PORTLAND HARBOR RI/FS

ROUND 3 JANUARY 2006 HIGH-FLOW SURFACE WATER FIELD SAMPLING REPORT

DRAFT

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LIST OF ACRONYMS

Axys	Axys Analytical Services, Ltd.
CAS	Columbia Analytical Services
DEA	David Evans and Associates
DGPS	differential global positioning system
DI	deionized
DOC	dissolved organic carbon
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
EQuIS	Environmental Quality Information System
FSP	field sampling plan
HSP	health and safety plan
LWG	Lower Willamette Group
LWR	lower Willamette River
NAD	North American Datum
NAVD	North American Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
OCS	Oregon Climate Service
ORP	oxidation reduction potential
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
QA	quality assurance
QC	quality control
QAPP	quality assurance project plan
RI/FS	remedial investigation and feasibility study
RM	river mile
SVOC	semivolatile organic compound
SDG	sample delivery group
TOC	total organic carbon
TDS	total dissolved solid
TSS	total suspended solid

1.0 INTRODUCTION

The remedial investigation and feasibility study (RI/FS) of the Portland Harbor Superfund Site includes several rounds of field sampling activities to investigate the nature and extent of contamination in the in-water portion of the lower Willamette River (LWR), to assess potential risk to human health and the environment, and to develop cleanup alternatives. Round 1 chemical and biological sampling took place during the summer and fall of 2002, and these results, as well as the results of physical studies that continued into the winter of 2004 (e.g., the February 2004 bathymetry survey), are described in the Round 1 Site Characterization Summary Report (Integral 2004a).

Round 2 sampling activities included beach sediment and riverbed surface sediment sampling for chemical and toxicity testing (Integral 2005b), subsurface sediment sampling for chemical analysis (Integral and Anchor 2005), three surface water sampling events for chemical analysis in November 2004, March 2005 and July 2005 (Integral 2005c,d,e), and a groundwater pathway assessment pilot study (Integral 2005a).

This Round 3 Winter 2006 Surface Water Field Sampling Report is the first of the Round 3 surface water sampling events and describes surface water collection activities that occurred from January 19-21, 2006.

Except where noted, all Round 3 surface water field activities, including navigational positioning, sample collection, sample handling and processing, and data management, followed guidelines specified in the Round 2A Field Sampling Plan: Surface Water Sampling (Integral 2004d), hereafter referred to as the Surface Water FSP; the Addendum to Round 2A Field Sampling Plan Surface Water Sampling (Integral 2006), the Round 2 Quality Assurance Project Plan (QAPP; Integral and Windward 2004); the Round 2 QAPP Addendum 1 (Integral 2004c); and the Round 2 Health and Safety Plan (HSP; Integral 2004b).

1.1 ROUND 3 SAMPLING OBJECTIVES

The purpose of Round 3 sampling was to collect surface water samples during the January 2006 high-flow event on the LWR (Integral 2006).

As reported by the Oregon Climate Service (OCS), a persistent wet weather pattern produced measurable rainfall for 30 of the 31 days across northwest Oregon and southwest Washington (from December 18, 2005 through January 17, 2006). This weather pattern produced very heavy rainfall that caused flooding over a large portion of the area. Rainfall totals from the Portland airport rain gauge were reported at 13.52 inches, 268% above normal (5.04 inches) (OCS 2006).

The objectives of this Round 3 surface water sampling event identified in the Addendum to the Round 2A FSP for the surface water sampling program required collection of the following types of data:

- Surface water chemistry to characterize the nature and extent of contamination including contaminant distribution and identification of potential source effects to the river.
- Surface water chemistry at river mile (RM) 16, an upstream location from the Portland Harbor Superfund Site.
- Surface water chemistry at two Round 2A upstream and downstream transect stations, RM11 and RM 4, respectively.
- Surface water chemistry and conventional water quality parameters to support the feasibility study.
- Surface water samples from a single point, approximately one-third below the water surface, at a mid-channel location. Peristaltic pump and high-volume XAD samples were collected at each location.

Analytical results from the Round 3 surface water sampling program will be summarized in a Round 3 site characterization report or data report, after completion of the Round 3 sampling events.

1.2 REPORT ORGANIZATION

The remaining sections of this document describe the field collection procedures used during Round 3 for surface water samples. Section 2 provides a chronology of the sampling activities that took place during this phase of sampling. Section 3 describes the field sampling methods, quality assurance/quality control samples, and deviations from the Addendum to the FSP, FSP, QAPP, and QAPP Addendum 1. Laboratory sample handling and processing, and laboratory deviations from the FSP and QAPP, are described in Section 4. A summary of this sampling event is described in Section 5. References cited are listed in Section 6.

Supporting information is provided in two appendices:

- Appendix A: Field Notebook
- Appendix B: Infiltrex and YSI Sampling Logs

2.0 CHRONOLOGY OF FIELD OPERATIONS

This report describes the first surface water sampling event of the Round 3 surface water sampling program that took place from January 19-21, 2006. Surface water sampling was conducted using two methods: the peristaltic pump method and high-volume sampling with XAD-2 columns. The three target stations sampled were W005, W023, and W024 located at RM 4, RM 11, and RM 16, respectively. Surface water samples were collected using a peristaltic pump at three mid-channel target locations at river miles 4, 11 and 16 in the Willamette River (Figure 2-1) with a peristaltic pump and using an Infiltrex 300 system connected to XAD-2 resin columns to collect hydrophobic organic compounds for analysis by ultra-low analytical methods. All stations identified in the Addendum to the FSP, including two upstream (W023 and W024) and one downstream (W005) locations were sampled (Table 2-1). One station (W023) was occupied twice to generate a field replicate for the peristaltic sampling method. A field replicate was not collected during this sampling event for the XAD method. In accordance with the surface water FSP and QAPP, surface water samples from all three target stations were submitted to analytical laboratories for chemical testing (see Section 4.1).

River stage and river flows on the Willamette River at Portland as well as local precipitation levels that occurred during the surface water sampling period (January 19-21, 2006) are shown in Table 2-2.

3.0 FIELD SAMPLING PROCEDURES

The following sections summarize the procedures and methods used to collect Round 3 surface water samples, including station navigation and positioning, sampling procedures, record keeping, sample handling, sample storage, and field quality control (QC) procedures. Sampling procedures generally followed those detailed in the Surface Water FSP (Integral 2004d) and the Addendum to the FSP (Integral 2006). Deviations from the FSP are discussed in Section 3.10.

3.1 SAMPLING VESSELS

David Evans and Associates (DEA) (Portland, OR) provided the research vessel *John B. Preston,* a 30-foot custom aluminum survey boat owned and operated by DEA. The aft deck space on the *John B. Preston* was equipped with an A-frame for raising and lowering the sampling device, navigational lights, anchors, and an integrated navigation and data acquisition system and a custom mount for the SeaBat 8101 sonar head. The Infiltrex 300 pump system sat on the aft deck while a portable table was used for collecting the peristaltic pump samples and for sample handling/processing. The cabin space included a dry, usable area for computer equipment, and seating for maintaining and filing paperwork (e.g., field forms).

3.2 NAVIGATION AND STATION POSITIONING

Navigation equipment aboard the *John B. Preston* was provided and operated by DEA. Horizontal positions were acquired with an Applanix POS/MV combined Differential Global Positioning System (DGPS) and inertial navigation system augmented by a Trimble MS 750 dual frequency RTK receiver. Horizontal control was obtained using a computer-integrated DGPS. The horizontal projection used for all sampling activities was the North American Datum of 1983 (NAD83) LatLong through the 1991 adjustment (NAD83/91), State Plane Coordinate System, Oregon North Zone. The vertical datum is the North American Vertical Datum of 1988 (NAVD88).

The integrated navigation system displayed the vessel's position relative to the target sampling location in plan view on the laptop screen. The screen display and numeric navigation data, including range and bearing to the target sampling location, assisted the vessel operator in approaching a station position to be sampled. The surface water samples were collected from a single point, approximately one-third below the water surface, at a mid-channel location. An anchor was cast at the bow of the vessel upstream from the target location and then the pilot repositioned the boat to the target location by letting the anchor line out. Sampling locations are included in Table 3-1. Figure 2-1 shows the locations for all water samples collected.

3.3 PERISTALTIC PUMP SAMPLES

Round 3 peristaltic surface water sample collection and processing generally followed the procedures specified in the Surface Water FSP (Integral 2004d), Addendum to the FSP (Integral 2006), the Round 2 QAPP (Integral and Windward 2004), and QAPP Addendum 1 (Integral 2004c). Deviations from the FSP and QAPP are discussed in Sections 3.10 and 4.3.

3.3.1 Sample Collection

Surface water samples for chemical and conventional analyses were collected using a peristaltic pump with an extended Teflon™ sampling tube lowered to the desired depth. The sampling tube intake was secured with plastic zip-ties to the vane of the water sampler. The water sampler was then lowered to the appropriate depth by A-frame and electrical winch on the stern of the boat. The water sampler was tethered to the winch with a stainless-steel cable. The bow anchor was attached to an individual winch using a polypropylene rope. The A-frame extended 10 feet from the stern with an additional 4 to 5 feet of sampling tube, placing the intake tubing approximately 15 feet away from the stern of the sampling vessel.

The outflow of the pump was directed through a Kynar™ Tee-splitter into two composite mixing carboys. Equal volumes were pumped into the two large, pre-cleaned, 20-liter mixing carboys containing a Teflon™-coated magnetic stir bar and placed over magnetic stirring plates. The first carboy, made of polycarbonate, was used for compositing and mixing samples for subsequent analysis of trace metals, butyltin, and conventionals. The second carboy, made of glass, was used for compositing and mixing samples for subsequent analysis of organic compounds. Following sample compositing in the mixing carboys, appropriate sample bottles were filled using a peristaltic pump, with the outflow directed into the sample bottle. The sample containers were capped, labeled, and placed inside a cooler with ice.

Two types of surface water samples were collected: unfiltered, and filtered for metals and dissolved organic carbon (DOC). For filtered metals samples, a 0.45-µm filter was placed inline near the tubing outlet to filter samples immediately before the water was discharged into the sample bottle. The filter size for DOC, determined in coordination with the U.S. Environmental Protection Agency (EPA), was also 0.45 µm. Samples for total suspended solids (TSS) and total dissolved solids (TDS) were filtered at the laboratory.

Water was collected with the peristaltic pump as described above at each of the three mid-channel sample locations shown in Figure 2-1.

In addition to surface water collection, general water quality parameters [temperature, pH, dissolved oxygen, oxidation-reduction potential (ORP), conductivity, TDS and depth] were measured *in situ* at all sampling stations using a YSI 6600 sonde connected by a 60-meter-long cable to a YSI 650MDS monitor and attached to the water sampler. The winch operator controlled the water sampler depth by continuously monitoring the YSI 650MDS display. Water quality data from each station are included in Table 3-1.

Surface water was collected at the three target stations using the peristaltic pump method (see Table 2-1). A summary of the total number of samples collected is provided in Table 3-2. Table 3-3 lists each surface water station sampled and the specific analyses to be conducted on each sample.

Copies of all surface water field notebooks and water quality parameter log sheets are provided in Appendices A and B, respectively. Original logbooks and sample description forms are on file in the Lower Willamette Group (LWG) Project Library at Integral's office in Olympia, WA.

3.4 HIGH-VOLUME SAMPLES

Round 3 high-volume surface water sample collection and processing generally followed the procedures specified in the Surface Water FSP (Integral 2004d), Addendum to the FSP (Integral 2006), the Round 2 QAPP (Integral and Windward 2004), and QAPP Addendum 1 (Integral 2004c). Deviations from the FSP and QAPP are discussed in Sections 3.10 and 4.3.

3.4.1 Sample Collection

High-volume surface water sampling was accomplished using an Infiltrex 300 pump system connected to XAD-2 resin columns. This sampling method was used to collect hydrophobic organic compounds from water that require ultra-low analytical detection methods.

Large volumes of water were pumped through Teflon™-lined polypropylene tubing, a 140-µm stainless-steel pre-filter, 0.5-µm glass fiber filter cartridges, and XAD-2 resin beads packed inside stainless-steel canisters using an Infiltrex 300 pump system [Axys Analytical Services, Ltd. (Axys)]. The method retained particulates on the 0.5-µm glass fiber filters and extracted dissolved organic contaminants onto the resin. This method eliminates the need to collect, store, and transport large volumes of water. A total volume of approximately 400 liters was pumped at each high-volume surface water sampling station at a flow rate of approximately 1.25 liters per minute. The total volume for each high-volume XAD-2 sample collected at each of the three mid-channel sample locations is included on Table 3-4. Infiltrex 300 pump system surface water sampling log forms are included in Appendix B.

The Teflon™-lined polypropylene intake tubing for the XAD-2 samples and the Teflon™ sampling tube for the peristaltic pump samples was secured together with plastic zip ties to the vane of the water sampler. Glass fiber filters (0.5 µm) were used to filter out the particulate fraction of the water. Since hydrophobic analytes are preferentially bound to particulates, this material (less than 140 µm and greater than 0.5 µm) was isolated in the filter to determine the particulate-bound fraction of hydrophobic analytes present. The in-line pressure was monitored to determine the need for replacement filters, when necessary. Replacement filters were not required at any of the sampling stations (see Table 3-2).

Once the desired volume was pumped, the column assembly was removed from the Infiltrex 300 unit, and any residual water was drained out. XAD-2 canisters were labeled, inserted inside a zip-locked bag, wrapped in bubble wrap, placed inside its original cardboard box, which in turn was placed inside another zip-locked bag and then placed in a cooler with wet ice. The glass fiber filters were drained of any residual water, removed from the housing, placed in pre-cleaned sample jars or wrapped in pre-cleaned aluminum foil, inserted into resealable plastic bags, labeled, and stored in a cooler containing wet ice.

At the analytical laboratory, the column and filters will be analyzed individually to determine, respectively, the apparent dissolved and particulate concentrations of analytes in the samples. These analytical results can be combined later to determine the total analyte concentration in surface water.

High-volume XAD samples were collected at three mid-channel stations (see Figure 2-1). The high-volume stations and a summary of the total number of samples and replicates analyzed are listed in Table 3-2. Table 3-3 includes each high-volume surface water station sampled, the sample date, and the specific analyses to be conducted on each sample.

3.5 SAMPLE IDENTIFICATION SCHEME

All samples were assigned a unique identification code, as described in the FSP, based on a sample designation scheme designed to meet the needs of field personnel, data management, and data users This code indicates the project phase, sample type, and level of replication/duplication (see Table 3-3). Station location identification numbers for each target location are listed in Table 2-1 and mapped in Figure 2-1.

3.6 EQUIPMENT DECONTAMINATION PROCEDURES

Decontamination procedures for all sample handling and compositing equipment followed procedures summarized below and detailed in Appendix C of the Portland

Harbor RI/FS Round 2A Surface Water Field Sampling Plan (Integral 2004d). Modifications to the decontamination procedure are detailed in the Portland Harbor RI/FS Round 2A FSR (Integral 2005c). Deviations from the standard procedures are noted in Section 3.10.

3.6.1 Teflon™ and C-Flex™ Pump Tubing for Intake Water and Teflon™-Coated Stir Bars for Carboys

The Teflon™ and C-Flex™ tubing used for the intake of site water and Teflon™ -coated stir bars used in the carboys were cleaned for all target parameters. The sample tubing was filled with reagent-grade methanol. The tubing and stir bars were allowed to soak in reagent-grade methanol for 24 hours. Next, they were removed from the methanol solution and rinsed thoroughly with deionized (DI) water. The tubing and stir bars were then soaked in dilute reagent-grade nitric acid (HNO_3) for 24 hours, removed, and flushed with DI water. The tubing and stir bars were stored in double-bagged polyethylene bags until assembly. One-half of the stir bars were cleaned accordingly with reagent-grade methanol, and the other half of the stir bars were cleaned with reagent-grade nitric acid.

3.6.2 Teflon™ and C-Flex™ Pump Tubing From Filtration Units to Sample Jars

The Teflon™ and C-Flex™ tubing used from the filtration units to the sample jars was cleaned for metals or for organic and conventional parameters, as described below.

3.6.2.1 Metals, Butyltin, and Conventional Analyses

Sample tubing was filled with dilute reagent-grade HNO_3 and allowed to soak for 24 hours. The acid was drained, and the tubing was flushed with DI water. Tubing was stored in double-bagged polyethylene bags until assembly.

3.6.2.2 Organic Analyses

Sample tubing was filled with reagent-grade methanol and allowed to soak for 24 hours. The methanol solution was drained, and the tubing was flushed with DI water. Tubing was stored in double-bagged polyethylene bags until assembly.

3.6.3 Filter Cartridges

Filter cartridges (0.45 µm) were used for sample collection. The 0.45-µm cartridges were used for the collection of dissolved trace metal samples and DOC in water. The DOC filter cartridge was cleaned according to the same procedure used for the 0.45-µm cartridges. The following procedures were used for cleaning the 0.45-µm filter cartridges for metals, butyltin species, and conventionals, and the selected cartridge for DOC.

3.6.3.1 Metals, Butyltin, and Conventional Analyses

The filter cartridge was filled with dilute reagent-grade HNO_3 and allowed to soak for 24 hours. The filter was drained of acid, flushed with DI water, and stored in double-bagged polyethylene bags until assembly.

3.6.3.2 Organic Analyses

The filter cartridge was filled with reagent-grade methanol and allowed to soak for 24 hours. The filter cartridge was drained of the methanol solution, flushed with DI water, and stored in double-bagged polyethylene bags until assembly.

3.6.4 20-Liter Glass and Polycarbonate Carboys

The glass and polycarbonate carboys were used to composite the sample prior to distribution to the sample carboys. The cleaning procedure for metals and for organic and conventional parameters is described below:

3.6.4.1 Metals, Butyltin, and Conventional Analyses

The polycarbonate carboys were half-filled with dilute reagent-grade HNO_3 and allowed to soak for 12 hours on each side, for a total of 24 hours. The carboys were drained of acid, filled with DI water, drained, and rinsed with DI water. The components of the composite surface water sampling units (i.e., lids, tubing, and air filter) were assembled on the carboy and stored double-bagged in polyethylene bags until used in the field.

3.6.4.2 Organic Analyses

The glass carboys were rinsed three times with reagent-grade methanol. The carboys were drained of methanol solution and flushed with DI water. The components of the filtration units were assembled and stored double-bagged in polyethylene bags until used in the field.

3.7 FIELD QUALITY CONTROL/QUALITY ASSURANCE

Field QA/QC samples were collected in association with the surface water sampling effort. The QC samples that were collected during this phase of the Round 3 sampling effort are described below.

3.7.1 Field Replicates

One field replicate sample (W023-2) was collected for peristaltic pump surface water samples. A replicate was not collected for high-volume surface water samples. The field replicate was generated by collecting new surface water at the original target sampling location, not by subsampling composited samples. The field replicate was collected to assess the within-station heterogeneity associated with the overall sampling process from station positioning through sampling homogenization. In Table 3-3, the field replicated station is indicated by a “-1” for the first sample and “-2” for the replicate sample at the end of the sample identification code.

3.7.2 Field Splits

Field splits were not requested by EPA or any other party during this sampling event.

3.7.3 Equipment Rinsates and Temperature Blanks

Inadvertent introduction of chemical contaminants during sampling and analytical activities is assessed by the analysis of rinsate blanks. One rinsate blank (LW3-W1901) was collected for this sampling event. One system blank sample (LW3-W1902C and LW3-W1902F) for high-volume surface water samples, consisting of an XAD-2 column and a 0.5-µm glass fiber filter respectively, were generated by passing ultra clean water through the Infiltrex system. Peristaltic pump rinsate blank samples and Infiltrex 300 pump system blank samples were submitted for analysis to the laboratories (see Tables 3-3 and 3-5).

Temperature blanks are used to measure and ensure cooler temperature upon receipt to the laboratory. One temperature blank was prepared and submitted with each cooler shipped to the analytical laboratory. The temperature blank consisted of a sample jar containing DI water that was packed into the cooler in the same manner as the rest of the samples and labeled "temp blank.”

3.8 SAMPLE HANDLING, STORAGE, TRANSPORT, AND CUSTODY

Sample processing and storage for the two different sampling methods, as well as sample transport and custody, are described in the following sections.

3.8.1 Peristaltic Pump Sample Handling and Storage

Peristaltic pump samples were processed and handled as described in Section 3.3. The composite samples were transferred to preserved, pre-rinsed sample bottles using a peristaltic pump, with the outflow directed into the bottle. The sample containers were capped, labeled, and then placed in a cooler with ice. At the end of each day, samples were either stored in refrigerators at the field lab or shipped to the analytical laboratories. The samples were generally shipped on ice within 48 hours of collection.

3.8.2 XAD Resin/Filter Sample Handling and Storage

XAD resin/filter samples were processed and handled as described in Section 3.4. The resin column assembly was removed from the Infiltrex 300 pump system, labeled, inserted into a zip-locked bag, placed in its original cardboard box, and then placed in a cooler with ice. The glass fiber filters were drained of any residual water, removed from the housing, placed in sample jars or wrapped in pre-cleaned aluminum foil and placed inside a zip-locked bag, labeled, and stored in a cooler with ice. At the end of each day, samples were stored in refrigerators at the field lab. At the end of the sampling event, the samples were stored at 4ºC ± 2ºC at the field laboratory and delivered to the analytical laboratory on February 17, 2006.

3.8.3 Sample Transport and Custody

Samples were packed to prevent breakage and separated in the shipping container (ice cooler) by bubble wrap and/or other shock-absorbent material. Loose ice was then placed in the cooler to maintain a temperature of approximately 4°C. A temperature blank was added to each cooler, and the associated chain-of-custody forms were placed into a zip-locked bag and taped on the inside lid of each cooler. Each ice cooler was sealed with shipping tape, and three chain-of-custody seals, which included the project name, date of shipment, and the name of the person sealing the cooler, were affixed to the cooler. Samples were transported to the analytical laboratories directly by courier, with the exception of the XAD resin/filter samples, which were delivered directly to Axys by Integral staff.

3.9 FIELD DOCUMENTATION

All field activities and observations were noted in bound field logbooks (Appendix A). Information included personnel, date, time, station designation, sampler, types of samples collected, and general observations. Any changes that occurred at the site (e.g., personnel, responsibilities, deviations from the Surface Water FSP and Addendum to the FSP) and the reasons for these changes were documented in the field logbook.

A sample collection checklist was produced prior to sampling and completed following sampling operations at each station. The checklist included station designations, types of samples to be collected (e.g., one jar for metals), and whether blind field replicates or additional sample volumes for laboratory QC analyses were collected. These checklists were similar in content to the detailed sample analyses lists provided in Table 3-3 of this field report.

Water quality parameters were recorded on log sheets for the YSI multiprobe data logger. Total volume filtered with time, pumping rates, pump rotations per minute, and pressure readings were also hand-written on log sheets for the Infiltrex 300 pump system. Copies of all log sheets for the YSI and Infiltrex are presented in Appendix B.

Finally, a sample chain-of-custody form was established in the field for each sample before it was shipped from the field lab to the analytical laboratories. A complete set of the project chain-of-custody forms are kept in the project file at Integral's Olympia, WA office.

3.10 DEVIATIONS FROM THE ROUND 2 FSP, FSP ADDENDUM AND QAPP

This section discusses Round 3 water sampling deviations from the Surface Water FSP (Integral 2004d), Addendum to the FSP (Integral 2006), Round 2 QAPP (Integral and Windward 2004), Round 2 QAPP Addendum 1 (Integral 2004c), and HSP (Integral 2004b).

3.10.1 Sampling Method Deviations

Several deviations from sampling methods described in the Surface Water FSP and Addendum to the FSP occurred during the first surface water sampling event of 2006.

3.10.1.1 Sample Stations

Each of the samples was collected at a single point mid-channel location. The ability to collect a sample at approximately one-third below the water surface was hindered by the high-flow conditions The average depth achieved at each of the locations was 5.18 m, 3.65 m, and 1.29 m at locations W005, W023 and W024, respectively.

The target sample collection volume for the Infiltrex 300 pump system was 500 liters at each sample station. Due to the conditions (high suspended solids, high flow, and decreased daytime hours), the field crew was not able to collect 500 liters. The following volumes were collected at each sample station:

W005 – 391 liters

W023 – 369 liters

W024 – 370 liters

3.10.2 Equipment Decontamination Deviations

The following equipment decontamination procedures deviated from those described in the surface water FSP:

- The peristaltic pump samples were filtered in the field for the collection of samples for dissolved metals and DOC. Therefore, it was decided that the 0.45-µm filter only needed to be cleaned with dilute HNO_3. However, the 0.45-µm filters were hydrophobic and had to be "wetted" with methanol prior to rinsing with a water-based solution. The cleaning process involved pumping methanol through the filter unit to wet the filter, draining the methanol, rinsing the filter with DI water for approximately 10 minutes, filling the filter unit with dilute HNO_3, and allowing it to soak for 24 hours. The filter unit was drained of acid and flushed with DI water. The unit was then filled with DI water and allowed to soak for 24 hours, followed by a series of draining and rinsing procedures with DI water. Filter units were dried in a laminar flow hood and double-bagged in polyethylene bags.
- Due to the volume of acid required to fill the polycarbonate carboys, the cleaning procedure was modified. Each polycarbonate carboy was half-filled with dilute reagent-grade HNO_3. The lid was secured, and the carboy was placed on its side for 12 hours, followed by rotation to the other side for an additional 12 hours. The carboys were drained of acid, rinsed with DI water, drained, dried in a laminar flow hood, and double-bagged in polyethylene bags.
- Due to the volume of methanol required to fill the glass carboys, the cleaning procedure was modified. Each glass carboy was rinsed three times with methanol using a squeeze bottle to thoroughly coat all inner surfaces. The carboys were rinsed with DI water, dried, and double-bagged.
- Half of the total number of Teflon™-coated stir bars were cleaned in reagent-grade methanol and the other half cleaned in dilute reagent-grade HNO_3, rinsed with DI water, dried, and placed inside glass and polycarbonate carboys, respectively.

3.10.3 Other Deviations

- Due to calibration complications, the YSI did not collect dissolved oxygen, conductivity, and depth measurements at locations W005 and W023. Water depths were estimated at these two stations.
- The water sampler was deployed from the stern of the boat and not from the bow as it was previously done in past Round 2A sampling events because a

different boat was used. The boat normally used for surface water sampling did not have a sufficiently strong engine and was not safe in the high currents of this high-flow event.

- The water sampler was tethered to a stainless-steel cable as opposed to a Technora™ rope. Due to the short amount of time needed to sample water, insufficient time was available to re-spool the winch with Technora™ rope.
- Samples were not contained within double zip-locked bags after collection in the field, as noted in Section 3.8 of the Surface Water FSP.

3.11 QUALITY ASSURANCE/QUALITY CONTROL

Table 3-3 summarizes the number of surface water samples collected by analyte group. Table 3-5 includes the target field QC sample (replicate, rinsate blanks) percentages and actual number of QC samples collected. Overall, the field QC program was implemented as defined in the Surface Water FSP, the Addendum to the FSP, and Round 2 QAPP.

4.0 LABORATORY ANALYSES

This section summarizes the chemical analyses that are being performed for the characterization of surface water samples from the Round 3 sampling event. Table 3-3 lists the analyses being conducted on each sample. The analytical methods being used for the samples are compiled in Table 4-1.

The standard chemical suite for all stations includes metals, semivolatile organic compounds (SVOCs), butyltin compounds, and herbicides. Samples for conventional parameters, including TDS, TSS, total organic carbon (TOC), and DOC, were collected at all stations. Water quality parameters (temperature, dissolved oxygen, specific conductance, pH, turbidity, and ORP) were also measured at all stations; however, due to problems with calibration, DO and conductivity data were not collected at W005 and W023. XAD resin and filter samples were collected at each of the three mid-channel stations (see Table 3-3) and are being analyzed for chemicals of interest, including dioxins/furans, polychlorinated biphenyls (PCBs) congeners, pesticides, and polycyclic aromatic hydrocarbons (PAHs).

4.1 CHEMICAL ANALYSES

4.1.1 Peristaltic Pump Samples

Columbia Analytical Services (CAS; Kelso, WA) is conducting all the chemical analysis of samples collected using the peristaltic pump.

4.1.2 XAD Resin/Filter Samples

Axys (Sydney, B.C., Canada) is extracting the XAD resins and 0.5-µm glass fiber filters, and conducting the analyses. Laboratory analysis for the high-volume XAD samples will be conducted according to the FSP Addendum and of the Round 2 QAPP Addendum 1, with the modification identified below:

- For the XAD samples, PCB congeners will be analyzed by high-resolution gas chromatography/mass spectrometry. The QAPP Addendum 1 specified PCB Aroclor analysis for these extracts; however, the method was changed during the Round 2A sampling events because of interference encountered during the PCB Aroclor analyses.
- To minimize the elevation of detection limits for PCB congeners for this high-flow event, the PCB congener analysis will be conducted with two-sixth of the XAD extract rather than one-sixth of the extract as specified in the QAPP Addendum.

- Phthalate esters will not be analyzed on the XAD extract. Laboratory contamination resulted in extensive qualification of the XAD phthalate data during Round 2A. The one-sixth-portion of the extract that could be designated for phthalate analysis will be consumed for the PCB congener analysis. Phthalate esters will be analyzed at each station in the peristaltic pump samples.

4.2 DATA MANAGEMENT

Once the laboratories have completed their internal QA/QC checks, they will export the analytical data (sample, test, batch, and result information) into comma-delimited text files with data columns arranged in an order that is recognized by the project's Environmental Quality Information System (EQuIS) database. These electronic data deliverables (EDDs) are e-mailed to Integral where they are checked for proper EQuIS structure and appended with specific information that was unknown by the labs, such as sampling location, composite information, and field replicate and split information. If any problems are found in the structure of the EDDs, then the laboratory is notified and asked to correct the problem and resubmit the EDD. Each emailed EDD transmission, with the original, unaltered EDD attachment, is stored to document and track the laboratories' delivery of electronic data to Integral.

When the EDD is corrected and complete, they are checked electronically by loading them into the temporary section of Integral's LWG project database. In the process of loading, EQuIS checks the EDDs for correct lookup codes (such as for analytes, test methods, and sample matrices); proper relationships for results, tests, batches, and samples (to ensure all results match with a test, tests with samples, and sample/test pairs with batches); and that all derived samples (such as replicates, splits, and matrix spikes) have corresponding parent samples.

In addition to these checks, EQuIS also checks "less important" characteristics, such as date and time formats and text field lengths, to ensure consistency throughout the database. Any error prevents the EDD from loading until the error is corrected. If errors are found that are related to the way the laboratory is reporting the data or constructing the EDD, then the laboratory is notified and asked to correct the problem and resubmit the EDD. If errors are related to Excel automatically formatting date and time fields, for example, then the error is corrected and steps are taken to avoid repeats of the problem (such as changing default settings in the software). Successfully loaded EDDs are saved to document and track the data that were loaded into Integral's LWG project database.

Each verified and accurate EDD is provided to the Round 3 data validation contractor (EcoChem, Seattle, WA) for data review and validation. These EDDs are also stored in a temporary section of the project database, where they can be queried and examined, if desired, until validation is complete. As EcoChem completes validation of the data by sample delivery group (SDG) or small groups of SDGs, the validator qualifiers and reason codes are applied to the data in the temporary section of the database. The validated data are then merged into the permanent project database. During the merging process, all previously performed electronic checks are repeated to ensure nothing was incorrectly modified with the application of the validation results.

Several queries have been set up in the permanent project database to translate the data structure to a form compatible with the National Oceanic and Atmospheric Administration's (NOAA) Query Manager. The data translation includes creating station and sample identifiers, converting the sample type code, and changing the date format. The translated data are imported into an Access file provided by NOAA that contained template tables for the Query Manager structure.

Integral's LWG project database contains all of the data reported by the analytical laboratories. This includes field and lab replicates, lab dilutions, results for the same analyte from multiple analytical methods (SW8270 and SW8270-SIM, for example), and laboratory QA samples such as matrix spikes, surrogates, and method blanks.

5.0 SUMMARY OF SURFACE WATER SAMPLING

As illustrated in Figure 2-1 and Tables 2-1, 3-2, 3-3, 3-4 and 3-5, the surface water sampling program was conducted in close accordance with the sampling program described in the Round 2A Surface Water FSP (Integral 2004d), Addendum to the Round 2A Surface Water FSP (Integral 2006), the Round 2 QAPP (Integral and Windward 2004), and QAPP Addendum 1 (Integral 2004c). Deviations from the planned approaches are described above and were generally coordinated with the EPA team prior to their implementation.

6.0 REFERENCES

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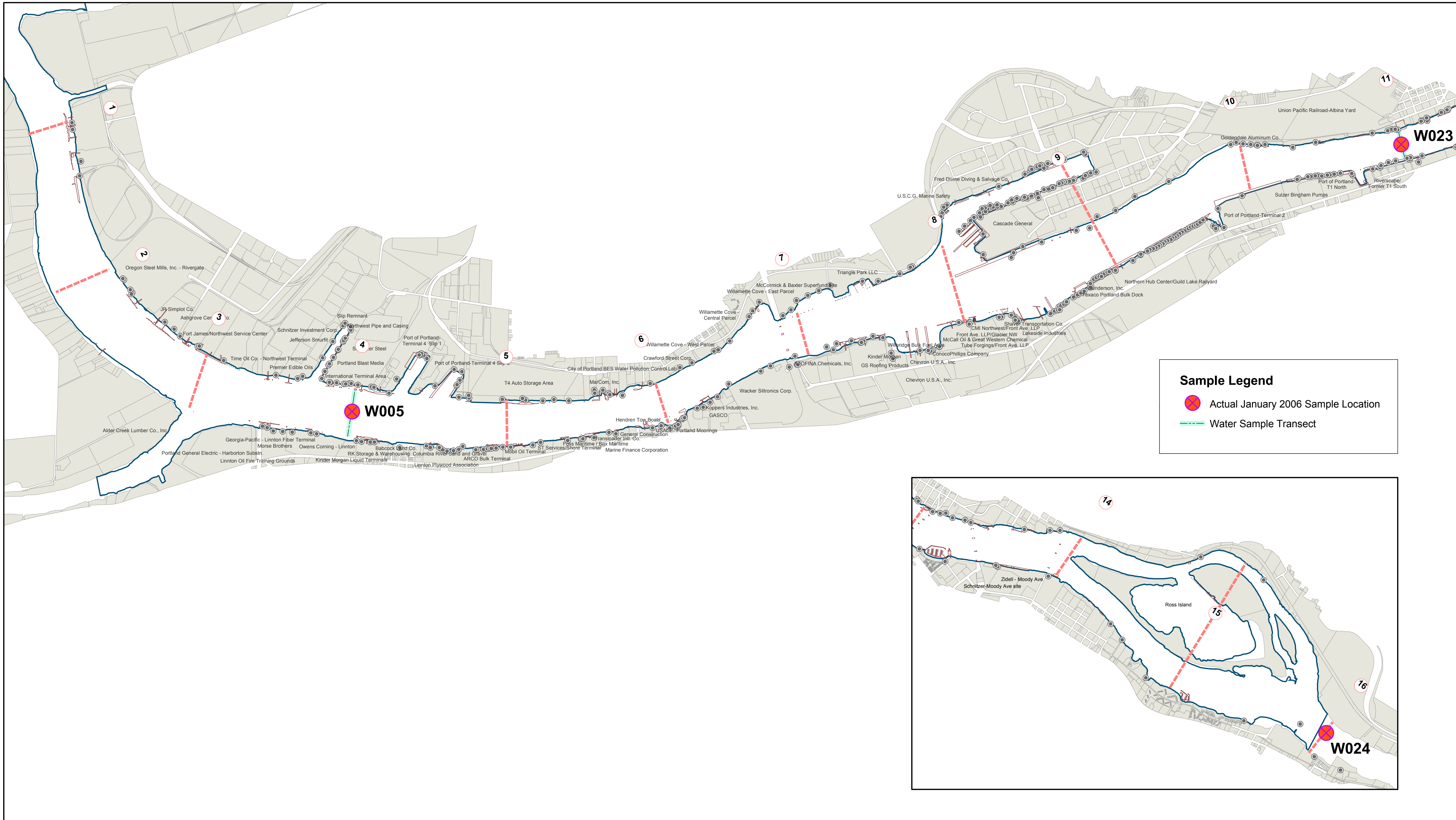

LWG LOWER WILLAMETTE GROUP

integral consulting inc.

FEATURE SOURCES: Metro RLIS, US Army Corps of Engineers.

N

0 1,500 3,000 6,000 Feet

Map Legend

- River Miles
- Outfalls
- Docks & Structures
- Waterfront Taxlots
- River Edge

DRAFT

DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

Figure 2-1. Round 3 January 2006, High-Flow
Surface Water Field Sampling Report
Surface Water Sample Locations

Table 2-1. Surface Water Sampling Stations and Sampling Methods for January 2006 High-Flow Event.

Station ID	River Mile	Sampling Station Description	Sampling Method: Peristaltic Pump	Sampling Method: High-volume XAD-2 Column
W005	MILE 3-4	Downstream Transect - (RM 4.0)	X	X
W023[(1)]	MILE 10-11	Upstream Transect - (RM 11)	X	X
W024	MILE 16	Upstream Transect - (RM 16)	X	X

Notes:
[1] A field replicate was collected at station W023 using a peristaltic pump.

Table 2-2. Precipitation, River Flow, Stream Velocity, and Gage Height for January 2006 High-Flow Event.

Sampling Dates	Gage Height (ft)[1]			Average Stream velocity (ft/s)[1]	Precipitation (in)[2]	River Flow (ft^3/s)[3,4]
	Min	Max	Avg			
1/19/2006	12.47	13.08	12.74	3.73	0.03	168,875
1/20/2006	12.52	13.75	13.2	3.69	0.45	168,646
1/21/2006	12.37	13.91	13.15	3.65	0.05	166,667

Notes:

[1] USGS Water Resources Web Page - USGS 14211720 Willamete River at Portland, OR - http://waterdata.usgs.gov/nwis.

[2] National Weather Service Forecast Office, Portland, OR - http://newweb.wrh.noaa.gov/climate/index.php?wfo=pqr.

[3] River flow data are estimated daily mean values.

[4] USGS Water Resources Department, Portland, OR.

Table 3-1. Surface Water Sampling Stations, Dates Sampled, Positional Data, and Conventional Water Quality Data for January2006 High-Flow Event.

Station ID	Date	Start Time	End Time	Anchored	State Plane Coordinates Oregon North Zone		Water Quality Parameters Measured with YSI[1]									Total sampling time
					Northing	Easting	log in time	log out time	Temperature (°C)	EC (uS/cm)	DO (mg/L)	Depth[(2)] (m)	pH	ORP (mV)	Turbidity (NTU)	
Peristaltic Samples																
W005	1/21/2006	9:16	10:00	Yes	7617628	715621	8:46	15:40	7.78	--	--	5.18	6.89	223	87	0:44
W023	1/20/2006	9:20	10:00	Yes	7642521	690101	--	--	--	--	--	--	--	--	--	0:40
W023-2	1/20/2006	11:05	11:33	Yes	7642521	690101	9:25	16:00	7.89	--	--	3.67	6.83	248	139	0:28
W024	1/19/2006	10:25	11:20	Yes	7646466	665593	10:25	16:44	7.84	82.0	14.07	1.29	6.82	220	110	0:55
XAD Samples																
W005	1/21/2006	9:16	15:42	Yes	7617628	715621	--	--	--	--	--	--	--	--	--	6:26
W023	1/20/2006	9:15	12:16	Yes	7642521	690101	--	--	--	--	--	--	--	--	--	3:01
		13:00	14:15	Yes	7642540	690074	--	--	--	--	--	--	--	--	--	1:15
		14:19	16:00	Yes	7642505	690084	--	--	--	--	--	--	--	--	--	1:41
W024	1/19/2006	10:25	16:47	Yes	7646466	665593	--	--	--	--	--	--	--	--	--	6:22

Note:
[1] Averaged data were collected with a YSI 6600 sonde with MDS650.
[2] Depth estimated for stations W005 and W023 due to YSI calibration problems.
Total pumping time is calculated on last column.
-- No YSI data available, calibration problem.

Table 3-2. Summary of Surface Water Stations and Sample Sets Collected for January 2006 High-Flow Event.

Sample Type	**Stations**	**Number of Samples Sets Collected**[1]		**Comments**
Peristaltic Pump				
Downstream (RM 4)	W005	1		
Upstream Transect (RM 11.0)	W023	2		One replicate collected at W023.
Upstream (RM 16)	W024	2		One rinsate collected in field laboratory.
Totals		***5***		
XAD-2 Resin and Pre-filter		**XAD-2 Resin**	**0.5µm-filter**	
Downstream (RM 4)	W005	1	1	
Upstream Transect (RM 11.0)	W023	1	1	
Upstream (RM 16)	W024	2	2	One system blank (XAD column and filter) collected in field laboratory.
Totals		***4***	***4***	

Note:
[1] Number of samples sets includes all analytes listed in Table 3-3. It also includes surface water QC samples (i.e., field replicates).

Table 3-3. Surface Water Samples Collected, Dates Sampled, and Analyses Conducted for January 2006 High-Flow Event.

		XAD-2 Resin & Prefilter				Peristaltic Pump								
Date Sampled	**Sample ID**	**Dioxin**	**PCB cong**	**Pesticides**	**PAHs**	**TSS**	**TDS**	**TOC**	**DOC (filt)**	**Metals Unfiltered**	**Metals Filtered & Hardness**	**TBT**	**Herbicides**	**SVOCs (incl phthalates)**
1/21/2006	**LW3-W1005**	X	X	X	X	X	X	X	X	X	X	X	X	X
1/20/2006	**LW3-W1023-1**	X	X	X	X	X	X	X	X	X	X	X	X	X
1/20/2006	**LW3-W1023-2**					X	X	X	X	X	X	X	X	X
1/19/2006	**LW3-W1024**	X	X	X	X	X	X	X	X	X	X	X	X	X
1/18/2006	**LW3-W1901***					X	X	X	X	X	X	X	X	X
1/18/2006	**LW3-W1902****	X	X	X	X									

Note:
[1] A field replicate sample was collected at station W023.
* Field persitaltic pump sampling system rinsate.
** Field Infiltrex pump sampling system blank collected in XAD-2 column and 0.5-µm filter.

Table 3-4. Surface Water Sampling Data from Stationary Locations Using the Infiltrex 300 System for January 2006 High-Flow Event.

Sample Location	Actual Depth (m)[1]	Estimated Total Sampling Time (hour)[2]	Actual Total Sampling Time (hour:min)[3]	Estimated rate of descent/ascent (m/min)	Measured rate of descent/ascent (m/min)	Infiltrex 300 Average pumping rate (mL/min)[4]	Total Volume Pumped per Station (L)[5]
W005	5.18	7:00	6:26	stationary	stationary	1,224	391
W023	3.67	7:00	5:57	stationary	stationary	1,220	369
W024	1.29	7:00	6:22	stationary	stationary	1,200	370

Notes:

[1] Actual depth was measured with a YSI 6600 sonde.

[2] Estimated sampling times are for sampling 500L with an Infiltrex pump at an average pumping rate of 1.25L/min.

[3] Actual total sampling time was calculated from entries in the Infiltrex 300 log sheets in Appendix B.

[4] Average pumping rate was calculated from field calibrated entries in the Infiltrex 300 log sheets in Appendix B.

[5] Total volume reported is field calibrated value determined from field pumping rate measurements. The % error between Infiltrex flow meter volume readings and calibrated flow measurements varied between 2% and 5%.

NA = not applicable

Table 3-5. Surface Water Sampling Field QC Samples for January 2006 High-Flow Event.

Parameter	Samples	Blind Field Replicates[1]	Blind Field Sample Splits[2]	Field Rinsate Blanks[3,4]	Decon Blank[5]	Total Number of Samples[6]
Peristaltic Pump						
Metals (unfiltered)	3	1	0	1	1	6
Metals (filtered)	3	1	0	1	1	6
Herbicides	3	1	0	1	1	6
SVOCs (incl phthalates)	3	1	0	1	1	6
Butyltin compounds	3	1	0	1	1	6
TSS	3	1	0	1	0	5
TDS	3	1	0	1	0	5
DOC (filtered)	3	1	0	1	1	6
TOC	3	1	0	1	1	6
XAD-2 Resin						
PCB Congeners	3	0	0	1	0	4
Organochlorine Pesticides	3	0	0	1	0	4
PAHs	3	0	0	1	0	4
Dioxins/Furans	3	0	0	1	0	4

Note:

1 Field QC sample numbers were based on a frequency of 5% or minimum of 1 per 20 samples.

2 Field split samples were not requested by EPA or any other parties.

3 A field rinsate blank was collected near the beginning of the sampling event for the peristaltic pump.

4 Prior to start of sampling event, 4 liters of certified ultra clean water (Axys) were passed through a new XAD-2 resin column and a new 0.5-um filter at the field lab. The column and filter were sent out to Axys as a system blank.

5 Prior to the start of sample collection activities, a decon blank of the peristaltic pump sampling equipment was generated by Battelle's laboratory.

6 Total number of samples includes laboratory QA/QC samples.

Table 4-1. Laboratory Methods for January 2006 High-Flow Surface Water Samples.

		Sample Preparation		Quantitative Analysis	
Analytes	**Laboratory**	**Protocol**	**Procedure**	**Protocol**	**Procedure**
Peristaltic Pump Samples					
Conventional Analyses	CAS				
Total Suspended Solids		EPA 160.2	Filtration and drying	EPA 160.2	Balance
Total Dissolved Solids		EPA 160.1	Filtration and drying	EPA 160.1	Balance
Total Organic Carbon		EPA 415.1	Chemical oxidation	EPA 415.1	Infrared detector
Dissolved Organic Carbon		EPA 415.1	Filtration, chemical oxidation	EPA 415.1	Infrared detector
Metals	CAS				
Aluminum, antimony, cadmium, total chromium, copper, lead, nickel, selenium, silver, zinc		EPA 3005	Acid digestion	EPA 200.8	ICP/MS
Arsenic		EPA 3005A (Modified)	Acid Digestion/pre-concentration	EPA 200.8	ICP/MS
Hardness (Ca, Mg)		EPA 3005	Acid digestion	EPA 200.8 or 6010B SM2340B	ICP/MS or ICP/OES Calculation
Chlorinated Herbicides	CAS	EPA 8151A	Solvent extraction Esterification	EPA 8151A	GC/ECD
Semivolatile Organic Compounds (including phthalates)	CAS	EPA 3520C	Continuous liquid-liquid extraction	EPA 8270C	GC/MS with LVI GC/MS-SIM (PAHs only)
XAD-2 Column Extracts					
Column Extraction	Axys	EPA 3540	Soxhlet extraction	--	--
Organochlorine Pesticides	Axys	AXYS SOP MLA-028	Florisil® cleanup Extract fractionation	AXYS SOP MLA-028	HRGC/HRMS
Polycyclic Aromatic Hydrocarbons	Axys	AXYS SOP MLA-021	Extract fractionation	AXYS SOP MLA-021	HRGC/LRMS
Chlorinated Dioxins and Furans	Axys	EPA 1613B[1]	Layered Acid/Base/SiO_3 column Florisil® cleanup Carbon/Celite clean-up column 1% deactivated basic Alumina	EPA 1613B	HRGC/HRMS
PCB congeners	Axys	EPA 1668A	Florisil® cleanup Extract fractionation Layered Acid/Base SiO_3 Alumina	EPA 1668A	HRGC/HRMS

[1]Cleanup procedures indicated in this table will be used as needed for chlorinated dioxin and furan analyses.

CAS - Columbia Analytical Services
EPA - U.S. Environmental Protection Agency
GC/ECD - gas chromatography/electron capture detection
GC/MS - gas chromatography/mass spectrometry
HRGC/HRMS - high resolution gas chromatography/high resolution mass spectrometry
HRGC/LRMS - high resolution gas chromatography/low resolution mass spectrometry
ICP/OES - inductively coupled plasma/optical emission spectrometry
ICP/MS - inductively coupled plasma - mass spectrometry
LVI - large-volume injector
SIM - selected ion monitoring
SOP - standard operating procedures

PORTLAND HARBOR RI/FS

ROUND 3 JANUARY 2006 HIGH-FLOW SURFACE WATER FIELD SAMPLING REPORT

APPENDIX A
FIELD NOTEBOOK

DRAFT

March 27, 2006

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LEVEL

All-Weather Notebook
No. 311

FALL 2005, JAN 2006
LWG MULTIPLATE STUDY.
(CONTINUED FROM DISCHARGE MAPPING + ~~FZW~~ FIELDBOOK)
~~+ FZW SAMPLING~~ 8

4 5/8" x 7" - 48 Numbered Pages

+ Round 3 January 2006
High-Flow Event
1/19/06 - 1/21/06

1/19/06 Rd 3 SW High Flow B0101484 J.SUND
J. SUND

0645 At lab. Load gear. (on 1/18/06) collect peristaltic pump system rinsate (LW3-W1901) and Infiltrex pump system blank (LW3-W1902). column: 00134 L8579-2
Assemble Column/Filter

0730 Meet DEA @ Riverplace Dock, unload + set up Sampling eqpt

Filter: L8316-6 L8579-6 30NOV05

Crew:
J. Moore } Integral
J. Sund }
Travis - DEA

weather - cool (40s) overcast

plan: Mob to RMile to collect peristaltic + XAD Samples @ W024. Sample location will be one location @ approx midpt of channel + sampler will be set ~ 1/3 way

JS

1/19/06 Rd3 SW High Flow B0101438H J.Sund

down in water column.

0750 Calibrate YSI 6600-D

pH std

@25C 4.0 Lot No. 5110-19 Exp 4/25/07

7.0 @ 25°C Lot No. 5006-17 exp 1/11/07

10 @ 25°C Lot No. 4343-13 Exp 1/27/07

Conductivity

~~15uS @ 85~~ ~~1413uS @ 25C~~ ~~HI 7031~~ for 85

lot No. G010

1.500 mS/cm @ 25°C Lot No 2507015 Exp June 2006

ORP HI 7021

240mV @ 25°C Lot No G277 exp: 1/2010

Conductivity: 2.237 mS/cm

pH: 4.0 4.26

7.0 6.95

JS

1/19/06 RD3 SW High Flow. B0101438H J.Sund

pH 10.0 → 10.00

ORP 240mV → 242.5mV

DO → reads 12.52 mg/L

0800 Health & Safety briefing

0810 Mob to RM 16, Station W024. Call Coast Guard + Sheriff.

0850 At RM16, setting anchor.

1015 Total depth @ Location ~100'

Sampler set in.

1025 Start Infiltrex, Start logging YSI

Sampled depth range B/T 4.5-8.0' below surface. Current v. strong. Attached rope to bottom of sample set up + tied off on boat cleat to put sampler from twist. Set up 25 lb weight on 10' cable + attached

JS

1/19/06 Rd3 SW High Flow B0101484 J.SUND

to bottom of sampler to try + keep sampler from drifting.

1120: STOP PERISTALTIC PUMP, ENOUGH VOLUME PUMPED.

1115 Peristaltic sample Collection Time

1203: COMPLETED PERISTALTIC SAMPLING.

1210: STOP INFILTREX - REATTACH LINE + TUBING TO SAMPLER - THE CURRENT HAD PULLED TUBING OUT OF ZIP TIES.

1215 Sampler + YSI Back in water, Start Infiltrex

1235 CHANGE 140 u FILTER

1240 START INFILTREX AGAIN - LOTS OF DEBRIS IN FILTER - MANY LOGS ALSO BUMPING INTO LINE.

~~NOTE~~ ~~GPS COORDINATES.~~

~~764646.30 EAST (METERS)~~

~~665392.36 NORTH "~~

WATER DEPTH 104 ft

1647 Stop Infiltrex, Stop

[signature]

1/19/06 Rd 3 SW High Flow B0101484 J. SUND

Logging YSI.

Total collected:

Infiltrex rdg: 348

Calibrated rdg: 375

1702 YSI cal check

Conductivity: 1.108 mS/cm

pH 4.0 → 4.02

pH 7.0 → 7.04

pH 10.0 → 10.00

ORP: → 237 mV

DO: → 11.75 mg/L

1720 Head back to boat dock @ Riverplace

1820 Back @ Lab, Decon Infiltrex & pre-filters.

1900 Depart LAB

[signature]

1/19/06

1/20/06 Rd 3 SW High Flow B0101484 J.SUND

0640 Arrive @ Lab, put on filter + column on XAD

Column: ID: 00133
L8579-1

40 mL CS020A-SUR/01 #4
1/16/06

240 mL DR012A-STK/02 #2
1/16/06

120 mL PR013A-STK/01 #2
1/16/06

Filter L8579-6
clay batch L8316-6
cleaned 30Nov05

LOAD Eqpt

0730 Meet DEA + Riverplace Boat Dock, set up eqpt.

Calibrate YSI

Cond. 1500 uS/cm @ 25°C = 2.2 mS/cm

pH 4.0 = 3.99
pH 7.0 = 7.0
pH 10.0 = 10.0

[initials]

1/20/06 Rd 3 SW High Flow J.SUND

DRO = 242
DO = 11.87

0800 MOB TO Rm 11, Statcon W1023

Crew: J.SUND } Integral
J.MOORE }
Trans - DEA

Call Coast Guard + Sheriff

Plan: Collect peristaltic + Infiltrex samples @ W023 + also collect duplicate.

0830 Setting anchor @ W023.

Deploy Sampler

TOTAL Depth = 68'

coordinates

N: 690100 (m)
E: 7642520 (m)

0900 YSI Probe not functioning properly. Not reading Conduc, D.O or depth. Checked all connections - all good

[initials]

1/20/06 RD3 SW High Flow B0101484H J. Sund

0915 Start infiltrex, Start logging YSI start
0920 peristaltic
0950 Unload YSI data from yesterday + Start logging file W023
1000 Collect LW3-W1023-1 on peristaltic, collect 3 add'l archive samples.
1040 COMPLETE PERISTALTIC SAMPLES + ARCHIVES.
1105 Start peristaltic to collect LW3-W1023-2 (duplicate) on same carboy + tubing setup as for W1023-1
1133 Stop peristaltic, complete collection.
1135 Peristaltic collection time LW3-W1023-2
1150 Call from Hoskins regarding YSI issues.
He suggest recalibrating.

1/20/06 RD3 SW High Flow B0101484H J. SUND

DO, cond + depth
1216 Stop infiltrex, pull up sampler to allow tug/barge to pass. Pull anchor to move, anchor caught on weight of sampler. Bottom structure of sampler broken apart. Able to velcro figure to send down w/ weight (lapped)
1300 Sampler in water. Infiltrex Start, Start logging YSI. Calibration did not fix issue w/ DO, Cond + depth.
1415 Stop infiltrex, reanchor (drifted off station a bit)
1419 start infiltrex
1504 Stop infiltrex, change pre-filter (140um)

B0101448H

1/20/06 RD3 SW High Flow J.SUND

1600 Stop Logging YSI, Stop Infiltrex.
Pull up Sampler.
Dnload YSI to Ecowatch
W023, W023B, W023R

1605 Head to Riverplace Boat Ramp.
Cal check on YSI
pH 4.0 => 4.10
pH 7.0 => 7.10
pH 10 => 10.0
ORP 240 mV => 237 mV
D.O rds @ 11.54 mg/L
cond => will not read soln. reads when exposed to Air but not when submerged.

1730 At lab, decon Infiltrex & put away samples.

1800 Depart Lab

B0101448H9

1/21/06 RD 3 SW High Flow J.SUND

0645 Arrive @ Field Lab
assemble column + filter on Infiltrex.
Column: 00136
L8579-4
16 Jan 06
Filter: L8571-6
Chnbatch L8316-6
Clned 30 Nov 05
40 uL CS020A-SUR/01 #4
240 uL DX012A-STK/02 #2
120 uL PR013A-STK/01 #2
1/16/06
LOAD GEAR, Head to Cathedral Park to meet TV [illegible]

0730 At boat ramp
weather cool (40's)
rainy
Call Coast Guard + Sheriff

0805 Depart Ramp, Mob to RM4.
Crew: J. Sund } Integral
J. Moore }

1/21/06 Rd 3 SW High Flow B0101484 J. SUND

Travis – DEA

Plan: collect XAD and peristaltic samples @ RMU, LW3-W1005

0810 Calibrate YSI
Cond (1413 ms/cm) ⇒ 1.850 @ 10.35 values varies
pH 4.0 @ 25°C ⇒ 3.94 @ 11.6°C
pH 7.0 @ 25°C ⇒ 6.93 @ 11.6°C
pH 10.0 @ 25°C ⇒ 9.94 @ 11.6°C
ORP (240 mV) ⇒ 240.6 @ 10.4°C
D.O ⇒ 11.70 mg/L @ 8.63°C
Try to calibrate depth @ surface to 0.0, but as lower sampler in water depth reads. less than what is read @ surface.

0845 Lower Sampler, on location.
Depth = 68.2'
Sampler lower to ~ 17.0'
Coordinates:
E: 7617628
N: 715621

[signature]

1/21/06 RD 3 SW High Flow B0101484 J. SUND

0916 Start Infiltrex, Start YSI logging, Start peristaltic pump

1000 Collect Peristaltic 2 Samples, LW3-W1005

1045 Complete collection of peristaltic samples

1112 Stop Infiltrex - backflush

1121 Start Infiltrex

1209 Stop Infiltrex - backflush

1217 Start Infiltrex

1250 Stop Infiltrex - backflush
Start Infiltrex

1326 Stop Change Pre-Filter

1341 Start Infiltrex

1412-1418 Stop - backflush

1449-1457 Stop - backflush

1542 Stop Infiltrex
TOTAL VOL 380
TOTAL VOL (CAL) 391
Pull up Sampler
Mob to Cathedral PK

1545 Check YSI Cal.
pH 4.0 = 4.18 ; pH 7.0 = 7.13

[signature]

1/21/06 R03 SW High Flow B010148H S-SUND

pH 10.0 = 10.0
ORP 240 mV = 237 mV
1556 Dnld YSI data to Ecowatch W1005.
1640 Sample time for column + filter.
1700 Depart Lab

1/21/06

3/11/06 SW High Flow (Notes) B010148H J Sund

Notes on High Flow Sampling Event 1-19-06 to 1-21-06.
On 1/18/06, equipment blanks were collected on peristaltic + XAD as follows:
1230 Collect peristaltic blank LW3-W1901
1500 Decon Infiltrex Unit
20 L Alconox Wash Water (10 in each filter casing)
5 L CAS DI water (2.5 each housing)
3 L Acetone (1.5 L each housing)
3 L Methanol (1.5 L ea. housing)
3 L Ultra pure (1.5 L ea. housing)

1530 Collect equipt. blank on Infiltrex Unit
Column ID : 00137
Repack ID : L8579-5
40 mL C5020A-SUR/01 #4
16 Jan 06
240 mL DX012A-STK/02 #2
16 Jan 06
120 mL PR013A-STK/01 #2
16 Jan 06

3/16/06 SW High Flow (Notes) B0101487A J. SUND

Filter (0.5um) L8579-6
Cleaned : 30 Nov 05
Cleaning batch : L8316-6

Ran Infiltrex @ 600 rpm for equip. blank
rate : 1.157 L/min
total 4.2 L UP H_2O.

(Notes transcribed from note pad in field lab 1/18 + 1/19/06)

On 1/19/06 the following Columns + Filters were used for sample collection.

Column ID: 00134, L8579-2
40 mL CS020A-SUR/01 #4
16 Jan 06
240 mL DX.012A-STK/02 #2
16 Jan 06
120 mL PR013A-STK/01 #2
16 Jan/06

[signature]

3/16/06 SW Hg Flow (Notes) B0101488 J. Sund

(1) Filter : L8316-6 cleaning batch
+
(2) L8579-6
cleaned 30 Nov 05

[signature] 3/16/06

LWG
LOWER WILLAMETTE GROUP

PORTLAND HARBOR RI/FS

ROUND 3 JANUARY 2006 HIGH-FLOW SURFACE WATER FIELD SAMPLING REPORT

APPENDIX B
INFILTREX AND YSI WATER SAMPLING LOGS

DRAFT

DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part.

March 27, 2006

YSI LOG

Survey: RD3 SW High Flow Crew: J. Moore, J. Sund Date: 1/19/06

Station	Time	Depth	Temp C	DO (mg/L)	pH	Conductivity (mS/cm)	ORP (mV)	Comments
W024	10:49	4.85	7.82	14.29	6.93	0.083	217	YSI start log (original start @ 1025)
↓	1055	5.26	7.82	14.07	6.92	0.082	215	
	1108	4.32	7.82	14.07	6.82	0.083	214	
	1119	4.71	7.82	14.23	6.82	0.083	216	
	1128	5.35	7.82	14.07	6.79	0.083	219	
	1156	4.98	7.82	14.08	6.90	0.083	215.7	
	1203	3.80	7.82	14.09	6.90	0.083	217	Pull up sampler @ 1204 + reset tubing back in @ 1215
	1215	4.31	7.82	14.00	6.87	0.083	315	
	1240	2.87	7.83	14.10	6.82	0.083	215	RESTARTED INFILTREX - FILTER X 140 mm
	1304	3.72	7.83	14.09	6.82	0.083	211	
	1316	3.95	7.83	14.09	6.81	0.083	211	
	1331	5.02	7.83	14.09	6.80	0.083	212	
	1355	5.07	7.84	14.10	6.79	0.083	209	
	1401	3.29	7.84	14.10	6.80	0.083	211	
	1415	3.61	7.84	14.10	6.82	0.083	209	
	1434	5.39	7.85	14.10	6.78	0.083	211	
	1458	2.95	7.85	14.10	6.79	0.083	211	
	1516	3.41	7.85	14.10	6.76	0.083	210.9	
	1529	4.31	7.85	14.10	6.79	0.083	212	
↓	1550	3.41	7.86	14.11	6.80	0.083	212	

YSI LOG

Survey RD3 SW High Flow Crew J. Moore, J. Sund Date 1/19/05

Station	Time	Depth	Temp C	DO (mg/L)	pH	Conduct-ivity (uS/cm)	ORP (mV)	Comments
W024	1604	2.93	7.86	14.11	6.83	0.083	223	
↓	1617	6.20	7.86	14.11	6.76	0.083	233	
	1631	4.59	7.86	14.11	6.77	0.083	226	
	1644	3.92	7.87	14.11	6.78	0.083	221	

YSI LOG

Survey: Rd3 SW HighFlow Crew: J. Sund, J. Moore Date: 1/20/06

Station	Time	QSE: 12 ft Depth	Temp C	DO (mg/L)	pH	Conductivity (uS/cm)	ORP (mV)	Comments
WO23	0925	—	7.85	—	6.84	—	391	Probe not functioning properly
	0935	—	7.85	—	6.86	—	349	fine when out of water + when calibrating
	0954	—	7.85	—	6.85	—	266	
	1015	—	7.85	—	6.84	—	249	
	1030	—	7.86	—	6.84	—	243	
	1034	—	7.86	—	6.84	—	232	
	1050	—	7.85	—	6.85	—	228	
	1107	—	7.85	—	6.84	—	225	
	1119	—	7.85	—	6.82	—	222	
	1136	—	7.85	—	6.83	—	219	
	1152	—	7.85	—	6.82	—	215	Stop YSI @ 1216 to recal.
	1306	—	7.85	—	6.80	—	—	
	1320	—	7.85	—	6.84	—	258	
	1336	—	7.86	—	6.84	—	237	
	1400	—	7.86	—	6.85	—	225	sampler up @ 1415-1419
	1419	—	7.86	—	6.87	—	215	
	1436	—	7.87	—	6.85	—	219	
	1450	—	7.86	—	6.85	—	217	
	1504	—	7.86	—	6.88	—	217	
	1525	—	7.86	—	6.85	—	217	

YSI LOG

Survey B3 SW High Flow Crew J. Moore, J. Slund Date 1/20/06

Station	Time	~12.0' Depth	Temp C	DO (mg/L)	pH	Conduct-ivity (uS/cm)	ORP (mV)	Comments
W023	1540	–	7.86	–	6.86	–	219	
↓	1600	–	7.86	–	6.86	–	221	Pull sampler - End.

YSI LOG

Survey Rd 3 SW High Flow Crew J. Sund, J. Moore Date 1/21/06

Station	Time	~17.01' Depth	Temp C	DO (mg/L)	pH	Conduct-ivity (uS/cm)	ORP (mV)	Comments
W1005	0919	0.030*	7.78	—	6.88	—	333	not able to calib cond, DO or depth
	0934	0.029	7.79	—	6.90	—	302	
	0952	"	7.79	—	6.89	—	275	
	1007	0.027	7.79	—	6.88	—	256	
	1024	"	7.79	—	6.90	—	239	
	1040	0.026	7.79	—	6.88	—	230	
	1058	0.027	7.79	—	6.90	—	222	
	1112	"	7.79	—	6.89	—	217	
	1123	0.026	7.79	—	6.90	—	214	
	1137	0.027	7.80	—	6.90	-	211	
	1153	0.026	7.80	—	6.89	—	208	
	1209	0.027	7.79	—	6.91	—	206	
	1217	"	7.79	—	6.90	—	206	
	1233	0.026	7.79	—	6.90	—	204	
	1250	0.026	7.79	—	6.91	—	203	
	1316	0.025	7.79	—	6.89	—	203	
	1333	0.024	7.79	—	6.90	—	201	
	1356	0.020	7.79	—	6.89	—	199	
	1412	0.019	7.79	—	6.90	—	198	
↓	1435	"	7.79	—	6.89		198	

* Depth reading inaccurate, attempted calibration

YSI LOG

Survey RD3 SW High Flow Crew J. SUND, J. MOORE Date 1/21/06

Station	Time	Depth	Temp C	DO (mg/L)	pH	Conductivity (uS/cm)	ORP (mV)	Comments
WI005	1449	0.019	7.78	–	6.90	–	199	
↓	1515	0.018	7.78	–	6.90	–	199	
	1530	0.018	7.78	–	6.89	–	199	
	1540	0.017	7.77	–	6.89	–	200	

1/21/06

Infiltrex 300 System - Water Sample Log

Survey LW3 WINTER Crew JM. JS. Date JAN 19th 2006

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W024	1025	1027	1000	1800	7	3		START INFILTREX 1.98 L/min
↓	1027	1030	900	1662		3		1.69 L/min
	1030	1033	750	1370	13	2		1.39 L/min
	1033	1035	720	1269		1		1.30 L/min
	1035	1050	720	416	29.4	<1		0.60 L/min
	1050							BACKFLUSH
	1052	1110	720	1188	32	1.5		1.30 L/min
	1110	1113						BACKFLUSH
	1113	1130	720	1197	49	1.5		1.29 L/min
	1130	1150	720	1188	59	2.0		1.30 L/min
	1150	1152	720	1119	71	2.0		1.09 L/min
	1152	1154						BACKFLUSH.
	1154	1210	720	1234	79	3.0		1.70 L/min
	1210	1215						STOP PUMP
	1215	1217	720	1058	89	2.5		START PUMP 1.09 L/min
	1217	1220						BACKFLUSH
	1220	1235	800	1320	95	4.0		Begin Pump 1.31 L/min
	1235	1240						STOP PUMP
	1240	1242	800	1370	116	3.0		START PUMP 1.39 L/min
↓	1242	1300	800	1120	141	3.0		1.27

Infiltrex 300 System - Water Sample Log

Survey LW3 WINTER 06 Crew JS. JM. Date JAN 19TH 2006

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W024	1300	~~1300~~ 1315	800	1197	153	3.0		1.30 L/min
↓	1315	1330	800	430	167	<1		
	1330	1335						Backflush
	1335	1339	850	1357	171	3.0		1.37 L/min
	1339	1354	850	618	190	<1		0.84 L/min
	1354							BACKFLUSH
	1400	1402	850	1365	191	4.0		1.34 L/min
	1402	1415	850	1324	208	4.0		1.25 L/min
	1415	1434	850	573	224	<1		<1.0 L/min
	1434	1442						BACKFLUSH
	1442	1443	850	1312	226	4.5		1.36 L/min
	~~1458~~ 1443	1458	850	1284	246	4.0		1.33 L/min
	1458	1516	850	1239	262	4.5		1.30 L/min
	1516 ~~1529~~	~~1529~~						BACKFLUSH
	1529 1534	→	850	1250	273	5.0		1.30 L/min
	1534	1550	850	1036	292	4.0		1.04 L/min
	1550	1555	1050	1098	296	3.0		increase rate to 1050 rpm; 1.0 L/min
	1555	1600						BACKFLUSH
	1600	1602	900	1356	301	5.0		1.32 L/min
↓	1602	1617	900	1238	320	5.0		1.29 L/min

Infiltrex 300 System - Water Sample Log

Survey RD3 SW High Flow Crew J. Moore, J. Sund Date 1/19/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W024	1617	1631	900	1056	337	3.5		1.15 4min
↓	1631	1645	900	502	348	<1		~0.64/min

Infiltrex 300 System - Water Sample Log

Survey R[3]SW High Flow Crew J. Moore, J. SUND Date 1/20/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W023	0915							Start Infiltrex
	0915	0921	800	1101	4.5	3.0		1.09 L/min
	0921	0925	900	1249	9.0	4.0		Increase RPM 1.28 L/min
	0925	0935	900	1148	23.0	4.5		1.24 L/min
	0935	0941	1000	1258	30.0	5.0		Increase RPM 1.31 L/min
	~~0941~~ 0948	0954	1000	1060	42.0	4.5		1.184 L/min
	0954	~~1000~~						Backflush
	1000	1002	1000	1320	47.0	6.5		1.35 L/min
	1002	1020	1000	1231	62	6.5		1.32 L/min
	1020	1035	1000	1254	86	6.5		1.29 L/min
	1035	1050	1000	1250	101	6.0		1.26 L/min
	1050	~~105~~ 1101						BACKFLUSH
	1101	1102	1000	1268	106	6.5		1.33 L/min
	1102	1119	1000	1225	125	6.0		1.28 L/min
	1119	1136	1000	603	143	21		~0.6 L/min
	1136	1148						Backflush
	1148	1152	1000	1248	148	6.0		1.25 L/min
	1152	1208	1000	1220	167	6.0		1.28 L/min
	1208	1216	1000	1159	177	6.5		1.28 L/min - STOP Pump.
	1216	1300						OFF

Infiltrex 300 System - Water Sample Log

Survey Rd 3 SW High Wollow Crew J. Moore June Sued Date 1/20/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W023	1300	1304	1000	1234	184	7.0		~~1345~~ 94sec 1.28 L/min
	1304	1322	1000	1197	204	6.5		95sec 1.26 L/min
	1322	1336	1000	1170	220	7.0		1.21 L/min
	1336	1338						Back Flush
	1338	~~1404~~ 1345	1050	1245	245	7.0		1.30 L/min
	~~1404~~ 1345	1404	1050	1190	247	7.5		1.25 L/min
	1415	1415						STOP INFILTREX
	1419	1420	1050	1178	257	7.5		Start Infiltrex 1.26 L/min
	1421	1436	1050	1142	274	7.0		1.17 L/min
	1436	1441	1200	1000	279	5.0		~~Backflush~~ Increase RPM - 1.0 L/m
	1441	1449						Backflush
	1449	1451	1200	1325	283	9.5		Start 1.36 L/min
	1451	1504	1200	886	301	4.5		0.92 L/min
	1504	1509						Change Prefilter, Stop Inf.
	1509	1512	1200	1310	305	9.0		Start Infiltrex 1.36 L/min
	1512	1525	1200	1236	323	9.0		93s 1.29 L/m
	1525	1540	1200	1238	338	9.5		1.29 L/min
	1540	1555	1200	1260	355	9.0		1.28 L/min STOP

Infiltrex 300 System V

Survey R03 SW High Flow Crew J. Sund J. Moore Date 1/21/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W1005	0916	0920	1000	1314	6.0	3.5	-	Start 926 1.30 L/min
↓	0920	0935	1000	1158	24.0	3.0	-	1.22 L/min (98%)
	0935	0939	1100	1346	28.0	4.0	-	Increase rate 1.36 L/min
	0939	0955	1100	1363	47.0	4.5	-	1.33 L/min
	0955	1010	1100	1301	58.0	4.0		1.22 L/min
	1010	1024	1100	1270	70.0	3.5	-	1.10 L/min
	1024	1026						BACKFLUSH.
	1026	1035	1100	1356	78	4.5	-	1.39 L/min
	1035	1056	1100	1300	99	4.5	-	1.36 L/min
	1056	1112	1100	1000	116	3.0	-	1.05 L/min
	1112	1121					-	+ Backflush
	1121	1123	1100	1334	120	4.5	-	start 1.36 L/min 88%.
	1123	1137	1100	1264	140	4.5	-	1.32 L/min (90%)
	1137	1153	1100	1288	157	4.5	-	1.28 L/min (94)
	1153	1209	1100	1120	172	4.5	-	1.14 L/min
	1209	1217						BACKFLUSH.
	1217	1219	1100	1300	177	4.5	-	1.35 L/min (89)
	1219	1233	1100	1218	196	4.0	-	1.24 L/min
	1233	1250	1100	800	212	2.0		L/min
↓	1250	1259						Backflush

Infiltrex 300 System - Water Sample Log

Survey Rd 3 SW High Flow Crew J. SUND, J. MOORE Date 1/21/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W1005	1259	1301	1100	1283	216	5.0	—	Start 1.35 L/min
	1301	1316	1100	1159	235	4.0	—	1.22 L/min
	1316	~~1322~~ 1326	1100	847	247	3.0	1400	CHANGE PRE FILTER.
	~~1322~~ 1326	~~1333~~ 1341	—					~~Stop~~
	1341 ~~1333~~	1342	1100	1244	251	5.0	—	Start 1.33 L/min
	1343	1356	1100	1238	269	5.0	—	1.26 L/min
	1356	1412	1100	1111	288	3.5		1.18 102
	1412	1418	—					Stop-backflush
	1418	1420	1100	1234	290	5.0	—	Start 1.29 L/min
	1420	1435	1100	1213	308	5.0	—	1.25 L/min
	1435	1449	1100	1045	323	4.5	—	1.09 L/min
	1449	1457	—					backflush
	1457	1459	1200	1315	329	6.0	—	start 1.36 L/min
	1459	1515	1200	1304	359	6.0	—	1.36 L/min
	1515	1531	1200	1100	369	5.5	—	1.18 L/min
↓	1531	1540	1200	1305	377	5.5	—	1.2 L/min
	1542	—						STOP

[signature] 1/21/06

YSI LOG

Survey RD3 SW High Flow Crew J. Moore, J. Sund Date 1/19/06

Station	Time	Depth	Temp C	DO (mg/L)	pH	Conduct-ivity (mS/cm)	ORP (mV)	Comments
W024	10:49	4.85	7.82	14.29	6.93	0.083	217	YSI start Log (original start @ 1025)
↓	1055	5.26	7.82	14.07	6.92	0.082	215	
	1108	4.32	7.82	14.07	6.82	0.083	214	
	1119	4.71	7.82	14.23	6.82	0.083	216	
	1128	5.35	7.82	14.07	6.79	0.083	219	
	1156	4.98	7.82	14.08	6.90	0.083	215.7	
	1203	3.80	7.82	14.09	6.90	0.083	217	Pull up sampler @ 1204 + reset tubing back in @ 1215
	1215	4.31	7.82	14.00	6.87	0.083	315	
	1240	2.87	7.83	14.10	6.82	0.083	215	RESTARTED INFILTREX - FILTER X 140mm
	1304	3.72	7.83	14.09	6.82	0.083	211	
	1316	3.95	7.83	14.09	6.81	0.083	211	
	1331	5.02	7.83	14.09	6.80	0.083	212	
	1355	5.07	7.84	14.10	6.79	0.083	209	
	1401	3.29	7.84	14.10	6.80	0.083	211	
	1415	3.61	7.84	14.10	6.82	0.083	209	
	1434	5.39	7.85	14.10	6.78	0.083	211	
	1458	2.95	7.85	14.10	6.79	0.083	211	
	1516	3.41	7.85	14.10	6.76	0.083	210.9	
	1529	4.31	7.85	14.10	6.79	0.083	212	
↓	1550	3.41	7.86	14.11	6.80	0.083	212	

YSI LOG

Survey RD3 SW High Flow Crew J. Moore, J. Sund Date 1/19/05

Station	Time	Depth	Temp C	DO (mg/L)	pH	Conduct-ivity (uS/cm)	ORP (mV)	Comments
W024	1604	2.93	7.86	14.11	6.83	0.083	223	
↓	1617	6.20	7.86	14.11	6.76	0.083	233	
	1631	4.59	7.86	14.11	6.77	0.083	226	
	1644	3.92	7.87	14.11	6.78	0.083	221	

YSI LOG

Survey Rd3 SW High Flow Crew J. Sund, J. Moore Date 1/20/06

Station	Time	QSE: 12 ft Depth	Temp C	DO (mg/L)	pH	Conductivity (uS/cm)	ORP (mV)	Comments
WO23	0925	—	7.85	—	6.84	—	391	Probe not functioning properly fine when out of water + when calibrating
↓	0935	—	7.85	—	6.86	—	349	
	0954	—	7.85	—	6.85	—	266	
	1015	—	7.85	—	6.84	—	249	
	1030	—	7.86	—	6.84	—	243	
	1034	—	7.86	—	6.84	—	232	
	1050	—	7.85	—	6.85	—	228	
	1107	—	7.85	—	6.84	—	225	
	1119	—	7.85	—	6.82	—	222	
	1136	—	7.85	—	6.83	—	219	
	1152	—	7.85	—	6.82	—	215	stop YSI @ 1216 to recal.
	~~12~~ 1306	—	7.85	—	6.80	—	—	
	1320	—	7.85	—	6.84	—	258	
	1336	—	7.86	—	6.84	—	237	
	1400	—	7.86	—	6.85	—	225	sampler up @ 1415-1419
	1419	—	7.86	—	6.87	—	215	
	1436	—	7.87	—	6.85	—	219	
	1450	—	7.86	—	6.85	—	217	
	1504	—	7.86	—	6.88	—	217	
	1525	—	7.86	—	6.85	—	217	

YSI LOG

Survey RD 3 SW High Flow Crew J. MOORE, J. SUND Date 1/20/06

Station	Time	~12.0' Depth	Temp C	DO (mg/L)	pH	Conduct-ivity (uS/cm)	ORP (mV)	Comments
W023	1540	–	7.86	–	6.86	–	219	
↓	1600	–	7.86	–	6.86	–	221	PULL SAMPLER - END.

YSI LOG

Survey Rd 3 SW High Flow Crew J. Sund, J. Moore Date 1/21/06

Station	Time	~17.01' Depth	Temp C	DO (mg/L)	pH	Conductivity (uS/cm)	ORP (mV)	Comments
W1005	0919	0.030*	7.78	—	6.88	—	333	not able to calib cond, DO or depth
↓	0934	0.029	7.79	—	6.90	—	302	
	0952	"	7.79	—	6.89	—	275	
	1007	0.027	7.79	—	6.88	—	256	
	1024	"	7.79	—	6.90	—	239	
	1040	0.026	7.79	—	6.88	—	230	
	1058	0.027	7.79	—	6.90	—	222	
	1112	"	7.79	—	6.89	—	217	
	1123	0.026	7.79	—	6.90	—	214	
	1137	0.027	7.80	—	6.90	—	211	
	1153	0.026	7.80	—	6.89	—	208	
	1209	0.027	7.79	—	6.91	—	206	
	1217	"	7.79	—	6.90	—	206	
	1233	0.026	7.79	—	6.90	—	204	
	1250	0.026	7.79	—	6.91	—	203	
	1316	0.025	7.79	—	6.89	—	203	
	1333	0.024	7.79	—	6.90	—	201	
	1356	0.020	7.79	—	6.89	—	199	
	1412	0.019	7.79	—	6.90	—	198	
	1435	"	7.79	—	6.89		198	

* Depth reading inaccurate, attempted calibration

YSI LOG

Survey RD3 SW High Flow Crew J. Sund, J. Moore Date 1/21/06

Station	Time	Depth	Temp C	DO (mg/L)	pH	Conductivity (uS/cm)	ORP (mV)	Comments
WI005	1449	0.019	7.78	—	6.90	—	199	
↓	1515	0.018	7.78	—	6.90	—	199	
	1530	0.018	7.78	-	6.89	-	199	
↓	1540	0.017	7.77	—	6.89	—	200	

[signature] 1/21/06

Infiltrex 300 System - Water Sample Log

Survey LW3 WINTER Crew JM. JS. Date JAN 19th 2006

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W024	1025	1027	1000	1800	7	3		START INFILTREX 1.98 L/min
↓	1027	1030	900	1662		3		1.69 L/min
	1030	1033	750	1370	13	2		1.39 L/min
	1033	1035	720	1269		1		1.30 L/min
	1035	1050	720	416	29.4	<1		0.60 L/min
	1050							BACKFLUSH
	1052	1110	720	1188	32	1.5		1.30 L/min
	1110	1113						BACKFLUSH
	1113	1130	720	1197	49	1.5		1.29 L/min
	1130	1150	720	1188	59	2.0		1.30 L/min
	1150	1152	720	1119	71	2.0		1.09 L/min
	1152	1154						BACKFLUSH.
	1154	1210	720	1234	79	3.0		1.70 L/min
	1210	1215						STOP PUMP
	1215	1217	720	1058	89	2.5		START PUMP 1.09 L/min
	1217	1220						BACKFLUSH
	1220	1235	800	1320	95	4.0		Begin Pump 1.31 L/min
	1235	1240						STOP PUMP
	1240	1242	800	1370	116	3.0		START PUMP 1.39 L/min
↓	1242	1300	800	1120	141	3.0		1.27

Infiltrex 300 System - Water Sample Log

Survey LW3 WINTER 06 Crew JS. JM. Date JAN 19th 2006

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W024	1300	~~1300~~ 1315	800	1197	153	3.0		1.30 L/min
↓	1315	1330	800	430	167	<1		
	1330	1335						Backflush
	1335	1339	850	1357	171	3.0		1.37 L/min
	1339	1354	850	618	190	<1		0.84 L/min
	1354							BACKFLUSH
	1400	1402	850	1365	191	4.0		1.34 L/min
	1402	1415	850	1324	208	4.0		1.25 L/min
	1415	1434	850	573	224	<1		<1.0 L/min
	1434	1442						BACKFLUSH
	1442	1443	850	1312	226	4.5		1.36 L/min
	~~1458~~ 1443	1458	850	1284	246	4.0		1.33 L/min
	1458	1516	850	1239	262	4.5		1.30 L/min
1516	~~1529~~	~~1529~~						BACKFLUSH
1529	1534 →		850	1250	~~273~~ 274	5.0		1.30 L/min
	1534	1550	850	1036	292	4.0		1.04 L/min
	1550	1555	1050	1098	296	3.0		increase rate to 1050 rpm; 1.0[illegible] L/min
	1555	1600						BACKFLUSH
	1600	1602	900	1356	301	5.0		1.32 L/min
↓	1602	1617	900	1238	320	5.0		1.29 L/min

Infiltrex 300 System - Water Sample Log

Survey RD3 SW high Flow Crew J. Moore, J. SUND Date 1/19/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W024	1617	1631	900	1056	337	3.5		1.15 4min
↓	1631	1645	900	502	348	<1		~0.64/min

Infiltrex 300 System - Water Sample Log

Survey RD[3]SW High Flow Crew J. Moore, J. SUND Date 1/20/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W023	0915							Start Infiltrex
	0915	0921	800	1101	4.5	3.0		1.09 L/min
	0921	0925	900	1249	9.0	4.0		Increase RPM 1.28 L/min
	0925	0935	900	1148	23.0	4.5		1.24 L/min
	0935	0941	1000	1258	30.0	5.0		Increase RPM 1.31 L/min
	0945	0954	1000	1060	42.0	4.5		1.184 L/min
	0954	1000						Backflush
	1000	1002	1000	1320	47.0	10.5		1.35 L/min
	1002	1020	1000	1231	62	6.5		1.32 L/min
	1020	1035	1000	1254	86	6.5		1.29 L/min
	1035	1050	1000	1250	101	6.0		1.26 L/min
	1050	~~105~~ 1101						BACKFLUSH
	1101	1102	1000	1268	106	6.5		1.33 L/min
	1102	1119	1000	1225	125	6.0		1.28 L/min
	1119	1136	1000	603	143	21		~0.6 L/min
	1136	1148						Backflush
	1148	1152	1000	1248	148	6.0		1.25 L/min
	1152	1208	1000	1220	167	6.0		1.28 L/min
	1208	1216	1000	1159	177	6.5		1.28 L/min - STOP Pump.
	1216	1300						OFF

Infiltrex 300 System - Water Sample Log

Survey Rd 3 SW High Wollow Crew J. Moore June Sued Date 1/20/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W023	1300	1304	1000	1234	184	7.0		~~1345~~ 94 sec 1.28 L/min
	1304	1322	1000	1197	204	6.5		95 sec 1.26 L/min
	1322	1336	1000	1170	220	7.0		1.21 L/min
	1336	1338						Back flush
	1338	~~1404~~ 1345	1050	1245	245	7.0		1.30 L/min
	~~1338~~ 1345	1404	1050	1190	247	7.5		1.25 L/min
	1415	1415						STOP INFILTREX
	1419	1420	1050	1178	257	7.5		Start Infiltrex 1.26 L/m
	1421	1436	1050	1142	274	7.0		1.17 L/min
	1436	1441	1200	1000	279	5.0		~~Backflush~~ Increase RPM ~1.0 L/m
	1441	1449						Backflush
	1449	1451	1200	1325	283	9.5		Start 1.36 L/min
	1451	1504	1200	886	301	4.5		0.92 L/min
	1504	1509						Change Prefilter, Stop Inf.
	1509	1512	1200	1310	305	9.0		Start Infiltrex 1.36 L/m
	1512	1525	1200	1236	323	9.0		93s 1.29 L/m
	1525	1540	1200	1238	338	9.5		1.29 L/m
	1540	1555	1200	1260	355	9.0		1.28 L/m STOP

Infiltrex 300 System

Survey R03 SW High Flow Crew J. Sund J. Moore Date 1/21/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W1005	0916	0920	1000	1314	6.0	3.5	-	Start 926 1.30 L/min
↓	0920	0935	1000	1158	24.0	3.0	-	1.22 L/min (98%)
	0935	0939	1100	1346	28.0	4.0	-	Increase rate 1.36 L/min
	0939	0955	1100	1363	47.0	4.5	-	1.33 L/min
	0955	1010	1100	1301	58.0	4.0		1.22 L/min
	1010	1024	1100	1270	70.0	3.5	-	1.10 L/min
	1024	1026						BACKFLUSH.
	1026	1035	1100	1356	78	4.5	-	1.39 L/min
	1035	1056	1100	1300	99	4.5	-	1.36 L/min
	1056	1112	1100	1000	116	3.0	-	1.05 L/min
	1112	1121					=	Backflush
	1121	1123	1100	1334	120	4.5	-	Start 1.36 L/min 88%.
	1123	1137	1100	1264	140	4.5	-	1.32 L/min (90%)
	1137	1153	1100	1288	157	4.5	-	1.28 L/min (94)
	1153	1209	1100	1120	172	4.5	-	1.14 L/min
	1209	1217						BACKFLUSH.
	1217	1219	1100	1300	177	4.5	-	1.35 L/min (89)
	1219	1233	1100	1218	196	4.0	-	1.24 L/min
	1233	1250	1100	800	212	2.0		L/min
↓	1250	1259						Backflush

Infiltrex 300 System - Water Sample Log

Survey Rd 3 SW High Flow Crew J. SUND, J. MOORE Date 1/21/06

Station ID	Start Time	End Time	RPM	Flow Rate (mL/min)	Volume Sampled (L)	Pressure (15-20 psi)	Filter change #	Comments
W1005	1259	1301	1100	1283	216	5.0	—	Start 1.35 L/min
	1301	1316	1100	1159	235	4.0	—	1.22 L/min
	1316	~~1322~~ 1326	1100	547	247	3.0	1400	CHANGE PRE FILTER.
	~~1322~~ 1326	~~1333~~ 1341	—					~~Stop~~ ST
	1341 ~~1333~~	1342	1100	1244	251	5.0	—	Start 1.33 L/min
	1343	1356	1100	1238	269	5.0	—	1.26 L/min
	1356	1412	1100	1111	288	3.5		1.18 102
	1412	1418	—					Stop-backflush
	1418	1420	1100	1234	290	5.0	—	Start 1.29 L/min
	1420	1435	1100	1213	308	5.0	—	1.25 L/min
	1435	1449	1100	1045	323	4.5	—	1.09 L/min
	1449	1457	—					backflush
	1457	1459	1200	1315	329	6.0	—	start 1.36 L/min
	1459	1515	1200	1304	359	6.0	—	1.36 L/min
	1515	1531	1200	1100	369	5.5	—	1.18 L/min
↓	1531	1540	1200	1305	377	5.5	—	1.2 L/min
	1542	—						STOP

[signature] 1/21/06