.009	
											min		34.0	14.0	2.0				0.005	0.001	0.003	
											sd		10	14	4.5				0.006	0.007	0.057	
											CV, %		23%	47%	99%				40%	81%	147%	
											# non-detected		0	0	2				0	1	[illegible]	
											% non-detected		0%	0%	50%				0%	20%	0%	

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All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hr ant, in.	48hr ant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
										SDN1	count		24	23	20	18	18	18	14	14	14	
										(006)	max		130	150	194	6	3	6	0.061	0.039	1.030	
									(former location downstream at SDN1-27, ends 1996)		95th		85	30	30	3	3	5	0.060	0.027	0.730	
											75th		48	19	19	2.5	2.5	5.0	0.045	0.015	0.480	
											median		22	14	10.3	2.5	2.5	5.0	0.035	0.012	0.385	
											25th		14.0	7.2	6.0	2.5	2.5	5.0	0.021	0.008	0.281	
											min		1.0	2.1	2.0	2.5	2.5	5.0	0.009	0.001	0.100	
											sd		20	30	38.0	0.8	0.0	0.3	0.023	0.008	0.208	
											CV, %		88%	154%	183%	31%	0%	5%	60%	66%	60%	
											# non-detected		1	0	2	17	18	17	0	1	0	
											% non-detected		4%	0%	8%	94%	100%	94%	0%	7%	0%	
										SDN1up	count		28	28	27	4	4	4	28	28	28	
										(008)	max		192	86	110	14	12	28	0.083	0.048	0.813	
									(upstream location at SDN1-22, begins 1997)		95th		130	68	28	12	11	22	0.080	0.038	0.672	
											75th		68	38	9	4.2	3.8	8.0	0.034	0.018	0.380	
											median		42	23	6.0	1.0	1.0	2.0	0.019	0.009	0.215	
											25th		24.3	15.0	4.1	1.0	1.0	2.0	0.013	0.006	0.145	
											min		1.8	0.8	2.0	1.0	1.0	2.0	0.003	0.001	0.008	
											sd		43	21	21.0	6.4	5.7	12.1	0.019	0.012	0.165	
											CV, %		82%	75%	107%	152%	140%	150%	72%	90%	60%	
											# non-detected		0	0	6	3	3	3	0	5	0	
											% non-detected		0%	0%	22%	75%	75%	75%	0%	18%	0%	
										SDN2	count		21	19	21	13	13	13	17	17	17	
										(007)	max		48	14	120	38	81	81	0.070	0.022	0.138	
									(pumped to IWS as of late 1997)		95th		33	11	88	18	32	42	0.062	0.022	0.108	
											75th		10	8	15	2.5	2.5	17.3	0.036	0.011	0.078	
											median		7	6	7.0	2.5	2.5	6.0	0.025	0.006	0.048	
											25th		4.2	2.3	6.0	2.5	2.5	5.0	0.013	0.003	0.026	
											min		1.0	1.5	2.0	2.5	2.5	5.0	0.000	0.002	0.017	
											sd		11	4	29.4	0.3	13.8	14.7	0.018	0.007	0.034	
											CV, %		108%	65%	180%	173%	180%	114%	66%	85%	67%	
											# non-detected		1	0	2	11	10	9	0	0	0	
											% non-detected		5%	0%	10%	85%	77%	69%	0%	0%	0%	
										SDN3	count		29	29	29	17	17	17	21	21	21	
										(009)	max		27	42	222	6	14	15	0.037	0.010	0.180	
											95th		25	29	61	3	5	8	0.036	0.004	0.150	
											75th		16	18	6	2.5	2.5	5.0	0.018	0.002	0.080	
											median		11	10	3.0	2.5	2.5	5.0	0.014	0.001	0.057	
											25th		3.1	5.1	2.0	2.5	2.5	5.0	0.011	0.001	0.045	
											min		0.0	1.0	0.0	1.0	1.0	2.0	0.003	0.000	0.020	
											sd		8	10	43.1	1.1	2.0	2.0	0.009	0.002	0.043	
											CV, %		71%	74%	200%	42%	93%	40%	60%	100%	60%	
											# non-detected		2	0	10	16	16	15	0	5	0	
											% non-detected		8%	0%	34%	94%	94%	88%	0%	24%	0%	
										SDN4	count		30	30	31	23	23	23	31	31	31	
										(011)	max		100	320	160	7	27	34	0.130	0.004	0.127	
											95th		60	73	75	3	3	5	0.079	0.003	0.073	
											75th		14	11	7	1.0	1.0	2.0	0.047	0.001	0.030	
											median		6	6	4.5	1.0	1.0	2.0	0.031	0.001	0.024	
											25th		3.7	4.1	2.0	1.0	1.0	2.0	0.022	0.001	0.018	
											min		2.0	1.7	2.0	1.0	1.0	2.0	0.013	0.001	0.003	
											sd		30	59	29.0	1.3	5.5	6.7	0.025	0.001	0.023	
											CV, %		200%	271%	205%	93%	230%	170%	65%	84%	70%	
											# non-detected		0	0	11	22	20	20	0	18	0	
											% non-detected		0%	0%	35%	96%	87%	87%	0%	58%	0%	

All Composite Sample Data			Storm Characteristics										concentration, mg/l									
outfall	POS ID	reported	date	depth, in.	dur, hr	int, in/hr	24hrant, in.	48hrant, in.	dryant, hr	purpose	type	ground deice?	TSS	Turb, NTU	BOD5	EG	PG	total glycols	Cu	Pb	Zn	comments
										EY	count		21	2	0	0	0	0	0	0	0	
										(012)	max		202	71.0								
											95th		120									
											75th		50									
											median		25									
											25th		12.0									
											min		3.2	4.3								
											sd		60									
											CV, %		120%									
											# non-detected		0	0								
											% non-detected		0%	0%								
										TY	count		43	4	0	1	1	1	0	0	0	
										(013)	max		400	12.0								
											95th		102	12								
											75th		30	10								
											median		24	8								
											25th		17	6								
											min		4	4								
											sd		102	8								
											CV, %		194%	71%								
											# non-detected		0	0								
											% non-detected		0%	0%								
										Airfield	count		121	110	130	84	84	84	120	120	120	
								(SDS3, SDS4, SDN3, SDN4)			max		310	320	640	32	385	384	0.130	0.043	0.194	
											95th		70	46	80	9	22	31	0.061	0.009	0.127	
											75th		10	16	10	3	3	6	0.039	0.003	0.055	
											median		9	7	5	3	3	6	0.020	0.001	0.034	
											25th		3.0	4.0	3.0	1.0	1.0	2.0	0.010	0.001	0.023	
											min		0.0	0.7	0.0	1.0	1.0	2.0	0.003	0.000	0.003	
											sd		40	36	75	5	47	44	0.024	0.005	0.030	
											CV, %		212%	162%	664%	332%	1700%	1172%	83%	400%	120%	
											# non-detected		3	0	27	72	68	67	0	59	0	
											% non-detected		2%	0%	21%	86%	81%	80%	0%	49%	0%	

AR 045754

APPENDIX C TABULAR DEICING EVENT SAMPLE DATA SUMMARIES

All Deicing Event Sample Data

order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
1	SDE4	SDE4 111394	11/11/94	1995	storm	0.28		48	NPDES		no				7	[illegible]	[illegible]	[illegible]	
2	SDE4	SDE4 111894	11/18/94	1995	baseflo	0			NPDES		no				26	[illegible]	[illegible]	[illegible]	
3	SDE4	SDE4 111994	11/19/94	1995	storm	0.42		52	NPDES		no				8	[illegible]	[illegible]	[illegible]	
4	SDE4	SDE4 041095	4/10/95	1995	storm	0.29		88	NPDES		no				8	[illegible]	[illegible]	[illegible]	
5	SDE4	SDE4 042895	4/28/95	1995	baseflo	0			NPDES		no					3	[illegible]	[illegible]	
6	SDE4	SDE4 050295	5/2/95	1995	nonstor	0.42		38	NPDES		no					10	[illegible]	10	
7	SDE4	SDE4 081795	8/16/95	1996	storm	1.34			NPDES		no					5	8	8	
8	SDE4	SDE4 012096 AVG	1/19/96	1996		1.8			SES	series avg	yes				72	13	11	24	20-hr avg of 8 discrete samples. 2 of 8 glycol <MDL
9	SDE4	SDE4 020496 AVG	2/3/96	1996		1.8			Washoff	series avg	yes				86	18	12	30	10-hr avg of 8 discrete samples. All>MDL
10	SDE4	SDE4 020396	2/3/96	1996	storm	1.8			NPDES	flow-wt comp	yes				74	14	12	26	
11	SDE4	SDE4 032296	3/22/96	1996	storm	0.21			SlipAg	flow-wt comp	no				12	[illegible]	[illegible]	[illegible]	
12	SDE4	SDE4 041696	4/15/96	1996	storm	0.49			NPDES	flow-wt comp	no	3	8		7	[illegible]	[illegible]	[illegible]	
13	SDE4	SDE4 090396	9/3/96	1997	storm	0.29		76	NPDES	flow-wt comp	no	0	3	3	7	[illegible]	[illegible]	[illegible]	
14	SDE4	SDE4 112196 A96	11/20/96	1997					NPDES	series avg	yes	60	237	0		21	71	92	composite of bottles A1, A2, A3 for quarterly glycols
15	SDE4	SDE4 121696	12/15/96	1997	nonstor	0.11		72	NPDES	flow-wt comp	no	11	41	63	9	[illegible]	[illegible]	[illegible]	nonstorm: backup data in case short on data for 96 Q4
16	SDE4	SDE4 122196	12/19/96	1997	storm	0.36		103	NPDES	flow-wt comp	no	38	44	76	12	[illegible]	[illegible]	[illegible]	
17	SDE4	SDE4 123196 AVG	12/26/96	1997		1.12			SES	series avg	yes	222	256	256	33	3	4	6	30-hr avg of 5 time-compositesamples. most glycol and BOD<MDL
18	SDE4	SDE4 010797 AVG	12/26/96	1997		1.12			SES	series avg	yes	222	256	256	13	8	15	23	6-day avg of 15 time-composite samples. 12of 15 BOD<MDL, 11 of15 glycol <MDL
19	SDE4	SDE4 011697	1/16/97	1997	storm	1.21		164	NPDES	flow-wt comp	no	22	67	138	13	[illegible]	[illegible]	[illegible]	
20	SDE4	SDE4 012797	1/27/97	1997	storm	0.41		100	SlipAg	flow-wt comp	no	21	89	145	2	[illegible]	40	40	
21	SDE4	SDE4 030697	3/5/97	1997	storm	0.39		42	NPDES	flow-wt comp	no	31	61	61	4	[illegible]	[illegible]	[illegible]	
22	SDE4	SDE4 060397	6/3/97	1997	storm	0.26		76	NPDES	flow-wt comp	no	1	2	2	6	[illegible]	[illegible]	2	
23	SDE4	SDE4 102897	10/28/97	1998	storm	0.47		26	NPDES	flow-wt comp	no	8	12	8	4	[illegible]	[illegible]	2	
24	SDE4	SDE4 121697	12/15/97	1998	storm	1		87	NPDES	flow-wt comp	no	15	23	30	8	[illegible]	[illegible]	[illegible]	
25	SDE4	SDE4 011398	1/12/98	1998	nonstor	1.13		123	NPDES	series avg	yes	181	266	457	213	6	5	11	24-HOUR TIME COMPOSITE
26	SDE4	SDE4 030198	3/1/98	1998	storm	0.96		6	NPDES	flow-wt comp	no	11	10	11	6	[illegible]	[illegible]	2	
27	SDE4	SDE4 030998	3/8/98	1998	storm	0.86		132	NPDES	flow-wt comp	no	16	42	154		1	1	2	taken for aircraft deicing only, no grab taken (No Liquid Detected)
28	SDE4	SDE4 042398	4/23/98	1998	storm	0.46		264	NPDES	flow-wt comp	no	6	8	29	21	[illegible]	[illegible]	2	
29	SDE4	SDE4 051498	5/14/98	1998	storm	0.21		126	NPDES	flow-wt comp	no	4	7	16	11	[illegible]	[illegible]	2	
30	SDE4	SDE4 091898	9/18/98	1999	nonstor	0.18	0.18	456	NPDES	flow-wt comp	no	3	4	6	14	[illegible]	[illegible]	2	nonstorm
31	SDE4	SDE4 092598	9/24/98	1999	storm	0.47	0.26	146	NPDES	flow-wt comp	no	0	0	3	[illegible]	[illegible]	[illegible]	2	
32	SDE4	SDE4 100398	10/3/98	1999	storm	0.4	0.22	36	NPDES	flow-wt comp	no	2	3	2	6	[illegible]	[illegible]	2	
33	SDE4	SDE4 102798	10/27/98	1999	storm	0.64	0.19	72	NPDES	flow-wt comp	no	6	8	12	6	[illegible]	[illegible]	2	
34	SDE4	SDE4 110498	11/3/98	1999	storm	1.62	0.48	36	NPDES	non-rep comp	no	8	11	8	2	[illegible]	[illegible]	2	not representative, incomplete sample, flow probe error
35	SDE4	SDE4 111998	11/19/98	1999	storm	2.34	0.18	73	NPDES	flow-wt comp	no	20	34	44	7	[illegible]	[illegible]	2	concurrent WET sample
36	SDE4	SDE4 121798	12/17/98	1999	nonstor	0.11	0.03	33	NPDES	flow-wt comp	no	20	33	20		[illegible]	[illegible]	2	non-storm, suitable for glycols only
37	SDE4	SDE4 122498	12/24/98	1999	storm	1.18	0.18	163	NPDES	flow-wt comp	yes	125	180	373	336	13	31	44	
38	SDE4	SDE4 011099	1/9/99	1999	storm	0.27	0.05	64	NPDES	non-rep comp	no	14	25	26	8	[illegible]	3	4	not representative, taken too late
39	SDE4	SDE4 012299	1/20/99	1999	storm	0.42	0.09	22	NPDES	flow-wt comp	no	14	31	14	6	[illegible]	[illegible]	2	concurrent WET sample
40	SDE4	SDE4 021899	2/18/99	1999	storm	0.8	0.08	20	NPDES	flow-wt comp	no	16	26	16	4	[illegible]	[illegible]	2	
41	SDE4	SDE4 022399	2/22/99	1999	storm	0.56	0.14	9	NPDES	flow-wt comp	no	18	28	18	2	[illegible]	[illegible]	2	concurrent WET sample
42	SDE4	SDE4 030899	3/8/99	1999	storm	0.28	0.05	96	NPDES	flow-wt comp	no	13	68	147	10	[illegible]	6	6	
43	SDE4	SDE4 031399	3/12/99	1999	storm	0.83	0.07	71	NPDES	flow-wt comp	no	13	43	53	6	[illegible]	[illegible]	2	
44	SDE4	SDE4 032499	3/24/99	1999	storm	0.28	0.08	40	NPDES	flow-wt comp	no	8	11	11	6	[illegible]	[illegible]	2	
45	SDE4	SDE4 032899	3/27/99	1999	storm	0.24	0.07	28	NPDES	flow-wt comp	no	7	17	7	2	[illegible]	[illegible]	2	
46	SDE 4	SDE4 110899	11/5/99	2000	storm	0.88	0.11	44	NPDES	flow-wt comp	no			22	2	[illegible]	[illegible]	2	
47	SDE 4	SDE4 111799	11/18/99	2000	storm	0.6	0.07	23	NPDES	flow-wt comp	no			10	2	[illegible]	[illegible]	2	
48	SDE 4	SDE4 120899	12/4/99	2000	storm	0.24	0.1	80	NPDES	flow-wt comp	no			34	6	[illegible]	[illegible]	2	
49	SDE 4	SDE4 011300	1/12/00	2000	storm	0.37	0.04	10	NPDES	flow-wt comp	yes			261		4	7	12	runway deice
50	SDE 4	SDE4 031300	3/13/00	2000	storm	0.47	0.13	49	NPDES	flow-wt comp	no			44	6	[illegible]	[illegible]	2	
51	SDE 4	SDE4 041300	4/13/00	2000	storm	0.34	0.08	74	NPDES	flow-wt comp	no				9	[illegible]	[illegible]	2	
52	SDS1	SDS1 111894	11/18/94	1995	baseflo	0			NPDES		no				[illegible]	32	[illegible]	32	
53	SDS1	SDS1 111994	11/19/94	1995	storm	0.42		82	NPDES		no				46	14	[illegible]	14	
54	SDS1	SDS1 020895	2/8/95	1995	baseflo	0			NPDES		no					[illegible]	[illegible]	[illegible]	

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All Deicing Event Sample Data

order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
55	SDS1	SDS1 021395	2/13/95	1995	baseflo	0			NPDES		yes				5	[illegible]	[illegible]	5	
56	SDS1	SDS1 021595	2/15/95	1995	storm	1.1		86	NPDES		yes				92	260	16	276	
57	SDS1	SDS1 042895	4/28/95	1995	baseflo	0			NPDES		no					[illegible]	[illegible]	5	
58	SDS1	SDS1 050295	5/2/95	1995	nonstor	0.42		36	NPDES		no					[illegible]	[illegible]	5	
59	SDS1	SDS1 092995	9/29/95	1996	baseflo	0			NPDES		no					[illegible]	[illegible]	5	
60	SDS1	SDS1 011496	1/13/96	1996	storm	0.37			NPDES	flow-wt comp	no				18	3	[illegible]	5	
61	SDS1	SDS1 012096 AVG	1/19/96	1996		1.8			SES	series avg	yes				130	105	193	298	20-hr avg of 6 discrete samples. 5 TKN <MDL
62	SDS1	SDS1 020496 AVG	2/3/96	1996	storm	1.8			Washoff	series avg	yes				131	23	96	118	14-hr avg of 8 discrete samples. 1 glycol <MDL
63	SDS1	SDS1 041696	4/15/96	1996	storm	0.49			NPDES	flow-wt comp	no	3	5		24	3	[illegible]	5	
64	SDS1	SDS1 042296	4/22/96	1996	storm	2.83			StipAg	flow-wt comp	no	12	14		8	3	[illegible]	5	
65	SDS1	SDS1 070496	7/3/96	1997	storm	0.23			NPDES	flow-wt comp	no	1	1		11	3	3	5	
66	SDS1	SDS1 110496	11/3/96	1997	nonstor	0.14		120	NPDES	flow-wt comp	no	5	10	24	8	3	3	5	taken for aircraft deicing only
67	SDS1	SDS1 112096 A1	11/20/96	1997					SES	time-comp	yes	60	237	0	428	60	2800	2860	
68	SDS1	SDS1 112396	11/23/96	1997	storm	0.63		72	NPDES	non-rep comp	yes	60	62	112	258	8	190	198	not representative (<2 hrs). reference only.
69	SDS1	SDS1 120496	12/4/96	1997	storm	0.82		44	NPDES	flow-wt comp	no	23	92	92	41	3	24	29	grab sample lost: bottle broken in transit
70	SDS1	SDS1 011697	1/16/97	1997	storm	1.21		164	NPDES	flow-wt comp	no	22	67	130	79	3	33	33	
71	SDS1	SDS1 041397	4/13/97	1997	storm	0.31			NPDES	flow-wt comp	no	8	9	8	21	3	3	5	
72	SDS1	SDS1 061797	6/16/97	1997	storm	0.36		135	NPDES	flow-wt comp	no	1	1	3	6	1	1	2	
73	SDS1	SDS1 102897	10/28/97	1998	storm	0.47		26	NPDES	flow-wt comp	no	9	12	9	7	1	1	2	
74	SDS1	SDS1 112097	11/19/97	1998	storm	0.65		24	NPDES	flow-wt comp	no	18	28	18	2	1	1	2	
75	SDS1	SDS1 121697	12/15/97	1998	storm	1		67	NPDES	flow-wt comp	no	16	23	30	6	1	1	2	
76	SDS1	SDS1 011198	1/12/98	1998	nonstor	1.13		123	NPDES	time-comp	yes	181	288	487	[illegible]	1	1	2	24-hour time composite
77	SDS1	SDS1 030998	3/9/98	1998	storm	0.66		132	NPDES	flow-wt comp	no	16	42	164		1	6	7	FULFILLS ANNUAL SAMPLE RQMT
78	SDS1	SDS1 102798	10/27/98	1999	storm	0.64	0.19	72	NPDES	flow-wt comp	no	5	6	12	6	1	1	2	
79	SDS1	SDS1 121798	12/17/98	1999	nonstor	0.11	0.03	33	NPDES	grab	no	20	33	20		1	1	2	nonstorm
80	SDS1	SDS1 031299 GRAB	3/12/99	1999	storm	0.83	0.07	71	NPDES	grab	no	13	43	83	123	6	43	49	quarterly deice grab sample in first 60 minutes
81	SDS1	SDS1 062099 GRAB	6/20/99	1999	storm	0.21	0.03	48	NPDES	grab	no					1	1	2	FOAM OBSERVED BELOW OUTFALL
82	SDS1	SDS1 062099 GRAB	6/20/99	1999	storm	0.21	0.03	48	NPDES	grab	no					1	1	2	FOAM OBSERVED BELOW OUTFALL
83	SDS 1	SDS1 070299	7/2/99	2000	storm	0.3	0.11	103	NPDES	flow-wt comp	no				8	1	1	2	
84	SDS 1	SDS1 070299 GRAB 1	7/2/99	2000	storm	0.3	0.11	103	NPDES	first flush grab	no				13	1	1	2	
85	SDS 1	SDS1 070299 GRAB 2	7/2/99	2000	storm	0.3	0.11	103	Source Trace	first flush grab	no				10	1	1	2	
86	SDS 1	SDS1 112799 GRAB	11/27/99	2000	storm	0.32	0.07	22	NPDES	first flush grab	no			31		1	1	2	
87	SDS 1	SDS1 010700 grab	1/7/00	2000	storm	0.38	0.12	23	NPDES	first flush grab	no			60		1	1	2	
88	SDS 1	SDS1 011200 grab	1/12/00	2000	storm	0.37	0.04	10	NPDES	first flush grab	yes			261		2	799	801	runway deice
89	SDS 1	SDS1 042100 grab	4/21/00	2000	Other Storm	0.1	0.04		NPDES	first flush grab	no					1	1	2	
90	SDS3	SDS3 090894	9/8/94	1995	storm	0.89		93	NPDES		no					3	3	5	
91	SDS3	SDS3 111894	11/18/94	1995	baseflo	0			NPDES		no				2	3	3	5	
92	SDS3	SDS3 111994	11/19/94	1995	storm	0.42		52	NPDES	flow-wt comp	no				18	3	3	5	glycols and BOD on lab/job "J 014"
93	SDS3	SDS3 020695	2/8/95	1995	baseflo	0			NPDES		no					3	3	5	
94	SDS3	SDS3 041295	4/10/95	1995	storm	0.29		66	NPDES		no				4	3	3	5	
95	SDS3	SDS3 042895	4/28/95	1995	baseflo	0			NPDES		no					3	3	5	
96	SDS3	SDS3 050295	5/2/95	1995	nonstor	0.42		36	NPDES		no					3	3	5	
97	SDS3	SDS3 093095	9/29/95	1996	baseflo	0			NPDES		no					3	3	5	
98	SDS3	SDS3 093095 GRAB	9/29/95	1996	baseflo	0			NPDES	random grab	no					3	3	5	
99	SDS3	SDS3 011496	1/13/96	1996	storm	0.37			NPDES	flow-wt comp	no				5	3	3	5	
100	SDS3	SDS3 012296 AVG	1/19/96	1996	nonstorm	1.8			SES	series avg	yes				118	26	14	40	3.5-day avg of 8 discrete + 8 time-comp samples. 7 glycol, 4 TKN, 2 NH3 <MDL
101	SDS3	SDS3 020896 AVG	2/3/96	1996	nonstorm	1.6			SES	series avg	yes				162	16	13	29	2-day avg of 8 time-comp samples. 5BOD>result, 2 glycol, 1 NH3 <MDL
102	SDS3	SDS3 032296	3/22/96	1996	storm	0.21			StipAg	flow-wt comp	no				8	3	3	5	
103	SDS3	SDS3 041696	4/16/96	1996	storm	0.49			NPDES	flow-wt comp	no	3	6		6	3	3	5	
104	SDS3	SDS3 102196	10/21/96	1997	storm	0.68		84	NPDES	flow-wt comp	no	7	6	18	[illegible]	3	3	5	

All Deicing Event Sample Data

order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
105	SDS3	SDS3 112696 AVG	11/20/96	1997					SES	series avg	yes	60	237		75	14	16	28	9-day avg of 32 time-comp samples. 11 glycol, 28 NH3 <MDL
106	SDS3	SDS3 112396	11/23/96	1997	storm	0.63		72	StipAg	flow-wt comp	yes	60	82	112	34	18	10	28	
107	SDS3	SDS3 010297 AVG	12/26/96	1997		1.12			SES	series avg	yes	222	256	256	252	19	44	62	7-day avg of 29 time-comp samples. 12 glycol, 8 BOD, 14 NH3 <MDL
108	SDS3	SDS3 011697	1/16/97	1997	storm	1.21		184	NPDES	flow-wt comp	no	22	67	136	10	[illegible]	[illegible]	[illegible]	
109	SDS3	SDS3 030697	3/6/97	1997	storm	0.39		42	NPDES	flow-wt comp	no	31	61	51	2	[illegible]	[illegible]	[illegible]	
110	SDS3	SDS3 011298	1/12/98	1998	nonstorm	1.13		123	NPDES	time-comp	yes	181	266	457	17	[illegible]	6	8	24-hour time composite
111	SDS3	SDS3 012098	1/20/98	1998	storm	0.2		107	NPDES	flow-wt comp	no	8	9	39	14	6	4	10	
112	SDS3	SDS3 030198	3/1/98	1998	storm	0.96		6	NPDES	flow-wt comp	no	11	10	11	8	[illegible]	[illegible]	2	
113	SDS3	SDS3 030898	3/8/98	1998	storm	0.96		132	NPDES	flow-wt comp	no	16	42	164	36	23	9	32	backup monthly sample in case 3/1/98 sample didn't qualify under new permit
114	SDS3	SDS3 042398	4/23/98	1998	storm	0.46		264	NPDES	flow-wt comp	no	6	8	29	9	[illegible]	[illegible]	[illegible]	
115	SDS3	SDS3 051498	5/14/98	1998	storm	0.21		126	NPDES	flow-wt comp	no	4	7	15	6	[illegible]	[illegible]	2	
116	SDS3	SDS3 091898	9/18/98	1999	nonstorm	0.19	0.16	456	NPDES	non-rep comp	no	3	4	5	12	1	1	2	not representative, extended into post-storm baseflow period
117	SDS3	SDS3 092598	9/24/98	1999	storm	0.47	0.26	148	NPDES	flow-wt comp	no	0	0	3	5	[illegible]	2	3	GLYCOLS MAY BE HIGH BIASED, DUPE WAS <MDL
118	SDS3	SDS3 100398	10/3/98	1999	storm	0.4	0.22	36	NPDES	flow-wt comp	no	2	3	2	4	[illegible]	[illegible]	2	
119	SDS3	SDS3 102798	10/27/98	1999	storm	0.64	0.19	72	NPDES	flow-wt comp	no	5	6	12	5	[illegible]	4	5	
120	SDS3	SDS3 110498	11/3/98	1999	storm	1.62	0.48	35	NPDES	flow-wt comp	no	8	11	8	7	6	[illegible]	6	
121	SDS3	SDS3 111398	11/11/98	1999	storm	0.96	0.15	31	NPDES	flow-wt comp	no	10	28	18	18	11	[illegible]	12	concurrent WET sample
122	SDS3	SDS3 121798	12/17/98	1999	nonstorm	0.11	0.03	33	NPDES	flow-wt comp	no	20	33	20		[illegible]	12	13	non-storm, suitbale for glycols only
123	SDS3	SDS3 122598	12/24/98	1999	storm	1.19	0.16	153	NPDES	flow-wt comp	yes	126	160	373	450	32	82	113	
124	SDS3	SDS3 011099	1/9/99	1999	storm	0.27	0.06	84	NPDES	flow-wt comp	no	14	25	25	22	8	14	22	
125	SDS3	SDS3 011499	1/13/99	1999	storm	1.07	0.16	85	NPDES	flow-wt comp	no	12	24	34	8	[illegible]	10	11	concurrent WET and WER
126	SDS3	SDS3 020399	2/3/99	1999	storm	0.26	0.07	27	NPDES	flow-wt comp	no	8	18	8	6	[illegible]	2	3	
127	SDS3	SDS3 030999	3/9/99	1999	storm	0.28	0.06	96	NPDES	flow-wt comp	no	13	60	147	220	7	161	168	
128	SDS3	SDS3 031399	3/12/99	1999	storm	0.83	0.07	71	NPDES	flow-wt comp	no	13	43	63	15	[illegible]	6	7	
129	SDS3	SDS3 032599	3/24/99	1999	storm	0.26	0.06	40	NPDES	flow-wt comp	no	6	11	11	12	[illegible]	[illegible]	[illegible]	
130	SDS 3	SDS3 110699 COMP 2	11/5/99	2000	storm	0.68	0.11	44	Source Trace	flow-wt comp	no			22	11	[illegible]	[illegible]	[illegible]	
131	SDS 3	SDS3 110699	11/5/99	2000	storm	0.68	0.11	44	NPDES	flow-wt comp	no			22	16	[illegible]	[illegible]	[illegible]	
132	SDS 3	SDS3 110699 GRAB 2	11/5/99	2000	storm	0.68	0.11	44	Source Trace	random grab	no			22	14	[illegible]	[illegible]	[illegible]	
133	SDS 3	SDS3 111099	11/10/99	2000	storm	0.6	0.07	23	NPDES	flow-wt comp	no			10	12	[illegible]	6	7	
134	SDS 3	SDS3 120599	12/4/99	2000	storm	0.24	0.1	60	NPDES	flow-wt comp	no			34	48	3	18	21	
135	SDS 3	SDS3 120999	12/8/99	2000	storm	0.49	0.09	40	NPDES	flow-wt comp	no			43	20	[illegible]	23	24	
136	SDS 3	SDS3 011300	1/12/00	2000	storm	0.37	0.04	10	NPDES	flow-wt comp	yes			261	640	9	365	384	runway deice
137	SDS 3	SDS3 031300	3/13/00		storm	0.47	0.13	49	NPDES	flow-wt comp	no			44	16	[illegible]	9	10	
138	SDS 3	SDS3 041400	4/13/00		storm	0.34	0.08	74	NPDES	flow-wt comp	no				16	[illegible]	[illegible]	[illegible]	
139	SDN1	SDN1 111994	11/19/94	1995	storm	0.42		62	NPDES		no				6	[illegible]	[illegible]	[illegible]	
140	SDN1	SDN1 010595	1/5/95	1995	baseflow	0			other		no				11	[illegible]	[illegible]	[illegible]	baseflow
141	SDN1	SDN1 020895	2/8/95	1995	baseflow	0			NPDES		no					[illegible]	[illegible]	[illegible]	
142	SDN1	SDN1 021395	2/13/95	1995	baseflow	0			NPDES		yes				5	[illegible]	[illegible]	[illegible]	
143	SDN1	SDN1 021695	2/15/95	1995	storm	1.1		86	NPDES		yes				31	6	[illegible]	8	
144	SDN1	SDN1 030595	3/4/95	1995	storm	0.18		158	StipAg		no				4	[illegible]	[illegible]	[illegible]	
145	SDN1	SDN1 030995	3/8/95	1995	storm	2.16		88	StipAg		no				6	[illegible]	[illegible]	[illegible]	
146	SDN1	SDN1 031595	3/13/95	1995	nonstorm	0.23		24	StipAg	random grab	no				4	[illegible]	[illegible]	[illegible]	nonstorm
147	SDN1	SDN1 040595	4/4/95	1995	storm	0.17		270	StipAg		no				5	[illegible]	[illegible]	[illegible]	
148	SDN1	SDN1 040795	4/6/95	1995	storm	0.61		60	NPDES		no				40	[illegible]	[illegible]	[illegible]	
149	SDN1	SDN1 020496	2/3/96	1996	storm	1.6			NPDES	flow-wt comp	yes				16	[illegible]	[illegible]	[illegible]	
150	SDN1	SDN1 041296	4/11/96	1996	nonstorm	0.21		110	StipAg	flow-wt comp	no	10	14	17	16	[illegible]	[illegible]	[illegible]	nonstorm
151	SDN1	SDN1 041696	4/15/96	1996	storm	0.49			StipAg	flow-wt comp	no	3	5		2	[illegible]	[illegible]	[illegible]	
152	SDN1	SDN1 042296	4/22/96	1996	storm	2.83			NPDES	flow-wt comp	no	12	14		9	[illegible]	[illegible]	[illegible]	
153	SDN1	SDN1 042596	4/25/96	1996	nonstorm	0.31		18	StipAg	flow-wt comp	no	5	9	5	2	[illegible]	[illegible]	[illegible]	nonstorm
154	SDN1	SDN1 051396	5/13/96	1996	storm	0.99		12	StipAg	flow-wt comp	no	2	8	2	4	[illegible]	[illegible]	[illegible]	
155	SDN1	SDN1 052296	5/21/96	1996	storm	0.31			StipAg	flow-wt comp	no	6	10		10	[illegible]	[illegible]	[illegible]	xtra NPDES/Stip Ag
156	SDN1	SDN1 052296 GRAB	5/21/96	1996	storm	0.31			StipAg	random grab	no	6	10		12	[illegible]	[illegible]	[illegible]	
157	SDN1	SDN1 062396	6/23/96	1996	storm	0.46			StipAg	flow-wt comp	no	2	8		20	[illegible]	[illegible]	[illegible]	xtra NPDES/Stip Ag
158	SDN1	SDN1 070496	7/3/96	1997	storm	0.23			NPDES	flow-wt comp	no	1	1		11	[illegible]	[illegible]	[illegible]	

All Deicing Event Sample Data

order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
159	SDN1	SDN1 071796	7/17/96	1997	storm	0.27			StipAg	flow-wt comp	no	0	2		26	[illegible]	[illegible]	6	
160	SDN1	SDN1 080296	8/2/96	1997	storm	1.01		325	StipAg	flow-wt comp	no	0	0	1	14	[illegible]	[illegible]	6	
161	SDN1	SDN1 080396	9/3/96	1997	storm	0.29		76	StipAg	flow-wt comp	no	0	3	3	10	[illegible]	[illegible]	6	
162	SDN1	SDN1 081496	8/13/96	1997	storm	0.72		144	StipAg	flow-wt comp	no	0	0	0	10	[illegible]	3	6	
163	SDN1	SDN1 081996	8/18/96	1997	storm	0.38		26	StipAg	flow-wt comp	no	0	0	0	2	3	3	6	
164	SDN1	SDN1 100496	10/4/96	1997	nonstorm	0.59		18	StipAg		no	2	6	2	6	[illegible]	[illegible]	6	Insuff sample for TSS, paired up/down sample
165	SDN1up	SDN1 121697	12/15/97	1998	storm	1		87	NPDES	flow-wt comp	no	16	23	30	5	[illegible]	[illegible]	2	
166	SDN1up	SDN1 091898	9/18/98	1999	nonstorm	0.19	0.16	456	NPDES	flow-wt comp	no	3	4	5	9	[illegible]	[illegible]	2	nonstorm
167	SDN1up	SDN1 122598	12/24/98	1999	storm	1.19	0.16	153	NPDES	flow-wt comp	yes	125	160	373	116	14	12	26	
168	SDN 1	SDN1 111699	11/16/99	2000	storm	0.6	0.07	23	NPDES	flow-wt comp	no			10	5	[illegible]	[illegible]	2	glycols not required at SDN1
169	SDN 1	SDN1 041300	4/13/00	2000	storm	0.34	0.08	74	NPDES	flow-wt comp	no				7	[illegible]	[illegible]	2	glycols not required at SDN1
170	SDN2	SDN2 111994	11/19/94	1995	storm	0.42		52	NPDES		no				10	[illegible]	[illegible]	6	
171	SDN2	SDN2 030595	3/4/95	1995	storm	0.18		158	StipAg		no				12	30	[illegible]	30	
172	SDN2	SDN2 031595	3/13/95	1995	nonstorm	0.23		24	StipAg	random grab	no				5	3	3	5	nonstorm. questionable high ammonia
173	SDN2	SDN2 040795	4/6/95	1995	storm	0.61		60	StipAg		no				15	3	3	6	
174	SDN2	SDN2 041295	4/10/95	1995	storm	0.29		56	NPDES		no				30	3	19	19	
175	SDN2	SDN2 121095	12/9/95	1996	nonstorm	0.82			Washoff	flow-wt comp	no					3	3	6	
176	SDN2	SDN2 012296 AVG	1/19/96	1996	nonstorm	1.8			SES	series avg	yes				21	22	24	44	4-day avg of 17 time-composite samples 8 glycol, 8NH3, and 6 BOD<MDL
177	SDN2	SDN2 020496 GRAB	2/3/96	1996	storm	1.6			SES	grab	yes				180	18	26	44	storm after runway deice
178	SDN2	SDN2 020696 AVG	2/3/96	1996	nonstorm	1.6			SES	series avg	yes				108	9	14	23	2.6-day avg of 6 time-composite samples. 3 glycol, 6 NH3 <MDL
179	SDN2	SDN2 021796	2/17/96	1996	storm	1.29			NPDES	flow-wt comp	no				6	6	11	17	
180	SDN2	SDN2 032096 GRAB	3/20/96	1996	nonstorm	0.13		120	StipAg	grab	no				10	[illegible]	[illegible]	6	nonstorm
181	SDN2	SDN2 041696	4/15/96	1996	storm	0.49			StipAg	flow-wt comp	no	3	6		2	[illegible]	[illegible]	6	
182	SDN2	SDN2 041996	4/19/96	1996	nonstorm	0.09		18	StipAg		no	6	16	6	2	[illegible]	[illegible]	6	nonstorm (0.02" storm)
183	SDN2	SDN2 042296	4/22/96	1996	storm	2.83			NPDES	flow-wt comp	no	12	14		7	[illegible]	[illegible]	6	
184	SDN2	SDN2 042596	4/25/96	1996	nonstorm	0.31		18	StipAg	flow-wt comp	no	5	9	5	2	[illegible]	[illegible]	6	nonstorm
185	SDN2	SDN2 051396	5/13/96	1996	storm	0.99		12	StipAg	flow-wt comp	no	2	6	2	5	[illegible]	[illegible]	6	
186	SDN2	SDN2 052296	5/21/96	1996	storm	0.31			StipAg	flow-wt comp	no	6	10		5	3	3	6	xtra NPDES/Stip Ag
187	SDN2	SDN2 052296 GRAB	5/21/96	1996	storm	0.31			StipAg	random grab	no	6	10		6	[illegible]	[illegible]	6	
188	SDN2	SDN2 062396	6/23/96	1996	storm	0.46			StipAg	flow-wt comp	no	2	6		10	[illegible]	[illegible]	6	xtra NPDES/Stip Ag
189	SDN2	SDN2 070396	7/3/96	1997	storm	0.23			StipAg	non-rep comp	no	1	1		21	3	3	6	
190	SDN2	SDN2 071796	7/17/96	1997	storm	0.27			StipAg	time-comp	no	0	2		18	[illegible]	[illegible]	6	flow-wt comp failed, reset to 20 min time comp
191	SDN2	SDN2 102196	10/21/96	1997	storm	0.68		64	NPDES	flow-wt comp	no	7	8	18	5	[illegible]	3	6	
192	SDN2	SDN2 112696 AVG	11/20/96	1997	nonstorm				SES	series avg	yes	60	237	0	249	31	134	166	9-day avg of 33 time-composite samples. 2 glycol, all NH3 <MDL
193	SDN2	SDN2 010297 AVG	12/26/96	1997	nonstorm	1.12			SES	series avg	yes	222	256	256	64	11	27	37	2-day avg of 7 time-composite samples. 1 glycol and 3 BOD<MDL
194	SDN2	SDN2 123196 AVG	12/26/96	1997	nonstorm	1.12			SES	series avg	yes	222	256	256	1180	316	370	684	6-day avg of 20 time-composite samples. 1 BOD and 17 NH3 <MDL
195	SDN2	SDN2 011697	1/16/97	1997	storm	1.21		154	NPDES	flow-wt comp	no	22	67	130	120	3	51	51	
196	SDN2	SDN2 041997	4/19/97	1997	storm	1.16		64	NPDES	flow-wt comp	no	6	6	9	2	[illegible]	[illegible]	6	
197	SDN2	SDN2 110498 GRAB	11/3/98	1999	storm	1.82	0.48	35	NPDES	grab	no	8	11	8	2	[illegible]	[illegible]	2	N. CARGO PUMP STATION BYPASS
198	SDN2	SDN2 112598 GRAB	11/25/98	1999	nonstorm	3.45	0.32	8	NPDES	grab	no	15	26	15	2	[illegible]	[illegible]	2	from North Cargo Pump Station bypass
199	SDN2	SDN2 012699 GRAB	1/26/99	1999	nonstorm	1.16	0.1	33	NPDES	grab	no					1	1	2	BYPASS SAMPLE, STORM<<DESIGN, MAINT NOTIFIED (O&M IN PROGRESS)
200	SDN2	SDN2 082499 GRAB	8/24/99	1999	storm	1.12	0.35	10	NPDES	grab	no					1	[illegible]	2	30 MIN PUMP STATION BYPASS
201	SDN 2	SDN2 121599 grab	12/15/99	2000	Other Storm	1.26	0.32	8	NPDES	first flush grab	no			3		4	[illegible]	6	no other bypasses in winter 2000
202	SDN3	SDN3 111994	11/19/94	1995	storm	0.42		52	NPDES		no				4	[illegible]	[illegible]	6	
203	SDN3	SDN3 020695	2/6/95	1995	baseflow	0			NPDES		no					[illegible]	[illegible]	6	
204	SDN3	SDN3 021395	2/13/95	1995	baseflow	0			NPDES		yes				3	[illegible]	[illegible]	6	
205	SDN3	SDN3 021695	2/15/95	1995	storm	1.1		86	NPDES		yes				60	[illegible]	[illegible]	6	
206	SDN3	SDN3 030595	3/4/95	1995	storm	0.18		158	StipAg		no				3	[illegible]	[illegible]	6	
207	SDN3	SDN3 030995	3/9/95	1995	storm	2.16		88	StipAg		no				3	[illegible]	[illegible]	6	
208	SDN3	SDN3 031695	3/13/95	1995	nonstorm	0.23		24	StipAg	random grab	no				6	[illegible]	[illegible]	6	
209	SDN3	SDN3 040595	4/4/95	1995	storm	0.17		270	StipAg		no				3	[illegible]	[illegible]	6	
210	SDN3	SDN3 011496	1/13/96	1996	storm	0.37			NPDES	flow-wt comp	no				6	[illegible]	[illegible]	6	

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order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
211	SDN3	SDN3 012096 AVG	1/19/96	1996	nonstor	1.8			StipAg	series avg	yes				30	3	3	6	36-hr avg of 4 time-composite samples. all glycol <MDL
212	SDN3	SDN3 020496	2/3/96	1996	storm	1.8			StipAg	flow-wt comp	yes					3	3	[illegible]	storm after runway deice
213	SDN3	SDN3 033096 GRAB	3/29/96	1996	nonstor	0.13		120	StipAg	grab	no				6	3	[illegible]	[illegible]	nonstorm, insuff flow to enable sampler
214	SDN3	SDN3 040196	3/31/96	1996	storm	0.64			StipAg	flow-wt comp	no				5	[illegible]	[illegible]	[illegible]	xtra NPDES/Stip Ag
215	SDN3	SDN3 041296 GRAB	4/11/96	1996	nonstor	0.21		110	StipAg	grab	no	10	14	17	4	[illegible]	[illegible]	[illegible]	nonstorm
216	SDN3	SDN3 041696	4/15/96	1996	storm	0.49			NPDES	flow-wt comp	no	3	8		2	[illegible]	[illegible]	[illegible]	
217	SDN3	SDN3 041996	4/19/96	1996	nonstor	0.09		16	StipAg		no	6	16	6	2	[illegible]	[illegible]	[illegible]	nonstorm
218	SDN3	SDN3 042296	4/22/96	1996	storm	2.83			StipAg	flow-wt comp	no	12	14		7	[illegible]	[illegible]	[illegible]	xtra NPDES/Stip Ag
219	SDN3	SDN3 042596	4/25/96	1996	nonstor	0.31		16	StipAg	flow-wt comp	no	6	9	5	[illegible]	3	[illegible]	[illegible]	nonstorm
220	SDN3	SDN3 051396	5/13/96	1996	storm	0.99		12	StipAg	flow-wt comp	no	2	6	2	[illegible]	3	[illegible]	6	
221	SDN3	SDN3 052296	5/21/96	1996	storm	0.31			StipAg	flow-wt comp	no	6	10		2	3	[illegible]	6	
222	SDN3	SDN3 120496	12/4/96	1997	storm	0.82		44	NPDES	flow-wt comp	no	23	92	92	2	3	[illegible]	6	
223	SDN3	SDN3 122196	12/19/96	1997	storm	0.36		103	NPDES	flow-wt comp	no	36	44	76	4	3	3	6	
224	SDN3	SDN3 030697	3/5/97	1997	storm	0.39		42	NPDES	flow-wt comp	no	31	61	61	2	6	3	6	
225	SDN3	SDN3 121097	12/15/97	1998	storm	1		87	NPDES	flow-wt comp	no	15	23	30	2	1	1	2	HAD QC DUPLICATE: GOOD DUPLICATION
226	SDN3	SDN3 122498	12/24/98	1999	storm	1.19	0.16	153	NPDES	flow-wt comp	yes	125	160	373	222	[illegible]	14	15	
227	SDS4	SDS4 111894	11/18/94	1995	storm	0.42		62	NPDES		no				5	[illegible]	3	6	
228	SDS4	SDS4 021395	2/13/95	1995	baseflo	0			NPDES		yes				5	3	3	6	
229	SDS4	SDS4 021595	2/15/95	1995	storm	1.1		86	NPDES		yes				83	3	6	[illegible]	
230	SDS4	SDS4 011496	1/13/96	1996	storm	0.37			NPDES	flow-wt comp	no				6	3	3	6	
231	SDS4	SDS4 012096 AVG	1/19/96	1996		1.8			SES	series avg	yes				138	3	4	6	20-hr avg of 8 discrete samples. 4 glycol <MDL
232	SDS4	SDS4 020496 AVG	2/3/96	1996	storm	1.8			Washoff	series avg	yes				242	13	18	31	12-hr avg of 8 discrete samples. all BOD>result
233	SDS4	SDS4 020596	2/3/96	1996	nonstor	1.8			Washoff		yes				13	14	7	21	
234	SDS4	SDS4 041696	4/15/96	1996	storm	0.49			NPDES	flow-wt comp	no	3	8		6	3	[illegible]	[illegible]	
235	SDS4	SDS4 042296	4/22/96	1996	storm	2.83			StipAg	flow-wt comp	no	12	14		6	3	[illegible]	[illegible]	
236	SDS4	SDS4 070496	7/3/96	1997	storm	0.23			NPDES	flow-wt comp	no	1	1		6	[illegible]	[illegible]	[illegible]	
237	SDS4	SDS4 120496	12/4/96	1997	storm	0.82		44	NPDES	flow-wt comp	no	23	92	92	2	[illegible]	[illegible]	[illegible]	
238	SDS4	SDS4 041997	4/19/97	1997	storm	1.10		64	NPDES	flow-wt comp	no	6	8	9	4	[illegible]	[illegible]	[illegible]	
239	SDS4	SDS4 011298	1/12/98	1998	nonstor	1.13		123	NPDES	time-comp	yes	181	266	457	[illegible]	[illegible]	[illegible]	[illegible]	24-hour time composite
240	SDS4	SDS4 030898	3/8/98	1998	storm	0.86		132	NPDES	flow-wt comp	no	16	42	164	[illegible]	[illegible]	[illegible]	[illegible]	makeup comp for 88Qw non-rep comp, has extra grab
241	SDS4	SDS4 111998	11/19/98	1999	storm	2.34	0.16	73	NPDES	flow-wt comp	no	20	34	44	[illegible]	[illegible]	[illegible]	[illegible]	
242	SDW3	SDW3 020496 AVG	2/3/96	1996	storm	1.8			SES	series avg	yes				76	6	6	12	24-hr avg of 3 time-comp samples. 2 glycol<MDL
243	SDN4	SDN4 120496	12/4/96	1997	storm	0.82		44	NPDES	flow-wt comp	no	23	92	92	6	3	[illegible]	[illegible]	
244	SDN4	SDN4 030597	3/5/97	1997	storm	0.39		42	NPDES	flow-wt comp	no	31	61	61	2	3	3	[illegible]	
245	SDN4	SDN4 102897	10/28/97	1998	storm	0.47		26	NPDES	flow-wt comp	no	9	12	9	7	1	1	2	
246	SDN4	SDN4 121097	12/15/97	1998	storm	1		87	NPDES	flow-wt comp	no	15	23	30	6	1	1	2	
247	SDN4	SDN4 011298	1/12/98	1998	nonstor	1.13		123	NPDES	time-comp	yes	181	266	457	120	1	1	2	24-hour time composite
248	SDN4	SDN4 030198	3/1/98	1998	storm	0.98		6	NPDES	flow-wt comp	no	11	10	11	2	1	1	2	
249	SDN4	SDN4 030898	3/8/98	1998	storm	0.86		132	NPDES	flow-wt comp	no	15	42	154	4	1	1	2	backup monthly sample in case 3/1/98 sample didn't qualify under new permit
250	SDN4	SDN4 062598	6/24/98	1998	storm	0.58		87	NPDES	flow-wt comp	no	3	5	7	6	1	1	2	
251	SDN4	SDN4 092598	9/24/98	1999	storm	0.47	0.26	148	NPDES	flow-wt comp	no	0	0	3	7	1	2	3	GLYCOLS MAY BE HIGH BIASED, DUPE WAS <MDL
252	SDN4	SDN4 100398	10/3/98	1999	storm	0.4	0.22	36	NPDES	flow-wt comp	no	2	3	2	2	1	1	2	
253	SDN4	SDN4 102798	10/27/98	1999	storm	0.84	0.19	72	NPDES	non-rep comp	no	5	6	12	6	1	1	2	not representative, insufficient duration (~1hr)
254	SDN4	SDN4 110498	11/3/98	1999	storm	1.82	0.48	35	NPDES	flow-wt comp	no	6	11	6	2	1	1	2	
255	SDN4	SDN4 111398	11/11/98	1999	storm	0.98	0.15	31	NPDES	flow-wt comp	no	16	28	16	2	1	1	2	concurrent WET sample
256	SDN4	SDN4 121798	12/17/98	1999	nonstor	0.11	0.03	33	NPDES	flow-wt comp	no	20	33	20		1	1	2	non-storm, suitable for glycols only
257	SDN4	SDN4 122698	12/24/98	1999	storm	1.19	0.16	153	NPDES	flow-wt comp	yes	125	160	373	168	7	27	34	
258	SDN4	SDN4 011499	1/13/99	1999	storm	1.07	0.16	86	NPDES	flow-wt comp	no	12	24	34	2	1	[illegible]	2	concurrent WET sample
259	SDN4	SDN4 020499	2/3/99	1999	storm	0.28	0.07	27	NPDES	flow-wt comp	no	8	18	8	2	1	[illegible]	2	
260	SDN4	SDN4 031399	3/12/99	1999	storm	0.83	0.07	71	NPDES	flow-wt comp	no	13	43	53	2	1	[illegible]	2	
261	SDN4	SDN4 032899	3/27/99	1999	storm	0.24	0.07	28	NPDES	flow-wt comp	no	7	17	7	2	1	[illegible]	2	

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All Deicing Event Sample Data

order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
262	SDN 4	SDN4 110899	11/5/99	2000	storm	0.68	0.11	44	NPDES	flow-wt comp	no	22	7			[illegible]	[illegible]	2	
263	SDN 4	SDN4 111699	11/16/99	2000	storm	0.6	0.07	23	NPDES	flow-wt comp	no	10	4			[illegible]	[illegible]	2	
264	SDN 4	SDN4 120899	12/8/99	2000	storm	0.49	0.09	40	NPDES	flow-wt comp	no	43	8			[illegible]	2	3	duplicate had EG<MD; PG result for this sample may be <MDL
265	SDN 4	SDN4 121799	12/17/99	2000	storm	0.34	0.06	26	NPDES	flow-wt comp	no	11	2			[illegible]	[illegible]	2	
266	SDN 4	SDN4 013100	1/31/00	2000	storm	1.76	0.15	9	NPDES	flow-wt comp	no	12	2			[illegible]	[illegible]	2	
267	SDN 4	SDN4 031400	3/13/00	2000	storm	0.47	0.13	49	NPDES	flow-wt comp	no	44	4			[illegible]	[illegible]	2	
268	SDN 4	SDN4 041300	4/13/00	2000	storm	0.34	0.08	74	NPDES	flow-wt comp	no		8			[illegible]	[illegible]	2	

shaded cells indicate result <MDL, value shown is 1/2 MDL

		dryant aircraft	BOD5	E-glycol	P-glycol	total glycols
All outfalls	count	146	227	268	268	268
	max	457	1180	316	2600	2650
	95th	373	203	18	44	60
	75th	76	18	3	3	5
	median	21	7	3	3	5
	25th	8.0	4.2	1.0	1.0	2.0
	min	0.0	1.0	1.0	1.0	2.0
	sd	114	109	28	181	180
	CV, %	158%	278%	405%	759%	625%
	# non-detected		41	221	209	203
	% non-detected		18%	82%	78%	76%

AR 045762

All Deicing Event Sample Data

order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
										SDE4 (002)	count			38	44	51	51	51	
											max			457	335	21	71	92	
											95th			278	92	14	23	37	
											75th			73	12	3	3	6	
											median			24	7	1	3	4	
											25th			10.3	4.3	1.0	1.0	2.0	
											min			0.0	2.0	1.0	1.0	2.0	
											sd			110	60	5	12	16	
											CV, %			148%	240%	137%	218%	177%	
											# non-detected				9	42	38	38	
											% non-detected				20%	82%	75%	75%	
										SDS1 (003)	count			18	26	38	38	38	
											max			457	428	280	2800	2859	
											95th			290	226	68	284	373	
											75th			107	73	3	5	25	
											median			31	16	3	3	5	
											25th			13.5	6.6	1.0	1.0	2.0	
											min			0.0	2.0	1.0	1.0	2.0	
											sd			116	96	45	468	477	
											CV, %			141%	182%	309%	418%	378%	
											# non-detected				1	30	28	26	
											% non-detected				4%	79%	74%	68%	
										SDS3 (005)	count			33	42	49	49	49	
											max			457	648	32	366	384	
											95th			308	260	21	67	93	
											75th			53	25	5	10	13	
											median			26	13	3	3	6	
											25th			12.0	6.5	1.0	2.1	5.0	
											min			2.0	2.0	1.0	1.0	2.0	
											sd			111	126	7	56	57	
											CV, %			149%	223%	140%	313%	253%	
											# non-detected				4	35	29	28	
											% non-detected				10%	71%	59%	57%	
										SDN1 (006) (includes both stations)	count			12	30	31	31	31	
											max			373	116	14	12	26	
											95th			184	36	4	3	9	
											75th			12	14	3	3	6	
											median			4	9	3	3	5	
											25th			1.8	5.0	2.5	2.5	5.0	
											min			0.0	2.0	1.0	1.0	2.0	
											sd			106	21	2	2	4	
											CV, %			284%	150%	79%	71%	76%	
											# non-detected				2	29	30	29	
											% non-detected				7%	94%	97%	94%	
										SDN2 (007)	count			12	28	32	32	32	
											max			256	1180	315	370	684	
											95th			256	225	33	88	102	
											75th			48	24	6	12	20	
											median			9	10	3	3	5	
											25th			4.5	4.8	2.5	2.5	5.0	
											min			0.0	2.0	1.0	1.0	2.0	
											sd			89	225	55	68	122	
											CV, %			186%	300%	351%	300%	320%	
											# non-detected				5	23	23	22	
											% non-detected				18%	72%	72%	69%	

AR 045763

All Deicing Event Sample Data

order	outfall	POS ID	event	report	type	depth	maxint	dryant	purpose	type	ground deice?	24hr aircraft	48hr aircraft	dryant aircraft	BOD5	E-glycol	P-glycol	total glycols	comments
										SDN3	count			9	23	25	25	25	
										(008)	max			373	222	6	14	16	
											95th			261	84	3	3	6	
											75th			76	5	3	3	5	
											median			30	3	3	3	5	
											25th			6.0	2.0	2.5	2.5	5.0	
											min			2.0	1.0	1.0	1.0	2.0	
											sd			117	48	1	2	2	
											CV, %			162%	273%	34%	62%	40%	
											# non-detected				8	24	24	23	
											% non-detected				35%	96%	96%	92%	
										SDS4	count			5	15	15	15	15	
										(009)	max			457	242	14	18	31	
											95th			396	189	13	10	24	
											75th			154	10	3	3	5	
											median			92	6	3	3	6	
											25th			44.0	4.5	2.5	2.5	5.0	
											min			9.0	2.0	1.0	1.0	2.0	
											sd			179	69	4	4	6	
											CV, %			119%	195%	110%	115%	110%	
											# non-detected				3	13	12	12	
											% non-detected				20%	87%	80%	80%	
										SDN4	count			19	19	27	27	27	
										(011)	max			457	168	7	27	34	
											95th			381	125	6	6	10	
											75th			52	7	1	1	2	
											median			16	4	1	1	2	
											25th			8.0	2.0	1.0	1.0	2.0	
											min			2.0	2.0	1.0	1.0	2.0	
											sd			126	47	1	6	6	
											CV, %			180%	210%	99%	217%	168%	
											# non-detected				9	25	25	25	
											% non-detected				47%	93%	93%	93%	

AR 045764

APPENDIX D WHOLE EFFLUENT TOXICITY SAMPLE DATA SUMMARIES

WET testing/Source tracing sample results

[illegible]	stormdate	type	event	t-Cu	t-Pb	t-Zn	d-Cu	d-Pb	d-Zn	hardness	WET survival
SDN1 36INCH 070299 GRAB 2	02-Jul-99	grab	storm	0.0256	<0.002	0.205					not tested
SDN1 36INCH 070299 GRAB 1	02-Jul-99	grab	storm	0.0316	<0.002	0.2					not tested
SDN1 10INCH 070299 GRAB 2	02-Jul-99	grab	storm	0.0422	<0.002	0.422					not tested
SDN1 10INCH 070299 GRAB 1	02-Jul-99	grab	storm	0.0276	<0.002	0.251					not tested
SDN1 36inch 110699	05-Nov-99	comp	storm	0.0078	0.005	0.103	0.0045	<0.002	0.056	11.9	70%
SDN1 10inch 110699	05-Nov-99	comp	storm	0.0064	<0.002	0.104	0.0061	<0.002	0.097	2.15	0%

WET testing done using daphnia Pulex 100% sample concentration

See Whole Effluent Testgin at Seattle-Tacoma International Airport: Final Report, May 2000

APPENDIX E OTHER SAMPLE DATA

storm date	POS ID	event	Fecals (MPN)	TPH-Dx (mg/l)	TSS (mg/l)	Turb (NTU)	BOD5 (mg/l)	total glycols (mg/l)	TR Cu (mg/l)	TR Pb (mg/l)	TR Zn (mg/l)	comments
Field Equipment Blanks												
05-Nov-99	SDN1 110599 bottle blank	1					<4		<0.002	<0.002	<0.005	bottle blank, prior to sampling
05-Nov-99	SDN1 110699 blank	1					<4		<0.002	<0.002	<0.005	eqpt blank after sampling
08-Dec-99	SDN3 120899 Blank	1	<2	<0.15	<0.05	0.4			<0.002	<0.002	0.004	
18-Apr-00	NPIN 041400 blank	1			<0.05	0.35			<0.002	<0.002	<0.005	
Stormwater Composite Sample Duplicates												
02-Jul-99	SDS3 070299 DUPE	1			11	12	4.6		0.028	0.001	0.030	
	SDS3 070299				11	14	4.7		0.025	0.001	0.028	
	RPD				0%	-15%	-2%		11%	0%	7%	
05-Nov-99	SDN4 110699 DUPE	1			12	19	7.62	2	0.020	0.001	0.024	
	SDN4 110699				12	17	6.94	2	0.017	0.001	0.023	
	RPD				0%	11%	9%	0%	15%	0%	4%	
16-Nov-99	SDE4 111799 DUPE	1			19	27	2	2	0.011	0.005	0.079	
					17	25	2	2	0.011	0.005	0.077	
	RPD				11%	8%	0%	0%	3%	-11%	3%	
04-Dec-99	SDS3 120599 DUPE	1			6.4	6.3	47.0	15.4	0.012	0.001	0.023	
	SDS3 120599				6.4	6.3	48.4	21	0.013	0.001	0.031	
	RPD				0%	0%	-3%		-6%	0%	-30%	
08-Dec-99	SDN4 120999 dupe	1			3.6	5	5.6	2.8	0.017	0.001	0.022	
					2.8	6.2	5.4	3.1	0.018	0.001	0.031	
	RPD				25%	-21%	3%	-10%	-6%	0%	-34%	
31-Jan-00	EY 013100 dupe	1			100	82	33.5	2	0.098	0.075	0.086	sampling problem for metals,
	EY 013100				96	71	24.1	2	0.020	0.026	0.179	but metals analysis not req'd,
	RPD				4%	14%	33%	0%	134%	96%	-70%	
13-Mar-00	SDN4 031400 dupe	1			11	3.1	<4	2	0.012	0.001	0.0025	
	SDN4 031400				14	6	4.04	2	0.030	0.001	0.0025	
	RPD				-24%	-64%	na	0%	-86%	0%	0%	

yellow shading indicates value <MDL replaced with 1/2 MDL

APPENDIX F SOURCE TRACING SAMPLE DATA SUMMARIES

SDE4 source tracing analyses in routine NPDES Grab samples

[illegible]	[illegible]	[illegible]	Fecals (MPN)	pH	NH3?	TKN?	[illegible]	[illegible]	Sum?	Cond	hard
first flush grab	02-Jul-99	SDE4 070299 grab	900	6.6	0.993	2.96	0.34	0.175	0.527	101	28
first flush grab	16-Nov-99	SDE4 111699 GRAB	>1600	6.3							
first flush grab	24-Nov-99	SDE4 112499 GRAB	21	6.9	0.391	0.74	0.53	0.349	0.352	92.0	34
first flush grab	04-Dec-99	SDE4 120499 grab	50	6.8	0.388	0.987	0.39	0.617	0.100	79.4	32
first flush grab	13-Mar-00	SDE4 031300 grab	170	6.7							
first flush grab	13-Apr-00	SDE4 041300 GRAB	130	6.7							

Table 1. Stormwater data for the Sea-Tac Airport microbial source tracking study.

Site	Date/Time	Sample ID	Event	Fecal coliform (CFU/100 mL)	Q	Enterococcus (CFU/100 mL)	Q	No. of Isolates
SDE4-065	4/12/00 11:10	SDE4-065041200-1	Base 1+2	8	E	NA		
SDE4-065	4/12/00 12:30	SDE4-065041200-2	Base 1+2	2	L	NA		
SDE4-996	4/12/00 10:05	SDE4-996041200-1	Base 1+2	2	L	NA		
SDE4-996	4/12/00 12:10	SDE4-996041200-2	Base 1+2	2	L	NA		
SDS3-OUT	4/12/00 13:05	SDS3-OUT041200-1	Base 1+2	2	L	NA		
SDS3-OUT	4/12/00 14:25	SDS3-OUT041200-2	Base 1+2	2	L	NA		
DMC-200	4/12/00 11:32	DMC-200041200-1	Base 1+2	8	E	NA		
DMC-200	4/12/00 14:00	DMC-200041200-2	Base 1+2	6	E	NA		
SDE4-065	4/25/00 9:15	SDE4-065042500-1	Storm 1+2	2,700		NA		
SDE4-065	4/25/00 11:00	SDE4-065042500-2	Storm 1+2	160	E	NA		
SDE4-017	4/25/00 8:40	SDE4-017042500-1	Storm 1+2	290		NA		
SDE4-017	4/25/00 11:30	SDE4-017042500-2	Storm 1+2	700		NA		
SDE4-996	4/25/00 8:15	SDE4-996042500-1	Storm 1+2	260		NA		
SDE4-996	4/25/00 10:40	SDE4-996042500-2	Storm 1+2	42		NA		
SDS3-OUT	4/25/00 10:15	SDS3-OUT042500-1	Storm 1+2	41		NA		
SDS3-OUT	4/25/00 12:20	SDS3-OUT042500-2	Storm 1+2	19		NA		
DMC-200	4/25/00 10:00	DMC-200042500-1	Storm 1+2	2,000		NA		
DMC-200	4/25/00 11:50	DMC-200042500-2	Storm 1+2	1,900		NA		
SDE4-B	4/25/00 8:10	SDE4-996042500-B	Storm 1+2	1	L	NA		NA
SDE4-065	5/8/00 0:00	SDE4-065050800-1	Storm 3	1,300		NA		
SDE4-017	5/8/00 0:00	SDE4-017050800-1	Storm 3	1,440		NA		
SDE4-996	5/8/00 0:00	SDE4-996050800-1	Storm 3	22	E	NA		
SDS3-OUT	5/8/00 0:00	SDS3-OUT050800-1	Storm 3	64		NA		
DMC-200	5/8/00 0:00	DMC-200050800-1	Storm 3	560		NA		
SDE4-B	5/8/00 0:00	SDE4-996050800-B	Storm 3	2	L	NA		NA
SDE4-065	5/9/00 0:00	SDE4-065050900-1	Storm 4+5	3,200	E	660		
SDE4-065	5/9/00 0:00	SDE4-065050900-2	Storm 4+5	5,200		760		
SDE4-017	5/9/00 0:00	SDE4-017050900-1	Storm 4+5	2,400	E	3,600	E	
SDE4-017	5/9/00 0:00	SDE4-017050900-2	Storm 4+5	540		1,160		
SDE4-996	5/9/00 0:00	SDE4-996050900-1	Storm 4+5	800		220	E	
SDE4-996	5/9/00 0:00	SDE4-996050900-2	Storm 4+5	1,180		1,140		
SDS3-OUT	5/9/00 0:00	SDS3-OUT050900-1	Storm 4+5	102		114		
SDS3-OUT	5/9/00 0:00	SDS3-OUT050900-2	Storm 4+5	38		72		
DMC-200	5/9/00 0:00	DMC-200050900-1	Storm 4+5	700		110		
DMC-200	5/9/00 0:00	DMC-200050900-2	Storm 4+5	700		1,480		
SDE4-B	5/9/00 0:00	SDE4-996050900-B	Storm 4+5	2	E	2	L	NA
SDS3-OUT	5/15/00 0:00	SDS3-OUT051600-1	Base 3+4	2	E	NA		
SDS3-OUT	5/15/00 0:00	SDS3-OUT051600-2	Base 3+4	2	E	NA		
DMC-200	5/15/00 0:00	DMC-200051600-1	Base 3+4	52		NA		
DMC-200	5/15/00 0:00	DMC-200051600-2	Base 3+4	70		NA		
SDE4-B	5/15/00 0:00	SDE4-996051600-B	Base 3+4	1	L	NA		NA
SDE4-065	5/26/00 0:00	SDE4-065052600-1	Storm 6+7	520		NA		

Table 1. Stormwater data for the Sea-Tac Airport microbial source tracking study.

Site	Date/Time	Sample ID	Event	Fecal coliform (CFU/100 mL)	Q	Enterococcus (CFU/100 mL)	Q	No. of Isolates
SDE4-065	5/26/00 0:00	SDE4-065052600-2	Storm 6+7	1,060		NA		
SDE4-017	5/26/00 0:00	SDE4-017052600-1	Storm 6+7	320	E	NA		
SDE4-017	5/26/00 0:00	SDE4-017052600-2	Storm 6+7	660		NA		
SDE4-996	5/26/00 0:00	SDE4-996052600-1	Storm 6+7	440		NA		
SDE4-996	5/26/00 0:00	SDE4-996052600-2	Storm 6+7	100	E	NA		
SDS3-OUT	5/26/00 0:00	SDS3-OUT052600-1	Storm 6+7	90		NA		
SDS3-OUT	5/26/00 0:00	SDS3-OUT052600-2	Storm 6+7	54		NA		
DMC-200	5/26/00 0:00	DMC-200052600-1	Storm 6+7	2,160		NA		
DMC-200	5/26/00 0:00	DMC-200052600-2	Storm 6+7	1,040		NA		
SDE4-B	5/26/00 0:00	SDE4-996052600-B	Storm 6+7	2	L	NA		NA
SDE4-065	6/6/00 0:00	SDE4-065052600-1	Storm 8+9	220	E	NA		
SDE4-065	6/6/00 0:00	SDE4-065052600-2	Storm 8+9	2,200	E	NA		
SDE4-017	6/6/00 0:00	SDE4-017052600-1	Storm 8+9	600		NA		
SDE4-017	6/6/00 0:00	SDE4-017052600-2	Storm 8+9	10,000		NA		
SDE4-996	6/6/00 0:00	SDE4-996052600-1	Storm 8+9	2	E	NA		
SDE4-996	6/6/00 0:00	SDE4-996052600-2	Storm 8+9	40	E	NA		
SDS3-OUT	6/6/00 0:00	SDS3-OUT052600-1	Storm 8+9	4	E	NA		
SDS3-OUT	6/6/00 0:00	SDS3-OUT052600-2	Storm 8+9	60	E	NA		
DMC-200	6/6/00 0:00	DMC-200052600-1	Storm 8+9	66		NA		
DMC-200	6/6/00 0:00	DMC-200052600-2	Storm 8+9	148		NA		
SDE4-B	6/6/00 0:00	SDE4-996052600-B	Storm 8+9	2	L	NA		NA
SDE4-065	6/12/00 0:00	SDE4-065052600-1	Storm 10+11	2,800	E			
SDE4-065	6/12/00 0:00	SDE4-065052600-2	Storm 10+11	1,600	E			
SDE4-017	6/12/00 0:00	SDE4-017052600-1	Storm 10+11	400	E			
SDE4-017	6/12/00 0:00	SDE4-017052600-2	Storm 10+11	3,800	E			
SDE4-996	6/12/00 0:00	SDE4-996052600-1	Storm 10+11	1,400	E			
SDE4-996	6/12/00 0:00	SDE4-996052600-2	Storm 10+11	64				
SDS3-OUT	6/12/00 0:00	SDS3-OUT052600-1	Storm 10+11	60				
SDS3-OUT	6/12/00 0:00	SDS3-OUT052600-2	Storm 10+11	84				
DMC-200	6/12/00 0:00	DMC-200052600-1	Storm 10+11	120	E			
DMC-200	6/12/00 0:00	DMC-200052600-2	Storm 10+11	820				
SDE4-B	6/12/00 0:00	SDE4-996052600-B	Storm 10+11	2	L			NA

NA = not analyzed
Qalifiers (Q):
L = less than indicated detection limit
E = estimated due to less than 20 colonies counted

AR 045779

Table 2. Wastewater and animal feces samples collected for the Sea Tac Airport microbial source tracking study.

Sample	Date/Time	Fecal Coliform (CFU/100 mL)	Q	No. of Isolates	Sample Location	Sample Description
Wastewater						
AWW-1	3/29/00 11:45	1,600	G*		Northwest 35 (Amsterdam) and 95 (Minneapolis)	Blue
AWW-2	5/4/00 13:20	10,000,000			Delta (St. Louis)	Blue
AWW-3	5/25/00 12:30	48,000,000	G		American (several domestic and Tokyo)	Blue
AWW-4	5/25/00 12:45	NA			Northwest (several domestic and Tokyo)	Blue
AWW-5	5/25/00 13:00	NA			American (several domestic)	Blue
AWW-6	6/15/00 11:30	41,000,000	G			
MWW-1	3/29/00 11:15	6,000			MWW (sanitary sewer)	Grey
MWW-2	5/4/00 14:00	39,000			MWW (sanitary sewer)	Grey
MWW-3	5/25/00 11:30	1,100,000			MWW (sanitary sewer)	Grey
MWW-4	5/25/00 12:00	NA			MWW (sanitary sewer)	Grey
MWW-5	6/15/00 11:00	1,900,000				
Animal Feces						
CROW-1	5/1/00	NA			Airport unknown (by USFW)	Black
DOG-1	3/29/00 11:20	NA			Grass 100 feet W of MWW	Light brown; 2.5 cm D
DOG-2	3/29/00 11:30	NA			Grass between Delta and Alaska hangers	Light brown; 1.9 cm D
DOG-3	3/29/00 11:35	NA			Grass between Delta and Alaska hangers	Light brown; 1.9 cm D
GOOSE-1	3/29/00 13:00	NA			40 yards NNE of outlet from west pond in golf course	Dark green with white; 1 cm D
GOOSE-2	5/1/00	NA			Airpot unknown (by USFW)	Dark green with white
GOOSE-3	5/1/00	NA			Airport unknown (by USFW)	Dark green with white
GOOSE-2	5/4/00 11:15	NA			Terminal A roof; UNKNOWN ORIGIN	Not noted
PIGEON-1	3/29/00 14:00	NA			Circle drive at lower floor in parking lot	Dark green with white; 0.3 cm D coil
PIGEON-2	3/29/00 14:10	NA			Circle drive at upper floor in parking lot	Dark green with white; 0.3 cm D coil
PIGEON-3	5/4/00 11:30	NA			Terminal A roof	Not noted
PIGEON-4	5/4/00 11:45	NA			Terminal A roof	Not noted
STARLING-1	5/8/00	NA			Airport trap (by USFW)	Black
STARLING-2	5/8/00	NA			Airport trap (by USFW)	Black
WIGEON-1	3/29/00 12:50	NA			20 feet N of outlet from west pond in golf course	Black; 0.5 cm D
WIGEON-2	3/29/00 12:55	NA			40 feet N of outlet from west pond in golf course	Dark green; 0.5 cm D

NA = not analyzed
Qualifiers (Q): G = greater than number indicated; * = most probable number

AR 045781

APPENDIX G OUTFALL INSPECTION SUMMARY

1999 Dry Weather Inspection for Permitted Outfalls
Conducted on 9/14-9/15/99
by Scott Tobiason, Port of Seattle

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						[illegible]
SDE4	002	manhole SDE4-47	15-Sep	trickle	0	0	0	0	0	0	insignificant flow (<<1 gpm), no baseflow sample possible
SDS1	003	outfall	15-Sep	no flow	no discharge						no flow, pipe was dry
SDS2	004	outfall	14-Sep	no flow	no discharge						pipe and ditch were dry
SDS3	005	outfall	14-Sep	trickle	0	1	0	0	0	0	insignificant discharge (too little to sample), no problems apparent
SDN1	006	manhole SDN1-22	15-Sep	no flow	no discharge						no flow, pipe was barely damp
SDN2	007	manhole	14-Sep	no flow	no discharge						no flow from pump station
SDN3	008	outfall	14-Sep	trickle	0	0	0	0	0	0	insignificant discharge (too little to sample), no problems apparent
SDS4	009	outfall	14-Sep	no flow	no discharge						
SDW3	010	manhole	14-Sep	no flow	no discharge						pipe dry, 188th St North (west bound) road ditch recently cleaned to bare dirt, all vegetation removed (by City)
SDN4	011	outfall	14-Sep	no flow	no discharge						pipe dry
Eng Yard	012	drain inlet	15-Sep	no flow	no discharge						recent concrete cutting water on surface, maintenance notified
Taxi Yard	013	drain inlet	15-Sep	no flow	no discharge						dumpster area dirty, debris on ground, maintenance notified
Subbasin B	014	outfall	14-Sep	no flow	no discharge						pipe dry, 188th St North (west bound) road ditch recently cleaned to bare dirt, all vegetation removed (by City)
Subbasin D	015	outfall	14-Sep	no flow	no discharge						pipe dry, 188th St North (west bound) road ditch recently cleaned to bare dirt, all vegetation removed (by City)

notes:
*** note presence and magnitude: 0 = absent, 5 = present to considerable degree
1. Inspected visually from surface through inlets, or by pumped sample for outfalls with monitoring points requiring confined-space entry (SDE4, SDN1, SDN2, EY, TY)
2. Monthly sampling sites visited on numerous other dates during the period, noted in remarks
3. Depths of flow are approximate, unless registered by local monitoring equipment

Other observations at non-permit locations:

S 28th St outfall	n/a	outfall									optional location not inspected
DM Creek above SDS1	n/a	creek	15-Sep	~ 4"	0	0	0	0	0	0	
DM Creek *Weir at Golf Course*	n/a	creek									optional location not inspected
DM Creek at SDS4	n/a	creek	15-Sep	~ 4"	0	0	0	0	0	0	
L. Reba outlet	n/a	outlet									optional location not inspected

AR 045785

Port of Seattle

1999-2000
Wet Season Outfall Inspection Summary

outfall	total number of visits	01-Jul-99	02-Jul-99	05-Jul-99	06-Jul-99	14-Jul-99	16-Jul-99	17-Jul-99	19-Jul-99	20-Jul-99	23-Jul-99	02-Aug-99	20-Aug-99	03-Sep-99
SDE4	30													
SDS1	21	M (N)	S (N)*1	M (N)								M (N)	M (N)	
SDS2	6													
SDS3	23	M (N)	S (N)	M (N)										
SDS4	5													
SDS7	5													
SDS5	5													
SDS6	5													
SDN3	5													
SDN4	29					M (N)	M (N)	S (N)	M (N)		M (N)		M (N)	M (N)
SDN2	23													
SDN1	33	M (N)	S (N)		M (N)									
EY	8													
TY	11	M (N)	S (N)		M (N)									
N.Cargo	4									*D.L.*				

S= Sample
N.A. = sampled but not analyzed
D = duplicate taken
B = blank taken
M = visited for set up or for maintenance
(N) = Information from site visit log book
D.L. = Data download from meter
* = info from chain of custody

Observations:
1. 7/2/99 storm runoff at SDS1 had foam below outfall, sampled and analyzed for surfactants in multiple samples.

AR 045786

Port of Seattle

1999-2000
Wet Season Outfall Inspection Summary

outfall	22-Sep-99	23-Sep-99	30-Sep-99	01-Oct-99	02-Nov-99	03-Nov-99	04-Nov-99	05-Nov-99	08-Nov-99	08-Nov-00	10-Nov-99	11-Nov-99	14-Nov-99	16-Nov-99
SDE4				M (N)	M (N)		M (N)	S (N)	M (N)				M (N)	S (N)
SDS1	M (N)	S (N)*2	M (N)											
SDS2														
SDS3														M (N)
SDS4														
SDS7														
SDS5														
SDS6														
SDN3														
SDN4								M (N)	M (N)				M (N)	M (N)
SDN2			M (N)					M (N)	M (N)		M (N)			M (N)
SDN1					M (N)	M (N) B	M (N)	M (N)	M (N)	M (N)		M (N)	M (N)	M (N)
EY														
TY														
N.Cargo														

S= Sample D = duplicate taken M = visited for set up or for maintenance *(N)* = Information from site visit log book

N.A. = sampled but not analyzed B = blank taken *D.L.* = Data download from meter

* = info from chain of custody

Observations:

2. 9/23/99 storm runoff at SDS1 - 2 grab samples taken; considerable foam below outfall (~1 cubic foot), runoff was orange/ brown. Second sample taken about 1 hour later; there was much less foam, and runoff was clear

AR 045787

Port of Seattle

1999-2000
Wet Season Outfall Inspection Summary

outfall	09-Dec-99	11-Dec-99	12-Dec-99	15-Dec-99	16-Dec-99	18-Dec-99	21-Dec-99	28-Dec-99	01-Jan-00	03-Jan-00	05-Jan-00	07-Jan-00	08-Jan-00
SDE4	M (N)	M (N)	M (N)		M (N)								
SDS1									M (N)			s (N)	
SDS2													
SDS3	N.A. (N)	M (N)		M (N)						M (N)	M (N)		
SDS4													
SDS7													
SDS5													
SDS6													
SDN3													
SDN4	s (N)							M (N)					M (N)
SDN2	M (N)		M (N)	s (N)*3			M (N)		M (N)	M (N)			
SDN1				s (N)	M (N)	N.A. (N)		M (N)					
EY													
TY													
N.Cargo													

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Notes:
3. 12/15/99: Pump station bypass due to rainfall intensity exceeding design. Manual grab sample taken by Scott Tobiason and Curtis Nickerson

(N) = Information from site visit log book
D.L. = Data download from meter
* = info from chain of custody

AR 045788

Port of Seattle

1999-2000
Wet Season Outfall Inspection Summary

outfall	10-Jan-00	12-Jan-00	15-Jan-00	21-Jan-00	27-Jan-00	28-Jan-00	01-Feb-00	02-Feb-00	03-Feb-00	04-Feb-00	07-Feb-00	08-Feb-00	10-Feb-00	20-Feb-00
SDE4		s (N)*4												
SDS1	M (N)	s (N)*4												
SDS2														
SDS3		s (N)	M (N)								M (N)			
SDS4														
SDS7														
SDS5														
SDS6														
SDN3														
SDN4		s (N)					s (N)		M (N)					
SDN2									M (N)					
SDN1														
EY		M (N)			M (N)	M (N)	s (N)	M (N)						
TY										M (N)	M (N)	M (N)	s (N)	s (N)
N.Cargo				D.L.										

S= Sample
D = duplicate taken
M = visited for set up or for maintenance
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Notes:
4. 1/12/00: Ground surface deicing event, sand and cehmicals applied. SDS1 and SDE4 samples had noticeable TSS and turbidity.

AR 045789

Port of Seattle

1999-2000
Wet Season Outfall Inspection Summary

outfall	25-Feb-00	07-Mar-00	10-Mar-00	13-Mar-00	14-Mar-00	21-Mar-00	22-Mar-00	28-Mar-00	01-Apr-00	03-Apr-00	14-Apr-00	15-Apr-00	21-Apr-00	04-May-00
SDE4		M (N)			S (N)					M (N)	S (N)	M (N)		
SDS1							S (N)						S (N)	
SDS2														
SDS3					S (N)					M (N)				
SDS4								M (N)	M (N)					
SDS7														M (N)
SDS5														M (N)
SDS6														M (N)
SDN3														
SDN4		M (N)		M (N)						N.A. (N)	S (N)	M (N)		
SDN2						M (N)								M (N)
SDN1						S (N)	S (N)			M (N)	S (N)	M (N)		
EY			M (N)											
TY	S (N)													
N.Cargo														

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AR 045790

Port of Seattle

1999-2000
Wet Season Outfall Inspection Summary

outfall	10-May-00	11-May-00	18-May-00	19-May-00	08-Jun-00	09-Jun-00	11-Jun-00	13-Jun-00	20-Jun-00	26-Jun-00	29-Jun-00	30-Jun-00	01-Jul-00	03-Jul-00
SDE4						M (N)	M (N)							S (N)
SDS1														
SDS2	M (N)		M (N)	M (N)							M (N)			S (N)
SDS3						M (N)	M (N)		M (N)					
SDS4														
SDS7						M (N)	M (N)	M (N)						
SDS5						M (N)	M (N)	M (N)						
SDS6						M (N)	M (N)	M (N)						
SDN3													M (N)	
SDN4										M (N)				
SDN2	M (N)	M (N)	M (N)				M (N)			M (N)		M (N)		
SDN1					M (N)		M (N)						M (N)	S (N)D
EY														
TY														
N.Cargo		D.L.												

S= Sample
N.A. = sampled but not analyzed
D = duplicate taken
B = blank taken
M = visited for set up or for maintenance
(N) = Information from site visit log book
D.L. = Data download from meter
* = Info from chain of custody

AR 045791

1999-2000
Wet Season Outfall Inspection Summary

outfall	04-Jul-00	05-Jul-00	11-Jul-00	20-Jul-00	21-Jul-00	24-Jul-00	25-Jul-00	04-Aug-00	08-Aug-00
SDE4							M (N)		M (N)
SDS1						M (N)			
SDS2						M (N)			
SDS3									M (N)
SDS4				M (N)		M (N)			M (N)
SDS7					M (N)				
SDS5					M (N)				
SDS6					M (N)				
SDN3	S (N)	M (N)			M (N)				M (N)
SDN4			N.A. (N)			M (N)			
SDN2							M (N)		
SDN1									
EY					M (N)				M (N)
TY					M (N)				M (N)
N.Cargo								D.L.	

S= Sample
N.A. = sampled but not analyzed
D = duplicate taken
B = blank taken
M = visited for set up or for maintenance

(N) = Information from site visit log book
D.L. = Data download from meter
* = Info from chain of custody

AR 045792