Annual Stormwater Discharge Monitoring Report

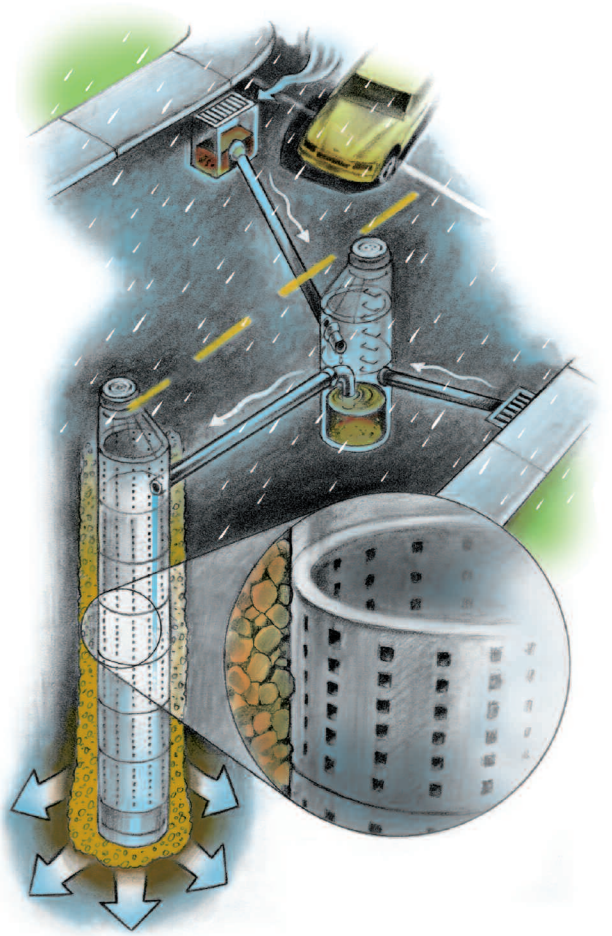
Year 5

October 2009 - May 2010

Water Pollution Control Facilities (WPCF) Permit

Class V Stormwater Underground Injection Control Systems

DEQ Permit Number 102830



July 2010

Prepared by

ENVIRONMENTAL SERVICES
CITY OF PORTLAND
working for clean rivers

— CITY OF PORTLAND —
ENVIRONMENTAL SERVICES
1120 SW Fifth Avenue, Room 1000, Portland, Oregon 97204 ▪ Dan Saltzman, Commissioner ▪ Dean Marriott, Director

July 15, 2010

Mr. Rodney Weick
NWR Stormwater and Underground Injection Control Manager
Oregon Department of Environmental Quality
2020 Southwest Fourth Avenue, Suite 400
Portland, Oregon 97201

Subject: Permit Required Submittal – Annual Stormwater Discharge Monitoring Report No. 5
City of Portland Water Pollution Control Facilities Permit No. 102830

Dear Rodney:

In accordance with the Oregon Department of Environmental Quality's (DEQ) Water Pollution Control Facilities Permit (WPCF Permit #102830 issued on June 1, 2005) for Class V Stormwater Underground Injection Control Systems (UICs), the City of Portland's Bureau of Environmental Services (City) is pleased to provide DEQ with *Annual Stormwater Discharge Monitoring Report: Year 5 – October 2009 – May 2010.*

This report presents the results of the Year 5 (October 1, 2009 through May 31, 2010) UIC Monitoring Program. Monitoring was implemented in accordance with the final *Stormwater Discharge Monitoring Plan* (SDMP), submitted to DEQ in August 2006. The monitoring program is representative of the estimated 9,000 City-owned UICs. Forty UIC locations were sampled in Year 4 including:

- Thirty UICs selected to implement the required Year 5 monitoring (*i.e.*, compliance monitoring) described in the SDMP:
  - Panel 5 (15 rotating UIC locations)
  - Panel 6 (15 fixed UIC locations)
- Two UIC locations carried over from Year 4 monitoring due to exceedances of the permit-defined maximum allow discharge limit (MADL) for pentachlorophenol and lead concentrations
- Ten supplemental UICs located near commercial and industrial sites

The report provides details regarding the UIC sampling program (*e.g.*, UIC locations, sampling and analysis, data quality); individual sampling events; annual mean concentrations; preliminary trend analysis, response actions, and the identification of Category 4 UICs as required by the permit.

Permit compliance is demonstrated in this report by documenting that Year 5 sampling, analyses, data evaluation, and response actions are performed in accordance with the permit, SDMP, and UIC Management Plan (submitted to DEQ in December 2006).

If you have any questions or need additional information to complete your review of this document, please call me at 503.823.5737. We look forward to continuing to work with you on implementing the City's UIC Program.

Sincerely,

Barbara Adkins
UIC Program Manager
Bureau of Environmental Services

Enclosures:

2 Copies: Annual Stormwater Discharge Monitoring Report – Year 5
(Note: Appendices and a full copy of the report are provided on a CD contained in the report)

cc: UIC Program File
Matt Criblez, BES
Dave Kliewer, BES
Joel Bowker, BES
Jan Betz, City Attorney

City of Portland, Oregon

Water Pollution Control Facilities (WPCF) Permit For
Class V Stormwater Underground Injection Control Systems

Permit Number: 102830

Annual Stormwater Discharge Monitoring Report
Year 5 – October 2009 - May 2010

Underground Injection Control Systems
System Monitoring

July 2010

Prepared By:
City of Portland, Bureau of Environmental Services

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Executive Summary

The *Annual Stormwater Discharge Monitoring Report* is required by the Water Pollution Control Facilities (WPCF) permit issued to the City of Portland (City) in June 2005 by the Oregon Department of Environmental Quality (DEQ). The City is required to monitor stormwater entering City-owned underground injection control (UIC) systems throughout the life of the permit and to submit this annual monitoring report.

Year 5 Monitoring Program: The City's UIC monitoring program was implemented in accordance with the final *Stormwater Discharge Monitoring Plan* (SDMP; City of Portland, 2006a), submitted to DEQ in August 2006 and approved by DEQ in November 2008. The monitoring program was designed to be representative of the estimated 9,000 City-owned UICs using a statistically robust method to identify a subset of UICs for monitoring. The following 42 UIC locations were sampled in Year 5:

- Thirty UICs selected to implement the required Year 5 monitoring (i.e., compliance monitoring) described in the SDMP
  - Panel 5 (15 rotating UIC locations sampled in permit Years 4 and 9)
  - Panel 6 (15 stationary UIC locations sampled in permit Years 1 through 10)
- Two UIC locations, SP3_6 and SP3_8, carried over from Year 4 monitoring because of an exceedance of the permit-defined maximum allowable discharge limit (MADL) for pentachlorophenol and lead concentrations
- Ten supplemental UICs located near commercial and industrial sites

UIC monitoring locations were selected on the basis of two traffic flow categories: <1,000 trips per day (TPD) and ≥1,000 TPD. Year 5 locations (i.e., Panels 5 and 6, Supplemental Panel 4, and two roll-over sites from Year 4) included 21 UIC locations in the <1,000 TPD category and 21 locations in the ≥1,000 TPD category.

Year 5 Results: Five sampling events were completed, as required, between October 2009 and May 2010. Stormwater discharge samples were analyzed for common pollutant analytes (e.g., metals, volatile organic compounds, semivolatile organic compounds, and pesticides) as defined by the WPCF permit. Year 5 field and laboratory data collected met the SDMP data quality objectives. Testing of priority pollutant screen (PPS) analytes is required in permit Years, 1, 4, and 9; however, nine PPS analytes are reported in Year 5 because they are capable of being detected using the U.S. Environmental Protection Agency (EPA) test methods for analysis of the common pollutants.

Thirteen of the 14 common pollutants and one PPS analyte (2,4-D) were detected in Year 5. Twenty-three ancillary pollutants (i.e., analytes derived from the analytical methods for common pollutants) were detected at low concentrations. The seven ancillary pollutants detected at the highest frequencies (between 51 percent and 93 percent) during the individual sampling events are polycyclic aromatic hydrocarbons (PAH): chrysene,

phenanthrene, naphthalene, pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, and fluoranthene.

MADL Exceedances: Four common pollutants – pentachlorophenol, di(2-ethylhexyl)phthalate (DEHP), benzo(a)pyrene, and arsenic – were detected in Year 5 at concentrations above their respective MADLs in at least one sample. Detected concentrations of other common and PPS analytes were below their respective MADLs. The City reported MADL exceedances to DEQ, as required by the WPCF permit.

Annual Geometric Mean Concentrations: Eleven UIC locations exceeded annual geometric mean concentrations. Ten of the 11 UIC locations (P6_1, P6_7, P6_14, SP3_6, SP3_8, P5_15, SP4_2, SP4_3, SP4_4, and SP4_10) exceeded the MADL for pentachlorophenol (1.0 micrograms per liter [µg/L]); annual geometric means for these locations ranged from 1.11 to 3.88 µg/L, slightly above the MADL. The remaining one site (P5_5) exceeded the MADL for benzo(a)pyrene (0.2 µg/L), slightly above the MADL at 0.25 µg/L. Annual geometric mean concentrations did not exceed MADLs for DEHP and arsenic.

The annual geometric mean is calculated for pollutants detected at a concentration >50 percent of the MADL for an individual sampling location in at least one sampling event. Lead was calculated for four UIC locations (P6_2, P6_14, SP4_3, and SP4_10); annual geometric means for these locations range from 4.9 to 12.7 µg/L, well below the MADL (50 µg/L). Annual geometric mean concentrations were not calculated for any other pollutants because their concentrations were <50 percent of the MADL.

Preliminary Trend Analysis: In general, low concentrations of common pollutants were detected in Years 1 through 5 data. Concentration ranges for each variable are similar for Years 1 through 5; generally within narrow ranges at individual UIC locations with geometric means well below their respective MADLs (i.e., <50 percent). Concentrations for the ≥1,000 TPD traffic category appear to be slightly higher than the <1,000 TPD traffic category in Years 1 through 5 and similar between panels.

Year 5 Response Actions:
No specific source investigations were conducted in Year 5 because of unanticipated stormwater discharge results or observations during UIC sampling activities.

Category 4 UICs:
Nine UIC sampling locations have been identified as Category 4 UICs based on sampling Years 1 through 5:

- Four UICs (P1_1, P6_1, P6_7, and P6_14) previously were identified as Category 4 UICs for pentachlorophenol in Year 2 and have been addressed through corrective actions. Three of these locations are part of stationary Panel 6 and are sampled yearly.
- Three UICs (P2_5, P2_13, P2_14) were identified as Category 4 in Year 3 and have been addressed through corrective actions.

- Two new locations (SP3_6 and SP3_8) had geometric annual mean concentrations that exceeded pentachlorophenol for the second consecutive year in Year 5. These two UICs have been identified as Category 4 UICs and will be addressed through corrective action.

Corrective actions are implemented in accordance with the DEQ-approved *Corrective Action Plan* (CAP; City of Portland, 2006f).

Additional Monitoring:
In addition to the Category 4 UICs identified in Year 5, six UICs had annual geometric mean concentrations that exceeded the MADL for a pollutant.

- Five UICs (P5_15, SP4_2, SP4_3, SP4_4, and SP4_10) exceeded for pentachlorophenol
- One UIC (P5_5) exceeded for benzo(a)pyrene

These six locations will be sampled again in Year 6.

Permit compliance is demonstrated in this report by documenting that Year 5 sampling, analyses, data evaluation, and response actions are conducted in accordance with the WPCF permit, SDMP, and UIC Management Plan.

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List of Acronyms

BES	City of Portland, Bureau of Environmental Services
BMP	best management practice
City	City of Portland
C	Celsius
CAP	Corrective Action Plan
CCA	chromate copper arsenate
COC	chain-of-custody
CSM	conceptual site model
DEHP	di(2-ethylhexyl)phthalate or bis(2-ethylhexyl)phthalate
DEM	digital elevation model
DEQ	Oregon Department of Environmental Quality
DFR	daily field report
DOC	dissolved organic carbon
DQO	data quality objective
EC	electrical conductivity
EOP	end-of-pipe
EPA	U.S. Environmental Protection Agency
EST	estimated value
F	Fahrenheit
FDS	field data sheet
FO	field operations
GIS	geographic information systems
GRTS	Generalized Random Tessellation Stratified
GWPD	Groundwater Protectiveness Demonstration
Gx	gasoline range
HYDRA	Hydrological Data Retrieval and Alarm System
IMS	BES Investigation and Monitoring Services
LCS	laboratory control sample
LIMS	BES Laboratory Information Management System
MADL	maximum allowable discharge limit
MDL	method detection limit
mg/kg	milligrams per kilogram
MRL	method reporting limit
MS	matrix spike
µmhos/cm	micromhos per centimeter
µg/L	micrograms per liter

List of Acronyms (Continued)

NCA	North Creek Analytical
PAH	polycyclic aromatic hydrocarbon
PDOT	City of Portland Department of Transportation
PPS	priority pollutant screen
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
ROW	right(s)-of-way
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SDMP	Stormwater Discharge Monitoring Plan
SOP	Standard Operating Procedures
SP	supplemental panel
SVOC	semi-volatile organic compound
TA	Test America
TPD	trips per day
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TSS	total suspended solids
UIC	underground injection control
UICMP	UIC Management Plan
VOC	volatile organic compound
WPCF	Water Pollution Control Facility
WPCL	Water Pollution Control Laboratory

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Section 1

1 Introduction and Organization

1.1 Purpose

This *Annual Stormwater Discharge Monitoring Report* presents the results of the City of Portland's (City) fifth year of stormwater sampling, conducted between October 1, 2009, and May 31, 2010, under the *Stormwater Discharge Monitoring Plan* (SDMP) (City of Portland, 2006a). This report is a requirement of the Water Pollution Control Facilities (WPCF) permit issued to the City in June 2005 by the Oregon Department of Environmental Quality (DEQ; Permit Number 102830). The permit requires the City to monitor stormwater entering City-owned or -operated (i.e., public) underground injection control (UIC) structures throughout the life of the permit (10 years, or permit term) and to submit this annual report. For the purposes of this report, all references to "WPCF permit" or "permit" refer to this permit.

Underground Injection Control

UIC, as used in this document, means any Class V underground stormwater control system owned or operated by the City of Portland.

This report includes sampling data collected during five sampling events in Year 5, a summary of descriptive information for the UICs sampled (e.g., location, surrounding land use), a description of individual storms comprising each sampling event, identification of the maximum allowable discharge limits (MADL) concentration exceedances, identification and discussion of common and ancillary pollutants detected, and a discussion of Year 5 response actions.

1.2 Background

The City currently has an estimated 9,000 Class V UICs, which collect stormwater from public rights-of-way (ROW) and discharge it to the subsurface. UICs are an essential element of the City's comprehensive watershed strategy to use stormwater as a resource by infiltrating it back into the ground.

In the Portland area, groundwater serves as a backup drinking water supply to the Bull Run reservoirs. The WPCF permit establishes the UIC construction, operation, and maintenance requirements that the City must implement to protect groundwater for use as a drinking water resource. The permit is designed to protect groundwater by implementing a comprehensive stormwater management strategy to prevent, minimize, and control pollutants at the surface before stormwater is discharged to the ground. State regulations require that all groundwaters of the state be protected from pollution that could impair existing or potential beneficial uses for which the natural water quality of the groundwater is adequate, and maintain the existing high quality of groundwater to support beneficial uses, including domestic water supply (Oregon Administrative Rule [OAR] 340-040-0020(3)).

The SDMP, which was used to direct Year 5 sampling, consists of the *Sampling and Analysis Plan* (SAP) (City of Portland, 2006b) and the *Quality Assurance Project Plan* (QAPP) (City of Portland, 2006c). Adherence to the SAP and QAPP ensures that the stormwater data collected are of known and acceptable quality and can be used to demonstrate permit compliance. The SDMP was submitted to DEQ in February 2006 and approved in January 2009, and much of the background information in this report is summarized from that document.

1.3 Permit Requirements and Monitoring Program Goals and Objectives

Under the WPCF permit, the City must submit an annual stormwater discharge monitoring report to DEQ by July 15 of each permit year that contains specific monitoring and reporting requirements. These requirements and where they are met in this annual report are presented in Table 1-1. Permit compliance is demonstrated in this report by documenting that Year 5 sampling, analyses, and data evaluation were conducted in accordance with the WPCF permit and SDMP, and that results are statistically representative of the City's UIC system.

In addition to this annual monitoring report, the permit requires the City to submit an annual *UIC Management Plan* (UICMP) report by November 1 of each year. Information presented in the annual UICMP report(s) supplements this report by:

- Identifying traffic or land use changes that would modify sampling protocols or the sampling network.
- Evaluating trends in the cumulative monitoring data.
- Identifying factors that strongly influence the quality of stormwater draining to public UICs to assist in enhancing protection of groundwater.
- Presenting a preliminary discussion of response actions.
- Presenting action(s) taken in response to monitoring data.

1.3.1 Monitoring Program Goals

The primary goals of the City's UIC monitoring program relate to complying with the WPCF permit and fulfilling the City Bureau of Environmental Services' (BES) mission.[1] They are to:

- Demonstrate that the quality of stormwater discharged into City-owned UICs meets permit conditions and that it is protective of groundwater quality (i.e., all beneficial uses).

[1] The Bureau of Environmental Services' mission is to serve the Portland community by protecting public health, water quality, and the environment. BES provides sewage and stormwater collection and treatment services to accommodate Portland's current and future needs. BES protects the quality of surface water and groundwater, and conducts activities that plan and promote healthy ecosystems in Portland's watersheds.

- Produce results that can be used to ensure that UICs are constructed and operated in a manner that provides multiple watershed benefits and protects groundwater.

UICs are an essential element of a comprehensive watershed strategy to use stormwater as a resource by infiltrating it back into the ground to help restore normative hydrology. Demonstrating permit compliance is important to the City to ensure that UICs continue to help achieve BES's mission.

1.3.2 Monitoring Program Objectives

The UIC monitoring program was designed to satisfy the following specific objectives, which are described in more detail in the SDMP:

- Monitor the quality of stormwater discharged into public UICs and demonstrate that groundwater is protected by meeting MADLs established in the WPCF permit (DEQ, 2005a, Table 1).
- Provide a high degree of confidence that the sampling design used for this program is representative of all UICs covered by the permit.
- Provide data that will be used to conduct trend analysis of the stormwater quality discharged into public UICs.
- Identify factors that strongly influence the quality of stormwater draining to public UICs to assist in enhancing groundwater protection.
- Evaluate the effectiveness of actions implemented to improve stormwater quality and meet MADLs.
- Provide data that can be compared with data collected from previous investigations conducted by the City and/or split/duplicate samples collected by others.

In addition, the monitoring data inform decision making processes to identify actions that will protect groundwater quality, improve UIC management practices, and improve overall watershed health.

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Section 2

2 Monitoring Design and Locations

This section summarizes the UIC system monitoring design and presents the Year 5 monitoring locations and their characteristics. The basis and details of the UIC monitoring program are presented in the SDMP.

2.1 Overview of Monitoring Design

It is not technically practicable or financially feasible to collect and analyze stormwater from each of the estimated 9,000 active City-owned UICs during every storm event (Figure 2-1). Therefore, a statistically robust method, the Generalized Random Tessellation Stratified (GRTS) survey design (Stevens and Olsen, 2004), was used to identify a representative subset of the City's UICs for monitoring. This method, which is described in detail in the SAP, provides a high degree of confidence that a monitored subset is reasonably representative of the entire system. This allows the characteristics of the entire UIC population to be estimated using the measured results of a representative sampling subset.

Background information about the sampling design is presented in this section. Information specific to the Year 5 design is discussed in Section 2.2.

2.1.1 Sample Locations

To perform long-term trend analysis and evaluate permit compliance during the 10-year permit term, UICs needed to be sampled to assess the spatial and temporal range of data. Therefore, the UIC sampling network consists of six sampling panels that are divided into two primary types: stationary and rotating. Each sampling panel consists of 15 UIC locations. Panel 6 locations are stationary (i.e., fixed) and the same locations will be sampled annually for 10 years. The other five panels of locations are rotated, so that each panel will be sampled twice during the 10-year permit term; once in Years 1 through 5, and once in Years 6 through 10. After 5 years, 75 rotating locations (five different panels x 15 locations per panel) will have been sampled once, and after 10 years they will have been sampled twice. Using this process, a total of 90 unique locations will be monitored during the permit term (15 stationary + 75 rotating locations). Locations were identified using the GRTS survey design.

2.1.2 Sample Size

The sample size, "n", for the UIC monitoring locations is described in detail in the SDMP and was selected to be representative of the City's UIC system. The sample size is based on a specified confidence level, interval width, and the estimated proportion of UICs exceeding the MADL (definitions of these measurements are provided in the *Annual Stormwater Discharge Monitoring Report - Year 1*; City of Portland, 2006e). To limit the amount of uncertainty around the estimated proportion of exceedances, the

confidence interval was set at a 90 percent confidence level and a half-width of 12 percent, as described in the SAP.

The proportion of UICs exceeding an MADL was estimated from stormwater discharge data collected during a pre-permit pilot study (described in the SAP). This study indicated that the proportion of all City-owned UICs estimated to exceed the pentachlorophenol MADL was 8.1 percent. Using the 90 percent confidence interval and a 12 percent precision half-width, 30 UIC locations were selected to be representative of the City's UIC population. The upper confidence limit on the number of UICs that may exceed the pentachlorophenol MADL was estimated to be 20.1 percent.

The results from Years 1 through 5 were consistent with the pre-permit pilot study results. As in the pre-permit pilot study, pentachlorophenol was the most frequently detected pollutant above its MADL of 1 microgram per liter (µg/L). The proportion of UICs exceeding the pentachlorophenol MADL from Years 1 through 4 consistently ranged between 6 to 7 percent and 20 to 24 percent. These results are consistent with the proportions estimated during the pre-permit pilot study and with the assumptions used to estimate the sample size.

2.1.3 Stratification

The permit requires that the sampled UIC population be divided into two traffic volume-based sub-populations, which are assumed to be associated with different stormwater qualities. These two traffic volume categories are identified in Table 2 of the WPCF permit and are presented in Table 2-1 of this report. The lower traffic volume category (<1,000 trips per day [TPD]) is presumed to be associated with lower pollutant concentrations. The higher traffic volume category (≥1,000 TPD) is presumed to be associated with higher pollutant concentrations. After the sample size was determined, the sampling design was stratified in accordance with the two identified traffic volume categories. Randomly selecting sampling locations and then stratifying based on traffic category also randomizes information for multiple factors that may affect stormwater quality (including older and newer industrial/commercial office buildings versus commercial salvage yards, etc.).

As explained in the SAP, preliminary work by the City determined that approximately 57 percent of active City-owned UICs are in the <1,000 TPD category and 43 percent are in the ≥1,000 TPD category. To ensure that there were enough data points in each traffic category for statistical analysis, initially 50 percent of the sample locations were selected from the <1,000 TPD category and 50 percent of the sample locations were selected from the ≥1,000 TPD category. Because most active UICs are in the <1,000 TPD category, and are predominantly in residential areas, the sample design is considered conservative.

2.2 Year 5 Monitoring Locations and Characteristics

2.2.1 Overview

Forty-two UIC locations were sampled in Year 5:

- Thirty UICs selected to implement the required Year 5 monitoring (i.e., compliance monitoring) described in the SDMP:
  - Panel 5 (15 rotating UIC locations sampled in Years 5 and 9[2])
  - Panel 6 (15 stationary UIC locations sampled in Years 1 through 10)
- Ten supplemental UICs located near commercial/industrial sites (Supplemental Panel [SP] 4 [SP4]; see Section 5.4)
- Two UIC locations (SP3_6 and SP3_8) carried-over from Year 4 monitoring because of annual geometric mean pentachlorophenol and lead concentrations exceeding the MADL (see Section 2.2.6)

Together, Panel 5 and Panel 6 represent 15 UIC sampling locations in the <1,000 TPD category and 15 locations in the ≥1,000 TPD category. Sites are balanced by traffic category and in accordance with the SDMP.

In accordance with the SAP, each selected UIC sampling location was inspected in August and September 2009 before sampling to confirm UIC information (e.g., location, type of construction) and to determine suitability for sampling (e.g., accessibility, potential health and safety concerns). Characteristics of Year 5 UIC monitoring locations are summarized in Tables 2-2 through 2-5. Year 5 sampling locations are shown in Figure 2-2, and detailed maps of all Year 5 locations are shown in Appendix A. The UIC sampling design is described in detail in the SAP.

2.2.2 Rotating Panel (Panel 5)

Fifteen new randomly selected UICs in the rotating panel (Panel 5) also were sampled during five storm events throughout the 2009-2010 wet season. This panel will be sampled again in Year 9 of the permit. Panel 5 includes seven UICs with traffic counts <1,000 TPD and eight UICs with traffic counts ≥1,000 TPD. Table 2-2 presents location information, characteristics, and maintenance information for each UIC in Panel 5.

[2] The rotating panels are scheduled to be sampled as follows: Panel 1 in Years 1 and 6; Panel 2 in Years 2 and 7; Panel 3 in Years 3 and 8; Panel 4 in Years 4 and 10; and Panel 5 in Years 5 and 9. The sequence of the last two panels in Years 9 and 10 were reversed because the permit requires the priority pollutant screen (PPS) analytes to be sampled in Years 1, 4, and 9. The reverse sequence was implemented so that Panel 4 is not sampled twice for PPS analytes in Years 4 and 9. This will result in a more robust data set by adding an additional 15 discrete locations for 45 total locations for PPS analytes.

2.2.3 Stationary Panel (Panel 6)

Fifteen randomly selected UICs in the stationary panel (Panel 6) were sampled during five storm events throughout the Year 5 wet season. These UIC locations also were sampled in Years 1 through 4, and will continue to be sampled throughout the term of the permit (i.e., 10 years). Panel 6 includes eight UICs with traffic counts <1,000 TPD and seven UICs with traffic counts ≥1,000 TPD[3]. Table 2-3 presents location information, characteristics, and maintenance information for each UIC in Panel 6.

2.2.4 Oversample Panel

An oversample panel of 85 alternate locations was generated previously, as described in the SAP, to develop Panels 5 and 6. This panel was used to find a replacement for one of the randomly selected Panel 5 UIC monitoring locations that were submitted to DEQ in August 2009. This UIC was determined to be unsuitable because of sampling difficulties, and was replaced after Event 1. The replacement UIC was sampled for five events. Further information about the rationale for replacement is included in Appendix B. Unsuitable UICs are replaced by selecting the next location on the oversample panel list with a site in a similar traffic categorization.

2.2.5 Supplemental Monitoring Near Commercial/Industrial Sites

Similar to the City's volunteer sampling in Years 2 through 4 for UICs located near drinking water wells (SP1 through SP3), the City conducted a new voluntary sampling effort in Year 5 at 10 additional UIC locations. The purpose of this new monitoring effort is to assess the quality of stormwater discharged to UICs from City ROW located adjacent to areas zoned commercial/industrial. Supplemental monitoring for this purpose will also be conducted in Years 6 and 7, with 10 unique UICs sampled each year for 3 years, for a total of 30 UICs.

Supplemental monitoring locations were taken from the list of the City-owned UICs in the *Systemwide Assessment* report (City of Portland, 2006d) that are estimated to be located near commercial or industrial sites[4]. Locations were selected randomly from this list using the GRTS method described in the SDMP, and stratified by traffic category. The final list of supplemental monitoring locations consisted of six UICs with estimated traffic counts of <1,000 TPD and four locations with estimated traffic counts of ≥1,000 TPD. Locations for Year 5 were inspected in August and September 2009 to determine

[3] A change in the TPD estimation methodology in Year 1 resulted in recategorizing traffic volume from ≥1,000 TPD to <1,000 TPD at three UIC locations: P6_2, P6_10, and P6_12. New UIC locations in the ≥1,000 TPD traffic category were selected randomly before Year 2 to replace the three UIC locations, and sample location codes were retained. See the Year 2 or Year 3 annual reports for more information.

[4] The *Systemwide Assessment* report (City of Portland, 2006d) identified 225 City-owned UICs located within 500 feet of commercial or industrial properties and that (based on off-site drainage assessments and on-site field inspections) may receive drainages from these properties. Properties considered under this evaluation are regulated under SARA Title III, or have a standard industrial classification (SIC) code for a business type that would be expected to result in a direct or indirect discharge to a UIC that may cause a violation of permit conditions.

whether they were suitable for sampling and representative of the associated traffic categories. Supplemental monitoring locations were sampled during all five Year 5 storm events. Sampling and analyses were conducted in accordance with the SDMP.

The statistical basis of the supplemental monitoring is presented in Section 2.3. Information on the supplemental sampling locations is presented in Table 2-4.

2.2.6 Carry Over Locations from Previous Year MADL Exceedances

Geometric mean stormwater concentrations were calculated in Years 1 through 5 for locations where the individual analyte was detected in at least one sampling event at a concentration $\geq$50 percent of the analyte's respective MADL. If the annual geometric mean concentration exceeded the MADL at a given UIC, the UIC was sampled again (i.e., carried over to) the following year.

There were no MADL exceedances of the annual geometric mean concentration in Panel 4; therefore, no Panel 4 UIC locations were carried over from Year 4 for monitoring into Year 5.

In Panel 6, annual geometric mean concentrations of pentachlorophenol exceeded the MADL at UIC locations P6_1, P6_7, and P6_14 in Year 5. At the end of Year 2, P6_1, P6_7, and P6_14 were identified as Category 4 UICs and have received a No Further Action determination from DEQ (DEQ, 2008). As part of (stationary) Panel 6, each of these locations will be sampled again in Year 6.

Analyte concentrations for two UICs in the first supplemental panel (i.e., those UIC locations near drinking water wells), SP3_6 and SP3_8, exceeded annual geometric mean MADLs in Year 4. UIC location SP3_6 exceeded the annual mean MADL for pentachlorophenol, and UIC location SP3_8 exceeded for annual mean MADL for both pentachlorophenol and for lead in Year 4. Both UICs were sampled again in Year 5. Information on the carry-over sampling locations is presented in Table 2-5.

2.3 Supplemental UIC Monitoring Statistical Basis

The objectives of the new supplemental monitoring effort were to:

- Assess the quality of stormwater discharged to UICs located near commercial/industrial sites.
- Demonstrate that the results of the citywide annual compliance monitoring program (described in the SDMP) are representative of stormwater discharging to UICs located near commercial/industrial sites.
- Demonstrate through the compliance monitoring and supplemental monitoring programs that stormwater discharges to public UICs near commercial/industrial sites meet permit MADLs and are protective of groundwater quality.

As stated in the *Annual Stormwater Discharge Monitoring Report – Year 2*[5](City of Portland, 2007), the supplemental monitoring program was designed to achieve the 12 percent confidence interval half width for a 90 percent confidence interval specified in the SDMP. This will be accomplished through sampling 10 UICs each year for 3 years for a final sample size of 30 UICs.

[5] Voluntary monitoring of SP1 through SP3 for UICs located near drinking water wells was initiated in Year 2, and implemented in Years 2 through 4.

Section

3

3 Monitoring Implementation

This section describes how key elements of the SDMP were implemented in Year 5. Analytical results are presented in Section 4.

3.1 Sampling Procedures

Procedures for staffing and coordinating event sampling teams, and collecting and documenting field data were conducted in accordance with the procedures described in the SDMP. Appendix B describes field sampling issues encountered during Year 5 monitoring events and includes copies of all data collection and Water Pollution Control Laboratory (WPCL) chain-of-custody (COC) forms. Appendix C documents that field audits of sampling procedures were conducted, as required by the QAPP.

3.2 Analytes

3.2.1 Common Pollutants

The common pollutants listed in Table 3-1 are required by the permit to be monitored annually. These pollutants were measured at all UIC monitoring locations during each stormwater sampling event. All samples required by the permit and by the SAP were collected in Year 5. Analytical laboratories, analytical methods, method detection limits (MDL), method reporting limits (MRL), and MADLs for common pollutants are listed in Table 3-2.

3.2.2 Priority and Ancillary Pollutants

The priority pollutant screen (PPS) analytes listed in Table 3-1 are required by the permit to be monitored for the first storm event in Years l, 4, and 9. PPS monitoring was not required in Year 5; however, the permit requires that analytes detected by any of the laboratory methods used in the stormwater monitoring program be reported. Detections are reported in Table 4-3 as required. The permit defines ancillary pollutants as those analytes that are detected during the required monitoring for common pollutant or PPS analytes using EPA-approved analytical methods. For the purposes of this report, any ancillary pollutants that also are listed in the permit as PPS analytes are reported as PPS analytes; all other detected pollutants are reported as ancillary. Table 3-3 also includes analytical laboratories, analytical methods, MDLs, MRLs, and MADLs for PPS analytes.

3.2.3 Additional Testing

The City conducted additional stormwater characterization testing in Year 5 including:

- Field parameters, including pH (EPA Method SM4500-HB), conductivity (EPA Method SM2510B), and temperature (EPA Method SM2550B), were measured at all UIC monitoring locations during each sampling event.

- Total suspended solids (TSS) were measured at all UIC monitoring locations during each sampling event, using EPA Method SM2540D.
- For each sampling event, dissolved arsenic, cadmium, chromium, copper, lead, zinc, antimony, barium, beryllium, selenium, and thallium were measured at all 42 UIC monitoring locations. Samples were:
    - Collected during each sampling event at end of pipe (EOP) for dissolved metal analyses.
    - Transported to the WPCL at the end of the sampling day.
    - Filtered by WPCL staff within 24 hours of collection using a 0.45 micron filter.
    - Preserved using nitric acid (pH < 2) before analyses.
    - Analyzed using the EPA methods specified in the SDMP for metals.

3.3 Storm Events

The Storm Event Coordinator worked directly with the City's contract weather forecasting service, Extended Range Forecasting Company, Inc., to obtain the weather forecasts, and to decide whether to proceed with a stormwater sampling event. To the extent practicable, staff adhered to target storm criteria to help ensure that stormwater runoff would be adequate for sample collection, representative of stormwater runoff, and consistent between sampling events. Before initiating a sampling event, the storm forecast was evaluated against the following three target storm criteria:

- Predicted rainfall amount of $\geq$0.2 inch per storm.
- Predicted rainfall duration of $\geq$6 hours.
- Antecedent dry period of $\geq$6 hours (as defined by <0.1 inch of precipitation during the previous 6 hours).

Storms meeting these criteria were expected to provide the volume of runoff necessary to implement sampling. Some sampled storms may not have met the criteria when the sampling event was completed.

After a sampling event was completed, the characteristics of the storm (or individual storms comprising the sampling event) were evaluated using data from the City's Hydrological Data Retrieval and Alarm (HYDRA) system rain gage network. Rain gage data are available at http://or.water.usgs.gov/non-usgs/bes/raingage_info/. The website also provides a map of rain gage locations. Precipitation data from the following 13 rain gages across Portland were averaged and used to characterize individual storms for Years 1 through 5:

HYDRA (Rain gage) Station	Address
Station #1: Airport Way 52 P.S.	14614 NE Airport Way
Station #2: Arleta School	5109 SE 66th Ave.
Station #3: Astor School	5601 N Yale St.
Station #4: Beaumont School	4043 NE Fremont St.
Station #5: Cascade PCC_02	705 N Killingsworth St.
Station #6: Holgate	4507 SE 136th Ave.
Station #7: Kelly School	9030 SE Cooper St.
Station #8: Mallory	8030 NE Mallory Ave.
Station #9: Open Meadows School	7602 N Emerald Ave.
Station #10: PDX Post Office	7660 NE Airport Way
Station #11: Swan Island	2600 N Going St.
Station #12: Vernon School	2044 NE Killingsworth St.
Station #13: WPCL	6543 N Burlington Ave.

Sampling staff attempted to sample all locations that were scheduled for the 2009-2010 season during discrete storms; however, if rainfall ceased before the collection of all required samples, the sampling event was extended over additional storms (i.e., sample collection period), as necessary. Each of the five Year 5 stormwater sampling events was comprised of several storms or sample collection periods. Dates of individual sample collection periods for each event are listed below:

- Event 1: 10/14/2009, 10/17/2009, 10/21/2009, 10/23/2009, 10/26/2009, 10/29/2009, 11/9/2009, 11/13/2009
- Event 2: 11/13/2009, 11/17/2009, 11/20/2009, 12/14/2009, 12/15/2009
- Event 3: 12/16/2009, 1/4/2010, 1/13/2010, 2/4/2010
- Event 4: 2/4/2010, 2/12/2010, 2/26/2010, 3/11/2010, 3/29/2010
- Event 5: 3/29/2010, 4/5/2010, 4/26/2010, 5/17/2010, 5/19/2010

Hourly "average" precipitation records are summarized for each storm event in Tables 3-4 through 3-8 and hydrographs are provided for each storm event in Figures 3-1 though 3-5. This information was used to estimate the duration, intensity, and the antecedent dry period[6] for each sample collection period in each storm event. These storm characteristics are summarized for Event 1 through Event 5 in Table 3-9. Additional information regarding forecasted rainfall for individual storms in a storm event is provided in the *Data Usability Report*, provided in Appendix B.

[6] The duration of an individual sample collection period was defined as a continuous rainfall event, preceded and followed by 0.0 inch of rain in an hour (*i.e.*, a dry hour). The intensity of an individual sample collection period was defined as the amount of precipitation recorded for the duration of the event. The antecedent dry period for each sample collection period was defined as the number of "dry" hours before the first measured rainfall in the sampling event.

The first predicted storm during the 2009-2010 wet season was targeted for sampling to investigate water quality differences that may be associated with the first significant rainfall of the fall season. The remaining monitoring events (Events 2 through 5) were distributed throughout the monitoring season as storms occurred that met the target storm event criteria.

A summary of long-term (30-year) and Years 1 through 5 precipitation and temperature records for the Portland area is provided in Table 3-10. The permit-defined wet-season months are shaded. Precipitation totals for these time periods are depicted graphically in Figure 3-6. Year 1 had approximately 5.69 inches more precipitation than the long-term average. In contrast, Years 2, 3, and 4 received approximately 2.67, 3.14 and 9.88 inches less precipitation (respectively) than the long-term average. Year 5 followed this trend, having approximately 2.49 inches less precipitation than the long-term average.

3.4 UIC Infiltration Volumes

The permit requires that the annual stormwater discharge monitoring report provide information on the total volume of recharge (i.e., stormwater infiltration) to the subsurface (i.e., aquifer) from City-owned UICs. This section describes the methods used to estimate the volume of water infiltrated to City-owned UICs.

BES estimated the catchment area (i.e., basin drainage area) and impervious surface area (e.g., roofs, parking lots, streets) for each known and active City-owned UIC. The impervious portion is the area of the UIC basin area assumed to provide stormwater runoff to the UIC. It was conservatively assumed that all of the impervious areas identified directed stormwater only to the subject UIC (i.e., no infiltration into pavement, no infiltration into unpaved or curbless areas).

The equation used to calculate infiltration volume for each UIC is:

Infiltration Volume (cubic feet) = AP x (1ft/12 inches) x IA x LE (1)

Where:

AP = Annual Precipitation (inches)
IA = Impervious Area within UIC catchment (square feet)
LE = Loss to evaporation (1.0 – ELF)

Where:

ELF = Evaporative loss factor assumed to be 26 percent (0.26) (Snyder et al., 1994)

Table 3-11 summarizes the total estimated stormwater infiltration volumes calculated for the City-owned UIC system for Years 1 through 5.

The total volume of stormwater infiltration was estimated using precipitation measurements from an average of 13 precipitation measurements for the periods between June 1 and May 31 for Year 1 (2005-2006), Year 2 (2006-2007), Year 3 (2007-2008), Year 4 (2008-2009), and Year 5 (2009-2010) and the estimated long-term annual precipitation total are presented earlier in this section. The total precipitation totals for these periods were 42.77, 34.41, 33.94, 27.2, and 34.59 inches, respectively (see Table 3-10).

UIC drainage (i.e., catchment) areas were estimated using a geographic information system (GIS), as described in Years 1 through 4 reports. A number of the delineated drainage areas contained more than one UIC. When this was the case, the effective drainage area was assigned to an individual sump and the other sumps were removed from the calculation. Approximately 789 UIC sumps (~9 percent of City-owned UICs) were identified and removed from this category.

Based on these calculations, the City-owned UICs drain a total area of approximately 698,860,000 square feet (16,044 acres), of which approximately 260,410,150 square feet (5,978 acres) are impervious. Using these values, approximately 37 percent of the drainage area is considered impervious. The average area drained by a UIC system in the City of Portland was estimated to be approximately 89,000 square feet (2 acres), of which an average 37 percent or 33,000 square feet (0.76 acre) is impervious. The stormwater infiltration volumes for the City's UIC system were estimated to be approximately:

- 589 million cubic feet (4.4 billion gallons) in Year 1 (June 1, 2005, through May 30, 2006)
- 474 million cubic feet (3.5 billion gallons) in Year 2 (June 1, 2006, through May 30, 2007)
- 467 million cubic feet (3.5 billion gallons) in Year 3 (June 1, 2007, through May 30, 2008)
- 374 million cubic feet (3.1 billion gallons) in Year 4 (June 1, 2008, through May 30, 2009)
- 552 million cubic feet (4.1 billion gallons) in Year 5 (June 1, 2009, through May 30, 2010)

The simplified method for calculating runoff used in this report assumes that all rain that falls on impervious areas becomes runoff and all rain that falls on pervious areas does not. *The method used to estimate stormwater volume described above is believed to yield a conservative estimate of stormwater infiltration volumes*. There are a number of uncertainties inherent in both the underlying information and method used to estimate the stormwater infiltration volume at each UIC. Uncertainties in the estimates also may be the result of one or more of the following assumptions:

- All stormwater runoff from identified impervious areas is assumed to enter the UIC. This assumption overestimates the recharge volume.

- The evaporative loss factor was assumed to be constant. This value may vary as the result of weather conditions (ambient air temperature, impervious surface temperature, rainfall intensity, rainfall duration, land surface topography, impervious surface type and condition).
- Annual precipitation was based on data collected at the Portland International Airport. Total rainfall amounts are known to vary across the Portland metropolitan area. A constant precipitation rate may result in either an overestimate or underestimate of stormwater infiltration volume.
- Storm duration and intensity (longer storms will have a higher runoff percentage, as will more intense storms; storm intensity in the Portland area usually is not very high).
- Antecedent conditions (there will be more runoff if the ground/pavement is already saturated).
- Vegetative cover was not included in the stormwater infiltration estimates and therefore infiltration volumes may be overestimated. The effects of vegetative cover would vary seasonally (e.g., summer versus winter) and spatially (e.g., areas with high density of evergreen trees, areas with significant tree cover over roads, neighborhoods with no mature trees).
- Topography (flat areas generally will retain more water than steep slopes).

Section 4

4 Monitoring Results and Evaluation

This section describes the data (e.g., storm event, field parameters) collected, results, and evaluation in accordance with the permit and SDMP during the 2009–2010 wet season.

4.1 Monitoring Results

4.1.1 Common Pollutants

Thirteen of the 14 common pollutants listed in Table 3-1 were detected during Year 5. Table 4-1 provides a summary of the information in Appendix D (Table D-1) and includes the number of detections (i.e., ≥MRL), number of samples analyzed, frequency of detection, range of Year 5 concentrations, and maximum percent of the MADL detected (i.e., maximum concentration/MADL *x* 100).

The permit requires that detected concentrations of common pollutants in each individual sampling event be compared to their respective MADLs. Four common pollutants [pentachlorophenol, DEHP, benzo(a)pyrene, and arsenic] were detected at concentrations above their MADLs in at least one sample, and are discussed further in Section 4.2.

4.1.2 Priority Pollutant Screen Analytes

Nine of the PPS analytes listed in Table 3-1 were derived from the analytical methods for common pollutants and therefore were tested during Year 5. Only one of these PPS analytes was detected during laboratory analysis for common pollutants in Year 5: 2,4-D. Table 4-1 provides a summary of the information presented in Appendix D (Table D-2), including: the number of detections (i.e., ≥ MRL), the number of samples analyzed, the frequency of detection, the range of Year 5 concentrations, and the maximum percent of the MADL detected (i.e., maximum concentration/MADL *x* 100) during Year 5. Table 4-2 provides a summary of the PPS analytes that were analyzed but not detected in Year 5, including the number of samples analyzed and the range of Year 5 MRLs.

For more information about the data, see ***Appendix***:

- ***B***: Data Usability Report (QA/QC results, copies of all field and data forms)
- ***C***: Field Audit Documentation
- ***D***: Summary Data Tables (For field parameters, common and PPS pollutants)
- ***E***: Analytical Laboratory Data Reports (Includes data flags)
- ***F***: Monitoring Data on Compact Disk (Analytical data and key UIC location characteristics)

The permit requires that detected concentrations of PPS analytes from each individual sampling event be compared to their respective MADLs. No PPS analytes were detected at concentrations above their respective MADLs.

4.1.3 Ancillary Pollutants

Table 4-3 provides a list of ancillary pollutants detected in Year 5, as well as the analytical method, sampling event number, number of samples analyzed, number of detections, frequency of detection, and minimum and maximum concentrations.

All ancillary pollutants were analyzed for five sampling events. Twenty-three ancillary pollutants were detected in Year 5. Ten of these pollutants were detected at a maximum frequency of less than or equal to 7 percent for one or more sampling events. Six were detected at maximum frequencies between 8 percent and 50 percent. The seven pollutants that were detected at the highest frequencies (>50 percent) during the individual sampling events are PAHs: chrysene, phenanthrene, napthalene, pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, and fluoranthene.

The detection of PAH compounds was an expected result because of the presence of numerous sources in an urban environment. PAH sources include, but are not limited to, fresh and used petroleum products (e.g., gasoline, diesel, motor oil, used oil), petroleum and coal combustion, motor vehicle exhaust, tire wear, wood ash, asphalt, insecticides, wood preservatives, used cigarette filters, and air deposition. PAHs tend to adhere to sediment particles rather than dissolve in water. PAHs will continue to be analyzed and reported as ancillary pollutants in future UIC sampling events.

4.1.4 Additional Testing

Dissolved Metals. Table 4-4 presents a summary of dissolved and total common pollutant and PPS metal analyses conducted in Year 5. This table includes the number of samples analyzed; number of detected values; average (i.e., arithmetic mean) concentration; geometric mean, minimum, and maximum concentrations; and ratio of the dissolved average concentration to the total average concentration. Dissolved copper, lead, mercury, and zinc were detected in most samples at concentrations well below the respective MADLs for these metals. The ratios of dissolved to total metal concentrations for ≥1,000 TPD traffic category ranged from 5 percent (lead) to 39 percent (zinc) and from 9 percent (lead) to 51 percent (copper and zinc) for <1,000 TPD. For individual metals, the ratio of dissolved to total metal concentrations is generally lower for the high traffic category. Ratios were not determined for mercury because total mercury is analyzed only for in PPS monitoring years.

Total Suspended Solids. Table 4-5 presents the summary statistics for TSS results. TSS in stormwater was analyzed for each UIC location during each of the five sampling events. TSS concentrations ranged from 2 milligrams per liter (mg/L) (both < and ≥1,000 TPD) to a maximum concentration of 484 (≥1,000 TPD) mg/L. The mean TSS

concentration for UICs with <1,000 TPD was 21 mg/L, and the mean concentration for UICs with ≥1,000 TPD was 51 mg/L.

Field Parameters. Field data were collected to aid in the interpretation of analytical results. Three field parameters (pH, specific conductivity, and temperature) were measured at all UIC locations during each stormwater sampling event, except as noted in the *Data Usability Report* (Appendix B). Table 4-6 summarizes the results presented in Appendix D (Table D-3).

- **pH**. pH measurements ranged from 5.4 to 9.3 in stormwater discharge during Year 5. The mean pH readings for individual events ranged from 6.7 to 6.9.
- **Conductivity**. Conductivity measurements ranged from 6 to 116 micromhos per centimeter (µmhos/cm) in stormwater discharge during Year 5. The mean conductivity readings for individual sampling events ranged from 22.3 to 33.4 µmhos/cm.
- **Temperature**. Temperature measurements ranged from 3.7 to 20.9 ^{o}C in stormwater discharge during Year 5. The mean temperature measurements for individual sampling events ranged from 7 to 14 ^{o}C.

4.2 Comparison to Individual MADLs - Exceedances

4.2.1 Common Pollutants

The permit requires that detected concentrations of common pollutants in each individual sampling event be compared to their respective MADLs. Table 4-7 summarizes the comparison of individual detected concentrations to MADL values for common pollutants. Four common pollutants [benzo(a)pyrene, pentachlorophenol, DEHP, and arsenic] were detected in Year 5 at concentrations above their MADLs in at least one sample, as shown on the following lists:

Arsenic

P6_8 (Event 2)

DEHP

P5_1 (Event 4)
P5_10 (Event 5)
P5_12 (Event 5)
P6_9 (Event 5)
SP3_8 (Events 3, 4)
SP4_2 (Event 3)

Pentachlorophenol

P5_7 (Event 2)
P5_8 (Event 4)
P5_15 (All events)
P6_1 (All events)
P6_2 (Events 3, 5)
P6_7 (Events 1, 3, 4)
P6_14 (Events 1, 2, 3, 4)
SP3_6 (All events)
SP3_8 (All events)

Pentachlorophenol (cont.)

SP4_2 (All events)
SP4_3 (Events 2, 3, 4, 5)
SP4_4 (Events 1, 3, 4, 5)
SP4_10 (All events)

Benzo(a)pyrene

P5_5 (Events 1, 2, 4)

Arsenic. One Year 5 UIC sample location exceeded the 10.0 µg/L MADL for arsenic by approximately 1 µg/L. This location is categorized as <1,000 TPD. Exceedances occurred at this location during Event 2, in both the sample and the duplicate.

Benzo(a)pyrene. One Year 5 UIC sample location exceeded the 0.2 µg/L MADL for benzo(a)pyrene. This location is categorized as <1,000 TPD. Exceedances occurred at this location during Events 1, 2, and 4. The maximum exceedance was 1.85 µg/L.

DEHP. Six Year 5 UIC sample locations exceeded the 6.0 µg/L MADL for DEHP. Of these, four UICs were categorized as ≥1,000 TPD, and two UICs were categorized as <1,000 TPD. Exceedances occurred during Events 3, 4, and 5. By sampling event, the fewest number of exceedances (none) occurred during Events 1 and 2, and the greatest number of exceedances (three) occurred during Event 5. The maximum exceedance was 22 µg/L.

Pentachlorophenol. Thirteen Year 5 UIC sample locations exceeded the 1.0 µg/L MADL, with between one and five exceedances per location. Of these, 11 were UICs categorized as ≥1,000 TPD, and 2 were UICs categorized as <1,000 TPD. By sampling event, the fewest number of exceedances (9) occurred during Events 1, 2, and 5 and the greatest number of exceedances (11) occurred during Events 3 and 4. The maximum exceedance was 6.3 µg/L.

As required by the permit, the City reported the observed MADL exceedances of common pollutants from each individual sampling event to DEQ within 7 days following the receipt of validated analytical data. Exceedances were reported to DEQ in the following correspondence:

- MADL Exceedance Notification Year 5 – Event 1, letter dated December 24, 2009
- MADL Exceedance Notification Year 5 – Event 2, letter dated February 1, 2010
- MADL Exceedance Notification Year 5 – Event 3, letter dated April 7, 2010
- MADL Exceedance Notification Year 5 – Event 4, letter dated April 26, 2010
- MADL Exceedance Notification Year 5 – Event 5, letter dated June 23, 2010, revised June 28, 2010

Causes of the MADL exceedances are known for some compounds. All compounds detected at concentrations greater than the MADL appear ubiquitous at low concentrations. Likely and potential sources are identified below:

- **Pentachlorophenol**. Leaching from treated wood utility poles (i.e., wood treatment). Poles have been observed near all UIC locations with pentachlorophenol exceedances. A utility pole pathway analysis was conducted during the 2007-2008 storm year and presented in Appendix G of

the *Annual Stormwater Discharge Monitoring Report – Year 3* (City of Portland, 2008b). That analysis demonstrated that the utility poles could account for most, if not all, of the pentachlorophenol present in stormwater entering the UICs. Other potential sources include: common pesticide (e.g., lindane, hexachlorobenzene) breakdown products, insecticides, fungicides, herbicides, preservatives (e.g., in laundry starch), glues, paper coatings, inks, incineration of chlorine containing wastes, etc. Note that pentachlorophenol no longer is used as a general herbicide and that new utility poles are the only potential "new" source of pentachlorophenol.

- **DEHP**. Historically, at least 95 percent of DEHP use has been as a plasticizer (ATSDR, 2002). Present in auto exhaust, tires, auto belts, used oil, brake pads, vinyl upholstery, air deposition, packing peanuts, paints, leaching and/or incineration from flexible plastic, etc. Also a common laboratory contaminant.
- **Arsenic**. Wood treatment (chromated copper arsenate [CCA]), herbicides, insecticides, fungicides, some metal alloys present in automobiles including as a lead hardener for wheel weights and lead-acid storage batteries (Brooks and USGS, 2010). Except for ant poison and non-residential CCA wood treatment, most pesticide uses of arsenic have been reduced significantly or discontinued.
- **Benzo(a)pyrene**. Incomplete combustion of organic material (e.g., fuel from vehicles, wood and oil burning furnaces, and incinerators), component of coal tar, tobacco smoke, charbroiled food.

Section 6 describes City actions taken in response to MADL exceedances.

4.2.2 Priority Pollutant Screen Analytes

2,4-D was the only PPS analyte detected during routine laboratory analysis for common pollutants in Year 5. No PPS analytes were detected at concentrations exceeding their respective MADLs. Concentrations of these analytes are significantly (<50 percent) less than their respective MADLs for all sampling events. Table 4-1 presents the maximum percent of the MADL detected for PPS analytes. Because the concentrations of PPS analytes are significantly (<50 percent) less than their respective MADLs, response actions or source investigations have not been conducted. This is consistent with the PPS Action Levels, defined in the permit and presented in Table 4-8.

4.3 Calculation of Annual Mean Concentrations

4.3.1 Method

The permit requires that the annual mean MADL concentration be met at the EOP discharge point after any pretreatment best management practices (BMP) or structural controls. The annual mean concentration is calculated using the geometric mean of the

five storm event concentrations for each pollutant. Additional details about the geometric mean calculation are provided in the QAPP. Based on the considerations outlined in the QAPP, half of the MRL was used to address non-detected values in calculating the geometric mean. In general, all data were used. No individual data points were identified as outliers and omitted from the calculations.

The annual geometric mean concentration was calculated for pollutants detected in at least one sampling event or individual sampling location at a concentration >50 percent of their respective MADLs. The annual geometric mean concentration cannot exceed the MADL for analytes detected at concentrations <50 percent of the MADL. Annual geometric mean concentrations were calculated for the following pollutants in Year 5:

- Arsenic
- Benzo(a)pyrene
- DEHP
- Lead
- Pentachlorophenol

The annual geometric mean concentrations for these pollutants are presented in Table 4-9. Table 4-9 also presents pollutant MADLs, the arithmetic mean (average), and the geometric mean, minimum, and maximum concentrations for reference and comparison. It should be noted that the arithmetic mean can be biased toward higher pollutant concentrations by skewed data points. Because stormwater data usually do not conform to a normal distribution and skewed data may bias the mean, using an arithmetic mean may be inappropriate (DEQ, 2005b).

4.3.2 Common Pollutants

Annual geometric mean concentrations for the following common pollutants were less than the MADL:

- **DEHP**. The annual geometric mean concentration was calculated for 15 locations where the DEHP concentration was ≥50 percent of the MADL in at least one sampling event using the results of the event samples and duplicate samples. The annual geometric means for these locations ranged from 1.67 to 5.1 µg/L. Only two of the geometric means were ≥50 percent of the 6.0 µg/L MADL, SP3_8 and SP4_2, and all were below the MADL.
- **Lead.** The annual geometric mean concentration for total lead was calculated for four UIC locations where the concentration was ≥50 percent of the 50.0 µg/L MADL in at least one sampling event. These locations were P6_2, P6_14, SP4_3, and SP4_10. The annual geometric means for these locations ranged from 4.85 to 12.66 µg/L, and were therefore <50 percent of the MADL.
- **Arsenic.** The annual geometric mean concentration for arsenic was calculated for two UIC locations, P6_8 and SP4_3. Geometric mean concentrations at

these locations were 1.14 and 1.3 µg/L, respectively. Both concentrations were <50 percent of the MADL of 10 µg/L.

Annual geometric mean concentrations for the following pollutants exceeded the MADL:

- **Benzo(a)pyrene**. The annual geometric mean concentration for benzo(a)pyrene was calculated for two UIC locations, P5_5 and SP3_8. Geometric mean concentrations at these locations were 0.247 and 0.026 µg/L, respectively. The annual geometric mean concentration for one UIC location, P5_5, was 0.247 µg/L, slightly above the MADL of 0.2 µg/L.
- **Pentachlorophenol**. The annual geometric mean concentrations for pentachlorophenol was calculated for 23 UIC locations where the concentration was ≥50 percent of the MADL (1.0 µg/L) in at least one sampling event. The geometric mean concentration for 10 UIC locations across Panels 5, 6, SP3, and SP4 exceeded the MADL in Year 5. The annual geometric means for these 10 locations ranged from 1.11 to 3.88 µg/L, slightly exceeding the MADL.

4.3.3 Priority Pollutant Screen Analytes

No individual PPS analytes were detected at concentrations ≥50 percent of their respective MADLs.

4.4 Evaluation of Year 5 Results

This section evaluates Year 5 data using statistical and graphical methods to look for potential differences or similarities between sample panels, sampling events, and traffic categories. Box plots were produced to present the results of selected analytes. Box plots are an effective way to convey information that otherwise might require multiple graphs, and graphically can depict the range of stormwater concentrations, percentiles (25th, 50th, 75th), skewness, and identify outliers. Presenting box plots side-by-side allows the general magnitude of the observations (i.e., stormwater concentrations) in each plot to be ascertained and general comparisons to be made regarding the data sets. Figure 4-1 illustrates and defines the components of a box plot.

Box plots were prepared only for analytes detected in Year 5 where the stormwater concentration in at least one sampling event was detected at a concentration ≥50 percent of the MADL.

4.4.1 Year 5 Concentration Data by Traffic Category

The box plots show the pollutant concentrations by traffic category and were prepared using Year 5 stormwater discharge data, including non-detect values. Concentrations reported as non-detect (<MRL) used the MRL to generate the box plots to avoid any distortion of the data distribution caused by substituting a value other than the MRL.

Figures were prepared to illustrate analyte concentrations by traffic category (i.e., <1,000 TPD, ≥1,000 TPD). Box plots for the following five pollutants were prepared and are presented in Figure 4-2:

- Arsenic
- Lead
- DEHP
- Benzo(a)pyrene
- Pentachlorophenol

The following general observations are made regarding this information:

- Pentachlorophenol, lead, benzo(a)pyrene, and DEHP generally appear to be symmetric on a log scale. However, several plots appear to be truncated by the nondetect values [e.g., pentachlorophenol, dissolved lead, chromium, benzo(a)pyrene, DEHP].
- The ≥1,000 TPD traffic category has a slightly higher median concentration than the <1,000 TPD category for the pollutants evaluated.
- The means and geometric means of the pollutants evaluated are, in general, <50 percent of their respective MADLs.
- Some individual event concentrations detected above their respective MADLs are identified as potential outliers by the box plot methodology [e.g., arsenic, benzo(a)pyrene, DEHP], although for benzo(a)pyrene and DEHP the nondetects have the effect of creating more 'outliers' than is reasonable.

Box plots for lead indicate that the mean and geometric mean for dissolved lead are approximately an order of magnitude less than for total lead, suggesting lead is associated with stormwater particulates. This is consistent with the known behavior of lead in the environment and its strong affinity to sorb to soil.

4.4.2 Individual UIC Location Concentration Data by Sampling Event

Dot plots (i.e., Trellis Displays) were prepared for:

- Pentachlorophenol (Figure 4-3)
- Lead (Figure 4-4)
- Benzo(a)pyrene (Figure 4-5)
- DEHP (Figure 4-6)
- Arsenic (Figure 4-7)

These plots depict the concentration for each UIC sampling location in Year 5 by sampling event and traffic category. The UIC locations on these plots are ordered according to increasing average concentration along the *x*-axis. These plots show the concentration of pollutant at an individual UIC for each sampling event. Concentrations

reported as non-detect (<MRL) were plotted at the MRL. The following general observations are made regarding these plots:

- Most individual sample concentrations (by event and by location) are below the applicable MADLs.
- Concentrations at most individual UIC locations are within a narrow concentration range.
- Concentrations appear slightly higher in UICs categorized as ≥1,000 TPD.

4.4.3 Year 5 Concentration Data by Sampling Event

Box plots showing the concentrations by sampling event were prepared using Year 5 stormwater discharge data, including non-detect values. Box plots were prepared for the following analytes (Figure 4-8):

- Pentachlorophenol
- Lead
- Benzo(a)pyrene
- DEHP
- Arsenic

Box plots were generated using data from 42 UIC monitoring locations for each sampling event. Concentrations reported as non-detect (<MRL) used the MRL to generate the box plot. The following general observations are made regarding these plots:

- Most individual sample concentrations (by event and by location) are below the MADL.
- There is no consistent relationship between concentration and event.

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Section 5

5 Preliminary Trend Analysis

5.1 General

This section presents stormwater discharge monitoring data for Years 1 through 5 using statistical and graphical methods to identify potential differences or similarities between permit years, traffic categories, and monitoring panels. Years 1 through 4 results are presented in their respective annual stormwater discharge monitoring reports (City of Portland, 2006e, 2007, 2008b, 2009).

Box plots were prepared to present the results of selected analytes for Years 1 through 5. These plots are presented side-by-side to allow both the general magnitude of stormwater concentrations and distribution in each plot to be viewed, and to allow general comparisons to be made regarding the data sets.

In general, plots were prepared for pollutants where the stormwater concentration in at least one sampling event was detected at a concentration greater than 50 percent of the MADL. Plots were generated using data from all five permit years, including values reported by the analytical laboratories as "non-detect" and flagged (i.e., estimated) data. Concentrations reported as non-detect (<MRL) were replaced with a value equal to the MRL in order to generate the box plots.

Additional data evaluation and analysis may be conducted and discussed in the annual UICMP report, as appropriate.

5.2 Permit Year

Plots were prepared for Panel 6 (stationary panel) to compare stormwater discharge concentrations of selected analytes by permit year. Figure 5-1 presents the plot comparisons for pentachlorophenol, lead, benzo(a)pyrene, DEHP, and arsenic. The following general observations are made regarding Figure 5-1:

- Concentration ranges and distributions are very similar among years.
- Annual geometric mean concentrations of the compounds evaluated are, in general, <50 percent of their respective MADLs for all years.
- Two DEHP results are an order of magnitude higher than the rest of the data and are inconsistent with the distribution of the rest of the DEHP data.

5.3 Traffic Categories

Plots were prepared for Panel 6 (stationary panel) to compare the concentrations of selected analytes by traffic category (i.e., <1,000 TPD, ≥1,000 TPD) for Years 1 through 5. Figure 5-2 presents the box plots for pentachlorophenol, lead, benzo(a)pyrene, DEHP, and arsenic. The following general observations are made regarding Figure 5-2:

- Patterns for both traffic categories have similar concentration ranges from permit year to permit year.
- Distributions of DEHP and benzo(a)pyrene are consistent with a lognormal model that has been truncated at the detection limit (i.e., data are skewed by the non-detect values).
- Annual median and geometric mean concentrations of the compounds evaluated are, in general, <50 percent of their respective MADLs.
- The ≥1,000 TPD traffic category has higher geometric mean and median concentrations than the <1,000 TPD category for the compounds evaluated.

***Summary**: Box plots were prepared to identify potential differences in pollutant concentrations between permit years and traffic categories. In general, for Years 1 through 5, data are similar for each variable. For most pollutants evaluated, the concentration ranges were generally narrow and geometric means were well below their respective MADL (i.e., <50 percent). Pollutant concentrations appear to be higher in the ≥1,000 TPD traffic category than in the <1,000 TPD category and similar between sample panels.*

5.4 Supplemental Data

Plots were prepared to compare SP4 data (commercial and industrial sites) with sites in the general UIC population. Figure 5-3 present box plots of Year 5 data from Panel 5, Panel 6, and SP4. The following general observations are made regarding Figure 5-3:

- Concentration ranges for SP4 data are in general similar to data from Panels 5 and 6.
- There is some indication that SP4 concentrations may be somewhat higher for lead and pentachlorophenol. However, these differences may be random variation because they are not much larger than the difference between Panels 5 and 6 for these pollutants, which can be attributed mainly to sampling error.

Section 6

6 Response Actions

This section presents a summary of the actions taken during Year 5 to further understand pollutant sources, to prevent pollutants of concern from exceeding respective MADLs, and to respond to conditions identified during implementation of the Stormwater Discharge Monitoring Program.

6.1 Response Actions for Individual Exceedances

6.1.1 Source Investigations

Source investigations may be conducted when new data are inconsistent with previous results or observations. No specific source investigations were conducted in Year 5 because of unanticipated stormwater discharge results or observations during UIC sampling.

6.1.2 UIC System Cleaning

As a result of observations during pre-sampling inspections or during stormwater event sampling, the City's UIC program requested that selected UICs be cleaned by City Bureau of Maintenance crews or through the City's response contract. Cleaning activities were conducted in general accordance with the *Surface Stormwater Facilities Maintenance Management Manual* (prepared for BES by Brown and Caldwell, 1997) and UICMP submitted to DEQ in December 2006.

Recent cleaning and/or maintenance activities conducted at Year 5 UIC sampling locations are identified in Tables 2-2 through 2-5.

6.1.3 Other

One of the goals of the permit and the SDMP is to identify factors that have a substantive effect on the quality of stormwater entering City-owned UICs. To identify these factors, the potential associations and relationships between stormwater quality, potential sources of pollution, traffic category, land use, etc., could be evaluated. As data are collected in successive years, and a larger data set becomes available, additional analysis will be considered, if needed (e.g., detailed trend analysis, correlations, or logistic regression). As appropriate, this type of evaluation and analyses, if conducted, will be included in the annual UICMP report(s). Types of analyses that may be conducted include:

- Investigate potential relationships between:
  - TSS and selected pollutants
  - Presence of treated wood utility poles and pentachlorophenol
  - Traffic volume (i.e., TPD) and selected pollutants
  - Pollutants (e.g., lead and arsenic, lead and antimony, DEHP and PAHs, lead and PAHs)

- Comparison of data groups to determine if they are statistically different (i.e., concentrations between traffic categories)

6.2 Response Actions for Previously Identified Category 4 UICs

6.2.1 Pentachlorophenol Response Actions

No specific response actions were conducted in Year 5 because of unanticipated stormwater discharge results or observations during UIC sampling.

The permit defines Category 4 UICs as those that become non-compliant by failing to meet the annual geometric mean MADL within one wet season after the initial exceedance. Pentachlorophenol has been detected above the MADLs in the first 5 years of UIC Stormwater Discharge Monitoring Program. Annual geometric mean concentrations at seven locations exceeded the MADL in 2 consecutive years, during Years 2 and 3, and were identified as noncompliant Category 4 UICs in annual stormwater discharge monitoring reports for Years 2 and 3 (City of Portland, 2007, 2008b, respectively). No Category 4 UICs were identified in Year 4.

The recommended corrective actions for the Category 4 UICs were identified and evaluated in accordance with the DEQ approved *Corrective Action Plan* (CAP; City of Portland, 2006f). The recommended corrective action for each Category 4 UIC was a groundwater protectiveness demonstration (GWPD) (i.e., risk assessment) or No Further Action determination as allowed by the permit [Schedule C(11)(a)].

The City developed the *Decision Making Framework for Groundwater Protectiveness Demonstrations* (Framework, City of Portland, 2008a). The purpose of the Framework is to provide a consistent, streamlined decision making framework for evaluating the potential impacts (i.e., risks) to groundwater quality associated with the discharge of urban ROW stormwater into permitted City-owned UICs. The Framework includes a groundwater protectiveness tool for assessing the potential "risk" to groundwater posed by the discharge of urban stormwater runoff into City-owned UICs. The Framework was submitted to DEQ in June 2008 and approved by DEQ in October 2008.

Scope of GWPD Analyses. GWPDs were conducted by the City in accordance with the protocols defined in the CAP and Section 10 of the Framework. The GWPDs evaluated the fate and transport of pentachlorophenol in stormwater discharged to Category 4 UICs using a one-dimensional mathematical fate and transport equation and site-specific parameter values (e.g., soil type, contaminant concentration). The analyses evaluated whether stormwater pollutant concentrations entering the UIC are reduced to levels protective of drinking water at the point the infiltrated stormwater reaches groundwater. Specific activities included:

- Preparing a conceptual site model (CSM) of potential transport pathways for pentachlorophenol discharge to a UIC.

- Assessing the fate and transport of pentachlorophenol in unsaturated soil under a range of geologic conditions and under a range of stormwater discharge concentrations.

Results. Results of fate and transport analyses demonstrated that unsaturated subsurface soil attenuates (i.e., treatment/removal) pentachlorophenol in stormwater discharges to the subject UICs to levels protective of beneficial uses of groundwater, public health, and the environment as required by OAR 340-040.

The UIC monitoring data for Years 1 through 5 indicate pentachlorophenol is generally present at low concentrations and within a narrow concentration range (between 0.04 and 6.3 µg/L). The analyses indicated that beneficial uses of groundwater are protected. Pentachlorophenol concentrations are not expected to increase significantly in the future because the source is strongly suspected to be leaching or weathering of treated wood utility poles, as demonstrated in the pentachlorophenol pathway analysis presented in Appendix G of the *Annual Stormwater Discharge Monitoring Report – Year 3* (City of Portland, 2008b).

The site-specific GWPDs for Year 2 Category 4 UICs were submitted to DEQ for review and approval in the spring of 2008 (GSI, 2008a, 2008b). DEQ issued No Further Action determinations for the four Year 2 Category 4 UICs in a letter dated May 30, 2008 (DEQ, 2008). Site-specific GWPDs for the three Year 3 Category 4 UICs were submitted to DEQ on March 30, 2009, for No Further Action determinations.

6.3 Response Actions for UICs Exceeding the Annual Geometric Mean Concentration in Year 5

6.3.1 Category 4 UICs/GWPDs

The WPCF permit requires the City to identify UICs at which the annual geometric mean concentrations exceed the MADL for 2 consecutive years as Category 4 UICs.

The annual geometric mean concentration of pentachlorophenol exceeded the MADL for a second consecutive year in five UICs monitored in Year 5. Three of the five sites (P6_1, P6_7, and P6_14) previously were identified as Category 4 UICs for pentachlorophenol in Year 2, as noted in Section 6.2.1. Two new Year 5 Category 4 UICs are provided in the table below.

Location Code	Approximate Address	BES UIC No.	Traffic Category (trips per day)	Separation Distance [a] (ft)	Year 4 Annual Geometric Mean Pentachlorophenol Concentration (µg/L)	Year 5 Annual Geometric Mean Pentachlorophenol Concentration (µg/L)
SP3_6	490 NE 133rd Ave.	ADS048	≥ 1,000	96	1.3	1.8
SP3_8[b]	12198 SE Holgate Blvd.	ADW251	≥ 1,000	8	1.4	3.88

Notes:

[a] The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC -2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design.

[b] Site was identified as a Category 3 UIC because of separation distance. The UIC was included in the *GWPD for UICs with Vertical Separation Distance ≥5 feet* submitted to DEQ for approval in June 2008, and a No Further Action determination was received from DEQ in January 2009.

6.3.2 Additional Monitoring

In addition to the locations identified above as Category 4 UICs, six other locations exceeded the annual geometric mean concentration for a constituent in Year 5 and will carry over to next year. Five of these UIC locations exceeded the MADL for pentachlorophenol: P5_15, SP4_2, SP4_3, SP4_4, and SP4_10. One location exceeded the MADL for benzo(a)pyrene.

These six UIC locations will be sampled again in Year 6.

Section 7

7 Data Management and Validation

This section summarizes the types of information managed and maintained during Year 5 of the Stormwater Discharge Monitoring Program. It also summarizes the results of data validation conducted in the field and analytical laboratory data collected during the 2009-2010 wet season. Specific procedures for data management and data validation are described in the QAPP.

7.1 Data Management

Technical data that were collected and used in the Data Usability Report (Appendix B) include the following:

- Field data (described below)
- Analytical laboratory data (described below)
- UIC construction data (provided in Section 2)
- UIC locations (described in Section 2)
- Sedimentation manhole depth to sediment measurements (described in Section 2)
- Traffic volume data (described in Section 2)
- Land use (described in Section 2)
- Sampling event data (described in Section 3)
- Calculated or manipulated data (described in Section 4)

There were no deviations from specific data management procedures described in the QAPP during the 2009-2010 wet season.

Additional technical data types are identified in the QAPP, but not specifically presented in this report. That information will be presented and discussed in other reports as appropriate.

7.1.1 Field Data

Field data were recorded on project-specific paperwork, as described in the SAP. BES maintains field records in both hard copy and electronic (pdf file) formats. Appendix B contains copies of the daily field reports (DFR), field data sheets (FDS), and WPCL COC forms. TestAmerica (TA) COCs are included with the analytical laboratory data packages (see below).

7.1.2 Laboratory Data

Analytical laboratory data (sample information and analytical results from both the WPCL and TA) were manually entered into the BES Laboratory Information Management System (LIMS), which functions as the BES database for data storage, sample tracking, and reporting. A WPCL chemist checked analytical data sheets and results of laboratory quality control (QC) samples to ensure that the QC statistics were within control limits and that appropriate corrective actions were taken if control limits were exceeded. The WPCL chemist also flagged or provided comments on results that did not strictly meet QC criteria. The WPCL applied an "EST," which means estimated value, to qualify results. TA used customized flags to communicate detailed QC issues; these flags are included on the TA analytical laboratory reports.

WPCL staff verified the accuracy of data entry into the LIMS system and did not release data until the data validation process was complete. The LIMS system was backed up on a daily basis. Appendix E contains electronic copies of the TA and WPCL analytical data reports.

The WPCL maintains project files containing any records necessary to reconstruct the analytical events associated with this project. All procedures for storage of hard copy and electronic data comply with the *WPCL Quality Manual* (City of Portland, 2005). Records related to analytical laboratory data that are maintained include:

- COC forms (copies included in analytical laboratory reports are presented in Appendix E)
- Instrument calibration and tuning records (as applicable)
- Analytical standards preparation logs
- Method Standard Operating Procedures (SOP)
- Analytical QC results (including method blanks, internal standards, surrogates, replicates, spikes, and spike duplicate results, as applicable)
- Raw data, specifically instrument printouts
- Bench worksheets and/or quantification reports
- Corrective action reports (if any)
- Details of the quality assurance/quality control (QA/QC) program in place at the time that the project analyses were conducted

Laboratory data were extracted from the LIMS system to generate Year 5 summary tables, in an electronic format, by UIC location and analytical constituent. A copy of the Access© Database containing a compilation of Years 1 through 5 monitoring data is included in Appendix F. Tables were checked against copies of the original final data sheets before data analyses. Data are tabulated as they are shown on the original data sheets. However, specific data flags by TA are not included in the Access© Database.

Noteworthy laboratory QC issues are included in the comments section of the spreadsheet.

7.1.3 Management Data

Management data included information that must be tracked to monitor, manage, and document the performance of the UIC program; such as schedules, cost estimates, and project reports. All original data, calculations, drawings, etc., were systematically filed as they were collected for easy reference, and are maintained by BES.

7.1.4 Data Storage

All technical and management data described above will be retained indefinitely and no other records will be destroyed without prior permission of the City's UIC Program Manager and notification of the DEQ UIC Permit Manager, as specified in the QAPP.

7.2 Data Quality Objectives (DQO)

DQOs are defined for environmental sampling and laboratory activities as qualitative and quantitative statements that specify the quality of the data required to support the project objectives. DQOs provide the driving force for the level of QC required for any particular sampling or analytical task. The key DQOs for the City's UIC monitoring program are to provide environmental data that are of known and acceptable quality, are scientifically defensible, and demonstrate compliance with the WPCF permit. The quality of data is known when all components associated with data generation are thoroughly documented. Data are of acceptable quality when a rigorous QA/QC program is implemented and the QC indicators fall within predefined limits of acceptability. The project QAPP describes the methods of data documentation and the mechanisms to be used in attaining data of acceptable quality.

Table 7-1 summarizes the project DQOs for analytical data. DQOs for Year 1 were carried forward into Years 2 through 5 without change. Additional information on DQOs can be found in the QAPP.

Field and laboratory data collected during Year 5 were determined to meet the DQOs described in the QAPP and to be of known and acceptable quality. All data are considered useable except for herbicide analyses (EPA 515.3) for eight samples collected during Event 5 (see Appendix B for details). These were analyzed outside of hold time because of contract laboratory instrument failure and data were received too late to be included in data summaries and analysis for this report.

7.3 Data Validation

This section summarizes the procedures used to review field and analytical data. The purpose of this review was to ensure that data collection and evaluation were conducted according to procedures specified in the SDMP. Deficiencies in field or analytical data, if any, are noted, as are the cause of these deficiencies. If these deficiencies required a corrective action, it is described in Section 7.4 of this report.

7.3.1 Field Data

Deviations from field procedures outlined in the SAP are noted in this section. Field data were collected in general accordance with the procedures described in the SDMP. The following paragraphs describe key components of the field program used to validate field data. All field data were determined to be valid and of acceptable quality.

Sample Locations. Pre-sampling investigations were conducted to determine whether any of the proposed UIC locations were unsuitable for sampling. The factors used in this evaluation are described in the SAP. As a result of these investigations, five Panel 5 locations and five proposed supplemental locations were determined to be unsuitable for sampling. Except for the locations listed below, these substitutions were made before initiating Year 5 storm event sampling. The sites listed below were replaced during the first and second storm sampling event.

Site	Final Location	Original Location	Rationale for Replacement
P5_5X	6126 SE 65th Ave.	1528 N Farragut St.	Car parked on sampling location, repeated attempts to encourage owner to move car unsuccessful
P5_5	10331 SE Clinton St.	6126 SE 65th Ave.	Minimal flow into sump (observed during first Event 1 sampling attempt, unable to collect sufficient sample volume during Event 2 sampling event)
P5_13	620 SE 136th Ave.	3921 NE 34th Ave.	Access issues because of parked vehicles

Sample Stratification. UIC monitoring locations are stratified by traffic category ($\geq$1,000 or <1,000 TPD). Sample stratification in Year 5 met the traffic criteria identified in the SDMP.

Precipitation Events. Five sampling events were completed successfully between October 2009 and May 2010. The precipitation events sampled are described in more detail in Table 3-9. Storms targeted for sampling met the criteria identified in the SAP to the extent practicable and were determined to be acceptable.

Sample Collection Procedures. No issues associated with sample collection procedures occurred during the 2009-2010 wet season.

Field Data Documentation. Field documentation is reviewed by both the BES Field Leader and the Monitoring Coordinator to ensure that sample collection was conducted according to procedures specified in the SDMP and that documentation is complete. Field records document:

- Adherence to SAP protocols
- Field corrective actions tracking and inherent data uncertainties
- Field procedures do not affect samples (i.e., collection of appropriate QC samples)
- Safe work practices are followed (i.e., adherence to the Health and Safety Plan)

Specific field records maintained by BES include the following:

- DFRs, FDSs, and COC forms
- Health and Safety Plan
- Field meter calibration and maintenance records (as applicable)
- Sample collection standard operating procedures
- Storm event information
- Sampling event summaries

Field data documentation for sampling met the objectives identified in the SAP to the extent practicable and was determined to be acceptable.

7.3.2 Laboratory Data

Year 5 analytical data validation included, but was not limited to, a review of the following:

- **Timeliness.** Verified laboratory analyses were conducted within the recommended analytical holding times. Samples not extracted or tested with the specified period were noted or flagged.
- **Detection Limits**. Verified analytical detection limits for each analysis met the project specific limits. Sample MRLs were less than the MADLs specified in the permit and met the MRLs proposed in the QAPP, except as noted in Appendix B.
- **Chain-of-Custody**. Verified COC procedures were followed by the laboratory.
- **Reagent Blanks/Trip Blanks**. Verified blanks did not contain any analytes. Analytes detected in the reagent blank indicate laboratory-introduced contamination that can be identified and flagged or separated from the sample results.

- **Matrix Spikes and Matrix Spike Duplicates**. Verified the percent recoveries between the spike quantity recovered and the known spike value were acceptable. The relative percent difference (RPD) was calculated using the duplicate analyses results.
- **Surrogate Spike Analyses**. Verified the percent recoveries were within the acceptable range for the analytical laboratories database.
- **Blind Duplicates**. Verified the RPD between the original sample and the blind duplicate was acceptable.
- **Equipment Blanks/Field Decontamination Blanks**. Verified blanks did not contain any analytes. Analytes detected in the blank indicate introduced contamination from field or decontamination processes that can be identified and flagged.

Year 5 analytical data were determined to meet the identified DQOs and to be of acceptable quality. Except as noted in Section 7.2, all planned data were collected and analyzed and all data were considered usable. Year 5 monitoring efforts resulted in a data completeness that exceeded the 95 percent goal set in the QAPP. Data QA/QC issues identified during the data validation process are summarized in Table 7-2 as described below. Appendices B, C, and E include the following information used for data validation:

- WPCL Laboratory Analysis Reports
- TA Laboratory Analysis Reports
- Data Usability Report
- Year 5 Analytical Data (e.g., Access© Database, City of Portland Janus database)

Validation occurred throughout the sample collection and analytical process. Initial validation was conducted during sample receipt and log-in and included the following steps: examination of the integrity of sample containers and labels, including suitability of containers for requested analyses; examination of the COC form for the presence of all required information and signatures; and verification of sample container identification numbers against those listed on the COC form.

Laboratory data validation also occurred during sample analysis and was carried out at the instrument by the analyst. This phase of validation involved performing and maintaining instrument calibration and assessing precision and accuracy of the data via the analysis of the appropriate QC checks by the individual laboratories. The analyst ensured that the QC statistics were within control limits and took appropriate corrective actions during analysis if control limits were exceeded.

Laboratory data validation also included checking the data reduction and transcription/ data entry operations used to calculate final results. An analyst or chemist other than the one who conducted the analysis, but who is fully knowledgeable about the analysis, conducted this validation. Results were verified against the raw data, including checking calculations, use of correct units and/or conversion factors, and use of correct sample preparation conditions. The technical reviewer also confirmed that all relevant previous validation checks were applied correctly and that QC statistics were within control limits.

Results that do not meet quality criteria were flagged by the TA, WPCL, WPCL QA Coordinator, or BES Investigation and Monitoring Services (IMS). Selected samples were flagged by the WPCL QA Coordinator using "EST," which means estimate, to qualify the results; the reason for the "EST" flag is described in the comments section of the WPCL Laboratory Analysis Reports and database. TA used customized flags to communicate QC issues. Definitions for these data flags are included in the TA data reports (see Appendix E). Data qualifiers were assigned through project data validation and are defined in the *Data Usability Report* (see Appendix B). Most laboratory-assigned flags were carried through using project-specific data qualifiers, and additional qualifiers were assigned through data usability assessment.

The analytical data were entered into BES LIMS and hard copies of the entered data were checked for data entry errors. After sample results (TA and WPCL) had undergone technical and data entry review, the WPCL QA Coordinator electronically marked the sample in LIMS. The mark indicates that all analyses for that sample are complete and have been checked for errors. At that point, the data were released to the UIC program for use.

Table 7-2 presents a summary of all noteworthy laboratory QC issues identified during the 2009-2010 wet season. The WPCL QA and Monitoring Coordinators reviewed all QC issues. These issues are discussed in the comments section of the WPCL Laboratory Analysis Reports (see Appendix E). Additional detailed flags may be found on the TA Laboratory Analysis Reports (Note: this information is not transferred to the WPCL Laboratory Analysis Reports comment section or database if it does not affect interpretation of the data). Intermittent DEHP QC issues were encountered during Year 5, though these issues were not nearly as pervasive as in Year 2 (see *Annual Stormwater Discharge Monitoring Report – Year 2* [City of Portland, 2007]). DEHP QC issues consisted primarily of elevated LCS and MS/MSD recoveries resulting from laboratory-introduced contamination. These QC issues typically resulted in DEHP analytical results that were biased high. DEHP QC issues and associated data qualifiers are described in the *Data Usability Report* (see Appendix B) and in Table 7-2.

7.4 Monitoring Program Corrections

Any unusual condition that occurred during a monitoring event that could affect the monitoring results was noted and, if necessary, corrected. These conditions may be

classified as a deviation, nonconformance, or occurrence[7]. Conditions or issues related to field sampling and laboratory activities are discussed in this section.

7.4.1 Deviations, Nonconformance, and Occurrences

No deviations, nonconformance, or occurrences were noted during the 2009-2010 wet season.

7.4.2 Field Corrective Actions

A field corrective action was initiated if problems associated with field measurements or field sampling equipment were observed. These problems and associated corrective actions are documented in *Corrective Action Reports* (Appendix G). No corrective action was taken during the 2009-2010 wet season.

One minor oversight occurred in that locations SP4_1 and SP4_7 were sampled twice during Event 5. This was the result of the sampling team failing to check off the sample locations on the Event sample tracking sheet located in the WPCL sample receiving area. This was not deemed serious enough to warrant corrective action. However, standard procedures were revised to include double-checking COC copies by the field team leader against the electronic version of the Event sample tracking sheet.

7.4.3 Laboratory Corrective Actions

The QAPP requires that a laboratory corrective action be initiated if problems associated with laboratory procedures or equipment are observed. These problems and associated corrective actions are documented on a corrective action report specific to the laboratory in question. As described in Section 7.2, one issue requiring laboratory corrective action occurred during the 2009-2010 wet season. Because of instrument failure at TA, the City's contract laboratory, eight samples from Event 5 were analyzed outside of hold time for herbicides (EPA 515.3). The corrective action report provided by TA is included in Appendix G.

[7] A deviation is a planned or unplanned departure from a procedure deemed reportable and tracked by the City's UIC Program Manager. Nonconformance is a deficiency in characteristics, documentation, or procedures that renders the quality of an item or activity unacceptable or indeterminate. An occurrence is any condition or event that could affect the health and safety of the public, have an adverse effect on the environment, endanger the health and safety of workers, affect the operations and intended purpose of a facility, or result in loss or damage of property.

Section 8

8 References

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Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

7. **Monitoring Reporting**. The Permittee must submit to the Department annual monitoring reports in accordance with Schedule C.19. At a minimum, each annual monitoring reports must address the following conditions [2]:	**Report Section**
a. Provide a summary of the monitoring data for the preceding wet season being reported. At a minimum, the summary must include:	
i. Data pertinent to each storm event sampled, including but not limited to:	Section 3 Tables 3-4 through 3-10 Figures 3-1 through 3-5 Appendix B
(1) A description of the date and duration of storm event sampled;	
(2) Precipitation estimates of the storm event;	
(3) Duration and intensity of the storm event; and	
(4) The duration in days between storm events sampled and the previous storm event;	
ii. A summary table for the injection systems being sampled that includes, but not limited to:	
(1) DEQ ID number for the public UIC;	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites
(2) Latitude and longitude of each sample location;	
(3) Street location;	
(4) The traffic volume, traffic pattern and type of land use in accordance with Table 2 for each public UIC injection system sampled;	
(5) Type of pretreatment, if any, for the public UIC sampled;	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites
(6) Depth to groundwater from ground surface based on USGS estimated depths to groundwater. Site specific data shall be used if available;	
(7) Date of the last maintenance and type of maintenance performed;	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites Section 6
(8) Date of last maintenance and inspection;	
(9) The level of the sediment in a sediment manhole, if the injection system has a sediment manhole as part of the pretreatment. If no sediment manhole is present, report the sediment level in the associated catch basins and in the bottom of the public UIC.	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites
(10) The estimated total volume of recharge to the aquifer by public UICs.	Section 3 Table 3-11

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

iii. A map showing the location of the public UIC injection systems sampled in relation to the Permittee's other public UIC systems authorized by this permit and any domestic wells and public water system wells;	Figures 2-1 and 2-2 Appendix A Systemwide Assessment Report (July 2006)
iv. A map of sufficient scale that clearly shows the location of the specific public UIC being sampled;	Appendix A
v. Identification and discussion of any exceedance of an individual storm event MADL and any annual mean MADL concentration, including:	Section 4 Tables 4-7 and 4-9
(1) A discussion of any potential cause of the exceedance, to the extent practicable and if known, and	Appendix B Section 4
(2) Actions taken during the wet season to reduce the concentration of the pollutant of concern;	Section 6
vi. Identification and discussion of any detected PPS pollutant during a PPS screen sampling event, including:	Section 4 Table 4-1
(1) The pollutant concentration:	Tables 4-1 and 4-2 Appendices D, E , and F
(2) The public UIC at which the detection occurred;	
(3) A discussion of the cause of the detection, if known; and	Section 4 Appendix B
(4) actions taken; and	Section 6
vii. A discussion of compliance response actions taken to correct a MADL annual mean exceedance.	Section 6
b. Provide a summary table of all laboratory monitoring data for the reporting period wet season, including:	Appendices D, E, and F
i. Ancillary pollutants derived from the approved analytical method;	Tables 3-2 and 3-3 Section 4 Table 4-3 Appendices D, E, and F
ii. MRLs; and	
iii. Analytical method used.	
c. Discuss any unusual conditions that occurred during a monitoring event that may impact the monitoring results.	Appendix B Sections 4 and 7

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

d. Include an analysis of the trends in the cumulative monitoring data, including water quality improvements or degradations for each annual report after the first year of reporting.	Section 5 Figures 5-1 and 5-2
e. Explain any outliers in the data used to determine the annual mean MADL concentration. If the outlier data was not used in the mean annual MADL concentration, provide an explanation of why the data was omitted from the determination.	Section 4
f. Include a statement that sampling and measurements taken as required herein are representative of the traffic volume and traffic patterns of the monitored discharge weighted or stratified in accordance with the Department-approved SDMP.	Sections 2 and 7
g. Discuss any annual mean MADL exceedance in accordance with Schedule C.10.	Section 4
h. Discuss, in accordance with Schedule C.8, any PPS pollutant detection during a PPS sampling event. This condition applies to the 1st, 4th and 9th year PPS sampling events, or whenever the Permittee samples for the presence of PPS pollutants.	Section 4 Tables 4-1, 4-2 and 4-3
i. In the event conditions occur beyond the reasonable control of the Permittee as identified in Schedule B.3, the Permittee must explain the circumstances in the annual monitoring report. The explanation must include why the sampling event or sample analysis was missed and (if applicable) any corrective actions to prevent the occurrence from happening again.	Section 7
j. For Category 4 public UICs, as defined in Schedule D.11, the Permittee must report in the annual monitoring report the following:	Sections 4 and 6 Category 4 UICs are defined as public UICs that become non-compliant by failing to meet the annual mean MADL within one wet season after the exceedance, or fails to satisfy any groundwater protection conditions of Schedule A of the permit.
i. Provide a list of the Category 4 public UICs;	
ii. A brief description of the public UICs;	
iii. The location of the public UIC at which the non-compliant condition occurred, including traffic volume and the nature of land uses that may drain to the public UIC;	
iv. The nature and concentration of the pollutant that exceeded the annual mean MADL concentration;	
v. The vertical separation distance to groundwater;	
vi. The proposed corrective action, which may include a risk assessment that meets Department risk assessment protocols;	
vii. Discuss the corrective action(s) completed;	
viii. Discuss on-going corrective action(s), or corrective actions to be implemented, including but not limited to:	
(1) The type of corrective action;	
(2) Implementation date;	
(3) Completion date; and	
(4) Other pertinent information regarding the public UIC or its corrective action obtained during the reporting period.	

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

k. In the event the Permittee undertakes groundwater monitoring, the Permittee must provide the following:	Not applicable for Year 5. Groundwater monitoring was not performed in Year 5.
i. Monitoring well locations with street location and latitude and longitude in decimal degrees;	
ii. Water level measurements and gradient;	
iii. As-built monitoring well construction details for any monitoring well installed during the reporting period;	
iv. The pollutant(s) being monitored;	
v. All groundwater monitoring data and other data pertinent to groundwater monitoring;	
vi. Any other pertinent data to groundwater monitoring obtained during the reporting period;	
vii. A discussion of the following:	
(1) Monitoring data;	
(2) Pollutant concentrations, including concentrations at background and compliance monitoring wells;	
(3) Compliance with Table 1 for groundwater;	
(4) Actions taken or to be taken by the Permittee with respect to groundwater monitoring;	
(5) An analyses of the data; and	
(6) Conclusions with respect to potential or demonstrated groundwater contamination from public UICs; and	
viii. If applicable, a discussion of any Department-approved groundwater corrective actions, including, but not limited to:	Not applicable for Year 5. Need for groundwater Corrective Action was not identified in Year 5.
(1) Nature of the action(s);	
(2) Status of the action(s);	
(3) All laboratory results related to the action;	
(4) Analyses of the data with respect to achieving the corrective action goal; and	
(5) Milestones reached.	
8. **Permittee Monitoring Responsibility**. The Permittee is responsible to protect groundwater quality while operating its public UICs. At a minimum, the Permittee must:	
a. Ensure data and information acquired through implementation of the SDMP is representative of the Permittee's entire public UIC system;	SDMP (August 2006) Section 2
b. Ensure the results of the system-wide assessment, required under Schedule D.8, are incorporated into the SDMP as appropriate;	SDMP (August 2006)
c. Notify the Department in the annual monitoring report of significant land use changes which change traffic volume or patterns which may affect public UICs in the SDMP. Significant land use changes include, but are not limited to:	Section 4
i. Zoning changes that result in an increase of 1,000 trips per day or more;	None
ii. A change in type of traffic, i.e. increase in truck traffic; or	None

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

iii. A change that may cause or causes an adverse impact to a BMP such that the BMP no longer performs as intended to meet the conditions of this permit;	None
d. Notify the Department when information or data indicates additional pollutants should be added to Table 1;	SDMP (August 2006)
e. Implement modifications to the permit, including the addition of pollutants that the Department deems necessary to incorporate into the SDMP or other actions under this permit as directed by the Department; and	SDMP (August 2006)
f. Ensure other verifiable data or information, which may indicate a potential that groundwater may be endangered by stormwater injection, is reported in a timely manner to the Department.	SDMP (August 2006)

Notes:

[1] The report section provides a reference to the sections, tables, or figures in the annual SDM report that best address given requirements.

[2] Conditions taken verbatim from Section B(7) of DEQ issued "Water Pollution Control Facilities Permit for Class V Stormwater Underground Injection Control Systems." [DEQ Permit (No. 102830), issued June 1, 2005].

Table 2-1: Vehicle Trips per Day and Predominant Land Use

Vehicle Trips per Day (TPD)	Predominant Land Use
< 1,000	Residential Streets; Small Parking Lot
≥ 1,000	Residential Feeder Streets; Commercially Zoned Areas; Transportation Corridors; Industrial Areas

Table 2-2: UIC Summary Information - Rotating Panel, Year 5, Panel 5

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b]	DEQ UIC ID	BES UIC ID [c]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System	Separation Distance [d]	Distance to Nearest Well (ft) [e]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed [f]	Sediment Level (ft) [g]
P5_1	6725 SE Kelly St	387	≥ 1000	SFR	10102-6926	ADU122	45.49959	-122.59445	30	Sediment Manhole	98	5,346	No	Jun-08	Cleaned UIC & Sed MH	1.2
P5_2	3304 NE 138th Ave	735	< 1000	SFR	10102-4371	AAZ898	45.54669	-122.51908	31	No Pretreatment	51	2,058	No	Sep-09	Cleaned UIC & Sed MH	4
P5_3	3700 SE 122nd Ave	21,959	≥ 1000	MFR	10102-6152	ADT418	45.49550	-122.53795	30	Sediment Manhole	26	1,330	No	Aug-05	Cleaned UIC & Sed MH	1
P5_4	900 NE 77th Ave	290	< 1000	SFR	10102-8490	ADR579	45.52919	-122.58377	20	Sediment Manhole	152	3,698	No	Apr-08	Cleaned UIC & Sed MH	1
P5_5	10331 SE Clinton St.	208	< 1000	SFR	10102-7062	ADW558	45.50264	-122.55650	21	No Pretreatment	84	959	No	Nov-06	Cleaned UIC & Sed MH	6
P5_6	3327 NE 142nd Ave	922	< 1000	SFR	10102-4369	ADW184	45.54721	-122.51663	20.5	No Pretreatment	51	1,722	No	Oct-06	Cleaned UIC & Sed MH	4
P5_7	1944 SE 130th Ave	2,736	≥ 1000	SFR	10102-7194	ADS324	45.50876	-122.52992	30	Sediment Manhole	61	797	No	Dec-09	Cleaned UIC & Sed MH	2.5
P5_8	1304 N Liberty St	1,015	≥ 1000	MFR	10102-4757	ADP286	45.57085	-122.67998	31.5	Sediment Manhole	89	5,270	No	Aug-08	Cleaned UIC & Sed MH	4.5
P5_9	1154 NE Dean St	4,616	≥ 1000	SFR	10102-2732	ADP372	45.57158	-122.65265	30	Sediment Manhole	78	3,104	No	Aug-08	Cleaned UIC & Sed MH	3
P5_10	6202 SE 60th Ave	1,882	≥ 1000	SFR	10102-5681	ACN791	45.47812	-122.60224	30	Sediment Manhole	97	1,099	No	Jan-10	Machine Cln Inlt/Lead [h]	2
P5_11	8568 N Oswego Ave	2,415	≥ 1000	SFR	10102-1674	ADN270	45.59188	-122.74808	30.1	Sediment Manhole	52	3,753	No	Apr-08	Cleaned UIC & Sed MH	2.6
P5_12	1534 NE 141st Ave	732	< 1000	SFR	10102-9003	ADR346	45.53428	-122.51806	30	Sediment Manhole	113	198	No	Jun-09	Cleaned UIC & Sed MH	3.5
P5_13	620 SE 136th Ave	850	< 1000	SFR	10102-7724	ADT108	45.51799	-122.52382	29	Sediment Manhole	81	1,606	No	Jan-10	Machine Cln Inlt/Lead	0.5
P5_14	12610 NE Davis St	54	< 1000	SFR	10102-7964	ADS026	45.52406	-122.53340	19	Sediment Manhole	100	1,776	No	Jul-09	Cleaned UIC & Sed MH	1.4
P5_15	5190 N Vancouver Ave	5,761	≥ 1000	MFR	10102-3269	ADP960	45.56036	-122.66837	25	Sediment Manhole	129	7,381	No	May-09	Cleaned UIC & Sed MH	4.3

Notes:

a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

b COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

c BES UIC ID number is obtained from the BES Hansen database.

d The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as "Depth to groundwater" (UIC Database Report) for inclusion in DEQ's UIC database. Reported to nearest foot. Separation distances are based on December 2008 USGS depth to groundwater data (Snyder, D.T., 2008, Estimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey Scientific Investigations Report 2008-5095, 40p. (Available at http://pubs.usgs.cov/sir/2008/5059).

e Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

f Sed MH = Sedimentation manhole.

g Sediment level represents "feet of sediment removed" from UIC as measured prior to cleaning.

h Catchbasins and the pipes between the catchbasins and the sediment manhole were machine cleaned with a vaccuum truck.

Table 2-3: UIC Summary Information - Stationary Panel, Year 5, Panel 6

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b]	DEQ UIC ID	BES UIC ID [c]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System [d]	Separation Distance [e]	Distance to Nearest Well (ft) [f]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed[d]	Sediment Level (ft) [g]
P6_01	3500 SE 112TH AVE	25,838	≥1000	COM	10102-6707	ADW577	45.49676	-122.54801	22.5	Sediment Manhole	58	1,443	No	Apr-08	Cleaned UIC & Sed MH	5
P6_02	3740 SE 104TH AVE	2,354	≥1000	POS	10102-662	ADT394	45.49511	-122.55601	30	Sediment Manhole	61	2,048	No	Dec-08	Cleaned UIC & Sed MH	4
P6_03	4541 NE 80TH AVE	130[h]	<1000	SFR	10102-3192	ADQ337	45.55605	-122.58071	30	Sediment Manhole	80	3,436	No	Apr-07	Cleaned UIC & Sed MH	18
P6_04	9090 SE CLAYBOURNE ST	393	<1000	SFR	10102-5070	ADT961	45.47471	-122.56991	30	Sediment Manhole	12	4,292	No	Sep-00	Cleaned UIC & Sed MH	1
P6_05	2513 SE 153RD AVE	36,904	≥1000	MFR	10102-6590	ADS740	45.50410	-122.50598	30.1	Sediment Manhole	27	688	No	Jun-09	Cleaned UIC & Sed MH	5
P6_06	5201 N EMERSON DR	<100 [h]	<1000	SFR	10102-3311	ANS742[i]	45.56055	-122.69662	30	Sediment Manhole	23	8,787	No	Jan-06	Cleaned UIC & Sed MH	6
P6_07	640 NE 87TH AVE	729	<1000	MFR	10102-236	AMU771[j]	45.52784	-122.57361	30	Sediment Manhole	143	5,317	No	Mar-08	New Construction Completed	12
P6_08	10064 SE WOODSTOCK BLVD	795	<1000	IND	10102-5448	ADV169	45.47613	-122.56014	25.8	Sediment Manhole	5	2,710	No	Feb-10	Cleaned UIC & Sed MH	2.5
P6_09	3617 SE 168TH AVE	557	<1000	SFR	10102-6117	ADT531	45.49604	-122.48968	30	Sediment Manhole	31	1,093	No	Nov-08	Cleaned UIC & Sed MH	3
P6_10	5502 NE 13TH AVE	12,028	≥1000	MFR	10102-3074	ADP732	45.56285	-122.65206	31.3	Sediment Manhole	140	6,206	No	Jun-10	Cleaned UIC & Sed MH	5.75
P6_11	1406 NE SKIDMORE ST	648	<1000	SFR	10102-3605	AAU014	45.55440	-122.65157	30	Sediment Manhole	157	7,353	No	Nov-09	Cleaned UIC & Sed MH	11
P6_12	550 SE 130TH AVE	3,536	≥1000	SFR	10102-7667	ADT061	45.51824	-122.52998	28.7	Sediment Manhole	82	716	No	Mar-10	Cleaned UIC & Sed MH	6
P6_13	14350 NE KNOTT ST	291	<1000	SFR	10102-4296	ADW213	45.54245	-122.51430	19.6	No Pretreatment	97	1,259	No	Mar-00	Cleaned UIC	1
P6_14	4289 NE PRESCOTT ST	8,100	≥1000	COM	10102-3510	ADQ252	45.55559	-122.61931	30.5	Sediment Manhole	156	1,494	No	Sep-07	Cleaned UIC & Sed MH	6
P6_15	13500 NE GLISAN ST	19,380	≥1000	POS	10102-8422	ADR767	45.52646	-122.52461	28.7	Sediment Manhole	104	543	No	May-10	Cleaned UIC & Sed MH	5

Notes:

a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

b COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

c BES UIC number is obtained from the BES Hansen database.

d Sed MH = Sedimentation manhole.

e The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as “Depth to groundwater” (UIC Database Report) for inclusion in DEQ’s UIC database. Reported to nearest foot. Separation distances are based on April 2007 USGS depth to groundwater data (Snyder, in press).

f Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

g Sediment level represents “feet of sediment removed” from UIC as measured prior to cleaning.

h No traffic count available. Value estimated from nearby street(s).

i A sedimentation manhole (ANS741) was added to this sump system in November 2007. A second UIC sump (ANS742) was installed between the new sedimentation manhole and the original sump (ADV395). The new sump was installed to a depth of 30 feet. The new sump (ANS742) is designed to overflow into the original sump (ADV395). The sampling point was moved to the new sump (ANS742) after installation.

j UIC (ADV645) was decommissioned and converted to a sedimentation manhole in the summer of 2007. The sedimentation manhole retained the ADV645 label. A new UIC (AMU771) was installed to a total depth of 30 feet. The depth of the former UIC sump (ADV645) prior to conversion was 21 feet. The sedimentation manhole (ADV645) provides pretreatment to the new UIC (AMU771).

Table 2-4: UIC Summary Information - UICs Near Commercial and Industrial Facilities - Supplemental Panel 4, Year 5

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b, c]	DEQ UIC ID	BES UIC ID [d]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System [e]	Separation Distance [f]	Distance to Nearest Well (ft) [g]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed [e]	Sediment Level (ft) [h]
SP4_01	5420 SE Bush St	661	<1000	COM	10102-6471	ADT178	45.49547	-122.60697	30.2	Sed MH	102	2906	No	06/11/2009	Cleaned UIC & Sed MH	4
SP4_02	8335 SE Division St	23226	≥1000	COM	10102-6803	ADP094	45.50474	-122.57691	27	Sed MH	106	939	No	03/15/2010	Cleaned UIC & Sed MH	5
SP4_03	8029 N Denver Ave	8154	≥1000	COM	10102-2438	ADN871	45.58152	-122.68693	30	Sed MH	44	3594	No	08/30/2009	Cleaned UIC & Sed MH	0
SP4_04	8006 SE Lafayette St	800	<1000	MFR	10102-6229	ADT312	45.49618	-122.58070	28	Sed MH	79	3712	No	06/01/2010	Cleaned UIC & Sed MH	4
SP4_05	7519 SE Steele St	378	<1000	COM	10102-5857	ADU615	45.48443	-122.58530	30	Sed MH	62	4246	No	06/18/2008	Cleaned UIC & Sed MH	1.5
SP4_06	5645 NE 34th Ave	915	<1000	SFR	10102-3216	ADP851	45.56377	-122.62967	30	Sed MH	113	1835	No	03/10/2009	Cleaned UIC & Sed MH	2
SP4_07	4032 SE 60th Ave	622	<1000	SFR	10102-6473	ADT195	45.49324	-122.60174	30.5	Sed MH	96	4473	No	06/11/2009	Cleaned UIC & Sed MH	4.5
SP4_08	5722 N Lombard St	18197	≥1000	COM	10102-2219	ADN663	45.58334	-122.72709	30	Sed MH	71	4098	No	04/30/2004	Cleaned UIC & Sed MH	6
SP4_09	4247 NE Alberta St	841	<1000	SFR	10102-3523	ADQ230	45.55888	-122.61945	30	Sed MH	139	705	No	06/30/2007	Cleaned UIC & Sed MH	4
SP4_10	10475 SE Division St	47006	≥1000	COM	10102-7325	ADW349	45.50432	-122.55474	19.6	No Pretreatment	97	1372	No	03/25/2010	Cleaned UIC & Sed MH	6

Notes:

[a] Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

[b] COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

[c] All UICs are in close proximity to commercial/industrial facilities. Some UICs are located in rights-of-way that are zoned multi-family or single-family; however, the inlets collect stormwater from rights-of-way designated as commercial/industrial. These UICs were identified as part of the system-wide assessment as potentially receiving drainage from commercial/industrial properties and thus chosen for this supplemental panel.

[d] BES UIC ID number is obtained from the BES Hansen database.

[e] Sed MH = Sedimentation manhole.

[f] The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as “Depth to groundwater” (UIC Database Report) for inclusion in DEQ’s UIC database. Reported to nearest foot. Separation distances are based on December 2008 USGS depth to groundwater data (Snyder, D.T., 2008, Esitimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey Scientific Investigations Report 2008-5095, 40p. (Available at http://pubs.usgs.cov/sir/2008/5059)).

[g] Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

[h] Sediment level represents “feet of sediment removed” from UIC as measured prior to cleaning.

Table 2-5: UIC Summary Information - Carry Over Sites from Year 4 to Year 5

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b]	DEQ UIC ID	BES UIC ID [c]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System [d]	Separation Distance [e]	Distance to Nearest Well (ft) [f]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed[d]	Sediment Level (ft) [g]
SP3_06	490 NE 133RD AVE	19,700	≥1000	SFR	10102-8052	ADS048	45.52618	-122.52604	29.4	Sed MH	97	301	No	5/26/2007	Cleaned UIC & Sed MH	3
SP3_08	12198 SE HOLGATE BLVD	14,463	≥1000	COM	10102-5882	ADW251	45.48959	-122.53791	21	No Sed MH	8	429	No	2/16/2008	Cleaned UIC	3

Notes:

a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

b COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

c BES UIC number is obtained from the BES Hansen database.

d Sed MH = Sedimentation manhole.

e The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as "Depth to groundwater" (UIC Database Report) for inclusion in DEQ's UIC database. Reported to nearest foot. Separation distances are based on April 2007 USGS depth to groundwater data (Snyder, in press).

f Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

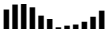
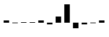
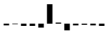
g Sediment level represents "feet of sediment removed" from UIC as measured prior to cleaning.

Table 3-1: UIC Stormwater Analytes

Common Pollutants	**Benzene**[1] **Toluene** **Ethylbenzene** **Xylenes**[3]	**Pentachlorophenol** **Di(2-ethylhexyl)phthalate**[2] **Benzo(a)pyrene**	**Arsenic (Total)** **Cadmium (Total)** **Chromium (Total)** **Copper (Total)** **Lead (Total)** **Zinc (Total)** **Nitrate-nitrogen**
Priority Pollutant Screen	Antimony (Total) Barium (Total) Beryllium (Total) Cyanide (Total) Mercury (inorganic) Selenium Thallium	Alachlor Atrazine Carbofuran **Carbon Tetrachloride** Chlordane **Chlorobenzene** **2,4-D** Dalapon **o-Dichlorobenzene**[4] **p-Dichlorobenzene**[5] **1,3-Dichlorobenzene**	Bis(2-chloroisopropyl)ether Bis(2-chloroethyl)ether **Dinoseb** Diqat Endothall Glyphosate Lindane **Picloram** **1,2,4-Trichlorobenzene**

Notes:
[1] Bold text indicates that the analyte was analyzed during Year 5.
[2] Di(2-ethylhexyl)phthalate is also known as bis(2-ethylhexyl)phthalate or DEHP.
[3] Xylenes is equal to o-xylene + m,p-xylene.
[4] o-Dichlorobenzene is also known as 1,2-dichlorobenzene.
[5] p-Dichlorobenzene is also known as 1,4-dichlorobenzene.

Table 3-10: Climate Data Summary for Years 1-5 and Long-term Average

		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Year	
Temperature[3]	Long Term Average[1]	63.3	68.1	68.5	63.2	54.5	46.1	40.2	39.6	43.4	47.3	50.9	57.1	53.5	
	Year 1	62.0	70.3	70.7	62.5	56.3	44.0	39.8	45.5	42.0	46.1	53.1	59.8	54.3	
	Year 2	66.4	71.0	69.2	65.2	54.0	47.4	40.0	38.1	44.2	50.1	51.7	58.6	54.7	
	Year 3	62.8	70.7	68.3	62.4	53.1	44.8	40.9	38.8	44.9	45.4	48.5	58.9	53.3	
	Year 4	61.8	68.8	69.6	65.2	53.5	49.2	37.5	40	41.3	45.3	52.3	60.1	53.7	
	Year 5	65.7	73.6	69.9	66.1	54.7	47.7	35.6	45	46.6	48.2	51.0	55	54.9	
Precipitation[3]	Long Term Average[2]	1.59	0.72	0.93	1.65	2.88	5.62	5.71	5.07	4.18	3.71	2.64	2.38	37.08	
	Year 1	2.21	0.41	1.05	1.71	3.40	4.98	7.52	10.92	2.15	2.96	2.46	3.00	42.8	
	Year 2	0.93	0.47	0.10	0.86	1.40	11.92	5.86	2.74	3.47	3.20	2.01	1.45	34.4	
	Year 3	1.08	0.55	0.46	2.04	3.26	4.25	7.57	4.71	2.19	3.71	2.09	2.03	33.9	
	Year 4	1.00	0.29	1.23	0.48	1.74	4.15	3.52	4.50	1.36	3.36	2.31	3.26	27.2	
	Year 5	1.30	0.34	0.76	1.40	3.02	5.13	3.76	4.94	2.76	3.58	2.92	4.68	34.6	
Precipitation difference from normal[4]	Year 1	0.62	-0.31	0.12	0.06	0.52	-0.64	1.81	5.85	-2.03	-0.75	-0.18	0.62	5.69	
	Year 2	-0.66	-0.25	-0.83	-0.79	-1.48	6.30	0.15	-2.33	-0.71	-0.51	-0.63	-0.93	-2.67	
	Year 3	-0.51	-0.17	-0.47	0.39	0.38	-1.37	1.86	-0.36	-1.99	0.00	-0.55	-0.35	-3.14	
	Year 4	-0.59	-0.43	0.30	-1.17	-1.14	-1.47	-2.19	-0.57	-2.82	-0.35	-0.33	0.88	-9.88	
	Year 5	-0.29	-0.38	-0.17	-0.25	0.14	-0.49	-1.95	-0.13	-1.42	-0.13	0.28	2.30	-2.49	

Notes:

[1] Mean Monthly temperatures at Portland Airport from www.ocs.oregonstate.edu/index.html

[2] Monthly Totals/Averages. Portland International Airport. Period 1971 - 2000. From NOWData - NOAA Online Weather Data at http://nowdata.rcc-acis.org/PQR/pubACIS_results.

[3] Preliminary Local Climatological Data - Portland Oregon. From http://www.weather.gov/climate/index.php?wfo=pqr

[4] A positive values indicates that the measured precipitation total for that month exceeds the monthly mean. Shaded area indicates permit "wet season".

Table 3-11: UIC Stormwater Discharge Volume[a]

Ownership	Total of UICs [b]	Sum of Total UIC Catchment Area [c] (ft^2)	Sum of Total Impervious Area Drainage[c] (ft^2)	Sum of Total UIC Catchment Area[c] (acre)	Sum of Total Impervious Area Drainage[c] (acre)	Adjusted Sum of Total UIC Catchment Area[f] (ft^2)	Adjusted Sum of Impervious Area Drainage[f] (ft^2)	Adjusted Sum of Total UIC Catchment Area[f] (acre)	Adjusted Sum of Impervious Area Drainage[f] (acre)	Year 2 Annual Infiltration Volume[g,h,i,j] (ft^3)	Year 3 Annual Infiltration Volume[g,h,i] (ft^3)	Year 4 Annual Infiltration Volume[g,h,i] (ft^3)	Year 5 Annual Infiltration Volume[g,h,i] (ft^3)
BES	9,130	698,860,000	260,040,000	16,000	6,000	594,630,000	223,090,000	13,700	5,121	473,385,826	466,919,934	374,196,293	552,370,821
Water	6	- [d]	37,150	- [d]	0.9	- [d]	37,150	- [d]	0.9				
UC [k]	54	- [d]	333,000	- [d]	0.8	- [d]	994,000	- [d]	23				
Others [l]	269	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]
Sum	9,459	698,860,000	260,410,150	16,000	6,002	594,630,000	224,121,150	13,700	5,145	475,573,874	469,078,096	375,925,876	554,923,949
Average per UIC[e]	-	89,000	33,000	2.0	0.8	-	-	-	-	NA	NA	NA	NA
Adjusted Average per UIC[f]	-	-	-	-	-	76,000	28,000	1.70	0.7	59,415	58,603	46,965	69,328

Notes:

[a] The volume of stormwater infiltrated estimated to discharge into the City's UIC is based on unverified subcatchment delineations. These delineations are likely to change due to refined mapping or modeling, or due to changes in the field. This table looks back at what the infiltration would have been for each year given the current conditions (e.g., total UICs, total UIC catchment, and total impervious Area).

[b] Approximately 526 BES UICs are identified in the UIC database to have a service status of "ABAN" (Abandoned); these were not included in the catchment/impervious area calculation or discharge volume estimation.

[c] Non-BES UICs with "Unknown" or "N/A" impervious/catchment drainage areas were not calculated. In addition, 789 BES UICs were not included in calculation because they were identified as being inside a catchment area with at least one other UIC.

[d] Denotes no UIC Catchment Area/Impervious Area Drainage reported for this classification of UIC.

[e] Average values for UICs with reported catchment areas > 0.

[f] Adjusted average values calculated by inserting "average[e]" catchment areas for those reported as 0. In addtion, several UIC catchment areas and impervious area outlier values appeared anomalous (> +2 standard deviations). These values were also changed to average values: 89,111 and 35,277 square feet, respectively.

[g] Infiltration volume = Annual Precipitation (inches) * 1ft/12in *Imprevious Area (ft^2)*(1-Evaporative Loss Factor).

[h] Based on estimated Permit Year precipitation totals. Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

[i] Infiltration volume calculation assumes that 26 percent of precipitation falling on impervious surfaces is lost to evaporation and 74 percent drains to the UIC (Snyder, D.T. and Others, 1994).

[j] Year 1 Annual Infiltration Volume is available in *Annual Stormwater Discharge Monitoring Reports - Years 1, 2, 3, and 4* .

[k] UC - UICs that are under construction with an estimated drainage area.

[l] Others - Bureau's Ownership other than BES: Bureau of General Services, Portland Fire Bureau, Portland Parks, Water Bureau.

Table 3-2: Stormwater Quality Analytes – Common Pollutant Analyses

Analyte	Analytical Laboratory	Method	Method Detection Limit	Method Reporting Limit	MADL
Benzene	WPCL[1]	EPA 8260B	0.02 µg/L	0.2 µg/L	5.0 µg/L
Toluene	WPCL	EPA 8260B	0.2 µg/L [2]	0.5 µg/L [2]	1,000 µg/L
Ethylbenzene	WPCL	EPA 8260B	0.5 µg/L	0.5 µg/L	700 µg/L
Xylenes	WPCL	EPA 8260B	1.0 µg/L	1.0 µg/L	10,000 µg/L
Pentachlorophenol	TA[3]	EPA 515.3[4]	0.004 µg/L	0.04 µg/L	1.0 µg/L
Di(2-ethylhexyl) phthalate	TA	EPA 8270-SIM[5]	0.3 µg/L	0.5 µg/L	6.0 µg/L
Benzo(a)pyrene	TA	EPA 8270-SIM[5]	0.01 µg/L	0.01 µg/L	0.2 µg/L
Total Arsenic	WPCL	EPA 200.8[6]	0.00134 µg/L	0.045 µg/L	10.0 µg/L
Total Cadmium	WPCL	EPA 200.8[6]	0.00078 µg/L	0.1 µg/L	5.0 µg/L
Total Chromium	WPCL	EPA 200.8[6]	0.00963 µg/L	0.4 µg/L	100 µg/L
Total Copper	WPCL	EPA 200.8[6]	0.00179 µg/L	0.2 µg/L	1300 µg/L
Total Lead	WPCL	EPA 200.8[6]	0.00045 µg/L	0.1 µg/L	50.0 µg/L
Total Zinc	WPCL	EPA 200.8[6]	0.00424 µg/L	0.5 µg/L	5000 µg/L
Nitrate-Nitrogen	WPCL	EPA 300.0[7]	0.0041 mg/L	0.1 mg/L	10 mg/L

Notes:

[1] WPCL indicates BES Water Pollution Control Laboratory.

[2] Values are corrected from QAPP Table 5-1.

[3] TA indicates Test America. (North Creek Analytical, identified in the SDMP, was acquired by Test America in early 2006).

[4] Preparation: Adjust pH of a 40 milliliter sample to 12 with sodium hydroxide. Let stand for 1 hour. Acidify the sample with sulfuric acid and extract with MTBE. Derivitize the sample with diazomethane. Remove the diazomethane with nitrogen. Analyze the extract using GC/ECD.

[5] Preparation: Sample is extracted with DCM and taken to final volume. The extract is analyzed using GC/MS.

[6] Preparation: hot block digestion.

[7] Preparation: sample filtered by WPCL using a 0.45 micron filter.

Table 3-3: Stormwater Quality Analytes – Priority Pollutant Screen Analyses

Analyte	Analytical Laboratory	Method	Method Detection Limit	Method Reporting Limit	MADL
Total Antimony	WPCL[1]	EPA 200.8[2]	0.00111 µg/L	0.1 µg/L	6.0 µg/L
Total Barium	WPCL	EPA 200.8[2]	0.00575 µg/L	0.1 µg/L	2000 µg/L
Total Beryllium	WPCL	EPA 200.8[2]	0.00210 µg/L	0.1 µg/L	4.0 µg/L
Total Selenium	WPCL	EPA 200.8[2]	0.0127 µg/L	0.5 µg/L	50.0 µg/L
Total Thallium	WPCL	EPA 200.8[2]	0.00099 µg/L	0.1 µg/L	2.0 µg/L
Total (inorganic) Mercury	WPCL	WPCL SOP M-10.02[3,4]	0.0009 µg/L	0.002 µg/L[4]	2.0 µg/L
Total Cyanide	WPCL	SM 4500-CN-E[4]	0.01 mg/L	0.01 mg/L	0.2 mg/L
Alachlor	TA[5]	EPA 8270C	0.170	1.0 µg/L	2.0 µg/L
Atrazine	TA	EPA 8270C	0.289	1.0 µg/L	3.0 µg/L
Carbofuran	TA	EPA 531.2	0.4 µg/L	1.0 µg/L	40.0 µg/L
Carbon Tetrachloride[6]	TA	EPA 8260B	0.2 µg/L	0.2 µg/L	5.0 µg/L
Chlordane (tech)	TA	EPA 8081	0.5 µg/L	1.0 µg/L	2.0 µg/L
Chlorobenzene[6]	TA	EPA 8260B	0.2 µg/L	0.2 µg/L	100 µg/L
2,4-D[6]	TA	EPA 515.3	0.05 µg/L	0.1 µg/L	70.0 µg/L
Dalapon	TA	EPA 552.2	0.1 µg/L	1.0 µg/L	200 µg/L
o-Dichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	600 µg/L
p-Dichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	75.0 µg/L
1,3-Dichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	5.5 µg/L
Bis(2-chloroisopropyl) ether	TA	EPA 8270C	0.0846 µg/L	0.25 µg/L	0.80 µg/L
Bis(2-chloroethyl) ether	TA	EPA 8270C	0.117 µg/L	0.25 µg/L	0.30 µg/L
Dinoseb[6]	TA	EPA 515.3	0.03 µg/L	0.1 µg/L	7.0 µg/L
Diquat	TA	EPA 549.2	0.3 µg/L	0.4 µg/L	20.0 µg/L
Endothall	TA	EPA 548.1	2.6 µg/L	10.0 µg/L	100 µg/L
Glyphosate	TA	EPA 547	4.3 µg/L	10.0 µg/L	700 µg/L
Lindane	TA	EPA 8081	0.05 µg/L	0.1 µg/L	0.2 µg/L
Picloram[6]	TA	EPA 515.3	0.04 µg/L	0.4 µg/L	500 µg/L
1,2,4-Trichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	70.0 µg/L

Notes:

[1] WPCL indicates BES Water Pollution Control Laboratory.

[2] Preparation: hot block digestion.

[3] Preparation: WPCL SOP M-05.01; Analysis performed under alternative test procedure as described in PY 5 Data Usability Report in Appendix B.

[4] Method and/or limit changed from QAPP, see Year 4 Data Usability Report.

[5] TA indicates Test America. (North Creek Analytical, identified in the SDMP, was acquired by Test America in early 2006).

[6] Indicates PPS pollutants analyzed during Year 5 as part of routine common pollutant testing and reporting.

Table 3-4: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 1

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
10/10/2009																									0.00
10/11/2009																									0.00
10/12/2009																									0.00
10/13/2009								0.01	0.03										0.01	0.07	0.01				0.14
10/14/2009	0.02	0.04	0.03	0.01	0.05		0.04					0.01	0.01					0.01							0.23
10/15/2009																									0.00
10/16/2009											0.01														0.01
10/17/2009											0.1	0.11	0.05	0.04	0.01	0.06									0.38
10/18/2009																									0.01
10/19/2009						0.03	0.01																		0.04
10/20/2009																									0.00
10/21/2009				0.01	0.01	0.11	0.07	0.01	0.03	0.02															0.27
10/22/2009																									0.00
10/23/2009							0.05	0.1	0.07	0.06	0.09	0.09													0.45
10/24/2009																									0
10/25/2009																									0
10/26/2009									0.24	0.12	0.11	0.04					0.05							0.01	0.59
10/27/2009	0.01					0.01			0.01	0.01															0.05
10/28/2009																							0.02	0.01	0.03
10/29/2009		0.02	0.01	0.02	0.08	0.06	0.06	0.04	0.02	0.02	0.03			0.01	0.01		0.01	0.01		0.01					0.39
10/30/2009			0.01	0.01																				0.02	0.04
10/31/2009	0.05	0.01	0.02	0.02				0.02	0.01					0.02	0.01										0.17
11/1/2009																									0
11/2/2009																									0
11/3/2009																									0
11/4/2009																									0
11/5/2009																			0.02	0.07	0.06	0.09	0.03	0.01	0.29
11/6/2009	0.08	0.08	0.02		0.06	0.04	0.03	0.01															0.02	0.08	0.42
11/7/2009	0.1	0.04	0.01		0.01	0.01	0.01					0.14	0.34	0.19	0.1	0.15	0.03		0.03	0.12	0.01		0.01	0.04	1.34
11/8/2009	0.01		0.03	0.01	0.01	0.04	0.04								0.02	0.01				0.01	0.01				0.21
11/9/2009										0.04	0.03			0.02					0.01	0.11					0.23
11/10/2009																	0.01	0.01	0.03	0.01	0.02	0.04			0.15
11/11/2009	0.03	0.02				0.01	0.02									0.01	0.06								0.15
11/12/2009		0.04	0.08	0.04	0.01	0.02																			0.18
11/13/2009							0.01	0.05	0.08	0.02	0.01	0.01	0.01		0.03										0.22

Notes:

Sample Collection Period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-5: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 2

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
11/9/2009										0.04	0.03			0.02					0.01	0.11					0.23
11/10/2009																	0.01	0.01	0.03	0.01	0.02	0.04			0.15
11/11/2009	0.03	0.02				0.01	0.02									0.01	0.06								0.15
11/12/2009		0.04	0.08	0.04	0.01	0.02																			0.18
11/13/2009							0.01	0.05	0.08	0.02	0.01	0.01	0.01		0.03										0.22
11/14/2009																									0.00
11/15/2009			0.01	0.01	0.01	0.02	0.01					0.01													0.07
11/16/2009							0.02																	0.01	0.04
11/17/2009	0.06	0.09	0.1	0.05	0.06	0.07	0.02	0.01	0.01		0.01		0.01	0.01	0.04										0.55
11/18/2009			0.04																						0.05
11/19/2009	0.02	0.02	0.04	0.03	0.03	0.04																			0.18
11/20/2009				0.01	0.01	0.05	0.04	0.01	0.02	0.03	0.02	0.01	0.01	0.02	0.01				0.07						0.31
11/21/2009									0.01											0.02	0.05	0.1	0.1	0.08	0.37
11/22/2009	0.05	0.03	0.01	0.02	0.03	0.06	0.05	0.06			0.02														0.34
11/23/2009																									0
11/24/2009																									0
11/25/2009																									0
11/26/2009							0.01	0.03	0.02	0.02	0.05	0.07	0.08	0.1	0.09	0.06	0.02	0.04	0.05	0.08	0.09	0.04			0.85
11/27/2009		0.03	0.01	0.02	0.04	0.03	0.01																		0.15
11/28/2009																									0
11/29/2009																									0
11/30/2009																									0
12/1/2009																									0
12/2/2009																									0
12/3/2009																									0
12/4/2009																									0
12/5/2009																									0
12/6/2009																									0
12/7/2009																									0
12/8/2009																									0
12/9/2009																									0
12/10/2009																									0
12/11/2009																									0
12/12/2009													0.01												0.03
12/13/2009																						0.01			0.03
12/14/2009				0.01												0.01	0.05	0.09	0.09	0.04	0.03	0.09	0.12	0.1	0.62
12/15/2009	0.05	0.08	0.08	0.06	0.04	0.02	0.02	0.1	0.12	0.09	0.04	0.05	0.08	0.05	0.06	0.04	0.08	0.06	0.09	0.05	0.05	0.04	0.04	0.04	1.42

Notes:

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-6: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 3

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
12/12/2009													0.01												0.03
12/13/2009																						0.01			0.03
12/14/2009				0.01												0.01	0.05	0.09	0.09	0.04	0.03	0.09	0.12	0.1	0.62
12/15/2009	0.05	0.08	0.08	0.06	0.04	0.02	0.02	0.1	0.12	0.09	0.04	0.05	0.08	0.05	0.06	0.04	0.08	0.06	0.09	0.05	0.05	0.04	0.04	0.04	1.42
12/16/2009								0.01		0.08	0.04	0.1	0.18	0.04	0.01	0.03	0.02		0.01	0.01	0.01	0.03	0.01		0.59
12/17/2009										0.01		0.01				0.01	0.01	0.01							0.07
12/18/2009																									0.01
12/19/2009			0.01	0.02	0.01	0.01	0.01	0.01				0.01			0.01										0.10
12/20/2009				0.01	0.01		0.03	0.02		0.01	0.01	0.01			0.01	0.02	0.04	0.06	0.02	0.02		0.02			0.30
12/21/2009		0.03	0.03		0.01	0.01		0.01	0.04	0.08	0.02	0.01	0.03	0.04	0.01									0.02	0.34
12/22/2009																									0.01
12/23/2009																									0.00
12/24/2009																									0.01
12/25/2009																									0.01
12/26/2009																									0
12/27/2009																									0
12/28/2009																									0
12/29/2009																								0.01	0.03
12/30/2009	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.06	0.09	0.09	0.03	0.01											0.47
12/31/2009							0.04	0.07	0.12	0.1	0.12	0.09	0.05	0.05	0.1	0.08	0.04	0.01	0.01	0.01	0.08	0.03	0.02	0.03	1.06
1/1/2010	0.07	0.05	0.04	0.02		0.1	0.06	0.06	0.02	0.01	0.03	0.01		0.04	0.07	0.04	0.04	0.02	0.01	0.01	0.01		0.01	0.01	0.73
1/2/2010																									0
1/3/2010																									0
1/4/2010				0.01			0.01	0.02	0.05	0.03	0.06	0.05	0.06	0.06	0.03	0.02	0.01		0.02	0.04	0.01	0.01	0.01		0.49
1/5/2010				0.02		0.01			0.02	0.02	0.02					0.03	0.01	0.01	0.01	0.03	0.11	0.09	0.04	0.04	0.45
1/6/2010	0.01	0.02	0.03	0.01																					0.07
1/7/2010																									0
1/8/2010	0.04	0.06	0.04					0.01	0.02	0.02						0.07	0.05	0.1	0.03	0.02	0.07	0.06	0.06	0.04	0.7
1/9/2010	0.03	0.01																							0.04
1/10/2010																									0
1/11/2010							0.01	0.01																0.04	0.05
1/12/2010	0.07	0.09	0.08	0.03	0.02	0.02					0.01	0.06	0.01	0.01	0.01			0.03	0.03						0.47
1/13/2010	0.01	0.02					0.01				0.03	0.01	0.03	0.06	0.01	0.01	0.02								0.2
1/14/2010																									0
1/15/2010											0.01	0.04	0.12	0.08	0.07	0.08	0.06	0.07	0.07	0.08	0.06	0.04	0.02	0.03	0.83
1/16/2010	0.03	0.03	0.04	0.04	0.02	0.01	0.02	0.01			0.01				0.01	0.02	0.01	0.01	0.01			0.02	0.01	0.03	0.32
1/17/2010	0.02	0.02		0.01	0.02	0.03				0.01	0.01	0.02	0.03	0.04	0.01	0.02	0.07	0.04	0.01	0.02					0.38
1/18/2010																									0
1/19/2010															0.03		0.01	0.01							0.06
1/20/2010		0.01																							0.01
1/21/2010																									0
1/22/2010														0.01	0.02	0.03	0.03	0.06	0.05	0.01	0.01				0.22
1/23/2010					0.01																				0.02
1/24/2010									0.03	0.09		0.05	0.02	0.06	0.09	0.14	0.12	0.02	0.02	0.02		0.01		0.05	0.72
1/25/2010	0.05		0.08	0.07			0.01	0.01																	0.23
1/26/2010																	0.01	0.07	0.04	0.03	0.01				0.16
1/27/2010																									0
1/28/2010																									0
1/29/2010																		0.01						0.01	0.02
1/30/2010	0.01	0.01						0.01	0.03	0.02	0.01									0.01		0.01			0.13
1/31/2010	0.01	0.01	0.01																						0.03
2/1/2010						0.03						0.01	0.02			0.01	0.03	0.05	0.05	0.01	0.01				0.24
2/2/2010																						0.01			0.02
2/3/2010						0.04	0.02					0.02	0.04	0.02											0.16
2/4/2010																	0.01	0.07	0.06	0.02			0.01	0.04	0.22

Notes:

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-7: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 4

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1/31/2010	0.01	0.01	0.01																						0.03
2/1/2010						0.03						0.01	0.02			0.01	0.03	0.05	0.05	0.01	0.01				0.24
2/2/2010																						0.01			0.02
2/3/2010						0.04	0.02					0.02	0.04	0.02											0.16
2/4/2010																	0.01	0.07	0.06	0.02			0.01	0.04	0.22
2/5/2010	0.03	0.03	0.03	0.01																					0.10
2/6/2010																			0.01	0.01					0.03
2/7/2010																									0.00
2/8/2010																									0.00
2/9/2010																									0.00
2/10/2010										0.01	0.06	0.05	0.06	0.04	0.02										0.24
2/11/2010			0.01		0.02													0.03	0.06	0.07	0.05	0.02	0.01		0.29
2/12/2010					0.01	0.05			0.02	0.06	0.03					0.02									0.21
2/13/2010						0.01	0.03	0.01																	0.06
2/14/2010	0.06	0.07	0.02	0.04	0.02	0.03	0.06	0.02	0.02	0.01						0.03	0.03								0.43
2/15/2010																				0.03	0.02	0.07	0.05	0.01	0.2
2/16/2010	0.03			0.01	0.01																				0.05
2/17/2010																									0
2/18/2010																									0
2/19/2010																									0
2/20/2010																									0
2/21/2010																									0
2/22/2010																									0
2/23/2010												0.01	0.01	0.03	0.03	0.05	0.05	0.03	0.02	0.01	0.03	0.05	0.02	0.02	0.37
2/24/2010	0.02	0.05	0.01		0.01		0.02								0.05	0.07								0.01	0.24
2/25/2010																							0.05	0.04	0.1
2/26/2010	0.06	0.05	0.02	0.04	0.05		0.03	0.04	0.06	0.1	0.06	0.06	0.02	0.01	0.02	0.01	0.02	0.02							0.69
2/27/2010																									0
2/28/2010																									0
3/1/2010																									0
3/2/2010																0.01	0.01								0.02
3/3/2010																									0
3/4/2010																									0
3/5/2010																									0
3/6/2010																									0
3/7/2010																				0.01	0.01	0.03	0.04		0.09
3/8/2010																									0.01
3/9/2010						0.01												0.01	0.05	0.04	0.04	0.01			0.17
3/10/2010				0.03	0.01	0.01						0.01													0.07
3/11/2010							0.01	0.02	0.01	0.01		0.01	0.01	0.01	0.06	0.06	0.07	0.06	0.08	0.11	0.08	0.05	0.05	0.05	0.74
3/12/2010	0.03	0.05	0.01			0.01	0.04	0.04	0.01	0.03		0.02					0.01			0.03	0.02				0.3
3/13/2010																									0.01
3/14/2010																									0
3/15/2010																									0
3/16/2010														0.01	0.02										0.03
3/17/2010																									0.01
3/18/2010																									0
3/19/2010																									0
3/20/2010																									0
3/21/2010											0.01	0.01											0.02		0.06
3/22/2010			0.02	0.01																					0.04
3/23/2010																									0
3/24/2010																							0.01	0.04	0.05
3/25/2010	0.04	0.09	0.05	0.02	0.02	0.01								0.01	0.02	0.04	0.02			0.02	0.03	0.01		0.01	0.37
3/26/2010				0.05	0.19	0.08	0.02							0.01											0.37
3/27/2010																									0
3/28/2010				0.01	0.08	0.13	0.12	0.03							0.02	0.03			0.01	0.01	0.08	0.12	0.12	0.04	0.8
3/29/2010	0.03	0.02		0.01		0.12	0.08	0.15	0.09	0.04	0.04	0.12	0.03	0.03	0.01	0.08	0.03	0.01	0.02	0.05	0.02	0.12	0.07		1.16

Notes:

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-8: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 5

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
3/25/2010	0.04	0.09	0.05	0.02	0.02	0.01								0.01	0.02	0.04	0.02			0.02	0.03	0.01		0.01	0.37
3/26/2010				0.05	0.19	0.08	0.02							0.01											0.37
3/27/2010																									0.00
3/28/2010				0.01	0.08	0.13	0.12	0.03							0.02	0.03			0.01	0.01	0.08	0.12	0.12	0.04	0.80
3/29/2010	0.03	0.02		0.01		0.12	0.08	0.15	0.09	0.04	0.04	0.12	0.03	0.03	0.01	0.08	0.03	0.01	0.02	0.05	0.02	0.12	0.07		1.16
3/30/2010													0.01	0.01		0.03	0.01	0.01			0.01	0.01	0.03		0.15
3/31/2010															0.01	0.02				0.01	0.06	0.01			0.12
4/1/2010																									0.00
4/2/2010					0.03	0.09	0.16	0.08	0.08	0.06	0.05	0.01		0.03	0.01	0.01	0.01	0.02			0.01			0.01	0.68
4/3/2010	0.01				0.02	0.01	0.02	0.01	0.02			0.01	0.01	0.01	0.01		0.01								0.14
4/4/2010																0.04	0.08								0.13
4/5/2010									0.01	0.02	0.03	0.02					0.02		0.01			0.06	0.06		0.24
4/6/2010				0.01	0.04			0.01	0.02			0.01	0.01												0.10
4/7/2010															0.01							0.01		0.05	0.07
4/8/2010	0.05	0.07	0.01				0.01										0.01								0.16
4/9/2010																									0.01
4/10/2010																									0
4/11/2010																								0.01	0.02
4/12/2010	0.01		0.02	0.06	0.12	0.05	0.02	0.03																	0.32
4/13/2010								0.01	0.02	0.01			0.01												0.06
4/14/2010																							0.01	0.03	0.04
4/15/2010	0.05	0.03	0.05	0.01																					0.15
4/16/2010																									0
4/17/2010																0.06									0.06
4/18/2010																									0
4/19/2010																									0
4/20/2010														0.01				0.01						0.02	0.07
4/21/2010	0.01	0.01																							0.02
4/22/2010																									0
4/23/2010																					0.03	0.01			0.04
4/24/2010												0.01	0.01	0.01											0.03
4/25/2010																									0
4/26/2010																0.02	0.05	0.05	0.04	0.04	0.07	0.08	0.04	0.03	0.44
4/27/2010	0.09	0.02					0.02	0.08					0.02	0.02	0.01	0.05	0.01	0.04	0.01	0.01					0.4
4/28/2010															0.01	0.01	0.07	0.12	0.02	0.01	0.03				0.29
4/29/2010												0.01		0.05	0.01	0.02	0.01	0.03							0.12
4/30/2010					0.01																				0.02
5/1/2010																									0
5/2/2010																									0
5/3/2010			0.01	0.07	0.01		0.01	0.01	0.05																0.16
5/4/2010											0.01	0.01	0.01	0.01	0.03	0.04	0.01	0.01	0.02	0.01					0.16
5/5/2010							0.01											0.02							0.05
5/6/2010																									0
5/7/2010																									0
5/8/2010																									0
5/9/2010																					0.01				0.02
5/10/2010	0.02		0.01	0.02	0.03	0.01		0.01	0.01																0.12
5/11/2010																									0
5/12/2010																									0
5/13/2010																									0
5/14/2010																									0
5/15/2010																									0
5/16/2010																									0.01
5/17/2010					0.01	0.03												0.05	0.17	0.01	0.01	0.01	0.01	0.03	0.32
5/18/2010	0.01	0.01	0.01									0.02	0.03	0.05	0.02										0.14
5/19/2010												0.02	0.12	0.12	0.07	0.01									0.33

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-9: UIC Permit Year 5 Stormwater Sampling Rainfall Data

Event	Start date of sampled storm	Daily		Individual sampled storm			
		Predicted rainfall [1] (inches)	Actual daily rainfall total [2] (inches)	Antecedent dry period [3] (hours)	Actual storm rainfall total[2] (inches)	Duration (hours)	Intensity (inches[2] per hour)
1	10/14/2009	0.47 - 0.62 +	0.23	8	0.02	2	0 - 0.01
	10/17/2009	0.97 - 1.34 +	0.38	> 72	0.38	6	0.01 - 0.11
	10/21/2009	0.18 - 0.29 +	0.27	3 (> 72[5])	0.27	7	0.01 - 0.11
	10/23/2009	0.23 - 0.37 +	0.45	2 (48[5])	0.45	6	0.05 - 0.10
	10/26/2009	0.94	0.59	0 (70[5])	0.53	4	0.04 - 0.24
	10/29/2009	0.25 - 0.42 +	0.39	4 (> 57[5])	0.42	20	0 - 0.08
	11/9/2009	0.58 - 0.71 +	0.23	21	0.02	1	0.02
1/2[4]	11/13/2009	0.28 - 0.45 +	0.22	28	0.22	9	0 - 0.08
2	11/17/2009	0.37 - 0.52 +	0.55	2 (> 72[5])	0.56	15	0 - 0.07
	11/20/2009	0.47 - 0.55 +	0.31	4 (> 21[5])	0.24	12	0.01 - 0.05
	12/14-15/2009	0.07 - 0.16 + 0.84 - 1.06 +	0.62	> 72	2.03	33	0.01 - 0.12
3	12/16/2009	0.17 - 0.25 +	0.59	12	0.59	16	0.01 - 0.18
	1/4/2010	0.38 - 0.47 +	0.49	62	0.49	20	0 - 0.06
	1/13/2010	0.37 - 0.51 +	0.2	17	0.16	7	0.01 - 0.06
3/4[4]	2/4/2010	0.26 - 0.37 +	0.22	33	0.32	12	0 - 0.07
4	2/12/2010	0.32 - 0.44 +	0.21	12	0.11	3	0.02 - 0.06
	2/26/2010	0.47 - 0.65 +	0.69	4 (> 32[5])	0.79	3	0.01 - 0.04
	3/11/2010	0.48 - 0.63 +	0.74	34	0.83	21	0 - 0.11
4/5[4]	3/29/2010	0.83 - 1.12 +	1.16	3 (> 8[5])	1.59	33	0 - 0.15
5	4/5/2010	0.09 - 027 +	0.24	17	0.09	4	0.01 - 0.03
	4/26/2010	0.24 - 0.37 +	0.44	> 72	0.55	11	0.02 - 0.09
	5/17/2010	0.09 - 0.17 +	0.32	> 72	0.35	10	0.01 - 0.17
	5/19/2010	0.28 - 0.41 +	0.33	23	0.33	5	0.01 - 0.12

Notes:

[1] Predicted rainfall from Extended Range Forecasting, Inc. daily reports.

[2] Rainfall totals are the average of 13 rain gauges (see Section 3.0, Year 5 Data Usability Report presented in Appendix B).

[3] Antecedent dry period ≤ 0.1" in 6 hours

[4] Next UIC sampling event was started the same day previous sampling event was finished (see Data Usability Report).

[5] Tail end of storm caught, started raining previous evening or early morning.

Table 4-1: Frequency of Detected [1] Common and Priority Pollutant Screen Analytes [2] - Year 5

Analyte	MADL (µg/L)	Event	Exceedances of MADL [2]	Number of Detections [2]	Number of Samples [2]	Frequency of Detection	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Maximum Percent of MADL Detected [Maximum concentration / MADL] (%)
Common Pollutants									
Arsenic (total)	10.0	1	0	42	42	100	0.126	4.65	47%
		2	**1** [3]	42	42	100	0.051	**11.2**	**112%**
		3	0	42	42	100	0.096	1.06	11%
		4	0	42	42	100	0.074	0.831	8%
		5	0	41	42	97.6	< 0.045 [4]	1.71	17%
Cadmium (total)	5.0	1	0	11	42	26.2	< 0.1	0.23	5%
		2	0	12	42	28.6	< 0.1	0.34	7%
		3	0	14	42	33.3	< 0.1	0.44	9%
		4	0	16	42	38.1	< 0.1	0.28	6%
		5	0	15	42	35.7	< 0.1	0.74	15%
Chromium (total)	100.0	1	0	35	42	83.3	< 0.4	6.18	6%
		2	0	31	42	73.8	< 0.4	18	18%
		3	0	34	42	81.0	< 0.4	6.29	6%
		4	0	35	42	83.3	< 0.4	4.87	5%
		5	0	37	42	88.1	0.28	9.06	9%
Copper (total)	1300.0	1	0	42	42	100	1.73	25.5	2%
		2	0	42	42	100	0.9	29.9	2%
		3	0	42	42	100	1.61	37	3%
		4	0	42	42	100	1.1	19.8	2%
		5	0	42	42	100	1.54	58.7	5%
Lead (total)	50.0	1	0	42	42	100	0.14	22.7	45%
		2	0	41	42	97.6	< 0.1	39.8	80%
		3	0	42	42	100	0.29	23.9	48%
		4	0	41	42	97.6	< 0.1	17.1	34%
		5	0	42	42	100	0.27	33.4	67%
Zinc (total)	5000.0	1	0	42	42	100	6.82	141	3%
		2	0	42	42	100	4.5	195	4%
		3	0	42	42	100	5.08	883	18%
		4	0	42	42	100	3.5	143	3%
		5	0	42	42	100	8.39	252	5%

Analyte	MADL (µg/L)	Event	Exceedances of MADL [2]	Number of Detections [2]	Number of Samples [2]	Frequency of Detection	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Maximum Percent of MADL Detected [Maximum concentration / MADL] (%)
Total Nitrogen	10000.0	1	0	25	42	59.5	< 0.1	0.3	0%
		2	0	8	42	19.0	< 0.1	0.29	0%
		3	0	11	42	26.2	< 0.1	0.23	0%
		4	0	9	42	21.4	< 0.1	0.31	0%
		5	0	9	42	21.4	< 0.1	0.61	0%
Pentachlorophenol	1.0	1	**9**	37	42	88.1	< 0.04	**3.56**	**356%**
		2	**9**	36	42	85.7	< 0.04	**2.48**	**248%**
		3	**11**	37	42	88.1	< 0.04	**6.3**	**630%**
		4	**11**	33	42	78.6	< 0.04	**4.82**	**482%**
		5	**9**	32	37	86.5	< 0.04	**4.2**	**420%**
Benzene	5.0	1	0	0	42	0	< 0.2	< 0.2	4%
		2	0	0	42	0	< 0.2	< 0.2	4%
		3	0	1	42	2.4	< 0.2	0.35	7%
		4	0	0	42	0	< 0.2	< 0.2	4%
		5	0	0	42	0	< 0.2	< 0.2	4%
Toluene	1000.0	1	0	20	42	47.6	< 0.5	7.58	1%
		2	0	16	42	38.1	< 0.5	10.9	1%
		3	0	10	42	23.8	< 0.5	3.13	0%
		4	0	12	42	28.6	< 0.5	3.48	0%
		5	0	21	42	50	< 0.5	27	3%
Xylenes	10000.0	1	0	0	42	0	< 1.5	< 1.5	0%
		2	0	1	42	2.4	< 1.5	1.58	0%
		3	0	0	42	0	< 1.5	< 1.5	0%
		4	0	0	42	0	< 1.5	< 1.5	0%
		5	0	0	42	0	< 1.5	< 1.5	0%
Benzo(a)pyrene	0.2	1	**1**	8	42	19.0	< 0.00962	**0.373**	**187%**
		2	**1**	13	42	31.0	< 0.00952	**1.85**	**925%**
		3	0	17	42	40.5	< 0.00952	0.107	54%
		4	**1**	18	42	42.9	< 0.00952	**0.522**	**261%**
		5	0	14	42	33.3	< 0.00962	0.0369	18%

Analyte	MADL (µg/L)	Event	Exceedances of MADL [2]	Number of Detections [2]	Number of Samples [2]	Frequency of Detection	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Maximum Percent of MADL Detected [Maximum concentration / MADL] (%)
Di(2-ethylhexyl)-phthalate	6.0	1	0	17	42	40.5	< 0.962	5.61	94%
		2	0	20	42	47.6	< 0.952	5.73	96%
		3	**2**	22	42	52.4	< 0.962	**14.1**	**235%**
		4	**3**	23	42	54.8	< 0.962	**22**	**367%**
		5	**2**	21	42	50	< 0.962	**18.1**	**302%**
Priority Pollutant Screen									
2,4-D	70.0	1	0	27	42	64.3	< 0.1	0.62	1%
		2	0	4	42	9.5	< 0.1	0.674	1%
		3	0	3	42	7.1	< 0.1	< 0.4	1%
		4	0	2	42	4.8	< 0.1	0.406	1%
		5	0	9	37	24.3	< 0.1	2.66	4%

Notes:

[1] This table includes only those common or priority pollutants that were detected in one or more samples.

[2] This table summarizes the results of the original UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

[3] Bold, shaded text indicate pollutant concentration exceeds the MADL.

[4] "<" Indicates the laboratory reporting limit.

Table 4-2 provides summary of non-detect priority pollutant stormwater monitoring data.

Table 4-2: Summary [1] of Non-Detect Priority Pollutant Screen Analyte Data - Year 5

Analyte	MADL (µg/L)	Event	MRL Exceeds MADL	Number of Non-Detections	Number of Samples	Minimum MRL (µg/L)	Maximum MRL (µg/L)
Common Pollutants [2]							
Ethylbenzene	700	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5
Priority Pollutant Screen [2,3]							
Dinoseb	7	1	0	42	42	0.1	0.2
		2	0	42	42	0.1	0.4
		3	0	42	42	0.1	0.4
		4	0	42	42	0.1	0.4
		5	0	37	37	0.1	0.4
Picloram	500	1	0	42	42	0.4	0.8
		2	0	42	42	0.4	1.6
		3	0	42	42	0.4	1.6
		4	0	42	42	0.4	1.6
		5	0	37	37	0.4	1.6
1,2,4-Trichlorobenzene	70	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5
1,3-Dichlorobenzene	5.5	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5
Carbon tetrachloride	5	1	0	42	42	0.2	0.2
		2	0	42	42	0.2	0.2
		3	0	42	42	0.2	0.2
		4	0	42	42	0.2	0.2
		5	0	42	42	0.2	0.2
Chlorobenzene	100	1	0	42	42	0.2	0.2
		2	0	42	42	0.2	0.2
		3	0	42	42	0.2	0.2
		4	0	42	42	0.2	0.2
		5	0	42	42	0.2	0.2
o-Dichlorobenzene [4]	600	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5

Analyte	MADL (µg/L)	Event	MRL Exceeds MADL	Number of Non-Detections	Number of Samples	Minimum MRL (µg/L)	Maximum MRL (µg/L)
p-Dichlorobenzene 5	75	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5

Notes:

[1] This table summarizes the results of the UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

[2] Table 4-1 provides a summary of common pollutants and PPS analytes detected in Year 5.

[3] Table 3-3 provides a complete list of PPS analytes. PPS analytes are thosed detected by analytical methods used for the required common pollutant monitoring. Full PPS testing is required by the WPCF permit in Years 1, 4, and 9.

[4] o-Dichlorobenzene is also known as 1,2-dichlorobenzene.

[5] p-Dichlorobenzene is also known as 1,4-dichlorobenzene.

Table 4-3: Summary of Detected Ancillary Pollutants [1] - Year 5

Analyte	Method	Event	Number of Detections	Number of Samples	Frequency of Detection (%)	Minimum Concentration [2] (µg/L)	Maximum Concentration (µg/L)
Ancillary Pollutants Detected by Required Analyses							
1,2,4-Trimethylbenzene	EPA 8260	1	0	42	0	< 0.5	< 0.5
		2	1	42	2	< 0.5	0.64
		3	0	42	0	< 0.5	< 0.5
		4	0	42	0	< 0.5	< 0.5
		5	0	42	0	< 0.5	< 0.5
2-Butanone	EPA 8260	1	1	42	2	< 5	95.2
		2	1	42	2	< 5	55
		3	1	42	2	< 5	59.7
		4	1	42	2	< 5	29
		5	1	42	2	< 5	15.3
4-Isopropyltoluene	EPA 8260	1	0	42	0	< 0.5	< 0.5
		2	2	42	5	< 0.5	2.64
		3	0	42	0	< 0.5	< 0.5
		4	0	42	0	< 0.5	< 0.5
		5	1	42	2	< 0.5	1
Acetone	EPA 8260	1	1	42	2	< 20	315
		2	1	42	2	< 20	100
		3	2	42	5	< 20	288
		4	1	42	2	< 20	316
		5	3	42	7	< 20	138
Chloroform	EPA 8260	1	1	42	2	< 0.2	0
		2	1	42	2	< 0.2	0.35
		3	1	42	2	< 0.2	0
		4	0	42	0	< 0.2	< 0.2
		5	1	42	2	< 0.2	< 0.2
Acenaphthene	EPA 8270M-SIM	1	0	42	0	< 0.0192	< 0.0288
		2	2	42	5	< 0.019	0
		3	0	42	0	< 0.019	< 0.0388
		4	1	42	2	< 0.019	0
		5	0	42	0	< 0.0192	< 0.0291
Acenaphthylene	EPA 8270M-SIM	1	0	42	0	< 0.0192	< 0.0777
		2	13	42	31	< 0.019	0.1
		3	2	42	5	< 0.019	< 0.0388
		4	0	42	0	< 0.019	< 0.0388
		5	1	42	2	< 0.0192	< 0.0291
Anthracene	EPA 8270M-SIM	1	3	42	7	< 0.0192	0.144
		2	2	42	5	< 0.019	1
		3	2	42	5	< 0.019	< 0.0388
		4	1	42	2	< 0.019	0
		5	0	42	0	< 0.0192	< 0.0222

Analyte	Method	Event	Number of Detections	Number of Samples	Frequency of Detection (%)	Minimum Concentration [2] (µg/L)	Maximum Concentration (µg/L)
Benzo(a)anthracene	EPA 8270M-SIM	1	9	42	21	< 0.00962	0
		2	14	42	33	< 0.00952	1.78
		3	18	42	43	< 0.00952	0
		4	20	42	48	< 0.00952	0.585
		5	14	42	33	< 0.00962	0
Benzo(b)fluoranthene	EPA 8270M-SIM	1	13	42	31	< 0.00962	0.446
		2	16	42	38	< 0.00952	2
		3	24	42	57	0.00961	0.147
		4	23	42	55	< 0.00952	1
		5	17	42	40	< 0.00962	0.0623
Benzo(ghi)perylene	EPA 8270M-SIM	1	10	42	24	< 0.0192	0
		2	16	42	38	< 0.019	1.58
		3	19	42	45	< 0.019	0
		4	23	42	55	< 0.019	0.463
		5	16	42	38	< 0.0192	0
Benzo(k)fluoranthene	EPA 8270M-SIM	1	9	42	21	< 0.00962	0.353
		2	10	42	24	< 0.00952	2
		3	13	42	31	< 0.00952	0.1
		4	16	42	38	< 0.00952	0
		5	10	42	24	< 0.00962	0.0376
Chrysene	EPA 8270M-SIM	1	27	42	64	< 0.00962	1
		2	23	42	55	< 0.00952	2.5
		3	30	42	71	< 0.00962	0
		4	34	42	81	< 0.00952	0.805
		5	31	42	74	< 0.00962	0
Di-n-octyl phthalate	EPA 8270M-SIM	1	0	42	0	< 0.962	< 1
		2	3	42	7	< 0.952	3
		3	0	42	0	< 0.952	< 3.88
		4	2	42	5	< 0.952	2
		5	1	42	2	< 0.962	1.71
Dibenzo(a,h) anthracene	EPA 8270M-SIM	1	3	42	7	< 0.00962	0
		2	1	42	2	< 0.00952	0.507
		3	6	42	14	< 0.00952	0
		4	6	42	14	< 0.00952	0.121
		5	2	42	5	< 0.00962	< 0.0111
Diethyl phthalate	EPA 8270M-SIM	1	1	42	2	< 0.962	1.12
		2	0	42	0	< 0.952	< 0.99
		3	0	42	0	< 0.952	< 1.94
		4	1	42	2	< 0.952	2
		5	1	42	2	< 0.962	5.93

Analyte	Method	Event	Number of Detections	Number of Samples	Frequency of Detection (%)	Minimum Concentration [2] (µg/L)	Maximum Concentration (µg/L)
Dimethyl phthalate	EPA 8270M-SIM	1	1	42	2	< 0.962	15
		2	0	42	0	< 0.952	< 0.99
		3	0	42	0	< 0.952	< 1.94
		4	0	42	0	< 0.952	< 1.94
		5	0	42	0	< 0.962	< 1.11
Fluoranthene	EPA 8270M-SIM	1	22	42	52	< 0.0192	1.09
		2	23	42	55	< 0.019	6
		3	30	42	71	< 0.0192	0.343
		4	29	42	69	< 0.019	2
		5	24	42	57	< 0.0192	0.247
Fluorene	EPA 8270M-SIM	1	1	42	2	< 0.0192	0
		2	8	42	19	< 0.019	0.18
		3	3	42	7	< 0.00971	< 0.0388
		4	1	42	2	< 0.019	0.0529
		5	0	42	0	< 0.0192	< 0.0288
Indeno(1,2,3-cd)pyrene	EPA 8270M-SIM	1	8	42	19	< 0.00962	0.32
		2	12	42	29	< 0.00952	1
		3	15	42	36	< 0.00952	0.0989
		4	17	42	40	< 0.00952	0
		5	13	42	31	< 0.00962	0.0367
Naphthalene	EPA 8270M-SIM	1	34	42	81	< 0.0192	0
		2	31	42	74	< 0.019	0.646
		3	32	42	76	< 0.0192	0
		4	21	42	50	< 0.019	0.0694
		5	16	42	38	< 0.0192	0
Phenanthrene	EPA 8270M-SIM	1	22	42	52	< 0.0192	0.471
		2	25	42	60	< 0.019	3
		3	39	42	93	< 0.0192	0.222
		4	33	42	79	< 0.019	1
		5	27	42	64	< 0.0192	0.116
Pyrene	EPA 8270M-SIM	1	28	42	67	< 0.0192	1
		2	28	42	67	< 0.019	4.55
		3	34	42	81	< 0.0192	1
		4	35	42	83	< 0.019	1.63
		5	30	42	71	< 0.0192	0

Notes:

[1] This table summarizes the results of the original UIC stormwater samples for each event for Panel 5, Panel 6, Supplemental Panel 4, and the carry over locations. It does not include the results of duplicate samples or laboratory reanalyses.

[2] Concentrations reported with a minimum and maximum concentration range of <x to <y may indicate all concentrations were below MRLs or may indicate a concentration is below the maximum MRL. See Appendix D, Table D-3, for actual values.

[3] "<" Indicates laboratory reporting limit.

Table 4-4: Summary of Total and Dissolved Metal Results - Year 5

Metal	MADL (ug/L)	Traffic Category (TPD)	Number of Samples	Number of Detections	Average [1] (ug/L)	Geometric Mean [1] (ug/L)	Minimum (ug/L)	Maximum (ug/L)	Ratio of Dissolved Average/Total Average
Common Pollutants									
Arsenic (total)	10	<1000	105	104	0.46	0.29	< 0.045	11.2	NA
	10	≥1000	105	105	0.53	0.36	0.05	8.09	
Cadmium (total)	5	<1000	105	17	0.11	0.11	< 0.1	0.27	NA
	5	≥1000	105	51	0.15	0.13	< 0.1	0.74	
Chromium (total)	100	<1000	105	75	0.97	0.75	0.28	5.62	NA
	100	≥1000	105	97	2.14	1.50	< 0.4	18	
Copper (total)	1300	<1000	105	105	5.87	4.67	0.90	20	
	1300	≥1000	105	105	12.13	9.47	1.77	58.7	<1000 51%
Copper (dissolved)	NA	<1000	105	105	3.01	2.24	0.47	17.3	≥1000 33%
	NA	≥1000	105	105	4.06	3.25	0.79	20.5	
Lead (total)	50	<1000	105	103	3.11	1.66	< 0.1	18.6	
	50	≥1000	105	105	8.21	5.78	0.61	39.8	<1000 9%
Lead (dissolved)	NA	<1000	105	65	0.28	0.18	0.05	3.66	≥1000 5%
	NA	≥1000	105	96	0.40	0.30	< 0.1	2.38	
Zinc (total)	5000	<1000	105	105	30.88	22.49	3.50	195	
	5000	≥1000	105	105	76.56	55.86	9.24	883	<1000 51%
Zinc (dissolved)	NA	<1000	105	105	14.84	11.49	2.02	76.6	≥1000 39%
	NA	≥1000	105	105	33.90	21.97	2.93	857	
Priority Pollutant Screen									
Mercury (dissolved)	NA	<1000	105	100	0.004	0.003	< 0.001	0.021	NA
	NA	≥1000	105	100	0.003	0.003	< 0.001	0.027	

Note:

[1] All data were used in calculation of the mean and geometric mean. No outliers were omitted. Values reported at <MRL were included at 50% of the MRL for estimation of the mean and geometric mean. Duplicate sample results were not included.

Table 4-5: Summary of Total Suspended Solids (TSS) Results [1] - Year 5

	Number of Samples	Total (mg/L)			
		Average	Geometric Mean	Minimum	Maximum
<1,000 Trips per Day (TPD)					
TSS	105	21	11	2	200
≥ 1,000 TPD					
TSS	105	51	30	2	484

Note:

[1] This table summarizes the results of the original UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the two carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

Table 4-6: Field Parameter Summary Statistics [1] - Year 5

Field Parameter	Units	Event	Number of Samples	Mean	Geometric Mean	Minimum	Maximum
Conductivity - specific	umhos/cm	1	42	33.4	28.6	10	102
		2	42	30.2	26.6	9	105
		3	42	22.3	19.6	9	73
		4	42	22.4	18.9	6	116
		5	42	28.3	24.6	10	82
pH	Units	1	42	6.7	6.6	5.4	7.4
		2	38	6.8	6.8	6	7.8
		3	42	6.9	6.9	6.5	8.3
		4	42	6.9	6.8	5.6	9.3
		5	42	6.7	6.7	5.8	7.9
Temperature	°C	1	42	14	13.7	5.4	18
		2	42	7	6.6	3.7	9.7
		3	42	7.4	7.3	5.3	10.1
		4	42	8.6	8.5	6.9	11.3
		5	42	11	10.6	8	20.9

Note:

[1] This table summarizes the results of the original UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the two carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

Table 4-7: Summary of Year 5 MADL Exceedances - Common Pollutants

Analyte	Location Code	Traffic Category (TPD)	MADL (ug/L)	Event (concentration (µg/L)) [1]				
				1	2	3	4	5
Arsenic (total)	P6_8	<1000	10.0	0.574	**11.2, 11.3** [2,3]	0.858	0.646	0.541
	SP4_3	≥1000		0.705	8.09 [4]	0.703	0.647	1.43
Benzo(a)pyrene	P5_5	<1000	0.2	**0.373**	**1.85**	0.0776	**0.522**	0.0332
	SP3_8	≥1000		0.0207	0.0165	0.107	0.0354	<0.00962
Di(2-ethylhexyl) phthalate	P5_1	≥1000	6.0	<0.971	<0.971	<0.971	**22**	1.72
	P5_10	≥1000		1.02	<0.962	<0.971	1.13	<0.962, **14.5**
	P5_12	<1000		1.04	2.29	<0.962	<0.962	**8.73**
	P5_3	≥1000		1.65	1.38	3.7	1.95	1.09
	P6_1	≥1000		2.09	3.21	3.39, 3.34	1.62	1.42
	P6_12	≥1000		<0.962	3.07	1.22	1.26	4.93
	P6_15	≥1000		1.3	2.22	3.46	1.78	2.43, 2.05
	P6_5	≥1000		1.41	1.11	3.51	2.63	1.08
	P6_7	<1000		2.15	<0.98, 1.77	1.91	9.73	1.26
	P6_9	<1000		<0.962	<0.971	0.971, <0.97	0.962, <0.96	**18.1**
	SP3_6	≥1000		1.13	3.32	1.5, 1.98	2.35	1.12
	SP3_8	≥1000		5.23	1.94	**14.1**	**8.38**	2.95
	SP4_10	≥1000		5.61	5.73	<1	1.74	2.41
	SP4_2	≥1000		2.95	4.47	**8.66**	1.46	2.48
	SP4_3	≥1000		2.62	1.2	3.27	2.02	2.67
	SP4_4	<1000		<0.971	<0.962	1.89	2.08	3.51
Lead (total)	P6_14	≥1000	50.0	3.69	7.04	8.38	8.36	33.4
	P6_2	≥1000		1.31	3.69	5.66	3.49	28.2
	SP4_10	≥1000		13.6	24.2	2.19	12.6	29.1
	SP4_3	≥1000		10.3	39.8	11.4	7.14	9.75

	P5_10	≥1000		0.559	0.23	0.334	0.868	0.92, 0.837
	P5_11	≥1000		0.934	0.571	0.582	0.448	0.565
	P5_15	≥1000		**1.63**	**1.78**	**3.26**	**3.52**	**4.2**
	P5_3	≥1000		0.278	0.501	0.29	0.406	0.32
	P5_5	<1000		0.971	0.881	0.845	0.327	na [5]
	P5_7	≥1000		0.448	**1.34**	0.549	0.942	0.0861
	P5_8	≥1000		0.159	0.205	0.106	**1.17**	0.175
	P5_9	≥1000		0.531	0.327	0.273	0.291	0.33, 0.287
	P6_1	≥1000		**1.65**	**1.41**	**1.53, 1.62**	**1.28**	**1.75**
	P6_12	≥1000		0.457	0.539	0.541	0.505	0.241
	P6_14	≥1000		**2.31**	**2.48**	**2.1**	**1.22**	na [5]
Pentachlorophenol	P6_15	≥1000	1.0	0.359	0.198	0.566	0.304	0.549, 0.589
	P6_2	≥1000		0.694	0.766	**1.16**	0.696	**1.71**
	P6_4	<1000		0.56, 0.668	0.362	0.733	0.254, 0.234	0.435
	P6_7	<1000		**1.02**	0.987, 0.921	**1.53**	**1.3**	0.842
	SP3_6	≥1000		**1.15**	**1.32**	**2.22, 2.12**	**2.72**	**2.15**
	SP3_8	≥1000		**3.56**	**2.35**	**6.3**	**4.82**	**3.48**
	SP4_10	≥1000		**2.76**	**1.47**	**3.06**	**1.71**	**2.15**
	SP4_2	≥1000		**2.59**	**2.44**	**3.84**	**2.25**	**1.57**
	SP4_3	≥1000		0.802	**1.09**	**1.9**	**1.51**	**1.01**
	SP4_4	<1000		**1.18**	0.996	**1.63**	**1.37**	**1.5**
	SP4_5	<1000		0.216, 0.259	0.146	0.306	0.649	0.189
	SP4_7	<1000		0.516	0.253, 0.27	0.531	0.967	0.38

Notes:

[1] This table includes only those analytes detected at concentrations ≥ 50% of the MADL during at least one sampling event.

[2] Bolded numbers exceed the MADL.

[3] Duplicate samples reported as: sample concentration, duplicate concentration.

[4] This table also includes UIC locations where sample concentrations of the listed analytes exceeded one-half the MADL.

[5] Missing data indicate laboratory equipment failure resulting in a subset of samples were not analyzed. Details are provided in

Table 4-8: Priority Pollutant Screen Analyte Action Levels

Annual Mean Concentration Action Level	Compliance Response Action
≤ 50 % MADL	No further action. Return to PPS sampling frequency specified in the permit.
> 50 % MADL, but < MADL	Continue monitoring UIC at frequency of 5 sampling events per wet season, or request permit modification to return to normal PPS sampling frequency specified in permit
≥ MADL	Implement compliance response in accordance with permit

Table 4-9: Year 5 Annual Mean Concentrations - Common Pollutants

Analysis	MADL	Location Code [1]	Traffic Category (TPD)	Number of Events	Average [2] (µg/L)	Geometric Mean [2] (µg/L)	Minimum [3] (µg/L)	Maximum [3] (µg/L)
Arsenic (total)	10.0	P6_8	<1000	5	2.764	1.14	0.541	**11.2** [4]
		SP4_3	≥1000	5	2.315	1.3	0.647	8.09
Benzo(a)pyrene	0.2	P5_5	<1000	5	**0.571**	**0.247**	0.0332	**1.85**
		SP3_8	≥1000	5	0.038	0.026	< 0.00962	0.107
Di(2-ethylhexyl) phthalate	6.0	P5_1	≥1000	5	5.327	2.032	< 0.971	**22**
		P5_12	<1000	5	2.797	1.807	< 0.962	**8.73**
		P5_3	≥1000	5	1.954	1.781	1.09	3.7
		P6_1	≥1000	5	2.336	2.2	1.42	3.34
		P6_12	≥1000	5	2.288	1.862	< 0.962	4.93
		P6_15	≥1000	5	2.238	2.124	1.3	3.46
		P6_5	≥1000	5	1.948	1.732	1.08	3.51
		P6_7	<1000	5	3.206	2.181	< 0.98	**9.73**
		P6_9	<1000	5	4.393	1.737	< 0.962	**18.1**
		SP3_6	≥1000	5	1.98	1.812	1.12	3.32
		SP3_8	≥1000	5	**6.52**	5.125	1.94	**14.1**
		SP4_10	≥1000	5	3.298	2.666	< 1	5.73
		SP4_2	≥1000	5	4.004	3.336	1.46	**8.66**
		SP4_3	≥1000	5	2.356	2.232	1.2	3.27
		SP4_4	<1000	5	1.883	1.667	< 0.962	3.51
Lead (total)	50.0	P6_14	≥1000	5	12.174	9.052	3.69	33.4
		P6_2	≥1000	5	8.47	4.853	1.31	28.2
		SP4_10	≥1000	5	16.338	12.145	2.19	29.1
		SP4_3	≥1000	5	15.678	12.661	7.14	39.8
Pentachlorophenol (cont.)	1.0	P5_10	≥1000	5	0.582	0.509	0.23	0.92
		P5_11	≥1000	5	0.62	0.601	0.448	0.934
		P5_15	≥1000	5	**2.878**	**2.686**	**1.63**	**4.2**
		P5_3	≥1000	5	0.359	0.35	0.278	0.501
		P5_5	<1000	4	0.756	0.697	0.327	0.971
		P5_7	≥1000	5	0.673	0.485	0.0861	**1.34**
		P5_8	≥1000	5	0.363	0.234	0.106	**1.17**
		P5_9	≥1000	5	0.35	0.34	0.273	0.531
		P6_1	≥1000	5	**1.542**	**1.532**	**1.28**	**1.75**
		P6_12	≥1000	5	0.457	0.439	0.241	0.541
		P6_14	≥1000	4	**2.027**	**1.957**	**1.22**	**2.48**
		P6_15	≥1000	5	0.395	0.368	0.198	0.566
		P6_2	≥1000	5	**1.005**	0.94	0.694	**1.71**
		P6_4	<1000	5	0.465	0.432	0.234	0.733
		P6_7	<1000	5	**1.136**	**1.11**	0.842	**1.53**
		SP3_6	≥1000	5	**1.892**	**1.799**	**1.15**	**2.72**
		SP3_8	≥1000	5	**4.102**	**3.884**	**2.35**	**6.3**
		SP4_10	≥1000	5	**2.23**	**2.147**	**1.47**	**3.06**
		SP4_2	≥1000	5	**2.538**	**2.436**	**1.57**	**3.84**

Analysis	MADL	Location Code [1]	Traffic Category (TPD)	Number of Events	Average [2] (µg/L)	Geometric Mean [2] (µg/L)	Minimum [3] (µg/L)	Maximum [3] (µg/L)
Pentachlorophenol (cont.)	1.0	SP4_3	≥1000	5	**1.262**	**1.204**	0.802	**1.9**
		SP4_4	<1000	5	**1.335**	**1.315**	0.996	**1.63**
		SP4_5	<1000	5	0.301	0.26	0.146	0.649
		SP4_7	<1000	5	0.529	0.48	0.253	0.967

Notes:

[1] Table includes only those UIC monitoring locations where the concentration was ≥50% of the MADL in at least one sample.

[2] Most concentrations are rounded to one decimal place.

[3] Minimum concentrations may be either MRL or MDL values (i.e., < symbol not shown).

[4] Bold, shaded text indicates pollutant concentration geometric mean exceeds the MADL.

Table 7-1: Overall Data Quality Objectives

Compound Class	Precision	Accuracy	Completeness
Volatile Organic Compounds (VOCs)	± 25%	Per method/per analyte	95%
Polynuclear Aromatic Hydrocarbons (PAHs)	± 50%	Per method/per analyte	95%
Semivolatile Organic Compounds (SVOCs)	± 50%	Per method/per analyte	95%
Herbicides/Pesticides	± 30%	± 30%	95%
Total Metals	± 20%	± 25%	95%
Conventionals	± 20%	± 25%	95%

Table 7-2: Laboratory Quality Control Issues for Permit Year 5
UIC WPCF Permit Monitoring

Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
1	8270M-SIM	Reanalysis of samples in batch 9100696 due to naphthalene method blank contamination, reanalysis extractions performed three to six days after extraction holding time expired.	None	Reanalysis	Except for sample SP4_10, reanalysis results comparable to original sample results but generally lower; most reanalysis results used only for comparison.	Used only for comparison
	8270M-SIM	Reanalysis of samples in batch 9101081 due to naphthalene method blank contamination, reanalysis extractions performed eleven days after extraction holding time expired.	None	Reanalysis	Reanalysis results comparable to original sample results but generally lower; most reanalysis results used only for comparison.	Used only for comparison
	8270M-SIM	For batch 9100696, Naphthalene detected in laboratory method blank at 0.0526 ug/l	P5_1, P5_9, P5_10, P5_15, P6_4, P6_4 DUP, P6_8, P6_10, P6_11, P6_14, SP4_1, SP4_4, SP4_6, SP4_7, SP4_10	Lab contamination	Naphthalene values qualified with "JB" for reported sample values < 5x blank concentration and "UB" for sample values < method blank concentration	Usable with qualifiers
	8270M-SIM	For batch 9101081, Naphthalene and phenanthrene detected in laboratory method blank at 0.0404 ug/l and ND (slightly below MRL)	P5_3, P6_1, P6_2, P6_5, P6_9, P6_15, SP3_8, SP4_2, SP4_3 SP4_5, SP4_5 DUP	Lab contamination	Sample values qualified with "JB" for reported sample values < 5x blank concentration and "UB" for sample values < method blank concentration	Usable with qualifiers
	8260	Dibromofluoromethane recovery slightly high (124%) for Oct 15, 2009 method blank	None	Analytical difficulties	All results ND, no action taken.	Usable
	8260	Dibromofluoromethane recovery slightly high for 16 samples Oct 20-21, 2009	P6_14	Analytical difficulties	Most results ND, P6_14 chloroform result qualified with "JH" for estimated, potential high bias	Usable with qualifiers
	8260	Dibromofluoromethane recovery slightly high (122%) for Oct 22, 2009	SP3_6	Analytical difficulties	All associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recovery slightly high (122%) for Oct 23, 2009	SP4_2, SP4_5 DUP	Analytical difficulties	All associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recovery slightly high (122%) for Oct 26, 2009	P6_12	Analytical difficulties	All associated results ND, no action taken.	Usable
	515.3	Initial run within hold time, reanalysis 5 days outside of extraction hold time.	P5_11	Analytical difficulties	Detects qualified with “J” for estimated, ND results for analytes typically not detected, no other action taken.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0271 ug/l (< MRL) for batch 9101082	P6_3	Lab contamination	Pentachlorophenol sample value qualified with "JB" for estimated due to blank contamination. All other results ND or > 5x blank concentration.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0222 ug/l (< MRL) for batch 9101201	None	Lab contamination	Analyte not detected in associated samples, no action taken	Usable
	515.3	For batch 9100914, Picloram LCS recovery (159%) outside acceptance limits	None	Analytical difficulties	Analyte not detected in associated samples, no action taken	Usable
	515.3	For batch 9110551, 3,5-Dichlorobenzoic acid LCS recovery (157%) outside acceptance limits	None	Analytical difficulties	Analyte not detected in associated samples, no action taken	Usable
	515.3	For batch 9100821, Pentachlorophenol (62.9%) and Picloram (137%) MS2 results outside acceptance limits.	None	Matrix effects	MS1/MSD1 results acceptable (no MSD2 sample was analyzed), no other QC issues, no action taken.	Usable
	515.3	For batch 9100914, 24-DB (145%), 3,5-Dichlorbenzoic acid (131%), and Pentachlorophenol (69.2%) MS2 and Picloram (175%, 175%, 162%) MS1/MS2/MSD1 recoveries outside	None	Matrix effects	Other recoveries and RPDs acceptable (no MSD2 sample was analyzed), no other QC issues, no action taken.	Usable
	515.3	For batch 9101082, Picloram (153%, 170%, 155%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
	515.3	For batch 9110517, Bentazon (145%, 133%), 3,5-Dichlorobenzoic acid (136%), and Picloram (163%, 162%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPDs acceptable, analyte not detected, no other QC issues, no action taken.	Usable
1/2*	8270M-SIM	For batch 9110563, Naphthalene detected in laboratory method blank at 0.0528 ug/l	P5_10, SP4_1, SP4_2, SP4_4, SP4_7 and SP4_7 DUP	Lab contamination	Sample values qualified with "JB" for reported sample values < 5x blank concentration and "UB" for sample values < method blank concentration	Usable with qualifiers

Table 7-2: Laboratory QC Issues for Permit Year 5
UIC WPCF Permit Monitoring

Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
	515.3	For batch 9110551, 3,5-Dichlorobenzoic acid (210%, 198%, 227%), and Picloram (161%, 166%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
2	200.8	Copper and zinc detected in field decontamination blank at 0.35 and 0.69 ug/l	None	Lab contamination	Blank concentration < 5x sample concentrations, no action taken	Usable
	200.8	Arsenic field duplicate RPD failed 0.055/0.073 ug/l (28%)	P5_2	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8270M-SIM	Bis(2-ethylhexyl)phthalate field duplicate RPD failed < 0.98/1.77 ug/l (57%)	P6_7	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8260	Dibromofluoromethane recoveries slightly high for 11 samples, November 17, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 20 samples, November 19, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 14 samples, November 24, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	December 15, 2009 1,1-Dichloroethene, benzene, trichloroethene, toluene, chlorobenzene RPDs failed (38%, 32%, 29%, 30%, 26%).	P6_12	Analyst error	MS/MSD recoveries acceptable. Believed to be analyst error, vial not properly homogenized following addition of surrogates. No other QC issues, no action taken.	Usable
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0337 ug/l (< MRL) for batch 9110816	P6_6	Lab contamination	Pentachlorophenol sample value qualified with "JB" for estimated due to blank contamination. All other results ND or > 5x blank concentration.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0257 ug/l (< MRL) for batch 9120559	P5_12, P6_10, SP4_9	Lab contamination	Pentachlorophenol sample values qualified with "JB" for estimated due to blank contamination. All other results ND or > 5x blank concentration.	Usable with qualifiers
	515.3	Surrogate recovery below acceptance limits (42.1%)	P6_15	Analytical difficulties	Sample reanalyzed outside hold time with similar results, no action taken	Usable
	515.3	For batch 9120559, Picloram (138%, 160%, 132%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
	515.3	For batch 9120614, Picloram (161%, 150%, 158%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
	515.3	Pentachlorophenol field duplicate RPD failed 0.312/0.218 ug/l (35%)	P6_8	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
2/3*	8270M-SIM	For batch 9120710, MS1/MSD1 and MS2/MSD2 RPDs outside acceptance limits for Benzo(a)anthracene (46.9%), Benzo(a)pyrene (77.6%, 47.5%), Benzo(b)fluoranthene (71.3%, 47.5%), benzo(ghi)perylene (100%, 69.8%), benzo(k)fluoranthene (77.5%, 45.6%), chrysene (45.8%), dibenzo(a,h)anthracene (102%, 76.1%), and indeno(1,2,3-cd)pyrene (100%, 72.5%).	None	Matrix effects	MS/MSD recoveries acceptable, analyte not detected in associated samples, no other QC issues, no action taken.	Usable
3	200.8	Zinc detected in laboratory method blank at 0.69 ug/l	None	Lab contamination	Blank concentration < 5x sample concentrations, no action taken	Usable
	200.8	Arsenic field duplicate RPDs failed 0.096/0.138 ug/l (36%) and 0.103/0.147 ug/l (35%)	P6_9, P6_13	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8270M-SIM	Reanalysis of samples in batch 10A0111 due to low surrogate recoveries for method blank, reanalysis extractions performed three days after extraction holding time expired.	None	Reanalysis	Reanalysis results comparable to original sample results but generally lower; most reanalysis results used only for comparison.	Used only for comparison
	8270M-SIM	Reanalysis of samples in batch 10A0383 due to LCS and MS/MSD results outside of acceptance limits, reanalysis extractions performed five days after extraction holding time expired		Reanalysis	Some reanalysis results significantly lower than original sample results; reanalysis results used only for applying qualifiers to original sample results as described under MS/MSD results.	Used only for comparison
	8270M-SIM	Surrogate recoveries for batch 10A0111 method blank failed. 3 out of 3 surrogates below acceptance limits (~ 1%).	None	Analytical difficulties	Associated samples re-analyzed outside of hold time, results comparable but generally lower. No other QC issues, no action taken.	Usable

Table 7-2: Laboratory QC Issues for Permit Year 5
UIC WPCF Permit Monitoring

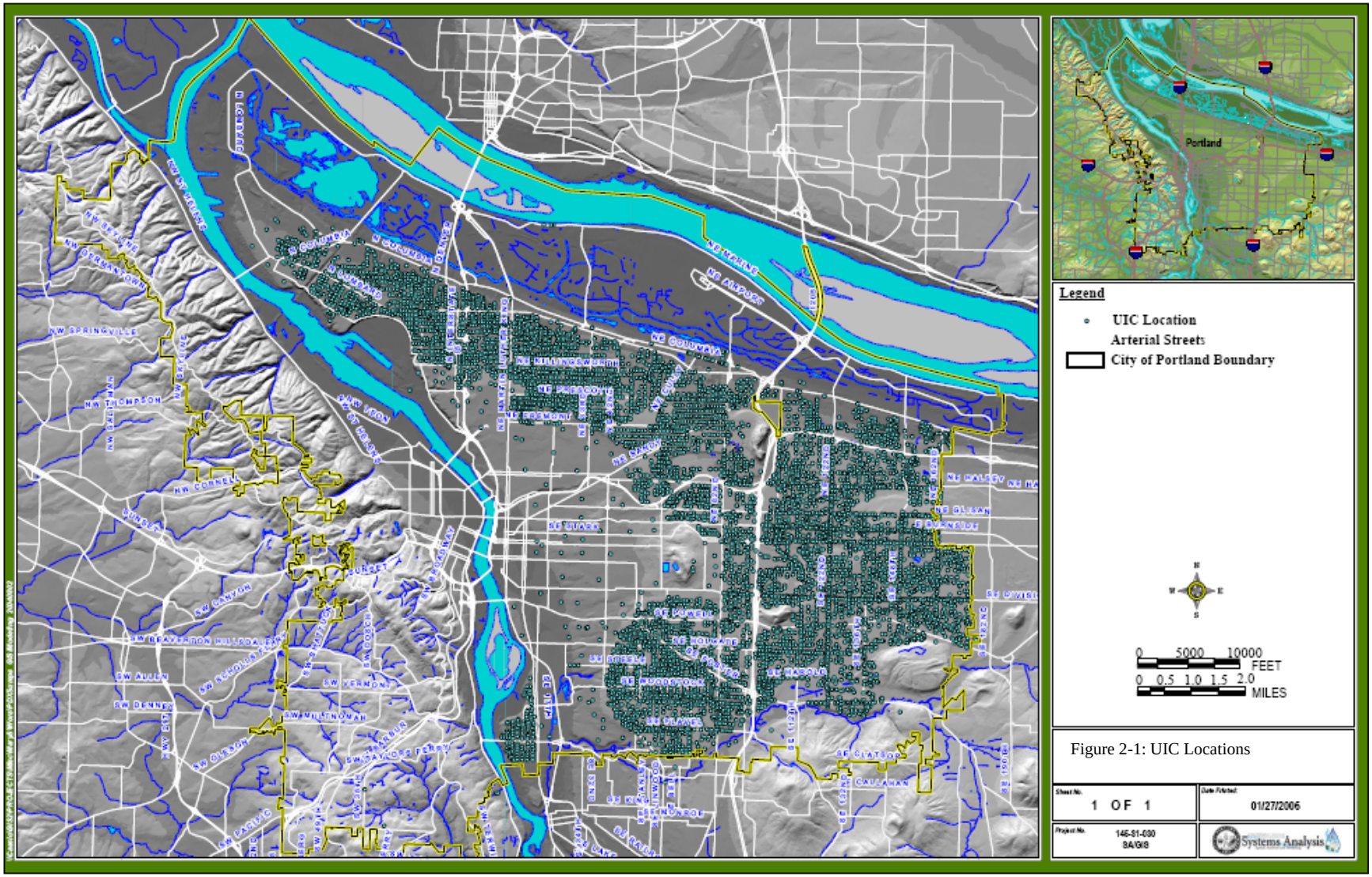
Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
	8270M-SIM	Bis(2-ethylhexyl)phthalate LCS recovery (427%) for batch 10A0383 outside acceptance limits	None	Lab contamination?	MS/MSD recoveries outside acceptance limits, see MS/MSD results for actions taken	Usable with qualifiers
	8270-SIM	For batch 10A0383, MS/MSD recoveries (-108%, -147%; SP3_8 original sample result 14.1, MS/MSD spike amount 3.88, results 9.91/8.39) below acceptance limits for Bis(2-ethylhexyl)phthalate. Also Di-n-octyl phthalate recoveries outside acceptance limits (154%, 184%).	P5_3, P6_1, SP3_8, SP4_2	Lab contamination	Samples reanalyzed outside of hold time, some results similar to original results, some significantly below original results. Sample results qualified with "JH" where original sample result 1.5x greater than reanalysis result. For Di-n-octyl phthalate, RPD acceptable, analyte not detected above MRL in associated samples, no other QC issues, no action taken.	Uasble with qualifiers
	8260	Dibromofluoromethane recoveries slightly high for 10 samples, December 17, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 22 samples, January 7, 2010	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 13 samples, January 19, 2010	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	515.3	Initial run internal standard failed, reinjection performed 5 hours outside of hold time.	P5_2	Analytical difficulties	Analytes not detected above MRL, ND results for analytes typically not detected, no action taken.	Usable
	515.3	Analyst neglected to spike initial sample run for P6_5, MS1, MS2, MSD1, and MSD2 with surrogate. Reanalysis extracted 1 day past extraction hold time.	P6_5	Analyst error	Detects qualified with "J" for estimated, ND results for analytes typically not detected, no other action taken.	Usable
	515.3	For batch 10A0088, 3,5-Dichlorobenzoic acid (135%) MSD2 recovery outside acceptance limits.	None	Matrix effects	RPD acceptable, analyte not detected, no other QC issues, no action taken.	Usable
	515.3	For batch 10A0274, Picloram (134%, 133%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable, analyte not detected, no other QC issues, no action taken.	Usable
	515.3	2,4-D field duplicate RPD failed 0.371/0.267 ug/l (33%)	P6_13	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
3/4*	515.3	Some samples rerun due to organic acid lab contamination that interfered with acifluorfen quantitation. Samples reextracted 1 day outside of extraction hold time.	various	Lab contamination	Only acifluorfen data affected (other analytes reported from first run), analyte typically not detected, no action taken.	Usable
	515.3	For batch 10B0327, 2,4-D (131%), 3,5-Dichlorobenzoic acid (140%), Pentachlorophenol (59.0%, 62.7%), and Picloram (138%) MS2/MSD1/MSD2 recoveries outside acceptance limits.	None	Matrix effects	RPDs acceptable, analyte not detected, no other QC issues, no action taken.	Usable
4	200.8	Zinc detected in field decontamination blank at 0.62 ug/l	None	Lab contamination	Blank concentration < 5x sample concentrations, no action taken	Usable
	200.8	Arsenic field duplicate RPD failed 0.168/0.231 ug/l (32%)	P6_4	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8270M-SIM	For batch 10B0312, Benzo(ghi)perylene MS/MSD RPD failed (60.5%).	None	Matrix effects	MS/MSD recoveries acceptable, no other QC issues, no action taken.	Usable
	8260	1,1-Dichloroethene MS/MSD recoveries outside acceptance limits.	P5_2	Matrix effects	RPD acceptable, no other QC issues, no action taken.	Usable
	515.3	Initial run surrogate recovery failed, reanalysis performed 7 days outside of extraction hold time.	P6_14	Analytical difficulties	Pentachlorophenol value qualified with "J" for estimated, no other action taken.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0196 ug/l (< MRL) for batch 10B0685	None	Lab contamination	All sample results > 5x method blank concentration or < MRL. No action taken	Usable
	515.3	For batch 10B0486, 3,5-Dichlorobenzoic acid (139%, 139%, 139%) MS1/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, analyte not detected, no action taken.	Usable
	515.3	For batch 10B0685, Pentachlorophenol (68.2%, 68.6%, 67.5%, 69.2%) MS1/MS2/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	515.3	For batch 10C0280, Pentachlorophenol (63.4%) MS2 and Bentazon (133%) MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
4/5*	515.3	For batch 10C0583, Pentachlorophenol (65.8%, 64.4%, 62.1%, 64.8%) MS1/MS2/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
5	8270M-SIM	Samples extracted four days outside hold time due to a laboratory miscommunication.	P5_2, P5_6, SP4_1, SP4_1 DUP, SP4_7	Laboratory miscommunication	No detects above MRLs, data consistent with previous data from these sample locations, no qualifiers assigned.	Usable

Table 7-2: Laboratory QC Issues for Permit Year 5
UIC WPCF Permit Monitoring

Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
	8270M-SIM	For batch 10D0094, Anthracene (127%, 125%), Benzo(a)anthracene (138%, 139%), and Benzo(a)pyrene (113%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	8270M-SIM	For batch 10D0095, Fluoranthene MS/MSD RPD failed (47.3%)	None	Matrix effects	MS/MSD recoveries acceptable, no other QC issues, no action taken.	Usable
	8270M-SIM	For batch 10D0921, Benzo(a)anthracene (132%, 132%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable, no other QC issues, no action taken.	Usable
	8270M-SIM	Bis(2-ethylhexyl)phthalate field duplicate RPD failed < 0.962/14.5 ug/l (180%)	P5_10	Lab contamination?	Duplicate sample qualified with "JH", original sample value used in data analysis, no other action taken	Usable with qualifiers
	515.3	Due to instrument failure, samples could not be analyzed within hold time. Data were reported but not received in time for inclusion in data analysis.	FDBLANK, P5_5, P5_13, P6_3, P6_10, P6_14, SP4_1, SP4_7	Laboratory instrument failure	SP4_1 and SP4_7 data were not necessary as these sites were sampled twice during Event 5 due to an oversight by BES FO	Not usable
	515.3	For batch 10D0143, Acifluorfen (67.0%) MSD and Pentachlorophenol (57.1%, 57.0%) MS/MSD results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	515.3	For batch 10D0315, Acifluorfen (65.4%, 62.2%, 67.4%, 63.6%), Dichlorprop (63.7%, 69.0%) Dinoseb (59.2%, 64.8%, 69.3%, 64.1%), Pentachlorophenol (49.2%, 54.8%, 54.9%, 56.2%), and 2,4,5-TP (64.2%) MS1/MS2/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	515.3	For batch 10D0910, Acifluorfen (148%, 144%), Bentazon (131%, 136%, 136%), and Picloram (138%, 133%), MS1/MS2/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, analytes not detected, no other QC issues, no action taken.	Usable

Notes: * = Some samples from separate Events analyzed as part of the same analytical batches by TA
Batch numbers are included in Laboratory Reports presented in Appendix E of the*Annual Stormwater Discharge Monitoring Report – Year 5*, July 2010.
BES FO = Bureau of Environmental Services Field Operations
DUP = field duplicate
LCS/LCSD = laboratory control sample/laboratory control sample duplicate
MDL = method detection limit
MRL = method reporting limit
MS/MSD = matrix spike/matrix spike duplicate
ND = not detected
QC = quality control
RPD = relative percent difference

Figure 2-1: City of Portland UIC Locations



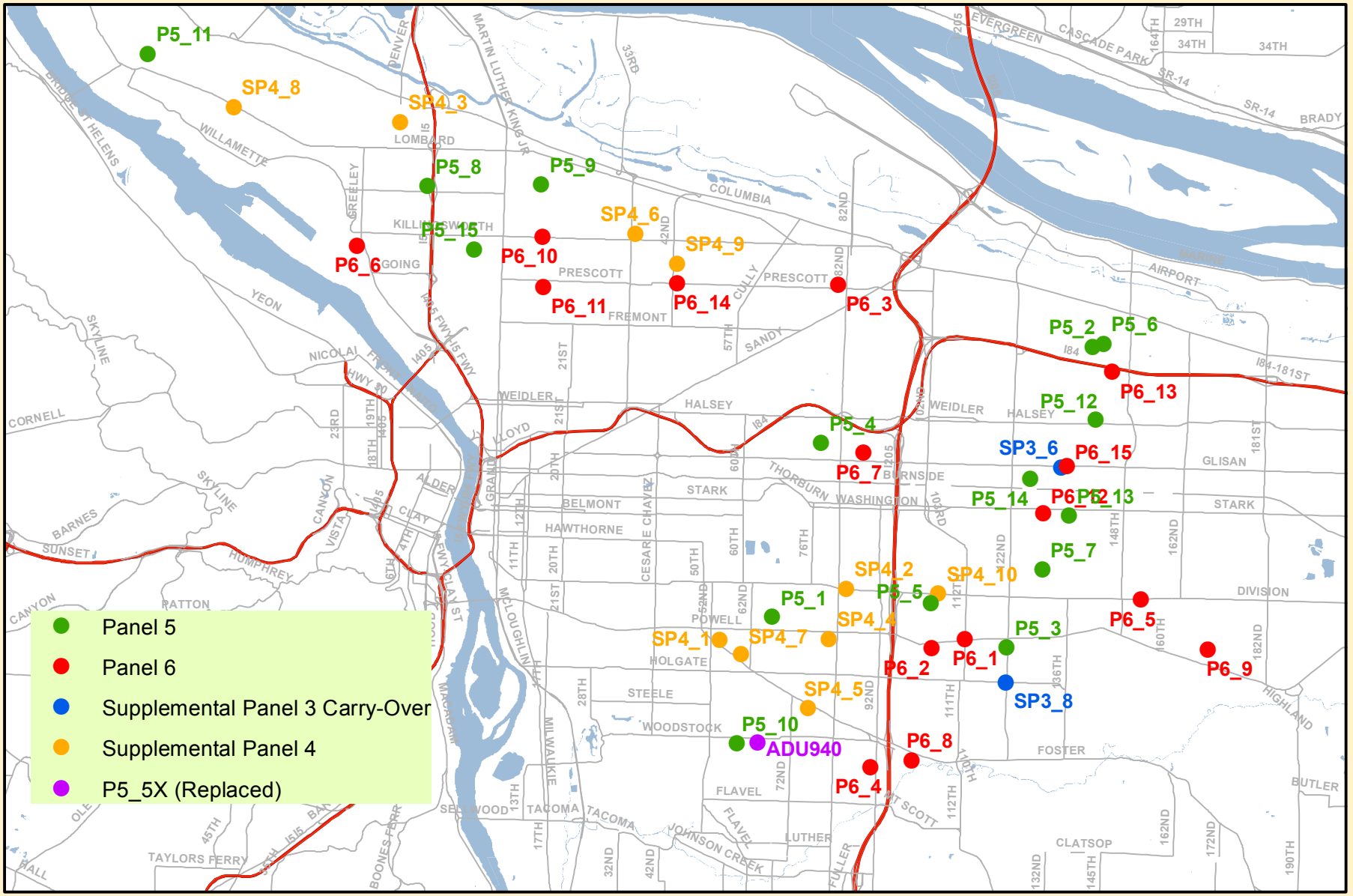


Figure 2-2
2009-10 (Year 5) UIC Monitoring Locations

Investigations & Monitoring Services
Bureau of Environmental Services

Source: ESRI Data & Maps CD
Created in ArcGIS 9.2 using ArcMap

Figure 3-1: Year 5 Event 1 Rain Gage Data

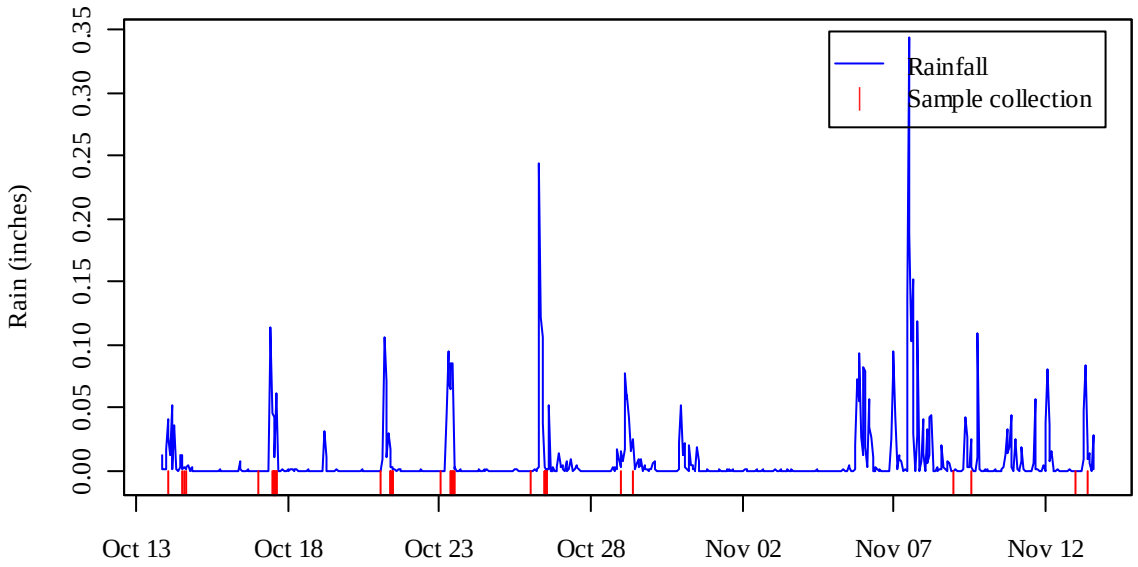


Figure 3-2: Year 5 Event 2 Rain Gage Data

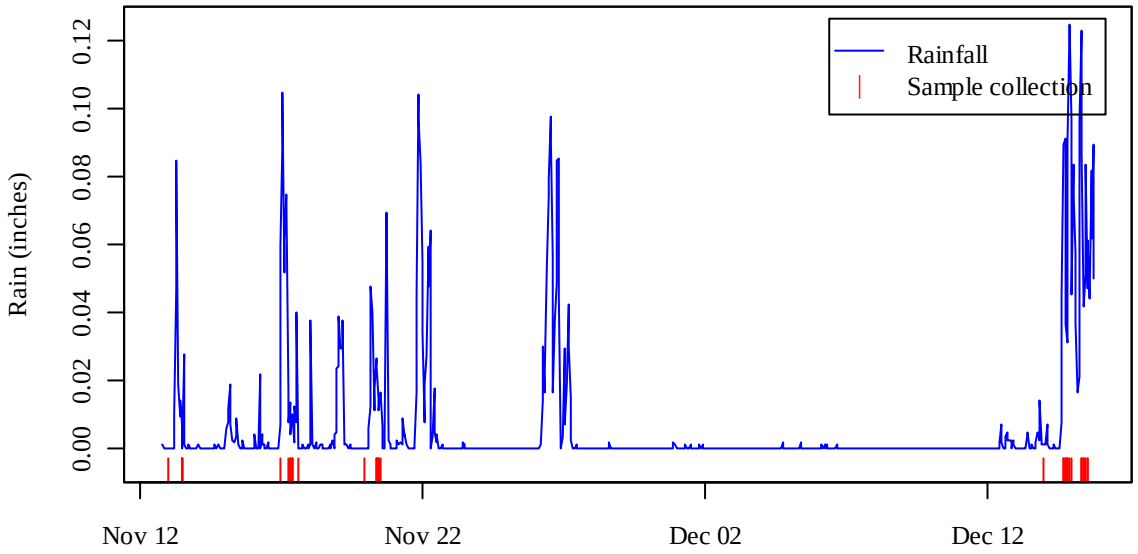


Figure 3-3: Year 5 Event 3 Rain Gage Data

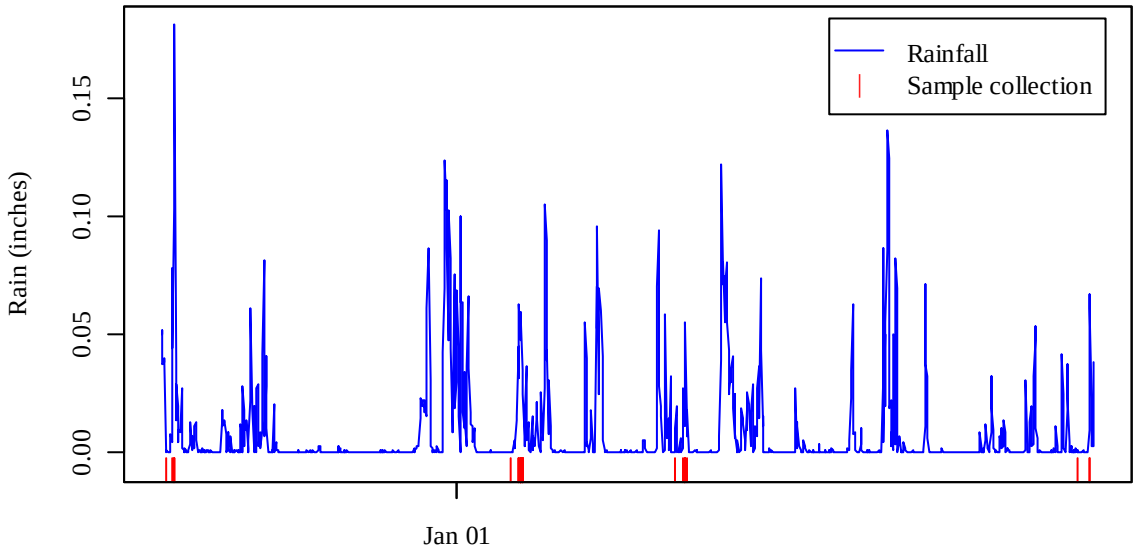


Figure 3-4: Year 5 Event 4 Rain Gage Data

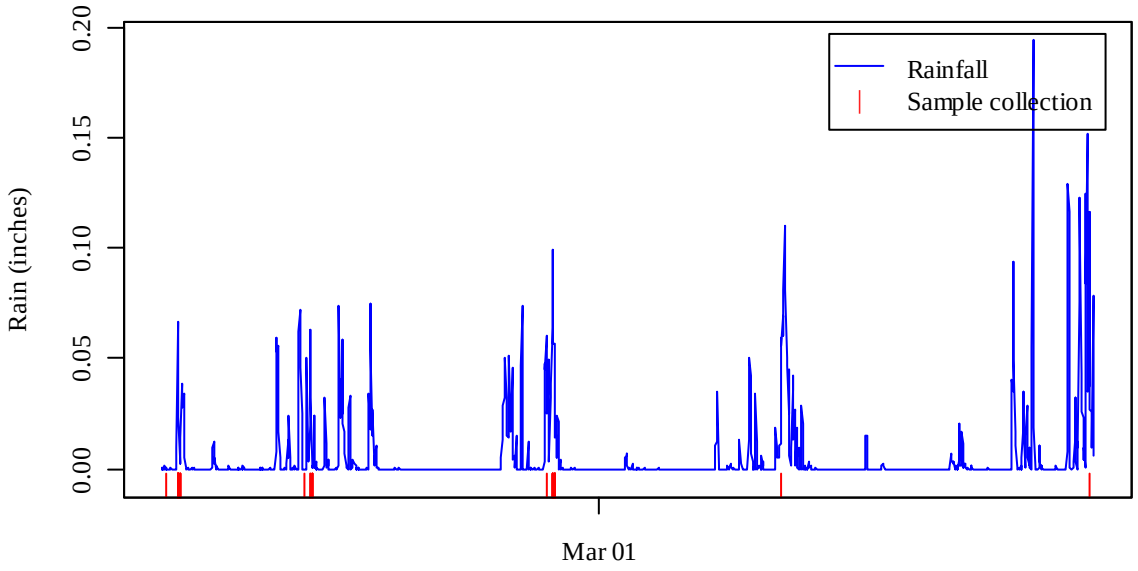


Figure 3-5: Year 5 Event 5 Rain Gage Data

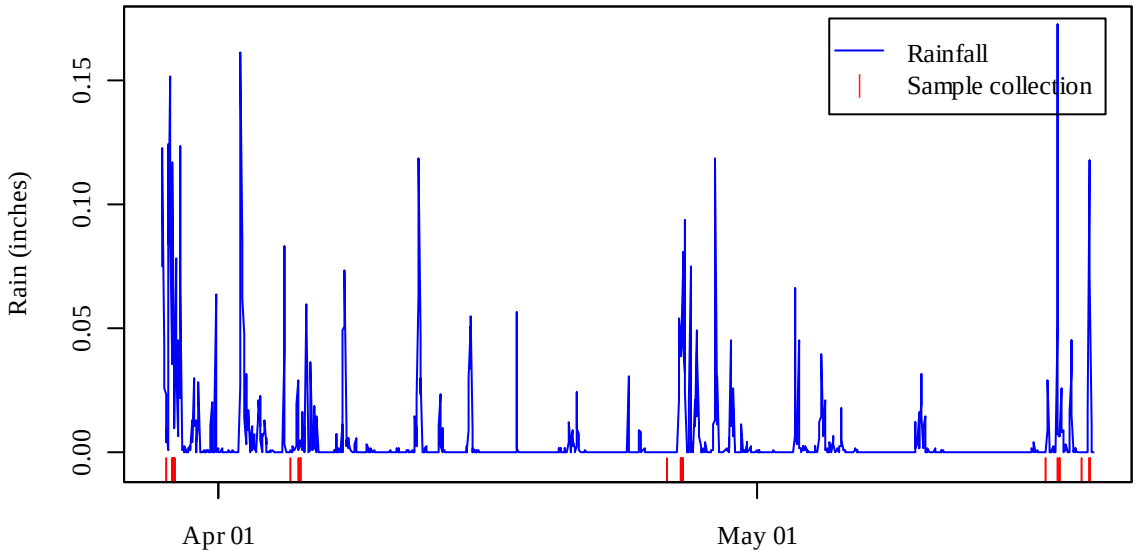
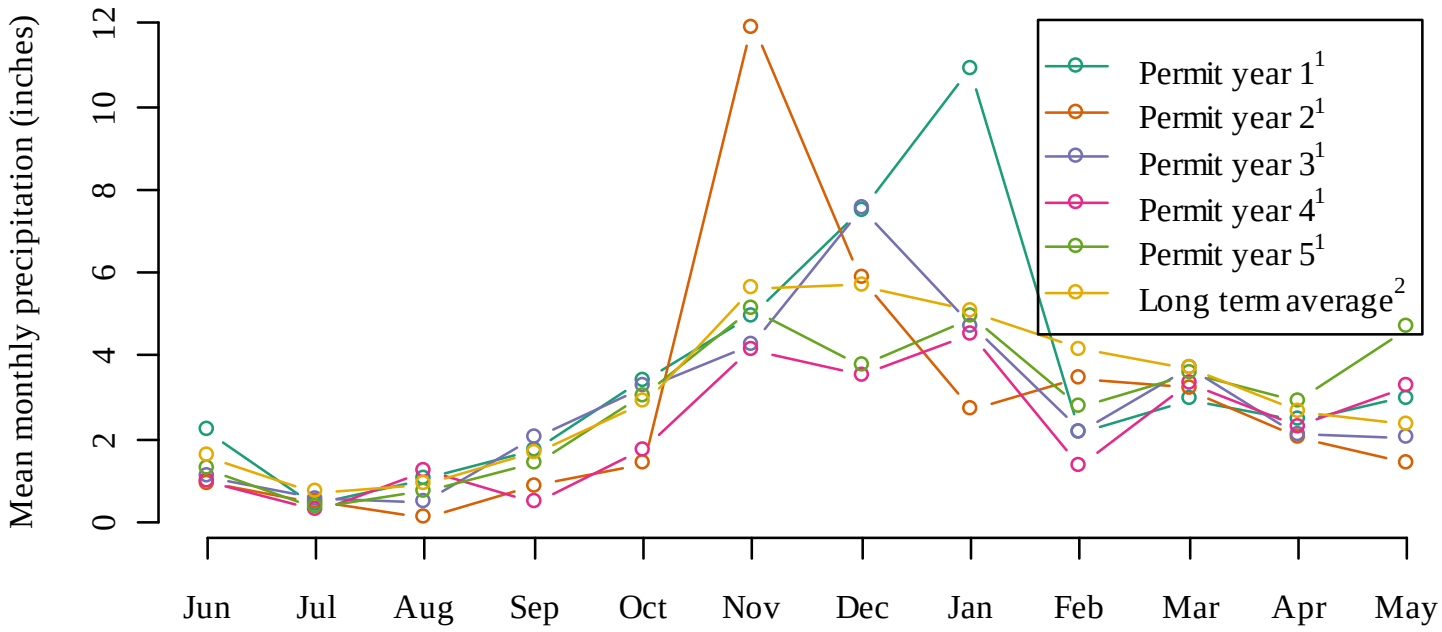


Figure 3-6: Regional Precipitation Data



1) Data source: Local Climatological Data - Portland Oregon.
From http://www.weather.gov/climate/index.php?wfo=pqr
2) Data source: Portland International Airport. Period 1971 - 2000.
From NOWData - NOAA Online Weather Data at http://nowdata.rcc-acis.org/PQR/pubACIS_results

Figure 4-1: Definition of a Box Plot

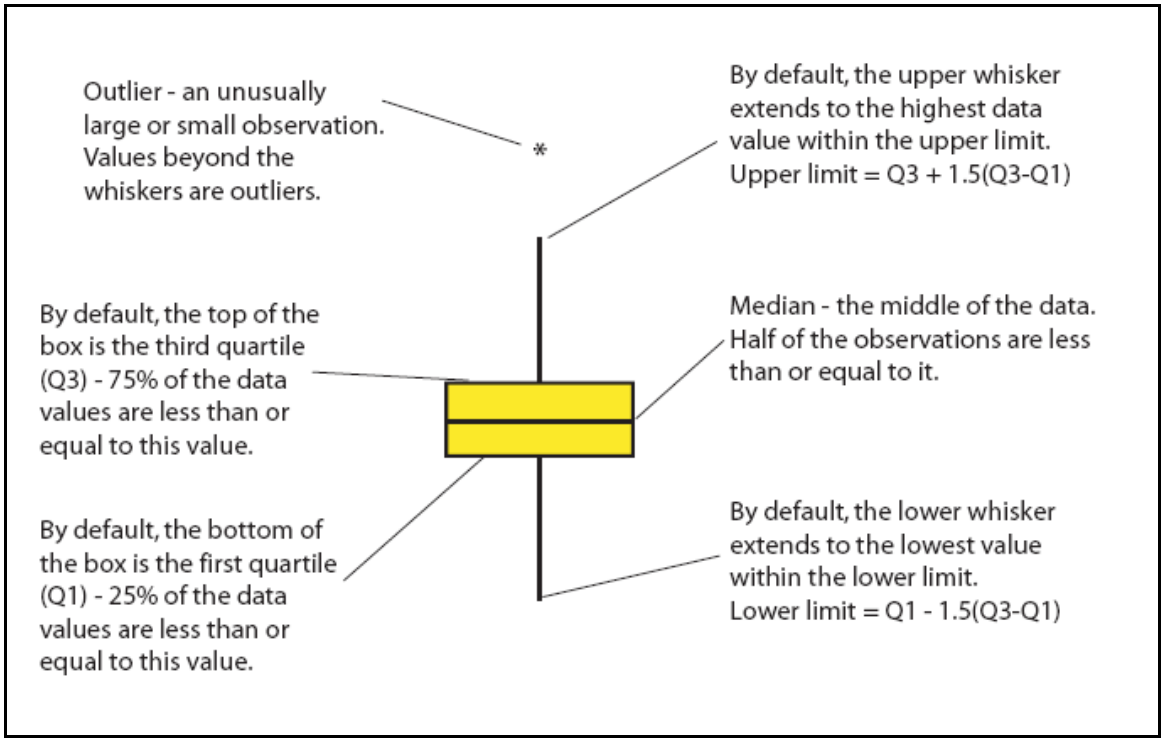
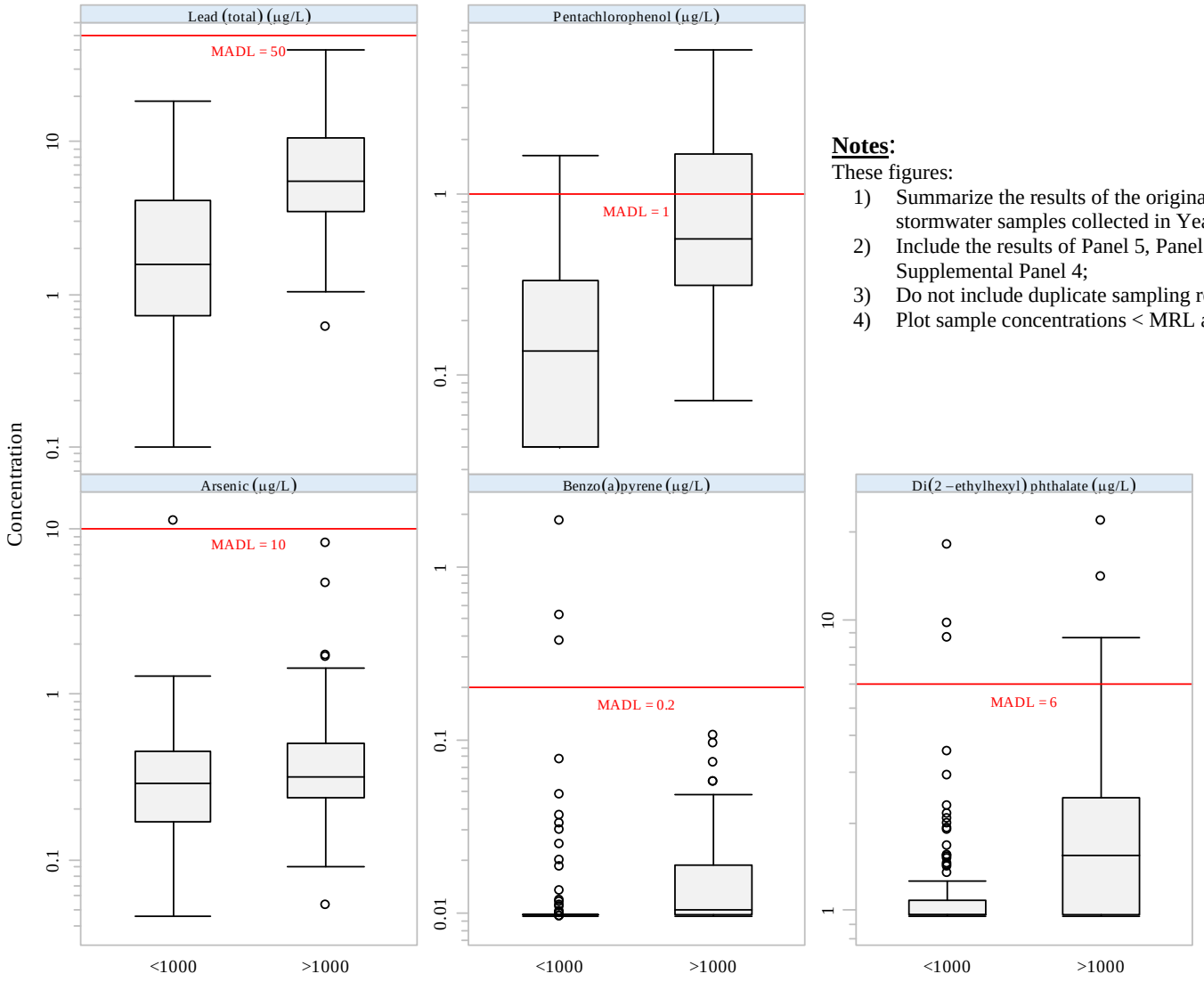


Figure note:
From Minitab®, version 14, 2006

Figure 4-2: Year 5 Pollutant Concentrations by Traffic Category

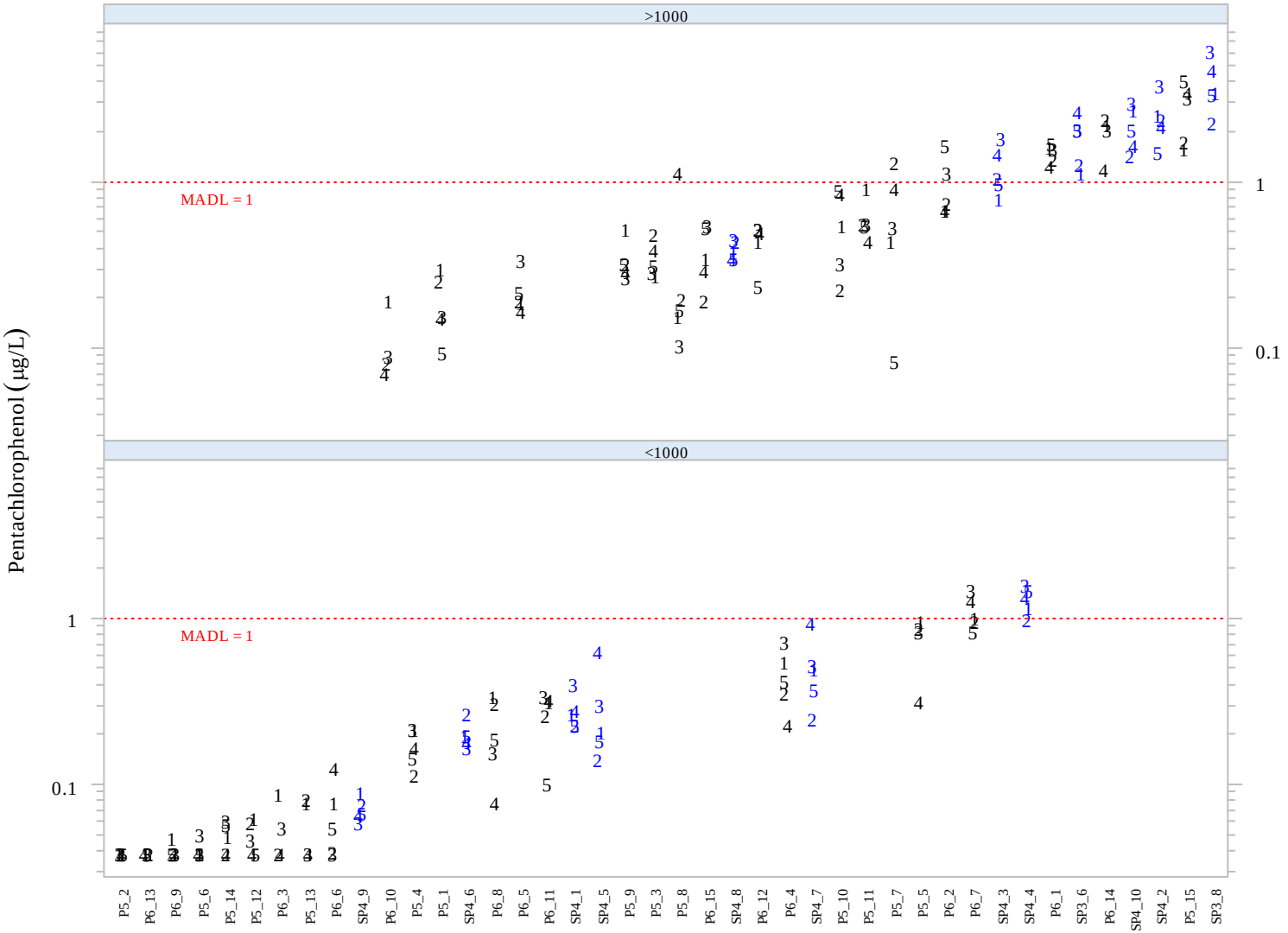


Notes:

These figures:

1) Summarize the results of the original UIC stormwater samples collected in Year 5;
2) Include the results of Panel 5, Panel 6, and Supplemental Panel 4;
3) Do not include duplicate sampling results; and
4) Plot sample concentrations < MRL at the MRL.

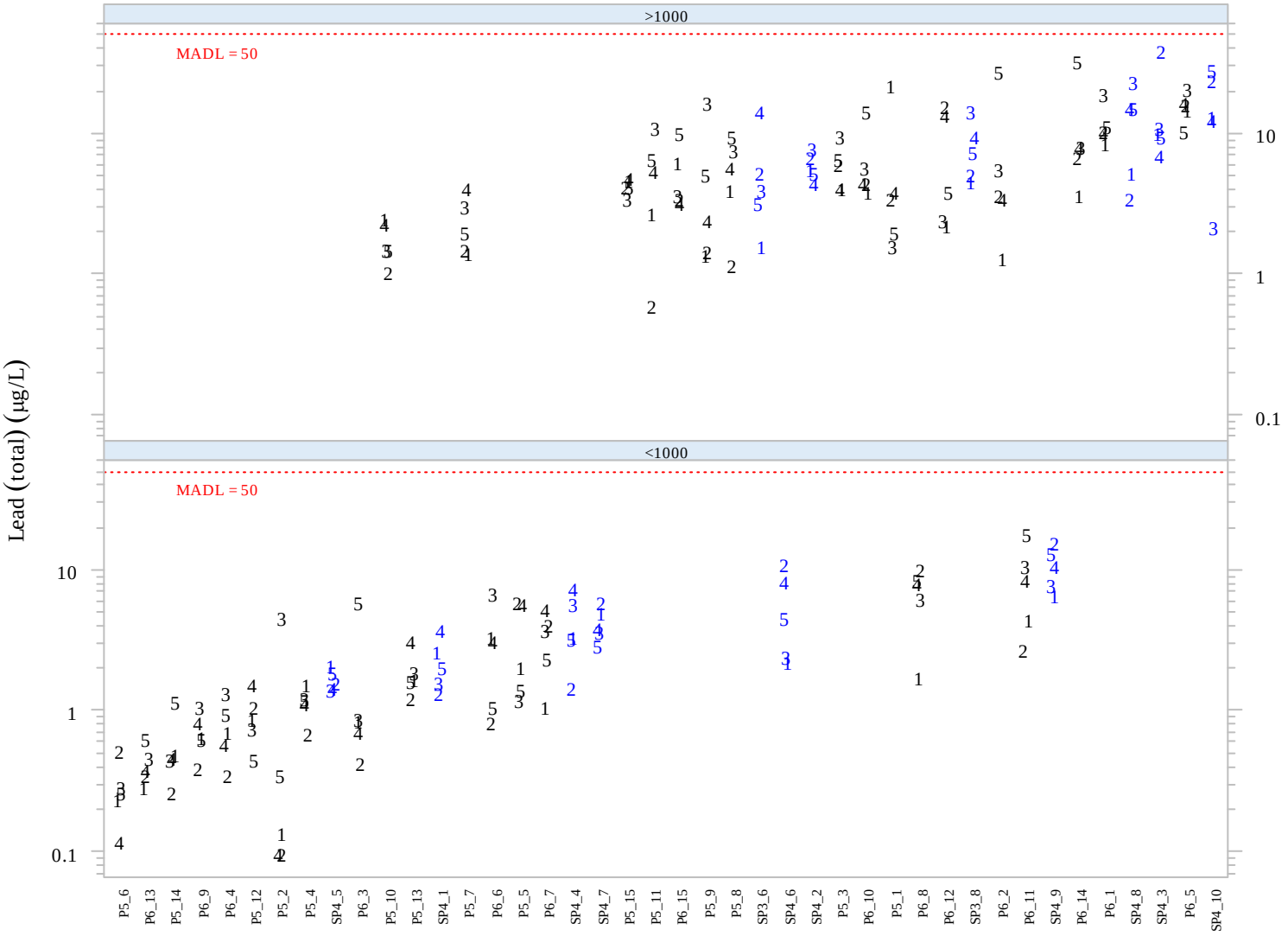
Figure 4-3: Year 5 Pentachlorophenol Concentrations by Sampling Event and Traffic Category



Notes:

(1, 2, 3, 4, 5) indicates Year 5 sampling event number.
<1000, >1000 indicates traffic category by estimated trips per day (TPD).
Concentrations are plotted on a logarithmic scale.
Data shown in blue are supplemental UIC monitoring locations.

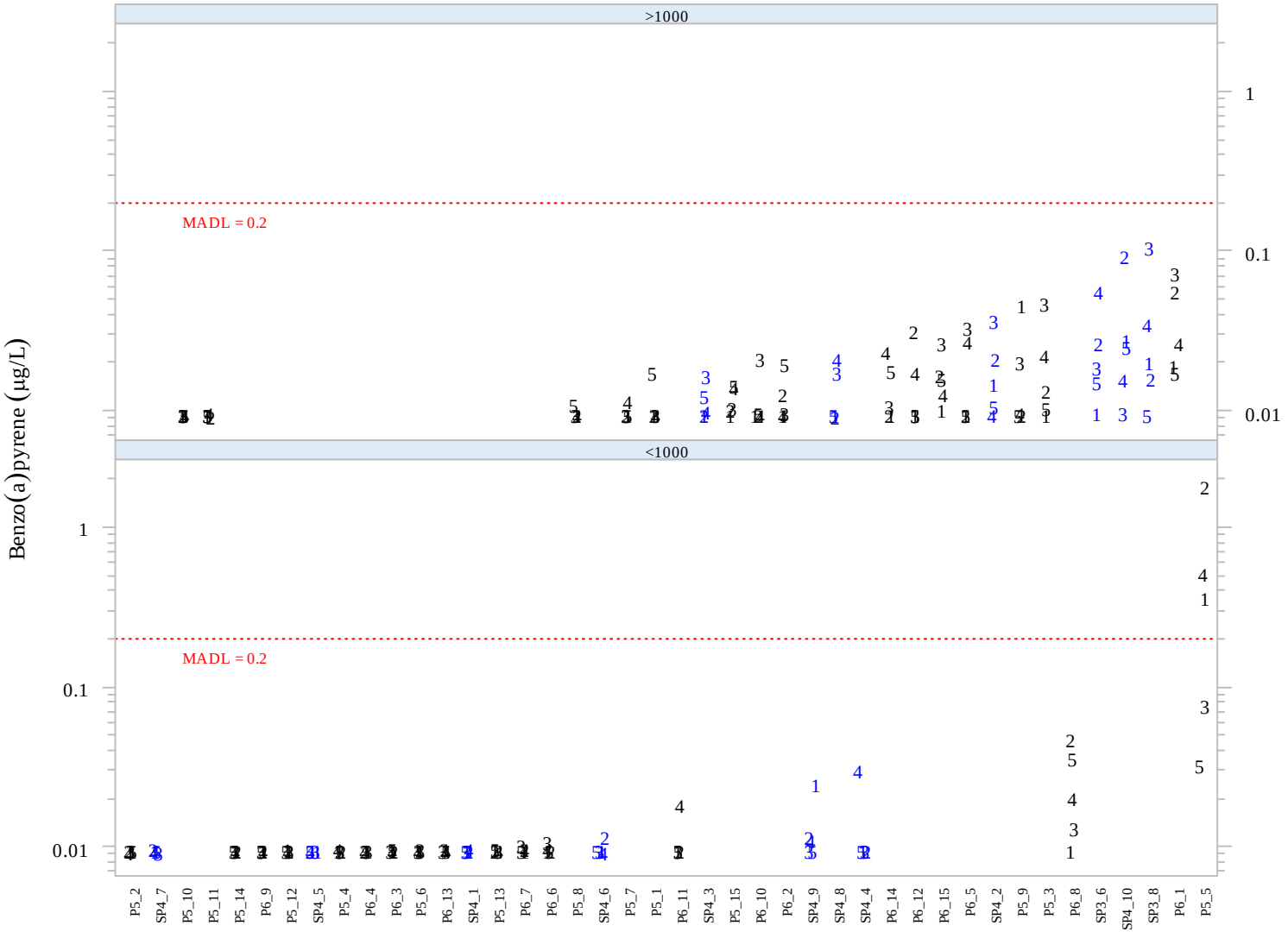
Figure 4-4: Year 5 Lead Concentrations by Sampling Event and Traffic Category



Notes:

(1, 2, 3, 4, 5) indicates Year 5 sampling event number.
<1000, >1000 indicates traffic category by estimated trips per day (TPD).
Concentrations are plotted on a logarithmic scale.
Data shown in blue are supplemental UIC monitoring locations.

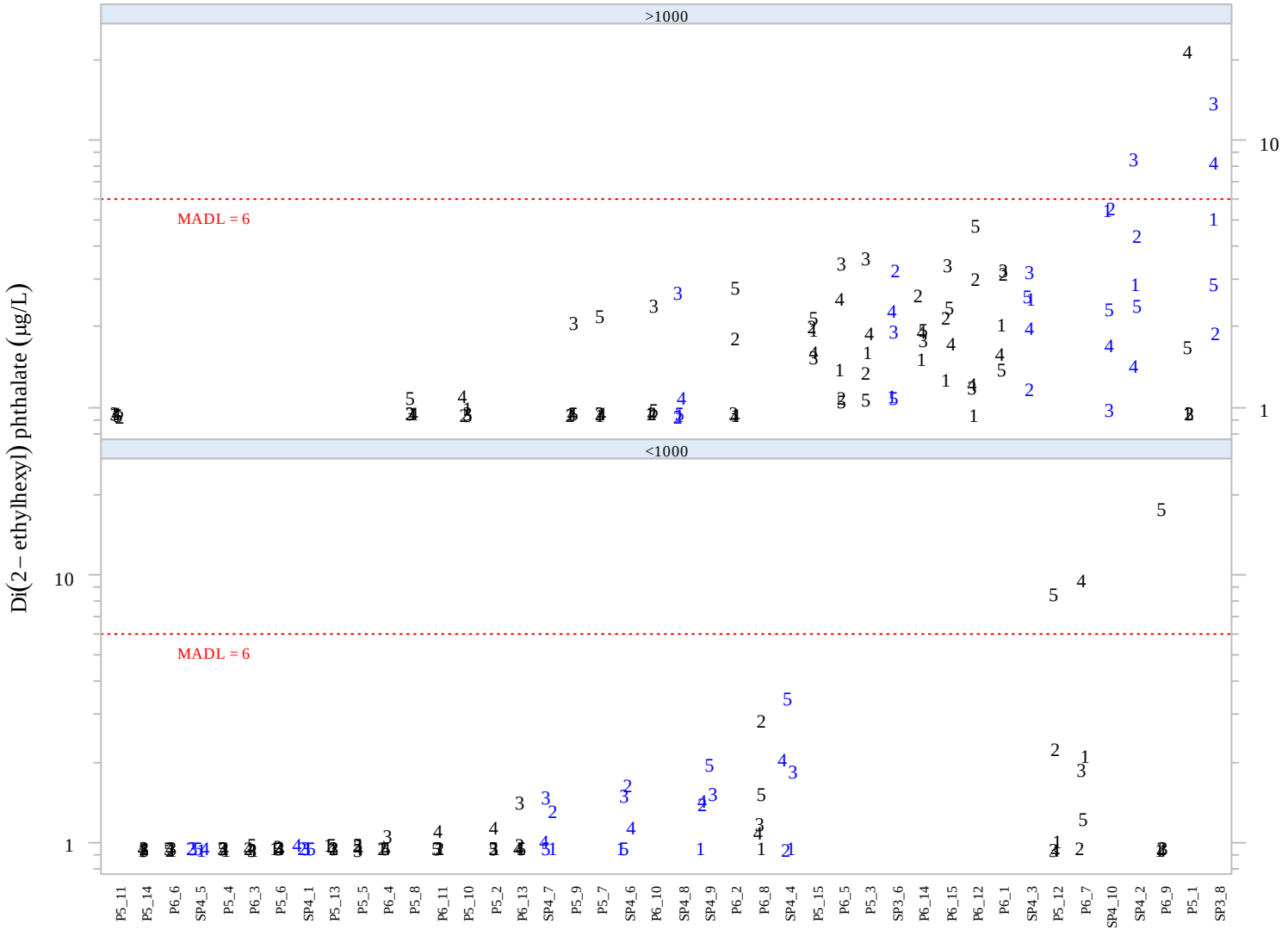
Figure 4-5: Year 5 Benzo(a)pyrene Concentrations by Sampling Event and Traffic Category



Notes:

(1, 2, 3, 4, 5) indicates Year 5 sampling event number.
<1000, >1000 indicates traffic category by estimated trips per day (TPD).
Concentrations are plotted on a logarithmic scale.
Data shown in blue are supplemental UIC monitoring locations.

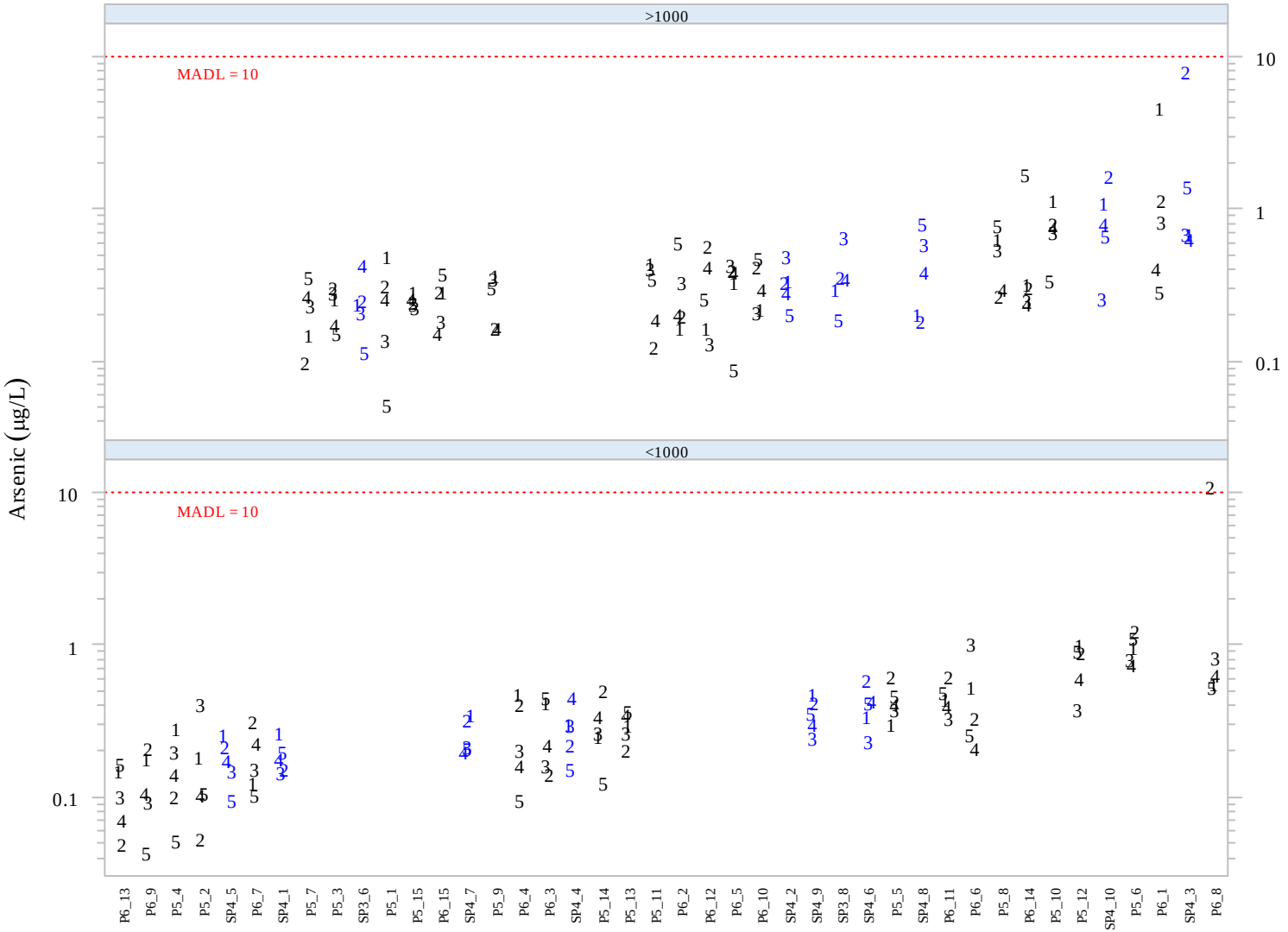
Figure 4-6: Year 5 Di(2-ethylhexyl)phthalate Concentrations by Sampling Event and Traffic Category



Notes:

(1, 2, 3, 4, 5) indicates Year 5 sampling event number.
<1000, >1000 indicates traffic category by estimated trips per day (TPD).
Concentrations are plotted on a logarithmic scale.
Data shown in blue are supplemental UIC monitoring locations.

Figure 4-7: Year 5 Arsenic Concentrations by Sampling Event and Traffic Category



Notes:

(1, 2, 3, 4, 5) indicates Year 5 sampling event number.
<1000, >1000 indicates traffic category by estimated trips per day (TPD).
Concentrations are plotted on a logarithmic scale.
Data shown in blue are supplemental UIC monitoring locations.

Figure 4-8: Year 5 Pollutant Concentrations by Sample Event

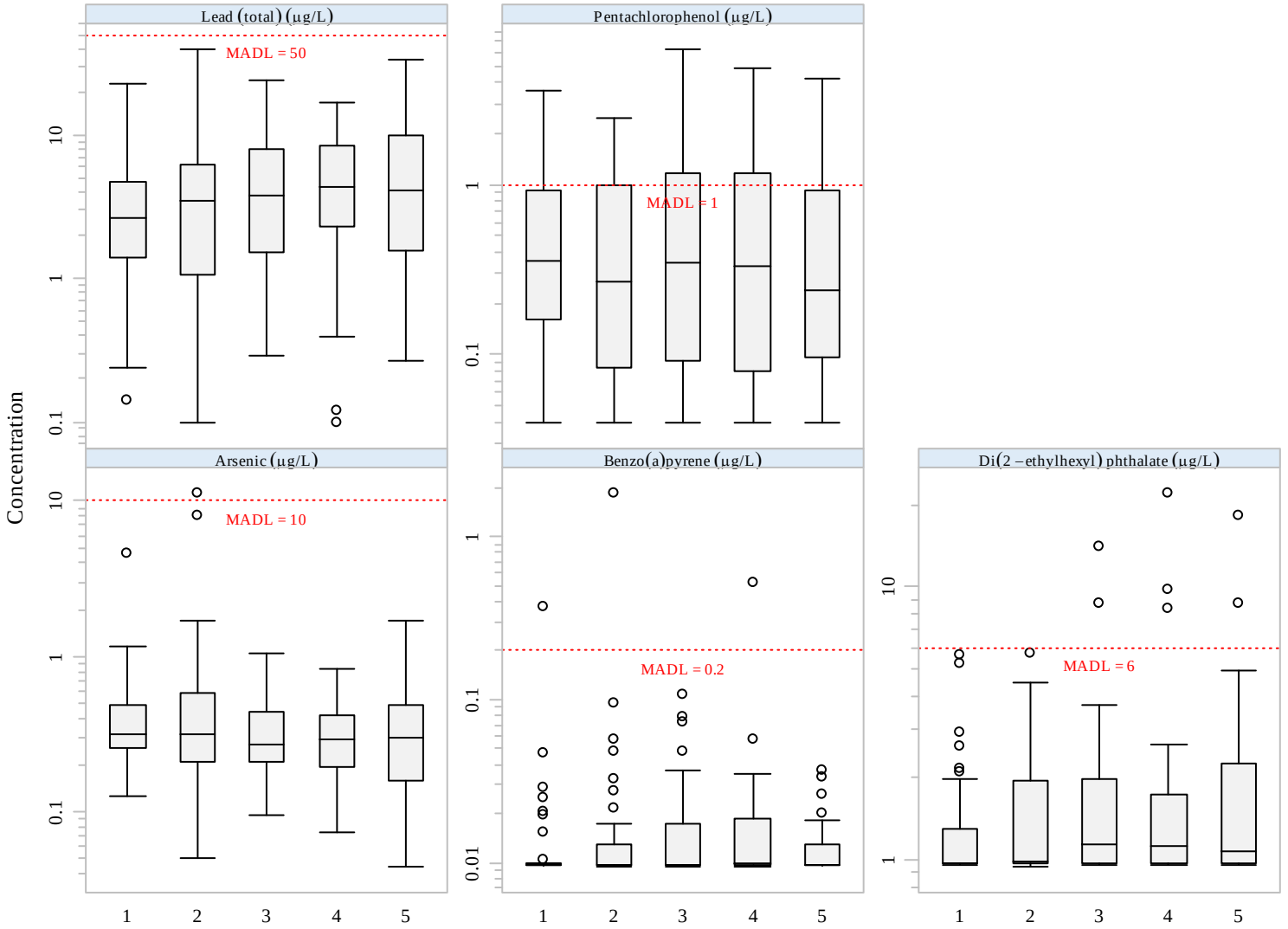
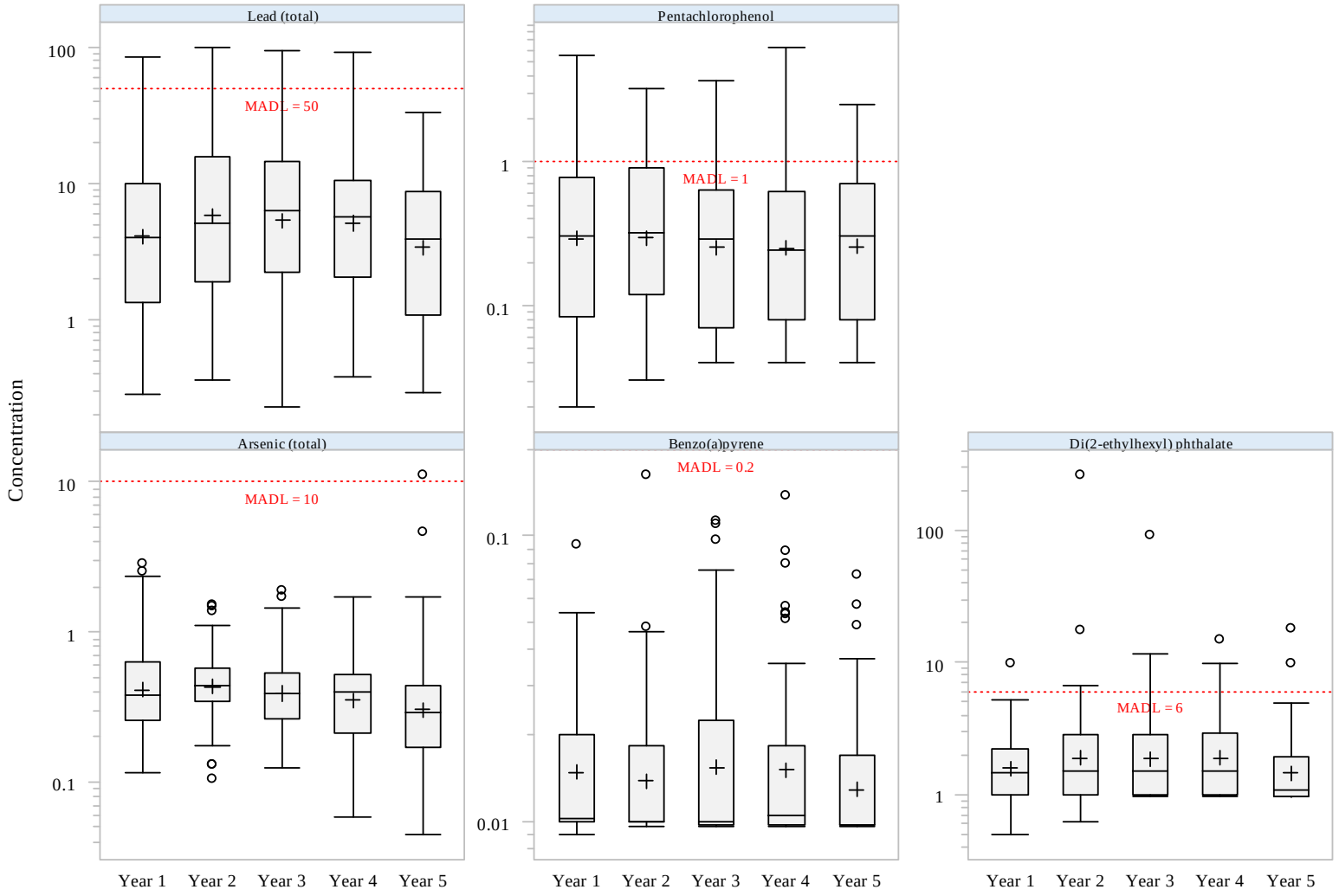
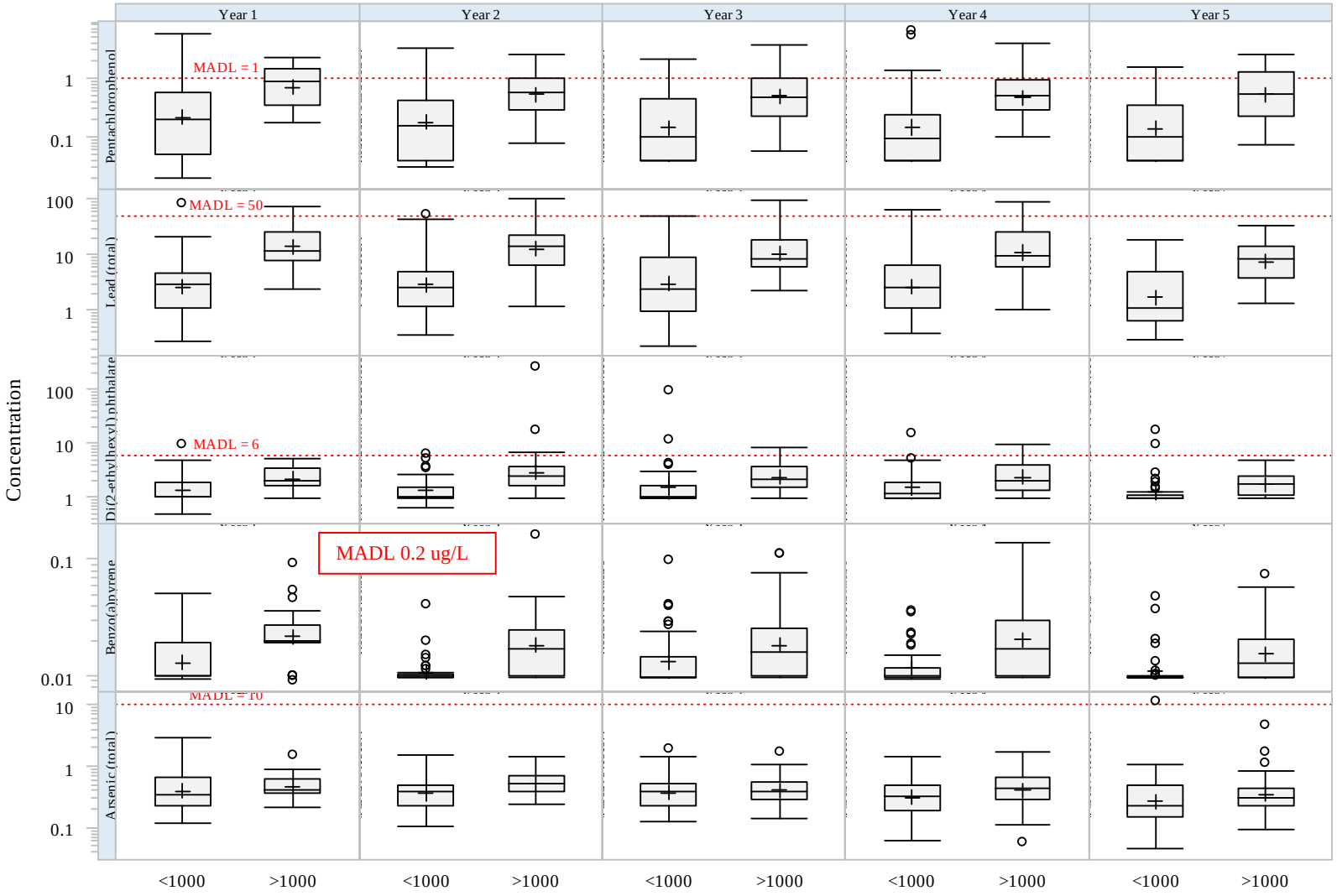


Figure 5-1: Comparison of Pollutant Concentrations for Years 1 – 5: Panel 6



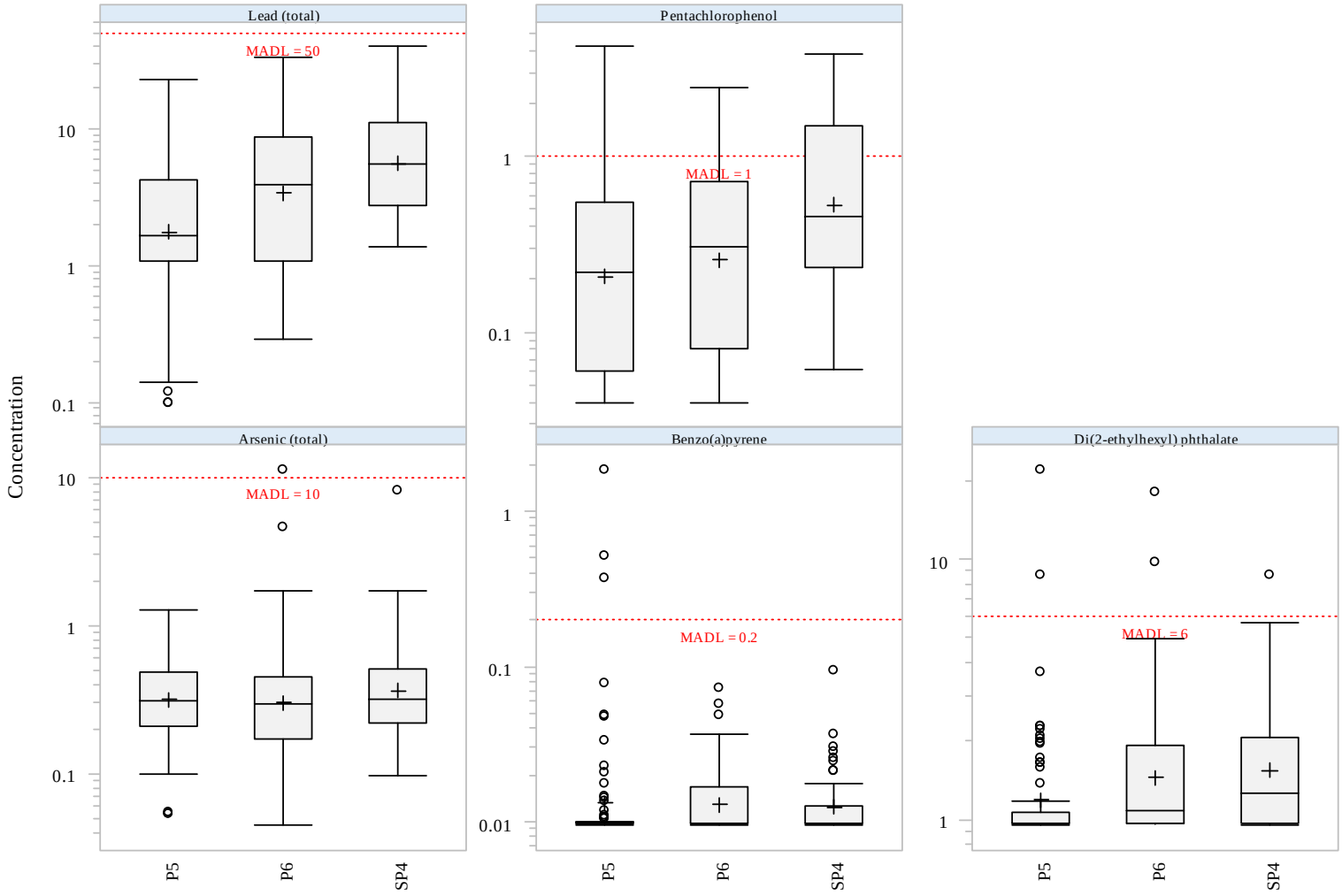
+ Indicates geometric mean

Figure 5-2: Comparison of Pollutant Concentrations by Year and Traffic Category



+ Indicates geometric mean

Figure 5-3: Comparison of Pollutant Concentrations by Sample Panel



+ Indicates geometric mean

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

7. **Monitoring Reporting**. The Permittee must submit to the Department annual monitoring reports in accordance with Schedule C.19. At a minimum, each annual monitoring reports must address the following conditions [2]:	**Report Section**
a. Provide a summary of the monitoring data for the preceding wet season being reported. At a minimum, the summary must include:	
i. Data pertinent to each storm event sampled, including but not limited to:	Section 3 Tables 3-4 through 3-10 Figures 3-1 through 3-5 Appendix B
(1) A description of the date and duration of storm event sampled;	
(2) Precipitation estimates of the storm event;	
(3) Duration and intensity of the storm event; and	
(4) The duration in days between storm events sampled and the previous storm event;	
ii. A summary table for the injection systems being sampled that includes, but not limited to:	
(1) DEQ ID number for the public UIC;	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites
(2) Latitude and longitude of each sample location;	
(3) Street location;	
(4) The traffic volume, traffic pattern and type of land use in accordance with Table 2 for each public UIC injection system sampled;	
(5) Type of pretreatment, if any, for the public UIC sampled;	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites
(6) Depth to groundwater from ground surface based on USGS estimated depths to groundwater. Site specific data shall be used if available;	
(7) Date of the last maintenance and type of maintenance performed;	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites Section 6
(8) Date of last maintenance and inspection;	
(9) The level of the sediment in a sediment manhole, if the injection system has a sediment manhole as part of the pretreatment. If no sediment manhole is present, report the sediment level in the associated catch basins and in the bottom of the public UIC.	Table 2-2 - Year 5 Panel 5 Table 2-3 - Year 5 Panel 6 Table 2-4 Supplemental Panel 4 Table 2-5 Carry Over Sites
(10) The estimated total volume of recharge to the aquifer by public UICs.	Section 3 Table 3-11

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

iii. A map showing the location of the public UIC injection systems sampled in relation to the Permittee's other public UIC systems authorized by this permit and any domestic wells and public water system wells;	Figures 2-1 and 2-2 Appendix A Systemwide Assessment Report (July 2006)
iv. A map of sufficient scale that clearly shows the location of the specific public UIC being sampled;	Appendix A
v. Identification and discussion of any exceedance of an individual storm event MADL and any annual mean MADL concentration, including:	Section 4 Tables 4-7 and 4-9
(1) A discussion of any potential cause of the exceedance, to the extent practicable and if known, and	Appendix B Section 4
(2) Actions taken during the wet season to reduce the concentration of the pollutant of concern;	Section 6
vi. Identification and discussion of any detected PPS pollutant during a PPS screen sampling event, including:	Section 4 Table 4-1
(1) The pollutant concentration:	Tables 4-1 and 4-2 Appendices D, E , and F
(2) The public UIC at which the detection occurred;	
(3) A discussion of the cause of the detection, if known; and	Section 4 Appendix B
(4) actions taken; and	Section 6
vii. A discussion of compliance response actions taken to correct a MADL annual mean exceedance.	Section 6
b. Provide a summary table of all laboratory monitoring data for the reporting period wet season, including:	Appendices D, E, and F
i. Ancillary pollutants derived from the approved analytical method;	Tables 3-2 and 3-3 Section 4 Table 4-3 Appendices D, E, and F
ii. MRLs; and	
iii. Analytical method used.	
c. Discuss any unusual conditions that occurred during a monitoring event that may impact the monitoring results.	Appendix B Sections 4 and 7

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

d. Include an analysis of the trends in the cumulative monitoring data, including water quality improvements or degradations for each annual report after the first year of reporting.	Section 5 Figures 5-1 and 5-2
e. Explain any outliers in the data used to determine the annual mean MADL concentration. If the outlier data was not used in the mean annual MADL concentration, provide an explanation of why the data was omitted from the determination.	Section 4
f. Include a statement that sampling and measurements taken as required herein are representative of the traffic volume and traffic patterns of the monitored discharge weighted or stratified in accordance with the Department-approved SDMP.	Sections 2 and 7
g. Discuss any annual mean MADL exceedance in accordance with Schedule C.10.	Section 4
h. Discuss, in accordance with Schedule C.8, any PPS pollutant detection during a PPS sampling event. This condition applies to the 1st, 4th and 9th year PPS sampling events, or whenever the Permittee samples for the presence of PPS pollutants.	Section 4 Tables 4-1, 4-2 and 4-3
i. In the event conditions occur beyond the reasonable control of the Permittee as identified in Schedule B.3, the Permittee must explain the circumstances in the annual monitoring report. The explanation must include why the sampling event or sample analysis was missed and (if applicable) any corrective actions to prevent the occurrence from happening again.	Section 7
j. For Category 4 public UICs, as defined in Schedule D.11, the Permittee must report in the annual monitoring report the following:	Sections 4 and 6 Category 4 UICs are defined as public UICs that become non-compliant by failing to meet the annual mean MADL within one wet season after the exceedance, or fails to satisfy any groundwater protection conditions of Schedule A of the permit.
i. Provide a list of the Category 4 public UICs;	
ii. A brief description of the public UICs;	
iii. The location of the public UIC at which the non-compliant condition occurred, including traffic volume and the nature of land uses that may drain to the public UIC;	
iv. The nature and concentration of the pollutant that exceeded the annual mean MADL concentration;	
v. The vertical separation distance to groundwater;	
vi. The proposed corrective action, which may include a risk assessment that meets Department risk assessment protocols;	
vii. Discuss the corrective action(s) completed;	
viii. Discuss on-going corrective action(s), or corrective actions to be implemented, including but not limited to:	
(1) The type of corrective action;	
(2) Implementation date;	
(3) Completion date; and	
(4) Other pertinent information regarding the public UIC or its corrective action obtained during the reporting period.	

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

k. In the event the Permittee undertakes groundwater monitoring, the Permittee must provide the following:	Not applicable for Year 5. Groundwater monitoring was not performed in Year 5.
i. Monitoring well locations with street location and latitude and longitude in decimal degrees;	
ii. Water level measurements and gradient;	
iii. As-built monitoring well construction details for any monitoring well installed during the reporting period;	
iv. The pollutant(s) being monitored;	
v. All groundwater monitoring data and other data pertinent to groundwater monitoring;	
vi. Any other pertinent data to groundwater monitoring obtained during the reporting period;	
vii. A discussion of the following:	
(1) Monitoring data;	
(2) Pollutant concentrations, including concentrations at background and compliance monitoring wells;	
(3) Compliance with Table 1 for groundwater;	
(4) Actions taken or to be taken by the Permittee with respect to groundwater monitoring;	
(5) An analyses of the data; and	
(6) Conclusions with respect to potential or demonstrated groundwater contamination from public UICs; and	
viii. If applicable, a discussion of any Department-approved groundwater corrective actions, including, but not limited to:	Not applicable for Year 5. Need for groundwater Corrective Action was not identified in Year 5.
(1) Nature of the action(s);	
(2) Status of the action(s);	
(3) All laboratory results related to the action;	
(4) Analyses of the data with respect to achieving the corrective action goal; and	
(5) Milestones reached.	
8. **Permittee Monitoring Responsibility**. The Permittee is responsible to protect groundwater quality while operating its public UICs. At a minimum, the Permittee must:	
a. Ensure data and information acquired through implementation of the SDMP is representative of the Permittee's entire public UIC system;	SDMP (August 2006) Section 2
b. Ensure the results of the system-wide assessment, required under Schedule D.8, are incorporated into the SDMP as appropriate;	SDMP (August 2006)
c. Notify the Department in the annual monitoring report of significant land use changes which change traffic volume or patterns which may affect public UICs in the SDMP. Significant land use changes include, but are not limited to:	Section 4
i. Zoning changes that result in an increase of 1,000 trips per day or more;	None
ii. A change in type of traffic, i.e. increase in truck traffic; or	None

Table 1-1: WPCF Permit Annual Monitoring Report Requirements[1]

iii. A change that may cause or causes an adverse impact to a BMP such that the BMP no longer performs as intended to meet the conditions of this permit;	None
d. Notify the Department when information or data indicates additional pollutants should be added to Table 1;	SDMP (August 2006)
e. Implement modifications to the permit, including the addition of pollutants that the Department deems necessary to incorporate into the SDMP or other actions under this permit as directed by the Department; and	SDMP (August 2006)
f. Ensure other verifiable data or information, which may indicate a potential that groundwater may be endangered by stormwater injection, is reported in a timely manner to the Department.	SDMP (August 2006)

Notes:

[1] The report section provides a reference to the sections, tables, or figures in the annual SDM report that best address given requirements.

[2] Conditions taken verbatim from Section B(7) of DEQ issued "Water Pollution Control Facilities Permit for Class V Stormwater Underground Injection Control Systems." [DEQ Permit (No. 102830), issued June 1, 2005].

Table 2-1: Vehicle Trips per Day and Predominant Land Use

Vehicle Trips per Day (TPD)	Predominant Land Use
< 1,000	Residential Streets; Small Parking Lot
≥ 1,000	Residential Feeder Streets; Commercially Zoned Areas; Transportation Corridors; Industrial Areas

Table 2-2: UIC Summary Information - Rotating Panel, Year 5, Panel 5

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b]	DEQ UIC ID	BES UIC ID [c]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System	Separation Distance [d]	Distance to Nearest Well (ft) [e]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed [f]	Sediment Level (ft) [g]
P5_1	6725 SE Kelly St	387	≥ 1000	SFR	10102-6926	ADU122	45.49959	-122.59445	30	Sediment Manhole	98	5,346	No	Jun-08	Cleaned UIC & Sed MH	1.2
P5_2	3304 NE 138th Ave	735	< 1000	SFR	10102-4371	AAZ898	45.54669	-122.51908	31	No Pretreatment	51	2,058	No	Sep-09	Cleaned UIC & Sed MH	4
P5_3	3700 SE 122nd Ave	21,959	≥ 1000	MFR	10102-6152	ADT418	45.49550	-122.53795	30	Sediment Manhole	26	1,330	No	Aug-05	Cleaned UIC & Sed MH	1
P5_4	900 NE 77th Ave	290	< 1000	SFR	10102-8490	ADR579	45.52919	-122.58377	20	Sediment Manhole	152	3,698	No	Apr-08	Cleaned UIC & Sed MH	1
P5_5	10331 SE Clinton St.	208	< 1000	SFR	10102-7062	ADW558	45.50264	-122.55650	21	No Pretreatment	84	959	No	Nov-06	Cleaned UIC & Sed MH	6
P5_6	3327 NE 142nd Ave	922	< 1000	SFR	10102-4369	ADW184	45.54721	-122.51663	20.5	No Pretreatment	51	1,722	No	Oct-06	Cleaned UIC & Sed MH	4
P5_7	1944 SE 130th Ave	2,736	≥ 1000	SFR	10102-7194	ADS324	45.50876	-122.52992	30	Sediment Manhole	61	797	No	Dec-09	Cleaned UIC & Sed MH	2.5
P5_8	1304 N Liberty St	1,015	≥ 1000	MFR	10102-4757	ADP286	45.57085	-122.67998	31.5	Sediment Manhole	89	5,270	No	Aug-08	Cleaned UIC & Sed MH	4.5
P5_9	1154 NE Dean St	4,616	≥ 1000	SFR	10102-2732	ADP372	45.57158	-122.65265	30	Sediment Manhole	78	3,104	No	Aug-08	Cleaned UIC & Sed MH	3
P5_10	6202 SE 60th Ave	1,882	≥ 1000	SFR	10102-5681	ACN791	45.47812	-122.60224	30	Sediment Manhole	97	1,099	No	Jan-10	Machine Cln Inlt/Lead [h]	2
P5_11	8568 N Oswego Ave	2,415	≥ 1000	SFR	10102-1674	ADN270	45.59188	-122.74808	30.1	Sediment Manhole	52	3,753	No	Apr-08	Cleaned UIC & Sed MH	2.6
P5_12	1534 NE 141st Ave	732	< 1000	SFR	10102-9003	ADR346	45.53428	-122.51806	30	Sediment Manhole	113	198	No	Jun-09	Cleaned UIC & Sed MH	3.5
P5_13	620 SE 136th Ave	850	< 1000	SFR	10102-7724	ADT108	45.51799	-122.52382	29	Sediment Manhole	81	1,606	No	Jan-10	Machine Cln Inlt/Lead	0.5
P5_14	12610 NE Davis St	54	< 1000	SFR	10102-7964	ADS026	45.52406	-122.53340	19	Sediment Manhole	100	1,776	No	Jul-09	Cleaned UIC & Sed MH	1.4
P5_15	5190 N Vancouver Ave	5,761	≥ 1000	MFR	10102-3269	ADP960	45.56036	-122.66837	25	Sediment Manhole	129	7,381	No	May-09	Cleaned UIC & Sed MH	4.3

Notes:

a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

b COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

c BES UIC ID number is obtained from the BES Hansen database.

d The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as "Depth to groundwater" (UIC Database Report) for inclusion in DEQ's UIC database. Reported to nearest foot. Separation distances are based on December 2008 USGS depth to groundwater data (Snyder, D.T., 2008, Estimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey Scientific Investigations Report 2008-5095, 40p. (Available at http://pubs.usgs.cov/sir/2008/5059).

e Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

f Sed MH = Sedimentation manhole.

g Sediment level represents "feet of sediment removed" from UIC as measured prior to cleaning.

h Catchbasins and the pipes between the catchbasins and the sediment manhole were machine cleaned with a vaccuum truck.

Table 2-3: UIC Summary Information - Stationary Panel, Year 5, Panel 6

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b]	DEQ UIC ID	BES UIC ID [c]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System [d]	Separation Distance [e]	Distance to Nearest Well (ft) [f]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed[d]	Sediment Level (ft) [g]
P6_01	3500 SE 112TH AVE	25,838	≥1000	COM	10102-6707	ADW577	45.49676	-122.54801	22.5	Sediment Manhole	58	1,443	No	Apr-08	Cleaned UIC & Sed MH	5
P6_02	3740 SE 104TH AVE	2,354	≥1000	POS	10102-662	ADT394	45.49511	-122.55601	30	Sediment Manhole	61	2,048	No	Dec-08	Cleaned UIC & Sed MH	4
P6_03	4541 NE 80TH AVE	130[h]	<1000	SFR	10102-3192	ADQ337	45.55605	-122.58071	30	Sediment Manhole	80	3,436	No	Apr-07	Cleaned UIC & Sed MH	18
P6_04	9090 SE CLAYBOURNE ST	393	<1000	SFR	10102-5070	ADT961	45.47471	-122.56991	30	Sediment Manhole	12	4,292	No	Sep-00	Cleaned UIC & Sed MH	1
P6_05	2513 SE 153RD AVE	36,904	≥1000	MFR	10102-6590	ADS740	45.50410	-122.50598	30.1	Sediment Manhole	27	688	No	Jun-09	Cleaned UIC & Sed MH	5
P6_06	5201 N EMERSON DR	<100 [h]	<1000	SFR	10102-3311	ANS742[i]	45.56055	-122.69662	30	Sediment Manhole	23	8,787	No	Jan-06	Cleaned UIC & Sed MH	6
P6_07	640 NE 87TH AVE	729	<1000	MFR	10102-236	AMU771[j]	45.52784	-122.57361	30	Sediment Manhole	143	5,317	No	Mar-08	New Construction Completed	12
P6_08	10064 SE WOODSTOCK BLVD	795	<1000	IND	10102-5448	ADV169	45.47613	-122.56014	25.8	Sediment Manhole	5	2,710	No	Feb-10	Cleaned UIC & Sed MH	2.5
P6_09	3617 SE 168TH AVE	557	<1000	SFR	10102-6117	ADT531	45.49604	-122.48968	30	Sediment Manhole	31	1,093	No	Nov-08	Cleaned UIC & Sed MH	3
P6_10	5502 NE 13TH AVE	12,028	≥1000	MFR	10102-3074	ADP732	45.56285	-122.65206	31.3	Sediment Manhole	140	6,206	No	Jun-10	Cleaned UIC & Sed MH	5.75
P6_11	1406 NE SKIDMORE ST	648	<1000	SFR	10102-3605	AAU014	45.55440	-122.65157	30	Sediment Manhole	157	7,353	No	Nov-09	Cleaned UIC & Sed MH	11
P6_12	550 SE 130TH AVE	3,536	≥1000	SFR	10102-7667	ADT061	45.51824	-122.52998	28.7	Sediment Manhole	82	716	No	Mar-10	Cleaned UIC & Sed MH	6
P6_13	14350 NE KNOTT ST	291	<1000	SFR	10102-4296	ADW213	45.54245	-122.51430	19.6	No Pretreatment	97	1,259	No	Mar-00	Cleaned UIC	1
P6_14	4289 NE PRESCOTT ST	8,100	≥1000	COM	10102-3510	ADQ252	45.55559	-122.61931	30.5	Sediment Manhole	156	1,494	No	Sep-07	Cleaned UIC & Sed MH	6
P6_15	13500 NE GLISAN ST	19,380	≥1000	POS	10102-8422	ADR767	45.52646	-122.52461	28.7	Sediment Manhole	104	543	No	May-10	Cleaned UIC & Sed MH	5

Notes:

a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

b COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

c BES UIC number is obtained from the BES Hansen database.

d Sed MH = Sedimentation manhole.

e The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as “Depth to groundwater” (UIC Database Report) for inclusion in DEQ’s UIC database. Reported to nearest foot. Separation distances are based on April 2007 USGS depth to groundwater data (Snyder, in press).

f Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

g Sediment level represents “feet of sediment removed” from UIC as measured prior to cleaning.

h No traffic count available. Value estimated from nearby street(s).

i A sedimentation manhole (ANS741) was added to this sump system in November 2007. A second UIC sump (ANS742) was installed between the new sedimentation manhole and the original sump (ADV395). The new sump was installed to a depth of 30 feet. The new sump (ANS742) is designed to overflow into the original sump (ADV395). The sampling point was moved to the new sump (ANS742) after installation.

j UIC (ADV645) was decommissioned and converted to a sedimentation manhole in the summer of 2007. The sedimentation manhole retained the ADV645 label. A new UIC (AMU771) was installed to a total depth of 30 feet. The depth of the former UIC sump (ADV645) prior to conversion was 21 feet. The sedimentation manhole (ADV645) provides pretreatment to the new UIC (AMU771).

Table 2-4: UIC Summary Information - UICs Near Commercial and Industrial Facilities - Supplemental Panel 4, Year 5

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b, c]	DEQ UIC ID	BES UIC ID [d]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System [e]	Separation Distance [f]	Distance to Nearest Well (ft) [g]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed [e]	Sediment Level (ft) [h]
SP4_01	5420 SE Bush St	661	<1000	COM	10102-6471	ADT178	45.49547	-122.60697	30.2	Sed MH	102	2906	No	06/11/2009	Cleaned UIC & Sed MH	4
SP4_02	8335 SE Division St	23226	≥1000	COM	10102-6803	ADP094	45.50474	-122.57691	27	Sed MH	106	939	No	03/15/2010	Cleaned UIC & Sed MH	5
SP4_03	8029 N Denver Ave	8154	≥1000	COM	10102-2438	ADN871	45.58152	-122.68693	30	Sed MH	44	3594	No	08/30/2009	Cleaned UIC & Sed MH	0
SP4_04	8006 SE Lafayette St	800	<1000	MFR	10102-6229	ADT312	45.49618	-122.58070	28	Sed MH	79	3712	No	06/01/2010	Cleaned UIC & Sed MH	4
SP4_05	7519 SE Steele St	378	<1000	COM	10102-5857	ADU615	45.48443	-122.58530	30	Sed MH	62	4246	No	06/18/2008	Cleaned UIC & Sed MH	1.5
SP4_06	5645 NE 34th Ave	915	<1000	SFR	10102-3216	ADP851	45.56377	-122.62967	30	Sed MH	113	1835	No	03/10/2009	Cleaned UIC & Sed MH	2
SP4_07	4032 SE 60th Ave	622	<1000	SFR	10102-6473	ADT195	45.49324	-122.60174	30.5	Sed MH	96	4473	No	06/11/2009	Cleaned UIC & Sed MH	4.5
SP4_08	5722 N Lombard St	18197	≥1000	COM	10102-2219	ADN663	45.58334	-122.72709	30	Sed MH	71	4098	No	04/30/2004	Cleaned UIC & Sed MH	6
SP4_09	4247 NE Alberta St	841	<1000	SFR	10102-3523	ADQ230	45.55888	-122.61945	30	Sed MH	139	705	No	06/30/2007	Cleaned UIC & Sed MH	4
SP4_10	10475 SE Division St	47006	≥1000	COM	10102-7325	ADW349	45.50432	-122.55474	19.6	No Pretreatment	97	1372	No	03/25/2010	Cleaned UIC & Sed MH	6

Notes:

[a] Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

[b] COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

[c] All UICs are in close proximity to commercial/industrial facilities. Some UICs are located in rights-of-way that are zoned multi-family or single-family; however, the inlets collect stormwater from rights-of-way designated as commercial/industrial. These UICs were identified as part of the system-wide assessment as potentially receiving drainage from commercial/industrial properties and thus chosen for this supplemental panel.

[d] BES UIC ID number is obtained from the BES Hansen database.

[e] Sed MH = Sedimentation manhole.

[f] The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as “Depth to groundwater” (UIC Database Report) for inclusion in DEQ’s UIC database. Reported to nearest foot. Separation distances are based on December 2008 USGS depth to groundwater data (Snyder, D.T., 2008, Esitimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey Scientific Investigations Report 2008-5095, 40p. (Available at http://pubs.usgs.cov/sir/2008/5059)).

[g] Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

[h] Sediment level represents “feet of sediment removed” from UIC as measured prior to cleaning.

Table 2-5: UIC Summary Information - Carry Over Sites from Year 4 to Year 5

Location Code	Approximate Address [a]	Estimated Trips per Day (TPD)	Traffic Category (TPD)	Predominant Land Use [b]	DEQ UIC ID	BES UIC ID [c]	Latitude	Longitude	UIC Depth (feet)	Pretreatment System [d]	Separation Distance [e]	Distance to Nearest Well (ft) [f]	Within Two-year Time of Travel from Public Drinking Water Well?	Date of Last Maintenance	Maintenance Performed[d]	Sediment Level (ft) [g]
SP3_06	490 NE 133RD AVE	19,700	≥1000	SFR	10102-8052	ADS048	45.52618	-122.52604	29.4	Sed MH	97	301	No	5/26/2007	Cleaned UIC & Sed MH	3
SP3_08	12198 SE HOLGATE BLVD	14,463	≥1000	COM	10102-5882	ADW251	45.48959	-122.53791	21	No Sed MH	8	429	No	2/16/2008	Cleaned UIC	3

Notes:

a Addresses should not be considered precise location information and are subject to change as City staff better describe the physical UIC locations relative to nearby properties. UIC Street addresses are assigned relative to nearby properties for general locating purposes. Latitude and longitude should be relied upon for accurate locating of UICs.

b COM = commerical; POS = Parks and Open Space; SFR = Single Family Residential; MFR = Multifamily Residential; IND = Industrial.

c BES UIC number is obtained from the BES Hansen database.

d Sed MH = Sedimentation manhole.

e The estimated separation distance is defined as the approximate depth in feet from the bottom-most perforation in the UIC to the approximate seasonal-high groundwater level. The bottom-most perforation is defined as the bottom of the UIC – 2 feet. Two feet were added to all separation distance calculations to account for the standard depth of the sediment trap ring on standard City UIC design. This information is reported to DEQ by the City as "Depth to groundwater" (UIC Database Report) for inclusion in DEQ's UIC database. Reported to nearest foot. Separation distances are based on April 2007 USGS depth to groundwater data (Snyder, in press).

f Horizontal distance to nearest groundwater drinking water well (e.g., muncipal, domestic, irrigation).

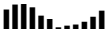
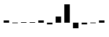
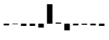
g Sediment level represents "feet of sediment removed" from UIC as measured prior to cleaning.

Table 3-1: UIC Stormwater Analytes

Common Pollutants	**Benzene**[1] **Toluene** **Ethylbenzene** **Xylenes**[3]	**Pentachlorophenol** **Di(2-ethylhexyl)phthalate**[2] **Benzo(a)pyrene**	**Arsenic (Total)** **Cadmium (Total)** **Chromium (Total)** **Copper (Total)** **Lead (Total)** **Zinc (Total)** **Nitrate-nitrogen**
Priority Pollutant Screen	Antimony (Total) Barium (Total) Beryllium (Total) Cyanide (Total) Mercury (inorganic) Selenium Thallium	Alachlor Atrazine Carbofuran **Carbon Tetrachloride** Chlordane **Chlorobenzene** **2,4-D** Dalapon **o-Dichlorobenzene**[4] **p-Dichlorobenzene**[5] **1,3-Dichlorobenzene**	Bis(2-chloroisopropyl)ether Bis(2-chloroethyl)ether **Dinoseb** Diqat Endothall Glyphosate Lindane **Picloram** **1,2,4-Trichlorobenzene**

Notes:
[1] Bold text indicates that the analyte was analyzed during Year 5.
[2] Di(2-ethylhexyl)phthalate is also known as bis(2-ethylhexyl)phthalate or DEHP.
[3] Xylenes is equal to o-xylene + m,p-xylene.
[4] o-Dichlorobenzene is also known as 1,2-dichlorobenzene.
[5] p-Dichlorobenzene is also known as 1,4-dichlorobenzene.

Table 3-10: Climate Data Summary for Years 1-5 and Long-term Average

		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Year	
Temperature[3]	Long Term Average[1]	63.3	68.1	68.5	63.2	54.5	46.1	40.2	39.6	43.4	47.3	50.9	57.1	53.5	
	Year 1	62.0	70.3	70.7	62.5	56.3	44.0	39.8	45.5	42.0	46.1	53.1	59.8	54.3	
	Year 2	66.4	71.0	69.2	65.2	54.0	47.4	40.0	38.1	44.2	50.1	51.7	58.6	54.7	
	Year 3	62.8	70.7	68.3	62.4	53.1	44.8	40.9	38.8	44.9	45.4	48.5	58.9	53.3	
	Year 4	61.8	68.8	69.6	65.2	53.5	49.2	37.5	40	41.3	45.3	52.3	60.1	53.7	
	Year 5	65.7	73.6	69.9	66.1	54.7	47.7	35.6	45	46.6	48.2	51.0	55	54.9	
Precipitation[3]	Long Term Average[2]	1.59	0.72	0.93	1.65	2.88	5.62	5.71	5.07	4.18	3.71	2.64	2.38	37.08	
	Year 1	2.21	0.41	1.05	1.71	3.40	4.98	7.52	10.92	2.15	2.96	2.46	3.00	42.8	
	Year 2	0.93	0.47	0.10	0.86	1.40	11.92	5.86	2.74	3.47	3.20	2.01	1.45	34.4	
	Year 3	1.08	0.55	0.46	2.04	3.26	4.25	7.57	4.71	2.19	3.71	2.09	2.03	33.9	
	Year 4	1.00	0.29	1.23	0.48	1.74	4.15	3.52	4.50	1.36	3.36	2.31	3.26	27.2	
	Year 5	1.30	0.34	0.76	1.40	3.02	5.13	3.76	4.94	2.76	3.58	2.92	4.68	34.6	
Precipitation difference from normal[4]	Year 1	0.62	-0.31	0.12	0.06	0.52	-0.64	1.81	5.85	-2.03	-0.75	-0.18	0.62	5.69	
	Year 2	-0.66	-0.25	-0.83	-0.79	-1.48	6.30	0.15	-2.33	-0.71	-0.51	-0.63	-0.93	-2.67	
	Year 3	-0.51	-0.17	-0.47	0.39	0.38	-1.37	1.86	-0.36	-1.99	0.00	-0.55	-0.35	-3.14	
	Year 4	-0.59	-0.43	0.30	-1.17	-1.14	-1.47	-2.19	-0.57	-2.82	-0.35	-0.33	0.88	-9.88	
	Year 5	-0.29	-0.38	-0.17	-0.25	0.14	-0.49	-1.95	-0.13	-1.42	-0.13	0.28	2.30	-2.49	

Notes:

[1] Mean Monthly temperatures at Portland Airport from www.ocs.oregonstate.edu/index.html

[2] Monthly Totals/Averages. Portland International Airport. Period 1971 - 2000. From NOWData - NOAA Online Weather Data at http://nowdata.rcc-acis.org/PQR/pubACIS_results.

[3] Preliminary Local Climatological Data - Portland Oregon. From http://www.weather.gov/climate/index.php?wfo=pqr

[4] A positive values indicates that the measured precipitation total for that month exceeds the monthly mean. Shaded area indicates permit "wet season".

Table 3-11: UIC Stormwater Discharge Volume[a]

Ownership	Total of UICs [b]	Sum of Total UIC Catchment Area [c] (ft^2)	Sum of Total Impervious Area Drainage[c] (ft^2)	Sum of Total UIC Catchment Area[c] (acre)	Sum of Total Impervious Area Drainage[c] (acre)	Adjusted Sum of Total UIC Catchment Area[f] (ft^2)	Adjusted Sum of Impervious Area Drainage[f] (ft^2)	Adjusted Sum of Total UIC Catchment Area[f] (acre)	Adjusted Sum of Impervious Area Drainage[f] (acre)	Year 2 Annual Infiltration Volume[g,h,i,j] (ft^3)	Year 3 Annual Infiltration Volume[g,h,i] (ft^3)	Year 4 Annual Infiltration Volume[g,h,i] (ft^3)	Year 5 Annual Infiltration Volume[g,h,i] (ft^3)
BES	9,130	698,860,000	260,040,000	16,000	6,000	594,630,000	223,090,000	13,700	5,121	473,385,826	466,919,934	374,196,293	552,370,821
Water	6	- [d]	37,150	- [d]	0.9	- [d]	37,150	- [d]	0.9				
UC [k]	54	- [d]	333,000	- [d]	0.8	- [d]	994,000	- [d]	23				
Others [l]	269	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]	- [d]
Sum	9,459	698,860,000	260,410,150	16,000	6,002	594,630,000	224,121,150	13,700	5,145	475,573,874	469,078,096	375,925,876	554,923,949
Average per UIC[e]	-	89,000	33,000	2.0	0.8	-	-	-	-	NA	NA	NA	NA
Adjusted Average per UIC[f]	-	-	-	-	-	76,000	28,000	1.70	0.7	59,415	58,603	46,965	69,328

Notes:

[a] The volume of stormwater infiltrated estimated to discharge into the City's UIC is based on unverified subcatchment delineations. These delineations are likely to change due to refined mapping or modeling, or due to changes in the field. This table looks back at what the infiltration would have been for each year given the current conditions (e.g., total UICs, total UIC catchment, and total impervious Area).

[b] Approximately 526 BES UICs are identified in the UIC database to have a service status of "ABAN" (Abandoned); these were not included in the catchment/impervious area calculation or discharge volume estimation.

[c] Non-BES UICs with "Unknown" or "N/A" impervious/catchment drainage areas were not calculated. In addition, 789 BES UICs were not included in calculation because they were identified as being inside a catchment area with at least one other UIC.

[d] Denotes no UIC Catchment Area/Impervious Area Drainage reported for this classification of UIC.

[e] Average values for UICs with reported catchment areas > 0.

[f] Adjusted average values calculated by inserting "average[e]" catchment areas for those reported as 0. In addtion, several UIC catchment areas and impervious area outlier values appeared anomalous (> +2 standard deviations). These values were also changed to average values: 89,111 and 35,277 square feet, respectively.

[g] Infiltration volume = Annual Precipitation (inches) * 1ft/12in *Imprevious Area (ft^2)*(1-Evaporative Loss Factor).

[h] Based on estimated Permit Year precipitation totals. Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

[i] Infiltration volume calculation assumes that 26 percent of precipitation falling on impervious surfaces is lost to evaporation and 74 percent drains to the UIC (Snyder, D.T. and Others, 1994).

[j] Year 1 Annual Infiltration Volume is available in *Annual Stormwater Discharge Monitoring Reports - Years 1, 2, 3, and 4* .

[k] UC - UICs that are under construction with an estimated drainage area.

[l] Others - Bureau's Ownership other than BES: Bureau of General Services, Portland Fire Bureau, Portland Parks, Water Bureau.

Table 3-2: Stormwater Quality Analytes – Common Pollutant Analyses

Analyte	Analytical Laboratory	Method	Method Detection Limit	Method Reporting Limit	MADL
Benzene	WPCL[1]	EPA 8260B	0.02 µg/L	0.2 µg/L	5.0 µg/L
Toluene	WPCL	EPA 8260B	0.2 µg/L [2]	0.5 µg/L [2]	1,000 µg/L
Ethylbenzene	WPCL	EPA 8260B	0.5 µg/L	0.5 µg/L	700 µg/L
Xylenes	WPCL	EPA 8260B	1.0 µg/L	1.0 µg/L	10,000 µg/L
Pentachlorophenol	TA[3]	EPA 515.3[4]	0.004 µg/L	0.04 µg/L	1.0 µg/L
Di(2-ethylhexyl) phthalate	TA	EPA 8270-SIM[5]	0.3 µg/L	0.5 µg/L	6.0 µg/L
Benzo(a)pyrene	TA	EPA 8270-SIM[5]	0.01 µg/L	0.01 µg/L	0.2 µg/L
Total Arsenic	WPCL	EPA 200.8[6]	0.00134 µg/L	0.045 µg/L	10.0 µg/L
Total Cadmium	WPCL	EPA 200.8[6]	0.00078 µg/L	0.1 µg/L	5.0 µg/L
Total Chromium	WPCL	EPA 200.8[6]	0.00963 µg/L	0.4 µg/L	100 µg/L
Total Copper	WPCL	EPA 200.8[6]	0.00179 µg/L	0.2 µg/L	1300 µg/L
Total Lead	WPCL	EPA 200.8[6]	0.00045 µg/L	0.1 µg/L	50.0 µg/L
Total Zinc	WPCL	EPA 200.8[6]	0.00424 µg/L	0.5 µg/L	5000 µg/L
Nitrate-Nitrogen	WPCL	EPA 300.0[7]	0.0041 mg/L	0.1 mg/L	10 mg/L

Notes:

[1] WPCL indicates BES Water Pollution Control Laboratory.

[2] Values are corrected from QAPP Table 5-1.

[3] TA indicates Test America. (North Creek Analytical, identified in the SDMP, was acquired by Test America in early 2006).

[4] Preparation: Adjust pH of a 40 milliliter sample to 12 with sodium hydroxide. Let stand for 1 hour. Acidify the sample with sulfuric acid and extract with MTBE. Derivitize the sample with diazomethane. Remove the diazomethane with nitrogen. Analyze the extract using GC/ECD.

[5] Preparation: Sample is extracted with DCM and taken to final volume. The extract is analyzed using GC/MS.

[6] Preparation: hot block digestion.

[7] Preparation: sample filtered by WPCL using a 0.45 micron filter.

Table 3-3: Stormwater Quality Analytes – Priority Pollutant Screen Analyses

Analyte	Analytical Laboratory	Method	Method Detection Limit	Method Reporting Limit	MADL
Total Antimony	WPCL[1]	EPA 200.8[2]	0.00111 µg/L	0.1 µg/L	6.0 µg/L
Total Barium	WPCL	EPA 200.8[2]	0.00575 µg/L	0.1 µg/L	2000 µg/L
Total Beryllium	WPCL	EPA 200.8[2]	0.00210 µg/L	0.1 µg/L	4.0 µg/L
Total Selenium	WPCL	EPA 200.8[2]	0.0127 µg/L	0.5 µg/L	50.0 µg/L
Total Thallium	WPCL	EPA 200.8[2]	0.00099 µg/L	0.1 µg/L	2.0 µg/L
Total (inorganic) Mercury	WPCL	WPCL SOP M-10.02[3,4]	0.0009 µg/L	0.002 µg/L[4]	2.0 µg/L
Total Cyanide	WPCL	SM 4500-CN-E[4]	0.01 mg/L	0.01 mg/L	0.2 mg/L
Alachlor	TA[5]	EPA 8270C	0.170	1.0 µg/L	2.0 µg/L
Atrazine	TA	EPA 8270C	0.289	1.0 µg/L	3.0 µg/L
Carbofuran	TA	EPA 531.2	0.4 µg/L	1.0 µg/L	40.0 µg/L
Carbon Tetrachloride[6]	TA	EPA 8260B	0.2 µg/L	0.2 µg/L	5.0 µg/L
Chlordane (tech)	TA	EPA 8081	0.5 µg/L	1.0 µg/L	2.0 µg/L
Chlorobenzene[6]	TA	EPA 8260B	0.2 µg/L	0.2 µg/L	100 µg/L
2,4-D[6]	TA	EPA 515.3	0.05 µg/L	0.1 µg/L	70.0 µg/L
Dalapon	TA	EPA 552.2	0.1 µg/L	1.0 µg/L	200 µg/L
o-Dichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	600 µg/L
p-Dichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	75.0 µg/L
1,3-Dichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	5.5 µg/L
Bis(2-chloroisopropyl) ether	TA	EPA 8270C	0.0846 µg/L	0.25 µg/L	0.80 µg/L
Bis(2-chloroethyl) ether	TA	EPA 8270C	0.117 µg/L	0.25 µg/L	0.30 µg/L
Dinoseb[6]	TA	EPA 515.3	0.03 µg/L	0.1 µg/L	7.0 µg/L
Diquat	TA	EPA 549.2	0.3 µg/L	0.4 µg/L	20.0 µg/L
Endothall	TA	EPA 548.1	2.6 µg/L	10.0 µg/L	100 µg/L
Glyphosate	TA	EPA 547	4.3 µg/L	10.0 µg/L	700 µg/L
Lindane	TA	EPA 8081	0.05 µg/L	0.1 µg/L	0.2 µg/L
Picloram[6]	TA	EPA 515.3	0.04 µg/L	0.4 µg/L	500 µg/L
1,2,4-Trichlorobenzene[6]	TA	EPA 8260B	0.5 µg/L	1.0 µg/L	70.0 µg/L

Notes:

[1] WPCL indicates BES Water Pollution Control Laboratory.

[2] Preparation: hot block digestion.

[3] Preparation: WPCL SOP M-05.01; Analysis performed under alternative test procedure as described in PY 5 Data Usability Report in Appendix B.

[4] Method and/or limit changed from QAPP, see Year 4 Data Usability Report.

[5] TA indicates Test America. (North Creek Analytical, identified in the SDMP, was acquired by Test America in early 2006).

[6] Indicates PPS pollutants analyzed during Year 5 as part of routine common pollutant testing and reporting.

Table 3-4: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 1

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
10/10/2009																									0.00
10/11/2009																									0.00
10/12/2009																									0.00
10/13/2009								0.01	0.03										0.01	0.07	0.01				0.14
10/14/2009	0.02	0.04	0.03	0.01	0.05		0.04					0.01	0.01					0.01							0.23
10/15/2009																									0.00
10/16/2009											0.01														0.01
10/17/2009											0.1	0.11	0.05	0.04	0.01	0.06									0.38
10/18/2009																									0.01
10/19/2009						0.03	0.01																		0.04
10/20/2009																									0.00
10/21/2009				0.01	0.01	0.11	0.07	0.01	0.03	0.02															0.27
10/22/2009																									0.00
10/23/2009							0.05	0.1	0.07	0.06	0.09	0.09													0.45
10/24/2009																									0
10/25/2009																									0
10/26/2009									0.24	0.12	0.11	0.04					0.05							0.01	0.59
10/27/2009	0.01					0.01			0.01	0.01															0.05
10/28/2009																							0.02	0.01	0.03
10/29/2009		0.02	0.01	0.02	0.08	0.06	0.06	0.04	0.02	0.02	0.03			0.01	0.01		0.01	0.01		0.01					0.39
10/30/2009			0.01	0.01																				0.02	0.04
10/31/2009	0.05	0.01	0.02	0.02				0.02	0.01					0.02	0.01										0.17
11/1/2009																									0
11/2/2009																									0
11/3/2009																									0
11/4/2009																									0
11/5/2009																			0.02	0.07	0.06	0.09	0.03	0.01	0.29
11/6/2009	0.08	0.08	0.02		0.06	0.04	0.03	0.01															0.02	0.08	0.42
11/7/2009	0.1	0.04	0.01		0.01	0.01	0.01					0.14	0.34	0.19	0.1	0.15	0.03		0.03	0.12	0.01		0.01	0.04	1.34
11/8/2009	0.01		0.03	0.01	0.01	0.04	0.04								0.02	0.01				0.01	0.01				0.21
11/9/2009										0.04	0.03			0.02					0.01	0.11					0.23
11/10/2009																	0.01	0.01	0.03	0.01	0.02	0.04			0.15
11/11/2009	0.03	0.02				0.01	0.02									0.01	0.06								0.15
11/12/2009		0.04	0.08	0.04	0.01	0.02																			0.18
11/13/2009							0.01	0.05	0.08	0.02	0.01	0.01	0.01		0.03										0.22

Notes:

Sample Collection Period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-5: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 2

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
11/9/2009										0.04	0.03			0.02					0.01	0.11					0.23
11/10/2009																	0.01	0.01	0.03	0.01	0.02	0.04			0.15
11/11/2009	0.03	0.02				0.01	0.02									0.01	0.06								0.15
11/12/2009		0.04	0.08	0.04	0.01	0.02																			0.18
11/13/2009							0.01	0.05	0.08	0.02	0.01	0.01	0.01		0.03										0.22
11/14/2009																									0.00
11/15/2009			0.01	0.01	0.01	0.02	0.01					0.01													0.07
11/16/2009							0.02																	0.01	0.04
11/17/2009	0.06	0.09	0.1	0.05	0.06	0.07	0.02	0.01	0.01		0.01		0.01	0.01	0.04										0.55
11/18/2009			0.04																						0.05
11/19/2009	0.02	0.02	0.04	0.03	0.03	0.04																			0.18
11/20/2009				0.01	0.01	0.05	0.04	0.01	0.02	0.03	0.02	0.01	0.01	0.02	0.01				0.07						0.31
11/21/2009									0.01											0.02	0.05	0.1	0.1	0.08	0.37
11/22/2009	0.05	0.03	0.01	0.02	0.03	0.06	0.05	0.06			0.02														0.34
11/23/2009																									0
11/24/2009																									0
11/25/2009																									0
11/26/2009							0.01	0.03	0.02	0.02	0.05	0.07	0.08	0.1	0.09	0.06	0.02	0.04	0.05	0.08	0.09	0.04			0.85
11/27/2009		0.03	0.01	0.02	0.04	0.03	0.01																		0.15
11/28/2009																									0
11/29/2009																									0
11/30/2009																									0
12/1/2009																									0
12/2/2009																									0
12/3/2009																									0
12/4/2009																									0
12/5/2009																									0
12/6/2009																									0
12/7/2009																									0
12/8/2009																									0
12/9/2009																									0
12/10/2009																									0
12/11/2009																									0
12/12/2009													0.01												0.03
12/13/2009																						0.01			0.03
12/14/2009				0.01												0.01	0.05	0.09	0.09	0.04	0.03	0.09	0.12	0.1	0.62
12/15/2009	0.05	0.08	0.08	0.06	0.04	0.02	0.02	0.1	0.12	0.09	0.04	0.05	0.08	0.05	0.06	0.04	0.08	0.06	0.09	0.05	0.05	0.04	0.04	0.04	1.42

Notes:

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-6: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 3

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
12/12/2009													0.01												0.03
12/13/2009																						0.01			0.03
12/14/2009				0.01												0.01	0.05	0.09	0.09	0.04	0.03	0.09	0.12	0.1	0.62
12/15/2009	0.05	0.08	0.08	0.06	0.04	0.02	0.02	0.1	0.12	0.09	0.04	0.05	0.08	0.05	0.06	0.04	0.08	0.06	0.09	0.05	0.05	0.04	0.04	0.04	1.42
12/16/2009								0.01		0.08	0.04	0.1	0.18	0.04	0.01	0.03	0.02		0.01	0.01	0.01	0.03	0.01		0.59
12/17/2009										0.01		0.01				0.01	0.01	0.01							0.07
12/18/2009																									0.01
12/19/2009			0.01	0.02	0.01	0.01	0.01	0.01				0.01			0.01										0.10
12/20/2009				0.01	0.01		0.03	0.02		0.01	0.01	0.01			0.01	0.02	0.04	0.06	0.02	0.02		0.02			0.30
12/21/2009		0.03	0.03		0.01	0.01		0.01	0.04	0.08	0.02	0.01	0.03	0.04	0.01									0.02	0.34
12/22/2009																									0.01
12/23/2009																									0.00
12/24/2009																									0.01
12/25/2009																									0.01
12/26/2009																									0
12/27/2009																									0
12/28/2009																									0
12/29/2009																								0.01	0.03
12/30/2009	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.06	0.09	0.09	0.03	0.01											0.47
12/31/2009							0.04	0.07	0.12	0.1	0.12	0.09	0.05	0.05	0.1	0.08	0.04	0.01	0.01	0.01	0.08	0.03	0.02	0.03	1.06
1/1/2010	0.07	0.05	0.04	0.02		0.1	0.06	0.06	0.02	0.01	0.03	0.01		0.04	0.07	0.04	0.04	0.02	0.01	0.01	0.01		0.01	0.01	0.73
1/2/2010																									0
1/3/2010																									0
1/4/2010				0.01			0.01	0.02	0.05	0.03	0.06	0.05	0.06	0.06	0.03	0.02	0.01		0.02	0.04	0.01	0.01	0.01		0.49
1/5/2010				0.02		0.01			0.02	0.02	0.02					0.03	0.01	0.01	0.01	0.03	0.11	0.09	0.04	0.04	0.45
1/6/2010	0.01	0.02	0.03	0.01																					0.07
1/7/2010																									0
1/8/2010	0.04	0.06	0.04					0.01	0.02	0.02						0.07	0.05	0.1	0.03	0.02	0.07	0.06	0.06	0.04	0.7
1/9/2010	0.03	0.01																							0.04
1/10/2010																									0
1/11/2010							0.01	0.01																0.04	0.05
1/12/2010	0.07	0.09	0.08	0.03	0.02	0.02					0.01	0.06	0.01	0.01	0.01			0.03	0.03						0.47
1/13/2010	0.01	0.02					0.01				0.03	0.01	0.03	0.06	0.01	0.01	0.02								0.2
1/14/2010																									0
1/15/2010											0.01	0.04	0.12	0.08	0.07	0.08	0.06	0.07	0.07	0.08	0.06	0.04	0.02	0.03	0.83
1/16/2010	0.03	0.03	0.04	0.04	0.02	0.01	0.02	0.01			0.01				0.01	0.02	0.01	0.01	0.01			0.02	0.01	0.03	0.32
1/17/2010	0.02	0.02		0.01	0.02	0.03				0.01	0.01	0.02	0.03	0.04	0.01	0.02	0.07	0.04	0.01	0.02					0.38
1/18/2010																									0
1/19/2010															0.03		0.01	0.01							0.06
1/20/2010		0.01																							0.01
1/21/2010																									0
1/22/2010														0.01	0.02	0.03	0.03	0.06	0.05	0.01	0.01				0.22
1/23/2010					0.01																				0.02
1/24/2010									0.03	0.09		0.05	0.02	0.06	0.09	0.14	0.12	0.02	0.02	0.02		0.01		0.05	0.72
1/25/2010	0.05		0.08	0.07			0.01	0.01																	0.23
1/26/2010																	0.01	0.07	0.04	0.03	0.01				0.16
1/27/2010																									0
1/28/2010																									0
1/29/2010																		0.01						0.01	0.02
1/30/2010	0.01	0.01						0.01	0.03	0.02	0.01									0.01		0.01			0.13
1/31/2010	0.01	0.01	0.01																						0.03
2/1/2010						0.03						0.01	0.02			0.01	0.03	0.05	0.05	0.01	0.01				0.24
2/2/2010																						0.01			0.02
2/3/2010						0.04	0.02					0.02	0.04	0.02											0.16
2/4/2010																	0.01	0.07	0.06	0.02			0.01	0.04	0.22

Notes:

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-7: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 4

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1/31/2010	0.01	0.01	0.01																						0.03
2/1/2010						0.03						0.01	0.02			0.01	0.03	0.05	0.05	0.01	0.01				0.24
2/2/2010																						0.01			0.02
2/3/2010						0.04	0.02					0.02	0.04	0.02											0.16
2/4/2010																	0.01	0.07	0.06	0.02			0.01	0.04	0.22
2/5/2010	0.03	0.03	0.03	0.01																					0.10
2/6/2010																			0.01	0.01					0.03
2/7/2010																									0.00
2/8/2010																									0.00
2/9/2010																									0.00
2/10/2010										0.01	0.06	0.05	0.06	0.04	0.02										0.24
2/11/2010			0.01		0.02													0.03	0.06	0.07	0.05	0.02	0.01		0.29
2/12/2010					0.01	0.05			0.02	0.06	0.03					0.02									0.21
2/13/2010						0.01	0.03	0.01																	0.06
2/14/2010	0.06	0.07	0.02	0.04	0.02	0.03	0.06	0.02	0.02	0.01						0.03	0.03								0.43
2/15/2010																				0.03	0.02	0.07	0.05	0.01	0.2
2/16/2010	0.03			0.01	0.01																				0.05
2/17/2010																									0
2/18/2010																									0
2/19/2010																									0
2/20/2010																									0
2/21/2010																									0
2/22/2010																									0
2/23/2010												0.01	0.01	0.03	0.03	0.05	0.05	0.03	0.02	0.01	0.03	0.05	0.02	0.02	0.37
2/24/2010	0.02	0.05	0.01		0.01		0.02								0.05	0.07								0.01	0.24
2/25/2010																							0.05	0.04	0.1
2/26/2010	0.06	0.05	0.02	0.04	0.05		0.03	0.04	0.06	0.1	0.06	0.06	0.02	0.01	0.02	0.01	0.02	0.02							0.69
2/27/2010																									0
2/28/2010																									0
3/1/2010																									0
3/2/2010																0.01	0.01								0.02
3/3/2010																									0
3/4/2010																									0
3/5/2010																									0
3/6/2010																									0
3/7/2010																				0.01	0.01	0.03	0.04		0.09
3/8/2010																									0.01
3/9/2010						0.01												0.01	0.05	0.04	0.04	0.01			0.17
3/10/2010				0.03	0.01	0.01						0.01													0.07
3/11/2010							0.01	0.02	0.01	0.01		0.01	0.01	0.01	0.06	0.06	0.07	0.06	0.08	0.11	0.08	0.05	0.05	0.05	0.74
3/12/2010	0.03	0.05	0.01			0.01	0.04	0.04	0.01	0.03		0.02					0.01			0.03	0.02				0.3
3/13/2010																									0.01
3/14/2010																									0
3/15/2010																									0
3/16/2010														0.01	0.02										0.03
3/17/2010																									0.01
3/18/2010																									0
3/19/2010																									0
3/20/2010																									0
3/21/2010											0.01	0.01											0.02		0.06
3/22/2010			0.02	0.01																					0.04
3/23/2010																									0
3/24/2010																							0.01	0.04	0.05
3/25/2010	0.04	0.09	0.05	0.02	0.02	0.01								0.01	0.02	0.04	0.02			0.02	0.03	0.01		0.01	0.37
3/26/2010				0.05	0.19	0.08	0.02							0.01											0.37
3/27/2010																									0
3/28/2010				0.01	0.08	0.13	0.12	0.03							0.02	0.03			0.01	0.01	0.08	0.12	0.12	0.04	0.8
3/29/2010	0.03	0.02		0.01		0.12	0.08	0.15	0.09	0.04	0.04	0.12	0.03	0.03	0.01	0.08	0.03	0.01	0.02	0.05	0.02	0.12	0.07		1.16

Notes:

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches.

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-8: City of Portland HYDRA Rain Gage[1] Data, Year 5, Event 5

Date	Hours																							Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
3/25/2010	0.04	0.09	0.05	0.02	0.02	0.01								0.01	0.02	0.04	0.02			0.02	0.03	0.01		0.01	0.37
3/26/2010				0.05	0.19	0.08	0.02							0.01											0.37
3/27/2010																									0.00
3/28/2010				0.01	0.08	0.13	0.12	0.03							0.02	0.03			0.01	0.01	0.08	0.12	0.12	0.04	0.80
3/29/2010	0.03	0.02		0.01		0.12	0.08	0.15	0.09	0.04	0.04	0.12	0.03	0.03	0.01	0.08	0.03	0.01	0.02	0.05	0.02	0.12	0.07		1.16
3/30/2010													0.01	0.01		0.03	0.01	0.01			0.01	0.01	0.03		0.15
3/31/2010															0.01	0.02				0.01	0.06	0.01			0.12
4/1/2010																									0.00
4/2/2010					0.03	0.09	0.16	0.08	0.08	0.06	0.05	0.01		0.03	0.01	0.01	0.01	0.02			0.01			0.01	0.68
4/3/2010	0.01				0.02	0.01	0.02	0.01	0.02			0.01	0.01	0.01	0.01		0.01								0.14
4/4/2010																0.04	0.08								0.13
4/5/2010									0.01	0.02	0.03	0.02					0.02		0.01			0.06	0.06		0.24
4/6/2010				0.01	0.04			0.01	0.02			0.01	0.01												0.10
4/7/2010															0.01							0.01		0.05	0.07
4/8/2010	0.05	0.07	0.01				0.01										0.01								0.16
4/9/2010																									0.01
4/10/2010																									0
4/11/2010																								0.01	0.02
4/12/2010	0.01		0.02	0.06	0.12	0.05	0.02	0.03																	0.32
4/13/2010								0.01	0.02	0.01			0.01												0.06
4/14/2010																							0.01	0.03	0.04
4/15/2010	0.05	0.03	0.05	0.01																					0.15
4/16/2010																									0
4/17/2010																0.06									0.06
4/18/2010																									0
4/19/2010																									0
4/20/2010														0.01				0.01						0.02	0.07
4/21/2010	0.01	0.01																							0.02
4/22/2010																									0
4/23/2010																					0.03	0.01			0.04
4/24/2010												0.01	0.01	0.01											0.03
4/25/2010																									0
4/26/2010																0.02	0.05	0.05	0.04	0.04	0.07	0.08	0.04	0.03	0.44
4/27/2010	0.09	0.02					0.02	0.08					0.02	0.02	0.01	0.05	0.01	0.04	0.01	0.01					0.4
4/28/2010															0.01	0.01	0.07	0.12	0.02	0.01	0.03				0.29
4/29/2010												0.01		0.05	0.01	0.02	0.01	0.03							0.12
4/30/2010					0.01																				0.02
5/1/2010																									0
5/2/2010																									0
5/3/2010			0.01	0.07	0.01		0.01	0.01	0.05																0.16
5/4/2010											0.01	0.01	0.01	0.01	0.03	0.04	0.01	0.01	0.02	0.01					0.16
5/5/2010							0.01											0.02							0.05
5/6/2010																									0
5/7/2010																									0
5/8/2010																									0
5/9/2010																					0.01				0.02
5/10/2010	0.02		0.01	0.02	0.03	0.01		0.01	0.01																0.12
5/11/2010																									0
5/12/2010																									0
5/13/2010																									0
5/14/2010																									0
5/15/2010																									0
5/16/2010																									0.01
5/17/2010					0.01	0.03												0.05	0.17	0.01	0.01	0.01	0.01	0.03	0.32
5/18/2010	0.01	0.01	0.01									0.02	0.03	0.05	0.02										0.14
5/19/2010												0.02	0.12	0.12	0.07	0.01									0.33

Sample Collection period

[1] Average of 13 rain gages in N, NE, and SE Portland, reported in inches

Blank cells indicate less than one rain gage bucket tip per hour. One bucket tip = 0.01 inches of rainfall.

Gage data for each hour has been reported to the nearest hundredth of an inch. Daily totals may not reflect the sum of hourly data due to rounding.

Event date ranges overlap due to replacement of P5_5 during Event 2 (five samples were collected at the new P5_5 site starting with Event 2; 2 samples were collected at P5_5 during Event 5).

Table 3-9: UIC Permit Year 5 Stormwater Sampling Rainfall Data

Event	Start date of sampled storm	Daily		Individual sampled storm			
		Predicted rainfall [1] (inches)	Actual daily rainfall total [2] (inches)	Antecedent dry period [3] (hours)	Actual storm rainfall total[2] (inches)	Duration (hours)	Intensity (inches[2] per hour)
1	10/14/2009	0.47 - 0.62 +	0.23	8	0.02	2	0 - 0.01
	10/17/2009	0.97 - 1.34 +	0.38	> 72	0.38	6	0.01 - 0.11
	10/21/2009	0.18 - 0.29 +	0.27	3 (> 72[5])	0.27	7	0.01 - 0.11
	10/23/2009	0.23 - 0.37 +	0.45	2 (48[5])	0.45	6	0.05 - 0.10
	10/26/2009	0.94	0.59	0 (70[5])	0.53	4	0.04 - 0.24
	10/29/2009	0.25 - 0.42 +	0.39	4 (> 57[5])	0.42	20	0 - 0.08
	11/9/2009	0.58 - 0.71 +	0.23	21	0.02	1	0.02
1/2[4]	11/13/2009	0.28 - 0.45 +	0.22	28	0.22	9	0 - 0.08
2	11/17/2009	0.37 - 0.52 +	0.55	2 (> 72[5])	0.56	15	0 - 0.07
	11/20/2009	0.47 - 0.55 +	0.31	4 (> 21[5])	0.24	12	0.01 - 0.05
	12/14-15/2009	0.07 - 0.16 + 0.84 - 1.06 +	0.62	> 72	2.03	33	0.01 - 0.12
3	12/16/2009	0.17 - 0.25 +	0.59	12	0.59	16	0.01 - 0.18
	1/4/2010	0.38 - 0.47 +	0.49	62	0.49	20	0 - 0.06
	1/13/2010	0.37 - 0.51 +	0.2	17	0.16	7	0.01 - 0.06
3/4[4]	2/4/2010	0.26 - 0.37 +	0.22	33	0.32	12	0 - 0.07
4	2/12/2010	0.32 - 0.44 +	0.21	12	0.11	3	0.02 - 0.06
	2/26/2010	0.47 - 0.65 +	0.69	4 (> 32[5])	0.79	3	0.01 - 0.04
	3/11/2010	0.48 - 0.63 +	0.74	34	0.83	21	0 - 0.11
4/5[4]	3/29/2010	0.83 - 1.12 +	1.16	3 (> 8[5])	1.59	33	0 - 0.15
5	4/5/2010	0.09 - 027 +	0.24	17	0.09	4	0.01 - 0.03
	4/26/2010	0.24 - 0.37 +	0.44	> 72	0.55	11	0.02 - 0.09
	5/17/2010	0.09 - 0.17 +	0.32	> 72	0.35	10	0.01 - 0.17
	5/19/2010	0.28 - 0.41 +	0.33	23	0.33	5	0.01 - 0.12

Notes:

[1] Predicted rainfall from Extended Range Forecasting, Inc. daily reports.

[2] Rainfall totals are the average of 13 rain gauges (see Section 3.0, Year 5 Data Usability Report presented in Appendix B).

[3] Antecedent dry period ≤ 0.1" in 6 hours

[4] Next UIC sampling event was started the same day previous sampling event was finished (see Data Usability Report).

[5] Tail end of storm caught, started raining previous evening or early morning.

Table 4-1: Frequency of Detected [1] Common and Priority Pollutant Screen Analytes [2] - Year 5

Analyte	MADL (µg/L)	Event	Exceedances of MADL [2]	Number of Detections [2]	Number of Samples [2]	Frequency of Detection	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Maximum Percent of MADL Detected [Maximum concentration / MADL] (%)
Common Pollutants									
Arsenic (total)	10.0	1	0	42	42	100	0.126	4.65	47%
		2	**1** [3]	42	42	100	0.051	**11.2**	**112%**
		3	0	42	42	100	0.096	1.06	11%
		4	0	42	42	100	0.074	0.831	8%
		5	0	41	42	97.6	< 0.045 [4]	1.71	17%
Cadmium (total)	5.0	1	0	11	42	26.2	< 0.1	0.23	5%
		2	0	12	42	28.6	< 0.1	0.34	7%
		3	0	14	42	33.3	< 0.1	0.44	9%
		4	0	16	42	38.1	< 0.1	0.28	6%
		5	0	15	42	35.7	< 0.1	0.74	15%
Chromium (total)	100.0	1	0	35	42	83.3	< 0.4	6.18	6%
		2	0	31	42	73.8	< 0.4	18	18%
		3	0	34	42	81.0	< 0.4	6.29	6%
		4	0	35	42	83.3	< 0.4	4.87	5%
		5	0	37	42	88.1	0.28	9.06	9%
Copper (total)	1300.0	1	0	42	42	100	1.73	25.5	2%
		2	0	42	42	100	0.9	29.9	2%
		3	0	42	42	100	1.61	37	3%
		4	0	42	42	100	1.1	19.8	2%
		5	0	42	42	100	1.54	58.7	5%
Lead (total)	50.0	1	0	42	42	100	0.14	22.7	45%
		2	0	41	42	97.6	< 0.1	39.8	80%
		3	0	42	42	100	0.29	23.9	48%
		4	0	41	42	97.6	< 0.1	17.1	34%
		5	0	42	42	100	0.27	33.4	67%
Zinc (total)	5000.0	1	0	42	42	100	6.82	141	3%
		2	0	42	42	100	4.5	195	4%
		3	0	42	42	100	5.08	883	18%
		4	0	42	42	100	3.5	143	3%
		5	0	42	42	100	8.39	252	5%

Analyte	MADL (µg/L)	Event	Exceedances of MADL [2]	Number of Detections [2]	Number of Samples [2]	Frequency of Detection	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Maximum Percent of MADL Detected [Maximum concentration / MADL] (%)
Total Nitrogen	10000.0	1	0	25	42	59.5	< 0.1	0.3	0%
		2	0	8	42	19.0	< 0.1	0.29	0%
		3	0	11	42	26.2	< 0.1	0.23	0%
		4	0	9	42	21.4	< 0.1	0.31	0%
		5	0	9	42	21.4	< 0.1	0.61	0%
Pentachlorophenol	1.0	1	**9**	37	42	88.1	< 0.04	**3.56**	**356%**
		2	**9**	36	42	85.7	< 0.04	**2.48**	**248%**
		3	**11**	37	42	88.1	< 0.04	**6.3**	**630%**
		4	**11**	33	42	78.6	< 0.04	**4.82**	**482%**
		5	**9**	32	37	86.5	< 0.04	**4.2**	**420%**
Benzene	5.0	1	0	0	42	0	< 0.2	< 0.2	4%
		2	0	0	42	0	< 0.2	< 0.2	4%
		3	0	1	42	2.4	< 0.2	0.35	7%
		4	0	0	42	0	< 0.2	< 0.2	4%
		5	0	0	42	0	< 0.2	< 0.2	4%
Toluene	1000.0	1	0	20	42	47.6	< 0.5	7.58	1%
		2	0	16	42	38.1	< 0.5	10.9	1%
		3	0	10	42	23.8	< 0.5	3.13	0%
		4	0	12	42	28.6	< 0.5	3.48	0%
		5	0	21	42	50	< 0.5	27	3%
Xylenes	10000.0	1	0	0	42	0	< 1.5	< 1.5	0%
		2	0	1	42	2.4	< 1.5	1.58	0%
		3	0	0	42	0	< 1.5	< 1.5	0%
		4	0	0	42	0	< 1.5	< 1.5	0%
		5	0	0	42	0	< 1.5	< 1.5	0%
Benzo(a)pyrene	0.2	1	**1**	8	42	19.0	< 0.00962	**0.373**	**187%**
		2	**1**	13	42	31.0	< 0.00952	**1.85**	**925%**
		3	0	17	42	40.5	< 0.00952	0.107	54%
		4	**1**	18	42	42.9	< 0.00952	**0.522**	**261%**
		5	0	14	42	33.3	< 0.00962	0.0369	18%

Analyte	MADL (µg/L)	Event	Exceedances of MADL [2]	Number of Detections [2]	Number of Samples [2]	Frequency of Detection	Minimum Concentration (µg/L)	Maximum Concentration (µg/L)	Maximum Percent of MADL Detected [Maximum concentration / MADL] (%)
Di(2-ethylhexyl)-phthalate	6.0	1	0	17	42	40.5	< 0.962	5.61	94%
		2	0	20	42	47.6	< 0.952	5.73	96%
		3	**2**	22	42	52.4	< 0.962	**14.1**	**235%**
		4	**3**	23	42	54.8	< 0.962	**22**	**367%**
		5	**2**	21	42	50	< 0.962	**18.1**	**302%**
Priority Pollutant Screen									
2,4-D	70.0	1	0	27	42	64.3	< 0.1	0.62	1%
		2	0	4	42	9.5	< 0.1	0.674	1%
		3	0	3	42	7.1	< 0.1	< 0.4	1%
		4	0	2	42	4.8	< 0.1	0.406	1%
		5	0	9	37	24.3	< 0.1	2.66	4%

Notes:

[1] This table includes only those common or priority pollutants that were detected in one or more samples.

[2] This table summarizes the results of the original UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

[3] Bold, shaded text indicate pollutant concentration exceeds the MADL.

[4] "<" Indicates the laboratory reporting limit.

Table 4-2 provides summary of non-detect priority pollutant stormwater monitoring data.

Table 4-2: Summary [1] of Non-Detect Priority Pollutant Screen Analyte Data - Year 5

Analyte	MADL (µg/L)	Event	MRL Exceeds MADL	Number of Non-Detections	Number of Samples	Minimum MRL (µg/L)	Maximum MRL (µg/L)
Common Pollutants [2]							
Ethylbenzene	700	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5
Priority Pollutant Screen [2,3]							
Dinoseb	7	1	0	42	42	0.1	0.2
		2	0	42	42	0.1	0.4
		3	0	42	42	0.1	0.4
		4	0	42	42	0.1	0.4
		5	0	37	37	0.1	0.4
Picloram	500	1	0	42	42	0.4	0.8
		2	0	42	42	0.4	1.6
		3	0	42	42	0.4	1.6
		4	0	42	42	0.4	1.6
		5	0	37	37	0.4	1.6
1,2,4-Trichlorobenzene	70	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5
1,3-Dichlorobenzene	5.5	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5
Carbon tetrachloride	5	1	0	42	42	0.2	0.2
		2	0	42	42	0.2	0.2
		3	0	42	42	0.2	0.2
		4	0	42	42	0.2	0.2
		5	0	42	42	0.2	0.2
Chlorobenzene	100	1	0	42	42	0.2	0.2
		2	0	42	42	0.2	0.2
		3	0	42	42	0.2	0.2
		4	0	42	42	0.2	0.2
		5	0	42	42	0.2	0.2
o-Dichlorobenzene [4]	600	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5

Analyte	MADL (µg/L)	Event	MRL Exceeds MADL	Number of Non-Detections	Number of Samples	Minimum MRL (µg/L)	Maximum MRL (µg/L)
p-Dichlorobenzene 5	75	1	0	42	42	0.5	0.5
		2	0	42	42	0.5	0.5
		3	0	42	42	0.5	0.5
		4	0	42	42	0.5	0.5
		5	0	42	42	0.5	0.5

Notes:

[1] This table summarizes the results of the UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

[2] Table 4-1 provides a summary of common pollutants and PPS analytes detected in Year 5.

[3] Table 3-3 provides a complete list of PPS analytes. PPS analytes are thosed detected by analytical methods used for the required common pollutant monitoring. Full PPS testing is required by the WPCF permit in Years 1, 4, and 9.

[4] o-Dichlorobenzene is also known as 1,2-dichlorobenzene.

[5] p-Dichlorobenzene is also known as 1,4-dichlorobenzene.

Table 4-3: Summary of Detected Ancillary Pollutants [1] - Year 5

Analyte	Method	Event	Number of Detections	Number of Samples	Frequency of Detection (%)	Minimum Concentration [2] (µg/L)	Maximum Concentration (µg/L)
Ancillary Pollutants Detected by Required Analyses							
1,2,4-Trimethylbenzene	EPA 8260	1	0	42	0	< 0.5	< 0.5
		2	1	42	2	< 0.5	0.64
		3	0	42	0	< 0.5	< 0.5
		4	0	42	0	< 0.5	< 0.5
		5	0	42	0	< 0.5	< 0.5
2-Butanone	EPA 8260	1	1	42	2	< 5	95.2
		2	1	42	2	< 5	55
		3	1	42	2	< 5	59.7
		4	1	42	2	< 5	29
		5	1	42	2	< 5	15.3
4-Isopropyltoluene	EPA 8260	1	0	42	0	< 0.5	< 0.5
		2	2	42	5	< 0.5	2.64
		3	0	42	0	< 0.5	< 0.5
		4	0	42	0	< 0.5	< 0.5
		5	1	42	2	< 0.5	1
Acetone	EPA 8260	1	1	42	2	< 20	315
		2	1	42	2	< 20	100
		3	2	42	5	< 20	288
		4	1	42	2	< 20	316
		5	3	42	7	< 20	138
Chloroform	EPA 8260	1	1	42	2	< 0.2	0
		2	1	42	2	< 0.2	0.35
		3	1	42	2	< 0.2	0
		4	0	42	0	< 0.2	< 0.2
		5	1	42	2	< 0.2	< 0.2
Acenaphthene	EPA 8270M-SIM	1	0	42	0	< 0.0192	< 0.0288
		2	2	42	5	< 0.019	0
		3	0	42	0	< 0.019	< 0.0388
		4	1	42	2	< 0.019	0
		5	0	42	0	< 0.0192	< 0.0291
Acenaphthylene	EPA 8270M-SIM	1	0	42	0	< 0.0192	< 0.0777
		2	13	42	31	< 0.019	0.1
		3	2	42	5	< 0.019	< 0.0388
		4	0	42	0	< 0.019	< 0.0388
		5	1	42	2	< 0.0192	< 0.0291
Anthracene	EPA 8270M-SIM	1	3	42	7	< 0.0192	0.144
		2	2	42	5	< 0.019	1
		3	2	42	5	< 0.019	< 0.0388
		4	1	42	2	< 0.019	0
		5	0	42	0	< 0.0192	< 0.0222

Analyte	Method	Event	Number of Detections	Number of Samples	Frequency of Detection (%)	Minimum Concentration [2] (µg/L)	Maximum Concentration (µg/L)
Benzo(a)anthracene	EPA 8270M-SIM	1	9	42	21	< 0.00962	0
		2	14	42	33	< 0.00952	1.78
		3	18	42	43	< 0.00952	0
		4	20	42	48	< 0.00952	0.585
		5	14	42	33	< 0.00962	0
Benzo(b)fluoranthene	EPA 8270M-SIM	1	13	42	31	< 0.00962	0.446
		2	16	42	38	< 0.00952	2
		3	24	42	57	0.00961	0.147
		4	23	42	55	< 0.00952	1
		5	17	42	40	< 0.00962	0.0623
Benzo(ghi)perylene	EPA 8270M-SIM	1	10	42	24	< 0.0192	0
		2	16	42	38	< 0.019	1.58
		3	19	42	45	< 0.019	0
		4	23	42	55	< 0.019	0.463
		5	16	42	38	< 0.0192	0
Benzo(k)fluoranthene	EPA 8270M-SIM	1	9	42	21	< 0.00962	0.353
		2	10	42	24	< 0.00952	2
		3	13	42	31	< 0.00952	0.1
		4	16	42	38	< 0.00952	0
		5	10	42	24	< 0.00962	0.0376
Chrysene	EPA 8270M-SIM	1	27	42	64	< 0.00962	1
		2	23	42	55	< 0.00952	2.5
		3	30	42	71	< 0.00962	0
		4	34	42	81	< 0.00952	0.805
		5	31	42	74	< 0.00962	0
Di-n-octyl phthalate	EPA 8270M-SIM	1	0	42	0	< 0.962	< 1
		2	3	42	7	< 0.952	3
		3	0	42	0	< 0.952	< 3.88
		4	2	42	5	< 0.952	2
		5	1	42	2	< 0.962	1.71
Dibenzo(a,h) anthracene	EPA 8270M-SIM	1	3	42	7	< 0.00962	0
		2	1	42	2	< 0.00952	0.507
		3	6	42	14	< 0.00952	0
		4	6	42	14	< 0.00952	0.121
		5	2	42	5	< 0.00962	< 0.0111
Diethyl phthalate	EPA 8270M-SIM	1	1	42	2	< 0.962	1.12
		2	0	42	0	< 0.952	< 0.99
		3	0	42	0	< 0.952	< 1.94
		4	1	42	2	< 0.952	2
		5	1	42	2	< 0.962	5.93

Analyte	Method	Event	Number of Detections	Number of Samples	Frequency of Detection (%)	Minimum Concentration [2] (µg/L)	Maximum Concentration (µg/L)
Dimethyl phthalate	EPA 8270M-SIM	1	1	42	2	< 0.962	15
		2	0	42	0	< 0.952	< 0.99
		3	0	42	0	< 0.952	< 1.94
		4	0	42	0	< 0.952	< 1.94
		5	0	42	0	< 0.962	< 1.11
Fluoranthene	EPA 8270M-SIM	1	22	42	52	< 0.0192	1.09
		2	23	42	55	< 0.019	6
		3	30	42	71	< 0.0192	0.343
		4	29	42	69	< 0.019	2
		5	24	42	57	< 0.0192	0.247
Fluorene	EPA 8270M-SIM	1	1	42	2	< 0.0192	0
		2	8	42	19	< 0.019	0.18
		3	3	42	7	< 0.00971	< 0.0388
		4	1	42	2	< 0.019	0.0529
		5	0	42	0	< 0.0192	< 0.0288
Indeno(1,2,3-cd)pyrene	EPA 8270M-SIM	1	8	42	19	< 0.00962	0.32
		2	12	42	29	< 0.00952	1
		3	15	42	36	< 0.00952	0.0989
		4	17	42	40	< 0.00952	0
		5	13	42	31	< 0.00962	0.0367
Naphthalene	EPA 8270M-SIM	1	34	42	81	< 0.0192	0
		2	31	42	74	< 0.019	0.646
		3	32	42	76	< 0.0192	0
		4	21	42	50	< 0.019	0.0694
		5	16	42	38	< 0.0192	0
Phenanthrene	EPA 8270M-SIM	1	22	42	52	< 0.0192	0.471
		2	25	42	60	< 0.019	3
		3	39	42	93	< 0.0192	0.222
		4	33	42	79	< 0.019	1
		5	27	42	64	< 0.0192	0.116
Pyrene	EPA 8270M-SIM	1	28	42	67	< 0.0192	1
		2	28	42	67	< 0.019	4.55
		3	34	42	81	< 0.0192	1
		4	35	42	83	< 0.019	1.63
		5	30	42	71	< 0.0192	0

Notes:

[1] This table summarizes the results of the original UIC stormwater samples for each event for Panel 5, Panel 6, Supplemental Panel 4, and the carry over locations. It does not include the results of duplicate samples or laboratory reanalyses.

[2] Concentrations reported with a minimum and maximum concentration range of <x to <y may indicate all concentrations were below MRLs or may indicate a concentration is below the maximum MRL. See Appendix D, Table D-3, for actual values.

[3] "<" Indicates laboratory reporting limit.

Table 4-4: Summary of Total and Dissolved Metal Results - Year 5

Metal	MADL (ug/L)	Traffic Category (TPD)	Number of Samples	Number of Detections	Average [1] (ug/L)	Geometric Mean [1] (ug/L)	Minimum (ug/L)	Maximum (ug/L)	Ratio of Dissolved Average/Total Average
Common Pollutants									
Arsenic (total)	10	<1000	105	104	0.46	0.29	< 0.045	11.2	NA
	10	≥1000	105	105	0.53	0.36	0.05	8.09	
Cadmium (total)	5	<1000	105	17	0.11	0.11	< 0.1	0.27	NA
	5	≥1000	105	51	0.15	0.13	< 0.1	0.74	
Chromium (total)	100	<1000	105	75	0.97	0.75	0.28	5.62	NA
	100	≥1000	105	97	2.14	1.50	< 0.4	18	
Copper (total)	1300	<1000	105	105	5.87	4.67	0.90	20	
	1300	≥1000	105	105	12.13	9.47	1.77	58.7	<1000 51%
Copper (dissolved)	NA	<1000	105	105	3.01	2.24	0.47	17.3	≥1000 33%
	NA	≥1000	105	105	4.06	3.25	0.79	20.5	
Lead (total)	50	<1000	105	103	3.11	1.66	< 0.1	18.6	
	50	≥1000	105	105	8.21	5.78	0.61	39.8	<1000 9%
Lead (dissolved)	NA	<1000	105	65	0.28	0.18	0.05	3.66	≥1000 5%
	NA	≥1000	105	96	0.40	0.30	< 0.1	2.38	
Zinc (total)	5000	<1000	105	105	30.88	22.49	3.50	195	
	5000	≥1000	105	105	76.56	55.86	9.24	883	<1000 51%
Zinc (dissolved)	NA	<1000	105	105	14.84	11.49	2.02	76.6	≥1000 39%
	NA	≥1000	105	105	33.90	21.97	2.93	857	
Priority Pollutant Screen									
Mercury (dissolved)	NA	<1000	105	100	0.004	0.003	< 0.001	0.021	NA
	NA	≥1000	105	100	0.003	0.003	< 0.001	0.027	

Note:

[1] All data were used in calculation of the mean and geometric mean. No outliers were omitted. Values reported at <MRL were included at 50% of the MRL for estimation of the mean and geometric mean. Duplicate sample results were not included.

Table 4-5: Summary of Total Suspended Solids (TSS) Results [1] - Year 5

	Number of Samples	Total (mg/L)			
		Average	Geometric Mean	Minimum	Maximum
<1,000 Trips per Day (TPD)					
TSS	105	21	11	2	200
≥ 1,000 TPD					
TSS	105	51	30	2	484

Note:

[1] This table summarizes the results of the original UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the two carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

Table 4-6: Field Parameter Summary Statistics [1] - Year 5

Field Parameter	Units	Event	Number of Samples	Mean	Geometric Mean	Minimum	Maximum
Conductivity - specific	umhos/cm	1	42	33.4	28.6	10	102
		2	42	30.2	26.6	9	105
		3	42	22.3	19.6	9	73
		4	42	22.4	18.9	6	116
		5	42	28.3	24.6	10	82
pH	Units	1	42	6.7	6.6	5.4	7.4
		2	38	6.8	6.8	6	7.8
		3	42	6.9	6.9	6.5	8.3
		4	42	6.9	6.8	5.6	9.3
		5	42	6.7	6.7	5.8	7.9
Temperature	°C	1	42	14	13.7	5.4	18
		2	42	7	6.6	3.7	9.7
		3	42	7.4	7.3	5.3	10.1
		4	42	8.6	8.5	6.9	11.3
		5	42	11	10.6	8	20.9

Note:

[1] This table summarizes the results of the original UIC stormwater samples for each event. This table includes the results of Panel 5, Panel 6, Supplemental Panel 4, and the two carry over locations. This table does not include the results of duplicate samples or laboratory reanalyses.

Table 4-7: Summary of Year 5 MADL Exceedances - Common Pollutants

Analyte	Location Code	Traffic Category (TPD)	MADL (ug/L)	Event (concentration (µg/L)) [1]				
				1	2	3	4	5
Arsenic (total)	P6_8	<1000	10.0	0.574	**11.2, 11.3** [2,3]	0.858	0.646	0.541
	SP4_3	≥1000		0.705	8.09 [4]	0.703	0.647	1.43
Benzo(a)pyrene	P5_5	<1000	0.2	**0.373**	**1.85**	0.0776	**0.522**	0.0332
	SP3_8	≥1000		0.0207	0.0165	0.107	0.0354	<0.00962
Di(2-ethylhexyl) phthalate	P5_1	≥1000	6.0	<0.971	<0.971	<0.971	**22**	1.72
	P5_10	≥1000		1.02	<0.962	<0.971	1.13	<0.962, **14.5**
	P5_12	<1000		1.04	2.29	<0.962	<0.962	**8.73**
	P5_3	≥1000		1.65	1.38	3.7	1.95	1.09
	P6_1	≥1000		2.09	3.21	3.39, 3.34	1.62	1.42
	P6_12	≥1000		<0.962	3.07	1.22	1.26	4.93
	P6_15	≥1000		1.3	2.22	3.46	1.78	2.43, 2.05
	P6_5	≥1000		1.41	1.11	3.51	2.63	1.08
	P6_7	<1000		2.15	<0.98, 1.77	1.91	9.73	1.26
	P6_9	<1000		<0.962	<0.971	0.971, <0.97	0.962, <0.96	**18.1**
	SP3_6	≥1000		1.13	3.32	1.5, 1.98	2.35	1.12
	SP3_8	≥1000		5.23	1.94	**14.1**	**8.38**	2.95
	SP4_10	≥1000		5.61	5.73	<1	1.74	2.41
	SP4_2	≥1000		2.95	4.47	**8.66**	1.46	2.48
	SP4_3	≥1000		2.62	1.2	3.27	2.02	2.67
	SP4_4	<1000		<0.971	<0.962	1.89	2.08	3.51
Lead (total)	P6_14	≥1000	50.0	3.69	7.04	8.38	8.36	33.4
	P6_2	≥1000		1.31	3.69	5.66	3.49	28.2
	SP4_10	≥1000		13.6	24.2	2.19	12.6	29.1
	SP4_3	≥1000		10.3	39.8	11.4	7.14	9.75

	P5_10	≥1000		0.559	0.23	0.334	0.868	0.92, 0.837
	P5_11	≥1000		0.934	0.571	0.582	0.448	0.565
	P5_15	≥1000		**1.63**	**1.78**	**3.26**	**3.52**	**4.2**
	P5_3	≥1000		0.278	0.501	0.29	0.406	0.32
	P5_5	<1000		0.971	0.881	0.845	0.327	na [5]
	P5_7	≥1000		0.448	**1.34**	0.549	0.942	0.0861
	P5_8	≥1000		0.159	0.205	0.106	**1.17**	0.175
	P5_9	≥1000		0.531	0.327	0.273	0.291	0.33, 0.287
	P6_1	≥1000		**1.65**	**1.41**	**1.53, 1.62**	**1.28**	**1.75**
	P6_12	≥1000		0.457	0.539	0.541	0.505	0.241
	P6_14	≥1000		**2.31**	**2.48**	**2.1**	**1.22**	na [5]
Pentachlorophenol	P6_15	≥1000	1.0	0.359	0.198	0.566	0.304	0.549, 0.589
	P6_2	≥1000		0.694	0.766	**1.16**	0.696	**1.71**
	P6_4	<1000		0.56, 0.668	0.362	0.733	0.254, 0.234	0.435
	P6_7	<1000		**1.02**	0.987, 0.921	**1.53**	**1.3**	0.842
	SP3_6	≥1000		**1.15**	**1.32**	**2.22, 2.12**	**2.72**	**2.15**
	SP3_8	≥1000		**3.56**	**2.35**	**6.3**	**4.82**	**3.48**
	SP4_10	≥1000		**2.76**	**1.47**	**3.06**	**1.71**	**2.15**
	SP4_2	≥1000		**2.59**	**2.44**	**3.84**	**2.25**	**1.57**
	SP4_3	≥1000		0.802	**1.09**	**1.9**	**1.51**	**1.01**
	SP4_4	<1000		**1.18**	0.996	**1.63**	**1.37**	**1.5**
	SP4_5	<1000		0.216, 0.259	0.146	0.306	0.649	0.189
	SP4_7	<1000		0.516	0.253, 0.27	0.531	0.967	0.38

Notes:

[1] This table includes only those analytes detected at concentrations ≥ 50% of the MADL during at least one sampling event.

[2] Bolded numbers exceed the MADL.

[3] Duplicate samples reported as: sample concentration, duplicate concentration.

[4] This table also includes UIC locations where sample concentrations of the listed analytes exceeded one-half the MADL.

[5] Missing data indicate laboratory equipment failure resulting in a subset of samples were not analyzed. Details are provided in

Table 4-8: Priority Pollutant Screen Analyte Action Levels

Annual Mean Concentration Action Level	Compliance Response Action
≤ 50 % MADL	No further action. Return to PPS sampling frequency specified in the permit.
> 50 % MADL, but < MADL	Continue monitoring UIC at frequency of 5 sampling events per wet season, or request permit modification to return to normal PPS sampling frequency specified in permit
≥ MADL	Implement compliance response in accordance with permit

Table 4-9: Year 5 Annual Mean Concentrations - Common Pollutants

Analysis	MADL	Location Code [1]	Traffic Category (TPD)	Number of Events	Average [2] (µg/L)	Geometric Mean [2] (µg/L)	Minimum [3] (µg/L)	Maximum [3] (µg/L)
Arsenic (total)	10.0	P6_8	<1000	5	2.764	1.14	0.541	**11.2** [4]
		SP4_3	≥1000	5	2.315	1.3	0.647	8.09
Benzo(a)pyrene	0.2	P5_5	<1000	5	**0.571**	**0.247**	0.0332	**1.85**
		SP3_8	≥1000	5	0.038	0.026	< 0.00962	0.107
Di(2-ethylhexyl) phthalate	6.0	P5_1	≥1000	5	5.327	2.032	< 0.971	**22**
		P5_12	<1000	5	2.797	1.807	< 0.962	**8.73**
		P5_3	≥1000	5	1.954	1.781	1.09	3.7
		P6_1	≥1000	5	2.336	2.2	1.42	3.34
		P6_12	≥1000	5	2.288	1.862	< 0.962	4.93
		P6_15	≥1000	5	2.238	2.124	1.3	3.46
		P6_5	≥1000	5	1.948	1.732	1.08	3.51
		P6_7	<1000	5	3.206	2.181	< 0.98	**9.73**
		P6_9	<1000	5	4.393	1.737	< 0.962	**18.1**
		SP3_6	≥1000	5	1.98	1.812	1.12	3.32
		SP3_8	≥1000	5	**6.52**	5.125	1.94	**14.1**
		SP4_10	≥1000	5	3.298	2.666	< 1	5.73
		SP4_2	≥1000	5	4.004	3.336	1.46	**8.66**
		SP4_3	≥1000	5	2.356	2.232	1.2	3.27
		SP4_4	<1000	5	1.883	1.667	< 0.962	3.51
Lead (total)	50.0	P6_14	≥1000	5	12.174	9.052	3.69	33.4
		P6_2	≥1000	5	8.47	4.853	1.31	28.2
		SP4_10	≥1000	5	16.338	12.145	2.19	29.1
		SP4_3	≥1000	5	15.678	12.661	7.14	39.8
Pentachlorophenol (cont.)	1.0	P5_10	≥1000	5	0.582	0.509	0.23	0.92
		P5_11	≥1000	5	0.62	0.601	0.448	0.934
		P5_15	≥1000	5	**2.878**	**2.686**	**1.63**	**4.2**
		P5_3	≥1000	5	0.359	0.35	0.278	0.501
		P5_5	<1000	4	0.756	0.697	0.327	0.971
		P5_7	≥1000	5	0.673	0.485	0.0861	**1.34**
		P5_8	≥1000	5	0.363	0.234	0.106	**1.17**
		P5_9	≥1000	5	0.35	0.34	0.273	0.531
		P6_1	≥1000	5	**1.542**	**1.532**	**1.28**	**1.75**
		P6_12	≥1000	5	0.457	0.439	0.241	0.541
		P6_14	≥1000	4	**2.027**	**1.957**	**1.22**	**2.48**
		P6_15	≥1000	5	0.395	0.368	0.198	0.566
		P6_2	≥1000	5	**1.005**	0.94	0.694	**1.71**
		P6_4	<1000	5	0.465	0.432	0.234	0.733
		P6_7	<1000	5	**1.136**	**1.11**	0.842	**1.53**
		SP3_6	≥1000	5	**1.892**	**1.799**	**1.15**	**2.72**
		SP3_8	≥1000	5	**4.102**	**3.884**	**2.35**	**6.3**
		SP4_10	≥1000	5	**2.23**	**2.147**	**1.47**	**3.06**
		SP4_2	≥1000	5	**2.538**	**2.436**	**1.57**	**3.84**

Analysis	MADL	Location Code [1]	Traffic Category (TPD)	Number of Events	Average [2] (µg/L)	Geometric Mean [2] (µg/L)	Minimum [3] (µg/L)	Maximum [3] (µg/L)
Pentachlorophenol (cont.)	1.0	SP4_3	≥1000	5	**1.262**	**1.204**	0.802	**1.9**
		SP4_4	<1000	5	**1.335**	**1.315**	0.996	**1.63**
		SP4_5	<1000	5	0.301	0.26	0.146	0.649
		SP4_7	<1000	5	0.529	0.48	0.253	0.967

Notes:

[1] Table includes only those UIC monitoring locations where the concentration was ≥50% of the MADL in at least one sample.

[2] Most concentrations are rounded to one decimal place.

[3] Minimum concentrations may be either MRL or MDL values (i.e., < symbol not shown).

[4] Bold, shaded text indicates pollutant concentration geometric mean exceeds the MADL.

Table 7-1: Overall Data Quality Objectives

Compound Class	Precision	Accuracy	Completeness
Volatile Organic Compounds (VOCs)	± 25%	Per method/per analyte	95%
Polynuclear Aromatic Hydrocarbons (PAHs)	± 50%	Per method/per analyte	95%
Semivolatile Organic Compounds (SVOCs)	± 50%	Per method/per analyte	95%
Herbicides/Pesticides	± 30%	± 30%	95%
Total Metals	± 20%	± 25%	95%
Conventionals	± 20%	± 25%	95%

Table 7-2: Laboratory Quality Control Issues for Permit Year 5
UIC WPCF Permit Monitoring

Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
1	8270M-SIM	Reanalysis of samples in batch 9100696 due to naphthalene method blank contamination, reanalysis extractions performed three to six days after extraction holding time expired.	None	Reanalysis	Except for sample SP4_10, reanalysis results comparable to original sample results but generally lower; most reanalysis results used only for comparison.	Used only for comparison
	8270M-SIM	Reanalysis of samples in batch 9101081 due to naphthalene method blank contamination, reanalysis extractions performed eleven days after extraction holding time expired.	None	Reanalysis	Reanalysis results comparable to original sample results but generally lower; most reanalysis results used only for comparison.	Used only for comparison
	8270M-SIM	For batch 9100696, Naphthalene detected in laboratory method blank at 0.0526 ug/l	P5_1, P5_9, P5_10, P5_15, P6_4, P6_4 DUP, P6_8, P6_10, P6_11, P6_14, SP4_1, SP4_4, SP4_6, SP4_7, SP4_10	Lab contamination	Naphthalene values qualified with "JB" for reported sample values < 5x blank concentration and "UB" for sample values < method blank concentration	Usable with qualifiers
	8270M-SIM	For batch 9101081, Naphthalene and phenanthrene detected in laboratory method blank at 0.0404 ug/l and ND (slightly below MRL)	P5_3, P6_1, P6_2, P6_5, P6_9, P6_15, SP3_8, SP4_2, SP4_3 SP4_5, SP4_5 DUP	Lab contamination	Sample values qualified with "JB" for reported sample values < 5x blank concentration and "UB" for sample values < method blank concentration	Usable with qualifiers
	8260	Dibromofluoromethane recovery slightly high (124%) for Oct 15, 2009 method blank	None	Analytical difficulties	All results ND, no action taken.	Usable
	8260	Dibromofluoromethane recovery slightly high for 16 samples Oct 20-21, 2009	P6_14	Analytical difficulties	Most results ND, P6_14 chloroform result qualified with "JH" for estimated, potential high bias	Usable with qualifiers
	8260	Dibromofluoromethane recovery slightly high (122%) for Oct 22, 2009	SP3_6	Analytical difficulties	All associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recovery slightly high (122%) for Oct 23, 2009	SP4_2, SP4_5 DUP	Analytical difficulties	All associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recovery slightly high (122%) for Oct 26, 2009	P6_12	Analytical difficulties	All associated results ND, no action taken.	Usable
	515.3	Initial run within hold time, reanalysis 5 days outside of extraction hold time.	P5_11	Analytical difficulties	Detects qualified with “J” for estimated, ND results for analytes typically not detected, no other action taken.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0271 ug/l (< MRL) for batch 9101082	P6_3	Lab contamination	Pentachlorophenol sample value qualified with "JB" for estimated due to blank contamination. All other results ND or > 5x blank concentration.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0222 ug/l (< MRL) for batch 9101201	None	Lab contamination	Analyte not detected in associated samples, no action taken	Usable
	515.3	For batch 9100914, Picloram LCS recovery (159%) outside acceptance limits	None	Analytical difficulties	Analyte not detected in associated samples, no action taken	Usable
	515.3	For batch 9110551, 3,5-Dichlorobenzoic acid LCS recovery (157%) outside acceptance limits	None	Analytical difficulties	Analyte not detected in associated samples, no action taken	Usable
	515.3	For batch 9100821, Pentachlorophenol (62.9%) and Picloram (137%) MS2 results outside acceptance limits.	None	Matrix effects	MS1/MSD1 results acceptable (no MSD2 sample was analyzed), no other QC issues, no action taken.	Usable
	515.3	For batch 9100914, 24-DB (145%), 3,5-Dichlorbenzoic acid (131%), and Pentachlorophenol (69.2%) MS2 and Picloram (175%, 175%, 162%) MS1/MS2/MSD1 recoveries outside	None	Matrix effects	Other recoveries and RPDs acceptable (no MSD2 sample was analyzed), no other QC issues, no action taken.	Usable
	515.3	For batch 9101082, Picloram (153%, 170%, 155%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
	515.3	For batch 9110517, Bentazon (145%, 133%), 3,5-Dichlorobenzoic acid (136%), and Picloram (163%, 162%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPDs acceptable, analyte not detected, no other QC issues, no action taken.	Usable
1/2*	8270M-SIM	For batch 9110563, Naphthalene detected in laboratory method blank at 0.0528 ug/l	P5_10, SP4_1, SP4_2, SP4_4, SP4_7 and SP4_7 DUP	Lab contamination	Sample values qualified with "JB" for reported sample values < 5x blank concentration and "UB" for sample values < method blank concentration	Usable with qualifiers

Table 7-2: Laboratory QC Issues for Permit Year 5
UIC WPCF Permit Monitoring

Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
	515.3	For batch 9110551, 3,5-Dichlorobenzoic acid (210%, 198%, 227%), and Picloram (161%, 166%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
2	200.8	Copper and zinc detected in field decontamination blank at 0.35 and 0.69 ug/l	None	Lab contamination	Blank concentration < 5x sample concentrations, no action taken	Usable
	200.8	Arsenic field duplicate RPD failed 0.055/0.073 ug/l (28%)	P5_2	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8270M-SIM	Bis(2-ethylhexyl)phthalate field duplicate RPD failed < 0.98/1.77 ug/l (57%)	P6_7	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8260	Dibromofluoromethane recoveries slightly high for 11 samples, November 17, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 20 samples, November 19, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 14 samples, November 24, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	December 15, 2009 1,1-Dichloroethene, benzene, trichloroethene, toluene, chlorobenzene RPDs failed (38%, 32%, 29%, 30%, 26%).	P6_12	Analyst error	MS/MSD recoveries acceptable. Believed to be analyst error, vial not properly homogenized following addition of surrogates. No other QC issues, no action taken.	Usable
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0337 ug/l (< MRL) for batch 9110816	P6_6	Lab contamination	Pentachlorophenol sample value qualified with "JB" for estimated due to blank contamination. All other results ND or > 5x blank concentration.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0257 ug/l (< MRL) for batch 9120559	P5_12, P6_10, SP4_9	Lab contamination	Pentachlorophenol sample values qualified with "JB" for estimated due to blank contamination. All other results ND or > 5x blank concentration.	Usable with qualifiers
	515.3	Surrogate recovery below acceptance limits (42.1%)	P6_15	Analytical difficulties	Sample reanalyzed outside hold time with similar results, no action taken	Usable
	515.3	For batch 9120559, Picloram (138%, 160%, 132%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
	515.3	For batch 9120614, Picloram (161%, 150%, 158%) MS1/MS2/MSD1 recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable (no MSD2 sample was analyzed), analyte not detected, no other QC issues, no action taken.	Usable
	515.3	Pentachlorophenol field duplicate RPD failed 0.312/0.218 ug/l (35%)	P6_8	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
2/3*	8270M-SIM	For batch 9120710, MS1/MSD1 and MS2/MSD2 RPDs outside acceptance limits for Benzo(a)anthracene (46.9%), Benzo(a)pyrene (77.6%, 47.5%), Benzo(b)fluoranthene (71.3%, 47.5%), benzo(ghi)perylene (100%, 69.8%), benzo(k)fluoranthene (77.5%, 45.6%), chrysene (45.8%), dibenzo(a,h)anthracene (102%, 76.1%), and indeno(1,2,3-cd)pyrene (100%, 72.5%).	None	Matrix effects	MS/MSD recoveries acceptable, analyte not detected in associated samples, no other QC issues, no action taken.	Usable
3	200.8	Zinc detected in laboratory method blank at 0.69 ug/l	None	Lab contamination	Blank concentration < 5x sample concentrations, no action taken	Usable
	200.8	Arsenic field duplicate RPDs failed 0.096/0.138 ug/l (36%) and 0.103/0.147 ug/l (35%)	P6_9, P6_13	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8270M-SIM	Reanalysis of samples in batch 10A0111 due to low surrogate recoveries for method blank, reanalysis extractions performed three days after extraction holding time expired.	None	Reanalysis	Reanalysis results comparable to original sample results but generally lower; most reanalysis results used only for comparison.	Used only for comparison
	8270M-SIM	Reanalysis of samples in batch 10A0383 due to LCS and MS/MSD results outside of acceptance limits, reanalysis extractions performed five days after extraction holding time expired		Reanalysis	Some reanalysis results significantly lower than original sample results; reanalysis results used only for applying qualifiers to original sample results as described under MS/MSD results.	Used only for comparison
	8270M-SIM	Surrogate recoveries for batch 10A0111 method blank failed. 3 out of 3 surrogates below acceptance limits (~ 1%).	None	Analytical difficulties	Associated samples re-analyzed outside of hold time, results comparable but generally lower. No other QC issues, no action taken.	Usable

Table 7-2: Laboratory QC Issues for Permit Year 5
UIC WPCF Permit Monitoring

Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
	8270M-SIM	Bis(2-ethylhexyl)phthalate LCS recovery (427%) for batch 10A0383 outside acceptance limits	None	Lab contamination?	MS/MSD recoveries outside acceptance limits, see MS/MSD results for actions taken	Usable with qualifiers
	8270-SIM	For batch 10A0383, MS/MSD recoveries (-108%, -147%; SP3_8 original sample result 14.1, MS/MSD spike amount 3.88, results 9.91/8.39) below acceptance limits for Bis(2-ethylhexyl)phthalate. Also Di-n-octyl phthalate recoveries outside acceptance limits (154%, 184%).	P5_3, P6_1, SP3_8, SP4_2	Lab contamination	Samples reanalyzed outside of hold time, some results similar to original results, some significantly below original results. Sample results qualified with "JH" where original sample result 1.5x greater than reanalysis result. For Di-n-octyl phthalate, RPD acceptable, analyte not detected above MRL in associated samples, no other QC issues, no action taken.	Uasble with qualifiers
	8260	Dibromofluoromethane recoveries slightly high for 10 samples, December 17, 2009	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 22 samples, January 7, 2010	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	8260	Dibromofluoromethane recoveries slightly high for 13 samples, January 19, 2010	various	Analytical difficulties	All results or associated results ND, no action taken.	Usable
	515.3	Initial run internal standard failed, reinjection performed 5 hours outside of hold time.	P5_2	Analytical difficulties	Analytes not detected above MRL, ND results for analytes typically not detected, no action taken.	Usable
	515.3	Analyst neglected to spike initial sample run for P6_5, MS1, MS2, MSD1, and MSD2 with surrogate. Reanalysis extracted 1 day past extraction hold time.	P6_5	Analyst error	Detects qualified with "J" for estimated, ND results for analytes typically not detected, no other action taken.	Usable
	515.3	For batch 10A0088, 3,5-Dichlorobenzoic acid (135%) MSD2 recovery outside acceptance limits.	None	Matrix effects	RPD acceptable, analyte not detected, no other QC issues, no action taken.	Usable
	515.3	For batch 10A0274, Picloram (134%, 133%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable, analyte not detected, no other QC issues, no action taken.	Usable
	515.3	2,4-D field duplicate RPD failed 0.371/0.267 ug/l (33%)	P6_13	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
3/4*	515.3	Some samples rerun due to organic acid lab contamination that interfered with acifluorfen quantitation. Samples reextracted 1 day outside of extraction hold time.	various	Lab contamination	Only acifluorfen data affected (other analytes reported from first run), analyte typically not detected, no action taken.	Usable
	515.3	For batch 10B0327, 2,4-D (131%), 3,5-Dichlorobenzoic acid (140%), Pentachlorophenol (59.0%, 62.7%), and Picloram (138%) MS2/MSD1/MSD2 recoveries outside acceptance limits.	None	Matrix effects	RPDs acceptable, analyte not detected, no other QC issues, no action taken.	Usable
4	200.8	Zinc detected in field decontamination blank at 0.62 ug/l	None	Lab contamination	Blank concentration < 5x sample concentrations, no action taken	Usable
	200.8	Arsenic field duplicate RPD failed 0.168/0.231 ug/l (32%)	P6_4	Non-homogenous samples, low concentrations	Values < 5x MRL, no action taken	Usable
	8270M-SIM	For batch 10B0312, Benzo(ghi)perylene MS/MSD RPD failed (60.5%).	None	Matrix effects	MS/MSD recoveries acceptable, no other QC issues, no action taken.	Usable
	8260	1,1-Dichloroethene MS/MSD recoveries outside acceptance limits.	P5_2	Matrix effects	RPD acceptable, no other QC issues, no action taken.	Usable
	515.3	Initial run surrogate recovery failed, reanalysis performed 7 days outside of extraction hold time.	P6_14	Analytical difficulties	Pentachlorophenol value qualified with "J" for estimated, no other action taken.	Usable with qualifiers
	515.3	Pentachlorophenol detected in laboratory method blank at 0.0196 ug/l (< MRL) for batch 10B0685	None	Lab contamination	All sample results > 5x method blank concentration or < MRL. No action taken	Usable
	515.3	For batch 10B0486, 3,5-Dichlorobenzoic acid (139%, 139%, 139%) MS1/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, analyte not detected, no action taken.	Usable
	515.3	For batch 10B0685, Pentachlorophenol (68.2%, 68.6%, 67.5%, 69.2%) MS1/MS2/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	515.3	For batch 10C0280, Pentachlorophenol (63.4%) MS2 and Bentazon (133%) MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
4/5*	515.3	For batch 10C0583, Pentachlorophenol (65.8%, 64.4%, 62.1%, 64.8%) MS1/MS2/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
5	8270M-SIM	Samples extracted four days outside hold time due to a laboratory miscommunication.	P5_2, P5_6, SP4_1, SP4_1 DUP, SP4_7	Laboratory miscommunication	No detects above MRLs, data consistent with previous data from these sample locations, no qualifiers assigned.	Usable

Table 7-2: Laboratory QC Issues for Permit Year 5
UIC WPCF Permit Monitoring

Event	Method	Issue	Affected Samples	Cause	Comments, Actions Taken	Usability
	8270M-SIM	For batch 10D0094, Anthracene (127%, 125%), Benzo(a)anthracene (138%, 139%), and Benzo(a)pyrene (113%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	8270M-SIM	For batch 10D0095, Fluoranthene MS/MSD RPD failed (47.3%)	None	Matrix effects	MS/MSD recoveries acceptable, no other QC issues, no action taken.	Usable
	8270M-SIM	For batch 10D0921, Benzo(a)anthracene (132%, 132%) MS/MSD recoveries outside acceptance limits.	None	Matrix effects	RPD acceptable, no other QC issues, no action taken.	Usable
	8270M-SIM	Bis(2-ethylhexyl)phthalate field duplicate RPD failed < 0.962/14.5 ug/l (180%)	P5_10	Lab contamination?	Duplicate sample qualified with "JH", original sample value used in data analysis, no other action taken	Usable with qualifiers
	515.3	Due to instrument failure, samples could not be analyzed within hold time. Data were reported but not received in time for inclusion in data analysis.	FDBLANK, P5_5, P5_13, P6_3, P6_10, P6_14, SP4_1, SP4_7	Laboratory instrument failure	SP4_1 and SP4_7 data were not necessary as these sites were sampled twice during Event 5 due to an oversight by BES FO	Not usable
	515.3	For batch 10D0143, Acifluorfen (67.0%) MSD and Pentachlorophenol (57.1%, 57.0%) MS/MSD results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	515.3	For batch 10D0315, Acifluorfen (65.4%, 62.2%, 67.4%, 63.6%), Dichlorprop (63.7%, 69.0%) Dinoseb (59.2%, 64.8%, 69.3%, 64.1%), Pentachlorophenol (49.2%, 54.8%, 54.9%, 56.2%), and 2,4,5-TP (64.2%) MS1/MS2/MSD1/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, no other QC issues, no action taken.	Usable
	515.3	For batch 10D0910, Acifluorfen (148%, 144%), Bentazon (131%, 136%, 136%), and Picloram (138%, 133%), MS1/MS2/MSD2 results outside acceptance limits.	None	Matrix effects	RPDs acceptable, analytes not detected, no other QC issues, no action taken.	Usable

Notes: * = Some samples from separate Events analyzed as part of the same analytical batches by TA
Batch numbers are included in Laboratory Reports presented in Appendix E of the*Annual Stormwater Discharge Monitoring Report – Year 5*, July 2010.
BES FO = Bureau of Environmental Services Field Operations
DUP = field duplicate
LCS/LCSD = laboratory control sample/laboratory control sample duplicate
MDL = method detection limit
MRL = method reporting limit
MS/MSD = matrix spike/matrix spike duplicate
ND = not detected
QC = quality control
RPD = relative percent difference