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Annual Report: 2011-2012 Non-Dry Dock Stormwater Monitoring for Puget Sound Naval Shipyard, Bremerton, Washington

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January 2012

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Acronyms and Abbreviations

Ag	silver
Al	aluminum
As	arsenic
BLM	biotic ligand model
BMP	Best Management Practice
BNC	Bremerton Naval Complex
°C	degree(s) Celsius
C&I	Commercial and Industrial Land-Use and Land-Cover
CaCO3	calcium carbonate
CAS	Columbia Analytical Laboratory Services
CIA	Controlled Industrial Area
Cd	cadmium
CDMA	Code Division Multiple Access
COC	chain of custody
Cr	chromium
Cu	copper
DI	deionized water
DME	dissolved metals
DOC	dissolved organic carbon
DOD	U.S. Department of Defense
DRO	diesel range organics (TPH)
DUP	laboratory duplicate
EB	equipment blank
Ecology	Washington State Department of Ecology
EMC	Event Mean Composite
ENVVEST	Project Environmental Investment (U.S. Navy)
EPA	U.S. Environmental Protection Agency
FC	fecal coliform
ft	foot(feet)
ft2	square foot(feet)
ft3	cubic foot(feet)
GFF	glass fiber filter
µg/L	microgram(s) per liter
Hg	mercury
hr	hour(s)
ICP-MS	inductively coupled plasma mass spectrometerty

ID	identification (number)
in.	inch(es)
INW	Instrumentations Northwest Inc.
L	liter(s)
LCS	laboratory control sample
LDPE	low-density polyethylene
LISST	Laser In-Situ Scattering and Transmissiometry
LULC	land-use and land-cover
µm	micron(s)
µmho/cm	micromho(s) per centimeter
MDL	method detection limit
min	minute(s)
mL	milliliter(s)
MS	matrix spike
MSD	matrix spike duplicate
MLLW	mean lower low water
NA	not available or applicable
NBK	Naval Base Kitsap
NDDSW	Non-Dry Dock Stormwater
ng	nanogram(s)
NPDES	National Pollutant Discharge Elimination System
NPOC	purgeable organic carbon
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons – Diesel fraction
Pb	lead
PME	particulate metals
PNNL	Pacific Northwest National Laboratory
PP	polypropylene
ppt	parts per thousand
PSNS&IMF	Puget Sound Naval Shipyard & Intermediate Maintenance Facility
PVDF	polyvinylidene fluoride
PWP	Project Work Plan
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RCM	Runoff Coefficient Method
RL	reporting limit
RPD	relative percent difference
RRO	residual range organics
SRM	standard reference material

TDSR	Telemetry Data Summary Report
TMDL	Total Maximum Daily Load
TME	total metals
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TR or TRM	total recoverable metals
TSS	total suspended solids
V	volt(s)
W	watt(s)
Zn	zinc

1.0 Introduction

The Puget Sound Naval Shipyard & Intermediate Maintenance Facility (PSNS&IMF) and Naval Base Kitsap-Bremerton (NBK-Bremerton) located in Bremerton, Washington (Figure 1.1) are committed to a culture of continuous process improvement for all aspects of shipyard operations, including reducing the release of hazardous substances in stormwater discharges. The facilities, collectively known as the Bremerton Naval Complex (BNC), are referred to as the Shipyard, for brevity. The U.S. Environmental Protection Agency (EPA) Region 10, the Washington State Department of Ecology (Ecology), and the Shipyard are working to renew the National Pollution Discharge Elimination System (NPDES) permit for discharges into Sinclair Inlet, Puget Sound, Washington (EPA 2008a, b). The discharge of stormwater from Shipyard operations is permitted by the EPA Region 10 under the Clean Water Act of 1977 (National Pollutant Discharge Elimination System [NPDES] permit WA-00206-2, 1994). Under the NPDES program, the Shipyard is required to implement best management practices (BMPs) designed to reduce, treat, and control discharges of contaminants from Shipyard operations (Jabloner et al. 2009) and conduct stormwater monitoring from representative storm drains within the Shipyard to ensure compliance with the NPDES.

The Shipyard and other industrial facilities have a number of unique attributes that make the identification of stormwater pollutant problems and their associated solutions difficult. Stormwater contains a broad variety of pollutants whose concentrations can vary widely depending on storm event size, predominant industrial activities, land-use and land-cover (LULC), and a number of other local and regional factors. The quality of stormwater runoff can often be difficult to manage due to the seasonal, sporadic nature of surface water discharges and the character and unpredictability of storm events. Monitoring stormwater discharges within the Shipyard presents the following additional challenges unique to a facility located within an industrial waterfront:

- Stormwater runoff from all BNC non-dry dock properties drains directly into adjacent marine receiving water.
- Most of the drainage basins are tidally influenced.
- The non-dry dock stormwater drainage systems are relatively short in length (from head to bay outfall), and many systems have limited access, eliminating the opportunity to conduct monitoring in non-tidally influenced areas.
- Industrial processes occurring within the sampling area must be isolated from the water sampled from the stormwater conveyance. Contamination of the sample during or after collection with process specific contaminants at the collection site would not represent the concentration of such contaminants at the point of discharge.

This project is designed to characterize the Non-Dry Dock Stormwater (NDDSW) outfall quality and to assist the U.S. Navy, EPA, Ecology, and other stakeholders in understanding the nature and condition of stormwater discharges from the Shipyard and help inform the permitting process (EPA 2008a, b). The Pacific Northwest National Laboratory (PNNL) designed and managed the execution of the project along with the technical and scientific evaluation of the stormwater quality relative to storm size, outfall basin type, and other factors. The TEC, Inc. team provided the necessary field logistics to appropriately collect stormwater samples and calculate the stormwater runoff. The U.S. Navy served as the technical advisors

and contributed to both field collection and the overall stormwater analysis of both current quality and measures of process improvement over the years.

Due to the complexity and cost of stormwater monitoring and evaluation, the project is being conducted in phases with each phase informed by the previous one. Adaptively managing the execution of the project allowed lessons learned to be immediately incorporated into the project and the development of recommendations for future stormwater assessments. Stations for each phase were or will be selected based on the results of the previous phases, representativeness of the sampling location (e.g., ensure that all major work activities are represented by the entire data set), and planned construction activities.

This interim report summarizes the stormwater monitoring conducted for Phase II NDDSW outfall monitoring from 2011 through 2012. It supplements the Phase I report that covered storm event sampling during 2010−2011. This report includes the collection, analyses, and descriptive statistics for Phase II stormwater sampling conducted from November 2011 through April 2012. In Phase II, six stormwater basins within the Shipyard were sampled during at least four storm events to characterize non-dry dock stormwater discharges at selected stormwater drains located within the facility. Based on Phase I data, a fifth storm event was monitored at station PSNS015 to further define the mercury (Hg) concentrations in the stormwater as the storm intensity increases and the tidal exchange in the stormwater outfall moves in and out of the pipe.

In addition, this report summarizes the current stormwater data available from the Shipyard, Sinclair/Dyes inlets watershed, and Puget Sound to put the data into a regional context. The data must be considered on multiple scales (e.g., watershed scale and mass balance or all sources and sinks scale for individual contaminants) in order to truly understand the potential stormwater runoff impairments to beneficial uses within Sinclair and Dyes inlets. Therefore, the results from the 2011−2012 sampling, reported herein, are synthesized with the existing regional data and the Phase I study to provide the current data on stormwater quality and recommendations to address knowledge gaps and inform the NPDES process.

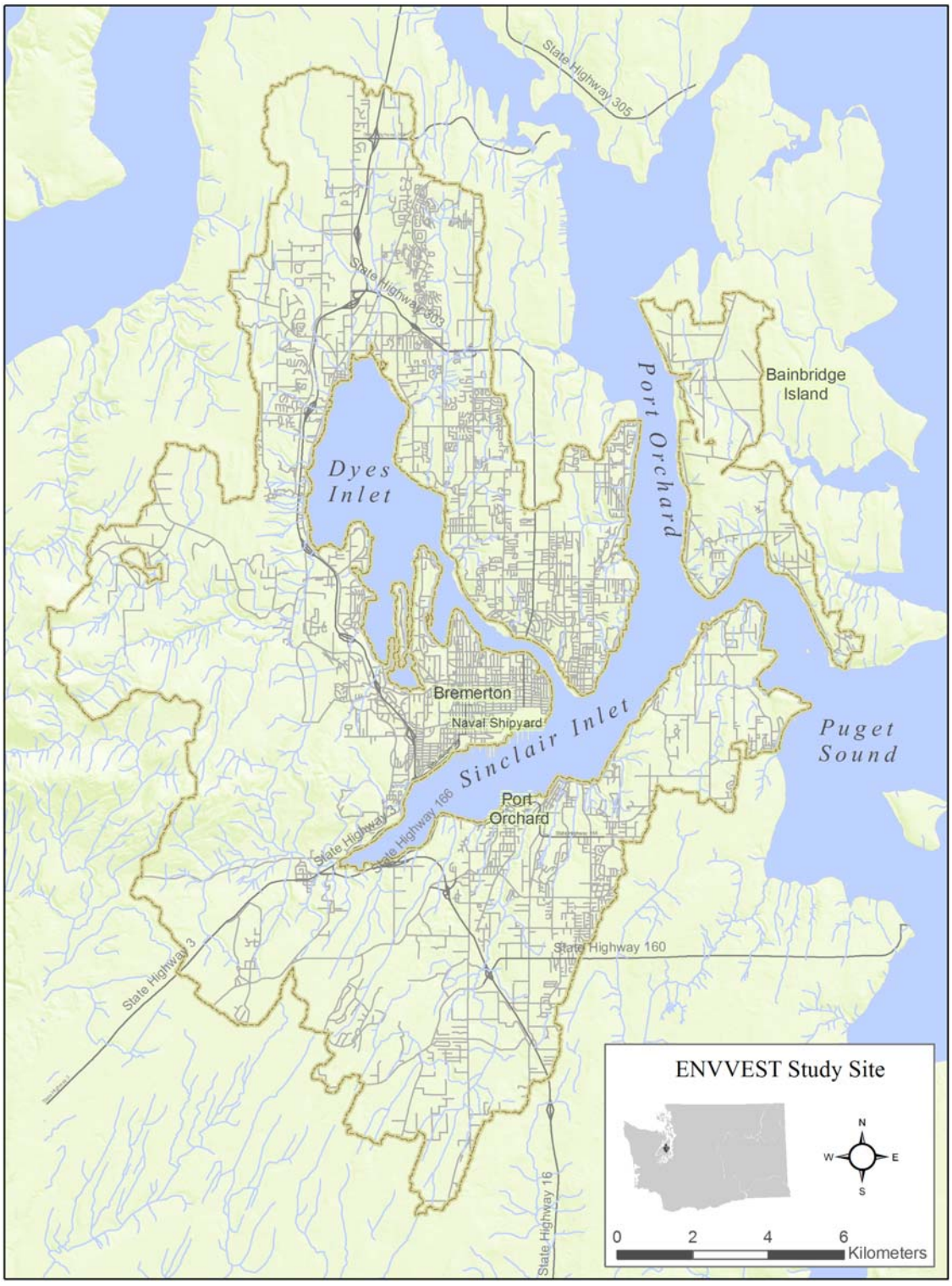

Figure 1.1. Location of the Puget Sound Naval Shipyard & Intermediate Maintenance Facility (Naval Shipyard) on Sinclair Inlet, Washington. The study region for the U.S. Navy ENVironmental inVESTment (ENVVEST) project is the watershed boundary supporting the receiving waters of Sinclair Inlet, Dyes Inlet, and the passage ways to the main basin of Puget Sound.

1.1 Regional Stormwater Information

There are two primary sources of information about stormwater quality for the Shipyard region: 1) U.S. Navy Project ENVironmental inVESTment (ENVVEST) and 2) the Phase I Non-Dry Dock Stormwater study. The data from both of these projects along with the broader Puget Sound data were used to place the data into a comparative context to other industrial stormwater and non-industrial locations including municipal outfalls, streams, rivers, and piped stream outfalls (e.g., high-density urban).

In 2000, ENVVEST was created in partnership with the Shipyard, EPA, Ecology, and local stakeholders to support the development of Total Maximum Daily Loads (TMDLs) for fecal coliform (FC) and other contaminants entering the Sinclair and Dyes inlets watershed (Figure 1.1, ENVVEST 2002a, b, 2006). As part of ENVVEST, 13 stormwater drainage basins within the watershed, including 3 basins within the Shipyard, were monitored for flow and sampled during storm events (Brandenberger et al. 2007a, b). The stormwater outfalls selected for flow monitoring were determined by a technical evaluation of 35 stormwater outfalls (including streams and other urbanized natural drainage areas) located within the City of Bremerton, City of Port Orchard, City of Bainbridge Island, Kitsap County, and the Shipyard (TEC 2003a, b, c). This work resulted in a calibrated and verified Hydrological Simulation Program Fortan for drainage basins within the watershed including the Shipyard (Skahill and LaHatte 2007) and estimates of stream and storm event runoff quality as a function of upstream LULC and storm intensity (Brandenberger et al. 2007a, b; Cullinan et al. 2007). This provided the ENVVEST data to develop a contaminant mass balance for heavy metals, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and nutrients where all sources and sinks were considered to allow a relative evaluation of the dominant sources (Brandenberger et al. 2008).

One gap identified by ENVVEST was the characterization of stormwater quality within the various basins of the Shipyard. Therefore, an evaluation of existing stormwater monitoring data for the Shipyard and a review of technical and regulatory requirements was conducted and reported in the Quality Assurance Project Plan (QAPP) for non-dry dock stormwater monitoring conducted under the NPDES (Taylor Associates Inc. 2009). Phase I of the NDDSW study was conducted during the 2010−2011 storm season and the interim report (PNNL and Taylor Associates 2012) documented the technical strategy, stormwater quality results, and the recommendations for subsequent phases of the NDDSW study. Seven representative stormwater outfalls were sampled during three storm events involving precipitation estimated to be greater than 1 in. in 24 hours.

The integrated watershed assessment approach of Project ENVVEST provided data on the current quality of the water, sediment, and biota present in both Sinclair and Dyes inlets. The objective was to establish a solid baseline and understand the variability on a spatial and seasonal scale to provide a means by which to assess process improvements within the Shipyard and bound the data in terms of regional sources of the contaminants present in stormwater runoff. The data from Phase I and II (reported herein) non-dry dock stormwater sampling improves the estimate of ENVVEST stormwater loading, the mass balance of chemical contaminants from the Shipyard, and augments the ambient monitoring to demonstrate ongoing environmental performance in support of NPDES requirements (Johnston et al. 2010).

1.2 Objectives

The goal of the NDDSW project is to collect and characterize stormwater from the selected locations within the Shipyard to provide preliminary data in support of the (Working Draft) NPDES Permit Number WA-00206-2 (EPA 2008a, b). The Phase II study supplements the Phase I data by providing additional sampling that represents activities within the industrial area of the Shipyard and provides additional data to address gaps identified during Phase I (e.g., Hg concentrations at PSNS015). In addition, these data support development of the ENVVEST LULC stormwater relational model (Brandenberger et al. 2007a, b; Cullinan et al. 2007) as part of the contaminant mass balance for Sinclair and Dyes inlets (Brandenberger et al. 2008).

The specific Phase II objectives are stated as follows:

1. Document logistics and site information for all six Phase II stations along with field and laboratory quality control procedures necessary to allow the NDDSW data to be comparable to the ENVVEST stormwater data set.
2. Collect grab and composite stormwater samples during a minimum of four qualifying storm events at each of the six stormwater sampling locations consistent with the methodology reported by ENVVEST.
3. Conduct chemical analyses using appropriate analytical techniques to ensure data are representative of stormwater quality.
4. Prepare field-sampling reports documenting the results of each storm event sampling including ancillary data (rainfall, temperature, salinity, etc.).
5. Prepare an annual report summarizing the results of chemical analysis relative to other regional data and providing the status of NDDSW monitoring at the Shipyard to inform the stormwater management program and future permit requirements (EPA 2008a).

1.3 BNC Study Area Description

The Shipyard is located along the northern shore of Sinclair Inlet, a subbasin of Puget Sound, and is bounded by the City of Bremerton. It covers approximately 350 acres of land and an additional 340 acres of tidelands along 11,000 ft of shoreline. There are over 300 buildings and structures consisting of industrial, supply and base facilities, a steam plant, six dry docks, piers, and numerous moorings. The predominant land cover within the Shipyard is rooftops, paved areas (roads, parking areas, sidewalks, and concrete working areas), and piers.

The Shipyard is divided into two areas: 1) Controlled Industrial Area (CIA) and 2) NBK. The CIA is one of Washington State's largest industrial installations and is responsible for overhaul, maintenance, docking, refueling, and decommissioning of naval vessels, as well as, dismantling of ships and submarines. The NBK provides base operating services, including support for home-ported surface ships and submarines. Support areas include housing, parking, shopping, entertainment, and recreation facilities. The stormwater system draining these two areas includes 156 distinct storm drainage systems, many of which serve small drainage areas. More than 1,000 catch basins and track drains on piers drain into Sinclair Inlet and an extensive rail system, which provides a pathway for stormwater to seep through

the subsurface. Depending on the flow rate and whether the track drains become clogged, this runoff will ultimately discharge directly into the Sinclair Inlet (Jabloner et al. 2009).

As described in the All Known, Available, and Reasonable Methods of Treatment (AKART) study (Jabloner et al. 2009), the Shipyard stormwater system is composed primarily of clay pipe with a mixture of concrete, polyvinyl chloride, steel, and cement-asbestos pipe. Stormwater is collected from buildings and roofs by rain gutters and roof drains, which then discharge into storm drainage pipes or into catch basins located around the buildings. On the piers and other surfaces located directly over the water there are drain holes in the deck that deposit the rainwater directly into Sinclair Inlet. The ground surfaces around the buildings are generally impervious, made up of either asphalt, concrete, or concrete base with asphalt over it. There are various cracks, breaks, and holes in some of the surface cover, as well as crane track pathways and a sloped vegetated hillside (the northern boundary of the CIA) that infiltrates a small portion of precipitation and surface runoff within the CIA. However, because the vast majority of the CIA contains no unpaved or pervious areas, stormwater infiltration is assumed to be minimal.

The depth of the stormwater system ranges 1–20 ft below ground surface. Most of the stormwater outfalls discharge to Sinclair Inlet below mean lower low water (MLLW). The Shipyard is only a few feet above high tide; therefore, most of the stormwater piping is tidally influenced.

Taylor Associates Inc. (2009) evaluated existing stormwater monitoring data for the Shipyard and reviewed technical and regulatory requirements prior to recommending the technical strategy and procedures for monitoring NDDSW basins within the Shipyard. Phase I and Phase II (reported herein) provided the stormwater quality measured within 11 distinct storm drainage systems that are representative of the main work activity types within the Shipyard (TEC and PNNL 2011, 2012). The primary activities include

- materials storage
- vessel, equipment, and materials recycling
- vessel maintenance
- non-aircraft carrier vessel support services
- aircraft carrier support services
- parking/steam plant (stormwater discharges only)/truck traffic
- municipal/commercial/residential services.

Sampling sites were selected that maximized the upstream drainage area, minimized tidal effects, and accounted for operational constraints (see Project Work Plan [PWP]; TEC and PNNL 2011, 2012). Figure 1.2 illustrates the Phase II locations in both the CIA and non-industrial NBK. In combination with Phase I locations, they represent the main industrial operations and processes at PSNS&IMF and support functions in the surrounding NBK. These basins were selected because of their relatively large size (in comparison to other basins with similar activity); heavy industrial use (for applicable primary work tasks); and because they contained unique and/or representative land use.

Table 1.1 includes both the Phase I and II drainage basins selected for monitoring and their associated stormwater outfall number, geographical area, and primary work activity. The stations PSNS015 and PSNS126 were sampled during both Phases I and II. The new stations added in Phase II were PSNS084.1, PSNS115.1, PSNS124, and PSNS124.1. Table 1.2 provides the specific attributes for the Phase II drainage basins with additional details provided in the PWP (TEC and PNNL 2012).

Figure 1.2. The Phase II Sampling Locations for 2011−2012 Non-Dry Dock Stormwater Outfall Study

Table 1.1. Phase I and II Drainage Basins Selected for Monitoring and Their Primary Work Activity

PSNS&IMF Outfall #	Geographical Area [a]	Primary Work Activity
	Phase I	
126	East CIA, Southwest B460 along "C" Street, east of DD3	Materials storage (outdoor)
096	Mid CIA, west of DD4, southeast of Bldg 457 along "N" St	Vessel maintenance
082.5	West CIA, southeast of B851, RMTS Area	Vessel, equipment and materials recycling
081.1	West CIA, NE of DD6 and NW of Pier 9, south side of Bldg 462	Non-aircraft carrier support services
032	East NBK, NW corner of B514	Aircraft carrier support services
015	Mid NBK, south side of McDonalds, east side of drive-through lane	Municipal/commercial/residential services
008	West NBK, east side of Inactive Fleet B550	Parking/steam plant/truck traffic
	Phase II	
126[b]	East CIA, Southwest B460 along "C" Street, east of DD3	Materials storage (outdoor)
124.1	Southwest of Bldg 460, west of Bldg 495, east of DD3	Dry-dock support activities, crane, vehicle and equipment traffic, laydown and staging areas
124	Northwest corner of Bldg. 357, west of DD3	Material storage, pipe/boiler/forge/nuclear repair shops, Chem Lab, DD3 cutting facility
115.1	South-southeast of Bldg 879, east of DD4	Materials storage (outdoors), various shops and training center, water front support activities
084.1	Southeast section of Bldg 983, west of DD5	Vehicle and equipment traffic, radiological work builds, outside equipment storage, paint shop, recycling, industrial waste pretreatment
015[b]	Mid NBK, south side of McDonalds, east side of drive-through lane	Municipal/commercial/residential services

(a) Drydock are denoted numerically as DD1, DD2, DD3, etc.
(b) Sampled during both Phase I and II.

Table 1.2. Drainage Basin Attributes for the Phase II 2011−2012 Outfall Sampling

PSNS Outfall No.	Outfall Location	Monitoring Location[a]	Total Basin Area (acres)[b]	Basin Impervious Surface Area (acres)	Basin Pervious Surface Area (acres)	Monitoring Location Manhole ID	Manhole Rim Elevation (ft)[c]	Approx. Elev. of Sampling Intake (ft)[c]	Effective Tide Height (ft)[d]
126	47°33’37”N, 122°37’36”W	47°33’42”N, 122°37’42”W	15.22	15.00	0.22	5110	18.22	8.60	+9
124.1	47°33’36”N, 122°37’44”W	47°33’39”N, 122°37’45”W	2.66	2.52	0.14	5880	17.15	8.19	+8
124	47°33’36”N, 122°37’47”W	47°33’39.2”N, 122°37’48”W	10.42	9.85	0.57	5881	17.75	5.27	+5
115.1	47°33’39”N, 122°37’54”W	47°33’40.4”N, 122°37’55”W	9.50	9.22	0.28	4860	17.72	1.27	+1
84.1	47°33’30”N, 122°38’20”W	47°33’31.3”N, 122°38’20”W	0.55	0.55	0.0	551	17.69	5.61	+5.5
015	47°33’21”N, 122°39’02”W	47°33’29”N, 122°39’03”W	92.26	46.13	46.13	A42	17.21	1.96	+2

(a) Coordinates for the monitoring location were determined using a Trimble global positioning system.
(b) Total basin areas are included in the Basin Description Table and were determined based on calculations supplied by the U.S. Navy.
(c) Referenced to mean lower low water (historical PSNS&IMF documents 1994–2008).
(d) Expected tidal height based on National Oceanic and Atmospheric Administration tide predications that would cause tidewater, under non-storm conditions, to be detected at a certain monitoring location.

1.4 PSNS &IMF NPDES Permit Overview

The Shipyard's first NPDES permit was issued in September 1986 and then reissued in April 1994. This 1994 permit is the current effectual stormwater discharge guidance for the Shipyard. The EPA, Ecology, and the Shipyard are working together to renew the PSNS &IMF's current NPDES permit for discharges into Sinclair Inlet, Puget Sound, Washington (EPA 2008a, b). In accordance with the NPDES permit, PSNS&IMF is required to monitor discharge from the following three operations:

- dry dock discharges (covered separately; Johnston et al. 2009)
- steam plant discharges (covered separately; Johnston et al. 2009)
- stormwater and miscellaneous runoff from non-dry dock areas (NDDSW outfall study).

In May 2008, the EPA issued a Working Draft NPDES Permit for the Shipyards' consideration, review, and preparation. In the 2008 Working Draft NPDES Permit, one stipulation addresses the characterization and assessment of NDDSW runoff. Table 1.3 details the proposed permit requirements (per Permit §I.C.3 and §III.A) for NDDSW monitoring assessment parameters, maximum daily effluent limits, sample frequency, and sample type. To leverage the 3 years of existing stormwater data conducted by ENVVEST within the Sinclair/Dyes inlets watershed, the list of permit-required parameters was expanded as noted in Table 1.3 to remain consistent with the ENVVEST program. Therefore, the comprehensive list of parameters are total recoverable and dissolved aluminum (Al), silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg) and zinc (Zn); hardness; total organic carbon (TOC); dissolved organic carbon (DOC); total suspended solids (TSS); turbidity; conductivity; and temperature.

This Phase II report provides the second year of monitoring for the NDDSW outfalls or conveyances that represent the primary work activities performed within the non-dry dock areas. Data from both Phase I and II collectively support NDDSW outfall considerations for the draft NPDES permit. They may also be used to evaluate the effectiveness of BMPs, develop future effluent limitations, help identify sources of pollution potentially affecting the quality of stormwater discharges associated with industrial activity from the facility, provide a baseline from which to evaluate process improvement, and may lead to recommendations for implementation of measures to minimize pollutants in stormwater discharges.

Table 1.3. Proposed Stormwater Monitoring Requirements and Final Effluent Limitations for Non-Dry Dock Stormwater Outfalls and Additional ENVVEST Parameters

Parameter	Maximum Daily Effluent Limit	Sample Frequency	Sample Type
Copper, total recoverable	5.8 µg/L	Quarterly	Composite.
Lead, total recoverable	221 µg/L	Quarterly	Composite
Mercury, total recoverable	2.1 µg/L	Quarterly	Composite
Zinc, total recoverable	95 µg/L	Quarterly	Composite
Arsenic, total recoverable	69 µg/L	Quarterly	Composite
Total Suspended Solids	--	Quarterly	Composite
Oil and Grease (NW-TPH-D)	--	Quarterly	Grab
Oily Sheen	No oily sheen	Quarterly	Visual Observation
Turbidity	5 NTU above background	Quarterly	Composite
Additional ENVVEST Parameters			
Aluminum, total recoverable and dissolved			
Silver, total recoverable and dissolved			
Arsenic, total recoverable and dissolved			
Cadmium, total recoverable and dissolved			
Chromium, total recoverable and dissolved			
Copper, total recoverable and dissolved			
Lead, total recoverable and dissolved			
Mercury, total recoverable and dissolved			
Zinc, total recoverable and dissolved			
Ancillary Parameters			
Hardness			
Total and dissolved organic carbon (TOC/DOC)			
Conductivity and Temperature			

Notes:
NTU - Nephelometric Turbidity Units

2.0 Field Collection Methods

Consistent with the requirements specified in the draft NPDES permit, grab samples (only total petroleum hydrocarbon [TPH] and fecal coliform) and automated, tidally compensated, time-paced composite samples were collected at six representative outfalls during Phase II. Field collection methods for the 2011−2012 stormwater sampling events followed guidance described by Taylor Associates (2009) and detailed in the Phase II PWP (TEC and PNNL 2012). A brief description of field collection methodologies is provided below. Detailed field activities and documentation for each of the five storm events (SW08–SW12) are provided in Appendix A, Storm Event Reports.

2.1 Stormwater Monitoring System/Equipment

The stormwater monitoring system at each station comprised various components. These components included a telemetric communication modem, central datalogger/system controller, autosampler, rain gauge, pressure (water level)/temperature transducer, conductivity sensor, salinity sensor, solar panel charger and batteries, and housings and various mountings. All of the sensors and gauges were frequently (typically twice or more a month during their operational periods) calibrated and maintained to ensure accurate data. The PWP provided a general schematic diagram of the monitoring system components. These components are further described below.

Telemetric communication modem. A telemetry communication system was installed at each station and provided remote communication access through the datalogger. Sierra Wireless AirLink Raven XT cellular modems (Campbell Scientific Inc., Logan, Utah), with Code Division Multiple Access (CDMA) digital technology, were used as the communication link between the remote user or server and the datalogger. This allowed for either transmission of collected data to an offsite computer and system status checks on a scheduled or on-demand basis or for execution of incoming system commands (e.g., setting or correcting enabling condition thresholds, changing a sample pacing rate, etc.). The use of the Raven XT modem in its project-specific configuration provided highly secure data transmissions, which was of the utmost importance to PSNS&IMF. Formal security permission was obtained for the modems and dataloggers (see PWP) used in this project. The security permission forms and other pertinent information were stored in each telemetry box.

Datalogger/system controller. Campbell Scientific, Inc. CR1000 (Logan, Utah) custom programmable dataloggers were used as the central "brains" of each monitoring system. The CR1000 is capable of storing large quantities of time-series data, as well as performing a wide range of system control functions. All of the system components, including sensors, autosamplers, and peripherals (e.g., batteries and solar charging system), were connected through the datalogger. Calibration of all project sensors, as well as controlling the enabling conditions for the autosampler, was facilitated through the datalogger. Connection to the datalogger could be accomplished either directly or remotely via proprietary software. All field data were automatically stored on the CR1000 datalogger at 5-minute intervals. Dataloggers were programmed to download, via the telemetry system, to a base station computer at the TEC, Inc. office on a schedule of at least once per day; more frequent downloads occurred during times of need (e.g., storm events, calibrations, etc.).

Autosampler. Stormwater samples were collected using automatic water samplers (autosamplers) installed at each site. Water sampling equipment included Teledyne-Isco® 6700 series samplers

(Lincoln, Nebraska), a Teflon™-lined polyethylene sampler suction line, and siliconized Tygon™ pump and distributor arm tubing. Autosamplers were deployed in an off-the-shelf configuration equipped with 24 1-L polypropylene wedge bottles. Each sampler was identically programmed (TEC and PNNL 2012). The associated dataloggers controlled activation and sample collection pacing. Sampler reports were also remotely downloaded and are included in Appendix A.

Rain gauge. Teledyne-Isco® 674 (Lincoln, Nebraska) tipping bucket rain gauges were used to collect rainfall data. These instruments measured rainfall at 0.01-in. increments. Rainfall data were downloaded via telemetry at least once each day and more frequently during and following targeted storm events. Each rain gauge was connected to its associated datalogger, which recorded rainfall data at 5-minute intervals.

Water level and temperature. Transducers were used at each monitoring station to record water level and temperature within a selected pipe or vault. Two different types of transducers were used for monitoring and sample collection. They were the Campbell Scientific CS450 and the Instrumentations Northwest Inc. (INW, Kirkland, Washington) CT2X. Each of these units measured pressure and temperature to very similar specifications. Water level and temperature were both measured and reported to 1/100 of a foot and degree Celsius, respectively.

Conductivity. Specific conductivity was continuously measured at each station by two different sensor types. The INW CT2X (Kirkland, Washington) and YSI (Yellow Springs, Ohio) 6820 multi-meter sonde were used to collect specific conductivity data. The INW CT2X specific conductivity sensor was integrated into its associated transducer (each CT2X measured pressure, temperature, and specific conductivity). The YSI 6820 is a standalone unit that was used in combination with the CS450 transducer. The YSI 6820 also provided redundant temperature data. Both specific conductivity probes recorded values to the nearest 1/100 micromhos/cm (µmho/cm), but were reported to the nearest whole number. Conductivity was also measured at the monitoring stations during non-storm periods to determine a relationship between conductivity and the tidal backwater conditions at that station.

Salinity. Salinity values were generated based on temperature-compensated conductivity measurements and temperature readings. For the CT2X units, salinity was calculated using conductivity and temperature readings. For the YSI, salinity was reported directly from the meter. The calculations for both units were based on the Standard Methods 2520B equation. Salinity values from both sensors were recorded to the nearest 1/100 of a part/thousand (ppt) and reported as a whole number.

In situ particle size and volume. A Laser In-Situ Scattering and Transmissiometry (LISST) analyzer from Sequoia Scientific (www.sequoiasci.com) was deployed at PSNS015 on April 13, 2012, prior to the SW12 event. The LISST-StreamSide unit was used to generate real-time data on the particle size distribution and volume through the progression of a storm (see Appendix A, SW12 Storm Report for more details).

Solar panel charger and batteries. The telemetry system, datalogger, and all associated water-quality monitoring components were powered by 12-V deep cycle marine batteries. Typically, each station used two batteries—one to power the datalogger, sensors, and telemetry system and one to power the autosampler. Campbell Scientific SP20 regulated 20-W solar panels were used to recharge the battery associated with the datalogger and its connected components. Depending on available sunlight exposure at a particular station, it was sometimes necessary to have two batteries connected in parallel to power the

datalogger. The standalone autosampler battery was removed from the equipment housing after each sampling event, recharged, and replaced prior to the next sampling event.

Housings and mountings. Monitoring stations were designed with modularity and mobility. Sturdy steel, lockable equipment enclosures were used to house the various monitoring system components and to provide a stable platform from which to mount open-air items. Attached 10-ft tall masts supported the solar panels, omni-directional antennas, and rain gauges at each station. Each housing was placed as close to the outfall monitoring location as possible. All stations were above-ground setups with conduit lines leading from the housing to the vaults and sampling points. A number of monitoring system components were installed underground at all of the sites. Transmission cables/lines for the transducers, conductivity meters, and sampler suction ran from the equipment housings into the associated vaults through heavy-duty plastic conduit. Inside each vault, the sampler suction lines ran along the wall and terminated at the intake anchor point, which was generally installed in the invert of the storm drain pipe.

2.2 Qualifying Storm Events

Stormwater events were targeted from November 2011 through April 2012. Phase II included the collection of four qualifying storm events (SW08–SW11) from each of the six monitoring stations and a fifth storm event (SW12) at PSNS015 to target the storm chemistry dynamics. Unlike the previous sampling season where monitoring sites were split into two distinct groups, samples from all six Phase II monitoring stations were collected concurrently during each of the targeted storm events (except SW12). Equipment was mobilized and installed at all six monitoring stations between October and November 2011 and demobilized between April and September 2012. Qualifying storm events were targeted based on modifications of the ENVVEST criteria for wet season sampling and are detailed in Table 2.1.

The critical gap identified in the ENVVEST (2003–2005) sampling was larger storm events (≥1.0 in.) in urban and industrial drainage basins. Therefore, the criteria were modified to add a conditional 24-hour antecedent qualification as necessary. The conditional qualification allows for the capture of discrete storm events during the more intensive wet season when the frequency of rain events is high. For example, this alteration is overwhelmed by the total storm volume, as long as the antecedent rainfall is less than 10% of the associated total storm event volume. The larger storm volumes would have the potential to release and/or expose sources that otherwise might not occur during smaller events. This conditional antecedent qualification was applied on a station specific basis for each event.

Storm targeting procedures were detailed in the 2011−2012 PWP and are briefly outlined here:

1. Weather forecasts for the Bremerton, Washington, area were checked weekly to determine if a qualifying storm event could occur during the next 7-day period.
2. If a forecast suggested a qualifying storm, the team conferred to decide if the storm should be considered for targeting and continued tracking. If yes, then forecasts were reviewed at least daily.
3. Precipitation forecasts were reviewed at 72–24 hours prior to targeted storm and team made final "go/no-go" decision.
4. If a "go" decision, then a sample event lead was designated.
5. The lead scheduled field team pre-storm site setup activities and was in control until all samples were delivered to the laboratory.

6. Internet-based forecasts were archived to document targeting decisions.

Table 2.1. Phase II Qualifying Storm Event Criteria

Criteria	Wet Season	Dry Season
Seasonal Period	October 1–April 30	May 1–September 30
Targeted Storm Size and Probability	≥0.20 in. in 24 hours ≥70% forecasted probability of occurrence 24 hours prior	≥0.10 in. in 24 hours ≥50% forecasted probability of occurrence 24 hours prior
Qualifying Storm Size	≥0.10 in. or a sufficient amount for sampling to have occurred for at least 2 hours during stormwater runoff	≥0.10 in., or a sufficient amount for sampling to have occurred for at least 2 hours during stormwater runoff
Antecedent Precipitation Conditions	Less than or equal to 0.1 in. rain in previous 24 hours No rain in previous 6 hours	Less than or equal to 0.02 in. rain in previous 72 hours No rain in previous 6 hours
Conditional 24-hour Antecedent Qualification	If there is more than 0.1 in. rain in a 24-hr antecedent period, the combined overage should not exceed 10% of the overall storm event rainfall total. The 6-hr condition is unchanged	Does not apply for Dry Season
Inter-Event Dry Period[(a)]	6 hours minimum, 12 hours maximum	6 hours minimum, 12 hours maximum

(a) A storm event can be considered completed once there has been a 6-hour period with no precipitation. However, water sampling could continue, as long as runoff is occurring or the station hydrograph is elevated above pre-storm conditions, for up to a 12-hour period with no precipitation, at which time the storm would be considered complete.

Prior to the start of the storm, the field team visited each sampling location to prepare the monitoring equipment for data and stormwater collection. During the pre-storm site visit, the field team checked/ modified the autosampler programs as detailed in each storm event report, conducted necessary maintenance and calibration activities, and placed sample bottles into the autosamplers. All setup, maintenance, and calibration activities were recorded on field data sheets, along with associated notes of other relevant site conditions (Appendix A).

2.3 In Situ Data Collection

At each of the monitoring stations, a variety of in situ data were collected. Data types included precipitation (rain amount and intensity), water level in the associated piping systems (level responses due to both runoff/process inputs and tidal influences), temperature, conductivity, salinity, and sample collection information. In situ data were collected with sensors, gauges, and autosamplers as described above. These equipment were connected to, logged by, and/or controlled with a station-specific datalogger and telemetric control system. These in situ data types and data collection, storage, and management procedures are described in detail in the PWP and briefly summarized below.

2.3.1 Precipitation Monitoring

Precipitation was monitored via a network of rain gauges installed at each monitoring station and atop Building 427 (official PSNS gauge) within the CIA. Data from the monitoring station's rain gauges were collected and stored on dataloggers and were accessible by either direct download or remotely through a telemetric network. Precipitation amounts (depth) and intensity were continuously monitored at each site. The continuous rainfall record was used to estimate the total storm runoff volume and to calculate the discharge volume for the sampling duration at each station using a variation of the Runoff Coefficient Method (RCM). The station's storm rainfall totals were used to classify the storm event size based on criteria consistent with ENVVEST (Brandenberger et al. 2007a). The RCM was previously used for volume estimation purposes during implementation of the 1994 PSNS NPDES compliance monitoring and Phase I. The RCM is an accepted industry standard and an effective tool for providing an estimate of storm flow volumes in the absence of dedicated flow monitoring equipment. Section 7.4 of the PWP (TEC and PNNL 2012) details the application, selection of coefficients, and calculation of the RCM.

Briefly, the RCM method uses the total sampling period rainfall, pervious and impervious drainage area size, and a land-cover runoff coefficient to calculate the total runoff volume in cubic feet. Runoff coefficients for the selected monitoring sites where chosen from published values for the following surface types: heavy (0.6–0.9) and light (0.5–0.8) industrial areas, railroad lines (0.2–0.4), continuous concrete or asphalt cover (0.7–0.95), heavy soil (0.18–0.22), and residential/suburban (0.25–0.4). The coefficient range gives latitude for consideration of particular basin characteristics. Typically, the upper end of the coefficient range values are applied to the more impervious portions and the lower end of the coefficient range values are applied to the more pervious portions of a certain surface type when calculating runoff volumes. The formula below was slightly modified from the standard RCM so that it accounts for the effective runoff from both pervious and impervious areas from each monitored outfall drainage basin (U.S. Navy 1996):

$$\text{Total Runoff Volume } (V) = R \times [(A_i \times C_i) + (A_p \times C_p)] \quad (2.1)$$

where
- V = total runoff volume (ft^3)
- R = total rainfall (ft)
- A_i = total impervious drainage area (ft^2)
- A_p = total pervious drainage area (ft^2)
- C_i = runoff coefficient for impervious area of the drainage basin
- C_p = the runoff coefficient for pervious area of drainage basin.

Table 2.2 presents this information for the monitored drainage basins, their percent pervious and impervious areas, runoff coefficient value ranges for the basin surface types, and the total discharge volume estimation equations. The upper range of coefficient values was used in all RCM calculations during the 2011−2012 storm events.

In addition, the rain gauges were used for storm event tracking and identifying the event start (to schedule grab sampling) and end (to retrieve composite samples). Rain data were also used to enable the autosamplers and validate the storm events based on the criteria presented above. Rain gauges were maintained in accordance with established methods of data assessment and comparison, scheduled maintenance, and appropriate calibration. The official PSNS rain gauge was maintained, serviced, and downloaded by the U.S. Navy.

Table 2.2. Stormwater Outfall Basin Attributes and Total Discharge Volume

PSNS Drainage Basin ID	Total Basin Area (ft^2)	Type of Surface	Percentage of Drainage Basin Surface Type	Area of Basin Surface Type (ft^2)	Runoff Coefficient Range[(a)]	Area of Basin Surface Type with Maximum Coefficient Value Applied (ft^2)	Total Discharge Volume (ft^3)[(b)]
126	662,986	Impervious	98.55	653,373	0.6–0.9	588,036	R x (591,881)
		Pervious	1.45	9,613	0.2–0.4	3,845	
124.1	116,000	Impervious	94.56	109,690	0.6–0.9	98,721	R x (101,245)
		Pervious	5.44	6310	0.2–0.4	2,524	
124	454,000	Impervious	94.56	429,302	0.6–0.9	386,372	R x (396,251)
		Pervious	5.44	24,698	0.2–0.4	9,879	
115.1	463,042	Impervious	97	449,104	0.6–0.9	361,422	R x (366,390)
		Pervious	3	13,938	0.2–0.40	4,968	
084.1	23,958	Impervious	100	23,958	0.6–0.9	21,562	R x (21,562)
015	4,018,862	Impervious	50	2,009,431	0.5–0.8	1,607,549	R x (2,411,317)
		Pervious	50	2,009,431	0.25–0.4	803,772	

(a) These values are derived from various published sources regarding the RCM.
(b) Rainfall (R) is in feet for calculation of total discharge volume.

2.3.2 Other Monitoring Data

Water-level, temperature, conductivity, salinity, and autosampler operation data were also recorded by the equipment discussed above in Section 2.1. The data were accessible by either direct download or remotely through a telemetric network. Water-level data were used for several key functions including autosampler enabling, stormwater hydrograph assessment, and tidal inundation assessment. Transducers were inspected and serviced as recommended by the manufacturer at least once each month and/or prior to targeted storm events, whichever was more frequent.

The autosampler units were connected to a Campbell Scientific datalogger and telemetry system, which allowed sample processing information to be immediately available to the storm lead. Necessary adjustments to sample timing could be made remotely. Feedback information from the autosamplers served as a record of setup and unit operation and was included in the individual storm reports (Appendix A). The autosampler downloads included programming data, enable date and time, sample marker designations, bottle information, pump cycle counts, aliquot success and associated source error codes, and sample completion date and time.

For SW12 only, the LISST was deployed in situ 6 days prior to the event and provided a nearly continuous log of the particle size and volume at PSNS015. Thirty-two size classifications were collected by the LISST, but the data were post-processed to aggregate them into the following size fractions: clay/silt (<63 μm), very fine/fine grain sand (64–234 μm), and medium grain sand (235–386 μm).

2.4 Stormwater Sample Collection

Five validated stormwater events were sampled during the Phase II 2011–1012 field season based on the criteria discussed above. Six stations were targeted for 4 events and a single station was targeted for an additional event for a total of 52 samples. During Phase II, three field duplicate sets were collected (three each of grabs and composites). Of the 52 potential samples, 52 were collected (27 grab and 28 composite samples), for a success rate of 100%. Table 2.3 lists the date for each storm event, station identification, the number of samples collected during each event, the number of total samples collected at each station, type of sample (e.g., grab or composite), and rainfall information. The rainfall information includes the antecedent dry period duration prior to each storm, the total duration of the storm event, and the total precipitation. The antecedent dry period was defined as the period prior to the onset of a qualifying event where rainfall did not cause runoff to occur. In general, the stations require ≥0.03 in. rainfall without a 3-hour gap to trigger runoff in the storm drains. Storm summary reports were written for each event and are compiled in Appendix A for storms SW08 through SW12.

All sample collection and management followed the guidance contained in the PWP (TEC and PNNL 2012). In brief, two types of stormwater samples were collected at each monitoring site: 1) manual grab samples and 2) time-proportionate composite samples. All sample containers and (non-metal) equipment were pre-cleaned as outlined in the PWP Appendix F (TEC and PNNL 2012). The collection containers, pump tubing, and other non-metal sampling equipment were pre-cleaned and packaged to maintain cleanliness (e.g., they were double bagged and ends of sampling tubing were closed together using silicon tubing). Equipment blanks and field blanks were periodically collected to ensure sampling equipment and collection methods were not a source of contamination (see Section 4.1.2). The following sections summarize the collection procedures for each Phase II storm event and any anomalies.

Table 2.3. The Non-Dry Dock Stormwater Outfalls Sampled During Each Storm, Storm Event Identification and Dates, Antecedent Dry Period, Storm Sampling Duration, Number of Grab and Composite Samples, and Total Event Rainfall

Station	Storm ID: SW	08	09	10	11	12	Totals
	Date	11/21/11	1/20/12	2/28/12	3/14/12	4/19/12	**Totals**
	Total No. Grabs	6	6	7	8	0	**27**
	Total No. Comp.	6	7	7	7	1	**28**
PSNS126	Antecedent (d:hr)	3:11	9:22	3:17	1:10		**4 storms**
	Sampling (hr:min)	28:03	23:44	19:44	30:44		
	# Samples	1 and 1	1 and 2*	2* and 2*	1 and 1		
	Rainfall (in.)	1.36	1.03	0.45	1.29		
PSNS124.1	Antecedent (d:hr)	3:12	9:00	3:17	0:18		**4 storms**
	Sampling (hr:min)	26:51	10:42	1:44	28:14		
	# Samples	1 and 1	1 and 1	1 and 1	2* and 1		
	Rainfall (in.)	1.99	1.13	0.23	1.52		
PSNS124	Antecedent (d:hr)	3:13	9:23	3:17	1:10		**4 storms**
	Sampling (hr:min)	28:01	18:41	1:44	26:06		
	# Samples	1 and 1	1 and 1	1 and 1	2* and 1		
	Rainfall (in.)	1.22	1.18	0.19	1.23		
PSNS115.1	Antecedent (d:hr)	3:11	9:21	3:18	1:10		**4 storms**
	Sampling (hr:min)	28:15	21:42	20:44	31:13		
	# Samples	1 and 1	1 and 1	1 and 1	1 and 1		
	Rainfall (in.)	1.45	1.17	0.46	1.17		
PSNS084.1	Antecedent (d:hr)	3:09	9:22	3:17	0:19		**4 storms**
	Sampling (hr:min)	25:51	20:42	18:59	30:14		
	# Samples	1 and 1	1 and 1	1 and 1	1 and 1		
	Rainfall (in.)	1.69	1.13	0.55	1.58		
PSNS015	Antecedent (d:hr)	3:12	9:22	3:17	0:18	1:10	**5 storms**
	Sampling (hr:min)	28:21	20:42	20:44	29:43	17:05	
	# Samples	1 and 1	1 and 1	1 and 1	1 and 2*	0 and 1	
	Rainfall (in.)	1.82	1.29	0.58	1.75	0.46	

Antecedent duration provides the number of days and hours since precipitation caused runoff.
Sampling period duration is provided in hours and minutes (hr:min).
Samples = number of grab and composite samples, respectively. An * indicates field duplicates were collected.
Rainfall (in.) is the total sampling period rainfall.

2.4.1 Storm Event Summaries

The storm event reports provide a detailed overview of the field activities including any deviations from the PWP and corrective actions. They were summarized and reported as Appendix A. No major anomalies were observed or otherwise noted during Phase II sampling. Minor anomalies such as labeling corrections, changes to start and stop conditions, and grab sample collection timing were documented. Several changes of note are discussed below.

The method for rainfall statistics, namely average, minimum, maximum, and median were previously calculated on static 1-hour segments. For all of Phase II, the statistics were calculated on a "rolling 1-hour data window" at 5-minute increments in an attempt to provide a more accurate and representative assessment of the actual rainfall conditions. In addition, most of the CT2X transducers and associated stainless steel pipe ring band showed signs of corrosion due to saltwater immersion. Therefore, they were upgraded to titanium to strengthen the earth grounds of all monitoring systems and to electrically isolate

the transducers for all other metal components. This maintenance issue did not affect data collection or quality.

During SW10, the composite samples for PSNS124 and PSNS124.1 were comprised of a single discrete wedge bottle. Freshwater conditions only occurred at these monitoring stations during one collection period with all other bottles dominated by saline water. The 2011–2012 PWP stipulates that composite samples should represent at least 2 hours of duration and contain a minimum of eight aliquots. The resulting samples represented 1 hour of duration and four aliquots. The samples were conditionally accepted and analyses progressed as they were considered representative of the stormwater conditions that existed at the stations and did not include dilution from incoming tidal water.

During SW11, pacing rates for each of the six stations were initially set at 15 minutes. The storm particulars included two fronts pushing through. To capture the bulk of the second front, the pacing rates were adjusted to 30 minutes after the first front pushed through. The pacing rate was adjusted back to 15 minutes prior to the second front. The composite sample formulation accounted for these changes accordingly (see the addendum to the field forms with detailed composite formulation notes). Table 2.4 provides an account of these pacing rates changes.

Table 2.4. The SW11 Composite Sample Pacing Rate Information

Station ID	Pacing Rate Changed to 30 min. (Date/Time)	Bottle Where Change Occurred	Pacing Rate Switched Back to 15 min. (Date/Time)	Bottle Where Change Back Occurred
PSNS015[(a)]	3/14/12 1600	7/8	3/15/12 0430	13/14
PSNS084.1	3/14/12 1530	6	3/15/12 0500	13
PSNS115.1	3/14/12 1530	7	3/15/12 0500	14
PSNS124	3/14/12 1540	5	3/15/12 0500	12
PSNS124.1	3/14/12 1530	4	3/15/12 0500	11
PSNS126	3/14/12 1730	8	3/15/12 0430	14

(a) The duplicate collected at PSNS015 was simultaneously collected by splitting the autosampler setup into two sets of bottle groups (e.g., 1–12 parent samples and 13–24 duplicates). Therefore, any changes affect both the parent and the duplicate.

In response to the Phase I and II data for PSNS015, an additional storm sampling event was added (SW12) to quantify the metal concentrations at this station in both the individual 1-hour time-paced samples and the Event Mean Composite (EMC). The modifications from the PWP were documented in the addendum (see Appendix B chemistry report for SW12) and included 1) sampling only at PSNS015; 2) collecting 18 samples from the individual wedge bottles prior to creation of the composite; and 3) reducing the parameter list to total and dissolved metals, DOC, TSS, salinity, and turbidity. All other collection and compositing procedures remained consistent with the PWP (TEC and PNNL 2012).

2.4.2 Grab Sampling

Fecal coliform and TPH samples were collected using a manual grab sampler. The precipitation and water-level data were used to guide the field team to collect grabs during the rising limb of the storm if

possible. In some cases, the grab samples were collected on the falling limb due to tidal conditions. Grab samples were collected after runoff commenced and conductivity levels were less than 2,000 µmho/cm, indicating that seawater was not a significant fraction of the water in the pipe. Qualifying stormwater conditions (runoff occurrence/hydrograph response and water quality) were also verified prior to grab sample collection at each station. Specific times and details are provided in the individual storm event reports along with the event hydrograph for each station and storm combination (Appendix A). No grab samples were collected for SW12.

A sterilized and pre-cleaned stainless steel cup was dipped into the flow stream (typically by using an extension pole). A new stainless steel cup was used at each station. The TPH samplers were poured into two separate pre-cleaned amber glass containers each containing preservative (see Table 2.5). Fecal coliform samples were collected and managed as described in the *Fecal Coliform Monitoring Assessment and Control - Water Year 2011 Quality Assurance Project Plan* (Johnston et al. 2010). Samples were stored in a cooler at 4°C until transport to the analytical laboratories. Grab and composite samples were collected as an associated pair during each storm event.

Table 2.5. Sample Container Types, Preservatives, Recommended Handling, and Holding Times

Parameter	Container Type	Handling / Preservation	Holding Time
Chemicals of Concern			
TPH (grab)	(2) 1-L Amber Glass	4°C ± 2°C, H_2SO_4	7 days for extraction, 40 days for analysis
Total Recoverable Metals (Al, As, Cu, Cr, Cd, Pb, Zn, Hg)	1 L Teflon	4°C ± 2°C; pH < 2.0 with nitric acid	90 days Hg and 6 months for all others
Dissolved Metals (Cu, Cr, Cd, Pb, Zn, Hg)	500 mL Teflon	4°C ± 2°C; pH < 2.0 with nitric acid after filtration	Filter (0.45 µm) within 48 hours of composite; once preserved same as above
Conventional Parameters			
Turbidity	10 L Glass	4°C ± 2°C	48 hours
TSS	1 L LDPE	4°C ± 2°C	7 days
Hardness, Total (as $CaCO_3$)	250 mL LDPE	4°C ± 2°C	14 days
TOC	250 mL LDPE w/Pres. or glass	4°C ± 2°C, H_2SO_4 or frozen	28 days
DOC	250 mL LDPE w/Pres. or glass	4°C ± 2°C, H_2SO_4 or frozen	After field filtration using GFF filter, 28 days

2.4.3 Automated Time-Proportionate Composite Sampling

Time-proportionate composite samples were collected using autosamplers at each station during qualifying storm events as described above. Autosamplers were configured to begin sampling when a given combination of rain, and/or water level, and/or conductivity conditions met the established criteria. Composite samples were collected for at least the first 2 hours of non-tidally affected runoff and up to 24-hours or until the storm precipitation dropped below 0.03 in. in an hour. Time-paced composites were collected into pre-cleaned polypropylene (PP) containers (wedge bottles) using Isco autosampler pumps

equipped with siliconized Tygon pump head tubing, Teflon-lined suction tubing, and various connectors/fittings. The PWP details the collection, handling, analytical, and quality control procedures associated with the composite sampling. The procedures are briefly described in the following sections.

The autosamplers were set to initiate their sampling program when a series of enabling conditions were met that indicated storm runoff was occurring and that there was minimal or no tidal influence. These enabling conditions included rainfall, water level, and conductivity. Specifically, the rain gauge must have detected a rain intensity of at least 0.03 in. of precipitation in a 1-hour period and a corresponding increase in the water-level sensor indicated the storm produced adequate runoff. The enabling water level was determined from background water-level measurements taken at each station when not affected by storm runoff or tides plus an upward water-level change beyond the sensitivity (i.e., noise) of the instrument. This water level typically changed from 0.03 to 0.3 ft, with final enabling conditions occurring when conductivity was less than 2,000 µmho/cm. A variation of the conductivity enable condition was the "repeatable enable." This is where the sampler program was toggled on and off based on the 2,000 µmho/cm threshold—such that only qualified water would be collected. Various combinations of these enabling conditions were used throughout the individual storm sampling events (see Appendix A).

The autosamplers were programmed to collect sequential samples over the course of a targeted event. A 24-bottle configuration was used to provide adequate sampling resolution. In this configuration, each discrete sample (i.e., wedge bottle) represented a 1-hour composite. The conductivity of each discrete sample was measured and only samples with conductivities less than 2,000 µmho/cm were included in the EMC. The acceptable discrete samples were then equally composited in a 10-L pre-cleaned glass jar. A detailed description of the compositing formulation was provided in Section 8 of the 2011–2012 PWP. The SW12 event is the only one where individual discrete samples were collected along with an EMC.

2.4.4 Field Sample Validation, Preservation, and Handling

Prior to creating the storm EMC samples, the individual time-composites (a single wedge bottle) were validated against criteria presented in Section 2.1. Validation activities for the grab and composite samples are presented below involved the following actions:

- reviewing field forms and the precipitation, water level, and conductivity data to ensure the grab samples were collected during storm runoff
- reviewing field notes to determine whether anomalous conditions were encountered that would disqualify the grab samples
- inspecting the grab sample containers to ensure they were properly filled and labeled.

Composite samples were validated by the following actions:

- reviewing the storm event hyetograph, hydrograph, and timing of the sample aliquot collection to ensure that the composite samples were collected within the first 2 hours of non-tidally influenced runoff
- reviewing field notes to determine whether anomalous conditions were encountered that would disqualify the composite sample

- testing the conductivity of each 1-L wedge bottle using a hand-held conductivity meter to ensure levels were below 2,000 µmhos/cm
- confirming the EMC consisted of at least eight 1-L wedge bottles
- inspecting the containers to ensure they were properly filled and labeled.

The EMC samples (final composite) were prepared in a 10-L pre-cleaned glass jar stored at 4±2°C until hand delivered to PNNL. Grab samples collected for TPH were stored at 4±2°C and hand delivered to PNNL. Table 2.5 lists the sample containers, preservatives, and analytical holding times for each parameter. Upon receipt at PNNL, the condition of all the samples was verified as acceptable and tracked back to the field chain of custody (COC). In the clean laboratory at PNNL, each glass composite sample was shaken vigorously (prior and between aliquot removal) and aliquots were poured into the following types of containers:

- 500-mL Teflon bottle for total metals (TME)
- 500-mL 0.45-µm polyvinylidene fluoride (PVDF) filter unit, vacuum filtered in a Class 100 clean bench and then poured into a 500-mL Teflon bottle for dissolved metals
- 250-mL low-density polyethylene (LDPE) bottle precharged with nitric acid preservative for samples to be analyzed for hardness
- 500-mL LDPE container with sulfuric acid preservative for the analysis of TOC
- 60-mL syringe and ashed glass fiber filter (GFF) in a cleaned filter holder and filtered into a 250-mL LDPE container with sulfuric acid preservative for the analysis of DOC
- 500-mL or 1-L LDPE bottle for the analysis of TSS.

The total metal and dissolved metal fractions were acidified inside a Class 100 clean bench to a pH of <2.0 with double distilled nitric acid. The TPH grab samples and composites for TOC, DOC, hardness, and TSS were all forwarded to Columbia Analytical Laboratory Services (CAS) for analyses. The only exception was the SW12 samples for TOC, DOC, and TSS were analyzed at PNNL because lower detection limits were required. Appendix B provides the documentation for the sample receipt and handling and the chemistry results for each storm event.

3.0 Laboratory Methods and Quality Control Results

The chemicals of concern for this project included total recoverable and dissolved Al, As, Cu, Cr, Cd, Pb, Zn, Hg, and TPH (see Table 2.5). Ancillary parameters included turbidity, TSS, hardness, TOC, and DOC. Table 3.1 lists the sample preparation and analytical methods along with the method detection limit (MDL) and reporting limit (RL). Collectively, these methods incorporate aspects of the EPA Method 1669 (EPA 1995) for clean hands sample collection and ambient water quality analyses methods (Method 1638 for metals [EPA 1996a] and Method 1631 for Hg [EPA 2002b]) to adequately represent ambient water chemistry. Although stormwater is not considered ambient water, it was critical to incorporate these protocols because industrial areas often have other sources of contamination at the outfall sampling locations. Once a sample is collected, it must be isolated from the industrial processes occurring around the manhole because contamination of the sample would mean the sample would no longer represent the chemistry of the stormwater transferred through the piped conveyance. In addition, these parameters allow the assessment of the bioavailability of the metals and the application of the biotic ligand model (BLM). The BLM has been developed to account for ancillary parameters like DOC that affect Cu bioavailability in freshwater (EPA 2007) and saltwater (DOD/EPA 2011; Hydroqual 2011[3]).

Table 3.1. Preparation and Analytical Methods for the Non-Dry Dock Stormwater Samples

Parameter	Preparation Method	Analytical Method	Method Detection Limit (MDL)[(a)]	Reporting Limit (RL)
TSS		EPA 160.2	5.0 mg/L[(b)]	5.0 mg/L[(b)]
Turbidity		180.1	0.1 NTU	0.1 NTU
Hardness (as $CaCO_3$)		STM2340C	0.8 mg/L	2 mg/L
TOC	SM5310C	SM5310C	0.07 mg/L[(b)]	0.50 mg/L[(b)]
DOC	Ashed GFF filtration	SM5310C	0.07 mg/L[(b)]	0.50 mg/L[(b)]
TPH (Diesel Range)	EPA 3510C	NWTPH-Dx	11–13 µg/L[(c)]	250 µg/L
TPH (Residual Range)	EPA 3510C	NWTPH-Dx	19–22 µg/L[(c)]	500 µg/L
Al	TRM EPA 1640m	EPA 1638m	0.3 µg/L	1.0 µg/L
As	TRM EPA 1640m	EPA 1638m	0.03 µg/L	0.1 µg/L
Cu	TRM EPA 1640m	EPA 1638m	0.007 µg/L	0.02 µg/L
Cr	TRM EPA 1640m	EPA 1638m	0.08 µg/L	0.3 µg/L
Cd	TRM EPA 1640m	EPA 1638m	0.004 µg/L	0.01 µg/L
Pb	TRM EPA 1640m	EPA 1638m	0.002 µg/L	0.006 µg/L
Zn	TRM EPA 1640m	EPA 1638m	0.05 µg/L	0.2 µg/L
Hg	EPA 1631 Rev E	EPA 1631 Rev E	0.1 ng/L	0.3 ng/L

(a) The MDL was reported from the annually verified MDL study as determined by seven replicates of deionized water spiked at appropriate concentrations and prepared using the Total Recoverable Metals (TRM) method. The RL = 3.18 × MDL.
(b) The SW12 event used ultra low-level DOC/TOC analyses with MDL = 0.03 mg/L and RL = 0.095 mg/L.
(c) MDLs were sample-specific based on the volume extracted. See data table for individual MDLs. The TSS MDL = 0.49 mg/L.

[3] Draft Update of Aquatic Life Ambient Saltwater Quality Criteria for Copper, in review. Contact Hydroqual for more information.

The PWP detailed the preparation and analytical methods and Appendix B provides the individual chemistry reports for each storm event. These reports include a brief description of the methods, all quality control samples analyzed, and any impacts on the data quality. The methods were either standard methods or modifications of EPA methods. A short synopsis of method modification is provided below. PNNL maintains a National Environmental Laboratory accreditation for the modified methods. Methods not described below follow the EPA protocol exactly (i.e., Hg).

Samples were analyzed for metals by inductively coupled plasma-mass spectrometry (ICP-MS) in accordance with Battelle standard operating procedure MSL-I-022, "Determination of Elements in Aqueous and Digestate Samples by ICP/MS." The base methods for this procedure are EPA Method 1638 and EPA Method 1640 (EPA 1996a, b). Freshwater samples (defined as salinity <2 ppt) were digested by following the total recoverable metals (TRM) method established in EPA Method 1640 (EPA 1996b) prior to analysis by ICP-MS. Both the filtered and unfiltered fractions were prepared using this method to destroy any colloidal particles remaining in the filtered (aka dissolved) fraction.

Seawater samples were preconcentrated via a precipitation step followed by reconstituted in a salt-free solution in accordance with Battelle SOP MSL-I-025, "Methods of Sample Preconcentration: Iron and Palladium/APDC Coprecipitation and Borohydride Reductive Precipitation for Trace Metals Analysis in Water." Preconcentrated seawater samples were analyzed for Al, Ag, Cd, Cr, Cu, Pb, and Zn by ICP-MS. Seawater data were reported as reagent corrected for the metals requiring Fe/Pd preconcentration (Al, Ag, Cd, Cr, Cu, Pb, and Zn) and denoted with a b-flag. The required preconcentration procedure for ICP-MS analyses includes the addition of chelating agents to induce precipitation of metals under specific conditions. Subsequently, reagents added to the samples should be of the purest quality to result in zero addition of metals to the seawater samples. Required reagents have trace impurities of these metals; therefore, the data were blank corrected for these elements. Results were corrected using the mean batch reagent blank identified for each preparation batch (BMRB_analysis date) and provided in Appendix B for each storm.

For events SW08 through SW11, the TOC/DOC method was the Standard Method for wet oxidation (SM5310C). The DOC samples for SW12 were analyzed using a High Temperature Catalytic Oxidation method. The instrument is specially equipped with a high-salt sample combustion tube kit and halogen scrubber for seawater analysis. Seawater samples were acidified to pH <2 by concentrated hydrochloric acid prior to analysis then sparged for 2 minutes to remove inorganic carbon. The non-purgeable organic carbons (NPOC) in samples were further converted to CO_2 by oxidation at 680°C with a platinum catalyst. A non-dispersive infrared detector was used to detect the converted CO_2 for quantification of NPOC. The data were reported as both milligrams per liter and micromols.

The objective for the usability, quality, type, and output of data collected, as stipulated in the PWP, is to achieve the requirements specified in the draft NPDES permit. Stormwater outfalls are not currently regulated under the NPDES permit, therefore, the data will inform the Navy of the status of the NDDSW outfalls and provide comparable data for the ENVVEST runoff model. The quality and usability of laboratory data generated in this investigation were evaluated for precision, accuracy (bias), representativeness, comparability, completeness, and sensitivity. The data were found to have acceptable measures of each of these variables. The overall precision was evaluated using the field duplicates, laboratory duplicates, and duplicate matrix spikes. The accuracy was evaluated using the equipment blank results, matrix spikes (MS), laboratory control samples (LCS), and standard reference material (SRM). The representativeness, comparability, and sensitivity were derived from the laboratory

method blanks, MDLs, RLs, and comparable methodology in collection and analytical procedures (e.g., time-paced composites vs. grab samples).

3.1 Field Quality Control

Field quality control (QC) conducted during this project included documented procedures specific to field activities, including calibrating field equipment, documentation, sample collection, QC samples, data review and verification, field team performance, and system audits and possible corrective actions for activities. These elements were described in the PWP and are briefly summarized below.

Original field records were maintained in designated binders and databases for all monitoring and field-related activities using project-specific forms and established procedures. Field documentation included, but was not limited to, storm controller work sheets, maintenance activity logs, instrument calibration logs, work permits for confined space, COC forms, raw data from continuous monitoring instrumentation, and other documentation. These records were included in the storm event reports (Appendix A).

Field QC samples were used to assess sample collection procedures, environmental conditions during sample collection, storage, and transport to the laboratory, and the adequacy of equipment and sampling container decontamination. The types of field QC samples collected were field duplicate samples and equipment blanks (including tubing blanks, composite bottles, and sample bottles). Field QC samples were labeled and tracked as individual samples. The collection frequency was greater than the target of 10% of the environmental samples collected for chemicals of concern (e.g., metals and TPH).

In addition, other field QC procedures used to ensure consistency, reduce contamination, and ensure representative samples were as follows

- Collect composite samples using automatic samplers for all parameters except TPH (grabs due to container requirements) consistent with previous studies.
- Collectd samples in certified contaminant-free or properly decontaminated containers as demonstrated by the equipment blank samples.
- Store sampling containers in clean, sealed boxes or bags prior to use.
- Use “clean hands/dirty hands” sampling techniques (e.g., one team member performs “dirty tasks” such as lifting manhole covers and handling samplers with batteries, while the other member performs “clean tasks” such as handling sample intake lines and sample collection bottles).
- Periodically clean or replace Teflon-lined sampler tubing and sampler strainers.
- Backflush sampler tubing with deionized water prior to a sampling event.
- Deliver samples to laboratory with proper COC forms, appropriate preservation and within recommended holding times.

3.1.1 Field Duplicates

Field duplicates provided a measure of field variability due to sample processing and handling. All field duplicate samples were collected in an identical manner to the primary or “parent” sample and

received an independent sample identification code. The field duplicate samples were used to evaluate whether environmental conditions were more variable than the sampling design could accommodate.

Field duplicate EMCs consisted of an "internal" duplicate, which included a replicate, composite sample collected at the same time using a single autosampler configuration. The autosampler was programmed to collect sequential aliquots of stormwater and deliver them to two separate sets of bottles (see PWP Section 8.2.5). In addition, field duplicates were collected for those parameters that require grab samples (i.e., TPH, fecal coliform) by filling an additional set of grab sample bottles in rapid succession.

Twenty-five EMC samples were collected plus three field duplicates for the metals and ancillary parameters. For the metals, the relative percent differences (RPDs) between the parent and duplicate samples were all less ≤40% RPD. This meets the data quality objective of ≤40% RPD suggesting the methodology accurately captures variability at a particular station within a given storm event. In fact, the average RPD for all metals was ≤8% RPD. The highest RPD values were noted for Hg at stations PSNS015 and PSNS126. The average RPD for Hg alone was ≤16% RPD. The variability was driven by the particulate fraction of Hg and discussed further in Section 4.3.

The RPDs for the ancillary parameters were ≤67% RPD with an average of 12%. The one high RPD (67%) was noted for TSS during SW09 at station PSNS126. A second field duplicate was collected at this station during SW10 with 10% RPD for TSS. The SW09 event was a large storm (>1 in.) and therefore it was not unusual to have high TSS with large variability.

Twenty-five storm grabs were collected plus three field duplicates. The RPD values for the diesel range organics (DRO) were ≤53% RPD with an average of 36% RPD. The RPD values for the residual range organics (RRO) were ≤89% RPD with an average of 57% RPD. The RPDs were high because the sample concentrations were either less than the RL or qualified due to the chromatographic fingerprint resembling a petroleum product, but the elution pattern suggested the presence of heavier molecular weight constituents than the calibration standard or the fingerprint does not match the calibration standard.

3.1.2 Field Blanks

Field collected equipment blanks (EBs) exceeded a frequency of 1 out of every 10 samples for metals and 1 per sample container lot for TPH. They were used to check for possible contamination of laboratory-cleaned grab sample equipment, autosampler equipment, and sample containers for the chemicals of concern (TPH and metals). The EBs were also used to detect contamination from the surroundings or cross-contamination during transportation and/or storage. For TPH, one equipment blank was collected by pouring deionized water (DI) into the stainless steel sampling cup and then into an amber glass sample container while at one randomly selected outfall location. The TPH concentration in the EB was not detected above the RL.

For the metals, an EB was collected at each station for a total of six EBs. The blanks represented the Teflon sample line tubing, autosampler pump and distributor arm tubing, and glass composite jars. DI was pumped through the deployed tubing, autosampler, laboratory cleaned sample intake line and strainer, and into the pre-cleaned glass composite jar. The EB samples were assigned a unique sample identification code, labeled, and delivered to the laboratory as a sample. At the laboratory, they were

handled as a sample and split into pre-cleaned Teflon bottles for total metals. All the EBs were less than the RL for Hg, As, Ag, Cd, and Cr. The EBs for Cu, Pb, and Zn were detected above the RL, which triggered corrective action. The corrective action included a review of the analytical method blanks to rule out laboratory contamination, a review of the clean hands sampling protocol, and all data were evaluated to determine if the EMC were <5 times the EB concentrations. Table 3.2 summarizes the mean EB concentrations compared to the MDL, RL, and shows that no sample concentrations were <5 times the mean EB. In fact, all sample concentrations were at least an order of magnitude above the detected blanks for Cu, Pb, and Zn. The data were not significantly affected by the detected blanks.

Table 3.2. Summary of Equipment Blank Concentrations for the Metals and any Sample Impacts

	MDL	RL	EB Mean	Standard Deviation	No. Samples <5 times EB Mean (only applied if mean EB > RL)
Hg (ng/L)	0.1	0.3	0.179 J	0.043	NA
Ag (µg/L)	0.002	0.006	0.002 U	--	NA
As (µg/L)	0.03	0.1	0.03 U	--	NA
Cd (µg/L)	0.004	0.01	0.004 U	--	NA
Cr (µg/L)	0.08	0.3	0.08 U	--	NA
Cu (µg/L)	0.007	0.02	0.122	0.0941	0
Pb (µg/L)	0.002	0.006	0.00894	0.00727	0
Zn (µg/L)	0.05	0.2	0.241	0.164	0

NA – not applicable; U value not detected above the MDL; and J estimated concentration below the RL.

3.1.3 Field Data Review and Verification

Field data were reviewed and verified following the guidance provided by the EPA (2002a). The verification included computer entries to field data sheets, calculations, and raw data review for outliers or nonsensical readings. In addition, the outfall and rainfall data were subjected to additional review and analysis, at a minimum frequency of every event (see Telemetry Data Summary Report [TDSR] included in Appendix A).

The rainfall, water-level, temperature, and conductivity data were reviewed monthly and after each sampled storm event. Data were reviewed for gross errors such as spikes or data gaps to determine completeness of the data set. Data were also verified against field sheets and calibration records and evaluated to determine if instrument calibrations demonstrated a need for data qualification or re-calculation.

The TEC and PNNL reviewed the procedures implemented in the field for consistency with the established protocols. The patterns/yields for a particular basin were reviewed against previous project data and the hyetograph was compared to the hydrograph for water-level response to rainfall. Members of the Navy Project Team also performed field procedural reviews. Sample collection, preservation, labeling, and other procedures were checked for completeness. No significant deviations were noted; minor deviations were documented in the field storm event or chemistry reports (Appendices A and B, respectively).

3.2 Laboratory Quality Control

The PWP detailed the laboratory procedures necessary to achieve the data quality objectives through appropriate analytical methods, quality assurance (QA)/QC, and data validation. The QC samples analyzed at a frequency of 1 each per 20 or fewer field samples included a method blank, LCS, MS, matrix spike duplicates (MSD), laboratory duplicate (DUP), and SRM for the metals. The TPH analyses included a method blank, LCS, and DUP. The QC data were provided in the individual storm chemistry reports (Appendix B) and summarized in Table 3.3 for all the parameters. The summary included both freshwater and seawater methods required for SW12, because both discrete intervals of the storm and the EMC were analyzed.

Table 3.3. Laboratory Quality Control Sample Summary

QC Type		Hg	As	Ag	Cd	Cr	Cu	Pb	Zn	TPH DRO	TPH RRO
MB	n =	18	7	10	10	10	10	10	10	5	5
MB	Mean	<RL	<MDL	<MDL	<MDL	<RL	<RL	<RL	<RL	<MDL	< RL
MB	Stdev	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Percent Recovery (%)											
LCS	n =	12	7	7	7	7	7	7	7	5	5
LCS	Mean	102%	98%	98%	100%	102%	99%	100%	98%	112%	100%
MS	n =	24	12	10	12	12	12	12	12	NA	NA
MS	Mean	101%	100%	95%	99%	100%	99%	103%	100%	NA	NA
SRM[(a)]	n =	6	7	7	9	8	9	8	9	NA	NA
SRM[(a)]	Mean	97%	96%	90%	96%	97%	95%	96%	94%	NA	NA
Relative Percent Difference (RPD)											
Lab Dup	n =	7	7	7	7	7	7	7	7	5	5
Lab Dup	Mean	11%	3%	18%	3%	3%	1%	1%	1%	12%	13%
Field Dup[(b)]	n =	6	6	6	6	6	6	6	6	3	3
Field Dup	Mean	16%	3%	11%	10%	8%	4%	9%	3%	36%	57%

Ancillary Parameters[(c)]					
QC Type		DOC	TOC	TSS	Hardness
MB	n =	12	6	8	5
MB	Mean	< RL	<MDL	<MDL	<MDL
Percent Recovery (%)					
LCS	n =	7	8	6	5
LCS	Mean	96%	95%	97%	102%
MS	n =	4	4	NA	NA
MS	Mean	98%	101%	NA	NA
SRM	n =	4	NA	NA	NA
SRM	Mean	98%	NA	NA	NA
Relative Percent Difference (RPD)					
Lab Dup	n =	27	34	NA	4
Lab Dup	Mean	5%	3%	NA	3%
Field Dup	n =	3	3	3	3
Field Dup	Mean	4%	8%	30%	5%

(a) Includes freshwater SRMs for SW08-SW12 and seawater SRMs for SW12.
(b) Field duplicate count for metals includes both total and dissolved fractions.
(c) Includes the QC samples analyzed by CAS for SW08-SW11 and PNNL for SW12.
EB = equipment blank; MB = method blank; LCS = laboratory control sample; MS = matrix spike
SRM = standard reference material; Lab Dup = laboratory duplicate; Field Dup = field duplicate; TPH = total petroleum hydrocarbons; DRO = diesel range organics; RRO = residual range organics.

All the data met the required QC requirements. As was noted in Phase I, the field duplicates from PSNS015 were highly variable for the total Hg fraction (Phase II ranged 2%–40% RPD). The average RPD was reduced from 80% in Phase I to 16% in Phase II. The total and dissolved pairs for each field duplicate suggest the heterogeneity is associated with the particulate fraction with the total Hg field duplicates averaging 28% RPD while the dissolved averaged (4% RPD).

3.3 Data Collection, Storage, and Management

Three types of data were generated during this project: 1) field activity data, including non-sampling field task operations, sample collection tasks, and monitoring equipment maintenance activities; 2) in situ monitoring data, including precipitation, water-level, temperature, conductivity, salinity, and autosampler collection information; and 3) laboratory chemistry data. The procedures for hard copy and electronic data handling, quality review, and archival were detailed in the PWP (TEC and PNNL 2012). Field notes and ancillary data are provided in Appendix A. In situ monitoring data were provided to the U.S. Navy and archived electronically on the TEC network. Field data were split into raw and comma-delimited formats. The raw data were stored "as-is," remaining static and unedited to serve as an archive and backup to the field monitoring data. The comma-delimited data were maintained as .DAT files. Comma-delimited files were uploaded to a proprietary water quality data management and display database (e.g., Isco® Flowlink, v4.15). All electronic data were reviewed for errors, omissions, and accuracy. The TDSR (for certain time periods before, during, and after storm events) and a 2011–2012 Telemetry Collection Metadata Report (entire monitoring period) summarized basic sensor specifications, location particulars, and collection issues. Appendix A contains the TDSRs and the Metadata Report.

Appendix B contains all laboratory generated data. The data were also formatted for the electronic submission into the ENVVEST database. Copies of analytical raw data were stored at the laboratory of their generation and are available upon request. All project data were maintained as part of the official project record and stored for a period as described in the PWP (TEC and PNNL 2012).

4.0 Results and Discussion

Five qualifying storm events were sampled from November 2, 2011 through April 19, 2012 (see Table 2.3). The field collection details for each storm are reported in Appendix A. The chemistry data are reported in Appendix B. Each event report (field and chemistry) contained a summary of storm event-specific qualification parameters, sample collection criteria, QC information, and storm and sample validation checklist items. The following sections provide a synopsis of this information.

4.1 Rainfall and Runoff Data

Rainfall data were collected from each station and from the PSNS gauge (B427). Table 4.1 presents a summary of the rainfall data collected at the Phase II stations, B427, and the calculated runoff for each basin and storm event. The table also provides the average and range of rainfall across the PSNS sampling locations to illustrate the variability even within PSNS during a given storm. The average rainfall was used to classify the storm based on the ENVVEST storm size classification (Brandenberger et al. 2007a). During Phase II, two small and three medium-large storms were sampled. Classifying the storms based on size, basin LULC, and water quality parameters provides a means of further developing relationships between metrics that are easily acquired, such as LULC data and the associated contaminant concentrations. This is discussed further in the stormwater chemistry and conclusions.

Runoff volume for each monitoring location was estimated from the continuous rainfall record using a variation of the Runoff Coefficient Method (RCM), as discussed previously. Table 4.2 presents a more detailed analysis of the rainfall and associated in situ water level and water quality data collected from the structure within the storm drain pipe where monitoring occurred referred to as the vault. This includes the maximum 1-hour rainfall intensity and event average 1-hour rainfall intensity (both in inches/hour). Sample event vault data were also assessed in 5-minute intervals (in 1-hour rolling average). As discussed above for Table 4.1, these data illustrate the variability in the rainfall statistics across the PSNS stations. However, although the maximum intensity and averages may vary significantly, the median intensities are quite similar, indicating the data are not significantly biased by the higher intensities.

Table 4.1 also includes the vault water level, salinity, and temperature data. These data provide a measure of the tidal influence during a given storm and the associated water-level changes in the pipe. There are some nuances to this type of data, such as negative water levels recorded at PSNS084.1 and PSNS115.1 due to transducer placement. These negative values were replaced with zeros. The salinity data for all stations except PSNS084.1 recorded a minimum of 2 ppt, which is due to the difference between the CT2X and YSI sensors. Salinity greater than 5 ppt is considered seawater when selecting the appropriate analytical method (e.g., metals by ICP-MS suffer salt interferences and methods must address this or false positives are possible). In situ data indicate that tidal water reached the sampling stations at all outfalls during each sampled storm even except for PSNS126 during SW10. The water-level and salinity data were used in the storm composite formulation (e.g., EMC). In all cases, the EMC was formulated to represent only the freshwater or storm event runoff and not the incoming tidal water.

Table 4.1. Total Rainfall (inches) for Each Storm Event, Calculated Runoff, and the ENVVEST Storm Size Classification

	SW	08	09	10	11	12
Station	Date	11/21/11	1/20/12	2/28/12	3/14/12	4/19/12
B427 – Navy Gauge		1.83	1.74[(a)]	0.57	1.42	0.47
PSNS126	Rainfall (in.)	1.36	1.03	0.45	1.29	--
	Runoff (ft^3)	67,080	50,803	22,196	63,627	--
PSNS124.1	Rainfall (in.)	1.99	1.13	0.23	1.52	--
	Runoff (ft^3)	16,790	9,534	1,941	12,824	--
PSNS124	Rainfall (in.)	1.22	1.18	0.19	1.23	--
	Runoff (ft^3)	40,286	38,965	6,274	40,616	--
PSNS115.1	Rainfall (in.)	1.45	1.17	0.46	1.17	--
	Runoff (ft^3)	44,272	35,723	14,045	35,723	--
PSNS084.1	Rainfall (in.)	1.69	1.13	0.55	1.58	--
	Runoff (ft^3)	3,037	2,030	988	2,839	--
PSNS015	Rainfall (in.)	1.82	1.29	0.58	1.75	0.46
	Runoff (ft^3)	365,717	259,217	116,547	351,651	92,434
Storm Average Rainfall (in.)[(b)]		**1.59**	**1.16**	**0.41**	**1.42**	**0.46**
Min (in.)		1.22	1.03	0.19	1.17	0.46
Max (in.)		1.99	1.74	0.58	1.75	0.47
ENVVEST Storm Size Classification[(c)]		Med-Large	Med-Large	Small	Med-Large	Small

(a) The B427 rain gauge was likely initially clogged with snow pack. The gauge did not record its first tip until approximately 5 hours after the monitoring sites recorded their first tips and the total rain amount is much greater than any station.
(b) Rain total averages do not include data from the B427 gauge.
(c) Storm size classification (Brandenberger et al. 2007a): small = <0.5 in., medium = 0.5–1.0 in., med-large = 1.0–2.0 in., large = ≥2.0 in.
-- = Not sampled.

Also SW08 and SW10 were considered bimodal storms with intra-event dry periods of 6 to 8 hours. Although there was an intra-event dry period, the two modes were considered part of the same storm and summed to provide the total event rainfall. See Appendix A for more detailed discussions of the data nuances for each storm.

Table 4.2. Storm Event Rainfall Descriptive Summary for Each 2011–2012 Storm and Station

			B427	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
SW08 (11/21/11)	**Total Rainfall (in.)**		**1.83**	**1.36**	**1.99**	**1.22**	**1.45**	**1.69**	**1.82**
	Max 1-hr Rainfall Intensity (in./hr)		**0.20**						
	Average 1-hr Rainfall Intensity (in./hr)		**0.065**						
	Rainfall – 5-min Interval (in.)	Min		0.00	0.00	0.00	0.00	0.00	0.00
		Max		0.16	0.30	0.16	0.19	0.21	0.20
		Average		0.04	0.06	0.04	0.05	0.05	0.06
		Median		0.02	0.03	0.02	0.02	0.03	0.03
	Water level (ft)	Min		0.04	0.17	0.22	0	0	0.39
		Max		5.02	4.81	8.54	12.19	8.04	9.25
		Average		1.18	1.12	3.45	6.69	2.92	4.17
		Median		0.32	0.30	3.16	7.00	2.69	4.08
	Salinity (ppt)	Min		2.00	2.00	2.00	2.00	0.05	2.00
		Max		42.00	42.00	42.00	42.00	34.33	42.00
		Average		7.10	17.00	18.66	11.47	9.48	12.67
		Median		2.00	2.00	4.11	2.00	0.22	2.00
	Temp (°C)	Min		4.40	5.11	4.80	4.47	5.37	4.27
		Max		10.96	11.61	13.07	12.51	19.27	13.15
		Average		9.31	9.52	9.77	9.24	11.06	8.91
		Median		9.64	9.64	9.82	9.47	10.48	9.15

Table 4.2. (contd)

			B427	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
	Total Rainfall (in.)		**1.74**	**1.03**	**1.13**	**1.18**	**1.17**	**1.13**	**1.29**
	Max 1-hr Rainfall Intensity (in./hr)		**0.28**						
	Average 1-hr Rainfall Intensity (in./hr)		**0.116**						
	Rainfall – 5-min Interval (in.)	Min		0.00	0.00	0.00	0.00	0.00	0.00
		Max		0.14	0.17	0.20	0.17	0.15	0.16
		Average		0.03	0.05	0.05	0.04	0.04	0.04
		Median		0.02	0.04	0.03	0.03	0.03	0.04
	Water level (ft)	Min		0.31	0.10	0.30	0.06	0	0.12
		Max		5.54	4.00	8.67	12.70	8.47	9.20
		Average		2.10	1.24	4.44	7.75	4.11	5.05
		Median		1.67	0.40	4.66	8.53	4.19	5.50
	Salinity (ppt)	Min		2.00	2.00	2.00	2.00	0.02	2.00
		Max		42.00	42.00	42.00	42.00	44.70	42.00
		Average		3.62	26.44	11.86	2.76	6.78	9.87
		Median		2.00	42.00	2.00	2.00	0.10	2.00
	Temp (°C)	Min		1.68	2.10	2.11	1.49	3.13	1.66
		Max		7.71	8.38	9.14	9.07	14.77	10.30
		Average		4.32	5.10	4.60	3.77	6.57	4.45
		Median		4.37	3.78	3.76	2.66	4.44	2.76

Table 4.2. (contd)

			B427	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
SW10 (2/28/12)	**Total Rainfall (in.)**		**0.57**	**0.45**	**0.23**	**0.19**	**0.46**	**0.55**	**0.58**
	Max 1-hr Rainfall Intensity (in./hr)		**0.10**						
	Average 1-hr Rainfall Intensity (in./hr)		**0.027**						
	Rainfall – 5-min Interval (in.)	Min		0.00	0.00	0.00	0.00	0.00	0.00
		Max		0.10	0.10	0.10	0.09	0.11	0.12
		Average		0.02	0.04	0.04	0.02	0.02	0.02
		Median		0.01	0.03	0.04	0.00	0.01	0.01
	Water level (ft)	Min		0.14	0.12	0.16	0.72	0	0.12
		Max		2.56	0.69	2.32	9.77	5.47	6.67
		Average		0.90	0.20	0.58	5.94	2.53	3.62
		Median		0.47	0.19	0.49	6.97	2.88	4.15
	Salinity (ppt)	Min		2.00	2.00	2.00	2.00	0.16	2.00
		Max		2.00	42.00	11.62	42.00	26.92	42.00
		Average		2.00	30.48	5.73	7.73	4.46	3.71
		Median		2.00	41.74	4.27	2.00	0.41	2.00
	Temp (°C)	Min		4.12	6.06	5.54	3.96	7.07	4.08
		Max		9.32	8.33	11.22	9.55	36.43	12.02
		Average		7.04	7.41	8.27	6.90	11.77	7.08
		Median		7.43	7.52	10.00	7.06	8.84	6.92

Table 4.2. (contd)

			B427	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
	Total Rainfall (in.)		**1.42**	**1.29**	**1.21**	**1.23**	**1.17**	**1.58**	**1.75**
	Max 1-hr Rainfall Intensity (in./hr)		**0.15**						
	Average 1-hr Rainfall Intensity (in./hr)		**0.059**						
	Rainfall – 5-min Interval (in.)	Min		0.00	0.00	0.00	0.00	0.00	0.00
		Max		0.19	0.27	0.19	0.17	0.22	0.21
		Average		0.04	0.04	0.04	0.03	0.05	0.05
		Median		0.02	0.03	0.03	0.02	0.03	0.04
	Water level (ft)	Min		0.02	0.08	0.21	0.12	0	0.35
		Max		3.91	3.25	7.31	11.25	7.00	8.28
		Average		1.44	1.06	4.26	7.15	3.55	4.78
		Median		1.06	0.33	4.88	8.27	4.13	5.51
	Salinity (ppt)	Min		2.00	2.00	2.00	2.00	0.01	2.00
		Max		42.00	42.00	42.00	42.00	48.44	31.69
		Average		3.77	10.80	13.53	5.00	4.27	3.80
		Median		2.00	2.00	2.34	2.00	0.09	2.00
	Temp (°C)	Min		5.45	5.64	5.77	4.75	6.85	4.68
		Max		10.93	8.48	10.15	10.67	16.97	10.93
		Average		8.44	7.45	8.17	7.78	10.02	7.84
		Median		8.45	7.53	8.11	7.86	9.46	7.85

Table 4.2. (contd)

			B427	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
SW12 (4/19/12)	**Total Rainfall (in.)**		**0.47**						**0.46**
	Max 1-hr Rainfall Intensity (in./hr)								
	Average 1-hr Rainfall Intensity (in./hr)								
	Rainfall – 5-min Interval (in.)	Min							0.00
		Max							0.13
		Average							0.02
		Median							0.01
	Water level (ft)	Min							0.18
		Max							7.43
		Average							4.02
		Median							4.30
	Salinity (ppt)	Min							2.00
		Max							42.00
		Average							7.63
		Median							2.00
	Temp (°C)	Min							9.94
		Max							16.17
		Average							12.45
		Median							12.83

The rainfall patterns during the Phase II 2011–2012 season were evaluated to determine whether they were representative of average conditions. The Phase II rainfall data were compared to historic rainfall records maintained for the Bremerton, Washington, area since 1899 and available through the Western Regional Climate Center (http://www.wrcc.dri.edu/). Table 4.3 presents monthly statistical rainfall summary data for Bremerton, Washington (station 450872), along with the PSNS monthly statistics for the Phase II sampling period.

Table 4.3. Historical Monthly Total Rainfall (inches) for Bremerton, Washington (Station ID 450872), from May 1, 1899 to August 31, 2012 Compared to the PSNS Monthly Rain Gauge Rainfall Statistics for the 2011–2012 Sampling Period

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Avg.[(a)]	3.99	7.28	7.65	7.24	5.3	4.66	2.73	1.83	1.44	0.73	0.86	1.67	45.39
Min.	0.16	0.83	0.44	0.61	0.27	0.27	0.26	0.13	0.04	0	0	0	22.73
Max.	14.12	21.6	16.22	20.08	18.03	12.19	7.67	5.46	4.52	3.11	3.97	7.09	75.81
No. Yrs.	102	95	97	96	101	100	106	107	108	105	106	107	64
PSNS B427 Rain Gauge Statistics[(b)]													
Rainfall		8.72	0.02	5.74	3.13	7.71	1.35						
Daily avg.		0.73	0.01	0.32	0.21	0.34	0.14						
Daily Min		0.04	0.01	0.01	0.01	0.01	0.01						
Daily Max		2.88	0.01	1.50	0.39	1.53	0.39						
Median		0.47	0.01	0.15	0.21	0.16	0.10						

(a) Historical rainfall downloaded from Western Regional Climate Center http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa0872.
(b) PSNS data included the following notes: 27 days were used to calculate the April monthly total, only days with measurable rain were used in the statistical calculations, and from December 1 through December 23, 2011 the actual rainfall was higher but the rain gauge was obstructed by snow on some days.

The "wet season" in western Washington is from October through April with an average annual precipitation of 45.39 in. Phase II sampling from November 2011 through April 2012 recorded 80 days of at least 0.01 in. of rain in a 24-hour period at the PSNS B427 rain gauge. The total rainfall at PSNS during this time was lower than average (39% below average) with 26.67 in. of rainfall compared to the historic data with 38.85 in. for the same period. The months of November and March had notably higher amounts of rainfall than average, while the other months (especially December) were below average.

4.2 Event Mean Composite Chemistry

The descriptive statistics for the SW08 through SW12 EMC samples are summarized in Table 4.4 for the metals listed in the draft permit and Table 4.5 for the additional metals that support the U.S. Navy mass balance calculations for Sinclair and Dyes inlets (Brandenberger et al. 2008). These data represent only the EMCs and not the discrete data collected during SW12 (see Section 4.3). The statistics were calculated on the pooled EMC data from all stations and storms and then individual stations. The NPDES stormwater draft permit and U.S. Navy general permit limits are provided in Table 4.4 in which statistics exceeding them are highlighted. The distribution of the data for all metals was highly variable (Figure 4.1).

Table 4.4. Descriptive Statistics for Phase II Event Mean Composite (EMC) Stormwater Samples. The draft permit and U.S. Navy General Permit limit are included for reference. The concentrations greater than the U.S. Navy General Permit limits are highlighted in blue and the draft permit limit are highlighted in orange.

Station		Hg	Hg	As	As	Cu	Cu	Pb	Pb	Zn	Zn
Fraction		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
					Units: µg/L						
MDL			0.0001		0.03		0.007		0.002		0.05
RL			0.0003		0.1		0.02		0.006		0.2
NPDES Stormwater Draft Permit Limit			2.1		69		5.8		221		95
U.S. Navy General Permit Limit							14.0				117
All	**Mean**	**0.00304**	**0.0142**	**1.64**	**1.91**	**14.1**	**33.7**	**0.574**	**9.70**	**85.6**	**135**
All	Stdev.	0.00306	0.0121	1.79	1.77	20.2	33.4	0.507	6.86	36.2	76.3
All	25th	0.00175	0.00568	0.542	0.932	5.88	14.7	0.26	4.56	54.5	76.6
All	Median	0.00194	0.0118	0.840	1.22	9.04	22.7	0.375	8.91	71.1	127
All	75th	0.00325	0.0186	1.55	2.14	15.3	39.5	0.631	12.9	117	177
All	n	25	25	25	25	25	25	25	25	25	25
PSNS126	**Mean**	**0.00450**	**0.00954**	**3.86**	**3.98**	**12.4**	**17.2**	**0.308**	**3.90**	**55.0**	**73.6**
PSNS126	Stdev.	0.00370	0.00565	1.81	1.70	7.97	7.42	0.0451	0.764	7.29	8.04
PSNS126	Min	0.00185	0.00396	2.03	2.14	4.78	8.98	0.255	3.00	48.1	61.9
PSNS126	Max	0.00982	0.0159	6.34	6.22	23.6	27	0.359	4.56	61.5	80.3
PSNS126	n	4	4	4	4	4	4	4	4	4	4
PSNS124.1	**Mean**	**0.00234**	**0.00563**	**0.834**	**1.07**	**13.1**	**42.8**	**0.601**	**11.9**	**105**	**172**
PSNS124.1	Stdev.	0.00101	0.00165	0.480	0.386	5.27	10.6	0.175	3.96	24.0	48.3
PSNS124.1	Min	0.00130	0.00330	0.532	0.724	7.65	34.6	0.371	6.04	71.1	100
PSNS124.1	Max	0.00357	0.00701	1.55	1.62	20.3	57.5	0.797	14.8	127	201
PSNS124.1	n	4	4	4	4	4	4	4	4	4	4

Table 4.4. (contd)

Station		Hg	Hg	As	As	Cu	Cu	Pb	Pb	Zn	Zn
Fraction		Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
					Units: µg/L						
PSNS124	**Mean**	**0.00520**	**0.0227**	**2.77**	**3.21**	**39.5**	**84.5**	**0.348**	**9.62**	**83.2**	**188**
PSNS124	Stdev.	0.00660	0.0174	3.05	3.01	45.0	58.8	0.232	3.97	41.6	150
PSNS124	Min	0.00183	0.00727	0.851	1.37	15.3	39.5	0.193	4.95	54.5	76.6
PSNS124	Max	0.0151	0.0476	7.32	7.69	107	170	0.694	14.5	145	408
PSNS124	n	4	4	4	4	4	4	4	4	4	4
PSNS115.1	**Mean**	**0.00220**	**0.0141**	**1.18**	**1.71**	**10.6**	**35.1**	**0.434**	**16.7**	**118**	**175**
PSNS115.1	Stdev.	0.000930	0.00438	0.760	0.691	4.62	11.7	0.0666	14.0	16.6	34.1
PSNS115.1	Min	0.00153	0.00912	0.455	1.16	7.47	22.7	0.339	2.59	98.3	127
PSNS115.1	Max	0.00357	0.0186	2.22	2.65	17.5	51	0.487	35.7	139	206
PSNS115.1	n	4	4	4	4	4	4	4	4	4	4
PSNS084.1	**Mean**	**0.00128**	**0.00411**	**0.902**	**1.07**	**7.16**	**18.1**	**0.258**	**5.58**	**119**	**150**
PSNS084.1	Stdev.	0.000312	0.000314	0.405	0.343	2.83	2.7	0.0809	2.29	11.6	16.4
PSNS084.1	Min	0.00096	0.00381	0.489	0.768	4.41	14.7	0.201	3.88	106	135
PSNS084.1	Max	0.00171	0.00455	1.46	1.56	11.0	21.1	0.375	8.91	134	169
PSNS084.1	n	4	4	4	4	4	4	4	4	4	4
PSNS015	**Mean**	**0.00280**	**0.0264**	**0.545**	**0.732**	**4.32**	**10.3**	**1.31**	**10.4**	**43.8**	**69.4**
PSNS015	Stdev.	0.000867	0.0126	0.166	0.165	1.66	2.50	0.737	2.05	9.03	8.23
PSNS015	Min	0.00180	0.0119	0.356	0.606	2.80	8.05	0.393	8.40	35.5	56.8
PSNS015	Max	0.00398	0.0462	0.812	1.01	6.89	14.4	2.35	13.1	57.2	78.4
PSNS015	n	5	5	5	5	5	5	5	5	5	5

Table 4.5. Descriptive Statistics for Even Mean Composite Stormwater Samples Collected During the Phase II 2011–2012 Storm Season. The metals are not included in the draft permit limit, but provided for project ENVVEST mass balance calculations.

Station		Ag	Ag	Cd	Cd	Cr	Cr
Fraction		**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**
			Units: µg/L				
MDL			**0.002**		**0.004**		**0.08**
RL			**0.006**		**0.01**		**0.3**
All	**Mean**	**0.0170**	**0.0587**	**0.191**	**0.382**	**2.16**	**4.26**
All	Stdev.	0.0313	0.0609	0.154	0.314	2.51	3.06
All	25th	0.00200	0.0190	0.0976	0.163	0.917	2.09
All	Median	0.00468	0.0311	0.170	0.255	1.49	3.10
All	75th	0.0113	0.0666	0.228	0.531	1.97	5.94
All	n	25	25	25	25	25	25
PSNS126	**Mean**	**0.0539**	**0.0993**	**0.129**	**0.211**	**1.19**	**1.80**
PSNS126	Stdev.	0.0564	0.0829	0.0500	0.0592	0.423	0.310
PSNS126	Min	0.00200	0.0175	0.0724	0.130	0.720	1.54
PSNS126	Max	0.128	0.190	0.194	0.256	1.56	2.22
PSNS126	n	4	4	4	4	4	4
PSNS124.1	**Mean**	**0.00347**	**0.0283**	**0.474**	**0.875**	**2.53**	**6.65**
PSNS124.1	Stdev.	0.00172	0.00922	0.115	0.288	0.871	1.71
PSNS124.1	Min	0.00200	0.0191	0.309	0.631	1.70	4.57
PSNS124.1	Max	0.00532	0.0399	0.566	1.21	3.62	8.07
PSNS124.1	n	4	4	4	4	4	4
PSNS124	**Mean**	**0.0277**	**0.115**	**0.231**	**0.549**	**3.25**	**5.88**
PSNS124	Stdev.	0.0427	0.0997	0.0605	0.292	2.23	1.01
PSNS124	Min	0.00200	0.0179	0.181	0.286	1.05	4.65
PSNS124	Max	0.0913	0.227	0.319	0.945	5.33	7.08
PSNS124	n	4	4	4	4	4	4
PSNS115.1	**Mean**	**0.0122**	**0.0749**	**0.216**	**0.443**	**3.80**	**6.45**
PSNS115.1	Stdev.	0.00829	0.0225	0.0434	0.141	5.87	5.97
PSNS115.1	Min	0.00354	0.0529	0.170	0.232	0.764	1.65
PSNS115.1	Max	0.02350	0.106	0.270	0.531	12.6	14.9
PSNS115.1	n	4	4	4	4	4	4
PSNS084.1	**Mean**	**0.00444**	**0.0181**	**0.104**	**0.185**	**1.25**	**2.76**
PSNS084.1	Stdev.	0.00283	0.00346	0.00627	0.0476	0.648	0.962
PSNS084.1	Min	0.00200	0.0134	0.0976	0.150	0.732	1.88
PSNS084.1	Max	0.00795	0.0217	0.112	0.255	2.20	3.96
PSNS084.1	n	4	4	4	4	4	4
PSNS015	**Mean**	**0.00352**	**0.0251**	**0.0312**	**0.0986**	**1.17**	**2.46**
PSNS015	Stdev.	0.00168	0.0118	0.00479	0.0626	0.392	0.471
PSNS015	Min	0.00200	0.0163	0.0264	0.0518	0.876	1.92
PSNS015	Max	0.00579	0.0445	0.0386	0.207	1.70	3.20

PSNS015	n	5	5	5	5	5	5

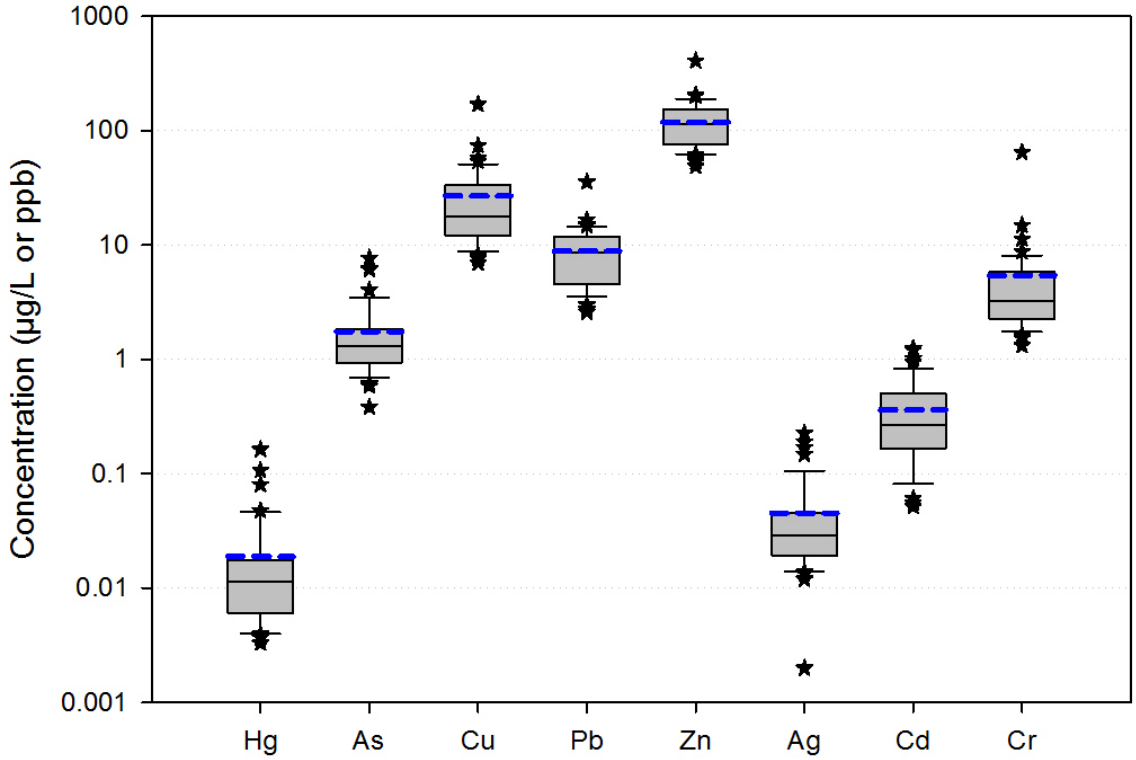

Figure 4.1. Total Event Mean Concentrations in Stormwater Collected During Phase I and Phase II. The top, middle, and bottom solid black lines of the box represent the 75th percentile, 50th, and 25th percentile, respectively. The whiskers are the 5th and 95th percentile and the asterisks fall outside the 5th and 95th percentiles (n = 49). The blue dashed line is the average.

The total recoverable (TR) Cu EMCs exceeded the U.S. Navy General Permit limit at a majority of the stations and storms with a few exceptions. Stations PSNS126 (CIA) and PSNS015 (NBK) showed the 25th percentile TR Cu EMCs was less than the U.S. Navy General Permit limit. However, as was noted during Phase I, all storms and stations exceeded the draft permit limit. Therefore, the data distribution suggest a high probability for stormwater collected in both CIA and NBK to exceed the NPDES draft permit limit for TR Cu and a minimum of 50% probability to exceed the U.S. Navy General Permit limit.

The TR Zn EMCs exceeded the U.S. Navy General Permit limit during all storms at PSNS084.1 and 115.1. Stations PSNS124 and 124.1 also exceeded this limit more than 50% of the time and the 25th percentile at PSNS124 exceeded the draft permit limit. Stations PSNS126 and 015 did not exceed either of the permit limits for TR Zn. The TR Zn data for all stations and storms suggest the EMCs would exceed both permit limits at least 50% of the time.

Evaluating the data on a station level supports identification of critical areas for further investigation and process improvement. Figure 4.2 and Figure 4.3 illustrate the inter-storm and station variability for Cu and Zn. The existing and draft permit limits are provided for reference. For Cu, all stations and storms would exceed the draft permit limit. Twenty-one TR Cu EMCs would exceed the U.S. Navy

General Permit limit and 11 would exceed the NPDES permit limit of 33 µg/L TR Cu. The stations PSNS0115.1, 124.1, and 124 had the highest frequency and magnitude of permit limit exceedances. Although the permit limit is based on TR Cu (top of the bars), Figure 4 also shows the partitioning of the chemistry between particulate and dissolved phases. This is important for the evaluation of biological availability of Cu and also for understanding the types of BMPs that would be most effective (e.g., particulate removal versus dissolved metal).

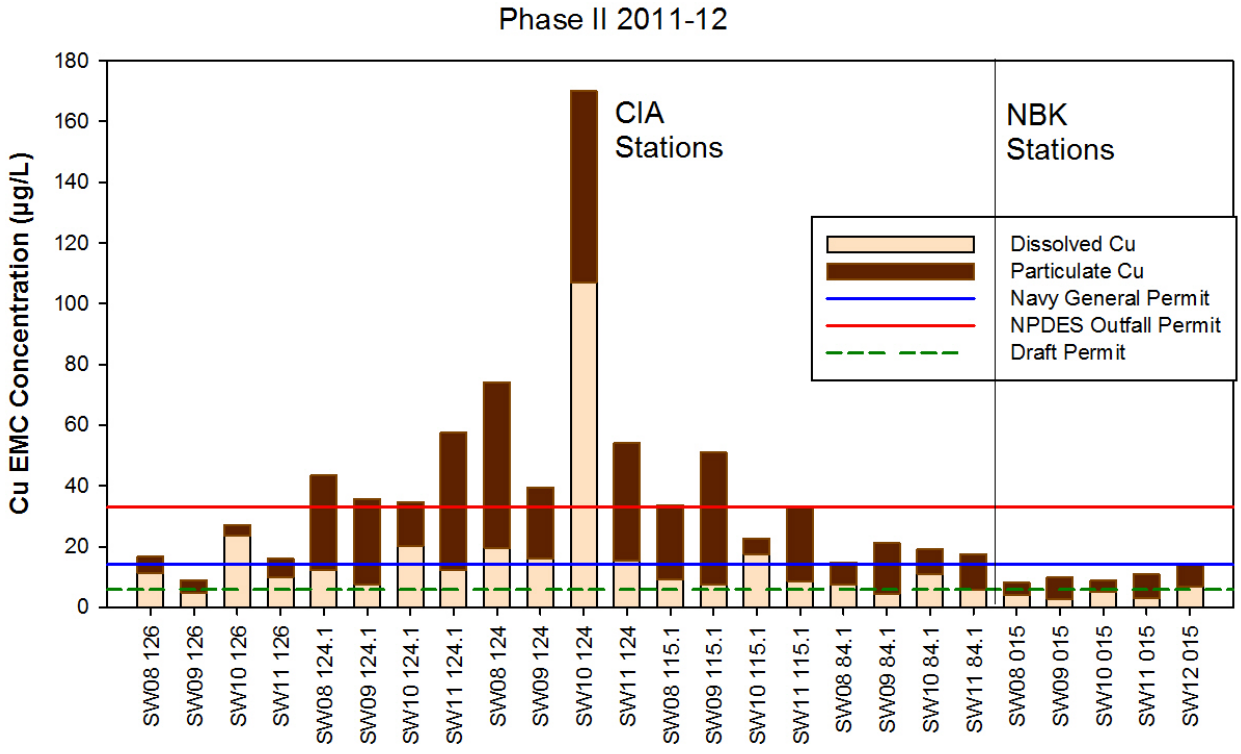

Figure 4.2. The concentrations of dissolved and particulate Cu measured in event mean concentration (EMC) samples from CIA and NBK outfalls. The storm event number (SW01, etc.) and station ID are on the x-axis. The tops of each column represent the total recoverable Cu. The reference lines are the NPDES outfall permit concentration (red = 33 µg/L), U.S. Navy General Permit (blue = 14 µg/L), and draft permit for (dashed green = 5.8 µg/L) for TR Cu.

The fraction of the TR Cu occurring as dissolved Cu ranged from 15%–87%. The proportion of dissolved versus particulate Cu can be used to identify the types of Cu entering the systems, predict the most effective BMPs for a particular drainage basin, and evaluate the fate of the Cu once it enters the marine receiving waters of Sinclair Inlet. The TR Cu concentrations in Sinclair Inlet ambient seawater ranges from 60% to 90% dissolved Cu (Brandenberger et al. 2008). Therefore, stations with less than 50% dissolved Cu might be targeted for particulate Cu sources.

For TR Zn, 15 EMCs exceeded the NPDES stormwater draft permit limit and 13 exceeded the U.S. Navy General Permit limit. The stations with the highest frequency of exceedances were PSNS124.1, 124, 115.1, and 084.1. In seawater, Zn occurs as 90%–100% dissolved and would be expected to be highly soluble after entering seawater. The percentage of TR Zn occurring as dissolved in seawater ranged from 36%–92%. Station PSNS124 was the only station with two EMCs <50% dissolved Zn,

suggesting that BMPs which remove particulates may be the most effective for reducing Zn concentrations in this basin.

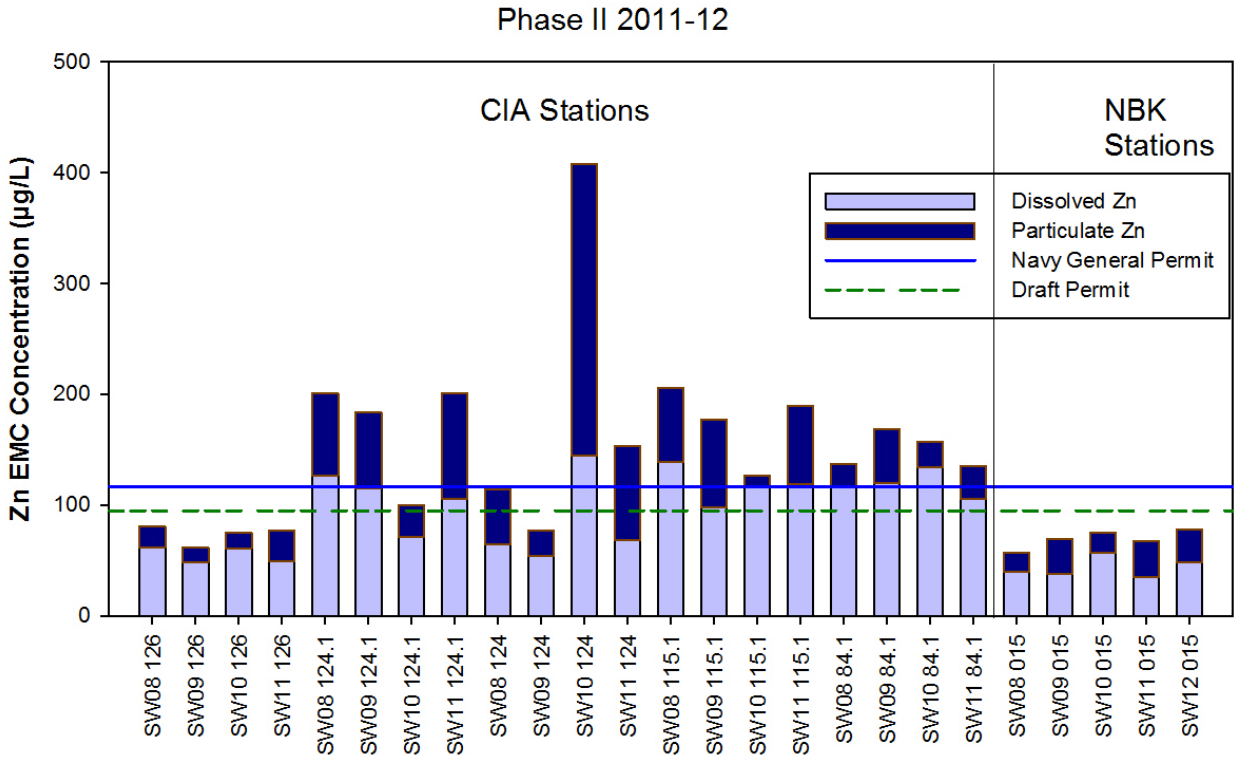

Figure 4.3. The concentrations of dissolved and particulate Zn measured in event mean concentration (EMC) samples from CIA and NBK outfalls. The storm event number (SW01, etc.) and station ID are on the x-axis. The tops of each column represent the TR Zn. The reference lines are the U.S. Navy General Permit limit (blue = 117.0 µg/L) and draft permit limit for (dashed green = 95.0 µg/L) for TR Zn.

Figure 4.4 illustrates the inter-storm and station variability for dissolved, particulate, and TR Hg EMCs. The EMCs are well below the NPDES stormwater draft permit limit of 2100 ng/L TR Hg. As was seen in Phase I, the TR Hg was significantly elevated above other stations at PSNS015 in NBK and within the CIA station PSNS124 during SW10 (total precipitation = 0.19 in.). The fraction of the TR Hg occurring as dissolved in the ambient waters of Sinclair/Dyes inlets averages approximately 50% with a range of 30%–80%. The Phase II stormwater EMCs averaged 29% dissolved Hg (Phase I was 24%); stations PSNS124, 115.1, and 015 showed the highest fraction of particulate Hg at <10% dissolved Hg.

The ancillary parameters are necessary to establish potential fate and transport pathways, transformation upon entering the seawater, and also bioavailability to evaluate potential impacts on beneficial uses. These analyses will be conducted and documented in the final report with the full set of data and are not discussed in detail in this interim report. Table 4.6 provides the descriptive statistics for the TPH (diesel and residual range) and ancillary parameters for all stations and storms. The TPH data are all qualified as being either less than the RL or being influenced by an interference that could bias the results due to a false positive.

Natural waters tend to have a hardness of around 100 mg/L, so, on average, the stormwater has a relatively low hardness; only stations PSNS124, 124.1, and 115.1 have a hardness at or near 100 mg/L. The contribution of $CaCO_3$ within these drainage basins may be attributed to the industrial activities. The DOC concentrations were consistently higher at the NBK station PSNS015 (average = 2.1 mg/L), which is not unusual because the primary work activities are municipal/commercial/ residential services with a higher percentage of pervious surface area. However, stations PSNS126 (materials storage) and PSNS124 (material storage and cutting facility) averaged 24 mg/L during SW10. This was a small event (total rainfall = 0.19−0.45 in.).

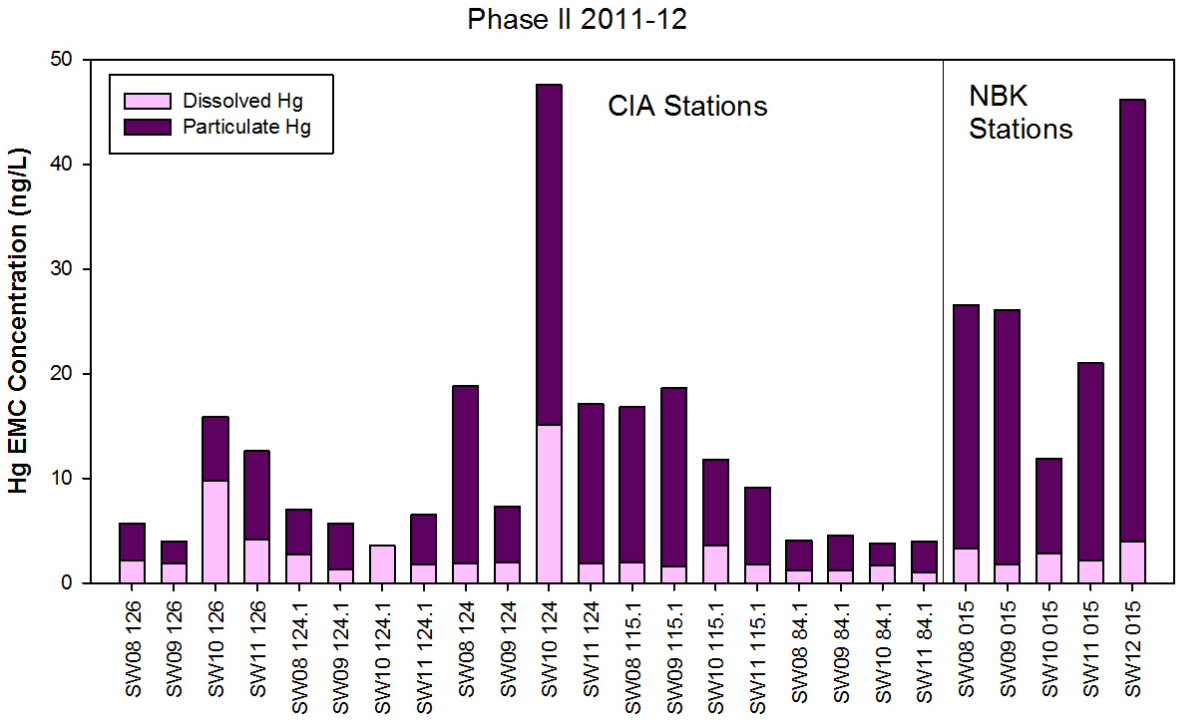

Figure 4.4. The concentrations of dissolved and particulate Hg measured in event mean concentration (EMC) samples from CIA and NBK outfalls. The storm event number (SW08, etc.) and station code are on the x-axis. The tops of each column represent the TR Hg.

Table 4.6. Descriptive Statistics for Total Petroleum (TPH) Diesel Range (DRO) and Residual Range (RRO) Along with the Ancillary Parameters for All Stations

Station	Units:	TPH (DRO) µg/L	TPH (RRO) µg/L	Hardness (as $CaCO_3$) mg/L	TOC mg/L	DOC mg/L	TSS mg/L
All	Mean	155 J	488 J	44.3	3.94	3.61	18.0
All	Stdev.	121	510	36.2	7.19	6.63	11.3
All	Min	65.0 J	170 J	12.0	1.03	0.89	5.00
All	Max	600 H	2600 O	162	33.9	31.5	48.0
All	N	24	24	24	24	24	24

H = The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.

J = Analyte detected above the MDL, but less than the RL.
O = The chromatographic fingerprint of the sample resembles an oil, but it does not match the calibration standard.

4.3 PSNS015 Detailed Storm Chemistry (SW12)

The Phase I study identified PSNS015 as a critical drainage basin for further Hg studies. Therefore, it was included in the Phase II study and the focus of the SW12 detailed storm event. Figure 4.5 illustrates the results of the precipitation (inches), water level in the pipe (ft), total concentration of particles as measured by the LISST (µL/L) and mean particle size (µm) during the progression of the SW12 event. The in situ sensors also collected conductivity and more detailed size measurements of particles during the progression of the storm. The LISST data were captured as 32 size classifications then post processed to group the data into three size classes: <63 µm (silt/clay), 63–234 µm (very fine and fine sand), and 234–386 µm (medium sand). All the size classification data and the grouped data are available in Appendix D.

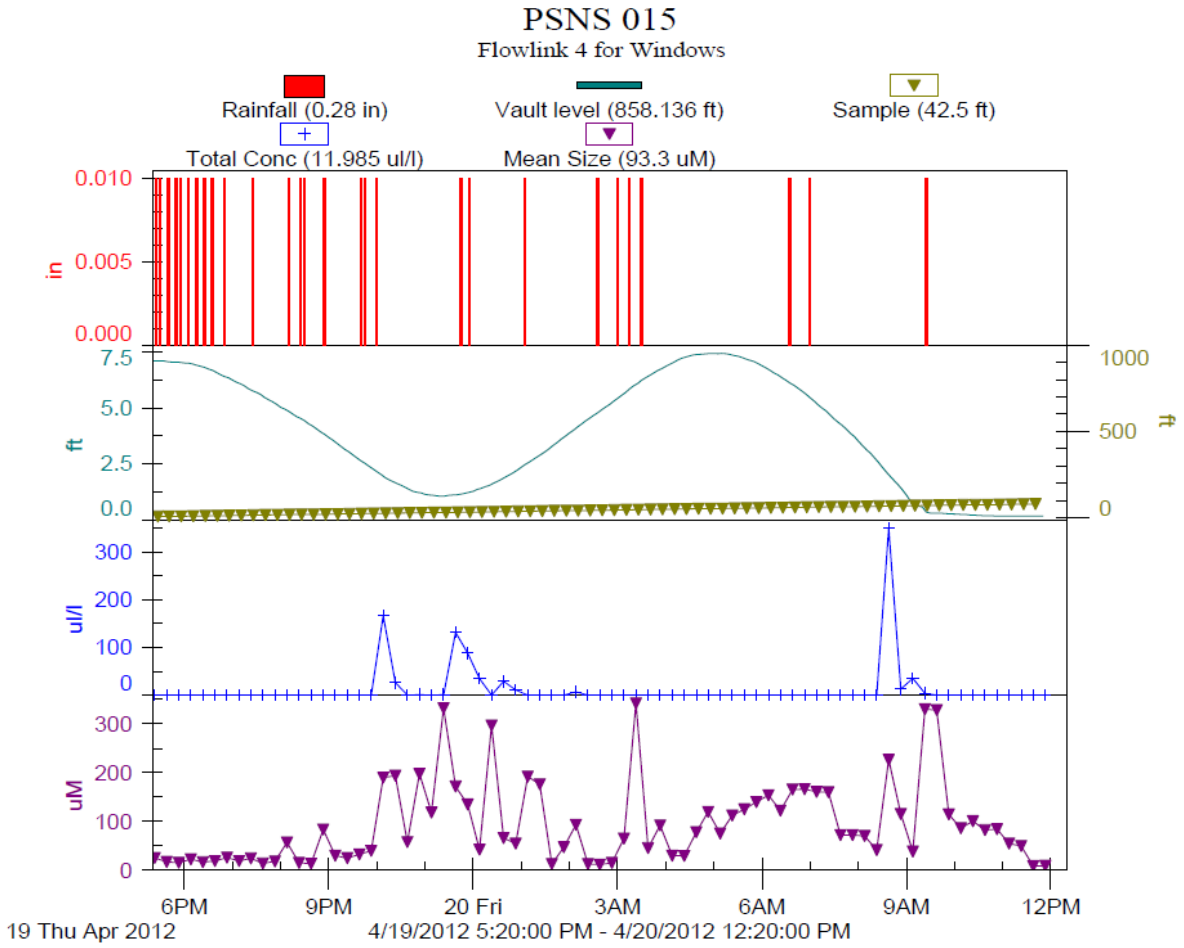

Figure 4.5. From Top to Bottom, Graphs of the Precipitation (inches), Water Level in the Pipe (feet), Total Concentration of Particles as Measured by the Laser In Situ Scattering and Transmissonmetry (LISST; µL/L) and Mean Particle Size (µm) of the Stormwater During the SW12 Event

These in situ measurements were then plotted again the concentrations of DOC and particulate and dissolved Hg (Figure 4.6) determined during the intervals of the storm. The TR Hg concentrations in the discrete samples of the storm are equal to the top of the stacked bars. The in situ measurements were collected at roughly 15-minute intervals, while the chemistry data were determined from the 1-hour composites collected by the automated sampler. The data show that as the rainfall begins smaller particles move through the outfall and the Hg concentration does not begin to increase until about 4 hours into the storm event. The first increase in Hg occurs around the time there is a peak in the size and volume of particles moving through the outfall around 23:00 to 24:00. By this time the precipitation volumes have begun to decrease and the tide begins to move into the pipe with conductivity rising around 03:00. While the denser saltwater is filling the pipe, the fresh stormwater is trapped behind the saltwater and the DOC concentrations are closer to those measured in the ambient seawater (~1–2 mg/L).

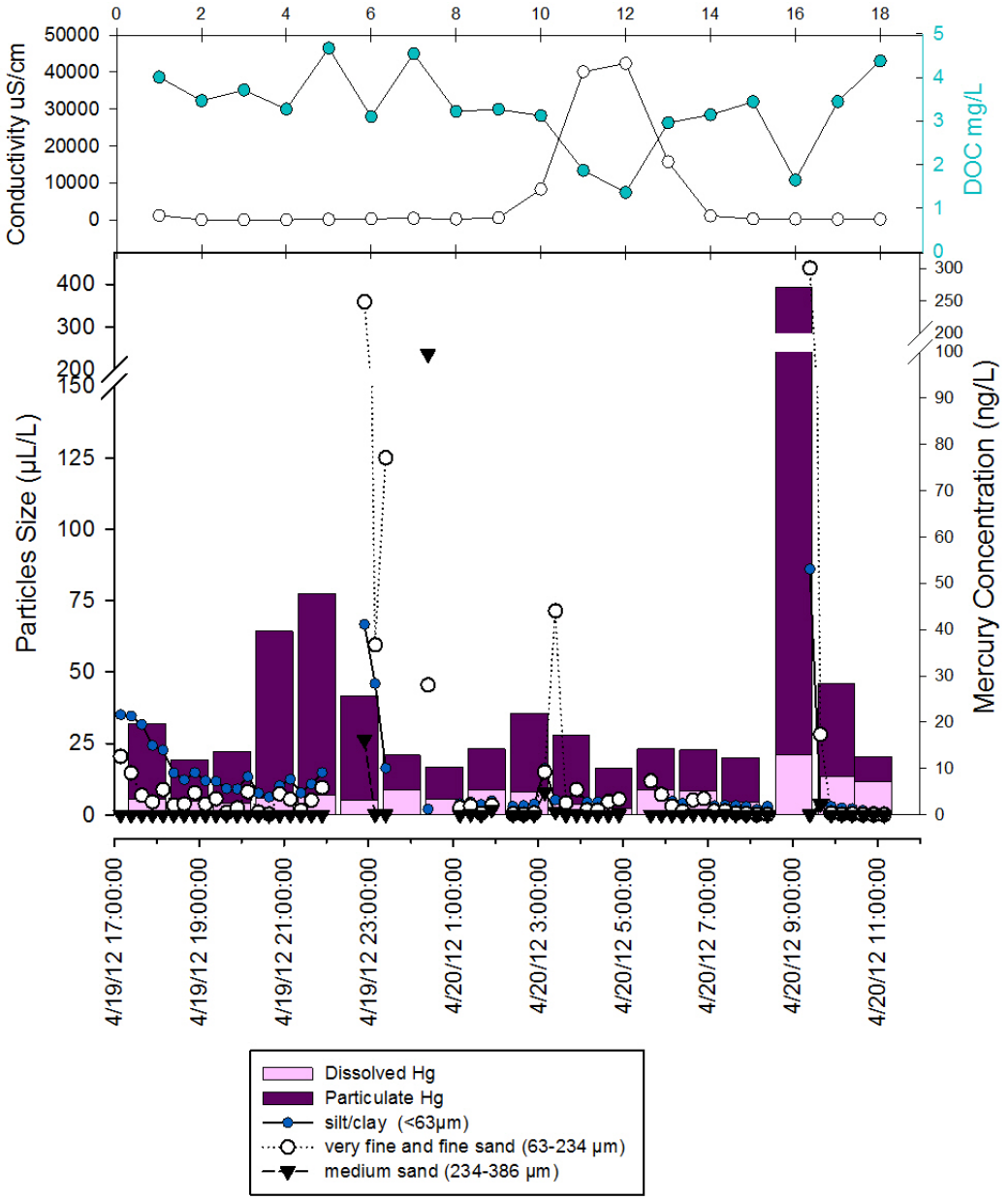

Figure 4.6. The Conductivity and Dissolved Organic Carbon During SW12 (top graph) and Discrete Sample Concentrations of Particulate and Dissolved Hg (bottom graph). The silt/clay, fine sand, and medium sand data collected from the LISST are plotted. The top of the bar represents TR Hg.

As the tide recedes, the DOC goes up and there is a peak in the TR Hg concentration along with a peak in the silt/clay and fine sand size classifications. After this peak, the Hg concentrations go down. However, the portion of the total Hg that is in the dissolved phase increases to as much as 57% compared to earlier values averaging 23%. The pulse of particulates traveling through the pipe during the collection of discrete sample 16 around 0900 on April 20, 2012, is reflected in all the metals as a spike in the particulate fraction (Figure 4.7).

Table 4.7. The Event Mean Composite (EMC) and Discrete Sample Concentrations for SW12. Each discrete sample is a 1-hour time-paced composite.

Station	Collected	Conductivity	TSS	DOC	Hg	Hg	Cu	Cu	Pb	Pb
Fraction	Date/Time				Dissolved	Total	Dissolved	Total	Dissolved	Total
Units		µS/cm	mg/L	mg/L	ng/L	ng/L	µg/L	µg/L	µg/L	µg/L
EMC		338	60.3	3.07	3.98	46.2	6.89	14.4	1.55	12.0
PSNS015-1	4/19/12 17:46	1200	41.8	4.01	3.40	19.7	7.43	17.4	0.872	14.4
PSNS015-2	4/19/12 18:46	70	23.3	3.47	3.04	11.9	6.02	12.3	1.18	9.77
PSNS015-3	4/19/12 19:46	42	14.6	3.71	2.58	13.7	5.77	9.9	1.54	9.39
PSNS015-4	4/19/12 20:46	67	11.9	3.27	3.71	39.6	7.18	11.2	2.28	9.73
PSNS015-5	4/19/12 21:46	168	58.3	4.67	4.34	47.8	7.38	14.8	1.67	12.3
PSNS015-6	4/19/12 22:46	304	13.8	3.10	3.09	25.7	7.08	12.6	1.84	9.75
PSNS015-7	4/19/12 23:46	417	3.34	4.55	5.27	12.9	7.13	9.5	2.22	6.12
PSNS015-8	4/20/12 0:46	228	6.34	3.22	3.43	10.3	7.22	10.1	2.32	7.06
PSNS015-9	4/20/12 1:46	581	5.70	3.27	5.29	14.2	7.32	9.67	2.18	6.45
PSNS015-10	4/20/12 2:46	8300	10.6	3.12	4.97	21.9	4.49	8.95	1.49	6.43
PSNS015-11	4/20/12 3:46	40,100	6.57	1.87	2.37	17.3	1.68	3.49	0.470	2.70
PSNS015-12	4/20/12 4:46	42,350	4.14	1.36	1.31	10.1	1.41	2.87	0.301	1.91
PSNS015-13	4/20/12 5:46	15,750	1.90	2.96	5.49	14.3	5.45	7.73	1.34	5.07
PSNS015-14	4/20/12 6:46	1065	2.95	3.14	5.25	14.0	8.06	10.7	1.79	6.08
PSNS015-15	4/20/12 7:46	311	5.57	3.44	2.83	12.4	6.71	8.95	3.55	8.34
PSNS015-16	4/20/12 9:01	236	181	1.65	13.0	271	2.96	28.5	0.350	22.5
PSNS015-17	4/20/12 10:01	158	8.41	3.45	8.35	28.4	6.07	8.69	1.58	5.40
PSNS015-18	4/20/12 10:54	186	8.90	4.38	7.23	12.6	7.51	10.0	2.29	5.70

Table 4.7. (contd)

Station	Collected	Zn	Zn	Ag	Ag	Cd	Cd	Cr	Cr
Fraction	Date	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
Units	Time	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EMC		48.7	78.4	0.00468	0.0445	0.0277	0.0610	0.888	2.32
PSNS015-1	4/19/12 17:46	43.7	76.2	0.00369	0.0296	0.0569	0.117	0.949	2.69
PSNS015-2	4/19/12 18:46	34.2	62.6	0.00200	0.0192	0.0183	0.0594	0.746	1.61
PSNS015-3	4/19/12 19:46	37.5	57.1	0.00311	0.0138	0.0146	0.0459	0.715	1.28
PSNS015-4	4/19/12 20:46	52.5	70.6	0.00241	0.0331	0.0260	0.0453	0.801	1.36
PSNS015-5	4/19/12 21:46	54.0	84.8	0.00249	0.0433	0.0198	0.0588	0.782	1.93
PSNS015-6	4/19/12 22:46	51.8	76.1	0.00448	0.0241	0.0261	0.0722	0.950	1.60
PSNS015-7	4/19/12 23:46	55.6	64.4	0.00427	0.0144	0.0284	0.0378	1.39	1.73
PSNS015-8	4/20/12 0:46	79.20	92.80	0.00474	0.0148	0.0314	0.0463	1.21	1.63
PSNS015-9	4/20/12 1:46	72.2	82.1	0.00531	0.0133	0.0332	0.0408	1.40	1.87
PSNS015-10	4/20/12 2:46	71.0	92.0	0.00526	0.0512	0.0732	0.0962	0.698	1.37
PSNS015-11	4/20/12 3:46	65.1	70.5	0.00420	0.0225	0.204	0.224	0.119	0.420
PSNS015-12	4/20/12 4:46	30.3	32.8	0.00420	0.0122	0.128	0.141	0.138	0.378
PSNS015-13	4/20/12 5:46	79.4	83.3	0.00519	0.0204	0.120	0.128	0.694	0.968
PSNS015-14	4/20/12 6:46	61.7	69.9	0.00493	0.0125	0.0301	0.0382	1.02	1.39
PSNS015-15	4/20/12 7:46	87.6	98.5	0.00332	0.0118	0.0329	0.0394	0.774	0.970
PSNS015-16	4/20/12 9:01	22.1	108	0.00200	0.129	0.0200	0.125	0.411	3.38
PSNS015-17	4/20/12 10:01	65.7	80.7	0.00926	0.0242	0.0279	0.0434	0.687	0.971
PSNS015-18	4/20/12 10:54	68.0	80.7	0.0103	0.0220	0.0282	0.0470	0.740	1.06

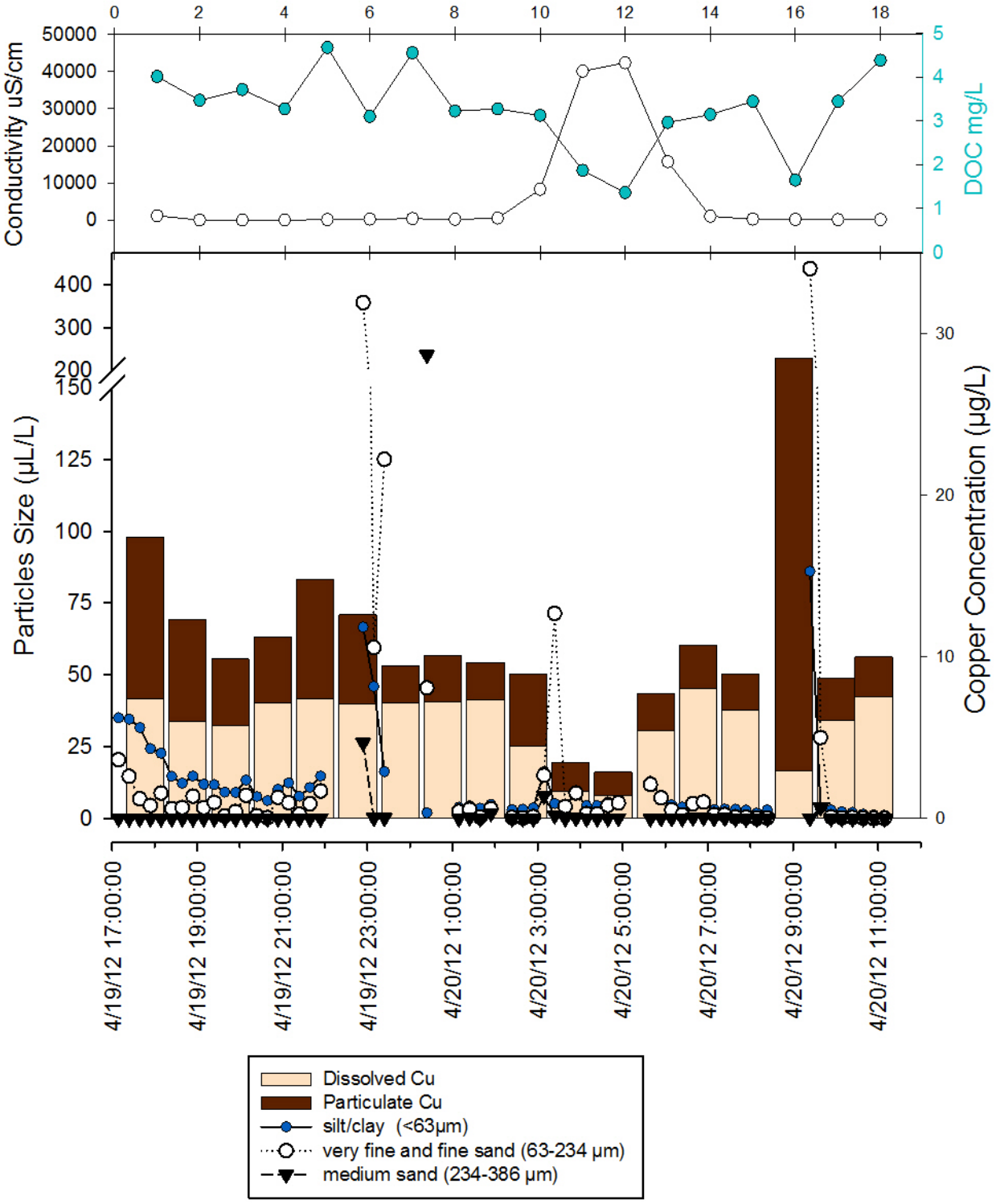

Figure 4.7. The Conductivity and Dissolved Organic Carbon (DOC) During SW12 (top graph) and Discrete Sample Concentrations of Particulate and Dissolved Cu. The silt/clay, fine sand, and medium sand data collected from the LISST are plotted. The top of the bar represents TR Cu.

5.0 Conclusion and Recommendations

This report summarizes the findings for the Phase I and II studies to provide current information about stormwater chemistry within the Shipyard. The overall goal of the NDDSW study is to provide a good characterization of the stormwater quality in Shipyard drainage basins, assess the probability of permit compliance, and the rationale of the proposed draft NPDES stormwater permit limits. Although this is an interim report and the data will not be completely synthesized to address these questions, Phase I and II data sets were used to inform the Phase III sampling (2012–2013 wet season), identify drainage basins likely to exceed the draft permit, and evaluate whether the draft permit limits were reasonable compared to other stormwater outfall chemistry data. The latter can be used to build a case that the proposed limits are either not feasibility attainable or are practical for the protection of beneficial uses in Sinclair Inlet. The potential for many sources of stormwater to enter Sinclair Inlet and potentially impair beneficial uses suggests the need for a mass balance or total maximum daily load type approach to management. In addition, the stormwater partitioning chemistry provided a means to begin to summarize recommended actions for each drainage basin and suggest potential BMPs for stormwater managers. The final project report will provide the overall recommendations for action and address the following questions:

1. Are discharges from shipyard industrial outfalls and storm drains protective of beneficial uses of Sinclair Inlet?
2. How does the water quality of stormwater runoff compare between various drainage basins in the Shipyard that support different types of activities (e.g., CIA versus NBK)?
3. What is the status and trend of stormwater quality relative to previous Shipyard sampling (e.g., Phase I in 2010–2011 and ENVVEST in 2003–2005) and/or other Puget Sound industrial areas?

Based on the Phase I and II data, the probabilities for stormwater EMCs collected from drainage basins in the Shipyard to exceed the draft NPDES stormwater permit limits were 100% for Cu, 59% for Zn, and 0% for all other metals. The probability for the EMCs to exceed the U.S. Navy General Permit limits for Cu and Zn were 67% and 43%, respectively. The median and ranges for the combined Phase I 2010–2011 and Phase II 2011–2012 NDDSW study were then compared to other regional urban, commercial, and industrial stormwater data (

Table 5.1). This provides three points of reference with respect to regional and comparable LULC stormwater chemistry. The first point of reference was the ENVVEST 2003–2005 stormwater data collected from PSNS outfalls, the second was ENVVEST stormwater data collected from urban outfalls in Kitsap County, and the third was a Puget Sound stormwater study of specific LULCs. The data are presented in

Table 5.1 and discussed below.

The ENVVEST 2003–2005 PSNS stormwater outfall study sampled PSNS015, 124, 008, and 101 using similar methodologies (Brandenberger et al. 2007a, b). The median concentrations for Phases I and II were all lower than the median for the 2003–2005 PSNS outfall data set. This suggests a measurable decrease in the overall concentration of these metals in the stormwater at the Shipyard and points to successes in process improvements.

Table 5.1. Comparison of 2010–2012 (Phase I and II) Stormwater Event Mean Concentrations (EMCs) with Regional Urban Stormwater Outfall and Commercial/Industrial (C&I) Land-Use/Cover Stormwater Concentrations for Total Recoverable Metals (note the unit for Hg is ng/L)

TR Concentration	TR Cu (µg/L)	TR Zn (µg/L)	TR Pb (µg/L)	TR As (µg/L)	TR Hg (ng/L)
PSNS Draft NPDES Stormwater Permit	5.8	95	221	69	2100
U.S. Navy General Permit	14.0	117			
Phase I and II 2010–2012 PSNS Median EMCs (range) n=70	14.8 (2.9-170)	82.7 (33-408)	8.2 (2.0-36)	1.2 (0.38-7.7)	12.6 (3.3-271)
ENVVEST 2003–2005 PSNS Outfalls Median (range)[(a)] n=19	42.4 (12-123)	113 (35-257)	11 (4-32)	4.3 (1-12)	28 (12-123)
ENVVEST Urban Outfalls Median (range)[(a)] n=40	11 (5-27)	62 (18-140)	9.8 (3-25)	0.97 (0.5-14)	11 (6-56)
Puget Sound C&I[(b)] Median n= 6	3.84	37.2	1.68	0.92	7

(a) Brandenberger et al. (2007 a, b) and Cullinan et al. (2007).
(b) Herrera Environmental Consultants, Inc. (2011).

The ENVVEST 2003–2005 study also collected stormwater from urban outfalls and streams (during storm events) within the Sinclair/Dyes inlets study area. In many cases, the medians are very similar and the ranges overlap the outfall data. Figure 5.1 illustrates the data sets and suggests that for some metals their sources may not be specific to Shipyard activities and may be driven more by activities occurring in both urban and industrial settings (e.g., vehicles, roof runoff, etc.). In fact, Brandenberger et al. (2010) found the Puget Sound concentrations of Cu and Hg in rainfall ranged from 0.29 to 5.5 µg/L and from 4.1 to 9.4 ng/L, respectively. For Hg, this is consistent with the data sets across all the studies where stream concentrations during storm events are within a factor of two of the industrial and urban stormwater outfall chemistry.

The third point of reference is the Ecology report on stormwater concentrations measured in two basins of Puget Sound (Puyallup and Snohomish) that targeted specific LULC distributions (Herrera Environmental Consultants, Inc. 2011). The median for the commercial/industrial LULC provides a measure of regional comparison. Overall the concentrations from the PSNS outfalls were higher, but the data should be compared with caution. Herrera Environmental Consultants, Inc. (2011) reported stormwater concentrations based on grab samples that were composited to reflect a storm event concentration; therefore, the data are not directly comparable.

Multiple lines of evidence were used to assess recommended actions thus far based on Phase I and II sampling. Table 5.2 uses four lines of evidence to summarize the NDDSW data: 1) the probability of that basin to exceed the NPDES stormwater draft permit limit, 2) the probability to exceed the U.S. Navy General Permit limit, 3) the loading of metals relative to other outfalls, and 4) the dominance of

particulate versus dissolved metals in the stormwater. These lines of evidence were used to provide some prioritized recommendation for each drainage basin.

The probabilities to exceed the permit limits were assessed at a station level. As discussed above, many had a high probability to exceed the limits for Cu. The metal load for each storm event and station was calculated and is presented in Appendix C. The storm loads for each station were then summed and presented relative to the loads from all stations and storms. This approach provided for a ranking of drainage basins contributing the largest load of metals. Collectively, this information provided an opportunity to recommend some BMP actions. The stormwater metals chemistry suggests that a majority of the stations are dominated by particulate phase metals (e.g., SW10 at PSNS124). Therefore, recommendations focused on particulate removal, such as street sweeping or stormwater treatment optimized for particulate removal. A review of the specific processes within each drainage basin would provide information on particle sources for those basins. However, stations PSNS084.1 and 126 showed a higher fraction of dissolved metals, which require a more complex review of the chemistry, potential sources, and effective BMPs.

One recommendation for all drainage basins is for any stormwater sampling at the Shipyard to include collection and analytical methods that compensate for the tidal intrusion into the drainage system. As was noted in the SW12 detailed storm analyses, the influence of the tide on the stormwater chemistry at PSNS015 was significant. Salinity, as low as 5 ppt, results in analytical artifacts and dilution of the runoff derived from a storm event. In addition, the tide "holds" up the stormwater, thereby resulting in a delay in the freshwater runoff independent of precipitation trends. The detailed chemistry as a function of rainfall, volume of stormwater runoff, and tide further highlighted the need to collect composite samples rather than only grab samples.

The dominance of the particulate or dissolved metal fraction is also a function of the total precipitation during the storm. Table 5.3 lists the average percent dissolved for each metal as a function of storm size. As would be expected, the larger storms have a larger fraction of particulate metals, while small storms are dominated by the dissolved fraction.

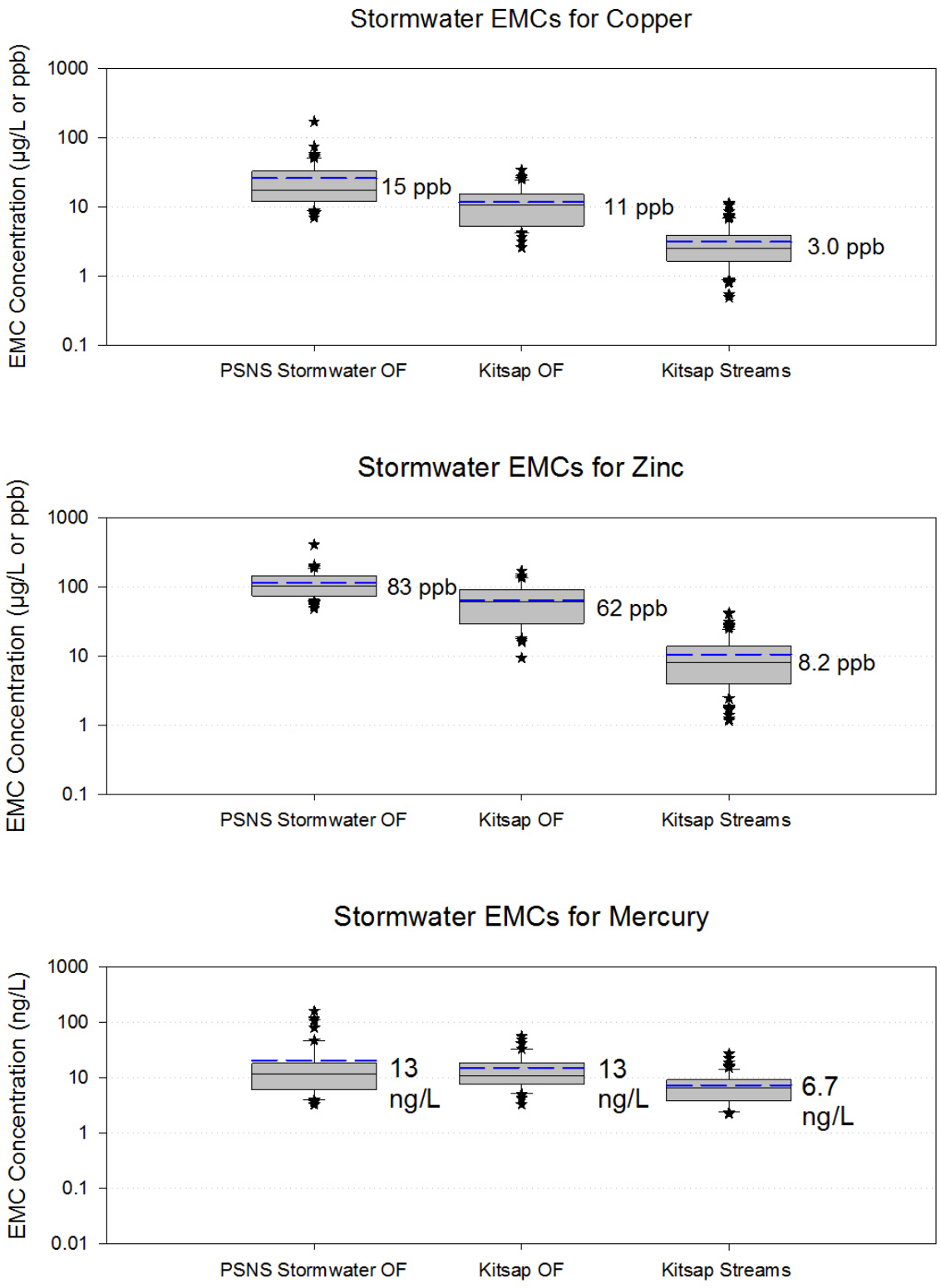

Figure 5.1. Data Distributions for the Phase I and II PSNS Non-Dry Dock Stormwater Outfalls, the ENVVEST 2003–2005 Kitsap County Urban Stormwater Outfalls, and Kitsap Streams During Storm Events (Brandenberger et al. 2007 a, b). The median concentrations are numerically noted on the graphs and the blue dashed line is the average concentration.

Table 5.2. The Lines of Evidence Used to Prioritize the Phase I and II Stations Include: 1) Total Number of Event Mean Concentrations (EMC) Greater Than the Draft NPDES Stormwater Permit, 2) U.S. Navy General Permit, 3) Relative Load for Permitted Metals, and 4) Relative Proportion of Dissolved and Particulate.

Outfall (n)[a]	Area	Probability of > Draft NPDES SW	Probability > U.S. Navy General Permit	Metal Load Relative to Other Stations[b]	Recommendations[c]
096 (n=5)	CIA	100% Cu 80% Zn	100% Cu	Cu=22%; Pb=17%; Zn=17%	Particulate driven: Street sweeping; high particulate load BMPs
081.1 (n=3)	CIA	100% Cu 100% Zn	100% Cu 100% Zn	Cu=19%; Pb=13%; Zn=16%	Particulate driven: Review activities generating particulate metal; street sweeping; high particulate load BMPs
124 (n=4)	CIA	100% Cu 75% Zn	100% Cu 50% Zn	Cu=12%	Particulate driven: street sweeping; high particulate load BMPs
115.1 (n=4)	CIA	100% Cu 100% Zn	100% Cu 100% Zn	All < 9%	Particulate driven: street sweeping; high particulate load BMPs
124.1 (n=4)	CIA	100% Cu 100% Zn	100% Cu 75% Zn	All < 6%	Particulate driven: Street sweeping; High particulate load BMPs
084.1 (n=4)	CIA	100% Cu 100% Zn	100% Cu 100% Zn	All < 1%	Mixed: street sweeping; high particulate load BMPs and cover outside materials
082.5 (n=3)	CIA	100% Cu 67% Zn	100% Cu 67% Zn	All <2 %	Particulate driven: review recycling activities; street sweeping; high particulate load BMPs
126 (n=7)	CIA	100% Cu	57% Cu	As=29%	Dissolved driven: cover metal materials in outside storage; tidal gate
008 (n=3)	NBK	100% Cu 100% Zn	33% Cu 100% Zn	All < 5%	Particulate driven: street sweeping; high particulate load BMPs; vehicle sources
015 (n=8)	NBK	100% Cu		Cu=23%; Pb=48%; Zn=34%; Hg=72%; As=26%	Particulate driven and special study of tidal impacts on storm drain discharges and sub-surface sources of metals, specifically Hg
032 (n=4)	NBK	100% Cu 50% Zn	25% Zn	All <2 %	Particulate driven: street sweeping; high particulate load BMPs; vehicle sources

(a) The n value is the total number of EMCs sampled during Phase I and II at this station.
(b) Relative percent of the total load based on total metal EMCs for all stations sampled during Phases I and II. Only permitted metals with loads >10% are reported in the table.
(c) The recommendations were based on the probability of the EMC exceeding the permit and the stormwater chemistry primarily for Cu. The influence of the tide on the metal chemistry is significant and all basins should be reviewed for potential tidal gates.

Table 5.3. The Average Percent Dissolved Metal in the Phase I and II Stormwater EMCs as a Function of Storm Size

	Cu	Zn	Hg	Pb
Small (<0.5 in.)	60%	72%	30%	19%
Medium (0.5–1.0 in.)	45%	62%	25%	9%
Med-Large (1–2.0 in)	36%	63%	23%	6%
Large (>2.0 in.)	25%	53%	26%	3%

The Phase I and II results suggest additional studies are required to provide scientific credibility in support of or to refute the draft permit limits for Cu and Zn as a function of actual bioavailability instead of TRM (e.g., implementing the BLM for site-specific criteria) and if there are truly impairments to beneficial uses within Sinclair/Dyes inlets. Even with adequate justification, the permit limit may never exceed the current NPDES permit limit for the dry dock of 33 µg/L TR Cu. With this assumption, specific outfalls with EMCs repeatedly above this concentration should be targeted for further monitoring and process evaluation. The outfalls in priority order include PSNS124, 124.1, 115.1, and 081.1. In addition, NBK stations PSNS015 and PSNS032 should be evaluated for sources of Hg.

The final recommendation is that field collection procedures for the Shipyard stormwater outfalls must include a methodology to limit the potential for post collection contamination. The metals are ubiquitous in shipyard operations and thus trigger the need to ensure the water collected during sampling adequately represents the water being discharged, and not contamination introduced to the sample itself during or after collection (i.e., at the manhole) and/or during laboratory analyses. The draft permit limits are approaching levels measured in streams during storm conditions and rainfall directly; therefore, additional precautions should be taken to ensure that the samples represent the chemistry of the water in the conveyance.

6.0 References

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APPENDIX A

Taylor/TEC Stormwater Sampling Reports

SW08 Through SW12

STORMWATER EVENT REPORT SW08
For
Non-Dry Dock Stormwater Monitoring
Conducted at
Puget Sound Naval Shipyard
Bremerton, WA
Project ENVVEST Study Area

November 21, 2011

Puget Sound Naval Shipyard and Surrounding Area

PNNL Contract No.: N4523A10MP00034 Amendment 1

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1.0 Introduction

Taylor/TEC conducted non-dry dock stormwater sampling tasks within the Puget Sound Naval Shipyard (PSNS) and adjacent areas within Naval Base Kitsap (NBK); collectively comprising the Project ENVVEST study area, between November 15th and 22nd, 2011. This was the first of four scheduled events of the 2011-2012 project year – referred to as *Phase II*. Overall, this is the eighth Stormwater (SW08) event of the project. A summary of the preparatory and sampling events, including site specific conditions that occurred during SW08 are presented in this report, with supporting information as attachments.

This SW08 Report is organized in the subsequent manner and contains the following: Section 2, Phase II Preparatory Tasks; Section 3, Event Summary; Section 4, Project Staff Participating in SW08; Section 5, Storm Event SW08 Preparatory Tasks; Section 6, Weather Forecast Information and SW08 Targeting Details; Section 7, Precipitation and SW08 Qualification Summary; Section 8, Sampling Information, Management and Validation; Section 9, Basin Runoff Calculations; Section 10, Descriptive Statistics and Discussion of Event Station Monitoring Data; Section 11, Notable Anomalies and Variations to the PWP; and Section 12, Action Items.

Attachments to this report include: *Storm Event Summary and Sampling Information, Validation Checklist* (spreadsheet), Stormwater Field Sampling Forms and Storm Controller Notes, Chain of Custody Forms, (basin) Runoff Calculation Worksheet, Station Hydrographs, Autosampler Reports and Weather Forecast Information.

2.0 Phase II Preparatory Tasks

Site visits and initial setup tasks began in late August, 2011. By mid-November all six of the Phase II monitoring stations (PSNS015, PSNS084.1, PSNS115.1, PSNS124, PSNS124.1 and PSNS126) had been installed and were fully operational. No major issues or setbacks were encountered during the station setup activities. Figure 1 shows the general location of the PSNS and NBK monitoring sites.

Between October 31st and November 2nd, 2011 field equipment blanks were collected at each of the six monitoring stations. Teflon®-lined polyethylene sampling lines at each monitoring station were thoroughly back flushed with laboratory supplied DI water prior to and immediately after field blank collection. Sampling lines at each station were made ready for storm event sample collection. An equipment blank, using the same batch of laboratory supplied DI water, was also collected from a representative stainless steel dip-cup used for grab-style parameter collection.

While conducting confined space entry tasks associated with station setups, attempts were made to collect samples of accumulated sediment from within each of the Phase II stormwater monitoring vaults. In total, three composited sediment samples were collected (one each) from PSNS015, PSNS115.1 and PSNS124.1. These samples were collected between October 26th and November 10th, 2011. Insufficient amounts of sediment prevented sample collection at the other project monitoring stations. See the attached Sediment Collection Field Sheets for details.

All preparatory phase equipment blank and sediment samples were submitted under chain-of-custody (COC) procedures to the Battelle Marine Science Laboratory in Sequim, WA. See the attached COCs for details.

3.0 Event Summary

Main SW08 details are provided below as a "*Quick Reference*":

- *Event/s conducted:* SW08
- *Event Date/s:* station prep. = 11/15/11; storm event tasks occurred between 11/20 – 11/22
- *Monitoring Stations Sampled:* PSNS015, 84.1, 115.1, 124, 124.1 and 126
- *Antecedent Conditions Met?:* Yes (greater than 3 days at each station); 0.0" in prior 24 hrs and 0.0" in prior 6 hrs preceding the storm/sampling event
- *Start of Rainfall at PSNS Stations:* 11/21/11 between 0420 and 0440
- *Sampling Period Duration Range:* start = 11/21/11 @ 0515 (PSNS015), stop = 11/22/11 @ 0938 (PSNS015). Max sampling duration = 28 hrs:21 mins
- *Sampling Event Rainfall Total:* PSNSB427 1.83, PSNS126 = 1.36", PSNS124.1 = 1.99", PSNS124 = 1.22", PSNS115.1 = 1.45", PSNS084.1 = 1.69", PSNS015 = 1.82"
- *Samples/Types Collected:* Grab and composite samples were collected at each stations (one each at each station) for a total of 12 samples
- *Quality Control (QC) Samples Collected:* No QC samples were collected during SW08. Prior to SW08 equipment blank samples were collected at each monitoring station and from representative grab-sampling gear.
- *Based on consideration of storm event and sample validation information, were the samples collected during SW08 valid for project purposes? (Y / N, composite, grab or both):* Yes-both; all grab and composite samples collected during this event were valid.

See Table A-1; *Storm Event Summary and Sampling Information, Validation Checklist*, for additional event summary details.

4.0 Project Staff Participating in SW08

Taylor/TEC:

Dave Metallo – Project Manager, Storm Controller, Field Event and QC Manager

Brian Rupert – Field Team Leader

Ian Sahlberg – Field Team Member

Navy Personnel:

Bob Johnston – Project Technical Lead / Oversight / Grab sample collection lead

Christine Gebhart – NPDES Program Support / Grab sample collection support

Eric Mollerstuen – NPDES Program Support / Grab sample collection support

5.0 Storm Event SW08 Preparatory Tasks

On Tuesday November 15th, 2011 all six stormwater monitoring stations (PSNS015, PSNS08.1, PSNS115.1, PSNS124, PSNS124.1 and PSNS126) were initially set up for and readied for storm event / stormwater sample collection. At the time of the initial station setups all of the monitoring equipment was deemed to be functioning properly, was operational and "sample ready" (see Sections 1 and 2 of the attached *Stormwater Field Sampling Forms).*

All stations were programmed with pre-determined autosampler enable and pacing conditions set "high" to prevent premature enabling (*sample disable mode*), as directed by the Taylor/TEC Storm Controller. Station operation was passed to the Taylor /TEC Storm Controller to be managed via telemetry. Final enabling conditions were determined by the Storm Controller closer to the onset of the storm event.

6.0 Weather Forecast Information and SW08 Targeting Details

Prior to the onset of SW08 (11/21/11), based on data from the Navy's rain gauge atop Building 427, 1.40" of rain was recorded, during three distinct periods at the Shipyard from the first of the month. The week prior to SW08 (again as measured by the gauge at B427) 0.77" of rain was recorded. The last measureable runoff occurred approximately 3.5 days prior to the SW08 event.

Rain was forecast at 100% probability for Monday 11/21/12, with 24-hour accumulations of over 1.75" into mid-morning of the 22nd. Project qualifying storm criteria (antecedent dry period, event probability and forecast rainfall depth) was met by early evening of the 18th, so the decision was made to continue *tracking* and targeting this well developing large storm system.

The Nation Weather System (NWS) was the main source used for the assessment of weather forecasting and conditions. Provided below is a link to the NWS-Bremerton, WA webpage; (http://forecast.weather.gov/MapClick.php?site=sew&textField1=47.56751&textField2=-122.63127&smap=1). A host of other internet available weather forecasting, observational and data sources are used for field and reporting purposes as appropriate Detailed *Weather Forecast Information* is attached to this report.

The routinely referenced weather models used to gain forecast information regarding the Pacific Northwest, the MM5-NAM http://www.atmos.washington.edu/mm5rt/rt/naminit.12km.html) and the GFS-WRF (http://www.atmos.washington.edu/mm5rt/rt/gfsinit.frame1.html) (both hosted by the University of WA and initialized for the PNW) were in decent agreement with each other regarding area-wide rainfall. Below is a synopsis of the model comparison:

Event starts on 11/21 around 0400, continuing to rain until approx. 1000, rain bands move through project area from 1000 until approx. 0100 on 11/22. Heavy rainfall to return to area around 0100 on 11/22 lasting until approx. 1000. NO more significant rain until around 1700 (11/22/11. Anticipated storm end after the 1000 portion on 11/22.

Station status checks were conducted at various times between November 15th and 19th, becoming more frequent from the 20th onwards when more detailed observations began. The final sampler enabling conditions were appropriately set at each monitoring station on the afternoon of the 20th (*sample ready mode*). A telemetry check at 0800 on the 21st reveled that all of the stations had enabled and began their sampling routines. Table 1 lists the final enabling conditions at each monitoring station that were used for SW08, along with the rainfall amounts in the 24 and 6 hour periods prior to the onset of the storm event.

Table 1. Monitoring Station Enabling Conditions

Station	Rainfall (in/hr)	Level (ft)	Conductivity (µS/cm)	Repeatable Conductivity Enable (Y/N)	Pacing (min)	[1]Rainfall Prior to Event Start (24hr/6hr)
PSNS015	0.05	0.25	2000	N	15	0.00"/ 0.00"
PSNS084.1	0.05	0.25	2000	N	15	0.00"/ 0.00"
PSNS115.1	0.05	0.25	2000	N	15	0.00"/ 0.00"
PSNS124	0.05	0.25	2000	N	15	0.00"/ 0.00"
PSNS124.1	0.05	0.25	2000	N	15	0.00"/ 0.00"
PSNS126	0.05	0.25	2000	N	15	0.00"/ 0.00"

[1]Conditions as checked on 11/20/11 at ~1200; final enable conditions set 11/20/11 at ~1400

7.0 Precipitation and SW08 Qualification Summary

Precipitation Summary:

Previous rainfall that caused runoff to occur (≥ 0.03" rainfall without 3-hr gap) prior to the onset of SW08 ranged from 3:09 (days:hours) at PSNS084.1 to 3:14 (days:hours) at PSNS124, as measured by each stations rain gauge. Rain began to fall over the project site, as predicted, between 0420 and 0440 on November 21st. Table 2 details the period since last runoff and antecedent duration prior to the storm event, as well as the rainfall start date/time at each monitoring station.

Table 2. Pre-Rain Event Conditions

Station	Last Runoff[1] (Date/Time)	Antecedent Duration (Days: Hrs)	Start of Rainfall (Date/Time)
PSNS015	11/17/11 15:40	3:12	11/21/11 4:35
PSNS084.1	11/17/11 19:00	3:09	11/21/11 4:40
PSNS115.1	11/17/11 16:45	3:11	11/21/11 4:30
PSNS124	11/17/11 15:40	3:13	11/21/11 4:40

Table 2. Pre-Rain Event Conditions

Station	Last Runoff[1] (Date/Time)	Antecedent Duration (Days: Hrs)	Start of Rainfall (Date/Time)
PSNS124.1	11/17/11 15:40	3:12	11/21/11 4:35
PSNS126	11/17/11 16:40	3:11	11/21/11 4:20

[1]Last runoff period is defined as ≥ 0.03" of rainfall without a 3-hr gap

Rainfall began registering at all stations by 0440 on 11/21/11 (see Table 2) and continued in a moderate fashion until about 0900. Sampling began at the monitoring between 0517 (PSNS015) and 0745 (PSNS84.1). Checks, via telemetry, revealed that all of the stations enabled their sampling routines as programmed; with rainfall, pipe level and conductivity values being in satisfaction of their threshold values (as listed in Table 1).

By 0930 rainfall had all but ceased. In order to preserve the amount of available / potential sampler bottles and to limit the amount of saline water captured (due to lack of runoff and rising tide levels) the decision was made to temporarily suspend the programming routines in the autosamplers. This was done via telemetry around 0945. At this point the rainfall totals at the monitoring stations ranged from 0.29” (PSNS126) to 0.35” (PSNS015 and -124.1). All six of the autosamplers sat idle for about the next eight hours (expect where the storm controller re-started the units to continue with their collection during the intra-event dry period such that each sampler was poised to resume its sampling regime at its next empty bottle). Some lite shower activity was recorded during the intra-event dry period, ranging from 0.06” at PSNS126 to 0.11” at PSNS124.1. Steady (and runoff producing) rainfall resumed around 1730. At this point sampling routines were restarted at all six monitoring stations.

Light to moderate rainfall was noted until around midnight of the 21st, when the rain intensity increased to moderately heavy to heavy, as the bulk of storm system pressed inland and onto the project area. Rainfall had ceased at the stations between 0800 and 0900 on the morning of the 22nd. The sampling routines were stopped, via telemetry, around 0930. Sampling durations ranged from 25:51(hrs:mins) at PSNS084.1 to 28:21(hrs:mins) at PSNS015. Station totals during this second period of rainfall ranged from 0.85” at PSNS124 to 1.56” at PSNS124.1. The Navy’s rain gauge at B427 recorded 0.34” and 1.39” during the two rainfall periods of the SW08, respectively.

Table 3 summarizes the sampling period start, sampling period end, rainfall amounts that occurred during the initial and second periods, as well as the total rainfall amounts for each monitoring station and the PSNS project gauge at B427 that occurred during SW08. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), attached to this report, provides additional sampling period rainfall information.

Table 3. Sampling Period Information and Rainfall Totals for PSNS Gauge and Monitoring Stations

Station	Sampling Period Start (Date/Time)	Sampling Period End (Date/Time)	Sampling Period Duration (Hrs:Mins)	[1]Rainfall During First Period of SW08 (in)	Rainfall During Intra-Event Period (in)	[2]Rainfall During Second Period of SW08 (in)	[3]Total Sampling Period Rainfall (in)
PSNS015	11/21/2011 5:17	11/22/2011 9:38	28:21	0.35	0.1	1.37	1.82
PSNS084.1	11/21/2011 7:45	11/22/2011 9:36	25:51	0.31	0.08	1.30	1.69
PSNS115.1	11/21/2011 5:21	11/22/2011 9:36	28:15	0.32	0.07	1.06	1.45
PSNS124	11/21/2011 5:33	11/22/2011 9:34	28:01	0.30	0.07	0.85	1.22
PSNS124.1	11/21/2011 6:42	11/22/2011 9:33	26:51	0.31	0.12	1.56	1.99
PSNS126	11/21/2011 5:24	11/22/2011 9:27	28:03	0.29	0.06	1.01	1.36
B427	NA	NA	NA	0.34	0.1	1.39	1.83

[1]As based on station start times until about 0945 on 11/21/11.

[2]Period from about 1730 on 11/21/11 until about 0935 on 11/22/11.

[3]Total Sampling Period Rainfall includes rainfall amounts from the first and second period as well as during the intra-event dry period.

SW08 Qualification Summary:

All storm qualification conditions were met for this event. Storm event qualification conditions included wet season event date range (Oct 1 – May 1), forecast probability (≥70%), forecasted storm depth (≥0.1"), storm duration (≥2hrs) and runoff occurrence / hydrograph stage (elevated above base flow). Antecedent dry period (≤0.1" rain in previous 24hrs and 0" rain in previous 6hrs) qualification for SW08 was also met without condition, as described above. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist)*, documents the particular SW08 qualification criteria listed above.

8.0 Sampling Information, Management and Validation

Grab Sampling:

Grab sample collection was performed by the Navy Team, with storm control assistance (limited to station status checks via telemetry) from Taylor/TEC as necessary. Grab sampling was conducted at all six of the monitoring stations. Grab samples were collected as per methodologies described in the 2011-12 Project Work Plan (PWP); using manual methods, a laboratory cleaned stainless steel dip cup, lowered on an extension pole, used to fill the appropriate analytical

containers. Water quality condition (conductivity and temperature) was assessed prior to the collection of the samples. Samples were collected only if conductivity was determined to be ≤2000 µS/cm. Parameters included total petroleum hydrocarbons (NW-TPH-Dx) and fecal coliform. All samples were collected on November 22nd between 0832 (PSNS015) and 1000 (PSNS126). Sample collection was coordinated with low or lower tidal conditions to ensure that proper conductivity conditions would exist. Grab sampling times are indicated on the attached hydrographs to illustrate the water level stage during collection. Grab sample IDs, along with the other pertinent information is listed in the *Stormwater Field Sampling Forms* and in Table A-1 (both are attached). Table 4 summarizes these results.

Table 4. Grab Sampling Information

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Grab sample ID	SW08-0056	SW08-0055	SW08-0054	SW08-0052	SW08-0053	SW08-0051
Grab Date /Time	11/22/2011 10:00	11/22/2011 9:48	11/22/2011 9:30	11/22/2011 8:50	11/22/2011 9:06	11/22/2011 8:32
Grab sample conductivity value (µS/cm)	534	6.09	42.8	98.9	98.6	61.6
Hydrograph stage at grab collection	Rising Limb	Intra-event Runoff	Rising Limb	Rising Limb	Rising Limb	Intra-event Runoff
Grab parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

Composite Sampling:

Composite sample retrieval tasks and formulation procedures were managed by Taylor/TEC with support from PNNL/MSL personnel. Composite samples were collected from all six monitoring stations.

Composite samples were collected via autosamplers which were operated and synchronized by a custom designed telemetered water quality control system. The composite sample collection period is noted above in Table 3. The sampling duration ranged from 25.85 hours at PSNS084.1 to 28.35 hours at PSNS015. The composite sample collection times ranged from 0517 on 11/21 (PSNS015) to 0938 on 11/22 at PSNS015. Table 3 also lists the rainfall that occurred during each stations sample period.

Wedge bottles from each station (contained in the autosampler bases) were brought back the C106 Stormwater Lab at B147 for processing. Composite formulation occurred on November 22nd between 1155 and 1530. Each individual wedge bottle was screened with bench-top meters for their conductivity (YSI 556) and turbidity (Hach 2100P) values. Bottles with conductivity values of

≤2000 µS/cm were considered for inclusion in the overall composite sample; bottles testing greater than 2000 µS/cm were discarded. The number and numeric identification of the wedge bottles that were used for the composite sample formulation and those that were discarded were noted in Section 5 of the Stormwater Field Sampling Forms.

Methods used in preparation, autosampler collection, retrieval and formulation of the composite samples were conducted as per the PWP. Discrete time-paced samples were collected in 1000-ml plastic wedge bottles (up to 24 bottles available in each autosampler base) at a rate of 240-ml / 15 minutes (four samples/bottle one bottle/hour) per aliquot; which, at this pacing, provides for up to 24 hours of sampling period coverage (under normal, non-duplicate, operating conditions). Samplers at each station were enabled as per the conditions stated in Section 6 of this report. Each station was outfitted with either a pressure transducer (level and temperature) / conductivity (with salinity post-calculated) probe combo (INW CT2X) or a pressure transducer (level and temperature) (Campbell CS450) and a separate multi-parameter sonde (conductivity, salinity and temperature) (YSI 6820) (PSNS084.1). Composite sample parameters included: hardness, TOC, DOC, TSS, total and dissolved metals and turbidity. A small portion from each of the overall composite samples was poured off for the assessment of its resultant conductivity and turbidity values.

Enough qualifying sample volume was collected at each station to permit analysis of all intended composite sample analytes. Composite sample formulation of all the monitoring stations was conducted in a routine manner. The total number of discrete wedge bottles collected at each sampler, along with the total number of those bottles used in the station's composite sample is noted below in Table 5. Dividing the number of wedge bottles used in the composite sample formulation by those that were excluded provides an estimation of the amount of time that freshwater conditions occurred at each station during the sampling event period.

Specific details regarding the composite formulation, results from individual bench top testing of the discrete bottles, sample IDs, sample date/time and resultant overall conductivity and turbidity values, as well as the number of wedge bottles collected during the sampling event and those used for the composite sample formulation are detailed in the *Stormwater Field Sampling Forms, Chain-of-Custody (CoC)* forms and in Table A-1 (all are attached). Table 5 summarizes these results.

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Composite sample ID	SW08-012	SW08-011	SW08-010	SW08-009	SW08-008	SW08-007
Composite Date /Time	11/22/2011 9:27	11/22/2011 9:33	11/22/2011 9:34	11/22/2011 9:36	11/22/2011 9:36	11/22/2011 9:38

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Overall Composite conductivity value (μS/cm)	187	284	651	1692	270	182
Overall Composite turbidity value (NTU)	6	25	10	4	11	16
Composite volume (ml)	8,400	7,500	5,000	6,500	7,200	8,000
Number of Bottles Collected During Sampling Event	21	21	20	22	19	21
Number of Bottles Included in Composite Sample	21	15	10	13	18	20
Percentage of Total Sampling Period that Freshwater Conditions Occurred	100%	71%	50%	59%	95%	95%
Composite parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

All sampling and vault monitoring equipment operated as designed and programmed. Details pertaining to autosampler programming and event-specific operation of each monitoring stations' autosampler unit are contained in the attached *Sampler Reports*.

QC Samples:

No quality control samples were collected for either the grab or composite samples during SW08. As mentioned in Section 2, field equipment blanks were collected at each station prior to this initial storm sampling event. These are the only planned equipment blanks that will be collected for the 2011-12 Phase II sampling events. Equipment blank information is listed in Table A-1. Table 6 summarizes the quality control sample collection information for SW08.

Table 6. Summary of Quality Control Sampling Information for SW08

Sample Collection Criteria:	Results
Grab sample duplicate ID	NA
Grab sample duplicate date and time	NA
Grab sample duplicate conductivity value (μS/cm)	NA
Composite sample duplicate ID	NA
Composite sample duplicate date and time	NA
Overall Composite Duplicate conductivity value (μS/cm)	NA

Overall Composite Duplicate turbidity value (NTU)	NA
Composite Duplicate volume (ml)	NA

Sample Management:

All samples were handled and managed as per Section 9 of the PWP and in a manner acceptable and within industry standards regarding practices typical for tasks of this nature. Once collected, both grab and composite samples were placed into coolers and put on ice and/or into the Stormwater Laboratory refrigerator to maintain temperatures between 2 and 6 °C.

All sample IDs, collection date and time, matrix, requested parameter analysis and other associated information were documented on *Chain of Custody* (*CoC) Forms* (attached). Samples were in direct control of project and/or laboratory personnel at all times. Samples were delivered to the testing facility, Battelle Marine Science Laboratory in Sequim, WA, in good, useable and properly chilled condition. Adequate sample volume was collected from the targeted stations to proceed with the scheduled analysis of all parameters per the 2011-12 PWP.

Sample Validation Summary:

All sample validation criteria were met for this event per Section 8.2.6 of the 2011-12 PWP. Prior to processing the samples and transferring custody to the analytical laboratory, the Taylor/TEC Field Event Lead validated the samples against certain criteria. These validation criteria included runoff occurrence / hydrograph stage, sample preparation and handling review, requested parameters, ≥2 hour sampling duration or 75% storm hydrograph coverage, minimum number of aliquots, minimum sample volume collected for required parameters, discrete and composite samples conductivity measurement results, quality control sample collection and anomalous conditions assessment. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), documents the particular SW-event qualification listed above.

9.0 Basin Runoff Calculations

Rainfall runoff volumes during the SW08 sampling period were calculated for each of the basins associated with the six Phase II monitoring stations. These calculations are based on the modified Runoff Coefficient Method (RCM) as described in Section 7.4 of the 2011-12 PWP.

The RCM formula incorporates a coefficient that has a certain predetermined range of possible values, which are based primarily on the land use/land cover considerations for a particular basin or parcel. In calculating the runoff volumes for SW08, the maximum coefficient values were applied. Total runoff volume (cubic feet converted to gallons) was calculated with the general assumption that all of the rainfall upstream from a monitoring station that fell during the sampling event flowed past that station; such that basin area (ft^2) X the selected coefficient (dimensionless) X rainfall amount (ft) equaled the total runoff volume.

The value ranges for the various land use/land cover categories assigned to each basin are listed in the attached *Runoff Calculation Tables*. Calculated runoff values are also presented in Table A-

1 (*Storm Qualification and Sample Validation Information Checklist*) (attached). Table 7 summarizes the results from these calculations.

Table 7. Runoff Calculations

Station	Type of Surface	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Combined Drainage Area (Ft^2)	Sample Event Rain Total (In)	Sample Event Rain Total (Ft)	Sample Event Period Runoff Vol. (Gal)
126	Impervious	653,373	0.6 – 0.9	591,881	1.36	0.1133	501,792
	Pervious	9,613	0.2 – 0.4				
124.1	Impervious	109,690	0.6 – 0.9	101,245	1.99	0.1658	125,596
	Pervious	6310	0.2 – 0.4				
124	Impervious	429,302	0.6 – 0.9	396,251	1.22	0.1017	301,357
	Pervious	24,698	0.2 – 0.4				
115.1	Impervious	449,104	0.6 – 0.9	366,390	1.45	0.1208	331,178
	Pervious	13,938	0.2 – 0.4				
84.1	Impervious	23,958	0.6 – 0.9	21,562	1.69	0.1408	22,716
	Impervious	2,009,431	0.5 – 0.8				
015	Pervious	2,009,431	0.25 – 0.4	2,411,321	1.82	0.1517	2,735,753
	Impervious	653,373	0.6 – 0.9				

10.0 Descriptive Statistics and Discussion of Event Station Monitoring Data

Descriptive statistics for the sampling period at each monitoring station are provided in Table 8, below. These statistics include minimum, maximum, average and median for 1-hour interval rainfall data, vault level, conductivity, salinity, transducer water temperature, YSI water temperature (PSNS084.1 only) and tidal stage. Sampling period rainfall totals (includes intra-event dry periods) are also included as part of each station's rainfall information.

Table 8. SW08 Sampling Period Rainfall and Vault Parameter Descriptive Statistics

Station ID	Statistics	Rainfall (1 hr) (in)	Vault level (ft)	Conductivity (uS/cm)	[1]Salinity (ppt)	trans temp (^oC)	YSI temp (^oC)	Tide Stage (ft)
PSNS126	**Min**	0.00	0.04	28	2.00	4.40		0.41
	Max	0.16	5.02	48,095	42.00	10.96		12.47
	Average	0.04	1.18	6,519	7.10	9.31		6.97
	Median	0.02	0.32	209	2.00	9.64		7.01

Table 8. SW08 Sampling Period Rainfall and Vault Parameter Descriptive Statistics

Station ID	Statistics	Rainfall (1 hr) (in)	Vault level (ft)	Conductivity (uS/cm)	[1]Salinity (ppt)	trans temp (°C)	YSI temp (°C)	Tide Stage (ft)
	Storm Total	**1.36**						
PSNS124.1	**Min**	0.00	0.17	35	2.00	5.11		0.41
	Max	0.30	4.81	47,465	42.00	11.61		12.47
	Average	0.06	1.12	17,871	17.00	9.52		6.91
	Median	0.03	0.30	617	2.00	9.64		6.85
	Storm Total	**1.99**						
PSNS124	**Min**	0.00	0.22	16	2.00	4.80		0.41
	Max	0.16	8.54	48,090	42.00	13.07		12.47
	Average	0.04	3.45	20,719	18.66	9.77		6.91
	Median	0.02	3.16	5,367	4.11	9.82		6.85
	Storm Total	**1.22**						
PSNS115.1	**Min**	0.00	-0.03	43	2.00	4.47		0.41
	Max	0.19	12.19	47,073	42.00	12.51		12.47
	Average	0.05	6.69	11,880	11.47	9.24		6.97
	Median	0.02	7.00	1,299	2.00	9.47		7.01
	Storm Total	**1.45**						
PSNS084.1	**Min**	0.00	-0.25	73	0.05	5.32	5.37	0.41
	Max	0.21	8.04	43,031	34.33	17.53	19.27	12.47
	Average	0.05	2.92	10,934	9.48	10.91	11.06	6.91
	Median	0.03	2.69	325	0.22	10.44	10.48	6.85
	Storm Total	**1.69**						
PSNS015	**Min**	0.00	0.39	-133	2.00	4.27		0.41
	Max	0.20	9.25	47,290	42.00	13.15		12.47
	Average	0.06	4.17	7,899	12.67	8.91		6.97
	Median	0.03	4.08	32	2.00	9.15		7.01
	Storm Total	**1.82**						

[1]salinity calculations for PSNS126, 124.1, 124, 115.1 and 015 are based on an algorithm that has a lower range cut-off value of 2ppt. Actual field values may have been lower. The PSNS084.1 conductivity probe (YSI6820) utilized a different salinity algorithm function and thus is able to calculate lower low range salinity values.

Hydrograph Assessment:

The hydrograph and rainfall signatures (see attached) for all six monitoring stations and B427 (rainfall only) showed very similar patterns. The B427 gauge did show a slightly different response during the intra-event portion of the sampling event rainfall period.

The initial onset of rain caused a short-lived response in the piping systems as evidenced by very minor "blips" in the hydrographs, except at PSNS115.1. Initial pipe level response was truncated by the rising tide, which took full effect of the hydrograph signature as the rain quickly tapered off. Consequently, conductivity and salinity showed a corresponding sharp rise that was then sustained for some period until the return of the rainfall. Coincident with the return of the rainfall was the waning of the tide cycle and sharp reduction of conductivity values, at which time sampling resumed at all of the stations. Conductivity remained low (below 2,000uS/cm) for the remainder of the sampling period, with minor spikes at PSNS124.1 and 115.1. PSNS124 did show a return to seawater salinity concentrations for a brief period as the rainfall subsided slightly between the intra-event period and the second rainfall period. During this second rainfall period pipe storage effects are noted at each of the stations. The hydrographs for PSNS126 and 124.1 show indication of their respective piping systems draining out as the tide recedes past their effective tide height elevations.

As mentioned above grab sampling information for SW08 is indicated on each of the station hydrographs. Composite sample markers have been applied to the hydrographs to indicate total collection time (see attached).

Telemetry Data Summary Report: TDSR

A review of the telemetry data collected during SW08 indicated that nearly all vault parameters were properly and effectively recorded (with only very minor level issues associated with low tide and no water in the pipe). The only issues of note were associated with intermittent and mostly short-lived conductivity and salinity outages at PSNS015. However, there were two data gaps of approximately 2.5 and 7.5 hours in duration. These gaps caused no impact to sample enabling or subsequent collection. Mostly these outages were associated with very low saline conditions (where the sensors have the most difficulty recording accurate values). Once there was even a slight upward shift in the salinity concentration (in correlation to tidal effects), the conductivity probe responded as designed, and thus the salinity values became positive and representative. This issue has been noticed during past SW events during Phase I data collection. The sensors were re-calibrated as much as practicable.

A TDSR report (table), detailing the anomalies noted during SW08 is attached.

11.0 Notable Anomalies and Variations to the PWP

There were no major anomalies observed or otherwise noted after completion of the sampling event and review of the associated data that would have caused any of the SW08 samples to be non-representative of the conditions from which they were collected. As reported above, all intended and scheduled grab and composite samples were submitted to the MSL within holding times and without incident. All support and sampling tasks, as well as collected samples, were managed as appropriate per the PWP.

There were, however, several minor anomalies that occurred during SW08. These were;

- Sediment samples being submitted to the laboratory with incorrect program IDs. This issue was correct by PNNL upon sample intake.
- Equipment blanks were initially submitted to the laboratory with SW08-designations, when they should been sequentially numbered following the blanks that were collected during the Phase I efforts. Consequently, the grab samples collected during SW08 had to have their IDs changed (by adding 50 to each, e.g. SW08-001 became SW08-051 and so on) to avoid duplication in the associated Navy Project ENVVEST database. PNNL corrected this issue in the form of revised CoCs and updates within their LIMS.
- Typically, once a sampler has been enabled it is allowed to continue upon its course until its sampling routine has been completed (usually 24-hrs). However, during SW08 it was necessary to halt the samplers after the initial slug of rainfall moved through the project area. This was done, with concurrence from the Navy, in order to assure that each sampler had a sufficient amount of available wedge bottles to capture and characterize the bulk of the storm event that had been slightly delayed. During the period that samplers were manually idled the tide was high – therefore nearly all of the water that would have been sampled during this time would have been disqualified due to high salinity (not to mention that runoff had all but returned to baseflow conditions).
- Change in calculation method (not an anomaly); the method by which rainfall statistics, namely average, minimum, maximum and median were previously calculated was on static 1-hour segments; currently all of these statistics are calculated on a “rolling 1-hour data window’ in an attempt to provide a more accurate and representative assessment of the actual rainfall conditions.

12.0 Action Items

Routine action items include resetting (reloading with bottles, charging batteries, back flushing with DI water, etc.) all four monitoring stations and re-stocking of sampling supplies. Routine station maintenance items (e.g. sensor cleaning and calibration, rain gauge maintenance, etc.) as well as storm set-up tasks will need to be completed as necessary.

Non-routine action items include trouble shooting some minor CT2X transducer calibration issues noted at PSNS015.

The current focus of the field efforts will be in maintaining proper station and equipment operational status, data and resource management and storm-tracking tasks.

Figure 1. Phase II Stormwater Monitoring Locations within the Shipyard Boundary

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ATTACHMENTS

- Storm Event Summary and Sampling Information, Validation Checklist
- Stormwater Field Sampling Forms and Controller Notes
- Chain-of-Custody Forms
- Runoff Calculation Worksheet
- Station Hydrographs
- Autosampler Reports
- Weather Forecast Information
- TDSR

Table A-1. PSNS Non-Dry Dock Stormwater Monitoring Tasks
Storm Event Summary and Sampling Information, Validation Checklist
Stormwater Sampling Event #8 (11/21/2011)

Cardno TEC
Shaping the Future

This form acknowledges representativeness criteria described in the project PWP.
Mark with "Yes" to acknowledge acceptable, "No" for not acceptable, "NA" or "- -" if not applicable.

[1] *Storm Event Data:*	
Project Storm Event (SW) #	8
Event Forecast Probability (%)	100
PSNS B427 Rain Gauge - Sample Event Total (in.)	1.83

Rainfall and Runoff Summary:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Last Runoff (≥ 0.03" rainfall without 3-hr gap) Prior to STE Start (Date/Time)	11/17/11 16:40	11/17/11 15:40	11/17/11 15:40	11/17/11 16:45	11/17/11 19:00	11/17/11 15:40
Antecedent Dry Period Duration (days: hrs)	3:11	3:12	3:13	3:11	3:09	3:12
Rainfall Prior 24-hrs to Sampling Start	0.00	0.00	0.00	0.00	0.00	0.00
Rainfall Prior 6-hrs to Sampling Start	0.00	0.00	0.00	0.00	0.00	0.00
Start of Rainfall (Date/Time)	11/21/11 4:20	11/21/11 4:35	11/21/11 4:40	11/21/11 4:30	11/21/11 4:40	11/21/11 4:35
Sampling Period Start Date & Time	11/21/2011 5:24	11/21/2011 6:42	11/21/2011 5:33	11/21/2011 5:21	11/21/2011 7:45	11/21/2011 5:17
Sampling Period End Date & Time	11/22/2011 9:27	11/22/2011 9:33	11/22/2011 9:34	11/22/2011 9:36	11/22/2011 9:36	11/22/2011 9:38
Sampling Period Duration (hrs:mins)	28:03	26:51	28:01	28:15	25:51	28:21
Sampling Period Duration Converted to Hours	28.05	26.85	28.02	28.25	25.85	28.35
Sampling Period Total Rainfall (in)	1.36	1.99	1.22	1.45	1.69	1.82
Sampling Period Max 1-hr Rainfall Intensity (in/hr)	0.16	0.30	0.16	0.19	0.21	0.20
Sampling Period Average 1-hr Rainfall Intensity (in/hr)	0.04	0.06	0.04	0.05	0.05	0.06
Runoff volume calculated for sampling period (gallons)	501,792	125,596	301,357	331,178	22,716	2,735,753
Number of Bottles Collected During Sampling Event	21	21	20	22	19	21
Number of Bottles Included in Composite Sample	21	15	10	13	18	20
Percentage of Total Sampling Period that Freshwater Conditions Occurred	100%	71%	50%	59%	95%	95%
[1] *Sample Collection Criteria:*						
Grab sample ID	SW08-0056	SW08-0055	SW08-0054	SW08-0052	SW08-0053	SW08-0051
Grab Date /Time	11/22/2011 10:00	11/22/2011 9:48	11/22/2011 9:30	11/22/2011 8:50	11/22/2011 9:06	11/22/2011 8:32
Grab sample conductivity value (mS/cm)	534	6.09	42.8	98.9	98.6	61.6
Hydrograph stage at grab collection	Rising Limb	Intra-event Runoff	Rising Limb	Rising Limb	Rising Limb	Intra-event Runoff
Grab parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
Composite sample ID	SW08-0012	SW08-0011	SW08-0010	SW08-0009	SW08-0008	SW08-0007
Composite Date /Time	11/22/2011 9:27	11/22/2011 9:33	11/22/2011 9:34	11/22/2011 9:36	11/22/2011 9:36	11/22/2011 9:38
Overall Composite conductivity value (mS/cm)	187	284	651	1692	270	182
Overall Composite turbidity value (NTU)	6	25	10	4	11	16
Composite volume (ml)	8,400	7,500	5,000	6,500	7,200	8,000
Composite parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
[1] *QC Sample Summary Information:*						
Grab sample duplicate ID	N/A	N/A	N/A	N/A	N/A	N/A
Grab sample duplicate date and time	N/A	N/A	N/A	N/A	N/A	N/A
Grab sample duplicate conductivity value (µS/cm)	N/A	N/A	N/A	N/A	N/A	N/A
Composite sample duplicate ID	N/A	N/A	N/A	N/A	N/A	N/A
Composite sample duplicate date and time	N/A	N/A	N/A	N/A	N/A	N/A
Overall Composite Duplicate conductivity value (µS/cm)	N/A	N/A	N/A	N/A	N/A	N/A
Overall Composite Duplicate turbidity value (NTU)	N/A	N/A	N/A	N/A	N/A	N/A
Composite Duplicate volume (ml)	N/A	N/A	N/A	N/A	N/A	N/A
Associated Equipment Blank	SW08-005	SW08-006	SW08-002	SW08-001	SW08-003	SW08-004
[1] *Storm and Sample Validation:*						
Was the targeted STE antecedent or conditional antecedent qualified per PSNS PWP? (if no, then see next line)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Was the antecedent overage amount greater than 10% of the total rain event ?	N/A	N/A	N/A	N/A	N/A	N/A
Was runoff occurring OR was the hydrograph at least 10% above background pipe level during grab collection ? If no, explain in summary narrative.	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were a minimum of 8 aliquots collected OR does the composite sample represent at least 75% of the stations storm event rain volume ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were all 1-hr sampler bottles used for the Composite sample ≤2000 µS/cm ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Did any anomalous conditions exist that could make samples non-representative? Explain if "Yes"	No	No	No	No	No	No
Based on consideration of the information above, was the sample collected during the STE valid for project purposes ? (Y / N, composite, grab or both)	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**

[1] If the answer to any of these questions is "No" OR indicate non-representative conditions, then these items should be explained in the Event Narrative.

Validation Check List Completed By : _____ **Reviewed By / Date:** _____ 1-12-12

TAYLOR ASSOCIATES, INC.

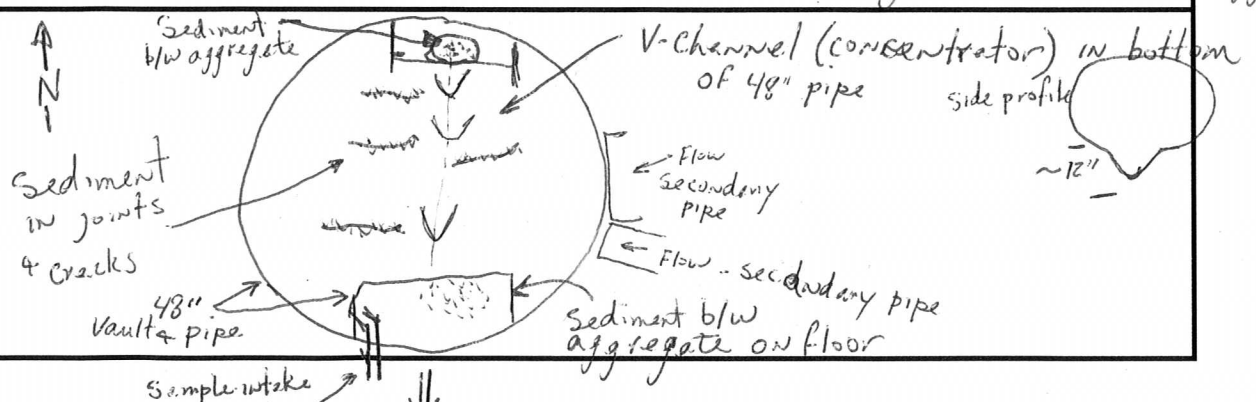
PSNS Non-Dry Dock Stormwater Monitoring Project
Sediment Grab Sample Collection Field Sheet

Personnel: Metallo, Rupert	**Date/Time:** 11/10/11 (2230)
Weather Clear, cold hi 30's, lite wind	

Station ID:	PSNS015
Manhole/CB #:	
Location Description:	
Sampling Methodology:	Certified clean plastic (in sealed package) scoop
Sampling Equipment Used:	Directly scoop material into lab-cert. clean jar
Decon'ed per PWP / PSNS Sed QAPP ?:	N/A
Trip Blanks ?:	No
Sediment Grab Sample ID:	PSNS015SED 3259-5 (tot. mets) 3259-6 (organics)
Sample time: 2230	**Bottles labeled?:** Yes
Parameters for Testing:	Metals / Organics SW08-0025 = tot metals, SW08-0026 = organics
Sediment Present? Approx depth?	Residual - Very bottom of pipe
Water Present? Approx depth?	Yes 2-3"
Water flowing? Stagnant?	Flowing
Sed. color: brown, black, grey, yellow, red, mottled	**Sed. odor:** petroleum, pungent, sewage, earthy, salty
Sed. sheen: none, some, lots	**Sed. consistency:** gravelly, sandy, silty, clayey, organic
Est. % of sample removed (particles ≥ 2 cm):	10%

Notes: Sediment available for collection was present in extremely small quantities & v. hard to access (in pipe joints & b/w pieces of rock/concrete debris and in scour pits in among the vault floor aggregate

Sketch:



TAYLOR ASSOCIATES, INC.

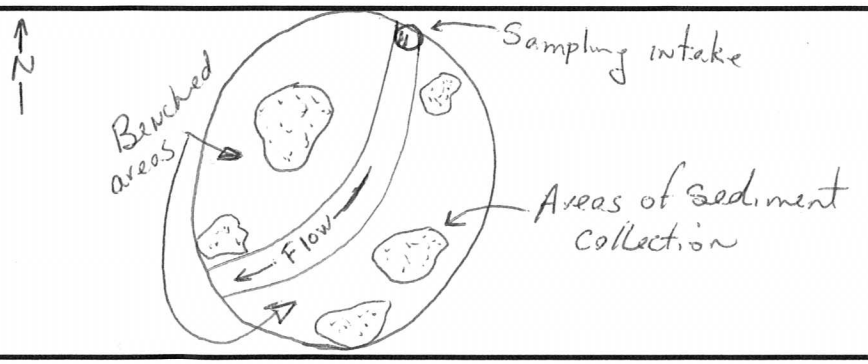
PSNS Non-Dry Dock Stormwater Monitoring Project
Sediment Grab Sample Collection Field Sheet

Personnel: Metallo, Rupert	**Date/Time:** 10/26/2012 (2030)
Weather Overcast, lo 40°s, lite NE'erly breeze	

Station ID:	PSNS 124.1
Manhole/CB #:	
Location Description:	Vault @ SW sampling location
Sampling Methodology:	Scoop sample material directly into lab supplied jar
Sampling Equipment Used:	Certified clean (mnf. pckgd) plastic scoop
Decon'ed per PWP / PSNS Sed QAPP ?:	N/A, used clean/disposable scoop
Trip Blanks ?:	No
Sediment Grab Sample ID:	3259 (-1 = metals) & (-3 = organics)
Sample time: 2100	**Bottles labeled?:** Yes
Parameters for Testing:	Metals & organics
Sediment Present? Approx depth?	thin, discontinuous "packets"
Water Present? Approx depth?	Yes, pooled
Water flowing? Stagnant?	Stagnant
Sed. color: brown, black, grey, yellow, red, mottled	**Sed. odor:** petroleum, pungent, sewage, earthy, salty
Sed. sheen: none, some, lots	**Sed. consistency:** gravelly, sandy, silty, clayey, organic
Est. % of sample removed (particles ≥ 2 cm):	5-7%

Notes: - Very limited (amount) of total sampleable sediment available

Sketch:



TAYLOR ASSOCIATES, INC.

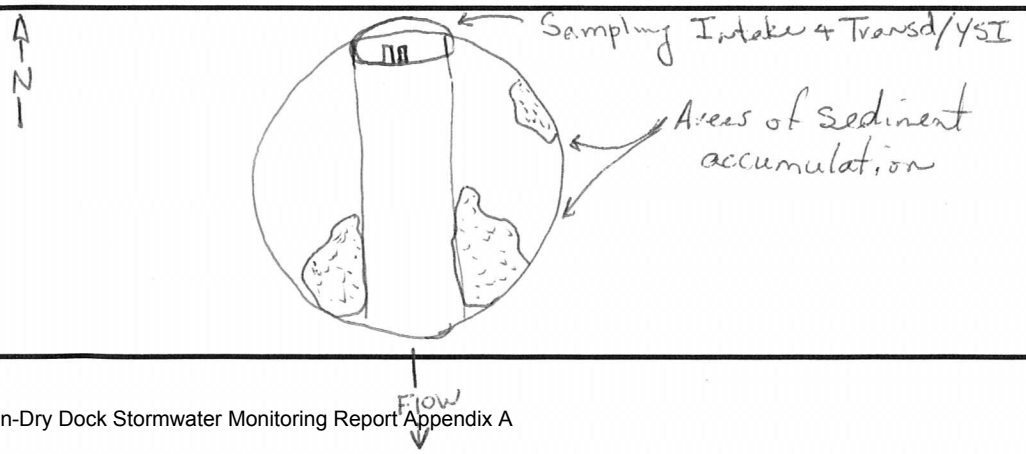
PSNS Non-Dry Dock Stormwater Monitoring Project
Sediment Grab Sample Collection Field Sheet

Personnel: Metallo, Rupert	**Date/Time:** 10/26/12 (2120)
Weather Overcast, lo 40°s, lite NE breeze	

Station ID:	PSNS 115.1
Manhole/CB #:	
Location Description:	Vault @ the PSNS115.1 SW Sampling location
Sampling Methodology:	Scoop material directly into lab-supplied jar
Sampling Equipment Used:	Plastic scoop that was in a sealed cert'd clean bag
Decon'ed per PWP / PSNS Sed QAPP ?:	NA - no decon necessary - used disposable scoop
Trip Blanks ?:	NO
Sediment Grab Sample ID:	3259 (-2 = metals) & (-4 = organics)
Sample time: 2142	**Bottles labeled?:** Yes
Parameters for Testing:	Metals & organics
Sediment Present? Approx depth?	Yes, laminant to ~1"
Water Present? Approx depth?	NO
Water flowing? Stagnant?	NA
Sed. color: brown, black, grey, yellow, red, mottled	**Sed. odor:** petroleum, pungent, sewage, earthy, salty
Sed. sheen: none, some, lots	**Sed. consistency:** gravelly, sandy, silty, clayey, organic
Est. % of sample removed (particles ≥ 2 cm):	5% OM Less than 1-2%

Notes: Several v. small pockets of sand/silt that were generally less than 1/4 to 1/2" in thickness

Sketch:



PSNS NDDSWv Monitoring Project Storm Control Work Sheet *Sht Rev. 112111* Sheet 1 of 2

Date:	11/20/11 (lids off), 11/21/11 (storm st.)			**Sampling Support Personnel:**	Metallo, Rupert, Sahlberg
STE #	8	**Antecedent Dry Cond. Met ?**	YES for all sites	**Tidal Info:**	11/21/2011 Mon 01:22AM LST 9.0 H 06:49AM LST 4.5 L 12:57PM LST 12.5 H 08:04PM LST 0.4 L 11/22/2011 Tue 02:37AM LST 10.1 H 07:55AM LST 5.4 L 01:37PM LST 12.7 H 08:48PM LST -1.1 L
Storm Controller:		Metallo		**Grab sampling Info.**	C106 to attempt grabs early on the morning of 11/22 (~0600-0800)
Pre-Storm / Weather Details:		NAM & GFS in decent agreement. Event start on 11/21 around 0400, continuing to rain until approx 1000, rain bands through project area from 1000 until approx 0100 on 11/22. Heavy rainfall return at 0100 on 11/22 lasting until approx 1000. NO more significant rain until around 1700. Anticipate storm end after the 1000 portion.			

Telemetry Measurements:	DATE/TIME (24HR)												
STATION:	Setup @ ~1400 11/20	2200	0800 11/21/11	~0945	1733 - 1739	0857 11/22/11	0940	0946	0952	0957	1003	1010	
PSNS015 Rain[1]	0/0	0/0	0.32/	(Paused Sample Collection @ all UNITS) Rain has nearly ceased	0.05/0.5	.01/1.47	0/1.47	0/1.38	0/1.13	0/.092	0/1.06	0/1.07	
PSNS008 Level						3.95	4.76	3.58	8.00	4.40		1.32	
PSNS008 Cond.						103	92	108	590	47,347		2919	
Smpl Marker	DM ~~3~~ 2		11		22(5)	83	86	78	92	94		89	
PSNS084.1 Rain	0/0	0/0			.03/.42	.01/1.38	Stopped	Stopped	Stopped	Stopped	Stopped	Stopped	
PSNS084.1 Level						2.69	DL'ed	DL'ed	DL'ed	DL'ed	DL'ed	DL'ed	
PSNS084.1 Cond.						104	Smplr	Smplr	Smplr	Smplr	Smplr	Smplr	
Smpl Marker	2		2		14(3)	75	Rpt	Rpt	Rpt	Rpt	Rpt	Rpt	
PSNS115.1 Rain	0/0	0/0			.03/.42	0/1.13	Collected	Collected	Collected	Collected	Collected	Collected	
PSNS115.1 Level						6.93	LN Data	LN Data	LN Data	LN Data	LN Data	LN Data	
PSNS115.1 Cond.	~~3~~ DM					311							
Smpl Marker	3		11		27(6)	88			↑	↑	↑	↑	
PSNS124 Rain	0/0	0/0			.02/.37	0/.92	↑	↑					
PSNS124 Level						3.18							
PSNS124 Cond.						4468							
Smpl Marker	90		10		29(5)	90	015	84.1	115.1	124	124.1	126	
PSNS124.1 Rain	0/0	0/0			.04/.47	0/1.64							
PSNS124.1 Level						0.21							
PSNS124.1 Cond.						80							
Smpl Marker	2		9		22(5)	83							
PSNS126 Rain	0/0	0/0			.03/.38	0/1.07							
PSNS126 Level						0.09							
PSNS126 Cond.						229							
Smpl Marker	3		11		23(5)	85							

[1]Rain dephs are reported as 1-hr / 24-hr totals

PSNS NDDSW Monitoring Project Storm Control Work Sheet, Continued *Sht Rev. 041311* Sheet 2 of 2

Date:	11/20/11 (lids off), 11/21/11 (storm st.)			**Sampling Support Personnel:**	Metallo, Rupert, Sahlberg
STE #	8	**Storm Controller:**	Metallo	**Strm Evnt Start / Stp**	~0517 (11/21/11) & 1010 (11/22/11) ~29 hrs

Enabling Information:

Sample Station:	PSNS015	PSNS084.1	PSNS115.1	PSNS124	PSNS124.1	PSNS126
Rain enable (in/hr)	.05	.05	.05	.05	.05	.05
Level Enable (ft)	.25	.25	.25	.25	.25	.25
Cond. (µS/cm)	2000	2000	2000	2000	2000	2000
Repeat Cond Set?	No	No	No	No	No	No
Pacing Rate (min)	15	15	15	15	15	15
Date	11/20/11	11/20/11	11/20/11	11/20/11	11/20/11	11/20/11
Time	1200	1205	1210	1215	1220	1225
Comp Dup ? / where:	No			**Grab Dup ? / where:**	No	

EVENT NOTES:

① 124 – encountered issues w/ Isco Autosampler pump (gear box); swapped out w/ back-up unit, took several (9) attempts to calibrate unit volume (240-ml)

– Checked the stations ~0800; all stations have enabled and collecting water. Units enabled: 015 (0517) 084.1 (0745) 115.1 (0521) 124 (0530) 124.1 (0642) 126 (0524)

– Spoke w/ Bob Johnston; plan is to pause sampling @ all stations during the lull in rain (late morning the late afternoon, according to forecast), turn samplers on during this period to get to next empty bottle, pause again and wait until ~~rain~~ either rain returns or ~ 1730. This will give us us 29+ hours of coverage – enough to capture a decent portion of the next large forecasted rain front/slug @ ~ 0100 – 1000 on 11/22

– Re-start samplers b/w (1733) & (1739) 11/21/11 – Checked samplers ~ (0900) all operating correctly ~~(2345-1010)~~

– Stopped all sampler units b/w (0945-1010)

PSNS126 (8.38 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 126	MH/CB#:5110	Loc. Descrip. Southwest corner of Bldg. 460

pages per station

Section 1. Station Reset and Inspection

Personnel: Brian Rupert/Ian Sahlberg	Weather: Sunny, temp low 30's	Arrival Date/Time: 11/15/11 @ 0910	
Carry-over maintenance to do prior to set-up:	None		done? NA
Sampler Battery Voltage	12.61	Changed? Y N	New voltage NA
Modem Battery Voltage	12.49	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes - change a week ago	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes - change a week ago	Normal Smpler Program or Dup. ?	Normal
Modem Status	operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	On
		Backflushed with DI?	Yes
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: Brian Rupert/Ian Sahlberg	Weather: Sunny, temp low 30's	Arrival Date/Time: 11/15/11 @ 0910	
Sampler Battery Voltage	12.61	Changed? Y N	New voltage NA
Modem Battery Voltage	12.49	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes
Transducer Cable OK?	Yes	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	NA	Program Reviewed (Yes/No), Dup ?	Yes
Recorded Level (FT)	2.79	Lids off bottles?	Yes
Measured Level (FT)	2.79	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	NA	Backflush with DI?	Yes
Level Adjusted ?	No	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	Program Dis. 13:51:20 SU 20 Nov
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)		Sondes calibrated in storm lab prior to deployment	

Section 3. Grab Sample Collection

Personnel: RKJ, EWM, CJG	Weather: Rain stopped Light sprinkle	Arrival Date/Time: 11/22/11 0950	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	534 / 371 uS
Grab Parameters Collected		Salinity Reading (PPT):	0.2 ppt
Grab Sample ID	11/22/11 ~~0950~~ 1000	Temp. Reading (°C):	10.5
Grab Date/Time	SW08-006 A+B	Turbidity Reading (NTU)	6.57 ntu
Grab Dup ID		Equipment running correctly?	
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?

11 b deep in vault very low flow

PSNS126 (8.38 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS 126 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: Rupert, Sahlberg	Weather: Raining, 40°s	Arrival Date/Time: 11/22/11 (1140)	
Sampler Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Telemtery Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	11/21/11 (0520)	Sampler Report Downloaded ?	Yes
Last Aliquot Taken (date/time, bott #, aliq #)	11/22/11 (0957) Aliq 89		
Total Composite Sample Volume Collected			
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Normal		
Storm Contoller notified (Y or N/A)?: NA	Which parameter?:	NA	
Notes: No issues			
Maintenance Needed: Re-Sets			

Section 5. Compositing Scheme and QC Sampling			
Personnel: Metallo, Rupert, Sahlberg		Date/Time: 11/22/11 (1530)	
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)			
Cond. = YSI 30 Turb = Hach 2100P - Navy Meters			
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1. 701 / 7	7. 182/8	13. 54/3.5	19. 81/7
2. 145/ 10	8. 266/ 6	14. 38/4	20. 157/6
3. 365/ 7	9. 182/ 5	15. ~~X~~ 34/4	21. 191/7
4. 111/ 6	10. 194/ 4	16. 49/ 6	22. 1051/ 7 N(X)
5. 501/ 8	11. 152/4	17. 43/8	23. X
6. 317/ 12	12. 67/4	18. 43/7	24. X
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)			
Used btl's			
btl's 23+24 Empty, Btl not used - only 2 aliquots			
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)			
Cond. = 187 Turb. = 6 Vol. = 8,400 Analysis per PWP			
Composite Sample ID & Time: SIW08-0012 (0927)			
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

PSNS 124.1 (8.19 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 124.1	MH/CB#: 5880	Loc. Descrip. North of Bldg 357/west of DD#3

Section 1. Station Reset and Inspection			
Personnel: Brian Rupert/Ian Sahlberg	Weather: Sunny, temp 30's	Arrival Date/Time: 11/15/11 @ 1013	
Carry-over maintenance to do prior to set-up:	None		done? NA
Sampler Battery Voltage	12.63	Changed? Y N	New voltage NA
Modem Battery Voltage	13.74	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes - changed last week	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes - changed last week	Normal Smpler Program or Dup. ?	Normal
Modem Status	operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	On
		Backflushed with DI?	Yes
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection			
Personnel:Brian Rupert/Ian Sahlberg	Weather:Sunny, temp 30's	Arrival Date/Time: 11/15/11 @ 1013	
Sampler Battery Voltage	12.63	Changed? Y N	New voltage NA
Modem Battery Voltage	13.74	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes
Transducer Cable OK?	Yes	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	NA	Program Reviewed (Yes/No), Dup ?	Yes - normal
Recorded Level (FT)	1.77	Lids off bottles?	Off
Measured Level (FT)	1.67	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	-0.1	Backflush with DI?	Yes
Level Adjusted ?	Yes	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	Program Dis. 12:42:47 SU 20 Nov
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)		Sondes calibrated in storm lab prior to deployment	

Section 3. Grab Sample Collection				
Personnel: RKJ EWM CJG	Weather: Rain Stopped	Arrival Date/Time: 11/22/11 0938		
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (~~mS~~/cm): mS	6.091 9.9	
Grab Parameters Collected	TPH, FC, Turb	Salinity Reading (PPT):	4.2	
Grab Sample ID	SW08-~~003~~ 005	Temp. Reading (°C):	9.7	
Grab Date/Time	11/22/11 ~~0447~~	Turbidity Reading (NTU)	5.59 ntu	
Grab Dup ID	0948	Equipment running correctly?		
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):		
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:				
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / (N)	Ice OK?	

2 6" in vault no flow

PSNS 124.1 (8,19ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS 124.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: Rupert, Sahlberg	Weather: Raining, 40°s	Arrival Date/Time: 11/22/11 (1125)	
Sampler Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Telemtery Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	No		
Composite Begin Time (date/time)	11/21/11 (0640)	Sampler Report Downloaded ?	Yes
Last Aliquot Taken (date/time, bott #, aliq #)	11/22/11 (1003)		
Total Composite Sample Volume Collected	21 BTLs 90-100% of 960-ml, BTL 22 2 aliquots		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Normal		
Storm Contoller notified (Y or N/A)?: NA	Which parameter?:	NA	
Notes: No issues			
Maintenance Needed: Re-sets			

Section 5. Compositing Scheme and QC Sampling			
Personnel: Metallo, Rupert, Sahlberg		Date/Time: 11/22/11 (1440)	
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#,/Cal.info.)	Cond. = YSI 30 Turb = Hach 2100P - Navy Meters		
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1. 6360/19 N	7. 1195/60 Y	13. 2569/24 N	19. 50/9 Y
2. 123/21 Y	8. 465/47 Y	14. 2751/21 N	20. 67/10 Y
3. 138/23 Y	9. 381/35 Y	15. 76/17 Y	21. 90/11 Y
4. 29470/9 N	10. 492/25 Y	16. 50/13 Y	22. 25650/5 N
5. 45000/1 N	11. 501/25 Y	17. 50/12 Y	23. Empty X
6. 19400/6 N	12. 476/31 Y	18. 45/18 Y	24. Empty X
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)	Used btl's 3, 7-12, & 15-21 @ 500-ml ea ~7500 ml BTLs 23 & 24 = empty		
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)	Cond. = 284 µS/cm Turb. = 25 NTU Vol. = 7500 ml Analysis per PWP		
Composite Sample ID & Time:	SW08-0011 (0933)		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

PSNS124 (5.27ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 124	MH/CB#:5661	Loc. Descrip. Southwest section of Bldg 460

pages per station

Section 1. Station Reset and Inspection			
Personnel: Brian Rupert/Ian Sahlberg	Weather: Sunny, temps 30's	Arrival Date/Time: 11/15/11 @1335	
Carry-over maintenance to do prior to set-up:	None		done? NA
Sampler Battery Voltage	12.7	Changed? Y N	New voltage NA
Modem Battery Voltage	12.9	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes - changed last week	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes - changed last week	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	On
		Backflushed with DI?	Yes
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection			
Personnel:Brian Rupert/Ian Sahlberg	Weather:Sunny, temps 30's	Arrival Date/Time: 11/15/11 @1335	
Sampler Battery Voltage	12.7	Changed? Y N	New voltage
Modem Battery Voltage	12.9	Changed? Y N	New voltage
Sample Tubing & Strainer OK?	Yes	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes
Transducer Cable OK?	Yes	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	NA	Program Reviewed (Yes/No), Dup ?	Yes - normal
Recorded Level (FT)	1.88	Lids off bottles?	Off
Measured Level (FT)	1.93	Diagnostics/Distributor arm check?	Yes
Offset Diff (FT)	0.05	Backflush with DI?	Yes
Level Adjusted ?	Yes	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	Program Dis. 16:04:08 SU 20 Nov
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)		Sondes calibrated in storm lab prior to deployment	
Distributor arm frozen/would not work - had to switch the sampler head with back up unit - reprogrammed backup unit with current sampling setup - rechecked - all OK			

Blinking not Blank

Section 3. Grab Sample Collection			
Personnel: BKS, EWM, CTB	Weather: Rain Stopped	Arrival Date/Time: 11/22/11 @916	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (~~µS/cm~~): mS	42.81 / 30.6 mS
Grab Parameters Collected		Salinity Reading (PPT):	28.0
Grab Sample ID SW08-004	TPH FC, Turb	Temp. Reading (°C):	9.7
Grab Date/Time	11/22/08 ~~0920~~	Turbidity Reading (NTU)	5.06 ntu
Grab Dup ID	0916	Equipment running correctly?	
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Controller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?

Vault depth 3ft

PSNS124. (5.27A)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS 124 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: Rupert, Sahlberg	Weather: Raining, 40°s	Arrival Date/Time:	11/22/11 (1105)
Sampler Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Telemetry Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO (0530)		
Composite Begin Time (date/time)	11/21/11 ~~(0630)~~	Sampler Report Downloaded ?	Yes
Last Aliquot Taken (date/time, bott #, aliq #)	11/22/11 (0949) BTL #22 Aliq #94		
Total Composite Sample Volume Collected	22 btls 85-100 % (960 ml) btl #23 only one aliquot		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Normal		
Storm Controller notified (Y or N/A)?: NA	Which parameter?:	NA	
Notes: * Needed to swap Isco head (gear box issue) prior to storm event, replaced w/ backup unit			
Maintenance Needed: Re-sets			

Section 5. Compositing Scheme and QC Sampling

Personnel: Metallo, Rupert, Sahlberg | Date/Time: 11/22/11 (1410)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond = YSI 30, Turb = Hach 2100P Navy meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 1537/15 Y	7. 2364/9 N	13. 1700/28 Y	19. 448/6 Y
2. 474/12 Y	8. 4010/6 N	14. 541/9 Y	20. 11716/51 Y
3. 2544/7 N	9. 4075/5 N	15. 105/6 Y	21. 22710/7 N
4. 35250/3 N	10. 4205/4 N	16. 120/7 Y	22. 43660/1 N
5. 40360/2 N	11. 25300/3 N	17. 241/5 Y	23. X
6. 3640/13 N	12. 20120/3 N	18. 250/8 Y	24. X

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Used btls 1,2,13-20 @ 500-ml ea. ~ 5000 ml total comp vol.

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Comp = 651 µS/cm Turb. = 10 NTU Vol. = 5000ml Analysis per PWP

Composite Sample ID & Time:	SW08-0010 (0934)
Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

PSNS 115.1 (1.27 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support — **Telemetry, 24-1L bottle set-up** — **Taylor Associates, Inc.**

ver.020411

Station: 115.1	MH/CB#:4860	Loc. Descrip. South of Bldg. 879

Page: 1 of 2 *pages per station*

Section 1. Station Reset and Inspection			
Personnel: Brian Rupert/Ian Sahlberg	Weather:Sunny, temps 30's	Arrival Date/Time: 11/15/11 @ 1111	
Carry-over maintenance to do prior to set-up:	None		done? NA
Sampler Battery Voltage	12.72	Changed? Y N	New voltage NA
Modem Battery Voltage	12.98	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Yes
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes - changed last week	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes - changed last week	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	On
		Backflushed with DI?	Yes
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection			
Personnel:Brian Rupert/Ian Sahlberg	Weather:Sunny, temps 30's	Arrival Date/Time: 11/15/11 @ 1111	
Sampler Battery Voltage	12.72	Changed? Y N	New voltage NA
Modem Battery Voltage	12.98	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes
Transducer Cable OK?	Yes	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	NA	Program Reviewed (Yes/No), Dup ?	Yes, normal
Recorded Level (FT)	8.04	Lids off bottles?	Off
Measured Level (FT)	7.99	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	-0.05	Backflush with DI?	Yes
Level Adjusted ?	Yes	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	Program Dis. 12:57:09 SU 20 Nov
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. = Diff. =	(>10% adj. offset); Offset =	New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)		Sondes calibrated in storm lab prior to deployment.	

Section 3. Grab Sample Collection			
Personnel: Johnston, Mollestaan, Webberant Weather: Rain stopped		Arrival Date/Time: 11/22/11 0841	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	98.6 / 68.5
Grab Parameters Collected	TPH	Salinity Reading (PPT):	0.0
Grab Sample ID 11/22/11	SW08-002	Temp. Reading (°C):	8.9
Grab Date/Time	~~0848~~ 0850	Turbidity Reading (NTU)	3.12 ntu
Grab Dup ID		Equipment running correctly?	Y
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / (N)	Ice OK?

~6ft of water in vault, ~~?~~ flow (very low) starting to sprinkle

PSNS 115.1 (1,27 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS 115.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: Rupert, Sahlberg	Weather: Raining, 40°s	Arrival Date/Time:	11/22/11 (1045)
Sampler Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Telemtery Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	11/21/11 (0519)	Sampler Report Downloaded ?	Yes
Last Aliquot Taken (date/time, bott #, aliq #)	11/22/11 (0951) BTL 23 1/4		
Total Composite Sample Volume Collected	80-100% for all except #23 (only one aliquot collated)		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Normal		
Storm Contoller notified (Y or N/A)?:	Which parameter?:		
Notes: Various btls (e.g. #8, #18, #17) have v.coarse to coarse grain black sand, shell frag's & organic detritus			
Maintenance Needed:	Typical Re-sets		

Section 5. Compositing Scheme and QC Sampling			
Personnel: Metallo, Rupert, Sahlberg		Date/Time:	11/22/11 (1310)
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)	Cond YSI 30 & Turb 2100P Hach : Navy meters		

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 10920/10 N	7. 2263/12 N	13. 635/3 Y	19. 34/27 Y
2. 3309/27 N	8. 575/11 Y	14. 44/2 Y	20. 63/4 Y
3. 13720/12 N	9. 1244/5 Y	15. 31/4 Y	21. 189/4 Y
4. 13000/10 N	10. 3270/8 N	16. 27/4 Y	22. 364/4 Y
5. 14140/8 N	11. 280/2 Y	17. 30/7 Y	23. 541/4 X vol. issue
6. 8000/12 N	12. 11730/2 N	18. 38/11 Y	

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Used btls 8, 9, 11, 13--22 for comp'ing. BTLS 1-7, 12 - Cond issues

btl #23 only one aliquot 13 btls total for comp'ing @ 500-ml's ea.

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 1692 µS/cm Turb. = 4 NTU Vol. = 6500 ml Analysis per PWP

Composite Sample ID & Time:	SW08-0009 (0936)
Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

PSNS 084.1 (5.61 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 84.1	MH/CB#: 551	Loc. Descrip. Southeast section of Bldg 983	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection			
Personnel: Brian Rupert/Ian Sahlberg	Weather: Sunny, temp 30's	Arrival Date/Time: 11/15/11 @ 1217	
Carry-over maintenance to do prior to set-up:	None		done? NA
Sampler Battery Voltage	12.77	Changed? Y N	New voltage NA
Modem Battery Voltage	12.72	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes - changed last week	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes - changed last week	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	On
		Backflushed with DI?	Yes
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection			
Personnel: Brian Rupert/Ian Sahlberg	Weather: Sunny, temp 30's	Arrival Date/Time: 11/15/11 @ 1217	
Sampler Battery Voltage	12.77	Changed? Y N	New voltage NA
Modem Battery Voltage	12.72	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes
Transducer Cable OK?	Yes	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	Yes	Program Reviewed (Yes/No), Dup ?	Yes - normal
Recorded Level (FT)	3.11	Lids off bottles?	Yes
Measured Level (FT)	2.78	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	-0.33	Backflush with DI?	Yes
Level Adjusted ?	Yes	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Program Dis. 12:32:58 SU 20 Nov
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)		Sondes callibrated in storm lab prior to deployment	

Section 3. Grab Sample Collection			
Personnel: Johnston EWM, CJG	Weather: Rain Stopped	Arrival Date/Time: 11/22/11 0900	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	78.9 / 72.6
Grab Parameters Collected	TPH, FC, Turb	Salinity Reading (PPT):	0.0
Grab Sample ID	SW08-003	Temp. Reading (°C):	11.1
Grab Date/Time	11/22/11 ~~0903~~	Turbidity Reading (NTU)	8.60 ntu
Grab Dup ID	0906	Equipment running correctly?	
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / (N)	Ice OK?

Vault depth 2.5 ft

PSNS 084.1 (5,61 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS 084.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: Rupert, Sahlberg	Weather: Raining, 40's	Arrival Date/Time:	11/22/11 (1025)
Sampler Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Telemtery Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NA		
Composite Begin Time (date/time)	11/21/11 (0742)	Sampler Report Downloaded ?	Yes
Last Aliquot Taken (date/time, bott #, aliq #)	11/22/11 btl 19 Aliq 78 (0939)		
Total Composite Sample Volume Collected	19 Full btls		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	OK-typical		
Storm Contoller notified (Y or N/A)?: NA	Which parameter?:	NA	
Notes:			
Maintenance Needed: Typical re-set tasks			

Section 5. Compositing Scheme and QC Sampling			
Personnel: Metallo, Rupert, Sahlberg		Date/Time: 11/22/11 (1225)	
Conductivity & Turbidity Meter/s Info:(Manuf., Model, Serial#, Cal.info.)	Cond (YSI 30) / Turb (2100P) Navy meters		
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1. 774 / 17 / Y	7. 315/9 Yes	13. 46/9 Yes	19. 100/11 Yes
2. 223 / 16 / Y	8. 121/7	14. 48/15	20
X 3. 34000/5/ N	9. 447/6	15. 67/11	No
4. 1728 / 18/ Y	10. 112/7	16. 50/16	Samples
5. 268/ 14/ Y	11. 78/7	17. 117/12	↓
6. 360/11/Y	12. 46/6 ↓	18. 93/12 ↓	24 Collected
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)	Used 400-ml from btls 1-2, 4-19; 18 x 400 = 7200 ml. BTL # 3 did not qualify for cond. and was used for spanning rain end-to late afternoon start.		
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)	Cond. = 270 µs/cm Turb. = 11 NTU Vol. = 7200 ml Analysis per PWP		
Composite Sample ID & Time:	SW08-0008 (0936)		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

PSNS 015 (1.96 ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 015	MH/CB#: A41	Loc. Descrip. South Side of McD's (Bldg 1019) drive through lane.

Section 1. Station Reset and Inspection			
Personnel: Brian Rupert/Ian Sahlberg	Weather: Sunny, low 40's	Arrival Date/Time: 11/15/11 @ 1415	
Carry-over maintenance to do prior to set-up:	None		done? NA
Sampler Battery Voltage	12.72	Changed? Y N	New voltage NA
Modem Battery Voltage	13.19	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes - changed last week	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes - changed last week	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	On
		Backflushed with DI?	Yes
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection			
Personnel:Brian Rupert/Ian Sahlberg	Weather: Sunny, low 40's	Arrival Date/Time: 11/15/11 @ 1415	
Sampler Battery Voltage	12.72	Changed? Y N	New voltage NA
Modem Battery Voltage	13.19	Changed? Y N	New voltage NA
Sample Tubing & Strainer OK?	Yes	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes
Transducer Cable OK?	Yes	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	NA	Program Reviewed (Yes/No), Dup ?	Yes - normal
Recorded Level (FT)	1.74	Lids off bottles?	Yes
Measured Level (FT)	2.59	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	0.85	Backflush with DI?	Yes
Level Adjusted ?	Yes	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Program dis. 11:55:09 SU 20 Nov
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)		Sondes calibrated in storm lab prior to deployment	

Shoreline

Section 3. Grab Sample Collection			
Personnel: Johnston, Mollerstuen, Edwards	Weather: Rain Stop	Arrival Date/Time: 11/22/11	0820
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	96.6 | 99.0
Grab Parameters Collected		Salinity Reading (PPT):	0.0
Grab Sample ID	SW04-001A, B	Temp. Reading (°C):	9.3
Grab Date/Time 11/22/11	~~0820~~ 0832	Turbidity Reading (NTU)	9.63 NTU
Grab Dup ID		Equipment running correctly?	Yes
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?

About 3 ft deep, flow visable Rain Stopped

PSNS015 (1.96ft)

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS015 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: Rupert, Sahlberg	Weather: Raining, 40's	Arrival Date/Time:	11-22-11 (1010)
Sampler Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Telemtery Battery Voltage	12.5+	Changed? Y (N)	New voltage NA
Additional Grabs (IDs, date/time)	NA		
Additional Dup Grab (IDs, date/time)	NA		
Composite Begin Time (date/time)	11/21/11 (0517)	Sampler Report Downloaded ?	Yes
Last Aliquot Taken (date/time, bott #, aliq #)	11/22/11 aliq #86 btl 21		
Total Composite Sample Volume Collected	21 full btls		
Aliquots missed/NLD (date/time/bott #/aliq #)	Btls 1-4 Kept, Btl #5 was used to "even" up full btls after ~~dumping~~ pausing Sampler after initial rain slug		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	OK		
Storm Contoller notified (Y or N/A)?: NA	Which parameter?: NA		
Notes: All worked well			
Maintenance Needed: Typical resets			

Section 5. Compositing Scheme and QC Sampling			
Personnel: Metallo, Rupert, Sahlberg		Date/Time: 11-22-11 (~~1135~~) DM (1155)	
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)	Navy's inst's: YSI 30 & Hach 2100P, cond. & turb respectively		
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1 ~~919~~, 15 ~~8~~ Y	7. 68 / 10 / Y	13. 29 / 7 / Y	19. 43 / 18 / Y
2 ~~848~~ / 24 / Y	8. 85 / 14 / Y	14. 25 / 8 / Y	20. 71 / 12 / Y
3. 50 / 23 / Y	9. 84 / 10 / Y	15. 24 / 10 / Y	21. 133 / 9 / Y
4. 80 / 18 / Y	10. 93 / 47 / Y	16. 22 / 12 / Y	22. NA
X 5. 12 / 13 / Y	11. 78 / 12 / Y	17. 26 / 12 / Y	23. NA
6. 1600 / 25 / Y	12. 36 / 9 / Y	18. 26 / 17 / Y	24. NA
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)	Used btl's 1-4, 6-21 for comping; 400-ml from ea. did not use btl #5 - this btl spanned rain end to mid-day (used for btl adjustment) No Samples in btls 22-24 (stopped at btl 21)		
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)	Cond. = 182 µS/cm Turb. = 16 NTU Vol. = ~8000 ml Analysis per PWP 2011		
Composite Sample ID & Time:	SW08-0007 (0938) 11/22/11		
Field Blank Collected? (date/time)	~~NA~~ NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

Equipment Blank (Composite and Grab) Samples

SAMPLE CHAIN OF CUSTODY FORM

Date:

Page: 1 of 1

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle

Marine Sciences Laboratory

1529 West Sequim Bay Road

Laboratory: Battelle MSL

Attention: Jill Brandenberger

Phone: (360) 681-4564

	Sample Label	Station ID	Collection Date/Time	Matrix	Analyze parameters per QAPP SP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. Reading µS/cm
3174- 73	SW008-001	115.1 EB	10/31/11 @ 0155	water					X							1			
74	-002	124 EB	10/31/11 @ 0410	water					X							1			
75	-003	~~0155~~ 84.1 EB	11/1/11 @ 0320						X							1			
76	-004	015 EB	11/1/11 @ 0545						X							1			
77	-005	126 EB	11/2/11 @ 1100						X							1			
78	-006	124.1 EB	11/2/11 @ 1215						X							1			
	-007	EB	11/2/11 @ 1330							X						2			ship to CAS

Relinquished by:	Received by:	**Total # of Containers:**	
Signature: [signature] Date: 11/3/11 Time: 0600	Signature: [signature] 11/3/11 1800	**Shipment Method:**	
Printed Name: Brian Rupert Company: TELFNL	Printed Name: JMBrandenberger	Sample Disposition:	
Relinquished by:	Received by:	Distribution: 1) PNNL — TME 2) CAS — TPH 3) TAI	
Signature: Date: Time:	Signature:		
Printed Name: Company:	Printed Name:		

Stormwater Grab and Composite Samples

SAMPLE CHAIN OF CUSTODY FORM
Date:
Page: 1 of 1
Project No.: N4523A10MP00034 Amend.1
Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Updates &	Sample Label	Station ID (Changed per JMB request 11/30/11)	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity ①	Total metals	Organics			No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
-0051	SW08-0001	PSNS015	11/22/11 (0832)	Water						X						2	Grab	8	61.6 uS/cm, 9.63 NTU
-0052	SW08-0002	PSNS115.1	11/22/11 (0850)	Water						X						2	Grab	8	98.9 uS/cm, 8.60 NTU
-0053	SW08-0003	PSNS084.1	11/22/11 (0906)	Water						X						2	Grab	8	98.6 us/cm, 3.12 NTU
-0054	SW08-0004	PSNS124	11/22/11 (0930)	Water						X						2	Grab	8	42.8 us/cm, 5.06 NTU
-0055	SW08-0005	PSNS124.1	11/22/11 (0948)	Water						X						2	Grab	8	6.09 us/cm, 5.59 NTU
-0056	SW08-0006	PSNS126	11/22/11 (1000)	Water						X						2	Grab	8	534 us/cm, 6.51 NTU
	SW08-0007	PSNS015	11/22/11 (0938)	Water	X	X	X	X	X							1	Comp	8	182 uS/cm, 16 NTU
	SW08-0008	PSNS084.1	11/22/11 (0936)	Water	X	X	X	X	X							1	Comp	8	270 uS/cm, 11 NTU
	SW08-0009	PSNS115.1	11/22/11 (0936)	Water	X	X	X	X	X							1	Comp	8	1692 us/cm, 4 NTU
	SW08-0010	PSNS124	11/22/11 (0934)	Water	X	X	X	X	X							1	Comp	8	651 us/cm, 10 NTU
	SW08-0011	PSNS124.1	11/22/11 (0933)	Water	X	X	X	X	X							1	Comp	8	
	SW08-0012	PSNS126	11/22/11 (0927)	Water	X	X	X	X	X							1	Comp	8	
		015	11/10/11 (2230)	Sed								X	X			1	Grap	Pre 8	Sed. Sample 015

see below

Relinquished by:	Received by:	
Signature: [signature] Date: 11/22/11 Time: 1820	Signature: [signature] 11/22/11	Total # of Containers:
Printed Name: Brian Rupert Company: TEC-FNC	Printed Name: Li-Jung Kuo	Shipment Method: Hand delivered & split @ MSL
		Sample Disposition:
Relinquished by:	Received by:	Distribution:
Signature Date Time	Signature	1) PNNL
		2) CAS
Printed Name Company	Printed Name	3) TAI

① Turbidty measurements conducted at Navy SW Lab w/ Hach 2100P benchtop meter

NOTE: sed sample should be logged in as CF 3259, part of SQV07

Sediment Samples from PSNS 115.1 & 124.1

SAMPLE CHAIN OF CUSTODY FORM

Date:

Page: 1 of 1

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle

Marine Sciences Laboratory

1529 West Sequim Bay Road

Laboratory: Battelle MSL

Attention: Jill Brandenberger

Phone: (360) 681-4564

Analyze samples for QAPP

Sample Label	Station ID (SQV07)	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity	Metals	Organics			No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. Reading µS/cm
3259-1	PSNS 124.1 -001	10/26/11 e 2100	SED								X	X				G		NA
3259-2	115.1 -002	10/26/11 e 2142	SED								X	X				G		NA
3259-3 split	124.1 -003											X				G		
3259-4	115.1 -004											X				G		

Relinquished by: _____ Signature; 10/28/11 Date; 11:38 Am Time

Brian Rupert Printed Name; TEL INC Company

Received by: _____ PNNL Signature; 10/28/11 1138

Jill Brandenberger Printed Name

Total # of Containers: 2 8oz. Jars

Shipment Method:

Sample Disposition: Sediment Grabs

Relinquished by: _____ Signature; Date; Time

Printed Name; Company

Received by: _____ Signature

Printed Name

Distribution:

1) PNNL

2) CAS

3) TAI

Sediment Sample from PSNS015

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/22/2011
Page: 1 of 1
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH	Total Metals	Organics	% Moisture		No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0025	PSNS015	11/10/11 2230	SED								x		x		1	comp	SW08	3174*91
SW08-0026	PSNS015	11/10/11 2230	SED									x			1	comp	SW08	3174*92
--end--																		

Relinquished by: Signature 11/23/11 Date 1140 Time
LT Jung Kuo Printed Name Battelle Company

Received by: Signature 11/23/11
C. Suslick Printed Name 1100

Total # of Containers
Shipment Method:
Retained at Battelle ✓
Sample Disposition:

Relinquished by: Signature Date Time
Printed Name Company

Received by: Signature
Printed Name

Distribution:
1) PNNL

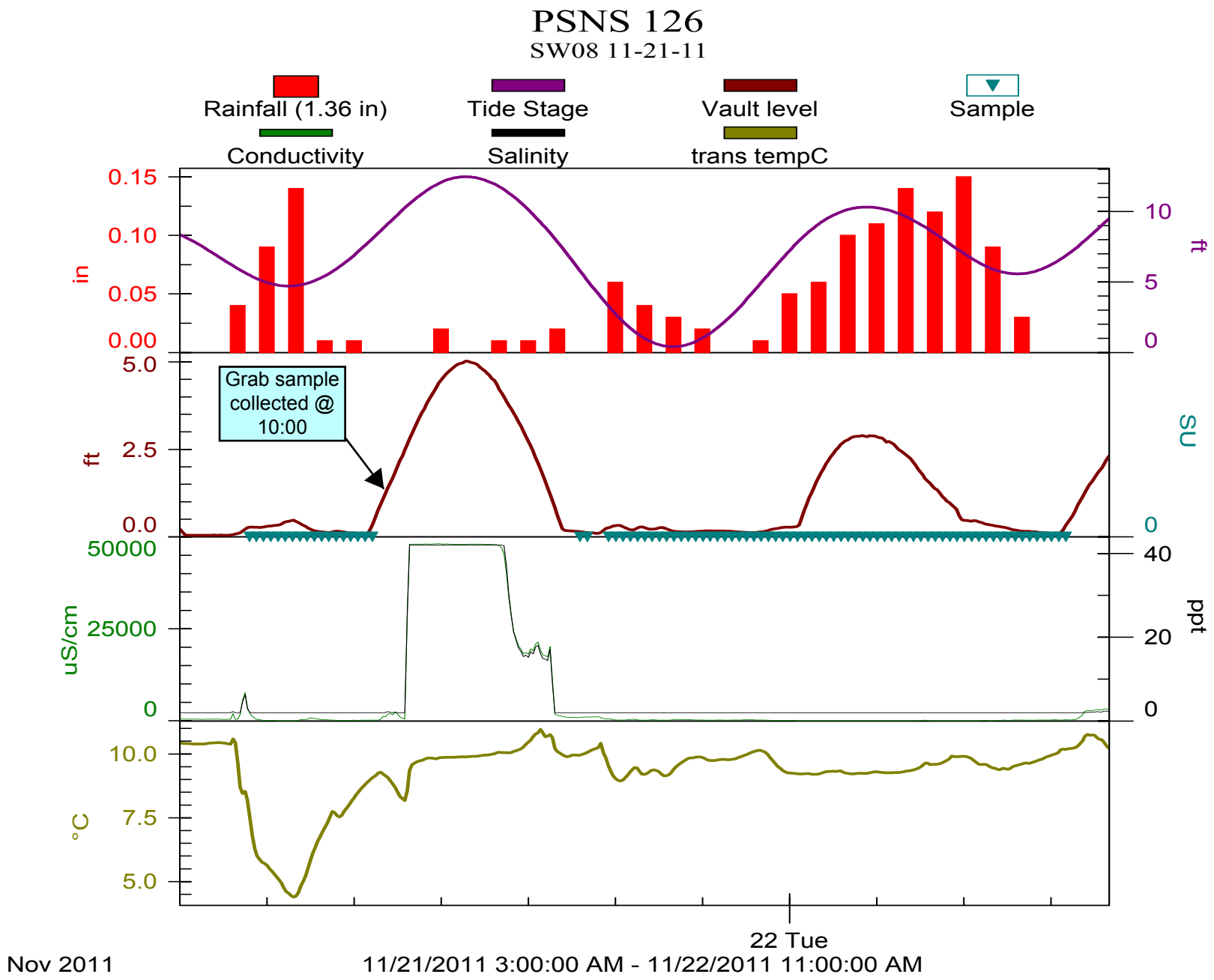
PSNS NDDSW Monitoring - SW08 11/21/2011

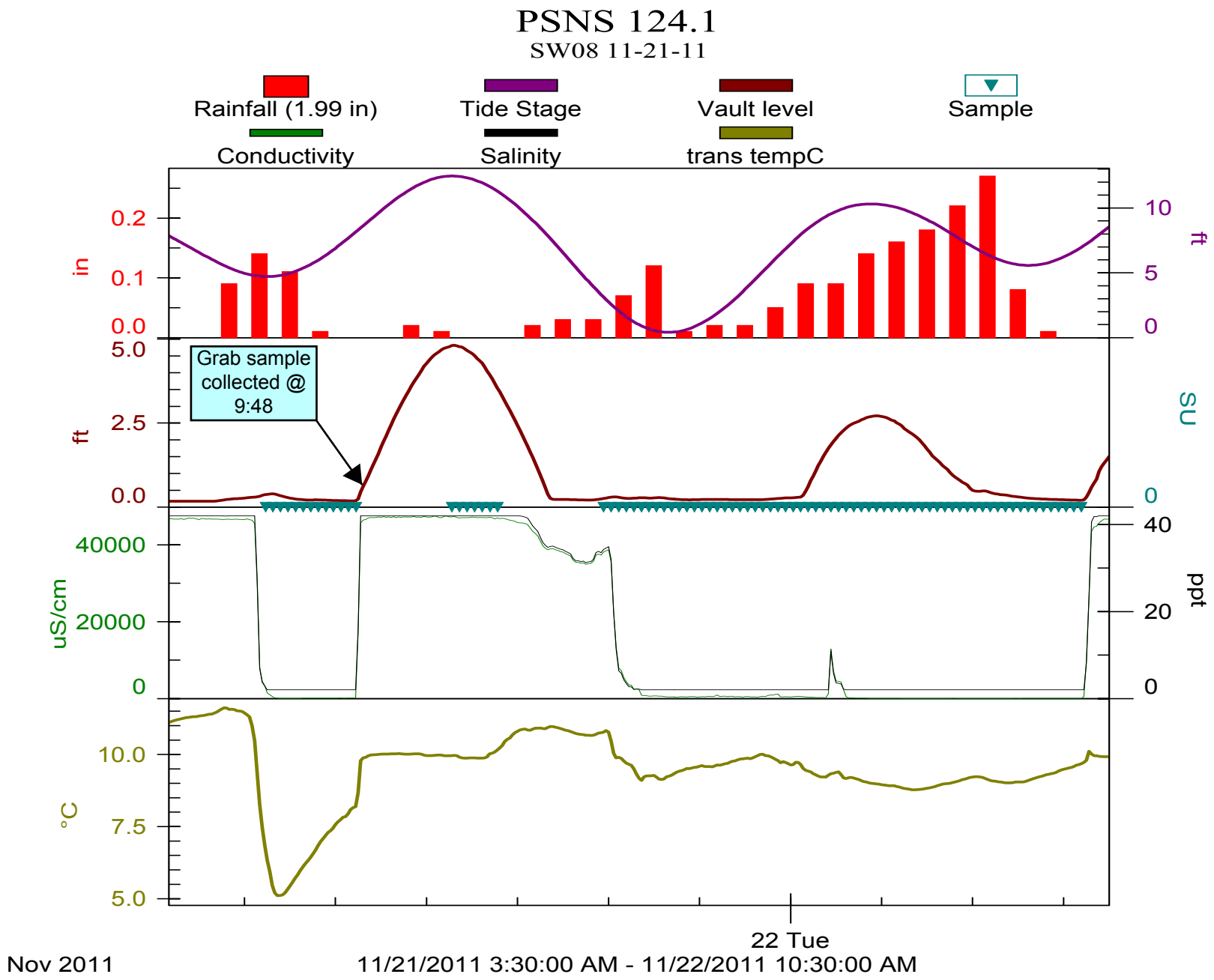
Stormwater Outfall Total Discharge Volume Estimation Equations

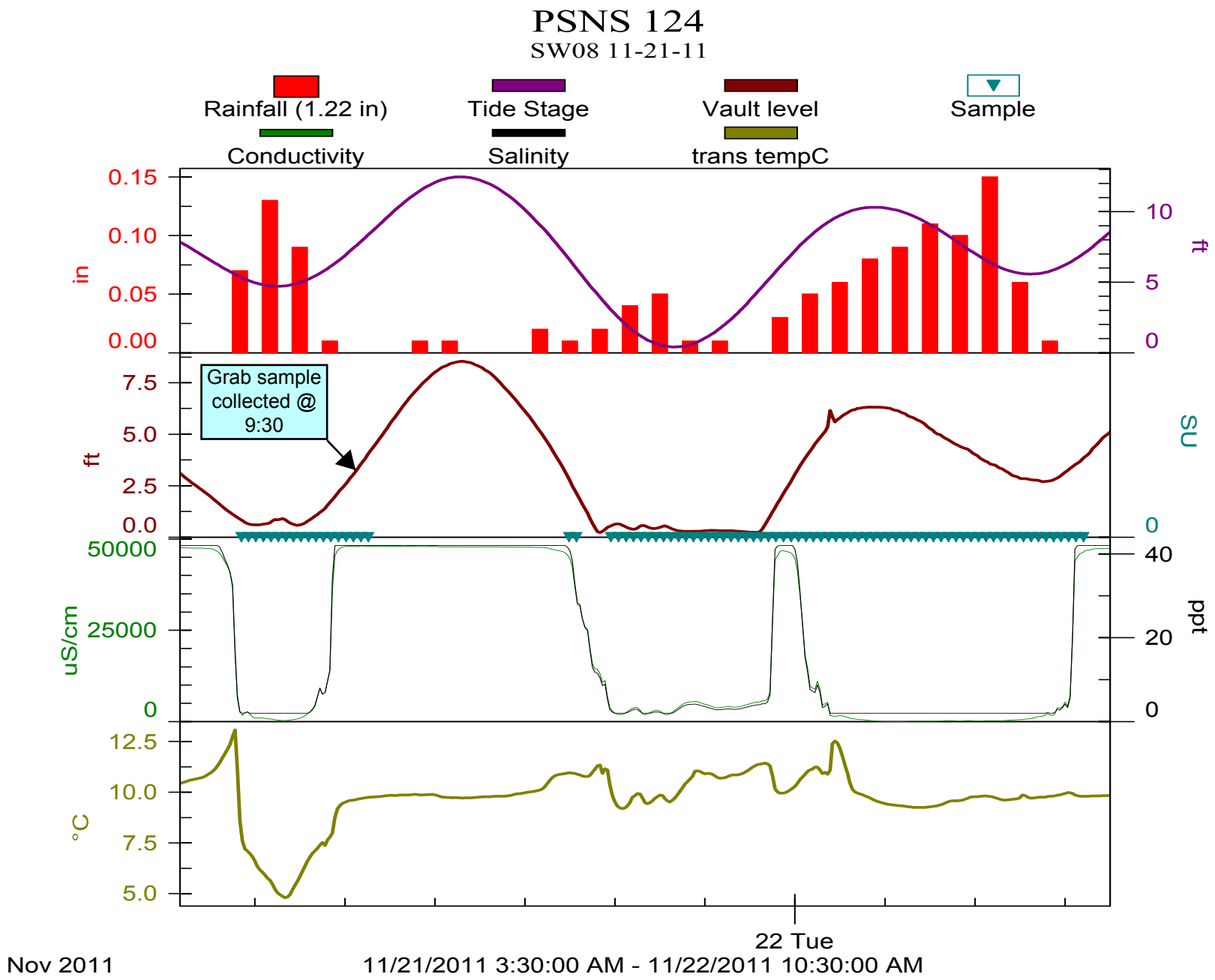
PSNS Drainage Basin	Total Basin Area (ft^2)	Type of Surface	Percentage of Drainage Basin Surface Type	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Area of Basin Surface Type with Maximum Coefficient Value Applied (ft^2)	[2]Total Discharge Volume (ft^3)
126	662,986	Impervious	98.55	653,373	0.6 – 0.9	588,036	R(591,881)
		Pervious	1.45	9,613	0.2 – 0.4	3,845	
124.1	116,000	Impervious	94.56	109,690	0.6 – 0.9	98,721	R(101,245)
		Pervious	5.44	6310	0.2 – 0.4	2,524	
124	454,000	Impervious	94.56	429,302	0.6 – 0.9	386,372	R(396,251)
		Pervious	5.44	24,698	0.2 – 0.4	9,879	
115.1	463,042	Impervious	97	449,104	0.6 – 0.9	361,422	R(366,390)
		Pervious	3	13,938	0.2 – 0.4	4,968	
84.1	23,958	Impervious	100	23,958	0.6 – 0.9	21,562	R(21,562)
15	4,018,862	Impervious	50	2,009,431	0.5 – 0.8	1,607,549	R(2,411,321)
		Pervious	50	2,009,431	0.25 – 0.4	803,772	

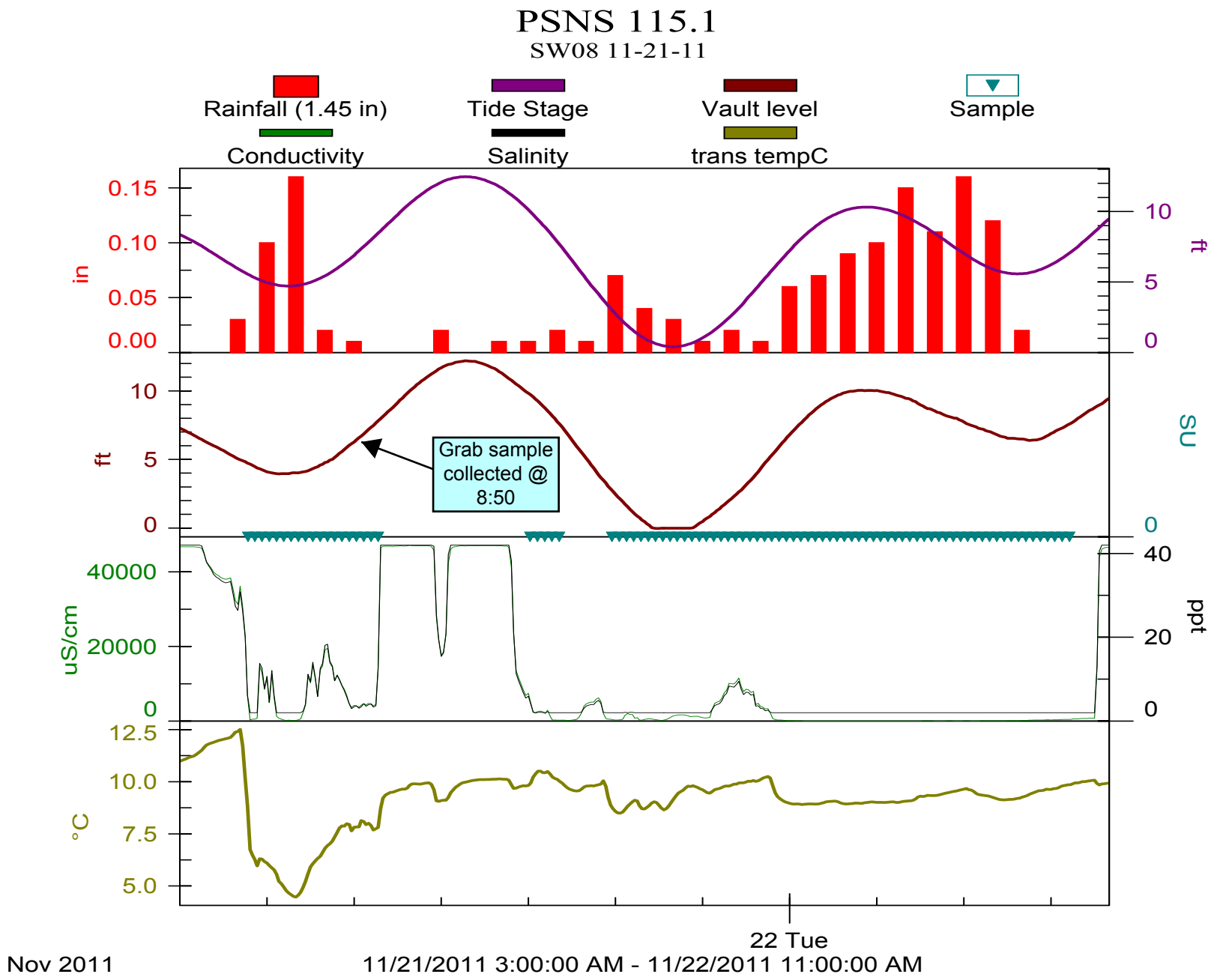
Calculation Worksheet: SW08 - 11/21/11

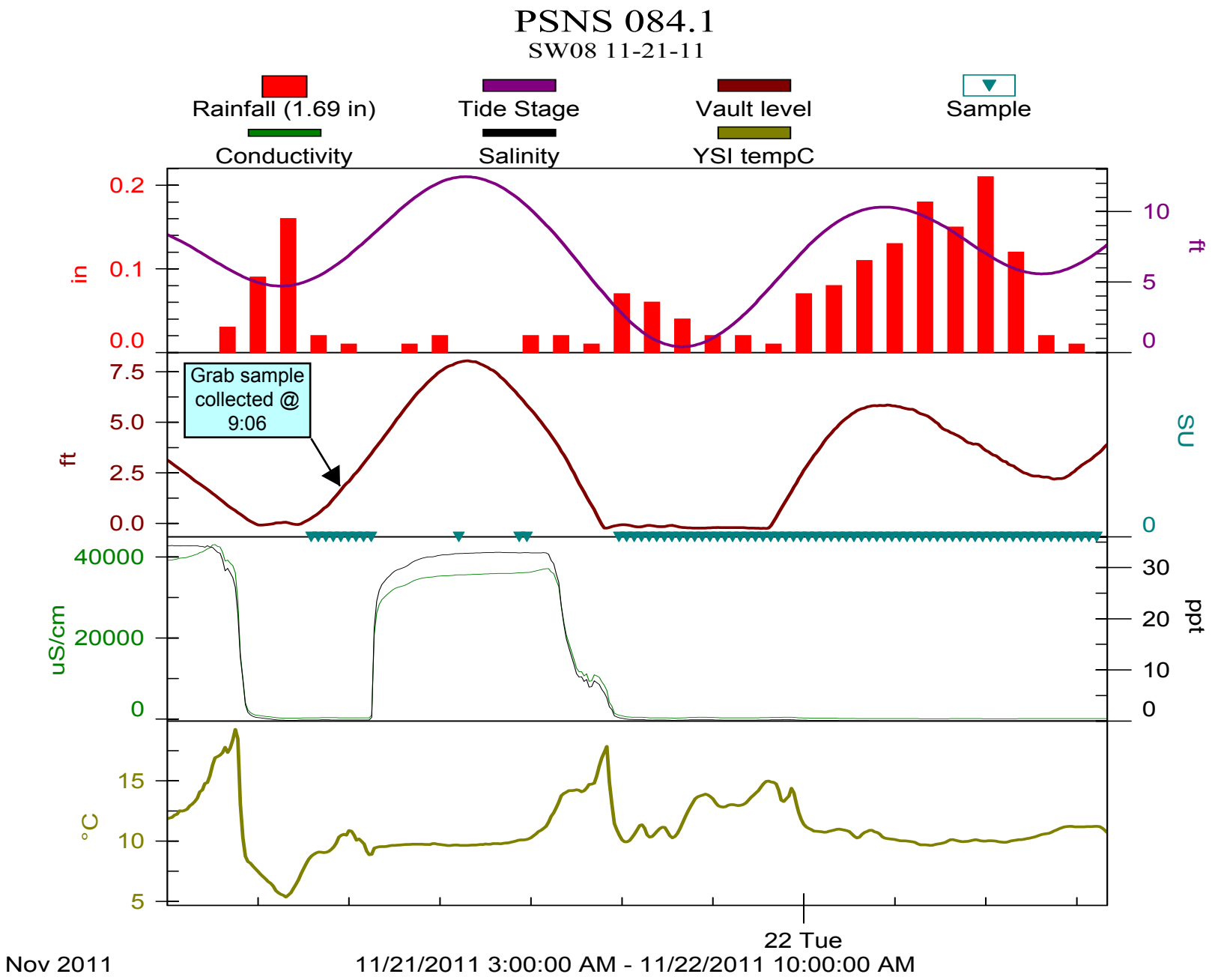
STATION	Combined Drainage Area (FT^2)	ENTER: Smpl Evnt Rain Total (in)	Sampl Evnt Rain Total (FT)	STE Runoff Vol. (gal)
126	591,881	1.36	0.1133	501,792
124.1	101,245	1.99	0.1658	125,596
124	396,251	1.22	0.1017	301,357
115.1	366,390	1.45	0.1208	331,178
84.1	21,562	1.69	0.1408	22,716
015	2,411,321	1.82	0.1517	2,735,753

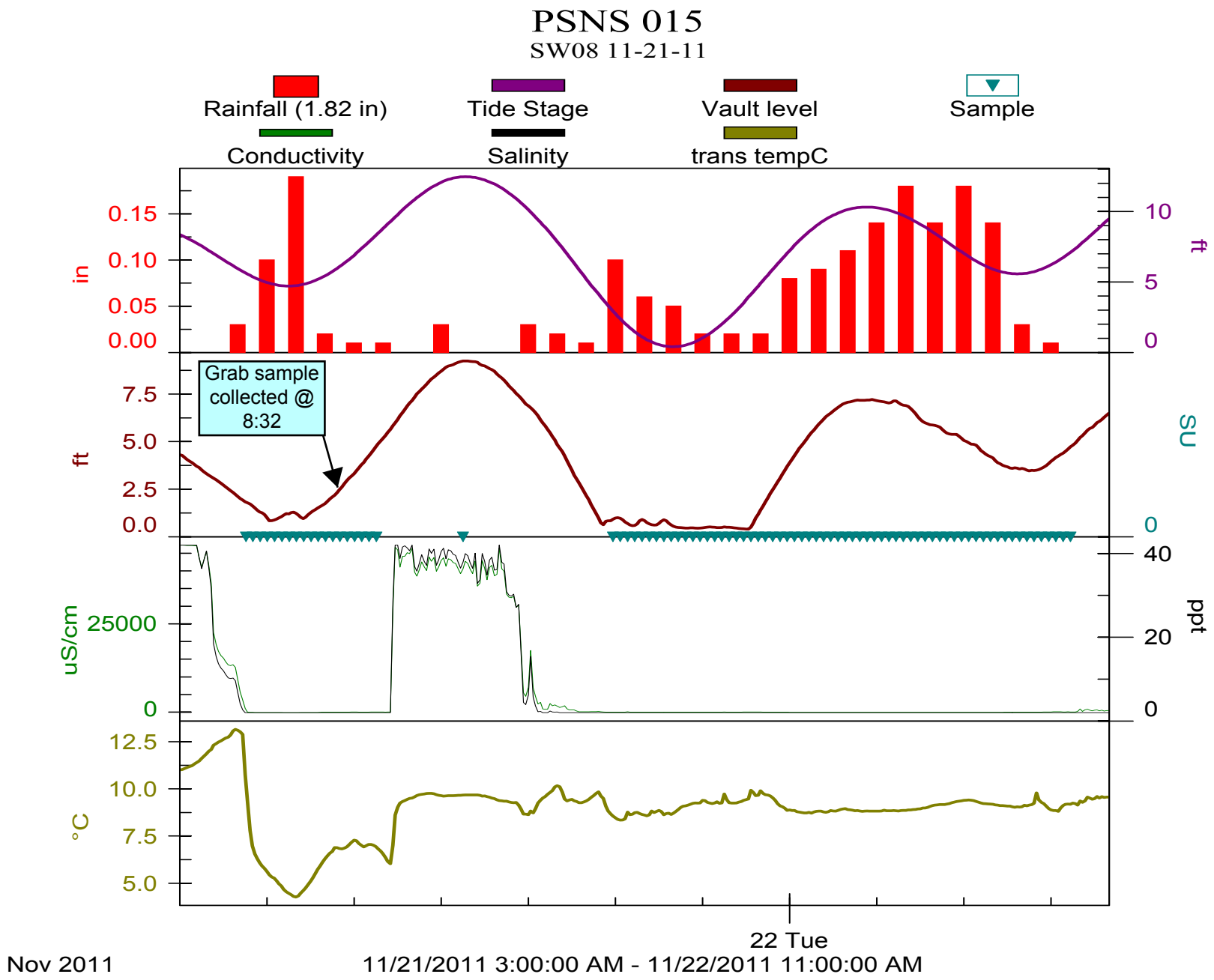

PSNS 126
SW08 11-21-11
Rainfall (1.36 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
5.0
2.5
0.0
ft
Grab sample collected @ 10:00
SU
0
50000
25000
0
uS/cm
40
20
0
ppt
10.0
7.5
5.0
°C
22 Tue
Nov 2011
11/21/2011 3:00:00 AM - 11/22/2011 11:00:00 AM

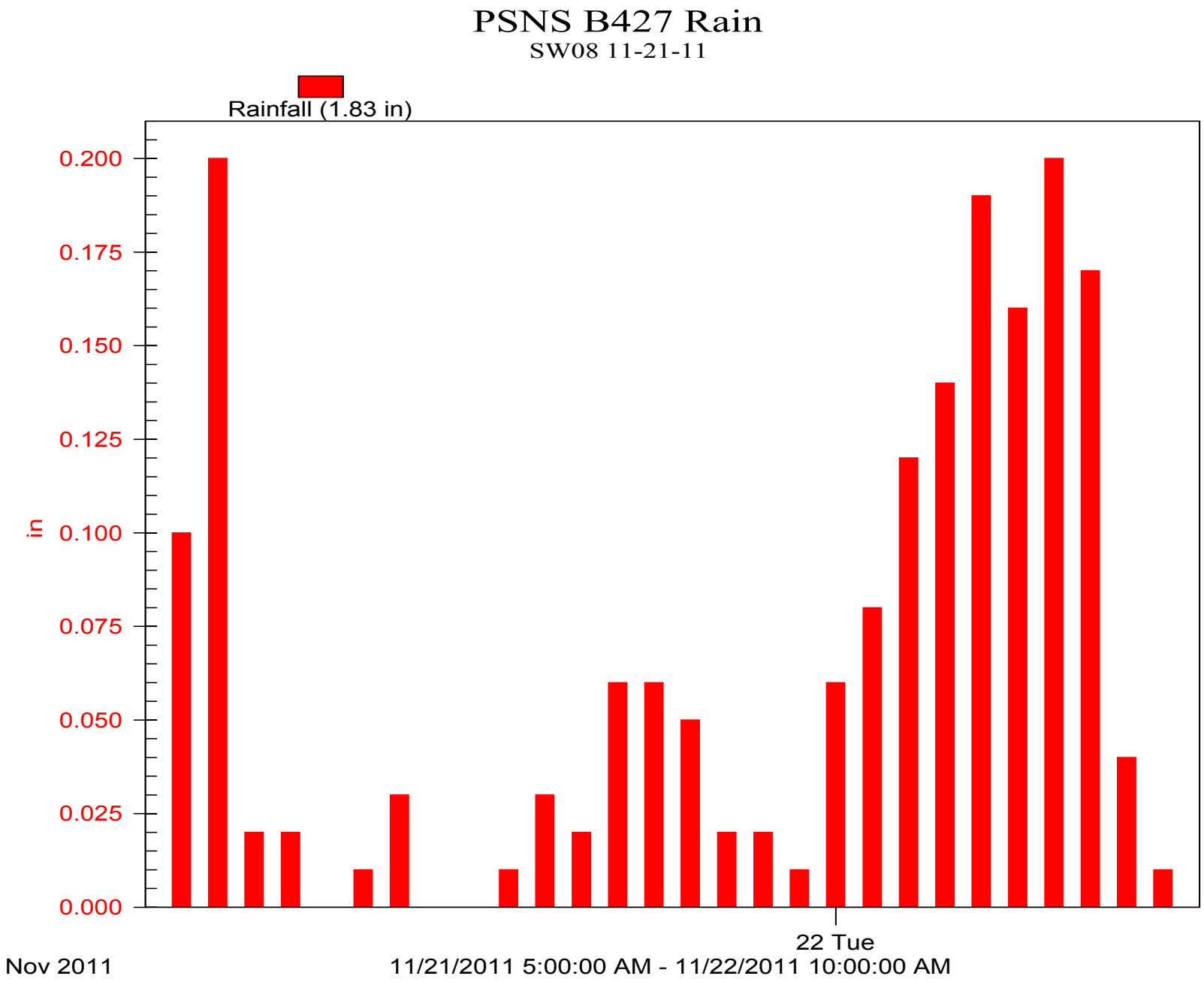

PSNS 124.1
SW08 11-21-11
Rainfall (1.99 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.2
0.1
0.0
ft
10
5
0
Grab sample collected @ 9:48
ft
5.0
2.5
0.0
SU
0
uS/cm
40000
20000
0
ppt
40
20
0
°C
10.0
7.5
5.0
22 Tue
Nov 2011
11/21/2011 3:30:00 AM - 11/22/2011 10:30:00 AM


PSNS 124
SW08 11-21-11
Rainfall (1.22 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
Grab sample collected @ 9:30
7.5
5.0
2.5
0.0
ft
SU
0
50000
25000
0
uS/cm
40
20
0
ppt
12.5
10.0
7.5
5.0
°C
22 Tue
Nov 2011
11/21/2011 3:30:00 AM - 11/22/2011 10:30:00 AM


PSNS 115.1
SW08 11-21-11
Rainfall (1.45 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
10
5
0
ft
Grab sample collected @ 8:50
SU
0
40000
20000
0
uS/cm
40
20
0
ppt
12.5
10.0
7.5
5.0
°C
22 Tue
Nov 2011
11/21/2011 3:00:00 AM - 11/22/2011 11:00:00 AM


PSNS 084.1
SW08 11-21-11
Rainfall (1.69 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
YSI tempC
0.2
0.1
0.0
in
10
5
0
ft
7.5
5.0
2.5
0.0
ft
Grab sample collected @ 9:06
SU
0
40000
20000
0
uS/cm
30
20
10
0
ppt
15
10
5
°C
22 Tue
Nov 2011
11/21/2011 3:00:00 AM - 11/22/2011 10:00:00 AM


PSNS 015
SW08 11-21-11
Rainfall (1.82 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.15
0.10
0.05
0.00
ft
10
5
0
Grab sample collected @ 8:32
ft
7.5
5.0
2.5
0.0
SU
0
uS/cm
25000
0
ppt
40
20
0
°C
12.5
10.0
7.5
5.0
22 Tue
Nov 2011
11/21/2011 3:00:00 AM - 11/22/2011 11:00:00 AM


PSNS B427 Rain
SW08 11-21-11
Rainfall (1.83 in)
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
in
22 Tue
Nov 2011
11/21/2011 5:00:00 AM - 11/22/2011 10:00:00 AM

```
SAMPLER ID# 1313656803  10:12 22-NOV-11
  Hardware:     B0  Software: 2.34
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS126   "
 SITE DESCRIPTION:
    "PSNS126   "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 19 ft SUCTION LINE
 13 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
      1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
 QUICK VIEW/CHANGE
     ----------
 TAKE MEASUREMENTS
  EVERY  1 MINUTES
     ----------
  DUAL SAMPLER OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
```

```
    ----------
    NO PERIODIC
   SERIAL OUTPUT
    ----------
    INTERROGATOR
     CONNECTOR
  POWER ALWAYS ON
    ----------
    ----------
    ----------
   NO RAIN GAUGE
    ----------
  NO SDI-12 SONDE
AUTO SDI-12 SCAN OFF
    ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
    ----------
  0 ANALOG OUTPUTS
    ----------
 NO EXTERNAL MODEM
    ----------
     NO ALARM
   CONDITIONS SET
    ----------
    ----------
----------------------------------------
SAMPLER ID# 1313656803  10:12 22-NOV-11
  Hardware:     B0  Software: 2.34
*********** SAMPLING RESULTS ***********
   SITE: PSNS126
PROGRAM: PSNS126
Program Started at 13:51 SU 20-NOV-11
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----  ------ -- --  ------
              13:51  PGM DISABLED
------------- MO 21-NOV-11 -------------
              05:20  PGM ENABLED
  1,4     1   05:20      E           503
  2,4     1   05:34      F           499
  3,4     1   05:49      F           505
  4,4     1   06:04      F           505
  1,4     2   06:19      F           505
  2,4     2   06:34      F           505
  3,4     2   06:49      F           505
  4,4     2   07:04      F           505
  1,4     3   07:19      F           505
  2,4     3   07:34      F           504
  3,4     3   07:49      F           502
  4,4     3   08:04      F           503
  1,4     4   08:19      F           505
  2,4     4   08:34      F           505
  3,4     4   08:49      F           505
  4,4     4   09:04      F           505
  1,4     5   09:19      F           505
  2,4     5   09:34      F           499
  3,4     5   16:43      F           494
  4,4     5   16:58      F           497
  1,4     6   17:42      F           499
```

2,4	6	17:57	F	505
3,4	6	18:12	F	505
4,4	6	18:27	F	502
1,4	7	18:42	F	504
2,4	7	18:57	F	507
3,4	7	19:12	F	509
4,4	7	19:27	F	509
1,4	8	19:42	F	511
2,4	8	19:57	F	509
3,4	8	20:12	F	509
4,4	8	20:27	F	509
1,4	9	20:42	F	509
2,4	9	20:57	F	506
3,4	9	21:12	F	509
4,4	9	21:27	F	509
1,4	10	21:42	F	511
2,4	10	21:57	F	509
3,4	10	22:12	F	509
4,4	10	22:27	F	509
1,4	11	22:42	F	509
2,4	11	22:57	F	509
3,4	11	23:12	F	509
4,4	11	23:27	F	509
1,4	12	23:42	F	509
2,4	12	23:57	F	510
----------	TU 22-NOV-11			----------
3,4	12	00:12	F	515
4,4	12	00:27	F	503
1,4	13	00:42	F	497
2,4	13	00:57	F	497
3,4	13	01:12	F	492
4,4	13	01:27	F	491
1,4	14	01:42	F	491
2,4	14	01:57	F	491
3,4	14	02:12	F	491
4,4	14	02:27	F	491
1,4	15	02:42	F	491
2,4	15	02:57	F	491
3,4	15	03:12	F	491
4,4	15	03:27	F	491
1,4	16	03:42	F	493
2,4	16	03:57	F	493
3,4	16	04:12	F	493
4,4	16	04:27	F	497
1,4	17	04:42	F	497
2,4	17	04:57	F	503
3,4	17	05:12	F	503
4,4	17	05:27	F	503
1,4	18	05:42	F	509
2,4	18	05:57	F	509
3,4	18	06:12	F	509
4,4	18	06:27	F	509
1,4	19	06:42	F	512
2,4	19	06:57	F	513
3,4	19	07:12	F	510
4,4	19	07:27	F	513
1,4	20	07:42	F	509
2,4	20	07:57	F	509
3,4	20	08:12	F	509
4,4	20	08:27	F	509
1,4	21	08:42	F	509
2,4	21	08:57	F	509
3,4	21	09:12	F	509

```
  4,4    21   09:27      F           503
  1,2    22   09:42      F           503
  2,2    22   09:57      F           497
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
---------------------------------------
```

```
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179321
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179321
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179321
> REPORT
SAMPLER ID# 3293179321  10:05 22-NOV-11
  Hardware: B2      Software: 3.26
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS124-1 "
 SITE DESCRIPTION:
    "PSNS124-1 "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 56 ft SUCTION LINE
 12 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
     DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
```

```
    ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
    ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
    ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
    NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 3293179321  10:06 22-NOV-11
  Hardware: B2      Software: 3.26
*********** SAMPLING RESULTS ***********
   SITE: PSNS124-1
PROGRAM: PSNS124-1
Program Started at 13:42 SU 20-NOV-11
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
              13:42  PGM DISABLED
------------- MO 21-NOV-11 -------------
              06:40  PGM ENABLED
  1,4     1   06:40      E          1329
  2,4     1   06:54      F          1290
  3,4     1   07:09      F          1302
  4,4     1   07:24      F          1314
  1,4     2   07:39      F          1314
  2,4     2   07:54      F          1315
  3,4     2   08:09      F          1301
  4,4     2   08:24      F          1315
  1,4     3   08:39      F          1314
  2,4     3   08:54      F          1321
  3,4     3   09:09      F          1321
  4,4     3   09:24      F          1327
  1,4     4   09:39      F          1325
  2,4     4   12:48      F          1233
  3,4     4   13:03      F          1241
  4,4     4   13:18      F          1249
  1,4     5   13:33      F          1255
  2,4     5   13:48      F          1267
  3,4     5   14:04      F          1255
  4,4     5   14:19      F          1292
  1,4     6   17:48      F          1325
  2,4     6   18:03      F          1325
  3,4     6   18:18      F          1367
  4,4     6   18:33      F          1331
  1,4     7   18:48      F          1314
  2,4     7   19:03      F          1351
  3,4     7   19:18      F          1359
  4,4     7   19:33      F          1361
  1,4     8   19:48      F          1326
  2,4     8   20:03      F          1351
  3,4     8   20:18      F          1337
  4,4     8   20:33      F          1337
```

```
  1,4     9   20:48      F          1338
  2,4     9   21:03      F          1331
  3,4     9   21:18      F          1343
  4,4     9   21:33      F          1333
  1,4    10   21:48      F          1343
  2,4    10   22:03      F          1337
  3,4    10   22:18      F          1337
  4,4    10   22:33      F          1343
  1,4    11   22:48      F          1352
  2,4    11   23:03      F          1337
  3,4    11   23:18      F          1355
  4,4    11   23:33      F          1333
  1,4    12   23:48      F          1337
------------- TU 22-NOV-11 -------------
  2,4    12   00:03      F          1333
  3,4    12   00:18      F          1343
  4,4    12   00:33      F          1326
  1,4    13   00:48      F          1301
  2,4    13   01:03      F          1316
  3,4    13   01:18      F          1319
  4,4    13   01:33      F          1307
  1,4    14   01:48      F          1313
  2,4    14   02:03      F          1280
  3,4    14   02:18      F          1315
  4,4    14   02:33      F          1313
  1,4    15   02:48      F          1301
  2,4    15   03:03      F          1290
  3,4    15   03:18      F          1296
  4,4    15   03:33      F          1301
  1,4    16   03:48      F          1301
  2,4    16   04:03      F          1302
  3,4    16   04:18      F          1301
  4,4    16   04:33      F          1309
  1,4    17   04:48      F          1314
  2,4    17   05:03      F          1325
  3,4    17   05:18      F          1328
  4,4    17   05:33      F          1333
  1,4    18   05:48      F          1331
  2,4    18   06:03      F          1331
  3,4    18   06:18      F          1337
  4,4    18   06:33      F          1345
  1,4    19   06:48      F          1343
  2,4    19   07:03      F          1343
  3,4    19   07:18      F          1331
  4,4    19   07:33      F          1339
  1,4    20   07:48      F          1337
  2,4    20   08:03      F          1337
  3,4    20   08:18      F          1351
  4,4    20   08:33      F          1332
  1,4    21   08:48      F          1334
  2,4    21   09:03      F          1347
  3,4    21   09:18      F          1326
  4,4    21   09:33      F          1337
  1,2    22   09:48      F          1344
  2,2    22   10:03      F          1343
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
----------------------------------------
```

```
***Time Stamp info. for Isco samples is 1-hour (advanced) off. Subtract one hour
when assessing sampling tasks.


?
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179322
> REPORT
SAMPLER ID# 3293179322  10:59 22-NOV-11
  Hardware: B2      Software: 3.26
********** PROGRAM SETTINGS **********
     ----------
   PROGRAM NAME:
    "PSNS 124  "
 SITE DESCRIPTION:
    "PSNS 124  "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 20 ft SUCTION LINE
 16 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
     DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
```

```
    ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
    ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
    ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
    NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 3293179322  10:59 22-NOV-11
  Hardware: B2      Software: 3.26
*********** SAMPLING RESULTS ***********
   SITE: PSNS 124
PROGRAM: PSNS 124
Program Started at 16:03 SU 20-NOV-11
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
              16:03  PGM DISABLED
------------- MO 21-NOV-11 -------------
              06:30  PGM ENABLED
  1,4     1   06:30      E           561
  2,4     1   06:44      F           558
  3,4     1   06:59      F           563
  4,4     1   07:14      F           563
  1,4     2   07:29      F           563
  2,4     2   07:44      F           563
  3,4     2   07:59      F           563
  4,4     2   08:14      F           569
  1,4     3   08:29      F           565
  2,4     3   08:44      F           563
  3,4     3   08:59      F           563
  4,4     3   09:14      F           557
  1,4     4   09:29      F           557
  2,4     4   09:44      F           557
  3,4     4   09:59      F           552
  4,4     4   10:14      F           551
  1,4     5   10:29      F           545
  2,4     5   10:44      F           546
  3,4     5   17:25      F           543
  4,4     5   17:40      F           557
  1,4     6   18:49      F           563
  2,4     6   19:04      F           563
  3,4     6   19:19      F           569
  4,4     6   19:34      F           569
  1,4     7   19:49      F           569
  2,4     7   20:04      F           570
  3,4     7   20:19      F           570
  4,4     7   20:34      F           574
  1,4     8   20:49      F           573
  2,4     8   21:04      F           575
  3,4     8   21:19      F           575
  4,4     8   21:34      F           575
```

1,4	9	21:49	F	575
2,4	9	22:04	F	575
3,4	9	22:19	F	575
4,4	9	22:34	F	575
1,4	10	22:49	F	575
2,4	10	23:04	F	575
3,4	10	23:19	F	576
4,4	10	23:34	F	575
1,4	11	23:49	F	575
----------	TU 22-NOV-11			----------
2,4	11	00:04	F	569
3,4	11	00:19	F	569
4,4	11	00:34	F	563
1,4	12	00:49	F	557
2,4	12	01:04	F	551
3,4	12	01:19	F	545
4,4	12	01:34	F	539
1,4	13	01:49	F	539
2,4	13	02:04	F	528
3,4	13	02:19	F	531
4,4	13	02:34	F	527
1,4	14	02:49	F	527
2,4	14	03:04	F	527
3,4	14	03:19	F	527
4,4	14	03:34	F	527
1,4	15	03:49	F	527
2,4	15	04:04	F	527
3,4	15	04:19	F	527
4,4	15	04:34	F	527
1,4	16	04:49	F	533
2,4	16	05:04	F	533
3,4	16	05:19	F	534
4,4	16	05:34	F	532
1,4	17	05:49	F	539
2,4	17	06:04	F	539
3,4	17	06:19	F	539
4,4	17	06:34	F	540
1,4	18	06:49	F	545
2,4	18	07:04	F	545
3,4	18	07:19	F	545
4,4	18	07:34	F	551
1,4	19	07:49	F	551
2,4	19	08:04	F	551
3,4	19	08:19	F	552
4,4	19	08:34	F	555
1,4	20	08:49	F	557
2,4	20	09:04	F	552
3,4	20	09:19	F	555
4,4	20	09:34	F	552
1,4	21	09:49	F	549
2,4	21	10:04	F	545
3,4	21	10:19	F	551
4,4	21	10:34	F	551
1,1	22	10:49	F	540

SOURCE E ==> ENABLE
SOURCE F ==> FLOW

```
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179316
> REPORT
SAMPLER ID# 3293179316  09:54 22-NOV-11
  Hardware: B2      Software: 3.26
********** PROGRAM SETTINGS **********
     ----------
   PROGRAM NAME:
    "PSNS115-1 "
 SITE DESCRIPTION:
    "PSNS115-1 "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 44 ft SUCTION LINE
 21 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
```

```
  AUTO POST-SAMPLE
     ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
     ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
     NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 3293179316  09:54 22-NOV-11
  Hardware: B2      Software: 3.26
********** SAMPLING RESULTS **********
   SITE: PSNS115-1
PROGRAM: PSNS115-1
Program Started at 12:57 SU 20-NOV-11
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----  -- --    ------
              12:57  PGM DISABLED
------------- MO 21-NOV-11 -------------
              05:19  PGM ENABLED
  1,4     1   05:19      E          1164
  2,4     1   05:33      F          1146
  3,4     1   05:48      F          1159
  4,4     1   06:03      F          1161
  1,4     2   06:18      F          1184
  2,4     2   06:33      F          1170
  3,4     2   06:48      F          1170
  4,4     2   07:03      F          1181
  1,4     3   07:18      F          1164
  2,4     3   07:33      F          1164
  3,4     3   07:48      F          1169
  4,4     3   08:03      F          1158
  1,4     4   08:18      F          1153
  2,4     4   08:33      F          1145
  3,4     4   08:48      F          1140
  4,4     4   09:03      F          1133
  1,4     5   09:18      F          1122
  2,4     5   09:33      F          1110
  3,4     5   09:48      F          1115
  4,4     5   15:02      F           971
  1,4     6   15:17      F          1074
  2,4     6   15:32      F          1091
  3,4     6   15:47      F          1116
  4,4     6   16:02      F          1110
  1,4     7   17:51      F          1188
  2,4     7   18:06      F          1211
  3,4     7   18:21      F          1223
  4,4     7   18:36      F          1243
  1,4     8   18:51      F          1314
  2,4     8   19:06      F          1255
  3,4     8   19:21      F          1311
  4,4     8   19:36      F          1328
  1,4     9   19:51      F          1333
  2,4     9   20:06      F          1286
  3,4     9   20:21      F          1301
  4,4     9   20:36      F          1311
```

```
  1,4    10   20:51      F          1279
  2,4    10   21:06      F          1268
  3,4    10   21:21      F          1255
  4,4    10   21:36      F          1244
  1,4    11   21:51      F          1248
  2,4    11   22:06      F          1225
  3,4    11   22:21      F          1217
  4,4    11   22:36      F          1207
  1,4    12   22:51      F          1187
  2,4    12   23:06      F          1176
  3,4    12   23:21      F          1163
  4,4    12   23:36      F          1152
  1,4    13   23:51      F          1140
------------- TU 22-NOV-11 -------------
  2,4    13   00:06      F          1122
  3,4    13   00:21      F          1115
  4,4    13   00:36      F          1121
  1,4    14   00:51      F          1106
  2,4    14   01:06      F          1103
  3,4    14   01:21      F          1091
  4,4    14   01:36      F          1085
  1,4    15   01:51      F          1081
  2,4    15   02:06      F          1082
  3,4    15   02:21      F          1085
  4,4    15   02:36      F          1085
  1,4    16   02:51      F          1086
  2,4    16   03:06      F          1069
  3,4    16   03:21      F          1088
  4,4    16   03:36      F          1091
  1,4    17   03:51      F          1098
  2,4    17   04:06      F          1098
  3,4    17   04:21      F          1099
  4,4    17   04:36      F          1105
  1,4    18   04:51      F          1103
  2,4    18   05:06      F          1116
  3,4    18   05:21      F          1127
  4,4    18   05:36      F          1117
  1,4    19   05:51      F          1117
  2,4    19   06:06      F          1121
  3,4    19   06:21      F          1127
  4,4    19   06:36      F          1146
  1,4    20   06:51      F          1135
  2,4    20   07:06      F          1133
  3,4    20   07:21      F          1139
  4,4    20   07:36      F          1146
  1,4    21   07:51      F          1141
  2,4    21   08:06      F          1143
  3,4    21   08:21      F          1142
  4,4    21   08:36      F          1127
  1,4    22   08:51      F          1134
  2,4    22   09:06      F          1128
  3,4    22   09:21      F          1133
  4,4    22   09:36      F          1122
  1,1    23   09:51      F          1110
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
----------------------------------------
```

```
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 2425546782
> REPORT
SAMPLER ID# 2425546782  09:47 22-NOV-11
  Hardware: B2      Software: 3.26
********** PROGRAM SETTINGS **********
     ----------
   PROGRAM NAME:
    "PSNS84-1  "
 SITE DESCRIPTION:
    "PSNS84-1  "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 22 ft SUCTION LINE
 15 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
NO SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
```

```
  AUTO POST-SAMPLE
     ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
     ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
     NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 2425546782  09:47 22-NOV-11
  Hardware: B2      Software: 3.26
********** SAMPLING RESULTS **********
   SITE: PSNS84-1
PROGRAM: PSNS84-1
Program Started at 12:32 SU 20-NOV-11
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----   -- --    ------
               12:32  PGM DISABLED
------------- MO 21-NOV-11 -------------
               07:42  PGM ENABLED
  1,4     1   07:42      E          534
  2,4     1   07:56      F          532
  3,4     1   08:11      F          530
  4,4     1   08:26      F          529
  1,4     2   08:41      F          519
  2,4     2   08:56      F          524
  3,4     2   09:11      F          518
  4,4     2   09:26      F          518
  1,4     3   09:41      F          512
  2,4     3   12:34      F          483
  3,4     3   14:34      F          494
  4,4     3   14:49      F          500
  1,4     4   17:51      F          548
  2,4     4   18:06      F          549
  3,4     4   18:21      F          549
  4,4     4   18:36      F          547
  1,4     5   18:51      F          554
  2,4     5   19:06      F          554
  3,4     5   19:21      F          554
  4,4     5   19:36      F          554
  1,4     6   19:51      F          554
  2,4     6   20:06      F          554
  3,4     6   20:21      F          554
  4,4     6   20:36      F          554
  1,4     7   20:51      F          554
  2,4     7   21:06      F          554
  3,4     7   21:21      F          555
  4,4     7   21:36      F          555
  1,4     8   21:51      F          558
  2,4     8   22:06      F          555
  3,4     8   22:21      F          554
  4,4     8   22:36      F          555
  1,4     9   22:51      F          552
  2,4     9   23:06      F          542
  3,4     9   23:21      F          536
  4,4     9   23:36      F          530
```

```
  1,4    10   23:51      F            524
------------ TU 22-NOV-11 -------------
  2,4    10   00:06      F            524
  3,4    10   00:21      F            518
  4,4    10   00:36      F            513
  1,4    11   00:51      F            510
  2,4    11   01:06      F            508
  3,4    11   01:21      F            506
  4,4    11   01:36      F            506
  1,4    12   01:51      F            506
  2,4    12   02:06      F            501
  3,4    12   02:21      F            504
  4,4    12   02:36      F            501
  1,4    13   02:51      F            506
  2,4    13   03:06      F            506
  3,4    13   03:21      F            506
  4,4    13   03:36      F            501
  1,4    14   03:51      F            505
  2,4    14   04:06      F            507
  3,4    14   04:21      F            510
  4,4    14   04:36      F            512
  1,4    15   04:51      F            512
  2,4    15   05:06      F            513
  3,4    15   05:21      F            516
  4,4    15   05:36      F            518
  1,4    16   05:51      F            518
  2,4    16   06:06      F            518
  3,4    16   06:21      F            519
  4,4    16   06:36      F            524
  1,4    17   06:51      F            525
  2,4    17   07:06      F            525
  3,4    17   07:21      F            525
  4,4    17   07:36      F            524
  1,4    18   07:51      F            530
  2,4    18   08:06      F            525
  3,4    18   08:21      F            530
  4,4    18   08:36      F            525
  1,4    19   08:51      F            524
  2,4    19   09:06      F            524
  3,4    19   09:21      F            518
  4,4    19   09:36      F            518
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
----------------------------------------
```

```
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 2425481222
> REPORT
SAMPLER ID# 2425481222  09:42 22-NOV-11
  Hardware: B2      Software: 3.26
********** PROGRAM SETTINGS **********
     ----------
   PROGRAM NAME:
    "PSNS015   "
 SITE DESCRIPTION:
    "PSNS015   "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 22 ft SUCTION LINE
 18 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
```

```
  AUTO POST-SAMPLE
     ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
     ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
     NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 2425481222  09:42 22-NOV-11
  Hardware: B2      Software: 3.26
********** SAMPLING RESULTS **********
   SITE: PSNS015
PROGRAM: PSNS015
Program Started at 11:54 SU 20-NOV-11
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----    -- --    ------
             11:54  PGM DISABLED
------------ MO 21-NOV-11 ------------
             05:15  PGM ENABLED
  1,4     1   05:15      E          792
  2,4     1   05:29      F          794
  3,4     1   05:44      F          802
  4,4     1   05:59      F          808
  1,4     2   06:14      F          809
  2,4     2   06:29      F          826
  3,4     2   06:44      F          808
  4,4     2   06:59      F          810
  1,4     3   07:14      F          814
  2,4     3   07:29      F          808
  3,4     3   07:44      F          802
  4,4     3   07:59      F          796
  1,4     4   08:14      F          796
  2,4     4   08:29      F          786
  3,4     4   08:44      F          779
  4,4     4   08:59      F          778
  1,4     5   09:14      F          772
  2,4     5   09:29      F          766
  3,4     5   09:44      F          760
  4,4     5   12:43      F          706
  1,4     6   17:53      F          803
  2,4     6   18:08      F          816
  3,4     6   18:23      F          814
  4,4     6   18:38      F          824
  1,4     7   18:53      F          820
  2,4     7   19:08      F          828
  3,4     7   19:23      F          828
  4,4     7   19:38      F          822
  1,4     8   19:53      F          830
  2,4     8   20:08      F          832
  3,4     8   20:23      F          834
  4,4     8   20:38      F          828
  1,4     9   20:53      F          842
  2,4     9   21:08      F          836
  3,4     9   21:23      F          827
  4,4     9   21:38      F          833
```

```
  1,4    10   21:53      F           834
  2,4    10   22:08      F           834
  3,4    10   22:23      F           835
  4,4    10   22:38      F           834
  1,4    11   22:53      F           816
  2,4    11   23:08      F           810
  3,4    11   23:23      F           802
  4,4    11   23:38      F           790
  1,4    12   23:53      F           780
------------- TU 22-NOV-11 -------------
  2,4    12   00:08      F           772
  3,4    12   00:23      F           768
  4,4    12   00:38      F           763
  1,4    13   00:53      F           756
  2,4    13   01:08      F           748
  3,4    13   01:23      F           750
  4,4    13   01:38      F           742
  1,4    14   01:53      F           742
  2,4    14   02:08      F           743
  3,4    14   02:23      F           737
  4,4    14   02:38      F           739
  1,4    15   02:53      F           742
  2,4    15   03:08      F           737
  3,4    15   03:23      F           744
  4,4    15   03:38      F           738
  1,4    16   03:53      F           748
  2,4    16   04:08      F           745
  3,4    16   04:23      F           751
  4,4    16   04:38      F           757
  1,4    17   04:53      F           755
  2,4    17   05:08      F           760
  3,4    17   05:23      F           763
  4,4    17   05:38      F           763
  1,4    18   05:53      F           768
  2,4    18   06:08      F           774
  3,4    18   06:23      F           781
  4,4    18   06:38      F           775
  1,4    19   06:53      F           780
  2,4    19   07:08      F           781
  3,4    19   07:23      F           786
  4,4    19   07:38      F           786
  1,4    20   07:53      F           786
  2,4    20   08:08      F           790
  3,4    20   08:23      F           790
  4,4    20   08:38      F           784
  1,4    21   08:53      F           775
  2,4    21   09:08      F           780
  3,4    21   09:23      F           775
  4,4    21   09:38      F           768
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
---------------------------------------
```

National Weather Service National Headquarters

National Weather Service

Area Forecast Discussion

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000
FXUS66 KSEW 210518 CCA
AFDSEW

AREA FORECAST DISCUSSION...CORRECTED
NATIONAL WEATHER SERVICE SEATTLE WA
915 PM PST SUN NOV 20 2011

.SYNOPSIS...A FRONT WILL BRING RAIN MONDAY MORNING WITH WINDY CONDITIONS AT THE COAST AND OVER THE NORTH INTERIOR. A STRONGER FRONTAL SYSTEM WILL STALL OVER THE AREA MONDAY NIGHT THROUGH TUESDAY NIGHT OR WEDNESDAY. THIS SYSTEM WILL HAVE HEAVIER RAINS AND POSSIBLE DAMAGING WINDS OVER THE COAST AND NORTH INTERIOR. ADDITIONAL FRONTS WILL BRING RAIN LATE THANKSGIVING DAY...AND AGAIN OVER THE WEEKEND.

&&

.SHORT TERM...MID AND HIGH CLOUDS HAVE SPREAD ACROSS THE AREA IN ADVANCE OF AN APPROACHING PACIFIC FRONTAL SYSTEM. RAIN WILL REACH THE COAST AFTER MIDNIGHT TONIGHT THEN SPREAD INTO THE INTERIOR MONDAY MORNING. WITH COOL AIR CURRENTLY IN PLACE...THERE IS SOME CONCERN PRECIPITATION COULD START OUT AS SNOW BEFORE CHANGING TO RAIN IN AREAS LIKE HOOD CANAL. EVEN IF THIS DOES HAPPEN...THE COLD AIR SHOULD SCOUR PRETTY FAST AND DO NOT EXPECT SIGNIFICANT IMPACTS.

RAIN WILL CHANGE TO SHOWERS MONDAY AFTERNOON AS THE FRONT MOVES INLAND. SNOW LEVELS WILL RISE TO 3000 FEET DURING THE DAY. THERE IS ENOUGH QPF EXPECTED TO PRODUCE SEVERAL INCHES OR SNOW BY AFTERNOON IN THE CASCADES. A WINTER WEATHER ADVISORY IS OUT FOR THIS. THERE WILL ALSO BE SOME WINDY CONDITIONS COAST AND NORTH INTERIOR AS THE FRONT MOVES THROUGH...PEAKING IN THE MORNING HOURS. A WIND ADVISORY IS UP FOR THIS. HIGHS WILL WARM ON MONDAY FROM THE BELOW NORMAL TEMPERATURES OF THE LAST FEW DAYS...BUT REMAIN A BIT BELOW NORMAL.

A STRONGER AND WETTER FRONTAL SYSTEM WILL MOVE OVER THE AREA MONDAY NIGHT...THEN STALL OVER THE AREA INTO TUESDAY NIGHT OR WEDNESDAY. SNOW LEVELS WILL RISE TO 5000 TO 6000 FEET MONDAY NIGHT...ENDING MOST OF THE MOUNTAIN SNOW CONCERNS ALTHOUGH THE HIGHER VOLCANOES COULD STAY ALL SNOW FOR AWHILE. EASTERLY FLOW COULD KEEP A WINTRY MIX IN THE PASSES INTO TUESDAY AS WELL. HEAVY RAINS IN THE MOUNTAINS COMBINED WITH THE HIGHER SNOW LEVELS WILL INTRODUCE FLOODING CONCERNS. SEE THE HYDROLOGY SECTION BELOW FOR MORE DETAILS. THERE WILL ALSO BE A PERIOD OF STRONG AND POSSIBLY DAMAGING WINDS FOR THE COAST AND NORTHWEST INTERIOR MONDAY NIGHT AND TUESDAY MORNING. A HIGH WIND WATCH HAS BEEN ISSUED FOR THIS. NO UPDATES PLANNED THIS EVENING. SCHNEIDER

.LONG TERM...PREVIOUS DISCUSSION...CONFIDENCE IN THE LONG TERM FORECAST REMAINS LOW. THE 12Z MODELS SHOW ANOTHER...WEAKER...FRONT MOVING INLAND ON THANKSGIVING DAY...BUT STILL HAVE TROUBLE NAILING DOWN THE TIMING. THE LATEST SOLUTIONS ARE A LITTLE SLOWER AND THE FRONT MAY NOT ARRIVE UNTIL THE EVENING HOURS. SNOW LEVELS ARE BACK DOWN TO 3000 FT AND MAY SEE MORE SNOW IN THE PASSES. OTHERWISE KEPT THE FORECAST CLOSE TO CLIMO OVER THE HOLIDAY WEEKEND. MODELS SHOW ANOTHER FRONT SLIDING INLAND BUT THE EXACT TIMING IS UNCLEAR. BUT THE EURO IS BUILDING A STRONG RIDGE OVER THE WEST WHICH MAY FORCE THE PRECIP NORTH INTO B.C. WILL NOT MAKE ANY SIGNIFICANT CHANGES JUST YET. 33

&&

.HYDROLOGY...PREVIOUS DISCUSSION...EXPECT SHARP RISES ON ALL WESTERN WA RIVER STARTING TUE...WITH POSSIBLE RIVER FLOODING TUE NIGHT INTO WED. ALTHOUGH LATEST FORECAST MODELS STILL DISPLAY A LOT OF VARIABILITY AND UNCERTAINTY...THERE IS STILL THE POSSIBILITY FOR RIVER FLOODING ACROSS WESTERN WA. THE LATEST GUIDANCE SHOWS SEVERAL INCHES OF RAIN FALLING THE IN MOUNTAINS WITH 5-8 INCHES POSSIBLE IN THE OLYMPICS...AND 3-6 INCHES IN THE CASCADES WITH HIGHER AMOUNTS POSSIBLE. THE RIVERS MOST AT RISK FOR FLOODING INCLUDE THE SKOKOMISH...ELWHA...STILLAGUAMISH AND NEWAUKUM. BUT THIS ALL CHANGE...

&&

.AVIATION...AN APPROACHING FRONTAL SYSTEM WILL SPREAD MID LEVEL MOISTURE OVER W WA TONIGHT. THE FRONT WILL SPREAD RAIN AND MVFR CIGS TO THE COAST BY 12Z AND TO THE INTERIOR BY 15Z. FRONTAL PASSAGE WILL BE AROUND 15Z FOR THE COAST AND AROUND 18Z INLAND. LOW LEVEL FLOW WILL BE STRONG...WITH SSW WINDS AT FL050 RISING TO NEAR 55 KT AT 15Z THEN EASING TO SW 30 KT BY 21Z. LOW LEVEL WIND SHEAR IS POSSIBLE 12Z-18Z.

KSEA...THE APPROACHING FRONTAL SYSTEM WILL KEEP BKN-OVC MID LEVEL
CLOUDS OVER THE AREA TONIGHT WITH NO FOG EXPECTED TO FORM. RAIN WILL
SPREAD OVER THE TERMINAL BY 15Z WITH CIGS DROPPING TO NEAR OVC030.
EXPECT MVFR CIGS THE REST OF THE DAY. WINDS ALOFT FROM 14Z-20Z FROM
FL050-FL100 WILL SSW 50-60KT. KAM

&&

.MARINE...A STRONG FRONT WILL RAISE GALES OVER THE AREA LATE TONIGHT
AND MONDAY MORNING. FROPA COAST WILL BE NEAR 15Z AND INLAND AROUND
18Z. A STRONGER FRONTAL SYSTEM WILL AFFECT THE AREA MONDAY EVENING
THROUGH TUESDAY. A WARM FRONT WILL MOVE NE ACROSS THE COASTAL WATERS
MONDAY EVENING. A DEEP SURFACE LOW WILL MOVE NE OFFSHORE TOWARD THE
CENTRAL B.C. COAST MONDAY NIGHT...REACHING THE COAST AROUND 12Z. THE
ASSOCIATED COLD FRONT WILL REACH THE WA COAST BY MID TUESDAY
MORNING...MOVING INLAND BY MIDDAY...THEN STALLING AND WEAKENING IN
THE AFTERNOON. HIGH END GALES ARE LIKELY FOR THE COAST AND INLAND
AREAS PRONE TO STRONG SE WINDS. THERE IS A SMALL CHANCE THAT THE
SYSTEM COULD PRODUCE STORM FORCE SUSTAINED WINDS OVER THE COASTAL
WATERS...BUT NONE OF THE GUIDANCE HAS CONVINCINGLY INDICATED THAT SO
FAR. KAM

&&

.SEW WATCHES/WARNINGS/ADVISORIES...
WA...WIND ADVISORY NORTHWEST INTERIOR 4 AM TO 3 PM MONDAY.
    .WIND ADVISORY NORTH AND CENTRAL COAST 1 AM TO NOON MONDAY.
    .HIGH WIND WATCH NORTHWEST INTERIOR MONDAY NIGHT/TUESDAY MORNING.
    .WINTER WEATHER ADVISORY OLYMPICS AND CASCADES 6 AM TO 4 PM
     MONDAY.
PZ...GALE WARNING ALL WATERS EXCEPT THE PUGET SOUND AND HOOD CANAL.
    .SMALL CRAFT ADVISORY FOR ROUGH BAR GRAYS HARBOR BAR.
    .SMALL CRAFT ADVISORY PUGET SOUND AND HOOD CANAL.
    .STORM WATCH COASTAL WATERS MONDAY NIGHT AND TUESDAY.
    .GALE WATCH PUGET SOUND AND HOOD CANAL MONDAY NIGHT AND TUESDAY.

$$

YOU CAN SEE AN ILLUSTRATED VERSION OF THE FORECAST DISCUSSION AT
WWW.WEATHER.GOV/SEATTLE/GAFD/LATEST_WEBAFD.HTML.

WWW.WEATHER.GOV/SEATTLE

Your National Weather Service forecast

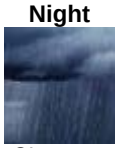
Bremerton WA

Enter Your "City, ST" or zip code Go BOOKMARK

NWS Seattle, WA
Point Forecast: Bremerton WA
47.56°N 122.62°W (Elev. 0 ft)

Mobile Weather Information | **En Español**
Last Update: 3:48 pm PST Nov 20, 2011
Forecast Valid: 11pm PST Nov 20, 2011-6pm PST Nov 27, 2011

Forecast at a Glance

Overnight	Monday	Monday Night	Tuesday	Tuesday Night	Wednesday	Wednesday Night	Thanksgiving Day	Thursday Night
								
80%	100%	80%	90%	90%	90%	50%		
Rain	Rain	Rain	Heavy Rain	Rain	Rain	Chance Rain	Rain Likely	Showers Likely
Lo 37 °F	Hi 46 °F	Lo 44 °F	Hi 52 °F	Lo 41 °F	Hi 46 °F	Lo 38 °F	Hi 45 °F	Lo 37 °F

Detailed 7-day Forecast

Overnight: Rain, mainly after 4am. Low around 37. South southeast wind around 8 mph. Chance of precipitation is 80%.

Monday: Rain. High near 46. Breezy, with a south wind between 20 and 24 mph, with gusts as high as 39 mph. Chance of precipitation is 100%.

Monday Night: Rain. Low around 44. Breezy, with a south wind between 20 and 24 mph, with gusts as high as 39 mph. Chance of precipitation is 80%.

Tuesday: Rain. The rain could be heavy at times. High near 52. Windy, with a south wind between 26 and 34 mph, with gusts as high as 55 mph. Chance of precipitation is 90%.

Tuesday Night: Rain. Low around 41. Breezy, with a south wind between 15 and 22 mph, with gusts as high as 34 mph. Chance of precipitation is 90%.

Wednesday: Rain. High near 46. Chance of precipitation is 90%.

Wednesday Night: A 50 percent chance of rain. Cloudy, with a low around 38.

Thanksgiving Day: Rain likely. Cloudy, with a high near 45.

Thursday Night: Showers likely. Cloudy, with a low around 37.

Friday: A chance of showers. Cloudy, with a high near 45.

Friday Night: Rain likely. Cloudy, with a low around 39.

Saturday: Rain likely. Cloudy and breezy, with a high near 48.

Saturday Night: Rain likely. Cloudy, with a low around 40.

Sunday: Rain likely. Cloudy, with a high near 45.

Detailed Point Forecast [Move Down]

Click Map for Forecast Disclaimer

Requested Location Forecast Area

Lat/Lon: 47.56°N 122.62°W **Elevation:**0 ft

XML

Current Conditions [Move Up]

Bremerton, Bremerton National Airport (KPWT)
Lat: 47.5 Lon: -122.75 Elev: 440
Last Update on 20 Nov 22:15 PST

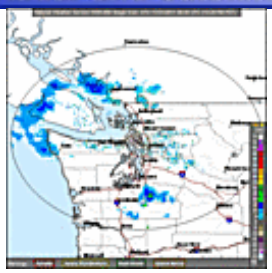
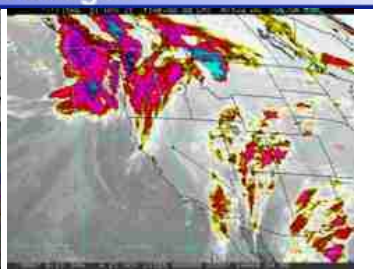
Mostly Cloudy

30°F (-1°C)

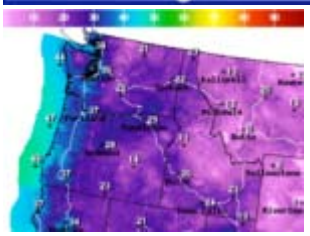
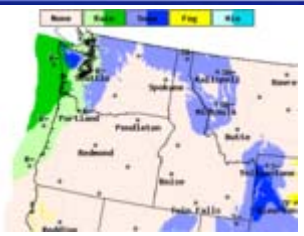
Humidity:	93 %
Wind Speed:	calm
Barometer:	29.82 in (N/A mb)
Dewpoint:	28°F (-2°C)
Wind Chill:	30°F (-1°C)
Visibility:	10.00 Miles

More Local Wx: 3 Day History:

Radar and Satellite Images

National Digital Forecast Database

Additional Forecasts & Information

Zone Area Forecast for Seattle/Bremerton Area, WA

Forecast Discussion

Printable Forecast | Text Only Forecast

Hourly Weather Graph | Tabular Forecast

Quick Forecast

International System of Units | About Point Forecasts

Forecast Weather Table Interface

Webmaster
National Weather Service:
Seattle, WA

Back to Previous Page

National Weather Service Forecast Office
Seattle, WA

weather.gov

Home News Organization Search for: NWS All NOAA Go

Point Forecast: Bremerton WA
47.56N 122.62W (Elev. 0 ft)

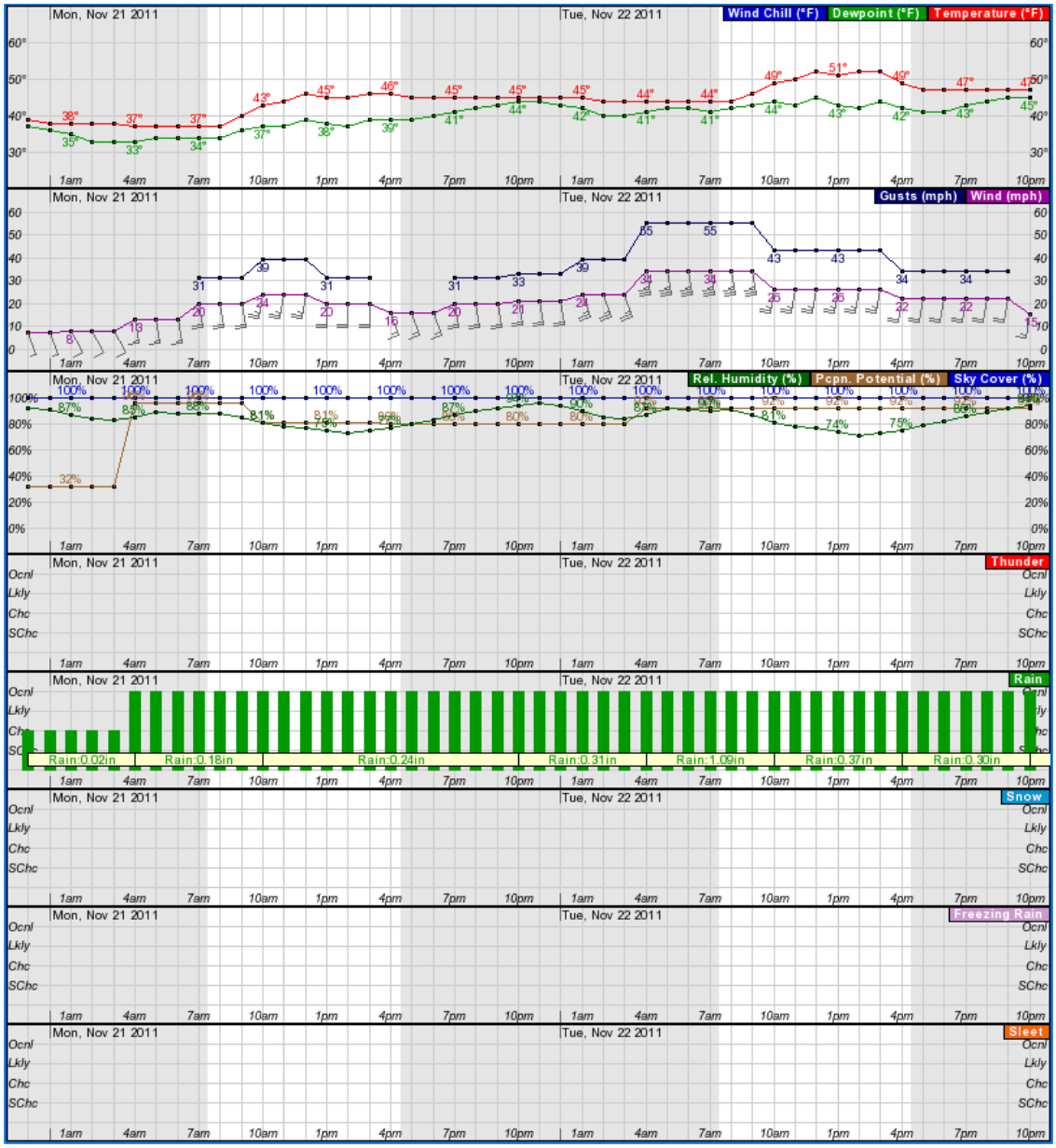
Last Update: 3:48 pm PST Nov 20, 2011

Hourly Weather Forecast Graph

[dashes/dots] | [b/w] | [hide menu]

Weather Elements	Weather/Precipitation	Fire Weather
☑ Temperature (°F)	☐ Thunder	☐ Mixing Height (x100ft)
☐ Dewpoint (°F)	☐ Rain	☐ Haines Index
☐ Wind Chill (°F)	☐ Snow	☐ Lightning Activity Level
☐ Surface Wind mph	☐ Freezing Rain	☐ Trans. Wind mph
☐ Sky Coverage	☐ Sleet	
☑ Precipitation Potential		
☐ Relative Humidity		

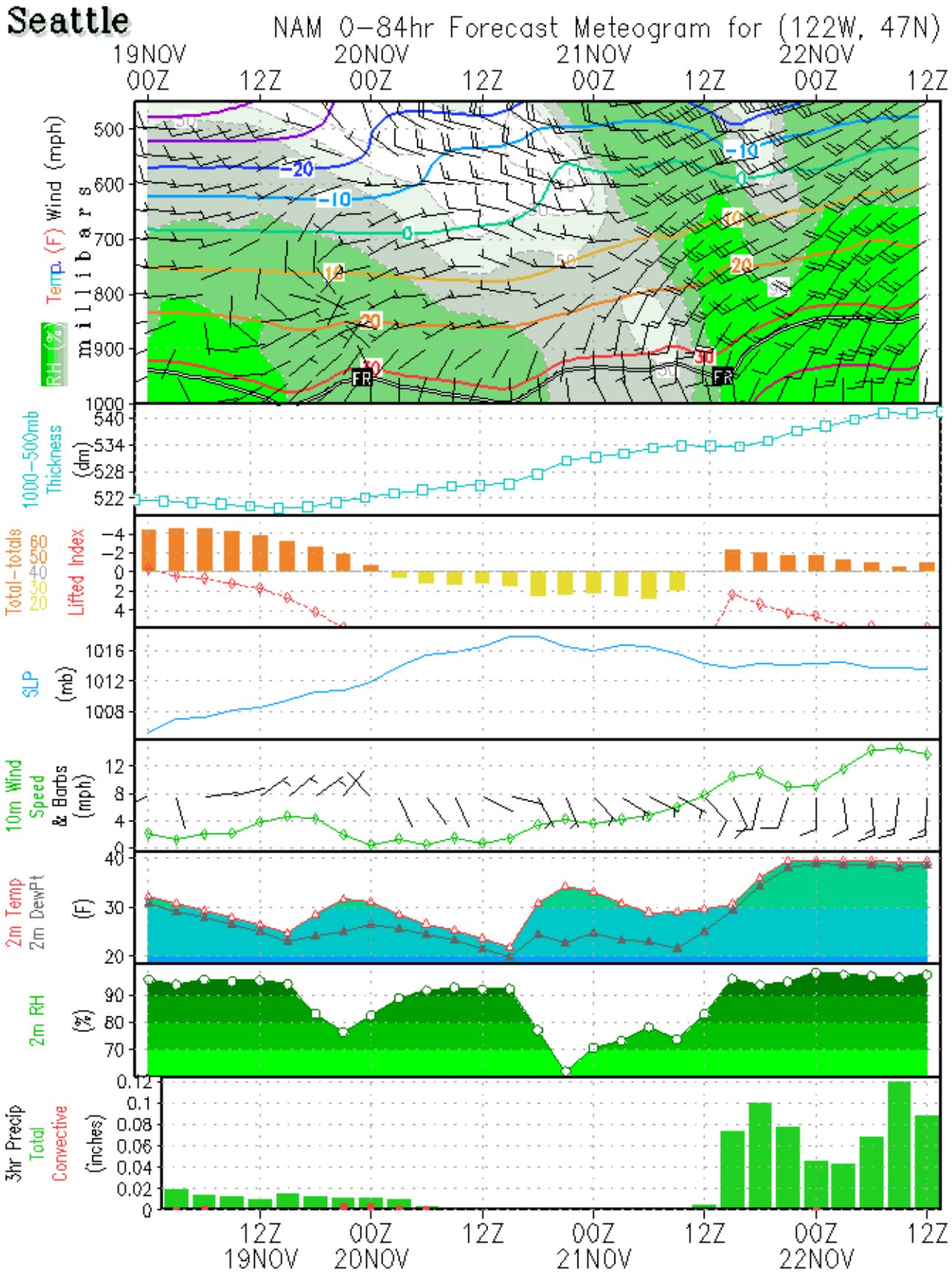
48-Hour Period Starting: 11pm Sun, Nov 20 2011 Submit Back 2 Days Forward 2 Days



Forecast For Lat/Lon: 47.5620/-122.6230 (Elev. 0 ft)
Bremerton WA

Custom Weather Forecast Table

	Sun Nov 20								Mon Nov 21								Tue Nov 22								Wed Nov 23
Weather							Chance Rain	Rain	Rain Showers	Rain	Rain						Rain				Rain				
Daily-Temp	High **41** Low **29**								High **46** Low **37**								High **52** Low **44**								Low **41**
Chance of Precip	10%		10%		10%		30%	95%		80%		80%		80%			90%		90%		90%		90%		
Precip	0.00"		0.00"		0.00"		0.02"	0.18"		0.12"		0.12"		0.31"			1.09"		0.37"		0.30"		0.23"		
12-hr Snow Total	0"				0"			0"				0"					0"				0"				
3-Hour	4am	7am	10am	1pm	4pm	7pm	10pm	1am	4am	7am	10am	1pm	4pm	7pm	10pm	1am	4am	7am	10am	1pm	4pm	7pm	10pm	1am	
Temp	30	29	37	40	40	39	39	38	37	37	43	45	46	45	45	45	44	44	49	51	49	47	47	44	
Cloudiness	20%	20%	56%	56%	87%	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Dewpoint	25	26	31	31	31	34	36	35	33	34	37	38	39	41	44	42	41	41	44	43	42	43	45	41	
Relative Humdity	82%	87%	79%	71%	70%	81%	90%	87%	85%	88%	81%	75%	77%	87%	94%	90%	87%	90%	81%	74%	75%	86%	94%	91%	
Wind	NW 1	NW 2	NW 1	N 2	SE 1	S 3	S 7	SE 8	S 13	S 20	S 24	S 20	S 16	S 20	S 21	S 24	S 35	S 35	S 26	S 26	S 22	S 22	S 15	S 15	
Snow Level (ft)	215	215	1118	1118	1204	1204	1224	1224	2174	2174	2712	2712	3375	3375	4662	4662	5380	5380	5167	5167	4042	4042	3840	3840	


Seattle
NAM 0-84hr Forecast Meteogram for (122W, 47N)
19NOV 00Z
12Z
20NOV 00Z
12Z
21NOV 00Z
12Z
22NOV 00Z
12Z
millibars
Temp. (F)
Wind (mph)
RH (%)
1000-500mb Thickness (dm)
Total-totals
Lifted Index
SLP (mb)
10m Wind Speed & Barbs (mph)
2m Temp
2m DewPt
(F)
2m RH (%)
3hr Precip
Total
Convective
(inches)

Telemetry Data Summary Report (TDSR); QAQC Data Notes, from 11/23/12

126

Data OK, no gaps or corrupt data

124.1

Data OK, no gaps or corrupt data

124

Data OK, no gaps or corrupt data

115.1

Vault level has negative values from 11/21/11 19:20 to 11/21/11 20:35, due to no water in pipe.

84.1

Vault level has negative values from 11/21/11 17:20 to 11/21/11 22:55, due to no water in pipe.

015

11/21/11 05:25 to 11/21/11 07:50, Conductivity went negative and corresponding loss of salinity values

11/21/11 17:50, no salinity value although conductivity was positive value

11/21/11 17:55 to 18:20, Conductivity went negative and corresponding loss of salinity values

11/21/11 18:25, no salinity value although conductivity was positive value

11/21/11 18:50 to 19:05, Conductivity went negative and corresponding loss of salinity values

11/21/2011 19:10, no salinity value although conductivity was positive value

11/21/2011 19:30, no salinity value although conductivity was positive value

11/21/11 19:35 to 19:40, Conductivity went negative and corresponding loss of salinity values

11/21/2011 19:45, no salinity value although conductivity was positive value

11/21/11 23:40 to 11/22/11 07:30, Conductivity went negative and corresponding loss of salinity values

STORM EVENT REPORT SW09
For
Non-Dry Dock Stormwater Monitoring
Conducted at
Puget Sound Naval Shipyard
Bremerton, WA
Project ENVVEST Study Area

January 20, 2012

Puget Sound Naval Shipyard and Surrounding Area

PNNL Contract No.: N4523A10MP00034 Amendment 1

Cardno TEC
Shaping the Future

Pacific Northwest
NATIONAL LABORATORY

1.0 Introduction

Taylor/TEC conducted non-dry dock stormwater sampling tasks within the Puget Sound Naval Shipyard (PSNS) and adjacent areas within Naval Base Kitsap (NBK); collectively comprising the Project ENVVEST study area, between December 1st, 2011 and January 21st, 2012. This was the second of four scheduled events of the 2011-2012 project year – referred to as *Phase II*. Overall, this is the ninth Stormwater (SW09) event of the project. A summary of the preparatory and sampling events, including site specific conditions that occurred during SW09 are presented in this report, with supporting information as attachments.

This SW09 Report is organized in the following manner and contains: Section 2, Event Summary; Section 3, Project Staff Participating in SW09; Section 4, Storm Event SW09 Preparatory Tasks; Section 5, Weather Forecast Information and SW09 Targeting Details; Section 6, Precipitation and SW09 Qualification Summary; Section 7, Sampling Information, Management and Validation; Section 8, Basin Runoff Calculations; Section 9, Descriptive Statistics and Discussion of Event Station Monitoring Data; Section 10, Notable Anomalies and Variations to the PWP; and Section 11, Action Items.

Attachments to this report include: Table A-1*, Storm Event Summary and Sampling Information, Validation Checklist* (spreadsheet); Stormwater Field Sampling Forms and Storm Controller Notes; Chain of Custody Forms; (basin) Runoff Calculation Worksheet; Station Hydrographs; Autosampler Reports; Weather Forecast Information and a Telemetry Data Summary Report.

2.0 Event Summary

Main SW09 details are provided below as a "*Quick Reference*":

- *Event/s conducted:* SW09
- *Event Date/s:* station prep. = 12/1/11; maint. items = 12/2/11 through 1/1612 and storm event tasks occurred between 1/17 – 1/21/12
- *Monitoring Stations Sampled:* PSNS015, 84.1, 115.1, 124, 124.1 and 126
- *Antecedent Conditions Met?:* Yes (3 days or greater at each station); 0.0" in prior 24 hrs and 0.0" in prior 6 hrs preceding the storm/sampling event at each station.
- *Start of Rainfall at PSNS Stations:* 1/20/12 between 0540 (PSNS124.1) and 1005 (PSNS124)
- *Sampling Period Duration Range:* start =1/20/12 @ 1207 (PSNS115.1), stop = 1/21/12 @ 1200 (PSNS126). Max sampling duration = 23 hrs:44 mins (PSNS126)
- *Sampling Event Rainfall Total:* PSNSB427 = 1.74", PSNS126 = 1.03", PSNS124.1 = 1.13", PSNS124 = 1.18", PSNS115.1 = 1.17", PSNS084.1 = 1.13" and PSNS015 = 1.29"
- *Samples/Types Collected:* Grab and composite samples were collected at each station (one each at each station) for a total of 12 "normal" samples.
- *Quality Control (QC) Samples Collected:* A composite duplicate was collected at PSNS126; no grab duplicates were collected during this event.

- *Based on consideration of storm event and sample validation information, were the samples collected during SW09 valid for project purposes? (Y / N, composite, grab or both):* Yes-both; all grab and composite samples collected during this event were valid.

See Table A-1; *Storm Event Summary and Sampling Information, Validation Checklist*, for additional event summary details.

3.0 Project Staff Participating in SW09

Taylor/TEC:

Dave Metallo – Project Manager, Storm Controller, Field Event and QC Manager

Brian Rupert – Field Team Leader

Bruce Beckwith – Field Team Member

Ian Sahlberg – Field Team Member

Navy Personnel:

Bob Johnston – Project Technical Lead / Oversight / Grab sample collection lead

Christine Gebhart – NPDES Program Support / Grab sample collection support

4.0 Storm Event SW09 Preparatory Tasks

On December 1st, 2011 all six stormwater monitoring stations (PSNS015, PSNS08.1, PSNS115.1, PSNS124, PSNS124.1 and PSNS126) were reset and re-calibrated. The stations remained in standby mode until they were re-visited on January 17th and readied for storm event / stormwater sample collection. At this point all of the monitoring equipment was deemed to be functioning properly, was operational and "sample ready" (see Sections 1 and 2 of the attached *Stormwater Field Sampling Forms).*

All stations were programmed with pre-determined autosampler enable and pacing conditions set "high" to prevent premature enabling (*sample disable mode*), as directed by the Taylor/TEC Storm Controller. Station operation was passed to the Taylor /TEC Storm Controller to be managed via telemetry. Final enabling conditions were determined by the Storm Controller closer to the onset of the storm event.

5.0 Weather Forecast Information and SW09 Targeting Details

Between the end of SW08 (storm event associated with SW08 lingered into 11/2311 @ 1730) and the just prior to the onset of SW09 (1/20/12 @ 0530) the average rainfall as measured at five of the six monitoring stations (PSNS084.1 had an incomplete record during this period) during this approximately 57 day period was 5.75". An average of only 2.41" of rainfall was recorded at these stations during the month of December; one of the driest on record dating back to 1899 (WRCC).

The last measureable runoff occurred approximately between 9 and 3 days prior to the SW09 event. Project qualifying antecedent dry period was met prior to the station being armed on 1/17/12. A potentially qualifying storm event (event probability and forecast rainfall depth) was

noted and targeted for 1/20/12. Snow was forecast with measureable accumulation of 6+ inches for the 18th and 19th. Rain was forecast at 99% probability for Friday 1/20/12, with 24-hour accumulations of over 1.44" into late-morning of the 21st. The decision was made to continue tracking and targeting this developing large storm system.

The Nation Weather System (NWS) was one the main source used for the assessment of weather forecasting and conditions. Provided below is a link to the NWS-Bremerton, WA webpage; (http://forecast.weather.gov/MapClick.php?site=sew&textField1=47.56751&textField2=-122.63127&smap=1). A host of other internet available weather forecasting, observational and data sources were used for field and reporting purposes as appropriate Detailed *Weather Forecast Information* is attached to this report.

Routinely referenced weather models used to gain forecast information regarding the Pacific Northwest included the MM5-NAM http://www.atmos.washington.edu/mm5rt/rt/naminit.12km.html) and the GFS-WRF (http://www.atmos.washington.edu/mm5rt/rt/gfsinit.frame1.html) (both hosted by the University of WA and initialized for the PNW). Below is a synopsis of the model comparison for SW09:

"GFS and NAM disagreed as to the storm event start; the GFS had earlier and heavier rain, but both models generally agreed on the storm duration and rain depths."

The final sampler enabling conditions were appropriately set at each monitoring station on the morning of 1/20/12 (*sample ready mode*). A telemetry check at 1435 on the 20th reveled that all of the stations had enabled and began their sampling routines. Table 1 lists the final enabling conditions at each monitoring station that were used for SW09, along with the rainfall amounts in the 24 and 6 hour periods prior to the onset of the storm event.

Table 1. Monitoring Station Enabling Conditions

Station	Rainfall (in/hr)	Level (ft)	Conductivity (µS/cm)	Repeatable Conductivity Enable (Y/N)	Pacing (min)	[1]Rainfall Prior to Event Start (24hr/6hr)
PSNS015	0.05	0.3	2000	N	15	0.00"/ 0.00"
PSNS084.1	0.05	0.3	2000	N	15	0.00"/ 0.00"
PSNS115.1	0.05	0.3	2000	N	15	0.00"/ 0.00"
PSNS124	0.05	0.3	2000	N	15	0.00"/ 0.00"
PSNS124.1	0.05	0.3	2000	N	15	0.00"/ 0.00"
PSNS126	0.05	0.3	2000	N	15	0.00"/ 0.00"

[1]Conditions as checked on 1/19/12 at ~2300; final enable conditions set 1/20/12 at 0850

6.0 Precipitation and SW09 Qualification Summary

Precipitation Summary:

Previous rainfall that caused runoff to occur (≥ 0.03" rainfall without 3-hr gap) prior to the onset of SW09 ranged from 3:00 (days:hours) at PSNS124.1 to 9:23 (days:hours) at PSNS124, as measured by each stations rain gauge. Rain began to fall over the project site between 0540 and 1005 on January 20th. Table 2 details the period since last runoff, antecedent duration prior to the start of the storm event, as well as the rainfall start date/time at each monitoring station.

Table 2. Pre-Rain Event Conditions

Station	Last Runoff[1] (Date/Time)	Antecedent Duration (Days: Hrs)	Start of Rainfall (Date/Time)
PSNS015	1/10/12 9:45	9:22	1/20/12 7:55
PSNS084.1	1/10/12 9:50	9:22	1/20/12 8:20
PSNS115.1	1/10/12 9:50	9:21	1/20/12 7:10
PSNS124	1/10/12 11:00	9:23	1/20/12 10:05
PSNS124.1	1/17/12 5:00	3:00	1/20/12 5:40
PSNS126	1/10/12 9:40	9:22	1/20/12 7:40

[1]Last runoff period is defined as ≥ 0.03" of rainfall without a 3-hr gap

Rainfall began registering at all stations by 1005 on 1/20/12 (see Table 2) and continued in a steady fashion until the end of the event, around noon on the 21st. Sampling began at the monitoring stations between 1207 (PSNS115.1) and 1445 (PSNS124.1) on the 20th. Checks, via telemetry, revealed that all of the stations enabled their sampling routines as programmed; with rainfall, pipe level and conductivity values being in satisfaction of their threshold values, (as listed in Table 1) except for PSNS124.1 which was "force" started (via telemetry) due to suspect conductivity readings.

Rainfall was steady throughout the sampling event, mostly moderate intensities, with a brief period of heavy rain as the bulk of the system pressed down on the project area. Station sampling period rainfall totals ranged from 1.03" at PSNS126 to 1.29" at PSNS015. The Navy's rain gauge at B427 recorded 1.74" (Note: the Navy's gauge atop B427 was clogged with snow; the melt from this clog is included in the reported total value).

The sampling routines all ran their courses to completion, except for PSNS124.1 which was manually stopped one aliquot short on its last bottle. Sampling durations ranged from 10:42(hrs:mins) at PSNS124.1 to 23:73(hrs:mins) at PSNS126.

Table 3 summarizes the sampling period start, sampling period end, sampling period duration as well as the total rainfall amounts for each monitoring station and the PSNS project gauge at B427 that occurred during the sampling period associated with SW09. Table A-1 (*Storm Event*

Summary and Sampling Information, Validation Checklist), attached to this report, provides additional sampling period rainfall information.

Table 3. Sampling Period Information and Rainfall Totals for Project Monitoring Stations

Station	Sampling Period Start (Date/Time)	Sampling Period End (Date/Time)	Sampling Period Duration (Hrs:Mins)	Total Sampling Period Rainfall (in)
PSNS015	1/20/12 13:15	1/21/2012 9:57	20:42	1.29
PSNS084.1	1/20/12 13:41	1/21/2012 10:23	20:42	1.13
PSNS115.1	1/20/12 12:07	1/21/2012 9:49	21:42	1.17
PSNS124	1/20/12 14:24	1/21/2012 9:05	18:41	1.18
PSNS124.1	1/20/12 14:45	1/21/2012 1:27	10:42	1.13
PSNS126	1/20/12 12:16	1/21/12 12:00	23:44	1.03
B427	1/20/12 12:07	1/21/12 12:00	[1]24:07	[2]1.74

[1]This incorporates the total span from all monitoring stations
[2]Gauge initially clogged with snowpack; total for this station incorporates snow melt and event rainfall

SW09 Qualification Summary:

All storm qualification conditions were met for this event. Storm event qualification conditions included wet season event date range (Oct 1 – May 1), forecast probability (≥70%), forecasted storm depth (≥0.1"), storm duration (≥2hrs) and runoff occurrence / hydrograph stage (elevated above base flow). Antecedent dry period (≤0.1" rain in previous 24hrs and 0" rain in previous 6hrs) qualification for SW09 was also met without condition, as described above. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist)*, documents the particular SW09 qualification criteria listed above.

7.0 Sampling Information, Management and Validation

Grab Sampling:

Grab sample collection was lead and performed by the Navy Team, with storm control assistance (limited to station status checks via telemetry) from Taylor/TEC as necessary. Grab sampling was conducted at all six of the monitoring stations. Grab samples were collected as per methodologies described in the 2011-12 Project Work Plan (PWP). Water quality condition (conductivity and temperature) was assessed prior to the collection of the samples. Samples were collected only if conductivity was determined to be ≤2000 µS/cm. Parameters included total petroleum hydrocarbons (NW-TPH-Dx) and fecal coliform. All grab samples were collected on January 20th

between 1700 (PSNS126) and 1827 (PSNS115.1). Sample collection was coordinated with low or lower tidal conditions to ensure that proper conductivity conditions would exist. Grab sampling times are indicated on the attached hydrographs to illustrate the water level stage during collection. Grab sample IDs, along with the other pertinent information is listed in the *Stormwater Field Sampling Forms* and in Table A-1 (both are attached). Table 4 summarizes these results.

Table 4. Grab Sampling Information

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Grab sample ID	SW09-0001	SW09-0002	SW09-0003	SW09-0006	SW09-0004	SW09-0005
Grab Date /Time	1/20/2012 17:00	1/20/2012 17:15	1/20/2012 17:30	1/20/2012 18:27	1/20/2012 17:45	1/20/2012 18:00
Grab sample conductivity value (μS/cm)	92	980	1719	176	833	300
Hydrograph stage at grab collection	Elevated Flow	Elevated Flow	Falling Limb	Falling Limb	Falling Limb	Falling Limb
Grab parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

Composite Sampling:

Composite sample retrieval tasks and formulation procedures were managed and lead by Taylor/TEC with support from PNNL/MSL personnel as needed. Composite samples were collected from all six monitoring stations.

Composite samples were collected via autosamplers which were operated and synchronized by a custom designed telemetered water quality control system. The composite sample collection period and duration for each monitoring station is noted in Table 3.

Wedge bottles from each station (contained in the autosampler bases) were brought back the C106 Stormwater Lab at B147 for processing. Composite formulation occurred on January 20th between 1540 and 1955. The number and numeric identification of the wedge bottles that were used for the composite sample formulation and those that were discarded were noted in Section 5 of the Stormwater Field Sampling Forms.

Methods used in preparation, autosampler collection, retrieval and formulation of the composite samples were conducted in a routine manner as per the 2011-12 PWP. Samplers at each station were enabled as per the conditions stated in Section 5 of this report. Composite sample parameters included: hardness, TOC, DOC, TSS, total and dissolved metals and turbidity.

The total number of discrete wedge bottles collected at each sampler, along with the total number of those bottles used in the station's composite sample is noted below in Table 5. Dividing the

number of wedge bottles used in the composite sample formulation by the total number of wedge bottles collected during the span of the entire sampling period provides an estimation of the amount of time (as a percentage of that stations entire collection period) where freshwater (i.e. runoff) conditions occurred at each station during the corresponding sampling event period.

Specific details regarding the composite formulation, results from individual bench top testing of the discrete bottles, sample IDs, sample date/time and resultant overall conductivity and turbidity values, as well as the number of wedge bottles collected during the sampling event and those used for the composite sample formulation are detailed in the *Stormwater Field Sampling Forms, Chain-of-Custody (CoC)* forms and in Table A-1 (all are attached). Table 5 summarizes these results.

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Composite sample ID	SW09-0010	SW09-0009	SW09-0012	SW09-0008	SW09-0007	SW09-0013
Composite Date /Time	1/21/2012 11:58	1/21/2012 1:27	1/21/2012 9:05	1/21/2012 9:49	1/21/2012 10:23	1/21/2012 9:57
Overall Composite conductivity value (μS/cm)	267	333	1695	112	178	233
Overall Composite turbidity value (NTU)	8	27	8	14	23	39
Composite volume (ml)	4,800	5,600	6,800	7,600	8,400	8,400
Number of Bottles Collected During Sampling Event	24	11	19	22	21	21
Number of Bottles Included in Composite Sample	24	8	17	20	21	21
Percentage of Total Sampling Period that Freshwater Conditions Occurred	100%	73%	89%	91%	100%	100%
Composite parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

All sampling and vault monitoring equipment operated as designed and programmed. Details pertaining to autosampler programming and event-specific operation of each monitoring stations' autosampler unit are contained in the attached *Sampler Reports*.

QC Samples:

During SW09 a composite duplicate was collected at PSNS126. Table 6 summarizes the quality control sample collection information for SW09.

Table 6. Summary of Quality Control Sampling Information for SW09

Sample Collection Criteria:	Results
Grab sample duplicate ID	NC
Grab sample duplicate date and time	NC
Grab sample duplicate conductivity value (μS/cm)	NC
Composite sample Duplicate ID	SW09-0011
Composite sample duplicate date and time	1/21/2012 11:58
Overall Composite Duplicate conductivity value (μS/cm)	302
Overall Composite Duplicate turbidity value (NTU)	8
Composite Duplicate volume (ml)	4800

Sample Management:

All samples were handled and managed as per Section 9 of the 2011-12 PWP and in a manner acceptable and within industry standards regarding practices typical for tasks of this nature. Once collected, both grab and composite samples were placed into coolers and put on ice and/or into the secure Stormwater Laboratory refrigerator to maintain temperatures between 2 and 6 °C.

All sample IDs, collection date and time, matrix, requested parameter analysis and other associated information were documented on *Chain of Custody* (*CoC) Forms* (attached). Samples were in direct control of project and/or laboratory personnel at all times. Samples were delivered to the testing facility, Battelle Marine Science Laboratory in Sequim, WA, in good, useable and properly chilled condition. Adequate sample volume was collected from the targeted stations to proceed with the scheduled analysis of all parameters per the 2011-12 PWP.

Sample Validation Summary:

All sample validation criteria were met for this event per Section 8.2.6 of the 2011-12 PWP. Prior to processing the samples and transferring custody to the analytical laboratory, the Taylor/TEC Field Event Lead validated the samples against certain criteria. These validation criteria included runoff occurrence / hydrograph stage, sample preparation and handling review, requested parameters, ≥2 hour sampling duration or 75% storm hydrograph coverage, minimum number of aliquots, minimum sample volume collected for required parameters, discrete and composite samples conductivity measurement results, quality control sample collection and anomalous conditions assessment. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), documents the particular SW-event qualification listed above.

8.0 Basin Runoff Calculations

Rainfall runoff volumes during the SW09 sampling period were calculated for each of the basins associated with the six Phase II monitoring stations. These calculations are based on the modified Runoff Coefficient Method (RCM) as described in Section 7.4 of the 2011-12 PWP.

The value ranges for the various land use/land cover categories assigned to each basin are listed in the attached *Runoff Calculation Tables*. Calculated runoff values are also presented in Table A-1 (*Storm Qualification and Sample Validation Information Checklist*) (attached). Table 7 summarizes the results from these calculations.

Table 7. Runoff Calculations

Station	Type of Surface	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Combined Drainage Area (Ft^2)	Sample Event Rain Total (In)	Sample Event Rain Total (Ft)	Sample Event Period Runoff Vol. (Gal)
126	Impervious	653,373	0.6 – 0.9	591,881	1.03	0.0858	380,034
	Pervious	9,613	0.2 – 0.4				
124.1	Impervious	109,690	0.6 – 0.9	101,245	1.13	0.0942	71,319
	Pervious	6310	0.2 – 0.4				
124	Impervious	429,302	0.6 – 0.9	396,251	1.18	0.0983	291,476
	Pervious	24,698	0.2 – 0.4				
115.1	Impervious	449,104	0.6 – 0.9	366,390	1.17	0.0975	267,227
	Pervious	13,938	0.2 – 0.4				
84.1	Impervious	23,958	0.6 – 0.9	21,562	1.13	0.0942	15,189
	Impervious	2,009,431	0.5 – 0.8				
015	Pervious	2,009,431	0.25 – 0.4	2,411,321	1.82	0.1517	2,735,753
	Impervious	653,373	0.6 – 0.9				

9.0 Descriptive Statistics and Discussion of Event Station Monitoring Data

Descriptive statistics for the sampling period at each monitoring station are provided in Table 8, below. These statistics include minimum, maximum, average and median at static 1-hour interval periods for vault level, conductivity, salinity, transducer water temperature, YSI water temperature (PSNS084.1 only) and tidal stage. The method by which the rainfall statistics are calculated is on a “rolling 1-hour data window’ in an attempt to provide a more accurate and representative assessment of the actual rainfall conditions. Sampling period rainfall totals are also included as part of each station’s rainfall information.

Table 8. SW09 Sampling Period Rainfall and Vault Parameter Descriptive Statistics

Station ID	Statistics	Rainfall (1 hr) (in)	Vault level (ft)	Conductivity (uS/cm)	[1]Salinity (ppt)	trans temp (^{o}C)	YSI temp (^{o}C)	Tide Stage (ft)
PSNS126	**Min**	0.00	0.31	11	2.00	1.68		-1.71
	Max	0.14	5.54	47,532	42.00	7.71		12.52
	Average	0.03	2.10	2,320	3.62	4.32		7.63
	Median	0.02	1.67	69	2.00	4.37		8.58
	Storm Total	**1.03**						
PSNS124.1	**Min**	0.00	0.10	-156	2.00	2.10		-1.71
	Max	0.17	4.00	51,386	42.00	8.38		11.77
	Average	0.05	1.24	23,564	26.44	5.10		6.42
	Median	0.04	0.40	14,227	42.00	3.78		8.01
	Storm Total	**1.13**						
PSNS124	**Min**	0.00	0.30	35	2.00	2.11		-1.71
	Max	0.20	8.67	46,662	42.00	9.14		12.52
	Average	0.05	4.44	12,189	11.86	4.60		7.26
	Median	0.03	4.66	1,701	2.00	3.76		8.32
	Storm Total	**1.18**						
PSNS115.1	**Min**	0.00	0.06	44	2.00	1.49		-1.71
	Max	0.17	12.70	46,547	42.00	9.07		12.52
	Average	0.04	7.75	1,375	2.76	3.77		7.39
	Median	0.03	8.53	166	2.00	2.66		8.32
	Storm Total	**1.17**						
PSNS084.1	**Min**	0.00	-0.11	25	0.02	3.13	3.13	-1.71
	Max	0.15	8.47	48,467	44.70	14.77	14.77	12.52
	Average	0.04	4.11	7,954	6.78	6.57	6.57	7.32
	Median	0.03	4.19	129	0.10	4.44	4.44	8.19
	Storm Total	**1.13**						
PSNS015	**Min**	0.00	0.12	80	2.00	1.66		-1.71
	Max	0.16	9.20	47,238	42.00	10.30		12.52
	Average	0.04	5.05	9,446	9.87	4.45		7.50
	Median	0.04	5.50	204	2.00	2.76		8.45
	Storm Total	**1.29**						

[1]salinity calculations for PSNS126, 124.1, 124, 115.1 and 015 are based on an algorithm that has a lower range cut-off value of 2ppt. Actual field values may have been lower. The PSNS084.1 conductivity probe (YSI6820) utilized a different salinity algorithm function and thus is able to calculate lower low range salinity values.

Hydrograph Assessment:

The rainfall signatures (see attached) for all monitoring stations, except PSNS124, showed similar patterns; with initial lite intensity, followed by a brief period of heavy rainfall, then followed by moderate to lite intensities for the remainder of the event. The rain gauges at PSNS124 and B427 showed a somewhat different response during the early portion of the sampling event rainfall period. This was likely due to snow in the cone portions of these gauges. The majority of snow was cleared from PSNS124 prior to the sampling event but a minor amount was present at the onset of the rainfall event. The gauge at B427 was not cleared at all prior to SW09.

The station hydrographs for SW09 were considered to be typical; a conductivity response to the onset of rainfall and corresponding freshwater storage in the pipes as runoff into the piping systems occurred through the rising tide cycle (except at PSNS124.1 and 124). At PSNS124 the rainfall towards the end of the event was not sufficient to overcome tidal effects and thus the system became saline sooner than the other monitoring locations. PSNS124.1 showed an intermittent return to saline conditions towards the end of the rainfall event, however, once the tide receded from its peak and reached the stations effective tide level, basin runoff again drove conductivity in the piping system back down to freshwater conditions.

As mentioned above grab sampling information for SW09 is indicated on each of the station hydrographs. Composite sample markers have been applied to the hydrographs to indicate total collection time (see attached).

Telemetry Data Summary Report: TDSR

A review of the telemetry data collected since SW08 and during SW09 was conducted. There were some minor anomalies in nearly all of the stations data sets due to the limited amount of rain fall in December, 2011. Also, seawater conditions had started to affect the transducers (stainless steel instrument bodies and dielectric effects) in varying degrees as noted during maintenance inspections. PSNS084.1 and PSNS124 were the most affected by saltwater conditions. PSNS084.1 was inoperable for much of December, 2011 and required several change-outs of the YSI units and associated cabling. However, overall, data gaps and other anomalies were very minor during the period from 11/23/11 to 1/23/12. All sensors were in reasonable and accurate operation during SW09. A TDSR report (table), detailing the anomalies noted during SW09 is attached.

10.0 Notable Anomalies and Variations to the PWP

There were no major anomalies observed or otherwise noted after completion of the sampling event and review of the associated data that would have caused any of the SW09 samples to be non-representative of the conditions from which they were collected. As reported above, all intended and scheduled grab and composite samples were submitted to the PNNL MSL ("the Lab") within holding times and without incident. All support and sampling tasks, as well as collected samples, were managed as appropriate per the 2011-12 PWP.

There were, however, several minor anomalies that occurred during SW09. These were;

1. The "forced" enabling start of the PSNS124.1 sampler. This action was explained in Section 6 as necessary by the Storm Controller because the conductivity values were suspect. In reviewing the data, it was noted the system was operating correctly and that indeed the conductivity value of the water in the piping system at that particular time was still saline. This forced start resulted in enabling the sampler ahead of the actual occurrence of freshwater conditions – therefore the first three discrete sample bottles were not usable for the composite formulation. However, an adequate volume of representative freshwater runoff was collected for the overall formulation of the composite sample.
2. The failure of the YSI units at PSNS084.1 due to saltwater corrosive effects and the subsequent loss of data. This was an ongoing maintenance issue that developed after SW08. It was corrected prior to SW09 and did not affect sample collection during the sampling event.
3. General maintenance issue – most of the CT2X transducers and associated stainless steel pipe ring band are showing signs of corrosion due to saltwater immersion. TEC continues to monitor the situation and plans to upgrade system components to titanium, to strengthen the earth grounds of all monitoring systems and to electrically isolate the transducers for all other metal components of the monitoring system. This maintenance issue has not affect data collection or quality – however, it does need to be addressed to assure proper and continued use of the monitoring systems.

11.0 Action Items

Routine action items include resetting (reloading with bottles, charging batteries, back flushing with DI water, etc.) all six monitoring stations and re-stocking of sampling supplies. Routine station maintenance items (e.g. sensor cleaning and calibration, rain gauge maintenance, etc.) as well as storm set-up tasks will need to be completed as necessary.

Non-routine action items include trouble shooting CT2X transducer calibration and corrosion issues noted at most of the monitoring stations.

The current focus of the field efforts will be in maintaining proper station and equipment operational status, data and resource management and storm-tracking tasks.

Figure 1. Phase II Stormwater Monitoring Locations within the Shipyard Boundary

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ATTACHMENTS

- Storm Event Summary and Sampling Information, Validation Checklist
- Stormwater Field Sampling Forms and Controller Notes
- Chain-of-Custody Forms
- Runoff Calculation Worksheet
- Station Hydrographs
- Autosampler Reports
- Weather Forecast Information
- TDSR

Table A-1. PSNS Non-Dry Dock Stormwater Monitoring Tasks
Storm and Sample Information and Validation Checklist
Stormwater Sampling Event #9 (01/20/2012)

Cardno TEC
Shaping the Future

This form acknowledges representativeness criteria described in the project PWP.
Mark with "Yes" to acknowledge acceptable, "No" for not acceptable, "NA" or "- -" if not applicable.

[1] Storm Event Data:						
Project Storm Event (SW) #	09					
Event Forecast Probability (%)	99					
PSNS B427 Rain Gauge - Sample Event Total (in.)	1.74 [2]					
Rainfall and Runoff Summary:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Last Runoff (≥ 0.03" rainfall without 3-hr gap) Prior to STE Start (Date/Time)	1/10/12 9:40	1/17/12 5:00	1/10/12 11:00	1/10/12 9:50	1/10/12 9:50	1/10/12 9:45
Antecedent Dry Period (days: hrs)	9:22	3:00	9:23	9:21	9:22	9:22
Rainfall Prior 24-hrs to Sampling Start	0.00	0.00	0.00	0.00	0.00	0.00
Rainfall Prior 6-hrs to Sampling Start	0.00	0.00	0.00	0.00	0.00	0.00
Start of Rainfall (Date/Time)	1/20/12 7:40	1/20/12 5:40	1/20/12 10:05	1/20/12 7:10	1/20/12 8:20	1/20/12 7:55
Sampling Period Start Date & Time	1/20/12 12:16	1/20/12 14:45	1/20/12 14:24	1/20/12 12:07	1/20/12 13:41	1/20/12 13:15
Sampling Period End Date & Time	1/21/12 12:00	1/21/2012 1:27	1/21/2012 9:05	1/21/2012 9:49	1/21/2012 10:23	1/21/2012 9:57
Sampling Period Duration (hrs:mins)	23:44	10:42	18:41	21:42	20:42	20:42
Sampling Period Duration (hours)	23.73	10.70	18.68	21.70	20.70	20.70
Sampling Period Total Rainfall (in)	1.03	1.13	1.18	1.17	1.13	1.29
Sampling Period Max 1-hr Rainfall Intensity (in/hr)	0.14	0.17	0.2	0.17	0.15	0.16
Sampling Period Average 1-hr Rainfall Intensity (in/hr)	0.03	0.05	0.05	0.04	0.04	0.04
Runoff volume calculated for sampling period (gallons)	380,034	71,319	291,476	267,227	15,189	1,939,078
[1] Sample Collection Criteria:						
Grab sample ID	SW09-0001	SW09-0002	SW09-0003	SW09-0006	SW09-0004	SW09-0005
Grab Date /Time	1/20/2012 17:00	1/20/2012 17:15	1/20/2012 17:30	1/20/2012 18:27	1/20/2012 17:45	1/20/2012 18:00
Grab sample conductivity value (mS/cm)	92	980	1719	176	833	300
Hydrograph stage at grab collection	Elevated Flow	Elevated Flow	Falling Limb	Falling Limb	Falling Limb	Falling Limb
Grab parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
Composite sample ID	SW09-0010	SW09-0009	SW09-0012	SW09-0008	SW09-0007	SW09-0013
Composite Date /Time	1/21/2012 11:58	1/21/2012 1:27	1/21/2012 9:05	1/21/2012 9:49	1/21/2012 10:23	1/21/2012 9:57
Overall Composite conductivity value (mS/cm)	267	333	1695	112	178	233
Overall Composite turbidity value (NTU)	8	27	8	14	23	39
Composite volume (ml)	4,800	5,600	6,800	7,600	8,400	8,400
Number of Bottles Collected During Sampling Event	24	11	19	22	21	21
Number of Bottles Included in Composite Sample	24	8	17	20	21	21
Percentage of Total Sampling Period that Freshwater Conditions Occurred	100%	73%	89%	91%	100%	100%
Composite parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
[1] QC Sample Summary Information:						
Grab sample duplicate ID	N/A	N/A	N/A	N/A	N/A	N/A
Grab sample duplicate date and time	N/A	N/A	N/A	N/A	N/A	N/A
Grab sample duplicate conductivity value (µS/cm)	N/A	N/A	N/A	N/A	N/A	N/A
Composite sample duplicate ID	SW09-0011	N/A	N/A	N/A	N/A	N/A
Composite sample duplicate date and time	1/21/2012 11:58	N/A	N/A	N/A	N/A	N/A
Overall Composite Duplicate conductivity value (µS/cm)	302	N/A	N/A	N/A	N/A	N/A
Overall Composite Duplicate turbidity value (NTU)	8	N/A	N/A	N/A	N/A	N/A
Composite Duplicate volume (ml)	4800	N/A	N/A	N/A	N/A	N/A
Associated Equipment Blank	SW08-005	SW08-006	SW08-002	SW08-001	SW08-003	SW08-004
[1] Storm and Sample Validation:						
Was the targeted STE antecedent or conditional antecedent qualified per PSNS PWP? (if no, then see next line)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Was the antecedent overage amount greater than 10% of the total rain event ?	N/A	N/A	N/A	N/A	N/A	N/A
Was runoff occurring OR was the hydrograph at least 10% above background pipe level during grab collection ? If no, explain in summary narrative.	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were a minimum of 8 aliquots collected OR does the composite sample represent at least 75% of the stations storm event rain volume ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were all 1-hr sampler bottles used for the Composite sample ≤2000 µS/cm ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Did any anomalous conditions exist that could make samples non-representative? Explain if "Yes"	No	No	No	No	No	No
Based on consideration of the information above, was the sample collected during the STE valid for project purposes ? (Y / N, composite, grab or both)	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**

[1] If the answer to any of these questions is "No" OR indicate non-representative conditions, then these items should be explained in the Event Narrative.

[2] The B427 rain gauge was likely initially clogged with snow pack. The gauge didn't record its first tip until approx. 5 hrs after the monitoring sites recorded their first tips and the total rain amount is much greater then any station.

Validation Check List Completed By: Brad Hansen Reviewed By / Date: Richard C. Metallo 2-16-12

PSNS NDDSW Monitoring Project Storm Control Work Sheet *Sht Rev. 112111* Sheet 1 of _2_

Date:	1/17/2012 (setup) ; 1/20/12 (storm event)			**Sampling Support Personnel:**	Grabs (C/106) + Beckwith, Comps: DM,BR and BB
STE #	9	**Antecedent Dry Cond. Met ?**	Cond.	**Tidal Info:**	1/20/12 Low-Low tide @ (2059) with a -1.75'
Storm Controller:	Dave Metallo			**Grab sampling Info.**	C/106 + TEC to collect ~1900-2200, dup required
Pre-Storm / Weather Details:	Stormagedon snow event ! Snow on Wed and Thur 1/18 & 1/19, depths of ~6' with ice layers on top. Rain gauges cleared morning of 1/19. Snowed add. 2-3 inches on 1/19 after gauges were cleared. Gauge at PSNS124 not cleared due to access hazards. All stations ready (lids off on 1/17), will go "hot" morning of 1/20. Warm frnt to push into area ~1000 with forecsted 24-hr total of 1"+.				

Telemetry Measurements:	**DATE/TIME (24HR)**												
STATION:	1-20-12 (0850)	1435	2110	1-21-12 (0900)	~1430								
PSNS015 Rain[1]	.05/.08	.14/0.57	.05/1.00	0/1.23	sampling end 1257, auto stop								
PSNS015 Level	4.73	8.06	0.25	5.09									
PSNS015 Cond.	23K	484	166	120									
Smpl Marker	0	6	33	79	96								
PSNS084.1 Rain	.05/.05	.13/.51	.05/.88	0/1.08	sampling end 1339, auto stop								
PSNS084.1 Level	3.54	7	-0.1	4.02									
PSNS084.1 Cond.	38K	177	134	62									
Smpl Marker	0	4	31	78	96								
PSNS115.1 Rain	.04/.1	.13/.55	.05/.92	0/1.07	sampling end 1149, auto stop								
PSNS115.1 Level	7.79	11.22	0.08	8.25									
PSNS115.1 Cond.	1156	76	302	134									
Smpl Marker	0	11	37	84	96								
PSNS124 Rain	0/0[2]	.11/.61	.05/.95	0/1.18	sampling end 1405, auto stop								
PSNS124 Level	3.73	7.19	0.32	4.28									
PSNS124 Cond.	46k	908	1960	456									
Smpl Marker	0	2	28	75	96								
PSNS124.1 Rain	.04/.10	.11/.57	.05/.89	0/1.07	sampling end 1412, manually stopped								
PSNS124.1 Level	0.11	4	0.19	0.67									
PSNS124.1 Cond.	46K	35K (sus)	55	40K									
Smpl Marker	0	1	26	74	95								
PSNS126 Rain	.08/.08	.09/.52	.06/.83	0/0.94	sampling end 1158, auto stop								
PSNS126 Level	0.59	4	0.32	1.05									
PSNS126 Cond.	1753	48	57	265									
Smpl Marker	0	11	36	84	96								

[1]Rain dephs are reported as 1-hr / 24-hr totals

[2]Rain gauge not cleared on 1/19/12, 4-6" of snow-ice in top of screen

PSNS NDDSW Monitoring Project Storm Control Work Sheet, Continued *Sht Rev. 112111* Sheet 2 of _2_

Enabling Information: STE#9 01-20-12														
Sample Staion:	PSNS015		PSNS084.1		PSNS115.1		PSNS124		PSNS124.1		PSNS126			
Rain enable (in/hr)	0.05		0.05		0.05		0.05		0.05	0.05	0.05			
Level Enable (ft)	0.3		0.3		0.3		0.3		0.3	0.3	0.3			
Cond. (µS/cm)	2000		2000		2000		2000		2000	Enb Bst	2000			
Repeat. Cond Set ?	N		N		N		N		N	N	N			
Pacing Rate (min)	15		15		15		15		15	15	15			
Date	1/20/12		1/20/12		1/20/12		1/20/12		1/20/12	1/20/12	1/20/12			
Time	0850		0850		0850		0850		0850	~1445	0850			
Comp Dup ? / where:			Yes, at PSNS 126				**Grab Dup ? / where:**			Yes, TBD				

EVENT NOTES:

1. The rain gauge at 124 was not cleared yesterday (1-19) due to access concerns in icy conditions.
2. 124.1 transducer was reporting what I consider to be suspect conductivity data (could be clogged with sed.), therefore manually triggered using Enable Boost function (~1445)
3. GFS and NAM disagreed as to the storm event start; the GFS had earlier and heavier rain, but both models generally agreed on the storm duration and rain depths
4. At ~0900 on 1-21 it had only rain between 0.03 and 0.01" at the stations with clearing skies. Samplers ran their course, except at 124.1, field crew stopped at Btl 24 3/4.
5. Grab collected at all stations. However, grab duplicate only collected for FC - TPH dup not collected. Will make for this during next sampling event.

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PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

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Station: 126	MH/CB#:5110	Loc. Descrip. Southwest corner of Bldg. 460	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection

Personnel: Brian Rupert/Bruce Beckwith	Weather: Overcast, high 30's	Arrival Date/Time: 12/1/11 1300	
Carry-over maintenance to do prior to set-up:	None		done?
Sampler Battery Voltage	11.93	Changed? Y N	New voltage - NA
Modem Battery Voltage	12.38	Changed? Y N	New voltage - NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Yes
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	NO - need to base to site
Notes (including channel condition):	Calibrated Level	Lid Status?	NA
Recorded level = 0.96	Level adjusted - Yes	Backflushed with DI?	No
Measured Level = 1.04	Also, cal'ed aliquot@240ML	Suction line & quick connect attached?	Yes
New Offset = +0.08		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: BR/BB	Weather: overcast - temp low 30's	Arrival Date/Time:	1/17/12 @ 0943
Sampler Battery Voltage	12.79	Changed? (Y) N added	New voltage —
Modem Battery Voltage	12.33	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes / OK
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / Duplicate
Recorded Level (FT)	4.26	Lids off bottles?	Yes
Measured Level (FT)	4.24	Diagnostics/Distrubutor arm check?	Yes / OK
Offset Diff (FT)	0.02	Backflush with DI?	NO
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Prog Dir: 10\01

Cond. Sonde Cal. Info. : Recorded Val. = Meas. Val. = Diff. = (>10% adj. offset); Offset = New Rec Val =

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)

Section 3. Grab Sample Collection

Personnel: CG, BB	Weather: Raining	Arrival Date/Time:	1-20-12 (1650)
On Composite... (Bottle #/ Aliq #)	—	Conductivity Reading (µS/cm):	92
Grab Parameters Collected	TPH, FC	Salinity Reading (PPT):	—
Grab Sample ID	SW09-0001	Temp. Reading (°C):	7.8
Grab Date/Time	1/20/12 1700	Turbidity Reading (NTU)	6.56
Grab Dup ID	NA	Equipment running correctly?	yes
Grab Dup Date/Time	NA	Sampler Battery Voltage (Changed?):	Good

Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:

Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?

Notes: (what meter was used for site readings, etc.)

Station: PSNS 126 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: BR, BB	Weather: Sunny, Windy, 40°s	Arrival Date/Time:	1-21-12 (1345)
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NA		
Additional Dup Grab (IDs, date/time)	NA		
Composite Begin Time (date/time)	1214 1-20-12.	Sampler Report Downloaded ?	Yes via telem
Last Aliquot Taken (date/time, bott #, aliq #)	1-21-12 (1158) BTL 23/24 #8 (Dup station)		
Total Composite Sample Volume Collected	100% equally @ ~900-ml		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or N/A)?	Which parameter?:	NA	
Notes: Duplicate collected at this station			
Maintenance Needed: Typical re-sets			

Section 5. Compositing Scheme and QC Sampling			
Personnel: DM, BR, BB		Date/Time:	1-21-12 (1735)
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)	Cond. = YSI 30 Turb. = Hach 2100P (both Navy Meters)		
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
* 1. 486/20/ Y	* 7. 74/6/ Y	* 13. 43/6/ Y	* 19. 142/4/ Y
2. 181/16/ Y	8. 73/7/ Y	14. 43/5/ Y	20. 145/5/ Y
* 3. 781/ Y	* 9. 68/5/ Y	* 15. 35/3/ Y	* 21. 284/6/ Y
4. 71/18/ Y	10. 68/5/ Y	16. 35/3/ Y	22. 287/6/ Y
* 5. 94/12/ Y	* 11. 69/5/ Y	* 17. 48/3/ Y	* 23. 1901/7/ Y
6. 94/10/ Y	12. 70/5/ Y	18. 48/4/ Y	24. 1746/6/ Y
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)	Even #'s - Normal sample *Odd #s - Dup sample. Used 400 ml X 12 btls for normal sample & for dup sample		
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)	Normal sample = 4800 ml Cond. = 267 µS/cm Turb. = 8 NTU Analysis per 2011-12 PWP		
Composite Sample ID & Time:	SW09-0010 (1158) 1-21-12		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	YES		
Duplicate sample ID	SW09-0011 (1158) 1-21-12		

NOTES:

Dup Sample Cond. = 302 µS/cm
Turb = 8 NTU
Vol. = 4800-ml

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PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

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Station: 124.1	MH/CB#: 5880	Loc. Descrip. North of Bldg 357/west of DD#3	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection

Personnel: Brian Rupert/Bruce Beckwith	Weather: Overcast, high 30's	Arrival Date/Time: 12/1/11 1125	
Carry-over maintenance to do prior to set-up:	None		done?
Sampler Battery Voltage	12.84 (installed charged Batt)	Changed? Y N	New voltage - NA
Modem Battery Voltage	12.69	Changed? Y N	New voltage - NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes	Tubing Replaced? (Yes/No)	No
Telem. Box Desiccant OK (Yes/No)	Yes	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):	Calibrated Level	Lid Status?	On
Recorded level = 1.06	Level adjusted - Yes	Backflushed with DI?	No
Measured Level = 1.34	Also, cal'ed aliquot@240ML	Suction line & quick connect attached?	Yes
New Offset = -0.28		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: BR/BB	Weather: Overcast - temp low 30's	Arrival Date/Time: 1/17/12 @ 0900	
Sampler Battery Voltage	12.59	Changed? (Y) N added	New voltage —
Modem Battery Voltage	13.97	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes / OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / Normal
Recorded Level (FT)	3.80	Lids off bottles?	Yes
Measured Level (FT)	5.38	Diagnostics/Distrubutor arm check?	Yes / OK
Offset Diff (FT)	-0.76 (new)	Backflush with DI?	NO
Level Adjusted ?	Yes / New 93.58	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Prog. Dis = 0936
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)	old offset was -0.44 / Reset to 0 & then put in new offset (-0.76) level was adjusted multiple meas. were collected, as Tide was falling		

Section 3. Grab Sample Collection

Personnel CG, BB	Weather: Raining	Arrival Date/Time: 1-20-12 (1705)	
On Composite... (Bottle #/ Aliq #)	—	Conductivity Reading (µS/cm):	980
Grab Parameters Collected	TPH, FC	Salinity Reading (PPT):	—
Grab Sample ID SW09-0002	~~1-20-12 1715~~ 2nd	Temp. Reading (°C):	2.6
Grab Date/Time	1-20-12 1715	Turbidity Reading (NTU)	36.1
Grab Dup ID	NA	Equipment running correctly?	yes
Grab Dup Date/Time	NA	Sampler Battery Voltage (Changed?):	Good
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.)			

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PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS 124.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: ~~DM~~, BR, BB	Weather: Sunny, Windy, 40°s	Arrival Date/Time:	1-21-12 (1400)
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NA		
Composite Begin Time (date/time)	1-20-12 (1443)	Sampler Report Downloaded ?	Yes, via telem
Last Aliquot Taken (date/time, bott #, aliq #)	1-21-12 (1412) btl 24 3 of 4 (manually stopped)		
Total Composite Sample Volume Collected	100% equal vol. ~900 ml		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or (N/A))?:	Which parameter?:	NA	
Notes: Stopped prgm manually in field @ BTL 24 3/4			
Maintenance Needed: Typical reset			

Section 5. Compositing Scheme and QC Sampling			
Personnel: DM, BR, BB		Date/Time:	1-21-12 (1740)
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)	Cond. = YSI 30 Turb. = Hach 2100P (both are Navy Meters)		
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1. 17,870/66/ N	7. 304/30/ Y	13. 44K N	19. ↓
2. 3358/84/ N	8. 192/25/ Y	14. ↓	20. ↓
3. 7620/46/ N	9. 204/23/ Y	15. ↓	21. 34K N
4. 747/38/ ~~N~~ Y	10. 184/26/ Y	16. 44K N	22. ↓
5. 676/33/ Y	11. 126/26/ Y	17. ↓	23. ↓
6. 34734/ Y	12. 31550/7/ N	18. ↓	24. ↓
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)	Comp Contains btls 4 - 11 (~700-ml ea btl), all other btls were over range for conductivity		
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)	Cond. = 333 uS/cm Turb. = 27 NTU Vol. = ~~8600~~ 8400 ml Analysis per 2011-12 PWP		
Composite Sample ID & Time:	SW09-0009 (0127) 1-21-12		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

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PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

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Station: 124	MH/CB#:5661	Loc. Descrip. Southwest section of Bldg 460	Page: 1 of 2

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Section 1. Station Reset and Inspection

Personnel: Brian Rupert/Bruce Beckwith	Weather: Overcast, high 30's	Arrival Date/Time:	12/1/2011 12:03
Carry-over maintenance to do prior to set-up:	None		done?
Sampler Battery Voltage	12.93 (installed charged Batt)	Changed? Y N	New voltage -NA
Modem Battery Voltage	12.53	Changed? Y N	New voltage -NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Yes
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	Yes	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):	Calibrated Level	Lid Status?	On
Recorded level = 5.18	Level adjusted - Yes	Backflushed with DI?	No
Measured Level = 5.25	Also, cal'ed aliquot@240ML	Suction line & quick connect attached?	Yes
New Offset = +0.00 - after resetting to zero - level was at 5.18 on handheld		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: BR/BB	Weather: Overcast - temp Low 30's	Arrival Date/Time:	1/17/12 @ 1022
Sampler Battery Voltage	12.55	Changed? (Y) N added	New voltage —
Modem Battery Voltage	12.42	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes / OK
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / Normal
Recorded Level (FT) HH	7.74	Lids off bottles?	Yes
Measured Level (FT) IFP	~~7.95~~ 7.72	Diagnostics/Distrubutor arm check?	Yes / OK
Offset Diff (FT)	NO (old = 0.04)	Backflush with DI?	NO
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Prog. Dis. 1049
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) Note: checked & adjusted level on 1/19/12
HH = 6.25 IFP = 6.37 (New offset - 0.12) = New level 6.25'

Section 3. Grab Sample Collection

Personnel: CG, BB	Weather: Raining	Arrival Date/Time:	1-20-12 (1720)
On Composite... (Bottle #/ Aliq #)	—	Conductivity Reading (µS/cm):	1719
Grab Parameters Collected	TPH, FC	Salinity Reading (PPT):	—
Grab Sample ID	SW09-0003	Temp. Reading (°C):	4.4
Grab Date/Time	1/20/12 1730	Turbidity Reading (NTU)	21.4
Grab Dup ID	NA	Equipment running correctly?	yes
Grab Dup Date/Time	NA	Sampler Battery Voltage (Changed?):	Good
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.)			

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PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS 124 | continued from previous page | Page: 2 of 2

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: BR, BB	Weather: Sunny, Windy, 40°s	Arrival Date/Time:	1-21-12 (1415)
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage ---
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage ---
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NA		
Composite Begin Time (date/time)	1-20-12 (1421)	Sampler Report Downloaded ?	Yes, via telem
Last Aliquot Taken (date/time, bott #, aliq #)	1-21-12 (1405) btl 24 4/4		
Total Composite Sample Volume Collected	95-100% for all btls		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or N/A)?:	Which parameter?:	NA	
Notes:			
Maintenance Needed:	Re-sets		

Section 5. Compositing Scheme and QC Sampling			
Personnel: DM, BR, BB		Date/Time:	1-21-12 (1915)
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)	Cond.= YSI30 Turb.= Hach 2100P (both are Navy meters)		
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1. 1836/17/Y	7. 1420/7/Y	13. 405/6/Y	19. 351/3/Y
2. 510/13/Y	8. 1828/4/Y	14. 373/5/Y	20. 2384/3/N
3. 620/13/Y	9. 1725/6/Y	15. 31500/3/N	21. 3164/3/N
4. 1713/18/Y	10. 1670/4/Y	16. 18,050/5/N	22. 21,700/2/N
5. 1875/10/Y	11. 735/13/Y	17. 650/4/Y	23. 43,130/1/N
6. 1531/6/Y	12. 705/8/Y	18. 131/2/Y	24. 43,440/2/N
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)	Used btls 1-14 and 17-19 for comp sample. BTLs 15, 16, 20-24 were not used due to being over-range for conductivity		
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)	Cond.= 1695 µS/cm Turb.= 8 NTU Vol.= 6800-ml Analysis per 2011-12 PWP		
Composite Sample ID & Time:	SW09-0012 (0905) 1-21-12		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

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PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

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Station: 115.1	MH/CB#:4860	Loc. Descrip. South of Bldg. 879	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection

Personnel: Brian Rupert/Bruce Beckwith	Weather: Overcast, high 30's	Arrival Date/Time: 12/1/11 1050	
Carry-over maintenance to do prior to set-up:	None		done?
Sampler Battery Voltage	13.02 (installed chrged Batt)	Changed? Y N	New voltage -NA
Modem Battery Voltage	12.61	Changed? Y N	New voltage -NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	No - changed in field	Tubing Replaced? (Yes/No)	No
Telem. Box Desiccant OK (Yes/No)	Yes - needs moisture card instal.	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):	Calibrated Level	Lid Status?	On
Recorded level = 10.44	Level adjusted - Yes	Backflushed with DI?	No
Measured Level = 10.34	Also, cal'ed aliquot@240ML	Suction line & quick connect attached?	Yes
New Offset = -.10		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: BR/BB	Weather: Overcast - temp low 30's	Arrival Date/Time: 1/17/12 @ 1100	
Sampler Battery Voltage	12.59	Changed? Y (N)	New voltage —
Modem Battery Voltage	13.97	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / Normal
Recorded Level (FT)	11.55	Lids off bottles?	Yes
Measured Level (FT)	11.68	Diagnostics/Distrubutor arm check?	Yes / OK
Offset Diff (FT)	+0.04	Backflush with DI?	NO
Level Adjusted ?	Yes / New = 11.6079	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Prog. Dis. 1114
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)			

Section 3. Grab Sample Collection

Personnel: CG, BB	Weather: Raining	Arrival Date/Time:	1-20-12 (1815)
On Composite... (Bottle #/ Aliq #)	—	Conductivity Reading (µS/cm):	176
Grab Parameters Collected	TPH, FC	Salinity Reading (PPT):	—
Grab Sample ID	SW09-0006	Temp. Reading (°C):	2.1
Grab Date/Time	~~BB~~ NA 1/20/12 1827	Turbidity Reading (NTU)	7.59
Grab Dup ID	NA	Equipment running correctly?	Yes
Grab Dup Date/Time	NA	Sampler Battery Voltage (Changed?):	Good
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.)			

Station: PSNS 115.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR, BB	Weather: Clear, Windy, 40°s	Arrival Date/Time: 1-21-12 (1430)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	1-20-12 (1205)	Sampler Report Downloaded ?	Yes - tclem
Last Aliquot Taken (date/time, bott #, aliq #)	1-21-12 (1149) BTL 24 4/4		
Total Composite Sample Volume Collected	generally 100%, several btls ~850-900 ml		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or N/A)?:	Which parameter?:	NA	
Notes: BTLs 1-8 contained "floaters" - were noteably turbid, BTL #8 has sediment and other settleable detritus			
Maintenance Needed: Re-sets			

Section 5. Compositing Scheme and QC Sampling

Personnel: DM, BR, BB — Date/Time: 1-21-12 (1640)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond. = YSI 30 (Navy meter) Turb. = Hach 2100P (Navy Meter)

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 3832/15/ N	7. 388/12 / Y	13. 3713/6 / X N	19. 26/2 / Y
2. 262/29/ X Y	8. 230/37 / Y	14. 121/5 / Y	20. 44/3/ Y
3. 69 /46/ Y	9. 137/7 / Y	15. 25/3 / Y	21. 78/4/ Y
4. 50/31 / Y	10. 238/7 / Y	16. 19/3 / Y	22. 113/5/ Y
5. 56/16 / Y	11. 289/7 / Y	17. 18/3/ Y	23. +6 hrs after last rain
6. 131/12 / Y	12. 6780/4 / X N	18. 18/2/ Y	24. Same as above

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Used bottles 2-11, 14-22. BTL's 1, 12 & 13 were over range for cond.

BTL's 23 & 24 not used because they were >6 hrs after last rain * Comp btl's = 400 ml ea.

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 112 Turb = 14 Vol. = 7600-ml Analysis = per 2011-12 PWP

Composite Sample ID & Time:	SW09-0008 (0949)
Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 84.1	MH/CB#: 551	Loc. Descrip. Southeast section of Bldg 983	Page: 1 of ___ pages per station

Section 1. Station Reset and Inspection

Personnel: Brian Rupert/Bruce Beckwith	Weather: Overcast, high 30's	Arrival Date/Time: 12/1/11 1030	
Carry-over maintenance to do prior to set-up:	None		done?
Sampler Battery Voltage	12.87 (installed charged Batt)	Changed? Y N	New voltage - NA
Modem Battery Voltage	12.14	Changed? Y N	New voltage - NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Yes
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes	Tubing Replaced? (Yes/No)	No
Telem. Box Desiccant OK (Yes/No)	Yes	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):	Calibrated Level	Lid Status?	On
Recorded level = 6.78	Level adjusted - Yes	Backflushed with DI?	No
Measured Level = 6.38	Also, cal'ed aliquot@240ML	Suction line & quick connect attached?	Yes
New Offset = -0.40		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: BR/BB	Weather: Overcast-temp low 30's	Arrival Date/Time:	1/17/12 @ 1225
Sampler Battery Voltage	12.26	Changed? Y (N)	New voltage —
Modem Battery Voltage	12.56	Changed? (Y) N Added	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes / OK
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / OK / Normal
Recorded Level (FT)	7.93	Lids off bottles?	Yes
Measured Level (FT)	7.13	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	-0.24	Backflush with DI?	NO
Level Adjusted ?	Yes - new level = 7.13	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Prog Dis. 11:39
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)	Changed Desiccant packs(3) - In telem. Box		

Section 3. Grab Sample Collection

Personnel: CG, BB	Weather: Raining / ~~Snowing~~ BJB	Arrival Date/Time:	1-20-12 (1730)
On Composite... (Bottle #/ Aliq #)	-	Conductivity Reading (µS/cm):	833
Grab Parameters Collected	TPH, FC	Salinity Reading (PPT):	
Grab Sample ID	SW9-0004	Temp. Reading (°C):	4.4
Grab Date/Time	1/20/12 1745	Turbidity Reading (NTU)	21.4
Grab Dup ID	NA	Equipment running correctly?	Yes
Grab Dup Date/Time	NA	Sampler Battery Voltage (Changed?):	Good
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:	floating material		
Storm Contoller notified (Y or N/A)?:	NA	Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.)			

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS OB4.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR, BB	Weather: Sunny, Windy, 40's	Arrival Date/Time: 1-21-12 ~~(1345)~~ (1445)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	No		
Composite Begin Time (date/time)	1-20-12 (1339)	Sampler Report Downloaded ?	Yes - Telem
Last Aliquot Taken (date/time, bott #, aliq #)	1-21-12 BTL 24 4-4 (1323)		
Total Composite Sample Volume Collected	100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or ~~N~~/A)?	Which parameter?:	NA	
Notes: Notable "floaters" in first 8 btls			
Maintenance Needed: Re-set, ~~replace fuse in Sampler power~~ wrong site for this, DM 015			

Section 5. Compositing Scheme and QC Sampling

Personnel: DM, BR | Date/Time: 1-21-12 (1540)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Conductivity = YSI 30 (Navy Meter) Turbidity = 2100P Hach (Navy Meter)

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1 879/61.5/Y	7 142/30/Y	13 50/12/Y	19 27/6/Y
2 219/53/Y	8 127/22/Y	14 30/9/Y	20 90/1/Y
3 214/50/Y	9 130/14/Y	15 26/8/Y	21 111/7/Y
4 295/40/Y	10 112/13/Y	16 21/6/Y	22 NA - base flow
5 842/32/Y	11 97/16/Y	17 19/5/Y	23 NA - base flow
6 306/33/Y	12 56/19/Y	18 22/6/Y	24 NA - base flow

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Used 400-ml ~~for~~ from each bottle, bottles 1-21, btls 22-24 were not used in comp samples because they were beyond 6 hrs after last rain

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 178 µs/cm Turb. = 23 ntu Vol. = 8400 Analysis = per 2011-12 PWP

Composite Sample ID & Time: SW09-00087 (1023)

Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 015	**MH/CB#: A41**	**Loc. Descrip.** South Side of McD's (Bldg 1019) drive through lane.	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection

Personnel: Brian Rupert/Bruce Beckwith	Weather: Overcast, high 30's	Arrival Date/Time: 12/1/11 1000	
Carry-over maintenance to do prior to set-up:	None		done?
Sampler Battery Voltage	12.76 (added sampler batt)	Changed? Y N	New voltage - NA
Modem Battery Voltage	12.43	Changed? Y N	New voltage - NA
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	*Yes - correct*
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Yes
Trands. Desiccant OK (Yes/No)	Yes	Tubing Replaced? (Yes/No)	No
Telem. Box Desiccant OK (Yes/No)	Yes	Normal Smpler Program or Dup. ?	Normal
Modem Status	On - working	Bottles Loaded ?	Yes
Notes (including channel condition):	Calibrated Level	Lid Status?	On
Recorded level = 7.04	Level adjusted - Yes	Backflushed with DI?	No
Measured Level = 7.71	Also, cal'ed aliquot@240ML	Suction line & quick connect attached?	Yes
New Offset = +0.67		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: BR/BB	Weather: Overcast, temp Low 30's	Arrival Date/Time: 1300	
Sampler Battery Voltage 12.34	12.34 v	Changed? Y (N)	New voltage —
Modem Battery Voltage 12.79	12.79 v	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK? OK	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes / OK
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / OK - Normal
Recorded Level (FT) HH	5.14	Lids off bottles?	Yes
Measured Level (FT) IFP	6.16	Diagnostics/Distrubutor arm check?	Yes / OK
Offset Diff (FT)	1.021	Backflush with DI?	NO
Level Adjusted ?	Y / new offset = -33.76	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	Disch. 13:31
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. = (>10% adj. offset); Offset =	New Rec Val =

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) old offset -34.78 / old Sonde changed out w/ new one - this one is not pressure compensated.

Section 3. Grab Sample Collection

Personnel: CG, BB	Weather: Raining	Arrival Date/Time: 1-20-12 (1745)	
On Composite... (Bottle #/ Aliq #)	—	Conductivity Reading (µS/cm):	300
Grab Parameters Collected	TPH FC	Salinity Reading (PPT):	—
Grab Sample ID	SW09-0005	Temp. Reading (°C):	2.3
Grab Date/Time	1/20/12 1800	Turbidity Reading (NTU)	41.4
Grab Dup ID	NA	Equipment running correctly?	Yes
Grab Dup Date/Time	NA	Sampler Battery Voltage (Changed?):	Good
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.)			

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | Telemetry, 24-1L bottle set-up | Taylor Associates, Inc.

Station: PSNS015 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR, BB	Weather: Sunny, Windy, 40's	Arrival Date/Time: 1-21-12 (1315)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NA		
Composite Begin Time (date/time)	1-20-12 (1313)	Sampler Report Downloaded ?	Yes, telem
Last Aliquot Taken (date/time, bott #, aliq #)	1-21-12 (1257) BTL 24 4/4		
Total Composite Sample Volume Collected	100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or N/A)?	Which parameter?:	NA	
Notes: Water has somewhat high turbidity w/ fine-grained, settleable material in wedge bottles			
Maintenance Needed: Re-sets, Autosampler power cable had blown fuse - needs replacement.			

Section 5. Compositing Scheme and QC Sampling

Personnel: DM, BR, BB | Date/Time: 1-21-12 (1955)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond. = YSI 30 Turb. = Hach 2100P both are Navy Meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 1633/168/ Y	7. 200/ 41/ Y	13. 77/24/ Y	19. 85/8/ Y
2. 492/168/ Y	8. 163/ 40/ Y	14. 71/18/ Y	20. 97/11/ Y
3. 328/78/ Y	9. 149/38/ Y	15. 70/13/ Y	21. 105/13/ Y
4. 280/65/ Y	10. 150/28/ Y	16. 65/4/ Y	22. 251/17/ Y X
5. 394/62/ Y	11. 150/25/ Y	17. 68/11/ Y	23. 99/23/ Y X
6. 260/48/ Y	12. 108/46/ Y	18. 72/10/ Y	24. 504/27/ Y X

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Cond. = 233 µs/cm Turb. = 39 Vol. = 8400 ml Analysis per 2011-12 PWP

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Used btls 1-21 for comp. Did not use btls 22-24 because they were 76 hrs post rainfall end

Composite Sample ID & Time: SW09-0013 (~~1257~~) 1-21-12 (0957)

Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

SAMPLE CHAIN OF CUSTODY FORM

Stormwater Event #09

Date: 1/20/2012
Page: 1 of 1
Project No.: N4523A10MP00034 Amend.1
Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Sample Label	Station ID	Collection Date/Time (1/20/2012)	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings (BJB NTU / µS BJB EM)		Temp °C
SW09-001	PSNS126	1700	SW						X						2	Grab	09	91.7	6.56	2.8
SW09-002	PSNS124.1	1715	SW						X						2	Grab	09	980	36.1	2.6
SW09-003	PSNS124	1730	SW						X						1	Grab	09	1719	21.4	4.4
SW09-004	PSNS84.1	1745	SW						X						1	Grab	09	*1070	11.5	3.0
SW09-005	PSNS015	1800	SW						X						1	Grab	09	300	41.4	2.3
SW09-006	PSNS115.1	1827	SW						X						1	Grab	09	176	7.59	2.1
																		µS/cm	NTU	
																		*floating stuff		

Relinquished by: BG Beckwith 1/21/12 1800
Signature Date Time
BG Beckwith TEC
Printed Name Company

Received by: 1/21/12 1800
Signature
Brian Rupert
Printed Name

Total # of Containers:
Shipment Method:
Sample Disposition:

Relinquished by: 1/21/12 2200
Signature Date Time
Brian Rupert TEC
Printed Name Company

Received by: 1/21/12 2200
Signature
JM Brandenberger
Printed Name

Distribution:
1) PNNL
2) CAS
3) TAI

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/21/2012

Page: _____ of _____

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Sample Label	Station ID	Collection Date/Time (1/21/2012)	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity ①					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings	
SW09-0007	PSNS 084.1	1023	SW	X	X	X	X	X							1	C	09	178	23
SW09-0008	PSNS 115.1	0949	SW	X	X	X	X	X							1	C	09	112	14
SW09-0009	PSNS 124.1	0127	SW	X	X	X	X	X							1	C	09	333	27
SW09-0010	PSNS 126	1158	SW	X	X	X	X	X							1	C	09	267	8
SW09-0011	PSNS 126 DUP	1158	SW	X	X	X	X	X							1	C	09	302	8
SW09-0012	PSNS 124	0905	SW	X	X	X	X	X							1	C	09	1695	8
SW09-0013	PSNS 015	0957	SW	X	X	X	X	X							1	C	09	233	39

DM

Relinquished by: _____ Signature; 1/21/12 Date; 2200 Time; Brian Rupert Printed Name; TEC Company

Received by: _____ Signature; 1/21/12 2200 Time; JM Brandenberger Printed Name

Total # of Containers:

Shipment Method:

Sample Disposition:

Relinquished by: _____ Signature; Date; Time; _____ Printed Name; Company

Received by: _____ Signature; _____ Printed Name

Distribution:
1) PNNL
2) CAS
3) TAI

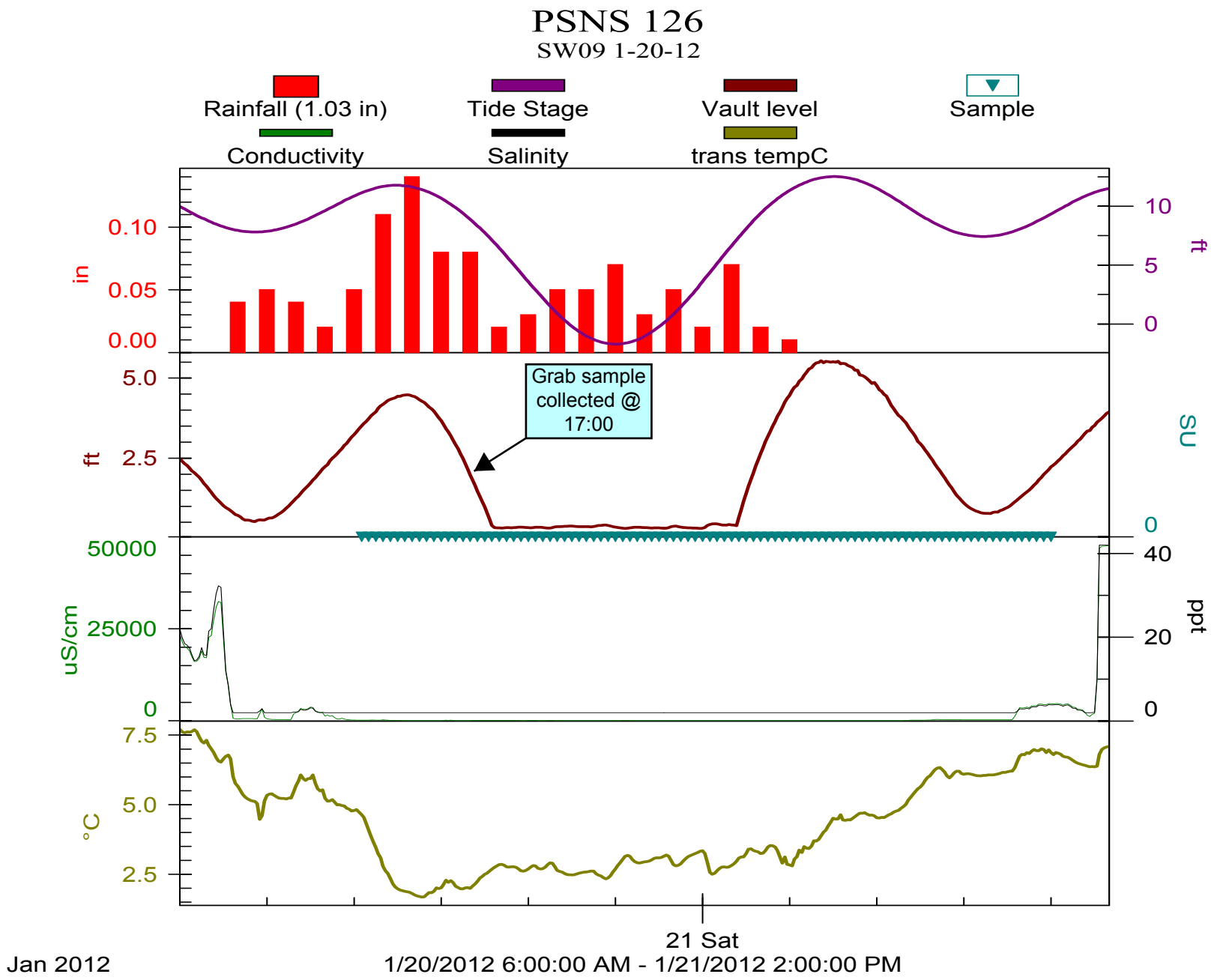
① Turbidity measured at Navy Stormwater Lab during comp'ing session

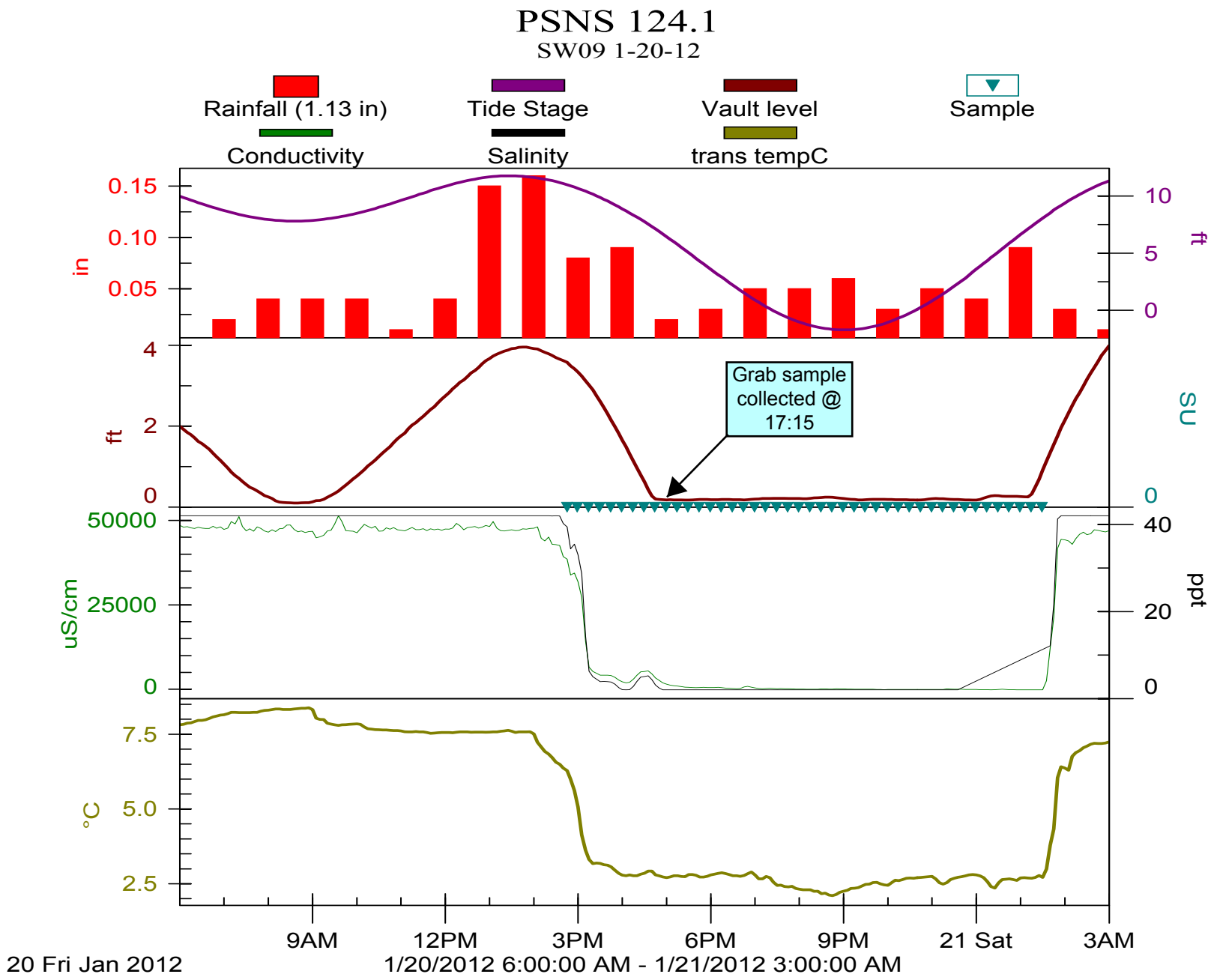
PSNS NDDSW Monitoring -- SW09 1/20/12
Stormwater Outfall Total Discharge Volume Estimation Equations

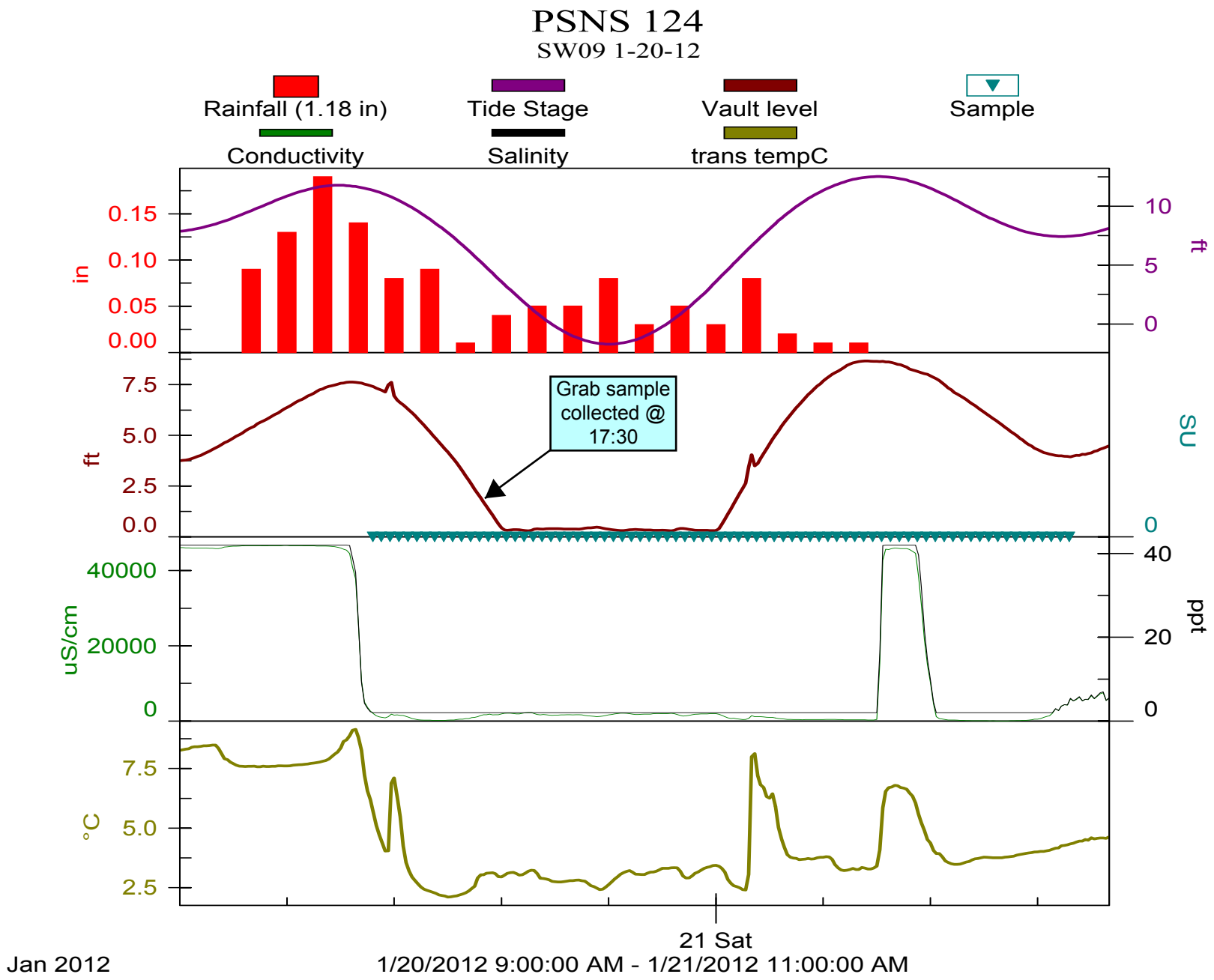
PSNS Drainage Basin	Total Basin Area (ft^2)	Type of Surface	Percentage of Drainage Basin Surface Type	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Area of Basin Surface Type with Maximum Coefficient Value Applied (ft^2)	[2]Total Discharge Volume (ft^3)
126	662,986	Impervious	98.55	653,373	0.6 – 0.9	588,036	R(591,881)
		Pervious	1.45	9,613	0.2 – 0.4	3,845	
124.1	116,000	Impervious	94.56	109,690	0.6 – 0.9	98,721	R(101,245)
		Pervious	5.44	6310	0.2 – 0.4	2,524	
124	454,000	Impervious	94.56	429,302	0.6 – 0.9	386,372	R(396,251)
		Pervious	5.44	24,698	0.2 – 0.4	9,879	
115.1	463,042	Impervious	97	449,104	0.6 – 0.9	361,422	R(366,390)
		Pervious	3	13,938	0.2 – 0.4	4,968	
96	717,872	Impervious	97	696,336	0.6 – 0.9	626,702	R(635,317)
		Pervious	3	21,536	0.2 – 0.4	8,615	
84.1	23,958	Impervious	100	23,958	0.6 – 0.9	21,562	R(21,562)
82.5	87,120	Impervious	100	87120	0.7 - 0.95	82,764	R(82,764)
81.1	965,294	Impervious	97	936,335	0.6 – 0.9	842703	R(849,074)
		Pervious	3	28,959	0.18 – 0.22	6,371	
32	208,653	Impervious	97	202,393	0.6 – 0.9	182,154	R(184,658)
		Pervious	3	6,260	0.2 – 0.4	2,504	
15	4,018,862	Impervious	50	2,009,431	0.5 – 0.8	1,607,549	R(2,411,321)
		Pervious	50	2,009,431	0.25 – 0.4	803,772	
8	553,650	Impervious	94	520,431	0.5 – 0.8	416349	R(429,637)
		Pervious	6	33,219	0.2 – 0.4	13,288	

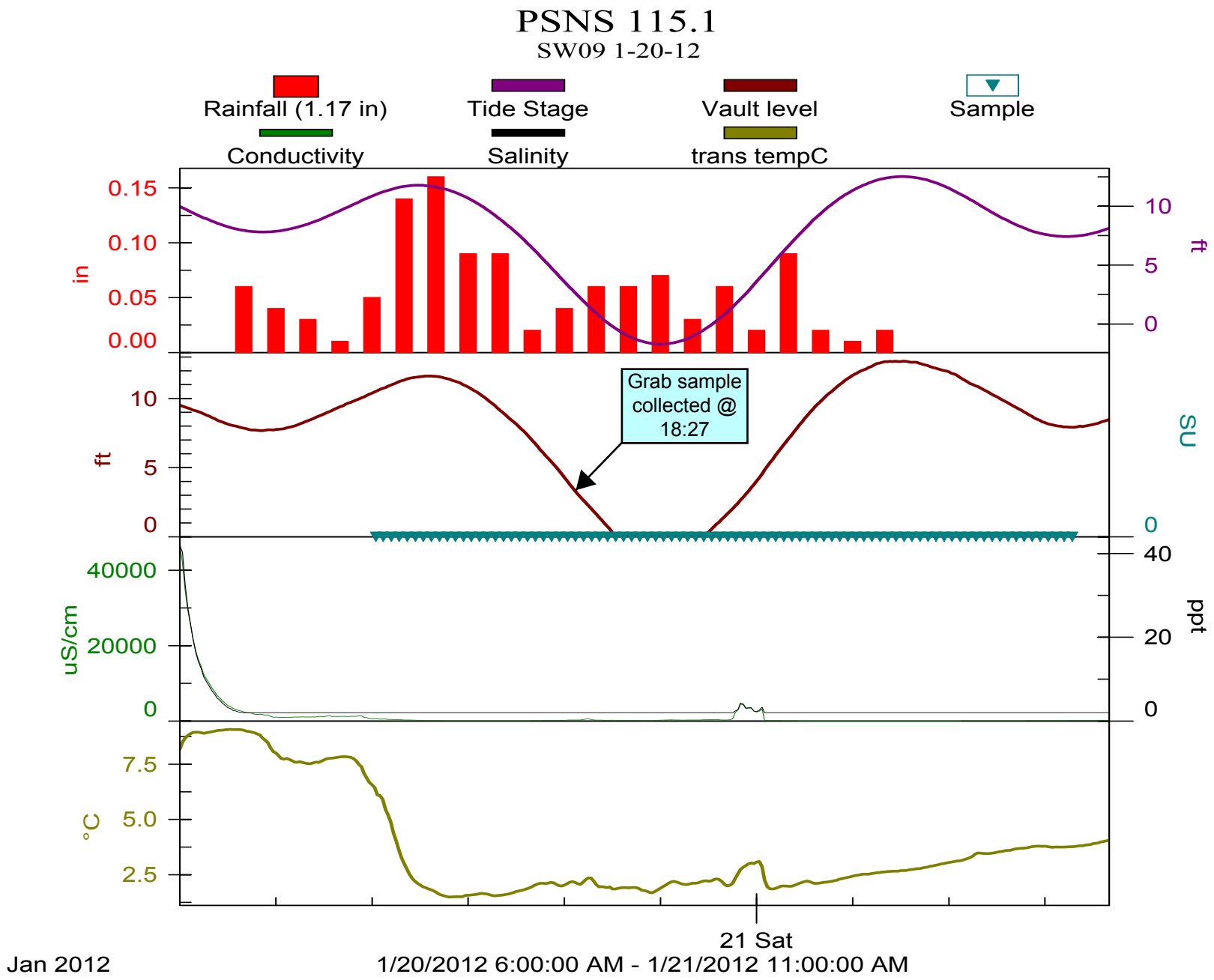
Calculation Worksheet: SW09 -- 1/20/12

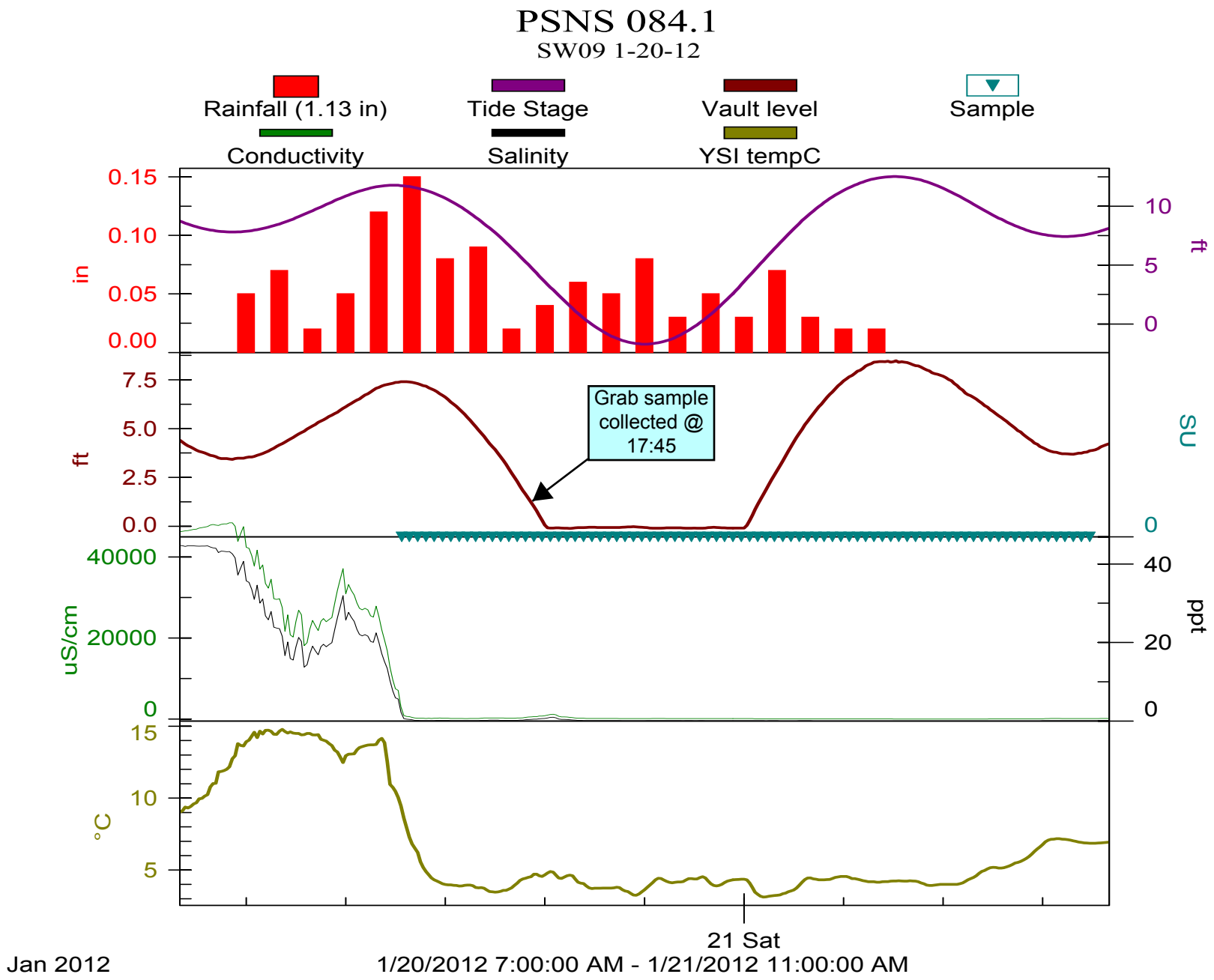
STATION	Combined Drainage Area (FT^2)	ENTER: Smpl Evnt Rain Total (in)	Sampl Evnt Rain Total (FT)	STE Runoff Vol. (gal)
126	591,881	1.03	0.0858	380,033.70
124.1	101,245	1.13	0.0942	71,318.55
124	396,251	1.18	0.0983	291,476.04
115.1	366,390	1.17	0.0975	267,226.77
84.1	21,562	1.13	0.0942	15,188.61
015	2,411,321	1.82	0.1517	2,735,753.10

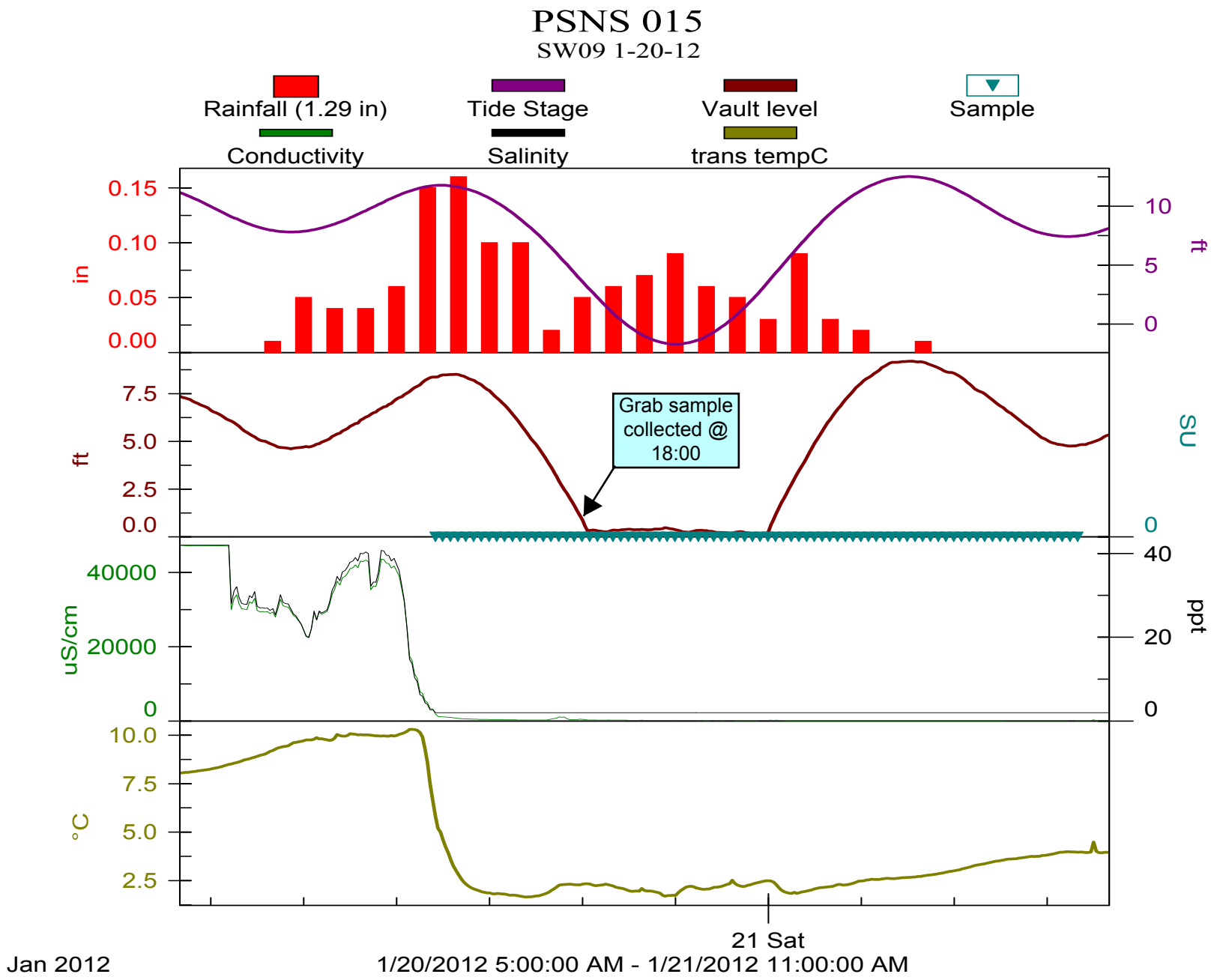

PSNS 126
SW09 1-20-12
Rainfall (1.03 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.10
0.05
0.00
ft
10
5
0
Grab sample collected @ 17:00
ft
5.0
2.5
SU
0
uS/cm
50000
25000
0
ppt
40
20
0
°C
7.5
5.0
2.5
21 Sat
Jan 2012
1/20/2012 6:00:00 AM - 1/21/2012 2:00:00 PM

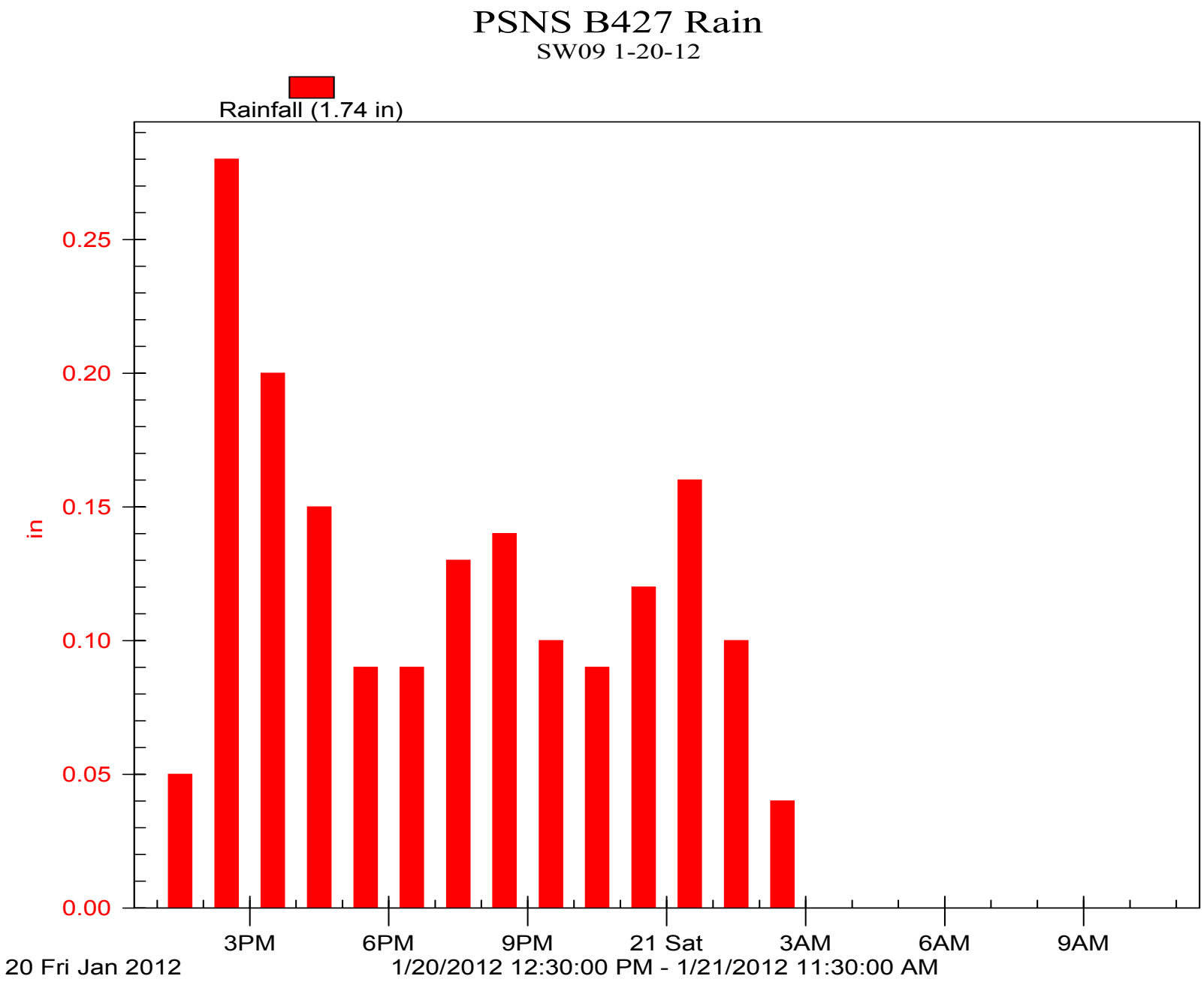

PSNS 124.1
SW09 1-20-12
Rainfall (1.13 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.15
0.10
0.05
ft
10
5
0
4
2
0
ft
SU
Grab sample collected @ 17:15
50000
25000
0
uS/cm
40
20
0
ppt
7.5
5.0
2.5
°C
9AM
12PM
3PM
6PM
9PM
21 Sat
3AM
20 Fri Jan 2012
1/20/2012 6:00:00 AM - 1/21/2012 3:00:00 AM


PSNS 124
SW09 1-20-12
Rainfall (1.18 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.15
0.10
0.05
0.00
ft
10
5
0
Grab sample collected @ 17:30
ft
7.5
5.0
2.5
0.0
SU
0
uS/cm
40000
20000
0
ppt
40
20
0
°C
7.5
5.0
2.5
21 Sat
Jan 2012
1/20/2012 9:00:00 AM - 1/21/2012 11:00:00 AM


PSNS 115.1
SW09 1-20-12
Rainfall (1.17 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
Grab sample collected @ 18:27
10
5
0
ft
SU
0
40000
20000
0
uS/cm
40
20
0
ppt
7.5
5.0
2.5
°C
21 Sat
Jan 2012
1/20/2012 6:00:00 AM - 1/21/2012 11:00:00 AM


PSNS 084.1
SW09 1-20-12
Rainfall (1.13 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
YSI tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
7.5
5.0
2.5
0.0
ft
Grab sample collected @ 17:45
SU
0
40000
20000
0
uS/cm
40
20
0
ppt
15
10
5
°C
21 Sat
Jan 2012
1/20/2012 7:00:00 AM - 1/21/2012 11:00:00 AM


PSNS 015
SW09 1-20-12
Rainfall (1.29 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
7.5
5.0
2.5
0.0
ft
Grab sample collected @ 18:00
SU
0
40000
20000
0
uS/cm
40
20
0
ppt
10.0
7.5
5.0
2.5
°C
21 Sat
Jan 2012
1/20/2012 5:00:00 AM - 1/21/2012 11:00:00 AM


PSNS B427 Rain
SW09 1-20-12
Rainfall (1.74 in)
in
0.25
0.20
0.15
0.10
0.05
0.00
3PM
6PM
9PM
21 Sat
3AM
6AM
9AM
20 Fri Jan 2012
1/20/2012 12:30:00 PM - 1/21/2012 11:30:00 AM

```
CR1000>P
1:  ComRS232
2:  ComME
3:  Com310
4:  ComSDC7
5:  ComSDC8
6:  Com320
7:  ComSDC10
8:  ComSDC11
9:  SDI-12
10:  COM2
11:  COM3
12:  COM4
14: SDM-SIO4
32..47: SDM-SIO1
Select: 10
Enter timeout (secs): 60
 opening 10
?
*** Model 6712  HW Rev:     B0  SW Rev: 2.34.0000  ID 1313656803
> ??
*** Model 6712  HW Rev:     B0  SW Rev: 2.34.0000  ID 1313656803
> ??
*** Model 6712  HW Rev:     B0  SW Rev: 2.34.0000  ID 1313656803
> REPORT
SAMPLER ID# 1313656803  15:39 21-JAN-12
  Hardware:     B0  Software: 2.34
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS126DUP"
 SITE DESCRIPTION:
    "PSNS126DUP"
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 19 ft SUCTION LINE
 13 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
  2 BOTTLES/SAMPLE
   8 SAMPLES/BOTTLE
     ----------
      VOLUME:
   120 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
```

```
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
 QUICK VIEW/CHANGE
     ----------
 TAKE MEASUREMENTS
  EVERY  1 MINUTES
     ----------
  DUAL SAMPLER OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
     ----------
    NO PERIODIC
   SERIAL OUTPUT
     ----------
    INTERROGATOR
     CONNECTOR
  POWER ALWAYS ON
     ----------
     ----------
     ----------
   NO RAIN GAUGE
     ----------
  NO SDI-12 SONDE
AUTO SDI-12 SCAN OFF
     ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
     ----------
  0 ANALOG OUTPUTS
     ----------
 NO EXTERNAL MODEM
     ----------
      NO ALARM
   CONDITIONS SET
     ----------
     ----------
----------------------------------------
SAMPLER ID# 1313656803  15:39 21-JAN-12
  Hardware:     B0  Software: 2.34
********** SAMPLING RESULTS **********
   SITE: PSNS126DUP
PROGRAM: PSNS126DUP
Program Started at 10:01 TU 17-JAN-12
Nominal Sample Volume =  120 ml
                                  COUNT
                                    TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
```

		10:01	PGM DISABLED		
		FR 20-JAN-12			
		12:14	PGM ENABLED		
1,8	1-2	12:14	E		479
2,8	1-2	12:28	F		476
3,8	1-2	12:43	F		476
4,8	1-2	12:58	F		475
5,8	1-2	13:13	F		476
6,8	1-2	13:28	F		475
7,8	1-2	13:43	F		481
8,8	1-2	13:58	F		481
1,8	3-4	14:13	F		482
2,8	3-4	14:28	F		483
3,8	3-4	14:43	F		482
4,8	3-4	14:58	F		485
5,8	3-4	15:13	F		487
6,8	3-4	15:28	F		488
7,8	3-4	15:43	F		495
8,8	3-4	15:58	F		499
1,8	5-6	16:13	F		499
2,8	5-6	16:28	F		501
3,8	5-6	16:43	F		513
4,8	5-6	16:58	F		511
5,8	5-6	17:13	F		513
6,8	5-6	17:28	F		511
7,8	5-6	17:43	F		513
8,8	5-6	17:58	F		511
1,8	7-8	18:13	F		513
2,8	7-8	18:28	F		512
3,8	7-8	18:43	F		513
4,8	7-8	18:58	F		513
5,8	7-8	19:13	F		513
6,8	7-8	19:28	F		512
7,8	7-8	19:43	F		513
8,8	7-8	19:58	F		514
1,8	9-10	20:13	F		513
2,8	9-10	20:28	F		514
3,8	9-10	20:43	F		513
4,8	9-10	20:58	F		514
5,8	9-10	21:13	F		513
6,8	9-10	21:28	F		513
7,8	9-10	21:43	F		513
8,8	9-10	21:58	F		514
1,8	11-12	22:13	F		513
2,8	11-12	22:28	F		513
3,8	11-12	22:43	F		515
4,8	11-12	22:58	F		517
5,8	11-12	23:13	F		517
6,8	11-12	23:28	F		517
7,8	11-12	23:43	F		514
8,8	11-12	23:58	F		513
		SA 21-JAN-12			
1,8	13-14	00:13	F		517
2,8	13-14	00:28	F		513
3,8	13-14	00:43	F		513
4,8	13-14	00:58	F		513
5,8	13-14	01:13	F		506
6,8	13-14	01:28	F		501
7,8	13-14	01:43	F		499
8,8	13-14	01:58	F		493
1,8	15-16	02:13	F		491
2,8	15-16	02:28	F		487

```
  3,8   15-16 02:43      F           487
  4,8   15-16 02:58      F           484
  5,8   15-16 03:13      F           483
  6,8   15-16 03:28      F           483
  7,8   15-16 03:43      F           483
  8,8   15-16 03:58      F           479
  1,8   17-18 04:13      F           481
  2,8   17-18 04:28      F           477
  3,8   17-18 04:43      F           476
  4,8   17-18 04:58      F           481
  5,8   17-18 05:13      F           480
  6,8   17-18 05:28      F           481
  7,8   17-18 05:43      F           481
  8,8   17-18 05:58      F           481
  1,8   19-20 06:13      F           487
  2,8   19-20 06:28      F           484
  3,8   19-20 06:43      F           485
  4,8   19-20 06:58      F           487
  5,8   19-20 07:13      F           490
  6,8   19-20 07:28      F           490
  7,8   19-20 07:43      F           493
  8,8   19-20 07:58      F           495
  1,8   21-22 08:13      F           494
  2,8   21-22 08:28      F           501
  3,8   21-22 08:43      F           499
  4,8   21-22 08:58      F           502
  5,8   21-22 09:13      F           505
  6,8   21-22 09:28      F           502
  7,8   21-22 09:43      F           505
  8,8   21-22 09:58      F           507
  1,8   23-24 10:13      F           505
  2,8   23-24 10:28      F           503
  3,8   23-24 10:43      F           499
  4,8   23-24 10:58      F           501
  5,8   23-24 11:13      F           503
  6,8   23-24 11:28      F           499
  7,8   23-24 11:43      F           497
  8,8   23-24 11:58      F           493
             11:58  PGM DONE 21-JAN
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
---------------------------------------
```

```
 exiting talk thru
CR1000>P
1:  ComRS232
2:  ComME
3:  Com310
4:  ComSDC7
5:  ComSDC8
6:  Com320
7:  ComSDC10
8:  ComSDC11
9:  SDI-12
10:  COM2
11:  COM3
12:  COM4
14: SDM-SIO4
32..47: SDM-SIO1
Select: 10
Enter timeout (secs): 60
 opening 10
?
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179321
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179321
> REPORT
SAMPLER ID# 3293179321  15:49 21-JAN-12
  Hardware: B2      Software: 3.26
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS124-1 "
 SITE DESCRIPTION:
    "PSNS124-1 "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 56 ft SUCTION LINE
 12 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
```

```
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
     ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
     ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
     NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 3293179321  15:49 21-JAN-12
  Hardware: B2      Software: 3.26
*********** SAMPLING RESULTS ***********
   SITE: PSNS124-1
PROGRAM: PSNS124-1
Program Started at 09:34 TU 17-JAN-12
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
              09:34  PGM DISABLED
------------- FR 20-JAN-12 -------------
              14:43  PGM ENABLED
  1,4     1   14:43      E          1262
  2,4     1   14:57      F          1250
  3,4     1   15:12      F          1258
  4,4     1   15:27      F          1251
  1,4     2   15:42      F          1286
  2,4     2   15:57      F          1297
  3,4     2   16:12      F          1302
  4,4     2   16:27      F          1320
  1,4     3   16:42      F          1323
  2,4     3   16:57      F          1327
  3,4     3   17:12      F          1337
  4,4     3   17:27      F          1331
  1,4     4   17:42      F          1332
  2,4     4   17:57      F          1328
  3,4     4   18:12      F          1332
```

4,4	4	18:27	F	1333
1,4	5	18:42	F	1334
2,4	5	18:57	F	1336
3,4	5	19:12	F	1335
4,4	5	19:27	F	1361
1,4	6	19:42	F	1334
2,4	6	19:57	F	1332
3,4	6	20:12	F	1331
4,4	6	20:27	F	1334
1,4	7	20:42	F	1334
2,4	7	20:57	F	1331
3,4	7	21:12	F	1341
4,4	7	21:27	F	1337
1,4	8	21:42	F	1337
2,4	8	21:57	F	1338
3,4	8	22:12	F	1344
4,4	8	22:27	F	1345
1,4	9	22:42	F	1338
2,4	9	22:57	F	1332
3,4	9	23:12	F	1344
4,4	9	23:27	F	1343
1,4	10	23:42	F	1344
2,4	10	23:57	F	1344
----------	SA 21-JAN-12			----------
3,4	10	00:12	F	1343
4,4	10	00:27	F	1337
1,4	11	00:42	F	1338
2,4	11	00:57	F	1343
3,4	11	01:12	F	1338
4,4	11	01:27	F	1332
1,4	12	01:42	F	1314
2,4	12	01:57	F	1320
3,4	12	02:12	F	1319
4,4	12	02:27	F	1301
1,4	13	02:42	F	1289
2,4	13	02:57	F	1290
3,4	13	03:12	F	1278
4,4	13	03:27	F	1279
1,4	14	03:42	F	1278
2,4	14	03:57	F	1298
3,4	14	04:12	F	1274
4,4	14	04:27	F	1267
1,4	15	04:42	F	1264
2,4	15	04:57	F	1267
3,4	15	05:12	F	1297
4,4	15	05:27	F	1273
1,4	16	05:42	F	1278
2,4	16	05:57	F	1274
3,4	16	06:12	F	1279
4,4	16	06:27	F	1290
1,4	17	06:42	F	1277
2,4	17	06:57	F	1301
3,4	17	07:12	F	1302
4,4	17	07:27	F	1308
1,4	18	07:42	F	1311
2,4	18	07:57	F	1314
3,4	18	08:12	F	1326
4,4	18	08:27	F	1324
1,4	19	08:42	F	1332
2,4	19	08:57	F	1367
3,4	19	09:12	F	1333
4,4	19	09:27	F	1355
1,4	20	09:42	F	1339

```
  2,4    20   09:57      F          1349
  3,4    20   10:12      F          1361
  4,4    20   10:27      F          1343
  1,4    21   10:42      F          1367
  2,4    21   10:57      F          1337
  3,4    21   11:12      F          1343
  4,4    21   11:27      F          1351
  1,4    22   11:42      F          1350
  2,4    22   11:57      F          1350
  3,4    22   12:12      F          1323
  4,4    22   12:27      F          1361
  1,4    23   12:42      F          1339
  2,4    23   12:57      F          1289
  3,4    23   13:12      F          1281
  4,4    23   13:27      F          1303
  1,3    24   13:42      F          1308
  2,3    24   13:57      F          1277
  3,3    24   14:12      F          1284
              14:20  MANUAL PAUSE
              14:20  PGM STOPPED 21-JAN
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
---------------------------------------
```

```
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179322
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179322
> REPORT
SAMPLER ID# 3293179322  14:22 21-JAN-12
  Hardware: B2      Software: 3.26
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS 124  "
 SITE DESCRIPTION:
    "PSNS 124  "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 20 ft SUCTION LINE
 16 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
```

```
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
     ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
     ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
     NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 3293179322  14:22 21-JAN-12
  Hardware: B2      Software: 3.26
********** SAMPLING RESULTS **********
   SITE: PSNS 124
PROGRAM: PSNS 124
Program Started at 10:48 TU 17-JAN-12
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
              10:48  PGM DISABLED
------------- FR 20-JAN-12 -------------
              14:21  PGM ENABLED
  1,4     1   14:21      E           511
  2,4     1   14:35      F           508
  3,4     1   14:50      F           507
  4,4     1   15:05      F           513
  1,4     2   15:20      F           519
  2,4     2   15:35      F           527
  3,4     2   15:50      F           531
  4,4     2   16:05      F           533
  1,4     3   16:20      F           532
  2,4     3   16:35      F           537
  3,4     3   16:50      F           543
  4,4     3   17:05      F           549
  1,4     4   17:20      F           555
  2,4     4   17:35      F           561
  3,4     4   17:50      F           575
  4,4     4   18:05      F           573
  1,4     5   18:20      F           575
  2,4     5   18:35      F           575
  3,4     5   18:50      F           575
  4,4     5   19:05      F           575
  1,4     6   19:20      F           573
  2,4     6   19:35      F           573
  3,4     6   19:50      F           573
  4,4     6   20:05      F           575
  1,4     7   20:20      F           573
  2,4     7   20:35      F           573
  3,4     7   20:50      F           573
  4,4     7   21:05      F           575
  1,4     8   21:20      F           573
  2,4     8   21:35      F           575
  3,4     8   21:50      F           573
  4,4     8   22:05      F           570
  1,4     9   22:20      F           575
  2,4     9   22:35      F           573
```

3,4	9	22:50	F	575
4,4	9	23:05	F	568
1,4	10	23:20	F	573
2,4	10	23:35	F	573
3,4	10	23:50	F	573
----------	SA 21-JAN-12			----------
4,4	10	00:05	F	573
1,4	11	00:20	F	562
2,4	11	00:35	F	556
3,4	11	00:50	F	551
4,4	11	01:05	F	543
1,4	12	01:20	F	537
2,4	12	01:35	F	532
3,4	12	01:50	F	531
4,4	12	02:05	F	525
1,4	13	02:20	F	525
2,4	13	02:35	F	519
3,4	13	02:50	F	516
4,4	13	03:05	F	513
1,4	14	03:20	F	515
2,4	14	03:35	F	515
3,4	14	03:50	F	510
4,4	14	04:05	F	511
1,4	15	04:20	F	513
2,4	15	04:35	F	513
3,4	15	04:50	F	513
4,4	15	05:05	F	513
1,4	16	05:20	F	514
2,4	16	05:35	F	517
3,4	16	05:50	F	513
4,4	16	06:05	F	513
1,4	17	06:20	F	519
2,4	17	06:35	F	519
3,4	17	06:50	F	521
4,4	17	07:05	F	525
1,4	18	07:20	F	525
2,4	18	07:35	F	525
3,4	18	07:50	F	531
4,4	18	08:05	F	535
1,4	19	08:20	F	531
2,4	19	08:35	F	537
3,4	19	08:50	F	537
4,4	19	09:05	F	539
1,4	20	09:20	F	545
2,4	20	09:35	F	537
3,4	20	09:50	F	538
4,4	20	10:05	F	537
1,4	21	10:20	F	537
2,4	21	10:35	F	537
3,4	21	10:50	F	537
4,4	21	11:05	F	537
1,4	22	11:20	F	537
2,4	22	11:35	F	537
3,4	22	11:50	F	537
4,4	22	12:05	F	537
1,4	23	12:20	F	531
2,4	23	12:35	F	531
3,4	23	12:50	F	526
4,4	23	13:05	F	529
1,4	24	13:20	F	527
2,4	24	13:35	F	522
3,4	24	13:50	F	525
4,4	24	14:05	F	519

```
                                  PSNS124 Smplr Rpt
             14:06  PGM DONE 21-JAN
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
----------------------------------------
```

```
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179316
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179316
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 3293179316
> REPORT
SAMPLER ID# 3293179316  14:27 21-JAN-12
  Hardware: B2      Software: 3.26
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS115-1 "
 SITE DESCRIPTION:
    "PSNS115-1 "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 44 ft SUCTION LINE
 21 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
```

```
    ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
    ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
    ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
    NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 3293179316  14:27 21-JAN-12
  Hardware: B2      Software: 3.26
*********** SAMPLING RESULTS ***********
   SITE: PSNS115-1
PROGRAM: PSNS115-1
Program Started at 11:14 TU 17-JAN-12
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
              11:14  PGM DISABLED
------------- FR 20-JAN-12 -------------
              12:05  PGM ENABLED
  1,4     1   12:05      E          1049
  2,4     1   12:19      F          1050
  3,4     1   12:34      F          1049
  4,4     1   12:49      F          1049
  1,4     2   13:04      F          1049
  2,4     2   13:19      F          1044
  3,4     2   13:34      F          1049
  4,4     2   13:49      F          1044
  1,4     3   14:04      F          1049
  2,4     3   14:19      F          1049
  3,4     3   14:34      F          1044
  4,4     3   14:49      F          1061
  1,4     4   15:04      F          1067
  2,4     4   15:19      F          1073
  3,4     4   15:34      F          1074
  4,4     4   15:49      F          1091
  1,4     5   16:04      F          1092
  2,4     5   16:19      F          1104
  3,4     5   16:34      F          1121
  4,4     5   16:49      F          1124
  1,4     6   17:04      F          1139
  2,4     6   17:19      F          1148
  3,4     6   17:34      F          1163
  4,4     6   17:49      F          1176
  1,4     7   18:04      F          1181
  2,4     7   18:19      F          1208
  3,4     7   18:34      F          1223
  4,4     7   18:49      F          1232
  1,4     8   19:04      F          1273
  2,4     8   19:19      F          1346
  3,4     8   19:34      F          1341
  4,4     8   19:49      F          1462
```

1,4	9	20:04	F	1401
2,4	9	20:19	F	1340
3,4	9	20:34	F	3602
4,4	9	20:49	F	1350
1,4	10	21:04	F	1331
2,4	10	21:19	F	1313
3,4	10	21:34	F	1345
4,4	10	21:49	F	1340
1,4	11	22:04	F	1331
2,4	11	22:19	F	1328
3,4	11	22:34	F	1293
4,4	11	22:49	F	1262
1,4	12	23:04	F	1260
2,4	12	23:19	F	1238
3,4	12	23:34	F	1214
4,4	12	23:49	F	1202
----------	SA 21-JAN-12		----------	
1,4	13	00:04	F	1188
2,4	13	00:19	F	1177
3,4	13	00:34	F	1154
4,4	13	00:49	F	1145
1,4	14	01:04	F	1133
2,4	14	01:19	F	1110
3,4	14	01:34	F	1104
4,4	14	01:49	F	1098
1,4	15	02:04	F	1091
2,4	15	02:19	F	1079
3,4	15	02:34	F	1073
4,4	15	02:49	F	1065
1,4	16	03:04	F	1067
2,4	16	03:19	F	1056
3,4	16	03:34	F	1055
4,4	16	03:49	F	1057
1,4	17	04:04	F	1058
2,4	17	04:19	F	1050
3,4	17	04:34	F	1050
4,4	17	04:49	F	1044
1,4	18	05:04	F	1055
2,4	18	05:19	F	1050
3,4	18	05:34	F	1050
4,4	18	05:49	F	1056
1,4	19	06:04	F	1051
2,4	19	06:19	F	1067
3,4	19	06:34	F	1073
4,4	19	06:49	F	1075
1,4	20	07:04	F	1073
2,4	20	07:19	F	1087
3,4	20	07:34	F	1080
4,4	20	07:49	F	1081
1,4	21	08:04	F	1097
2,4	21	08:19	F	1103
3,4	21	08:34	F	1102
4,4	21	08:49	F	1106
1,4	22	09:04	F	1110
2,4	22	09:19	F	1115
3,4	22	09:34	F	1115
4,4	22	09:49	F	1117
1,4	23	10:04	F	1115
2,4	23	10:19	F	1112
3,4	23	10:34	F	1110
4,4	23	10:49	F	1099
1,4	24	11:04	F	1104
2,4	24	11:19	F	1109

```
                                  PSNS115.1 Smplr Rpt
  3,4    24   11:34      F          1100
  4,4    24   11:49      F          1097
              11:50  PGM DONE 21-JAN
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
---------------------------------------
```

```
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 2425546782
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 2425546782
> REPORT
SAMPLER ID# 2425546782  14:29 21-JAN-12
  Hardware: B2      Software: 3.26
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS84-1  "
 SITE DESCRIPTION:
    "PSNS84-1  "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 22 ft SUCTION LINE
 15 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
NO SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
      ENABLE:
 0 PAUSE & RESUMES
     ----------
 NO DELAY TO START
     ----------
     ----------
     ----------
  LIQUID DETECT ON
    NO RAIN GAGE
     ----------
    NO YSI SONDE
     ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
     ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
     ----------
  PUMP COUNTS FOR
```

```
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
     ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
     ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
     ----------
     NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 2425546782  14:30 21-JAN-12
  Hardware: B2      Software: 3.26
********** SAMPLING RESULTS **********
   SITE: PSNS84-1
PROGRAM: PSNS84-1
Program Started at 11:39 TU 17-JAN-12
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
              11:39  PGM DISABLED
------------- FR 20-JAN-12 -------------
              13:39  PGM ENABLED
  1,4     1   13:39      E           484
  2,4     1   13:53      F           486
  3,4     1   14:08      F           492
  4,4     1   14:23      F           492
  1,4     2   14:38      F           493
  2,4     2   14:53      F           496
  3,4     2   15:08      F           499
  4,4     2   15:23      F           502
  1,4     3   15:38      F           505
  2,4     3   15:53      F           509
  3,4     3   16:08      F           511
  4,4     3   16:23      F           520
  1,4     4   16:38      F           522
  2,4     4   16:53      F           524
  3,4     4   17:08      F           534
  4,4     4   17:23      F           536
  1,4     5   17:38      F           546
  2,4     5   17:53      F           548
  3,4     5   18:08      F           558
  4,4     5   18:23      F           555
  1,4     6   18:38      F           562
  2,4     6   18:53      F           560
  3,4     6   19:08      F           558
  4,4     6   19:23      F           558
  1,4     7   19:38      F           558
  2,4     7   19:53      F           556
  3,4     7   20:08      F           556
  4,4     7   20:23      F           558
  1,4     8   20:38      F           560
  2,4     8   20:53      F           558
  3,4     8   21:08      F           560
  4,4     8   21:23      F           558
  1,4     9   21:38      F           558
  2,4     9   21:53      F           558
```

3,4	9	22:08	F	558
4,4	9	22:23	F	559
1,4	10	22:38	F	562
2,4	10	22:53	F	560
3,4	10	23:08	F	558
4,4	10	23:23	F	560
1,4	11	23:38	F	558
2,4	11	23:53	F	560
----------	SA 21-JAN-12			----------
3,4	11	00:08	F	552
4,4	11	00:23	F	546
1,4	12	00:38	F	536
2,4	12	00:53	F	534
3,4	12	01:08	F	524
4,4	12	01:23	F	522
1,4	13	01:38	F	514
2,4	13	01:53	F	512
3,4	13	02:08	F	510
4,4	13	02:23	F	504
1,4	14	02:38	F	500
2,4	14	02:53	F	498
3,4	14	03:08	F	494
4,4	14	03:23	F	495
1,4	15	03:38	F	498
2,4	15	03:53	F	493
3,4	15	04:08	F	491
4,4	15	04:23	F	490
1,4	16	04:38	F	493
2,4	16	04:53	F	491
3,4	16	05:08	F	490
4,4	16	05:23	F	491
1,4	17	05:38	F	496
2,4	17	05:53	F	498
3,4	17	06:08	F	498
4,4	17	06:23	F	498
1,4	18	06:38	F	500
2,4	18	06:53	F	504
3,4	18	07:08	F	504
4,4	18	07:23	F	504
1,4	19	07:38	F	510
2,4	19	07:53	F	509
3,4	19	08:08	F	511
4,4	19	08:23	F	509
1,4	20	08:38	F	516
2,4	20	08:53	F	516
3,4	20	09:08	F	517
4,4	20	09:23	F	522
1,4	21	09:38	F	518
2,4	21	09:53	F	519
3,4	21	10:08	F	520
4,4	21	10:23	F	522
1,4	22	10:38	F	518
2,4	22	10:53	F	518
3,4	22	11:08	F	518
4,4	22	11:23	F	512
1,4	23	11:38	F	511
2,4	23	11:53	F	508
3,4	23	12:08	F	510
4,4	23	12:23	F	506
1,4	24	12:38	F	506
2,4	24	12:53	F	506
3,4	24	13:08	F	506
4,4	24	13:23	F	496

```
                                PSNS084.1 Smplr Rpt
             13:23  PGM DONE 21-JAN
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
----------------------------------------
```

```
CR1000>P
1:  ComRS232
2:  ComME
3:  Com310
4:  ComSDC7
5:  ComSDC8
6:  Com320
7:  ComSDC10
8:  ComSDC11
9:  SDI-12
10:  COM2
11:  COM3
12:  COM4
14: SDM-SIO4
32..47: SDM-SIO1
Select: 10
Enter timeout (secs): 60
 opening 10
?
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 2425481222
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 2425481222
>
*** Model 6700  HW Rev:     B2  SW Rev: 3.26.0000  ID 2425481222
> REPORT
SAMPLER ID# 2425481222  16:36 21-JAN-12
  Hardware: B2      Software: 3.26
*********** PROGRAM SETTINGS ***********
     ----------
   PROGRAM NAME:
    "PSNS015   "
 SITE DESCRIPTION:
    "PSNS015   "
     ----------
   UNITS SELECTED:
     LENGTH: ft
     ----------
  24,  1000 ml BTLS
 22 ft SUCTION LINE
 18 ft SUCTION HEAD
0 RINSES, 0 RETRIES
     ----------
  ONE-PART PROGRAM
     ----------
      PACING:
    FLOW, EVERY
       1 PULSES
  SAMPLE AT START
     ----------
    DISTRIBUTION:
   4 SAMPLES/BOTTLE
     ----------
      VOLUME:
   240 ml SAMPLES
     ----------
      ENABLE:
  NONE PROGRAMMED
     ----------
      ENABLE:
   ONCE ENABLED,
    STAY ENABLED
  SAMPLE AT ENABLE
     ----------
```

```
     ENABLE:
 0 PAUSE & RESUMES
    ----------
 NO DELAY TO START
    ----------
    ----------
    ----------
  LIQUID DETECT ON
    NO RAIN GAGE
    ----------
    NO YSI SONDE
    ----------
  MASTER/SLAVE OFF
BTL FULL DETECT OFF
  TIMED BACKLIGHT
    ----------
  EVENT MARK SENT
 DURING PUMP CYCLE
    ----------
  PUMP COUNTS FOR
 EACH PURGE CYCLE:
   200 PRE-SAMPLE
  AUTO POST-SAMPLE
    ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
    ----------
  0 ANALOG OUTPUTS
    NO PERIODIC
   SERIAL OUTPUT
    ----------
    NO DIALOUT
   CONDITIONS SET
----------------------------------------
SAMPLER ID# 2425481222  16:36 21-JAN-12
  Hardware: B2      Software: 3.26
********** SAMPLING RESULTS **********
   SITE: PSNS015
PROGRAM: PSNS015
Program Started at 13:31 TU 17-JAN-12
Nominal Sample Volume =  240 ml
                                    COUNT
                                      TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
              13:31  PGM DISABLED
------------- FR 20-JAN-12 -------------
              13:13  PGM ENABLED
  1,4     1   13:13      E           707
  2,4     1   13:27      F           700
  3,4     1   13:42      F           703
  4,4     1   13:57      F           706
  1,4     2   14:12      F           711
  2,4     2   14:27      F           707
  3,4     2   14:42      F           712
  4,4     2   14:57      F           722
  1,4     3   15:12      F           723
  2,4     3   15:27      F           725
  3,4     3   15:42      F           736
  4,4     3   15:57      F           740
  1,4     4   16:12      F           747
  2,4     4   16:27      F           754
```

3,4	4	16:42	F	758
4,4	4	16:57	F	770
1,4	5	17:12	F	779
2,4	5	17:27	F	786
3,4	5	17:42	F	796
4,4	5	17:57	F	814
1,4	6	18:12	F	824
2,4	6	18:27	F	828
3,4	6	18:42	F	823
4,4	6	18:57	F	821
1,4	7	19:12	F	827
2,4	7	19:27	F	815
3,4	7	19:42	F	822
4,4	7	19:57	F	820
1,4	8	20:12	F	821
2,4	8	20:27	F	818
3,4	8	20:42	F	824
4,4	8	20:57	F	818
1,4	9	21:12	F	871
2,4	9	21:27	F	856
3,4	9	21:42	F	818
4,4	9	21:57	F	821
1,4	10	22:12	F	820
2,4	10	22:27	F	845
3,4	10	22:42	F	824
4,4	10	22:57	F	912
1,4	11	23:12	F	826
2,4	11	23:27	F	894
3,4	11	23:42	F	824
4,4	11	23:57	F	821
----------	SA 21-JAN-12			----------
1,4	12	00:12	F	802
2,4	12	00:27	F	796
3,4	12	00:42	F	785
4,4	12	00:57	F	772
1,4	13	01:12	F	762
2,4	13	01:27	F	752
3,4	13	01:42	F	746
4,4	13	01:57	F	740
1,4	14	02:12	F	736
2,4	14	02:27	F	728
3,4	14	02:42	F	723
4,4	14	02:57	F	718
1,4	15	03:12	F	717
2,4	15	03:27	F	718
3,4	15	03:42	F	710
4,4	15	03:57	F	706
1,4	16	04:12	F	706
2,4	16	04:27	F	712
3,4	16	04:42	F	713
4,4	16	04:57	F	707
1,4	17	05:12	F	712
2,4	17	05:27	F	712
3,4	17	05:42	F	712
4,4	17	05:57	F	711
1,4	18	06:12	F	718
2,4	18	06:27	F	717
3,4	18	06:42	F	725
4,4	18	06:57	F	727
1,4	19	07:12	F	730
2,4	19	07:27	F	731
3,4	19	07:42	F	731
4,4	19	07:57	F	736

```
  1,4    20   08:12      F           740
  2,4    20   08:27      F           746
  3,4    20   08:42      F           748
  4,4    20   08:57      F           747
  1,4    21   09:12      F           754
  2,4    21   09:27      F           760
  3,4    21   09:42      F           760
  4,4    21   09:57      F           758
  1,4    22   10:12      F           760
  2,4    22   10:27      F           752
  3,4    22   10:42      F           754
  4,4    22   10:57      F           756
  1,4    23   11:12      F           751
  2,4    23   11:27      F           745
  3,4    23   11:42      F           745
  4,4    23   11:57      F           742
  1,4    24   12:12      F           738
  2,4    24   12:27      F           738
  3,4    24   12:42      F           738
  4,4    24   12:57      F           736
             12:58  PGM DONE 21-JAN
   SOURCE E  ==> ENABLE
   SOURCE F  ==> FLOW
----------------------------------------
```

National Weather Service National Headquarters

National Weather Service

Area Forecast Discussion

Issued by NWS Seattle/Tacoma, WA

Current Version | Previous Version | Text Only | Print | Product List | Glossary Off
Versions: 1234567891011121314151617181920212223242526272829303132333435

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FXUS66 KSEW 201706
AFDSEW

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE SEATTLE WA
900 AM PST FRI JAN 20 2012

.SYNOPSIS...TEMPERATURES WILL CONTINUE TO GRADUALLY WARM OVER WESTERN WASHINGTON TODAY. A WARMER WET FRONTAL SYSTEM WILL REACH WESTERN WASHINGTON THIS EVENING. AN ACTIVE WEATHER PATTERN WILL CONTINUE THROUGH THE MIDDLE OF NEXT WEEK AS A SERIES OF FRONTS REACH THE AREA.

&&

.SHORT TERM...TEMPS STILL BELOW FREEZING OVER THE NORTHWEST INTERIOR...BUT THERE ISN`T MUCH COLD AIR LEFT TO DRAIN INTO THE AREA AND BLI-YWL GRADIENT HAS FALLEN FROM -15MB 24HRS AGO TO -8MB. THAT GRADIENT WILL TICK UP A NOTCH TODAY AS THE EASTERLY GRADIENT AHEAD OF THE FRONTAL SYSTEM JUST OFFSHORE INCREASES OVER WRN WA AND THE WINTER WEATHER ADVISORY THAT IS IN EFFECT UP THEIR TIL 4PM SEEMS JUST ABOUT RIGHT...WITH SOME MIXED PCPN TODAY AND THEN TURNING OVER TO RAIN BY EVENING. THE LIGHT NE WIND UP THERE NOW SHOULD SWITCH TO A SOUTHEAST WIND AS THE LAST OF THE COLD AIR FINALLY SCOURS OUT AS WINDS ALOFT AHEAD OF THE VIGOROUS FRONT JUST OFFSHORE START TO MIX DOWN. FOR THE REST OF THE LOWLANDS OF WRN WA THE MOST WE MIGHT SEE IS SOME WET SNOW...BUT THE MILD RAINY WEATHER FOR LATER TODAY IS AN EASY FORECAST. THERE ARE MANY WAYS TO WARM WRN WA...EASTERLY DOWNSLOPE OFF THE CASCADES...ANY MIXING FROM THE INCREASINGLY WARM AIR ALOFT...AND THE FACT THAT WE HAVE ALREADY GRADUALLY WARMED OVERNIGHT. THE 24HR CHANGE IN TEMPS OVER WRN WA AT 8AM RANGED FROM 2 TO 12 DEGREES AS THE FRASER OUTFLOW AND NLY WIND WE HAD YDY PETERED OUT OVERNIGHT.

THE MAIN FNTL BAND SHOULD REACH WRN WA THIS EVENING...WITH PRECIP INCREASING THIS AFTERNOON AND THE STRONGEST PTN OF THE FRONT WITH THE MOST MOISTURE AND WARMTH ALOFT OVER WRN WA 4-7PM. THEN OVERNIGHT THE NAM SHOWS STRONG WINDS ALOFT OVER OREGON...PUSHING BACK UP OVER THE CASCADES BEFORE DAYBREAK...SO THERE WILL PROBABLY BE TWO SURGES OF RAIN FOR THE LOWLANDS AND TWO SURGES OF HEAVY MIXED PCPN AND SNOW FOR THE MOUNTAINS. FOR THE OLYMPICS MUCH OF THE PRECIP OVERNIGHT WILL BE RAIN AS 850MB TEMPS WARM TO +4C...BUT OVER THE CASCADES COLD AIR WILL KEEP THE PRECIP SNOW OR A MIX OF SNOW AND FREEZING RAIN IN THE PASSES...WHILE ALONG THE MORE EXPOSED WEST SLOPES OF THE CASCADES THE SNOW LEVEL RISES. EXPOSED PEAKS LIKE MT RAINIER COULD SEE THE SNOW LEVEL RISE TO 6000 FEET TONIGHT...WHILE THE SNOW LEVEL REMAINS AT THE SURFACE IN THE PASSES. THE NORTH CASCADES WILL PROBABLY SEE OF AN AREAL AVERAGE SNOW LEVEL RISING TO ARND 2000FT TONIGHT...BUT THAT IS PRETTY TRICKY TOO AND IT COULD VERY WELL SLOPE FROM A PEAK OF 5000FT AT MT PILCHUCK IN SNOHOMISH COUNTY TO A SNOW LEVEL CLOSE THE SURFACE WAY UP AT MARBLEMOUNT.

IN THE AFTERNOON FCST DISCUSSION I WILL ADDRESS THE POTENTIAL FOR WINDY WEATHER LATE TONIGHT AS WHAT SORT OF LOOKS LIKE THE BENT BACK TROUGH COMES THRU WRN WA...THE NAM SHOWS A 16MB PDX-BLI GRADIENT AT 4AM WITH THE STRONGEST GRADIENT OVER THE PUGET SOUND BASIN. I HAVE NOT HAD A CHANCE TO EXPLORE ANY OF THE GUIDANCE FROM THE UW MESOSCALE MODELS THOROUGHLY...BUT THE UW 4KM WRFGFS SHOWS SE GALES COASTAL WATERS AND EAST ENTRANCE STRAIT OF JUAN DE FUCA THIS AFTERNOON AHEAD OF THE FRONT...AND A WIND SHIFT TO WLY ARND MIDNIGHT TONIGHT ON THE COAST...WITH A BRIEF SW GALE OVER PUGET SOUND AND A WLY GALE IN THE STRAIT AT 12Z. THAT IS NOT NEARLY AS WINDY AS THE NAM SLP FCST SUGGESTS. 19

.LONG TERM...A QUICK LOOK AT THE LATEST 12Z GFS SHOWS A PRETTY TYPICAL FRONTAL SYSTEM ON TAP FOR SUN NITE...HEIGHT RISES MONDAY AFTERNOON THROUGH TUESDAY WHICH SET UP A MILD SW FLOW AND BAROCLINIC ZONE FOR PROBABLY TWO FNTL WAVES TUE AND WED...THAT WILL BE WARM WET AND WINDY WITH A PERIOD OF RAIN IN THE MOUNTAINS...AND THEN COOLING WITH STRONG WLY FLOW ALF THU AND FRI...BUT THE FLOW TURNING MORE NWLY AND HEIGHT RISING LATE IN THE WEEK. THE GFS AND ECMWF THEN DIVERGE SHARPLY AFTER THAT...AS MUCH AS I HAVE SEEN RECENTLY. 19

&&

.HYDROLOGY...PERIODS OF HEAVY RAIN LATER TODAY INTO SATURDAY ON TOP OF THE SNOW BLANKETING ALL OF WESTERN WASHINGTON COULD CAUSE RIVER FLOODING IN SOUTHWEST WASHINGTON AND URBAN AND SMALL STREAM FLOODING THROUGHOUT THE AREA. THE RAIN COMBINED WITH LOWLAND SNOW MELT COULD DRIVE THE SKOKOMISH AND CHEHALIS RIVERS ABOVE FLOOD STAGE BETWEEN TONIGHT AND SATURDAY EVENING...EVEN THOUGH THE RIVER FLOODING IS

EXPECTED TO MINOR.

ALL AREAS COULD SEE EXCESSIVE SURFACE RUNOFF WITH PONDING OF WATER...PONDING AROUND CLOGGED DRAINS OR CULVERTS...AND/OR SMALL STREAMS GOING OVER THEIR BANKS. WORSE AREA FLOODING COULD OCCUR IN SPOTS...PARTICULARLY IN THE AREAS OF DEEP LOWLAND SNOW AND HEAVIER RAIN LIKE THE SOUTHWEST INTERIOR. SNOW MELTING INTO THE SOIL AND THE UPCOMING ADDITION OF RAINFALL WILL INCREASE THE THREAT OF LANDSLIDES.

UNCERTAINTY IS HIGH WITH THIS EVENT AND THE SNOW MELT IS A BIG PART OF THAT UNCERTAINTY. THE TEMPERATURES ONLY WARM TO THE MID FORTIES WHICH WOULD NOT ARGUE FOR A FAST MELTING OF SNOW...HOWEVER...SNOW MELT CAN ACT IN SUCH A WAY AS TO HOLD THE RAIN WATER AND THEN MELT AND RELEASE THE WATER IN A RELATIVELY SHORT PERIOD OF TIME WHICH WOULD GREATLY INCREASE THE RIVER RUNOFF. IT IS EXTREMELY DIFFICULT TO SAY HOW THE SNOW WILL MELT. RIVER MODELS DO NOT ALWAYS HANDLE THESE SITUATIONS VERY WELL SO SPECIFIC RIVER FORECASTS MAY NOT FULLY INDICATE THE EXISTING FLOOD RISK.
BOWER/FELTON

&&

.AVIATION...SHOWERS WILL CONTINUE ACROSS WESTERN WA TODAY AS A PAC SYSTEM MOVES INLAND. EXPECT OCCASIONAL MVFR CIGS. WARMER MARINE AIR HAS SPREAD INLAND TO AROUND KPAE THIS MORNING. THE LOW LEVEL AIR MASS IS WARM ENOUGH FOR RAIN AT THE SURFACE. THE LAST AREA TO TRANSITION WILL BE THE N INTERIOR AS FRASER RIVER OUTFLOW CONTINUES. HOWEVER NE PRES GRADIENTS ARE DECREASING AND WINDS ARE FORECAST TO SWITCH TO S/SE EARLY THIS AFTERNOON. UNTIL THEN...EXPECT A MIXED BAG OF PRECIP FOR AREAS LIKE KBLI...WITH A TRANSITION TO RAIN SHOWERS THIS AFTERNOON. TEMPS WILL REMAIN ABOVE FREEZING TONIGHT. 33

KSEA...RAIN SHOWERS EXPECTED TODAY WITH SURFACE TEMPS REMAINING ABOVE FREEZING. EXPECT OCCASIONAL MVFR CEILINGS. S/SE FLOW WILL INCREASE LATE TONIGHT. 33

&&

.MARINE...EXPECT INCREASING S/SE FLOW OVER THE WATERS TODAY AS A STRONG PAC SYSTEM APPROACHES WESTERN WA. GALE WARNINGS REMAIN IN EFFECT FOR THE COASTAL WATERS...ENTRANCES TO THE STRAIT... AND NORTHERN INLAND WATERS. HIGH END SMALL CRAFT ADVISORY WINDS ARE FORECAST FOR THE CENTRAL STRAIT...ADMIRALTY INLET...PUGET SOUND AND HOOD CANAL. A SURFACE TROUGH WILL MOVE INLAND LATE TONIGHT BRINGING A BURST OF SOUTH WINDS TO THE INTERIOR...MAY SEE GALES FOR PUGET SOUND AND HOOD CANAL. POST FRONTAL GALES ARE ANTICIPATE THROUGH THE STRAIT OF JUAN DE FUCA SAT MORNING/AFTERNOON AS WELL.

STRONG FRONTAL SYSTEMS WILL ALSO MOVE THROUGH WESTERN WASHINGTON AND ITS COASTAL WATERS LATE THIS WEEKEND AND AGAIN EARLY NEXT WEEK. FAIRLY WIDESPREAD GALES ARE LIKELY WITH BOTH SYSTEMS.

WESTERLY SWELLS WILL BUILD TO 20 TO 25 FT LATE SATURDAY THROUGH SUNDAY...CREATING HIGH SURF CONDITIONS ALONG THE COAST. 33

&&

WA...WINTER WEATHER ADVISORY FOR THE NORTHWEST INTERIOR UNTIL 4 PM.
WINTER WEATHER ADVISORY FOR THE REMAINDER OF THE INTERIOR AND THE STRAIT UNTIL 10 AM.
.WINTER STORM WATCH NORTH AND CENTRAL CASCADES LATE THIS AFTERNOON THROUGH SATURDAY MORNING.
.FLOOD WATCH FOR WESTERN WASHINGTON TONIGHT THROUGH SATURDAY NIGHT.
PZ...GALE WARNING COASTAL WATERS...ENTRANCES TO THE STRAIT...AND NORTHERN INLAND WATERS THROUGH NOON SATURDAY.
.GALE WARNING FOR THE CENTRAL STRAIT OF JUAN DE FUCA SATURDAY MORNING.
.SMALL CRAFT ADVISORY FOR ADMIRALTY INLET...PUGET SOUND AND HOOD CANAL.
.SMALL CRAFT ADVISORY FOR ROUGH BAR CONDITIONS THROUGH SATURDAY.

$$

YOU CAN SEE AN ILLUSTRATED VERSION OF THE FORECAST DISCUSSION AT
WWW.WEATHER.GOV/SEATTLE/GAFD/LATEST_WEBAFD.HTML

Incorrect Region Format!
Web Master's E-mail: NWS Internet Services Team
Page last modified: Apr 14th, 2011 20:35 UTC

Your National Weather Service forecast

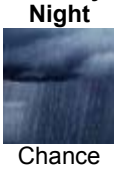
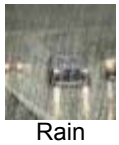
Bremerton WA

Enter Your "City, ST" or zip code Go BOOKMARK

NWS Seattle, WA
Point Forecast: Bremerton WA
47.56°N 122.62°W (Elev. 0 ft)

Mobile Weather Information | **En Español**
Last Update: 4:40 am PST Jan 20, 2012
Forecast Valid: 9am PST Jan 20, 2012-6pm PST Jan 26, 2012

Forecast at a Glance

Today	Tonight	Saturday	Saturday Night	Sunday	Sunday Night	Monday	Monday Night	Tuesday
 100%	 100%	 70%	 40%	 90%	 90%	 70%		
Wintry Mix	Rain	Showers Likely	Chance Showers	Rain	Rain	Showers Likely	Chance Showers	Rain
Hi 38 °F	Lo 38 °F	Hi 46 °F	Lo 39 °F	Hi 45 °F	Lo 38 °F	Hi 44 °F	Lo 38 °F	Hi 47 °F

Detailed 7-day Forecast

Hazardous weather condition(s):

Winter Weather Advisory
Flood Watch

Today: Occasional snow and freezing drizzle before 10am, then rain. Snow level 200 feet rising to 3700 feet. High near 38. North wind 7 to 13 mph becoming south. Chance of precipitation is 100%. Little or no ice accumulation expected. Little or no snow accumulation expected.

Tonight: Rain. Low around 38. Southeast wind 11 to 16 mph becoming northeast. Chance of precipitation is 100%.

Saturday: Showers likely, mainly before 10am. Cloudy, with a high near 46. Windy, with a southwest wind between 22 and 30 mph. Chance of precipitation is 70%.

Saturday Night: A 40 percent chance of showers. Mostly cloudy, with a low around 39. South southwest wind around 15 mph.

Sunday: Rain. High near 45. South southeast wind between 11 and 13 mph. Chance of precipitation is 90%.

Sunday Night: Rain. Low around 38. Chance of precipitation is 90%.

Monday: Showers likely. Cloudy, with a high near 44. Chance of precipitation is 70%.

Monday Night: A chance of showers. Cloudy, with a low around 38.

Tuesday: Rain. Cloudy, with a high near 47.

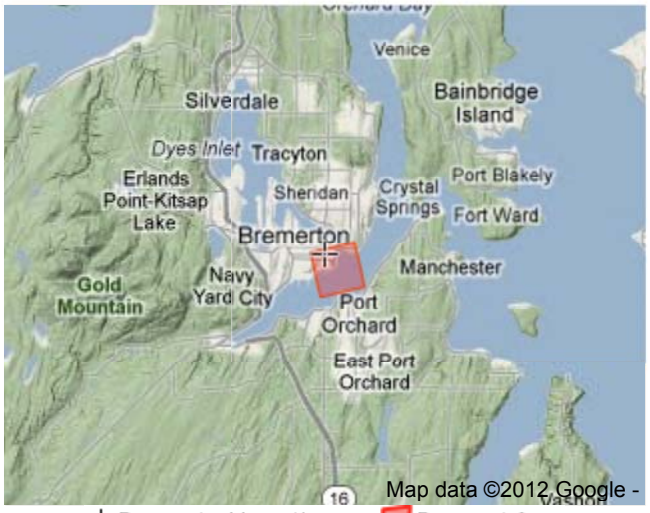
Tuesday Night: Rain. Cloudy, with a low around 37.

Wednesday: Rain. Mostly cloudy, with a high near 51.

Wednesday Night: Rain. Cloudy, with a low around 37.

Detailed Point Forecast [Move Down]

Click Map for Forecast Disclaimer



Lat/Lon: 47.56°N 122.62°W **Elevation:**0 ft

XML

Current Conditions [Move Up]

Bremerton, Bremerton National Airport (KPWT)
Lat: 47.5 Lon: -122.75 Elev: 440
Last Update on 20 Jan 8:15 PST

Overcast

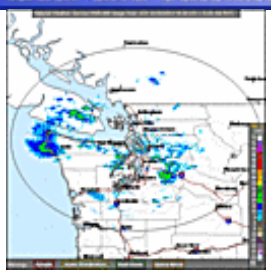
32°F (0°C)

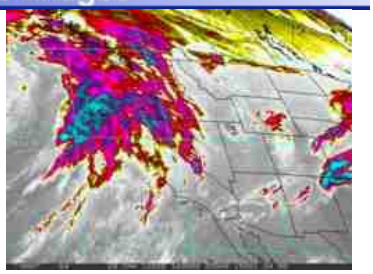
Humidity:	93 %
Wind Speed:	calm
Barometer:	29.66 in (N/A mb)
Dewpoint:	30°F (-1°C)
Wind Chill:	32°F (0°C)
Visibility:	1.75 Miles

Thursday: Showers. Cloudy, with a high near 48.

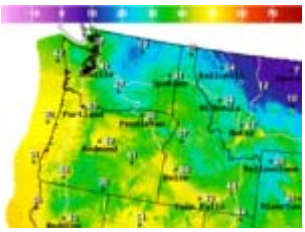
More Local Wx: 3 Day History:

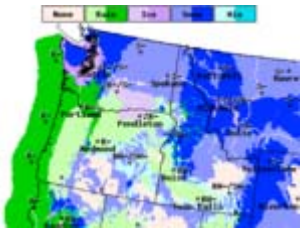
Radar and Satellite Images





National Digital Forecast Database





Additional Forecasts & Information

Zone Area Forecast for Seattle/Bremerton Area, WA

Forecast Discussion

Printable Forecast | Text Only Forecast

Hourly Weather Graph | Tabular Forecast

Quick Forecast

International System of Units | About Point Forecasts

Forecast Weather Table Interface

Webmaster
National Weather Service:
Seattle, WA

Back to Previous Page

National Weather Service Forecast Office
Seattle, WA

weather.gov

Home | News | Organization | Search for: NWS All NOAA Go

Point Forecast: Bremerton WA
47.56N 122.62W (Elev. 0 ft)

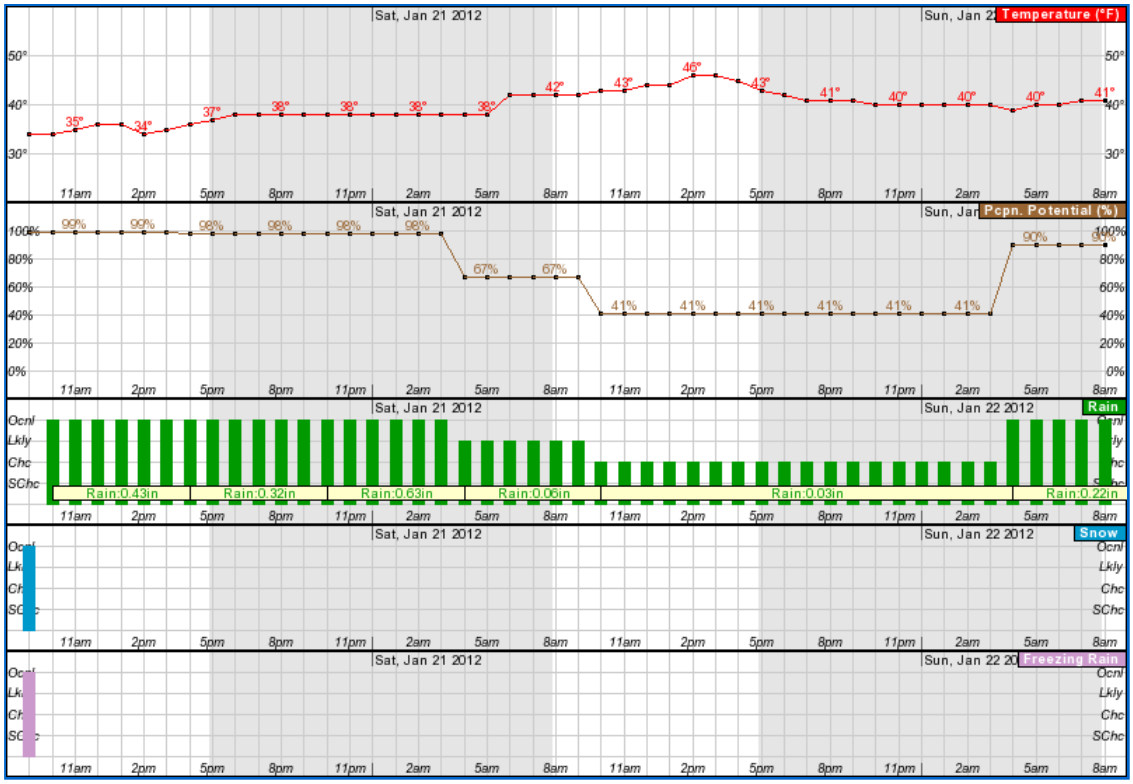
Last Update: 4:40 am PST Jan 20, 2012

Hourly Weather Forecast Graph

[dashes/dots] | [b/w] | [hide menu]

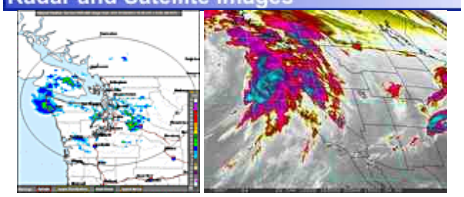
Weather Elements	Weather/Precipitation	Fire Weather
Temperature (°F)	Thunder	Mixing Height (x100ft)
Dewpoint (°F)	Rain	Haines Index
Wind Chill (°F)	Snow	Lightning Activity Level
Surface Wind mph	Freezing Rain	Trans. Wind mph
Sky Coverage	Sleet	
Precipitation Potential		
Relative Humidity		

48-Hour Period Starting: 9am Fri, Jan 20 2012 Submit Back 2 Days Forward 2 Days



Sunday, January 22 at 12am
Temperature: 40 °F
Precipitation Potential: 41%
Rain: Chance (30%-50%) Snow: <10% Freezing Rain: <10%

Radar and Satellite Images



Additional Forecasts & Information

International System of Units | Forecast Discussion
7-Day Forecast | Tabular Forecast
Quick Forecast

Webmaster
NOAA's National Weather Service
Seattle, WA

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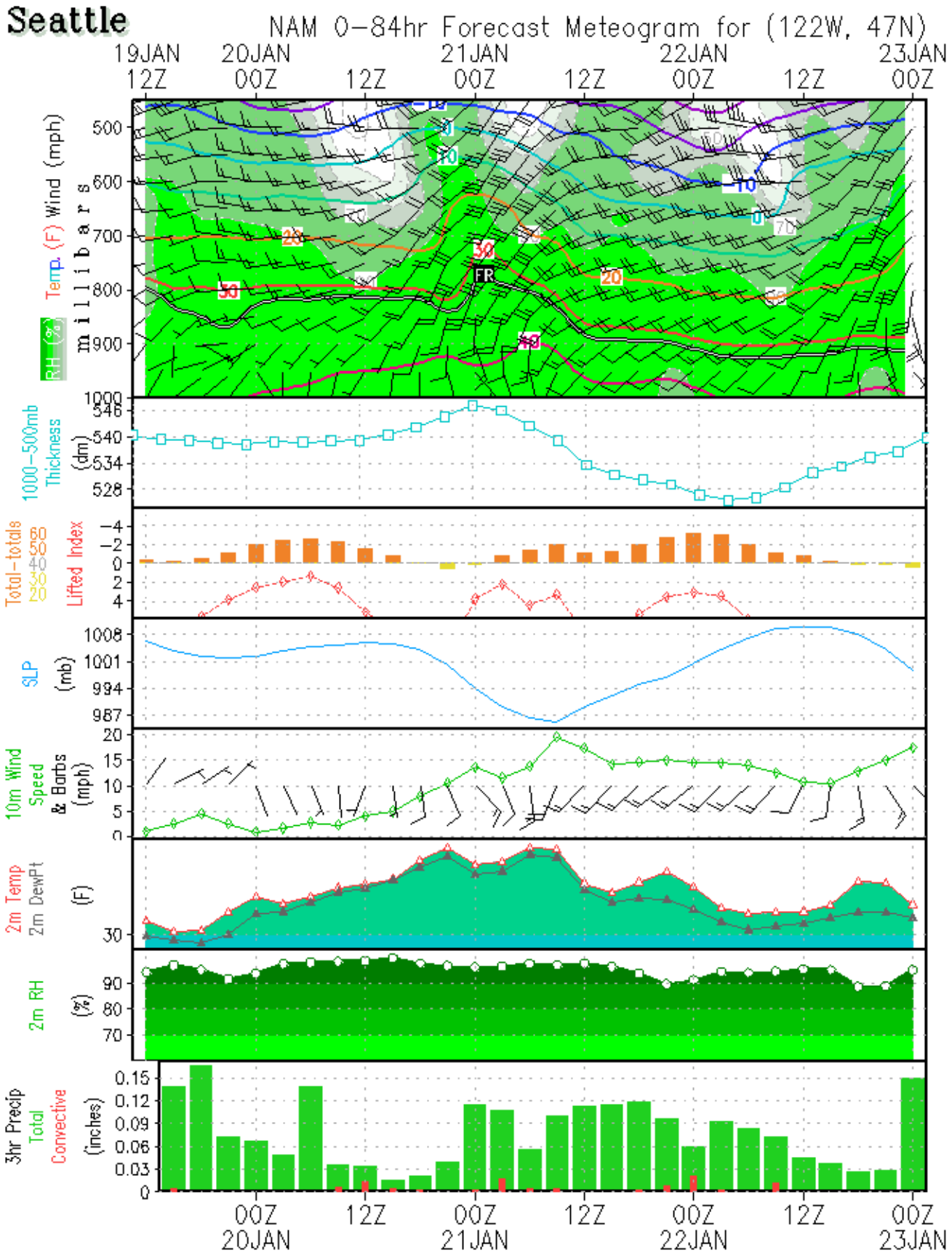
Forecast For Lat/Lon: 47.5620/-122.6230 (Elev. 0 ft)
Bremerton WA

Custom Weather Forecast Table

	Fri Jan 20								Sat Jan 21								Sun Jan 22								Mon Jan 23
Weather	Occasional Freezing Drizzle and Snow		Rain						Likely Rain		Scattered Rain Showers		Chance Rain Showers				Rain								
Daily-Temp	High **38** Low **31**								High **46** Low **38**								High **45** Low **39**								Low **38**
Chance of Precip	100%		100%		100%		100%		65%		40%		40%		40%		90%		90%		90%		90%		
Precip	0.06"		0.43"		0.32"		0.63"		0.06"		0.01"		0.01"		0.01"		0.22"		0.26"		0.14"		0.12"		
12-hr Snow Total	0"				0"				0"				0"				0"				0"				
3-Hour	4am	7am	10am	1pm	4pm	7pm	10pm	1am	4am	7am	10am	1pm	4pm	7pm	10pm	1am	4am	7am	10am	1pm	4pm	7pm	10pm	1am	
Temp	31	33	34	36	36	38	38	38	38	42	43	44	45	41	40	40	39	41	42	43	44	40	39	39	
Cloudiness	95%	95%	98%	98%	98%	98%	92%	92%	97%	97%	97%	97%	76%	76%	76%	76%	97%	97%	97%	97%	97%	97%	97%	97%	
Dewpoint	31	31	34	36	36	38	37	38	38	38	40	40	37	34	32	33	33	35	38	39	36	34	32	33	
Relative Humdity	91%	91%	95%	90%	76%	82%	83%	85%	85%	85%	88%	85%	73%	76%	76%	77%	78%	79%	88%	86%	73%	79%	78%	80%	
Wind	N 8	N 8	E 7	S 13	SE 16	SE 16	NE 12	NE 12	S 25	SW 30	S 22	SW 22	SW 15	SW 15	S 14	S 14	S 13	S 13	SE 12	SE 12	SE 12	SE 12	S 18	S 18	
Snow Level (ft)	206	206	206	3668	4027	4027	5175	5175	3256	3256	2393	2393	2182	2182	1652	1652	1603	1603	1898	1898	1695	1695	1695	1695	


Seattle
NAM 0-84hr Forecast Meteogram for (122W, 47N)
19JAN 12Z
20JAN 00Z
12Z
21JAN 00Z
12Z
22JAN 00Z
12Z
23JAN 00Z
RH (%) Temp. (F) Wind (mph)
millibars
500
600
700
800
900
1000
1000-500mb Thickness (dm)
546
540
534
528
Total-totals
Lifted Index
SLP (mb)
1008
1001
994
987
10m Wind Speed & Barbs (mph)
20
15
10
5
0
2m Temp
2m DewPt
(F)
30
2m RH (%)
90
80
70
3hr Precip
Total
Convective
(inches)
0.15
0.12
0.09
0.06
0.03
0
00Z 20JAN
12Z
00Z 21JAN
12Z
00Z 22JAN
12Z
00Z 23JAN

Telemetry Data Summary Report (TDSR); QAQC Data Notes, from 11/23/11 to 1/23/12

126

12/4/11 to 12/8/11 Values for conductivity and salinity (low) showed little to no response to tidal fluctuations. No rain during this period.
Rest of data set 11/23/11 to 1/23/12 OK

124.1

11/30/11 to 12/21/11, Sensor likely clogged in period of little to no rain. Cond/Sal readings were effected by tidal deposition. Readings during this period showed little response.
12/27/11 to 1/23/11, During rain events, conductivity values went negative and corresponding salinity values missing, including SW09 sampling event on 1/20/11.

124

11/23/11 02:00-06:15, Negative conductivity (no salinity) values with elevated level.
12/21/11 17:45, Start of negative level values when nearing zero, periodic until 12/26/11. Values ok until 1/8/12.
1/8/12, Negative level values when nearing zero until end of review record 1/23/12 13:00.

115.1

11/23/11 to 1/17/12, Negative level values when near or at zero, periodic.
1/17/12, Level values look ok, no negative values when at or near zero until end of review record 1/23/12 13:00.

84.1

Intermittent negative level values when at or near zero from 11/22/11 to 12/6/11.
12/6/11 07:20, All data missing or corrupt
Level and trans temp restored on 12/6/11 12/05, with intermittent negative values when at or near zero.
Temperatures for both YSI and trans reaches high temps (37+ deg Celsius) on episodic basis.
All data missing on 12/19/11 14:55 until 12/21/11 19:10. YSI data (cond, sal, temp) corrupt again on 12/22/11 00:20.
Level and trans temp data OK from 12/21/11 19:10 to 12/27/11 15:10 (no negative values).
All data missing on 12/27/11 15:10 until 1/2/12 17:40.
All data OK from 1/2/12 to 1/17/12.
1/17/12 15:10, Intermittent negative level values when level get at or near zero through to 1/23/12 at the end of review record.

015

11/22/11 to 12/31/11: When level reaches approx 0.5 or below, conductivity goes negative and correspondingly no salinity value.
During this time period, salinity values would be missing although conductivity values were OK. This seemed to happen after a period of negative conductivity values. This pattern occurred again sporadically until 1/17/12.
12/21/11 20:20 to 21:25, Temperature intermittent, missing values
12/1/11, Small missing data, due to station maintenance
1/10/12 22:15-22:20, Level Spike
1/10/12 to 1/16/12, Negative level when at or near zero.
1/7/12 13:10 to 13:15, No data, due to station maintenance
1/7/12 13:20, After this point, all data looks OK to 1/23/12 13:00, end of review record.

STORM EVENT REPORT SW10
For
Non-Dry Dock Stormwater Monitoring
Conducted at
Puget Sound Naval Shipyard
Bremerton, WA
Project ENVVEST Study Area

February 28, 2012

Puget Sound Naval Shipyard and Surrounding Area

PNNL Contract No.: N4523A10MP00034 Amendment 1

Cardno TEC
Shaping the Future

Pacific Northwest
NATIONAL LABORATORY

1.0 Introduction

Taylor/TEC conducted non-dry dock stormwater sampling tasks within the Puget Sound Naval Shipyard (PSNS) and adjacent areas within Naval Base Kitsap (NBK); collectively comprising the Project ENVVEST study area, between January 23rd and February 29th, 2012. This was the third of four scheduled events of the 2011-2012 project year – referred to as *Phase II*. Overall, this is the tenth Stormwater (SW10) event of the project. A summary of the preparatory and sampling events, including site specific conditions that occurred during SW10 are presented in this report, with supporting information as attachments.

This SW10 Report is organized in the following manner and contains: Section 2, Event Summary; Section 3, Project Staff Participating in SW10; Section 4, Storm Event SW10 Preparatory Tasks; Section 5, Weather Forecast Information and SW10 Targeting Details; Section 6, Precipitation and SW10 Qualification Summary; Section 7, Sampling Information, Management and Validation; Section 8, Basin Runoff Calculations; Section 9, Descriptive Statistics and Discussion of Event Station Monitoring Data; Section 10, Notable Anomalies and Variations to the PWP; and Section 11, Action Items.

Attachments to this report include: Table A-1*, Storm Event Summary and Sampling Information, Validation Checklist* (spreadsheet); Stormwater Field Sampling Forms and Storm Controller Notes; Chain of Custody Forms; (basin) Runoff Calculation Worksheet; Station Hydrographs; Autosampler Reports; Weather Forecast Information and a Telemetry Data Summary Report.

2.0 SW10 Event Summary

Main SW10 details are provided below as a "*Quick Reference*":

- *Event/s Conducted:* SW10
- *Event Date/s:* maint. items; 1/23/12 through 2/27/12, station prep.; 2/28/11; and storm event tasks occurred between 2/28 – 2/29/12
- *Monitoring Stations Sampled:* PSNS015, 84.1, 115.1, 124, 124.1 and 126
- *Antecedent Conditions Met?:* Yes (3 days or greater at each station); 0.0" in prior 24 hrs and 0.0" in prior 6 hrs preceding the storm/sampling event at each station.
- *Start of Rainfall at PSNS Stations:* 2/28/12 between 1615 (PSNS126, 124 and 084.1) and 1635 (PSNS115.1)
- *Sampling Period Duration Range:* start =2/28/12 @ 1643 (PSNS015) and stop = 2/29/12 @ 1340 (PSNS115.1). Max sampling duration = 20 hrs:44 mins (PSNS115.1 and 015)
- *Sampling Event Rainfall Total:* PSNSB427 = 0.57", PSNS126 = 0.45", PSNS124.1 = 0.23", PSNS124 = 0.19", PSNS115.1 = 0.46", PSNS084.1 = 0.55" and PSNS015 = 0.58"
- *Samples/Types Collected:* Grab and composite samples were collected at each station (one each at each station) for a total of 12 "normal" samples.
- *Quality Control (QC) Samples Collected:* Both composite and grab sample duplicates were collected at PSNS126 during this event.

- *Based on consideration of storm event and sample validation information, were the samples collected during SW10 valid for project purposes? (Y / N, composite, grab or both):* Yes-both; all grab and composite samples collected during this event were valid.

See Table A-1; *Storm Event Summary and Sampling Information, Validation Checklist*, for additional event summary details.

3.0 Project Staff Participating in SW10

Taylor/TEC:

Dave Metallo – Project Manager, Storm Controller, Field Event and QC Manager

Brian Rupert – Field Team Leader

Bruce Beckwith – Field Team Member, Navy grab sampling support

Navy Personnel:

Bob Johnston – Project Technical Lead / Oversight / Grab sample collection lead

4.0 Storm Event SW10 Preparatory Tasks

On February 28th, 2012 all six stormwater monitoring stations (PSNS015, PSNS08.1, PSNS115.1, PSNS124, PSNS124.1 and PSNS126) were reset and re-calibrated. The stations were also readied for storm event / stormwater sample collection on the same day. At this point all of the monitoring equipment was deemed to be functioning properly, was operational and "sample ready" (see Sections 1 and 2 of the attached *Stormwater Field Sampling Forms).*

All stations were programmed with pre-determined autosampler enable and pacing conditions set "high" to prevent premature enabling (*sample disable mode*), as directed by the Taylor/TEC Storm Controller. Station operation was passed to the Taylor /TEC Storm Controller to be managed via telemetry. Final enabling conditions were determined by the Storm Controller closer to the onset of the storm event.

5.0 Weather Forecast Information and SW10 Targeting Details

Between the end of SW09 (1/21/12 ~ 1330) and the just prior to the onset of SW10 (2/28/12 @ 1615) the average rainfall as measured at the six monitoring stations during this approximately 38 day period was 4.22". The Navy's rain gauge at Build 427 recorded a total of 4.91" during this period.

The last measureable runoff occurred approximately 3 days prior to the SW10 event. Project qualifying antecedent dry period was met prior to the stations being armed on 2/28/12. A potentially qualifying storm event (event probability and forecast rainfall depth) was identified and targeted for 2/28/12. Rain was forecast at 100% probability for Tuesday 2/28/12, with 24-hour accumulations of over 0.40" into the evening of the 29th. A rain-snow mix was forecasted to begin the event later in the afternoon of the 28th, changing to all rain by later in the morning of the 29th – with no measureable amounts of snow accumulation. The decision was made to continue tracking and targeting this developing large storm system.

The Nation Weather System (NWS) was one the main source used for the assessment of weather forecasting and conditions. Provided below is a link to the NWS-Bremerton, WA webpage; (http://forecast.weather.gov/MapClick.php?site=sew&textField1=47.56751&textField2=-122.63127&smap=1). A host of other internet available weather forecasting, observational and data sources were used for field and reporting purposes as appropriate Detailed *Weather Forecast Information* is attached to this report.

Routinely referenced weather models used to gain forecast information regarding the Pacific Northwest included the MM5-NAM http://www.atmos.washington.edu/mm5rt/rt/naminit.12km.html) and the GFS-WRF (http://www.atmos.washington.edu/mm5rt/rt/gfsinit.frame1.html) (both hosted by the University of WA and initialized for the PNW). Below is a synopsis of the model comparison for SW10:

"GFS and NAM are in good agreement regarding storm start (~1500 on the 28th) but disagree slightly as to event duration; at 11 and 19 hours, respectively. The GFS has the event rain total at approximately 0.72" and the NAM approximately 1.10-inches"

Final sampler enabling conditions were appropriately set at each monitoring station early on afternoon of the 28th (*sample ready mode*). Table 1 lists the final enabling conditions at each monitoring station that were used for SW10, along with the rainfall amounts in the 24 and 6 hour periods prior to the onset of the storm event.

Table 1. Monitoring Station Enabling Conditions

Station	Rainfall (in/hr)	Level (ft)	Conductivity (µS/cm)	Repeatable Conductivity Enable (Y/N)	Pacing (min)	[1]Rainfall Prior to Event Start (24hr/6hr)
PSNS015	0.03	0.3	2000	N	15	0.00"/ 0.00"
PSNS084.1	0.03	0.3	2000	N	15	0.00"/ 0.00"
PSNS115.1	0.03	0.3	2000	N	15	0.00"/ 0.00"
PSNS124	0.03	0.3	2000	N	15	0.00"/ 0.00"
PSNS124.1	0.03	0.3	2000	N	15	0.00"/ 0.00"
PSNS126	0.03	0.3	2000	N	15	0.00"/ 0.00"

[1]Conditions as checked on 2/28/12 at 1110; final enable conditions set at ~1400

6.0 Precipitation and SW10 Qualification Summary

Precipitation Summary:

Previous rainfall that caused runoff to occur (≥ 0.03" rainfall without 3-hr gap) prior to the onset of SW10 ranged from 3:17 (days:hours) at all stations except PSNS115.1 to 3:18 (days:hours) at PSNS115.1 as measured by each stations rain gauge. Rain began to fall over the project site

between 1615 and 1635 on February 28th. Table 2 details the period since last runoff, antecedent duration prior to the start of the storm event, as well as the rainfall start date/time at each monitoring station.

Table 2. Pre-Rain Event Conditions

Station	Last Runoff[1] (Date/Time)	Antecedent Duration (Days: Hrs)	Start of Rainfall (Date/Time)
PSNS015	2/24/12 22:35	3:17	2/28/12 16:20
PSNS084.1	2/24/12 22:35	3:17	2/28/12 16:15
PSNS115.1	2/24/12 22:35	3:18	2/28/12 16:35
PSNS124	2/24/12 22:35	3:17	2/28/12 16:15
PSNS124.1	2/24/12 22:35	3:17	2/28/12 16:25
PSNS126	2/24/12 22:45	3:17	2/28/12 16:15

[1]Last runoff period is defined as ≥ 0.03" of rainfall without a 3-hr gap

Rainfall began registering at all stations by 1635 on 2/28/12 (see Table 2). The rainfall intensities began in a moderate to moderately heavy fashion.

Operational checks during the evening of the 28th, via telemetry, revealed that all of the stations enabled their sampling routines as programmed; with rainfall, pipe level and conductivity values being in satisfaction of their threshold values, (as listed in Table 1) except for stations PSNS084.1 and PSNS124.1. It was noted that the water level in the piping system associated with PSNS124.1 was not building to / exceeding its enabling condition (0.30') as expected. PSNS084.1 had an issue stemming from a battery swap after its enabling conditions had been set – thus causing a reset of the rain depth counter and sample pacing setting. Therefore these stations were "manually' started via telemetric control. Sampling began at these monitoring stations between 1643 (PSNS015) and 1842 (PSNS124.1) on the 28th.

The initial rainfall associated with the beginning of the event lasted for a couple of hours then tailed off to moderate to light intensities for several more hours. An intra-event period of no rain fall lasting between six and eight hours split the overall SW10 event into two – resuming in a moderate fashion for another four to five hours before ending altogether around 1300 on the 29th.

Station sampling period rainfall totals ranged from 0.23" at PSNS124.1 to 0.58" at PSNS015. The Navy's rain gauge at B427 recorded 0.57".

The sampling routines all ran their courses to completion, except for PSNS124.1 which was manually stopped at the completion of its 23rd (of 24) composite bottle. Sampling durations (the range of time covering bottles used in the formulation of the overall station composite sample) ranged from 1:44(hrs:mins) (PSNS124.1 and 124) to 20:44(hrs:mins) (PSNS115.1 and 015).

Table 3 summarizes the sampling period start, sampling period end, sampling period duration as well as the total rainfall amounts for each monitoring station and the PSNS project gauge at B427 that occurred during the sampling period associated with SW10. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), attached to this report, provides additional sampling period rainfall information.

Table 3. Sampling Period Information and Rainfall Totals for Project Monitoring Stations

Station	Sampling Period Start (Date/Time)	Sampling Period End (Date/Time)	Sampling Period Duration (Hrs:Mins)	Total Sampling Period Rainfall (in)
PSNS015	2/28/12 16:43	2/29/2012 13:27	20:44	0.58
PSNS084.1	2/28/12 18:37	2/29/2012 13:36	18:59	0.55
PSNS115.1	2/28/12 16:56	2/29/2012 13:40	20:44	0.46
PSNS124	2/28/12 17:07	2/28/2012 18:51	1:44	0.19
PSNS124.1	2/28/12 18:42	2/28/2012 20:26	1:44	0.23
PSNS126	2/28/12 16:53	2/29/2012 12:37	19:44	0.45
[1]B427	2/28/12 16:43	2/29/2012 13:40	20:57	0.57

[1]B427 start/stop and duration incorporates the total span from all monitoring stations

SW10 Qualification Summary:

All storm qualification conditions were met for this event. Storm event qualification conditions included wet season event date range (Oct 1 – May 1), forecast probability (≥70%), forecasted storm depth (≥0.1”), storm duration (≥2hrs) and runoff occurrence / hydrograph stage (elevated above base flow). Antecedent dry period (≤0.1” rain in previous 24hrs and 0” rain in previous 6hrs) qualification for SW10 was also met without condition, as described above. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist)*, documents the particular SW10 qualification criteria listed above.

7.0 Sampling Information, Management and Validation

Grab Sampling:

Grab sample collection was lead and performed by the Navy Team, with storm control assistance (limited to station status checks via telemetry) from Taylor/TEC as necessary. Grab sampling was conducted at all six of the monitoring stations. Grab samples were collected as per methodologies described in the 2011-12 Project Work Plan (PWP). Parameters included total petroleum hydrocarbons (NW-TPH-Dx) and fecal coliform. All grab samples were collected on February 29th

between 1535 (PSNS124.1) and 1720 (PSNS015). Sample collection was coordinated with low or lower tidal conditions to ensure that proper conductivity conditions would exist. Grab sampling times are indicated on the attached hydrographs to illustrate the water level stage during collection. Grab sample IDs, along with the other pertinent information is listed in the *Stormwater Field Sampling Forms* and in Table A-1 (both are attached). Table 4 summarizes these results.

Table 4. Grab Sampling Information

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Grab sample ID	SW10-002	SW10-001	SW10-004	SW10-005	SW10-006	SW10-007
Grab Date /Time	2/29/2012 15:58	2/29/2012 15:35	2/29/2012 16:18	2/29/2012 16:40	2/29/2012 16:58	2/29/2012 17:20
Grab sample conductivity value (μS/cm)	338	2882	5180	2840	253	405
Hydrograph stage at grab collection	Falling Limb	Falling Limb	Falling Limb	Falling Limb	Falling Limb	Falling Limb
Grab parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

Composite Sampling:

Composite sample retrieval tasks and formulation procedures were managed and lead by Taylor/TEC with support from PNNL/MSL personnel as needed. Composite samples were collected from all six monitoring stations.

Composite samples were collected via autosamplers which were operated and synchronized by a custom designed telemetered water quality control system. The composite sample collection period and duration for each monitoring station is noted in Table 3.

Wedge bottles from each station (contained in the autosampler bases) were brought back the C106 Stormwater Lab at B147 for processing. Composite formulation occurred on February 29th between 1850 and 2210. The number and numeric identification of the wedge bottles that were used for the composite sample formulation and those that were discarded were noted in Section 5 of the attached *Stormwater Field Sampling Forms*.

Methods used in preparation, autosampler collection, retrieval and formulation of the composite samples were conducted in a routine manner as per the 2011-12 PWP. Samplers at each station were enabled as per the conditions stated in Section 5 of this report. Composite sample parameters included: hardness, TOC, DOC, TSS, total and dissolved metals and turbidity.

The total number of discrete wedge bottles collected at each sampler, along with the total number of those bottles used in the station's composite sample is noted below in Table 5. Dividing the

number of wedge bottles used in the composite sample formulation by the total number of wedge bottles collected during the span of the entire sampling period provides an estimation of the amount of time (as a percentage of that stations entire collection period) where freshwater (i.e. runoff) conditions occurred at each station during the corresponding sampling event period.

Specific details regarding the composite formulation, results from individual bench top testing of the discrete bottles, sample IDs, sample date/time and resultant overall conductivity and turbidity values, as well as the number of wedge bottles collected during the sampling event and those used for the composite sample formulation are detailed in the *Stormwater Field Sampling Forms, Chain-of-Custody (CoC)* forms and in Table A-1 (all are attached). Table 5 summarizes these results.

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Composite sample ID	SW10-0010	SW10-0014	SW10-0012	SW10-0013	SW10-009	SW10-008
Composite Date /Time	2/29/2012 12:37	2/28/2012 20:26	2/28/2012 18:51	2/29/2012 13:40	2/29/2012 13:36	2/29/2012 13:27
Overall Composite conductivity value (μS/cm)	245	1493	1162	493	146	222
Overall Composite turbidity value (NTU)	8	15	20	7	16	17
Composite volume (ml)	9,000	850	2,000	7,000	8,000	8,500
Number of Bottles Collected During Sampling Event	20	2	2	21	21	21
Number of Bottles Included in Composite Sample	20	1	2	14	17	17
Percentage of Total Sampling Period that Freshwater Conditions Occurred	100%	50%	100%	67%	81%	81%
Composite parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

All sampling and vault monitoring equipment operated as designed and programmed. Details pertaining to autosampler programming and event-specific operation of each monitoring stations' autosampler unit are contained in the attached *Sampler Reports*.

QC Samples:

During SW10 both grab and composite duplicate samples were collected at PSNS126. Table 6 summarizes the quality control sample collection information for SW10.

Table 6. Summary of Quality Control Sampling Information for SW10

Sample Collection Criteria:	Results
Grab sample duplicate ID	SW10-003
Grab sample duplicate date and time	2/29/2012 16:00
Grab sample duplicate conductivity value (μS/cm)	338
Composite sample Duplicate ID	SW10-0011
Composite sample duplicate date and time	2/29/2012 12:37
Overall Composite Duplicate conductivity value (μS/cm)	252
Overall Composite Duplicate turbidity value (NTU)	8
Composite Duplicate volume (ml)	9000

Sample Management:

All samples were handled and managed as per Section 9 of the 2011-12 PWP and in a manner acceptable and within industry standards regarding practices typical for tasks of this nature. Once collected, both grab and composite samples were placed into coolers and put on ice and/or into the secure Stormwater Laboratory refrigerator to maintain temperatures between 2 and 6 °C.

All sample IDs, collection date and time, matrix, requested parameter analysis and other associated information were documented on *Chain of Custody* (*CoC) Forms* (attached). Samples were in direct control of project and/or laboratory personnel at all times. Samples were delivered to the testing facility, Battelle Marine Science Laboratory in Sequim, WA, in good, useable and properly chilled condition. Adequate sample volume was collected from the targeted stations to proceed with the scheduled analysis of all parameters per the 2011-12 PWP.

Sample Validation Summary:

All sample validation criteria were met for this event per Section 8.2.6 of the 2011-12 PWP, except at PSNS124.1 – which failed to meet the prescribed minimum number of aliquots and duration. This issue is further described in Section 10 of this report. Prior to processing the samples and transferring custody to the analytical laboratory, the Taylor/TEC Field Event Lead validated the samples against certain criteria. These validation criteria included runoff occurrence / hydrograph stage, sample preparation and handling review, requested parameters, ≥2 hour sampling duration or 75% storm hydrograph coverage, minimum number of aliquots, minimum sample volume collected for required parameters, discrete and composite samples conductivity measurement results, quality control sample collection and anomalous conditions assessment. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), documents the particular SW-event qualification listed above.

8.0 Basin Runoff Calculations

Rainfall runoff volumes during the SW10 sampling period were calculated for each of the basins associated with the six Phase II monitoring stations. These calculations are based on the modified Runoff Coefficient Method (RCM) as described in Section 7.4 of the 2011-12 PWP.

The value ranges for the various land use/land cover categories assigned to each basin are listed in the attached *Runoff Calculation Tables*. Calculated runoff values are also presented in Table A-1 (*Storm Qualification and Sample Validation Information Checklist*) (attached). Table 7 summarizes the results from these calculations.

Table 7. Runoff Calculations

Station	Type of Surface	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Combined Drainage Area (Ft^2)	Sample Event Rain Total (In)	Sample Event Rain Total (Ft)	Sample Event Period Runoff Vol. (Gal)
126	Impervious	653,373	0.6 – 0.9	591,881	0.45	0.0375	166,034
	Pervious	9,613	0.2 – 0.4				
124.1	Impervious	109,690	0.6 – 0.9	101,245	0.23	0.0192	14,516
	Pervious	6310	0.2 – 0.4				
124	Impervious	429,302	0.6 – 0.9	396,251	0.19	0.0158	46,933
	Pervious	24,698	0.2 – 0.4				
115.1	Impervious	449,104	0.6 – 0.9	366,390	0.46	0.0383	105,064
	Pervious	13,938	0.2 – 0.4				
84.1	Impervious	23,958	0.6 – 0.9	21,562	0.55	0.0458	7,393
	Impervious	2,009,431	0.5 – 0.8				
015	Pervious	2,009,431	0.25 – 0.4	2,411,321	0.58	0.0483	871,833
	Impervious	653,373	0.6 – 0.9				

9.0 Descriptive Statistics and Discussion of Event Station Monitoring Data

Descriptive statistics for the sampling period at each monitoring station are provided in Table 8, below. These statistics include minimum, maximum, average and median at static 1-hour interval periods for vault level, conductivity, salinity, transducer water temperature, YSI water temperature (PSNS084.1 only) and tidal stage. The method by which the rainfall statistics are calculated is on a “rolling 1-hour data window’ in an attempt to provide a more accurate and representative assessment of the actual rainfall conditions. Sampling period rainfall totals are also included as part of each station’s rainfall information.

Table 8. SW10 Sampling Period Rainfall and Vault Parameter Descriptive Statistics

Station ID	Statistics	Rainfall (1 hr) (in)	Vault level (ft)	Conductivity (uS/cm)	[1]Salinity (ppt)	trans temp (^{o}C)	YSI temp (^{o}C)	Tide Stage (ft)
PSNS126	**Min**	0.00	0.14	68	2.00	4.12		1.68
	Max	0.10	2.56	1,848	2.00	9.32		10.36
	Average	0.02	0.90	167	2.00	7.04		7.46
	Median	0.01	0.47	135	2.00	7.43		7.94
	Storm Total	0.45						
PSNS124.1	**Min**	0.00	0.12	-479	2.00	6.06		1.68
	Max	0.10	0.69	46,386	42.00	8.33		8.54
	Average	0.04	0.20	24,684	30.48	7.41		4.33
	Median	0.03	0.19	40,932	41.74	7.52		3.86
	Storm Total	0.23						
PSNS124	**Min**	0.00	0.16	659	2.00	5.54		1.68
	Max	0.10	2.32	14,065	11.62	11.22		6.39
	Average	0.04	0.58	6,407	5.73	8.27		3.15
	Median	0.04	0.49	4,895	4.27	10.00		2.51
	Storm Total	0.19						
PSNS115.1	**Min**	0.00	0.72	46	2.00	3.96		1.62
	Max	0.09	9.77	46,920	42.00	9.55		10.36
	Average	0.02	5.94	7,535	7.73	6.90		6.42
	Median	0.00	6.97	684	2.00	7.06		7.17
	Storm Total	0.46						
PSNS084.1	**Min**	0.00	-0.23	239	0.16	7.12	7.07	1.62
	Max	0.11	5.47	29,328	26.92	35.07	36.43	10.36
	Average	0.02	2.53	5,289	4.46	13.03	11.77	6.71
	Median	0.01	2.88	770	0.41	8.83	8.84	7.42
	Storm Total	0.55						
PSNS015	**Min**	0.00	0.12	49	2.00	4.08		1.68
	Max	0.12	6.67	45,617	42.00	12.02		10.36
	Average	0.02	3.62	2,151	3.71	7.08		6.92
	Median	0.01	4.15	122	2.00	6.92		7.55
	Storm Total	0.58						

[1]salinity calculations for PSNS126, 124.1, 124, 115.1 and 015 are based on an algorithm that has a lower range cut-off value of 2ppt. Actual field values may have been lower. The PSNS084.1 conductivity probe (YSI6820) utilized a different salinity algorithm function and thus is able to calculate lower low range salinity values.

Hydrograph Assessment:

The rainfall signatures for all monitoring stations showed similar patterns; a bimodal pattern with more intense and longer duration initial peaks, followed by an intra-event dry period, then finishing the event with second, less intense, shorter duration rainfall episodes. The Navy's rain gauge atop B427 also reflected this bimodal rainfall signature. Most of the monitoring stations showed a certain amount of freshwater runoff storage, with the exception of PSNS 124.1 and 124 – which seemed to remain tidally effected in spite of the rainfall event. A return to higher conductivity conditions was noted in the stations (124.1 and 124, aside) during the intra-event dry period, with a rapid response back to freshwater conditions at the onset of the second rain period (as noted in PSNS115.1, 084.1 and 015). Hydrograph responses are considered to be typical for these stations. The differences noted at PSNS124.1 could possibly be attributed to its small basin area which could not produce enough runoff during this particular rainfall event to overcome the tide. An obvious reason for PSNS124 not overcoming tidal influences is not as straightforward. One possibility is that the 124 basin may be rather "flashy", with the bulk of the runoff occurring prior to the lessening of the initial rainfall intensity, then not producing enough additional runoff to overcome tidal effects for the remainder of the storm event.

As mentioned above, grab sampling information for SW10 is indicated on each of the station hydrographs. Composite sample markers have been applied to the hydrographs to indicate total collection time (i.e. sample event period). The monitoring station hydrographs, as well as the rainfall graph for B427, are attached.

Telemetry Data Summary Report: TDSR

A review of the telemetry data collected since SW09; from 1/23 to 3/1/12, including the SW10 event, was conducted. There were some minor anomalies in nearly all of the stations data sets due to maintenance and/or transducer replacement tasks. As noted in the previous TDSR, exposure of the transducers to seawater had caused various corrosion issues, which warranty additional maintenance. PSNS124 was noted to have issues from 2/2 through 3/1. However, the transducer was on-line and functioning properly during the SW10 event.

Overall, data gaps and other anomalies were very minor during the period from 2/28/12 to 2/29/12. All sensors were in reasonable and accurate operation during SW10. A TDSR report (table), detailing the anomalies noted during SW10 (and the period is attached.

10.0 Notable Anomalies and Variations to the PWP

There were no major anomalies observed or otherwise noted after completion of the sampling event and review of the associated data that would have caused any of the SW10 samples to be non-representative of the conditions from which they were collected. As reported above, all intended and scheduled grab and composite samples were submitted to the PNNL MSL ("the Lab") within holding times and without incident. All support and sampling tasks, as well as collected samples, were managed as appropriate per the 2011-12 PWP.

There were, however, several minor anomalies that occurred during SW10. These were;

1. The "forced" enabling start of the PSNS124.1 and 84.1 samplers. This action was explained in Section 6 as necessary.
2. As noted on the Storm Controller Form (see attached *Field Forms*) and mentioned in Section 6, the same battery swap at PSNS084.1 that caused issues with the rainfall totalizer ("rolling" time increment counter) had also caused an issue with the sampler pacing (collection frequency) counter. The counter reverted back to its default value of zero-minutes. Therefore, when the sampler was activated it collected samples one after the other with no time pacing in between. This effected water collected into the first two discrete wedge bottles. This discrepancy was accounted for during the formulation of the overall composite sample for this station by combing the contents of bottles 1 and 2 into a sub-composite and using this material to stand for one discrete sample bottle. Therefore there were 16 usable discrete samples, out of a span of 21, that were utilized during the overall composite sample formulation.
3. The composite sample at PSNS124.1 was comprised of a single discrete wedge bottle (BTL#2). Freshwater conditions only occurred at this monitoring station during this bottles' collection period; saline conditions dominated for the remainder of the SW10 event. The 2011-12 PWP stipulates that composite samples should represent at least 2 hours of duration and contain a minimum of 8 aliquots. The resulting sample represented one of duration and four sample aliquots. This situation was discussed with the Lab and it was decided that the SW10 sample from PSNS124.1 should be (and was) submitted for analysis. Although this sample was conditional accepted it is considered to be representative of the freshwater conditions that existed at PSNS124.1 during the SW10 event.
4. Several of the grab samples (PSNS124.1, 124 and 115.1) were collected from their monitoring stations during less than optimal periods when saline conditions in their corresponding vaults were greater than 2,000µS/cm. See Table 4, above (or Table A-1) for conductivity values. Logistics, coupled with the particulars of the SW10 rainfall event caused the collection of the grab samples during these times. In general saline conditions are avoided due to their effects on the analyses of metals and associated parameters. However, the grab sample parameter consisted of total petroleum hydrocarbon – which is not as effected by higher salinity than other project specific compounds of concern. Grab samples were submitted to the Lab, who in turn managed their analyses accordingly.
5. General maintenance issue – corrosion impacts continued to affect the transducers and associated monitoring/mounting equipment. TEC increased maintenance efforts during this period and has planned for the upgrade of all transducers (to titanium bodies) and other key portions of the monitoring systems.

11.0 Action Items

Routine action items include resetting (reloading with bottles, charging batteries, back flushing with DI water, etc.) all six monitoring stations and re-stocking of sampling supplies. Routine station maintenance items (e.g. sensor cleaning and calibration, rain gauge maintenance, etc.) as well as storm set-up tasks will need to be completed as necessary.

Non-routine action items include the continued trouble shooting of the CT2X transducers, calibration and managing corrosion issues noted at most of the monitoring stations.

The current focus of the field efforts will be in maintaining proper station and equipment operational status, data and resource management and storm-tracking tasks.

Figure 1. Phase II Stormwater Monitoring Locations within the Shipyard Boundary

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ATTACHMENTS

- Storm Event Summary and Sampling Information, Validation Checklist
- Stormwater Field Sampling Forms and Controller Notes
- Chain-of-Custody Forms
- Runoff Calculation Worksheet
- Station Hydrographs
- Autosampler Reports
- Weather Forecast Information
- TDSR

Table A-1. PSNS Non-Dry Dock Stormwater Monitoring Tasks
Storm and Sample Information and Validation Checklist
Stormwater Sampling Event #10 (2/28/12)

Cardno TEC
Shaping the Future

This form acknowledges representativeness criteria described in the project PWP.
Mark with "Yes" to acknowledge acceptable, "No" for not acceptable, "NA" or "- -" if not applicable.

[1] Storm Event Data:	
Project Storm Event (SW) #	10
Event Forecast Probability (%)	100
PSNS B427 Rain Gauge - Sample Event Total (in.)	0.57

Rainfall and Runoff Summary:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Last Runoff (≥ 0.03" rainfall without 3-hr gap) Prior to STE Start (Date/Time)	2/24/12 22:45	2/24/12 22:35	2/24/12 22:35	2/24/12 22:35	2/24/12 22:35	2/24/12 22:35
Antecedent Dry Period (days: hrs)	3:17	3:17	3:17	3:18	3:17	3:17
Rainfall Prior 24-hrs to Sampling Start	0.00	0.00	0.00	0.00	0.00	0.00
Rainfall Prior 6-hrs to Sampling Start	0.00	0.00	0.00	0.00	0.00	0.00
Start of Rainfall (Date/Time)	2/28/12 16:15	2/28/12 16:25	2/28/12 16:15	2/28/12 16:35	2/28/12 16:15	2/28/12 16:20
Sampling Period Start Date & Time	2/28/12 16:53	2/28/12 18:42	2/28/12 17:07	2/28/12 16:56	2/28/12 18:37	2/28/12 16:43
Sampling Period End Date & Time	2/29/2012 12:37	2/28/2012 20:26	2/28/2012 18:51	2/29/2012 13:40	2/29/2012 13:36	2/29/2012 13:27
Sampling Period Duration (hrs:mins)	19:44	1:44	1:44	20:44	18:59	20:44
Sampling Period Duration (hours)	19.73	1.73	1.73	20.73	18.98	20.73
Sampling Period Total Rainfall (in)	0.45	0.23	0.19	0.46	0.55	0.58
Sampling Period Max 1-hr Rainfall Intensity (in/hr)	0.10	0.10	0.10	0.09	0.11	0.12
Sampling Period Average 1-hr Rainfall Intensity (in/hr)	0.02	0.04	0.04	0.02	0.02	0.02
Runoff volume calculated for sampling period (gallons)	166,034	14,516	46,933	105,064	7,393	871,833
[1] Sample Collection Criteria:						
Grab sample ID	SW10-002	SW10-001	SW10-004	SW10-005	SW10-006	SW10-007
Grab Date /Time	2/29/2012 15:58	2/29/2012 15:35	2/29/2012 16:18	2/29/2012 16:40	2/29/2012 16:58	2/29/2012 17:20
Grab sample conductivity value (µS/cm)	338	2882	5180	2840	253	405
Hydrograph stage at grab collection	Falling Limb	Falling Limb	Falling Limb	Falling Limb	Falling Limb	Falling Limb
Grab parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
Composite sample ID	SW10-0010	SW10-0014	SW10-0012	SW10-0013	SW10-009	SW10-008
Composite Date /Time	2/29/2012 12:37	2/28/2012 20:26	2/28/2012 18:51	2/29/2012 13:40	2/29/2012 13:36	2/29/2012 13:27
Overall Composite conductivity value (µS/cm)	245	1493	1162	493	146	222
Overall Composite turbidity value (NTU)	8	15	20	7	16	17
Composite volume (ml)	9,000	850	2,000	7,000	8,000	8,500
Number of Bottles Collected During Sampling Event	20	2	2	21	21	21
Number of Bottles Included in Composite Sample	20	1	2	14	16	17
Percentage of Total Sampling Period that Freshwater Conditions Occurred	100%	50%	100%	67%	76%	81%
Composite parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
[1] QC Sample Summary Information:						
Grab sample duplicate ID	SW10-003	N/A	N/A	N/A	N/A	N/A
Grab sample duplicate date and time	2/29/2012 16:00	N/A	N/A	N/A	N/A	N/A
Grab sample duplicate conductivity value (µS/cm)	338	N/A	N/A	N/A	N/A	N/A
Composite sample duplicate ID	SW10-0011	N/A	N/A	N/A	N/A	N/A
Composite sample duplicate date and time	2/29/2012 12:37	N/A	N/A	N/A	N/A	N/A
Overall Composite Duplicate conductivity value (µS/cm)	252	N/A	N/A	N/A	N/A	N/A
Overall Composite Duplicate turbidity value (NTU)	8	N/A	N/A	N/A	N/A	N/A
Composite Duplicate volume (ml)	9000	N/A	N/A	N/A	N/A	N/A
Associated Equipment Blank	SW08-005	SW08-006	SW08-002	SW08-001	SW08-003	SW08-004
[1] Storm and Sample Validation:						
Was the targeted STE antecedent or conditional antecedent qualified per PSNS PWP? (if no, then see next line)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Was the antecedent overage amount greater than 10% of the total rain event ?	N/A	N/A	N/A	N/A	N/A	N/A
Was runoff occurring OR was the hydrograph at least 10% above background pipe level during grab collection ? If no, explain in summary narrative.	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were a minimum of 8 aliquots collected OR does the composite sample represent at least 75% of the stations storm event rain volume ?	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**
Were all 1-hr sampler bottles used for the Composite sample ≤2000 µS/cm ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Did any anomalous conditions exist that could make samples non-representative? Explain if "Yes"	No	No	No	No	No	No
Based on consideration of the information above, was the sample collected during the STE valid for project purposes ? (Y / N, composite, grab or both)	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**

[1] If the answer to any of these questions is "No" OR indicate non-representative conditions, then these items should be explained in the Event Narrative.

Validation Check List Completed By: Brad Kwasnowski **Reviewed By /Date:** David C. Metallo 3-22-12

PSNS NDDSW Monitoring Project Storm Control Work Sheet *Sht Rev. 112111* Sheet 1 of 2

Date:	2-28-2012			**Sampling Support Personnel:**	Rupert, Beckwith; Metallo (controller)
STE #	10	**Antecedent Dry Cond. Met ?**	Yes	**Tidal Info:**	2/28 LL = (1532) @ 1.57' 2/29 LL = (1626) @ 1.58'
Storm Controller:	Metallo			**Grab sampling Info.**	C106 to collect if possible
Pre-Storm / Weather Details:	NWS has forecast 0.36" from 1700 (2-28) to 1000 (2-29), w/ another 0.07 afterwards through Thur. 3-1. GFS: rain arrives ~ 1500 w/ bulk of storm over by 0200 2-29. NAM; rain start ~1500 last until ~1000 2-29 GFS = 0.72" NAM = 1.10"				

Telemetry Measurements: (1) Rain total suspect.... **DATE/TIME (24HR)** (2) initial pacing btls 142 ~~set to~~ reverted to 0

STATION:	2-28-12 (1110)	(1338)	(1834)			2-29-12 (0136)	(0740)	(1320)		Strm END/DL
PSNS015 Rain[1]	0/0		.07/.20			.01/.37	0.01/.38	0/.58		
PSNS008 Level	3.62'		1.40'			4.42'	6.13'	1.24'		Routine
PSNS008 Cond.	10,356		118			102.	45967	241		Completed
Smpl Marker	0		8			36	61	83		RTD'ed (~1700)
(2) PSNS084.1 Rain	0/0		08/1.32 (1)			.01/.81 (1)	0/.51 (1)	0/.59		Routine
PSNS084.1 Level	2.44		0.62			3.25	5.02	0.12		Completed
PSNS084.1 Cond.	41598		256			241	24910	5880		Smplr Rpt
Smpl Marker	0		(2)			36	60	82		Via telem (1752)
PSNS115.1 Rain	0/0		06/.16			.01/.31	0/.31	0/.46		Routine
PSNS115.1 Level	6.50		4.70			7.49	9.28	4.29		Completed
PSNS115.1 Cond.	43004		313			110	46864	2401		Smplr Rpt
Smpl Marker	0		7			35	60	82		Via Telem (~1745)
PSNS124 Rain	0/0	0/0	.05/.17			.01/.30	0/.30	0/.41		Routine
PSNS124 Level		0.22	.90			3.67	5.44	0.42		Completed
PSNS124 Cond.		9474	713			22783	47328	12893		Smplr Rpt
Smpl Marker	0	0	7			35	59	82		Via Telem (~1740)
PSNS124.1 Rain	0/0		.06/.18			.01/.33	0/.33	.01/.49		Routine
PSNS124.1 Level	0.12	0.12	.24			0.16	1.70	0.15		Halted @ 23 4/4
PSNS124.1 Cond.	48861	52929	863			44358	45137	12826		Smplr Rpt
Smpl Marker	0	0	0.1 enable boost			28	51	74		Via telem (~1735)
PSNS126 Rain	0/0		.06/.18			.0/.30	0/.31	0/.45		Routine
PSNS126 Level	0.14		0.36			0.26	2.09	0.17		Completed
PSNS126 Cond.	96		131			136	168	98		Smpl Rpt
Smpl Marker	0		8			36	60	83		Via Telem (~1725)

[1]Rain depths are reported as 1-hr / 24-hr totals

~~126~~ Rain last 72 hrs: 124 (0.0), 015 (0.0), 84.1 (0.0), 115.1 (0.0), 124 (0.0), 124.1 (0.0)

PSNS NDDSW Monitoring Project Storm Control Work Sheet, Continued *Sht Rev. 112111* Sheet 2 of 2

Date:	2-28-12			Sampling Support Personnel:	Rupert, Beckwith							
STE #	10	Storm Controller:	Metallo	Strm Evnt Start / Stp	~(1615) 2/28/12 / Sample Stop = (1340) 2/29/12							
Enabling Information:												
Sample Staion:	PSNS015		PSNS084.1		PSNS115.1		PSNS124		PSNS124.1		PSNS126		Batts log/Smpl
Rain enable (in/hr)	0.03		0.03		0.03		0.03		003		0.03		126: 12.08 12.68
① Level Enable (ft)	~~.283~~	0.3	20		20	0.3	0.3		20	0.3	~~0.3~~20	0.3	
Cond. (µS/cm)	2000		2000		2000		2000		2000		2000		124.1 : 13 / 12.73
Repeat. Cond Set ?	No		No		No		No		No		No		124: 12.73/12.70
Pacing Rate (min)	15		15		15		15		15		15		115 : 13.06/
Date	2-28	2-28	2-28		2-28	2-28	2-28		2-28	2-28	2-28	2-28	84.1 : 11.81/12.81
Time	1116	1347	1119		1122	1401	1341		1126	1352	1108	1349	015 : 13.10/12.80
Comp Dup ? / where:			PSNS126				Grab Dup ? / where:			PSNS126			

EVENT NOTES:

① as of (1100~) all level enable's are temporarily set to 20' as a preventative measure

? Ask Brian if Storm_Reset was enabled @ PSNS126

- Field crew will swap out logger battery @ 84.1 w/ fresh unit
- Conducted 3 rnds of telem. check by 1424 - all stations properly set
- Battery Levels good. Swapped out 84.1 = 12.57(Log) & 12.81 (Smpl)
- Checked stations several times b/w ~1830 & 0130(2-29) and all was well, except the following: @1830 all stations were enable except 84.1 & 124.1 - both of stations needed to be "manually" started - 124.1 because the level in the pipe just wasn't building to .3 (it was ~.26') and 84.1 had a new battery installed ~~and~~ (after the afternoon settings were applied) thus causing pace rate to be defaulted to 0, rain counter not stabilized ~~and~~ - station was enable boosted to start ~1 to 1.5 behind other stations. The pacing was not adjusted to 15 mins until ~9 to 10 samples were collected in a rapid mode. Back on track for remainder of event.

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 126	MH/CB#: 5110	Loc. Descrip. B460 SW side	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection			
Personnel:	Weather:	Arrival Date/Time:	
Carry-over maintenance to do prior to set-up:			done?
Sampler Battery Voltage		Changed? Y N	New voltage
Modem Battery Voltage		Changed? Y N	New voltage
Sample Tubing & Strainer OK?		**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	
Trands. Cable OK?		Internal Sampler Tubing OK?	
Trands. Desiccant OK (Yes/No)		Tubing Replaced? (Yes/No)	
Telem. Box Desiccant OK (Yes/No)		Normal Smpler Program or Dup. ?	
Modem Status		Bottles Loaded ?	
Notes (including channel condition):		Lid Status?	
		Backflushed with DI?	
		Suction line & quick connect attached?	
		Smplr Status (on/off) / last screen..	

Section 2. Storm Setup and Inspection			
Personnel: RR/BB	Weather: overcast, temp 30's	Arrival Date/Time: 0953 2/28/12	
Sampler Battery Voltage 12.81	New - added 2/27/12	Changed? Y (N)	New voltage —
Modem Battery Voltage 12.27		Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes/OK
Transducer Cable OK?	Yes	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	Yes	Program Reviewed (Yes/No), Dup ?	Yes / Dup
Recorded Level (FT)	~~1.62~~ 1.53	Lids off bottles?	Yes
Measured Level (FT)	1.62	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	0.09	Backflush with DI?	NO
Level Adjusted ?	Yes / NOW 1.57	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	PROG 10.15
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. = (>10% adj. offset); Offset =	New Rec Val = 2/28/12
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)			

Section 3. Grab Sample Collection			Field	LAB
Personnel: Johnston / Beckwith	Weather: Clear	Arrival Date/Time:	1558	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	137	338
Grab Parameters Collected	TPH, FC, Turb	Salinity Reading (PPT):		
Grab Sample ID	SW1126-007	Temp. Reading (°C):	8.0	7.6
Grab Date/Time	2/29/2012 1558	Turbidity Reading (NTU)		2.72
Grab Dup ID	SW1026-003	Equipment running correctly?	Yes	
Grab Dup Date/Time	2/29/2012 1600	Sampler Battery Voltage (Changed?):		
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:		OK		
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?	
Notes: (what meter was used for site readings, etc.)	pretty good flow 4" deep			

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS 126 — continued from previous page — Page: 2 of 2

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR	Weather: Overcast, windy, 30's	Arrival Date/Time: 2/29/12 (1710)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	No		
Composite Begin Time (date/time)	2-28-12 (1653)	Sampler Report Downloaded ?	Yes - telem
Last Aliquot Taken (date/time, bott #, aliq #)	2-29-12 (1637) btl 23/24 4of4		
Total Composite Sample Volume Collected	24 btls 100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Normal/typical		
Storm Contoller notified (Y or N/A)?:	Which parameter?:	NA	
Notes: Duplicate sample collected at this location			
Maintenance Needed: Typical Re-set			

Section 5. Compositing Scheme and QC Sampling

Personnel: DM / BR / BB — Date/Time: 2/29/12 (2000)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

YSI 30 (Cond.) + Hach 2100P (Turb.) - Navy meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 472/15/Y	7. 205/6/Y	13. 276/3/Y	19. 139/17/Y
2. 459/12/Y	8. 203/6/Y	14. 259/3/Y	20. 139/12/Y
3. 212/10/Y	9. 195/5/Y	15. 389/17/Y	21. X base flow
4. 208/10/Y	10. 195/5/Y	16. 328/2/Y	22. 145/6/X base flow
5. 208/7/Y	11. 187/3/Y	17. 185/15/Y	23. X base flow
6. 206/9/Y	12. 188/3/Y	18. 191/16/Y	24. 137/3/X base flow

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Even #'s btls = Sample Odd # btls = Dup

Sample: used btls 2, 4, ... 20, excluded 22-24 - base flow

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Sampl. Info. Cond. = 245 Turb = 8 Vol. = ~9000 ml Analysis: per PWP

Composite Sample ID & Time:	SW10C-003 (1237) normal Sample
Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	YES
Duplicate sample ID	SW10C-004 (1237) duplicate

NOTES:

Dup. Info:

Cond. = 252 Turb. = 8 Vol. = ~9000 ml

Used btls 1, 3, 5. . . 19; excluded btls 21-23 - base flow

TAYLOR ASSOCIATES, INC.

Station: 124.1	MH/CB#: 5880	Loc. Descrip. DD#3 eastside	Page: 1 of 2 pages per station

Section 1. Station Reset and Inspection

Personnel:	Weather:	Arrival Date/Time:	
Carry-over maintenance to do prior to set-up:			done?
Sampler Battery Voltage		Changed? Y N	New voltage
Modem Battery Voltage		Changed? Y N	New voltage
Sample Tubing & Strainer OK?		**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	
Trands. Cable OK?		Internal Sampler Tubing OK?	
Trands. Desiccant OK (Yes/No)		Tubing Replaced? (Yes/No)	
Telem. Box Desiccant OK (Yes/No)		Normal Smpler Program or Dup. ?	
Modem Status		Bottles Loaded ?	
Notes (including channel condition):		Lid Status?	
		Backflushed with DI?	
		Suction line & quick connect attached?	
		Smplr Status (on/off) / last screen..	

Section 2. Storm Setup and Inspection

Personnel: BR/BD	Weather: overcast/Temp 30's	Arrival Date/Time: 1040 / 2/28/12	
Sampler Battery Voltage	Added 2/27/12	Changed? Y (N)	New voltage —
Modem Battery Voltage		Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	Yes/ok	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	ok
Transducer Cable OK?	ok	Aliquot Vol. Cal.'ed (Y/N & vol.)	
Multi-meter Cable OK	ok	Program Reviewed (Yes/No), Dup ?	Yes / Normal
Recorded Level (FT)	0.92	Lids off bottles?	Yes
Measured Level (FT)	0.17	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	-0.73	Backflush with DI?	NO
Level Adjusted ?	Yes	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	Prog. Disa 11:00
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. = Diff. =	(>10% adj. offset); Offset =	New Rec Val = 2/28/12

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)

Section 3. Grab Sample Collection

2/29/2012 LAB

Personnel: Johnston/Beckwith	Weather: Clear	Arrival Date/Time: 1530	LAB
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	800-1000 0 top / 3800 bottom
Grab Parameters Collected	TPH, FC, turb	Salinity Reading (PPT):	2882
Grab Sample ID SW10G001	SW10G-001	Temp. Reading (°C):	7.3 / 7.5
Grab Date/Time 2/29/2012 1535	1535	Turbidity Reading (NTU)	~~2~~ 62.8
Grab Dup ID		Equipment running correctly?	Yes
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?

Notes: (what meter was used for site readings, etc.) standing water stratified from top about 6" deep no flow

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS 124i | continued from previous page | Page: 2 of 2

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR	Weather: Overcast, 30's Windy	Arrival Date/Time: 2-29-12 1745	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	No		
Composite Begin Time (date/time)	2-28-12 (1842)	Sampler Report Downloaded ?	Yes, telem
Last Aliquot Taken (date/time, bott #, aliq #)	2-29-12 (1726) BTL 23 4/4		
Total Composite Sample Volume Collected	100% 23 btls - full		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor…)?	Normal		
Storm Contoller notified (Y or N/A)?: NA	Which parameter?:	NA	
Notes: Stopped sampler via telem. Due to pipe dia / basin size the level in this pipe didn't get to 0.3', forced start @ ~1842 via telem			
Maintenance Needed: Reset			

Section 5. Compositing Scheme and QC Sampling

Personnel: DM, BR, BB | Date/Time: 2-29-12 (2210)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond.= YSI 30 Turb.= Hach 2100P – both Navy meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 15750/12/ N	7. 41510/2 / N	13. 44650/1/ N	19. 29530/25/ N
2. 1493/ 15/ N Y	8. 40750/2 / N	14. 44570/1/ N	20. 26400/27/ N
3. 36470/3/ N	9. 40420/2/ N	15. 44300/1/N	21. 22140/31/ N
4. 42750/1/N	10. 38500/3/ N	16. 40700/3/ N	22. 18310/42/ N
5. 42550/1/ N	11. 35700/3/N	17. 37300/8/ N	23. 14720/46/ N
6. 41960/2/ N	12. 42006/2/ N	18. 33950/15/ N	24. X Empty

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Only (1) qualifying bottle; #2

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 1493 Turb.= 15 Vol.= ~850 ml Analysis per PWP

Composite Sample ID & Time: SW10C-007 (2026) 2-28-12

Field Blank Collected? (date/time)	No
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

** Very low vol. of water; ~1000 ml

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 124	MH/CB#: 5881	Loc. Descrip. B357 / OWS build	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection

Personnel:	Weather:	Arrival Date/Time:	
Carry-over maintenance to do prior to set-up:			done?
Sampler Battery Voltage		Changed? Y N	New voltage
Modem Battery Voltage		Changed? Y N	New voltage
Sample Tubing & Strainer OK?		**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	
Trands. Cable OK?		Internal Sampler Tubing OK?	
Trands. Desiccant OK (Yes/No)		Tubing Replaced? (Yes/No)	
Telem. Box Desiccant OK (Yes/No)		Normal Smpler Program or Dup. ?	
Modem Status		Bottles Loaded ?	
Notes (including channel condition):		Lid Status?	
		Backflushed with DI?	
		Suction line & quick connect attached?	
		Smplr Status (on/off) / last screen..	

Section 2. Storm Setup and Inspection

Personnel: BR/NB	Weather: Light Rain	Arrival Date/Time: 1230 2/28/12	
Sampler Battery Voltage 12.80	added 2/27/12	Changed? Y (N)	New voltage
Modem Battery Voltage 12.80		Changed? Y (N)	New voltage
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / Normal
Recorded Level (FT)	0.22	Lids off bottles?	Y
Measured Level (FT)	0.21	Diagnostics/Distrubutor arm check?	Y
Offset Diff (FT)	0	Backflush with DI?	NO
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2Y	Last screen...	Prog. Disa. 1358
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. = (>10% adj. offset); Offset =	New Rec Val = 2/28/12

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)

Section 3. Grab Sample Collection 2/29/2012

Personnel: Johnston / Beckwith	Weather: Cloudy Windy	Arrival Date/Time: 1616		LAB
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	5000 - 20000	51800
Grab Parameters Collected	TPH, FC, Turb	Salinity Reading (PPT):		
Grab Sample ID	SWOG-004	Temp. Reading (°C):	10	8.4
Grab Date/Time	2/29/12 1618	Turbidity Reading (NTU)		3.21
Grab Dup ID		Equipment running correctly?		
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):		
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:				
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?	

Notes: (what meter was used for site readings, etc.)

very low flow but moving 5" depth strange smell exhaust

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS 124 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR	Weather: Overcast, 30's, windy	Arrival Date/Time: 2-29-12 (1735)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage ----
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage ----
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	No		
Composite Begin Time (date/time)	1707	Sampler Report Downloaded ?	Yes - telem
Last Aliquot Taken (date/time, bott #, aliq #)	2-29-12 (1651) BTL 24 4/4		
Total Composite Sample Volume Collected	100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)? Typical			
Storm Contoller notified (Y or N/A)?: NA	Which parameter?:	NA	
Notes: Just prior to storm event the refurbished titanium transducer was placed back into vault			
Maintenance Needed: Typical re-sets			

Section 5. Compositing Scheme and QC Sampling

Personnel: DM, BR, BB | Date/Time: 2-29-12 (2050)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond = YSI 30 Turb = Hach 2100P both Navy meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 1120/27 / Y	7. 36260/4 / N	13. 43180/1 / N	19. 17350/10/ N
2. 805/19 / Y	8. 24780/5 / N	14. 43670/11/N	20. 22690/2/ N
3. 13620/9 / N	9. 19430/8 / N	15. 43300/1 /N	21. 15140/6/ N
4. 42500/1 / N	10. 23490/6 / N	16. 43700/1 / N	22. 6340/6/ N
5. 43750/2/ N	11. 26000/4 / N	17. 40 930/1/ N	23. 8850/5/ N
6. 43120/1 / N	12. 32280/2 /N	18. 25540/7 /N	24. 9150/ /N

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

Btl's 1 and 2 = ~2000 ml

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 1162 Turb = 20 Vol. = ~2000 ml Analysis per PWP

Composite Sample ID & Time: SW10C-005 (1851) 2-28-12

Field Blank Collected? (date/time)	No
Blank ID:	NA
Duplicate comp sample? Yes/No	No
Duplicate sample ID	NA

NOTES:

* Very low vol. in comp. sample

#2 TD = 16.43
WLI = 15.40
HA = 1.05

TAYLOR ASSOCIATES, INC. 1.2

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: 115.1	MH/CB#: 4860	Loc. Descrip. B879	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection			
Personnel:	Weather:	Arrival Date/Time:	
Carry-over maintenance to do prior to set-up:			done?
Sampler Battery Voltage 12.49	added 2/27/12	Changed? Y N	New voltage
Modem Battery Voltage 12.99		Changed? Y N	New voltage
Sample Tubing & Strainer OK?		**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	
Trands. Cable OK?		Internal Sampler Tubing OK?	
Trands. Desiccant OK (Yes/No)		Tubing Replaced? (Yes/No)	
Telem. Box Desiccant OK (Yes/No)		Normal Smpler Program or Dup. ?	
Modem Status		Bottles Loaded ?	
Notes (including channel condition):		Lid Status?	
		Backflushed with DI?	
		Suction line & quick connect attached?	
		Smplr Status (on/off) / last screen..	

Section 2. Storm Setup and Inspection			
Personnel: BR/BA	Weather: Light Rain	Arrival Date/Time: 1415 2/28/12	
Sampler Battery Voltage 12.49	added. 2/27/12	Changed? Y (N)	New voltage —
Modem Battery Voltage 12.99	—	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / Normal
Recorded Level (FT)	1.05	Lids off bottles?	Yes
Measured Level (FT)	1.15	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	+0.10	Backflush with DI?	NO
Level Adjusted ?	Yes	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2Y	Last screen...	Prog Disa 1433
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. = (>10% adj. offset); Offset =	New Rec Val = 2/28/12
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)			

Section 3. Grab Sample Collection				
Personnel: Johnston / Beckwith	Weather: Cloudy Windy	Arrival Date/Time: 1635		LAB
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	3000-6000	28440
Grab Parameters Collected	TPH, FC, Turb	Salinity Reading (PPT):		
Grab Sample ID	SW106-005	Temp. Reading (°C):	7.7	8.3
Grab Date/Time	2/29/12 1640	Turbidity Reading (NTU)		2.81
Grab Dup ID		Equipment running correctly?		
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):		
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:				
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?	
Notes: (what meter was used for site readings, etc.) Standing water very slight flow 6" deep				

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS115.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR	Weather: Overcast, 30's, Windy	Arrival Date/Time: 2-29-12 (1725)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	2-28-12 (16:56)	Sampler Report Downloaded ?	Yes-via telem
Last Aliquot Taken (date/time, bott #, aliq #)	2-29-12 (16:40) Btl 24 4/4		
Total Composite Sample Volume Collected	100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor…)?	Typical		
Storm Contoller notified (Y or N/A)?: NA	Which parameter?:	NA	
Notes:			
Maintenance Needed: Resets			

Section 5. Compositing Scheme and QC Sampling

Personnel: DM, BR, BB | Date/Time: 2-29-12 (2135)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond = YSI 30 Turb = Hach 2100P - both Navy meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 9600/21 N	7. 6314 / Y	13. 87512 / Y	19. 8322 / Y
2. 14270/3 / N	8. 772 / Y	14. 30310 / 1 / N	20. 137/10 / Y
3. 2410/5 / N	9. 104/3 / Y	15. 43030/21 N	21. 1956/10 / Y
4. ~~4922/5/ N~~ Y	10. 161/3 / Y	16. 39310/1 / N	22. 5160 / 33 / N
5. 1154/6 / Y	11. 253/3 / Y	17. 4436/10 / N	23. 6670/30/N
6. 391/4 / Y	12. 520/3 / Y	18. 52 /22 / Y	24. 6420/9 / N

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

14 qualifying btls — 500 ml. from ea. bottle

Used btl's 4-13 & 18-21

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 493 Turb. = 7 Vol. = ~7000 Analysis per PWP

Composite Sample ID & Time: SW10C-0006 (1340)

Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

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Station: 84.1	MH/CB#: MH 551	Loc. Descrip. Build 983	Page: 1 of 2

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Section 1. Station Reset and Inspection			
Personnel:	Weather:	Arrival Date/Time:	
Carry-over maintenance to do prior to set-up:			done?
Sampler Battery Voltage		Changed? Y N	New voltage
Modem Battery Voltage		Changed? Y N	New voltage
Sample Tubing & Strainer OK?		**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	
Trands. Cable OK?		Internal Sampler Tubing OK?	
Trands. Desiccant OK (Yes/No)		Tubing Replaced? (Yes/No)	
Telem. Box Desiccant OK (Yes/No)		Normal Smpler Program or Dup. ?	
Modem Status		Bottles Loaded ?	
Notes (including channel condition):		Lid Status?	
		Backflushed with DI?	
		Suction line & quick connect attached?	
		Smplr Status (on/off) / last screen..	

Section 2. Storm Setup and Inspection			
Personnel: BR/BB	Weather: Light Rain	Arrival Date/Time:	1440/2/28/12
Sampler Battery Voltage	added 2/27/12	Changed? Y (N)	New voltage —
Modem Battery Voltage	11.92	Changed? (Y) N	New voltage 12.76
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / Normal
Recorded Level (FT)	-0.23	Lids off bottles?	Yes
Measured Level (FT)	Not Enough water	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	↓	Backflush with DI?	NO
Level Adjusted ?		Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	Prog Disa /SD8
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. = (>10% adj. offset); Offset =	New Rec Val = 2/28/12
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)			

Section 3. Grab Sample Collection				LAB
Personnel: Johnston/Beckwith	Weather: Cloudy Windy Sprinkling	Arrival Date/Time:	1655	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	380	253
Grab Parameters Collected	TPH, FC, Turb	Salinity Reading (PPT):		
Grab Sample ID	SW106-006	Temp. Reading (°C):	30	15.9
Grab Date/Time	2/29/12 1658	Turbidity Reading (NTU)		5.72
Grab Dup ID		Equipment running correctly?		
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):		
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:				
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?	
Notes: (what meter was used for site readings, etc.) Flowing from main channel Very warm water Grab - Sand in Sample				

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS084.1 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR	Weather: Overcast, windy, 30's	Arrival Date/Time: 2/29/12 (1800)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	No		
Composite Begin Time (date/time)	2/28/12 (1831)	Sampler Report Downloaded ?	Yes via telem.
Last Aliquot Taken (date/time, bott #, aliq #)	2/29/12 (1636)		
Total Composite Sample Volume Collected	100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	None		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	OK-typical		
Storm Contoller notified (Y or N/A)?:	Which parameter?:	NA	

Notes: This station was manually started due a default that occurred in the data logger prgm as a result of swapping out the logger battery – btls 1+2 paced at 0-mins

Maintenance Needed: Resets

Section 5. Compositing Scheme and QC Sampling

Personnel: DM / BR / BB | Date/Time: 2/29/2012 (1930)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

YSI 30 (cond.) + Hach 2100P (Turb.) – Navy Meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 114 / 15 / Y (1)	7. 67/9 / Y	13. 169/7 / Y	19. 211/31 / Y	
2. 83 / 15 / Y (1)	8. 61/8 / Y	14. 34830/3 / N	20. 164/29 / Y	
3. 77/14 / Y	9. 67/8 / Y	15. 43500/1 / N	21. 491/28 / Y	
4. 73/10 / Y	10. 74/8 / Y	16. 43650/1 / N	22. 646/20 / Y X	base flow ↓
5. 76/11 / Y	11. 84/7 / Y	17. 33100/5 / N	23. 492/15 / Y X	
6. 79/12 / Y	12. 91/7 / Y	18. 1631/25 / Y	24. 418/12 / Y X	

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

(1) BTLs represent 8-mins of coverage due to pacing glitch – combined ~~15~~ 16 btls + comb'ed btls 1+2 = ~~19~~ 18 btls; decided not to use btls 22-24, baseflow

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 146 Turb. = 16 Vol. = ~~9500~~ 8000 ml Analysis per PWP

Composite Sample ID & Time:	SW10C-002 (1336)
Field Blank Collected? (date/time)	No
Blank ID:	NA
Duplicate comp sample? Yes/No	No
Duplicate sample ID	NA

NOTES: Combined 250-ml's ~~from~~ each from BTLs 1+2 (500 ml total) + 500 ml ea. from btls 3-13, 18-21; 16X500 = 8000 ml

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

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Station: 015	MH/CB#: A42	Loc. Descrip. McD5 drivethru	Page: 1 of 2

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Section 1. Station Reset and Inspection

Personnel: BL/SR	Weather: Overcast, temp low 30's	Arrival Date/Time: 2/28/12 0820	
Carry-over maintenance to do prior to set-up:	None		done?
Sampler Battery Voltage 12.96	add new one 2/27/12	Changed? Y (N)	New voltage
Modem Battery Voltage 12.70		Changed? Y (N)	New voltage
Sample Tubing & Strainer OK?	Yes	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Yes
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	OK
Trands. Desiccant OK (Yes/No)	Yes	Tubing Replaced? (Yes/No)	NO
Telem. Box Desiccant OK (Yes/No)	Yes	Normal Smpler Program or Dup. ?	Normal
Modem Status	Yes	Bottles Loaded ?	Yes
Notes (including channel condition): Grounded Box -		Lid Status?	ON
		Backflushed with DI?	NO
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	off

Section 2. Storm Setup and Inspection

Personnel: BL/BL	Weather: overcast	Arrival Date/Time: Same as abv	
Sampler Battery Voltage		Changed? Y (N)	New voltage
Modem Battery Voltage		Changed? Y (N)	New voltage
Sample Tubing & Strainer OK?		**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	Yes
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes / @ 240mL
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Yes / NO
Recorded Level (FT)	~~(0.60)~~ 0.61	Lids off bottles?	~~off~~ off
Measured Level (FT)	0.60	Diagnostics/Distrubutor arm check?	~~Yes~~ Yes
Offset Diff (FT)	0.01	Backflush with DI?	NO
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	~~Yes~~ Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	CT2X	Last screen...	~~off~~ PRG D.SC
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. = (>10% adj. offset); Offset =	New Rec Val = 0913
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.)			2/28/12

3:00 main side channel

Section 3. Grab Sample Collection

			Field	LAB	
Personnel: Johnston / Beckwith	Weather: Cloudy Windy	Arrival Date/Time:	1515	LAB	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	303	152	405
Grab Parameters Collected	TPH FC, turb	Salinity Reading (PPT):			
Grab Sample ID	SW10G-007	Temp. Reading (°C):	9.6	8.7	8.4
Grab Date/Time	2/29/12 1516	Turbidity Reading (NTU)		7.11	16.2
Grab Dup ID		Equipment running correctly?			
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):			
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?: SIDE Channel					
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?		

Notes: (what meter was used for site readings, etc.)

Flow from main and port 3:00 measurements from manual 4" deep side stream @ 3:00 sampled for FC tea colored

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS015 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: DM/BR	Weather: Overcast, breezy, 40°	Arrival Date/Time: 2/29/12 (1650)	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage ____
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage ____
Additional Grabs (IDs, date/time)	No		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	2-28-12 (1643)	Sampler Report Downloaded ?	Yes - RTD
Last Aliquot Taken (date/time, bott #, aliq #)	2-29 (1342) BTL 22 1 of 4		
Total Composite Sample Volume Collected	100%		

Aliquots missed/NLD (date/time/bott #/aliq #): BTL 22 2/4 (NM) → 24 4/4 (NL) 11 aliquots total

Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)? OK-typical

Storm Contoller notified (Y or (N/A)?)	Which parameter?:	NA

Notes: BTL #8 - Cap was left on - No samples collected in this btl

Maintenance Needed: Pump head tubing needs to be changed, Reset station

Section 5. Compositing Scheme and QC Sampling

Personnel: DM / BR / BB | Date/Time: 2.29.12 (1850)

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

YSI 30 & Hach 2100P - both Navy owned meters

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1. 1196/55 / Y	7. 48/12 / Y	13. 341/9 / Y	19. 49/18 / Y
2. 60/18 / Y	8. Empty - cap on	14. 372/9 / Y	20. 66/17 / Y
3. 43/19 / Y	9. 49/14 / Y	15. 10200/9 / Y N	21. 108/20 / Y
4. 45/16 / Y	10. 170/12 / Y	16. 43000/2 / N	22. One aliq. - X
5. 87/11 / Y	11. 235/8 / Y	17. 10680/12 / N	23. No liquid - X
6. 67/14 / Y	12. 371/8 / Y	18. 166/23 / Y	24. No liquid - X

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

17 - BTLs @ 960 ml = 16,320 ÷ 2 = 8,160 — Used 500 ml's from the 17 "keepers" above = 8500ml

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond. = 222 Turb. = 17 Vol. = 8500 ml Analysis per PWP

Composite Sample ID & Time: SW10C-001 (1327)

Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES: 1

SAMPLE CHAIN OF CUSTODY FORM

Date: 2/29/2012 2pm 1

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Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

JMB 3/1/12 Labels changed per QAPP (no G or C) SW10-

Sample Label	Station ID	Collection Date/Time	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity-①						No. containers	Sample Type (Grab vs. Comp)	Storm#	COND µS	NTU	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
SW106-001	PSNS 124.1	1535	SW						X							2	G	SW10	2882	62.8	
SW106-002	PSNS 126	1558	SW						X							2	G	SW10	338	2.72	
SW106-003	PSNS 126 DUP	1600	SW						X							2	G	SW10			
SW106-004	PSNS 124	1618	SW						X							2	G	SW10	5180	3.21	smelled @ exhaust
SW106-005	PSNS 115.1	1640	SW						X							2	G	SW10	2840	2.81	
SW106-006	PSNS084.1	1658	SW						X							2	G	SW10	253	5.72	bank in Sample
SW106-007	PSNS015	1720	SW						X							2	G	SW10	405	16.2	
SW10C-0018	PSNS015	1327	SW	X	X	X	X	X								1	C	SW10	222	17	
SW10C-0029	PSNS084.1	1336	SW	X	X	X	X	X								1	C	SW10	146	16	
SW10C-0037 10	PSNS ~~115.1~~ 126	1237	SW	X	X	X	X	X								1	C	SW10	245	8	
SW10C-0041 11	PSNS 126 DUP	↓ 1237	SW	X	X	X	X	X								1	C	SW10	252	8	
② SW10C-0051 12	PSNS 124	2-28-12 (1851)	SW	X	X	X	X	X								1	C	SW10	1162	20	* Very low Samp. Vol.
SW10C-0061 13	PSNS 115.1	2-29-12 (1340)	SW	X	X	X	X	X								1	C	SW10	493	7	
③ SW10C-0071 14	PSNS 124.1	2-28-12 (2026)	SW	X	X	X	X	X								1	C	SW10	1493	15	

Relinquished by: RK Fuller — Signature — 2/29/2012 — Date — 1825 — Time — Printed Name — Company

Received by: BG Beckwith — Signature — BG Beckwith — Printed Name

Total # of Containers:

Shipment Method: Hand carry

Sample Disposition:

Relinquished by: BG Beckwith — Signature — 3/1/2012 — Date — 1000 — Time — BG Beckwith — Printed Name — Cardno TEC — Company

Received by: — Signature — Jon Brandenberger PNNL — Printed Name — 3/1/12 1000

Distribution:
1) PNNL
2) CAS
3) TAI

① Turbidity measured in SW Lab w/ Hach 2100P meter

② Very low Sample vol. >2000ml

③ Extremely low Sample vol. >1000 ml

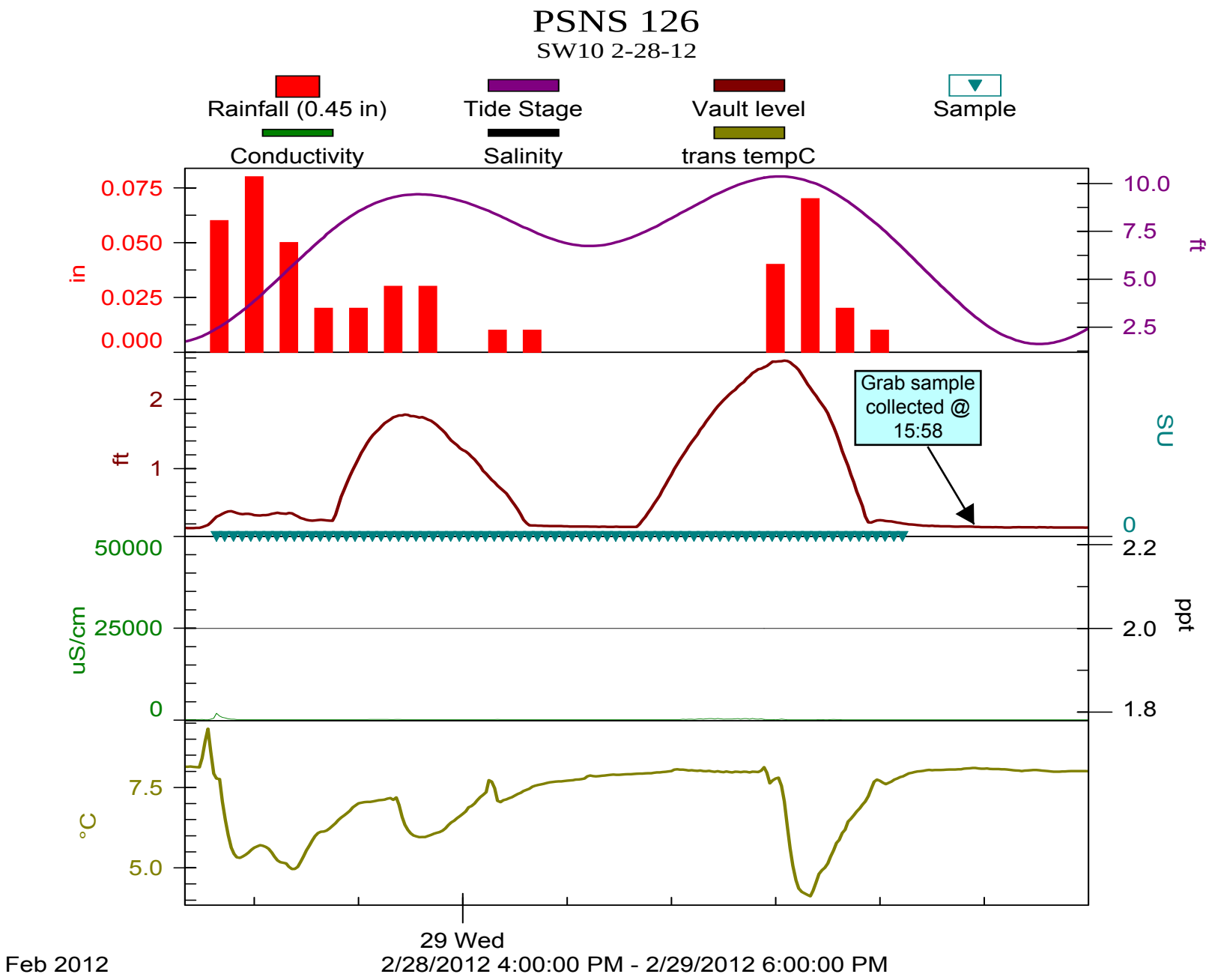
PSNS NDDSW Monitoring Stormwater Sampling Event #10 (2/28/12)

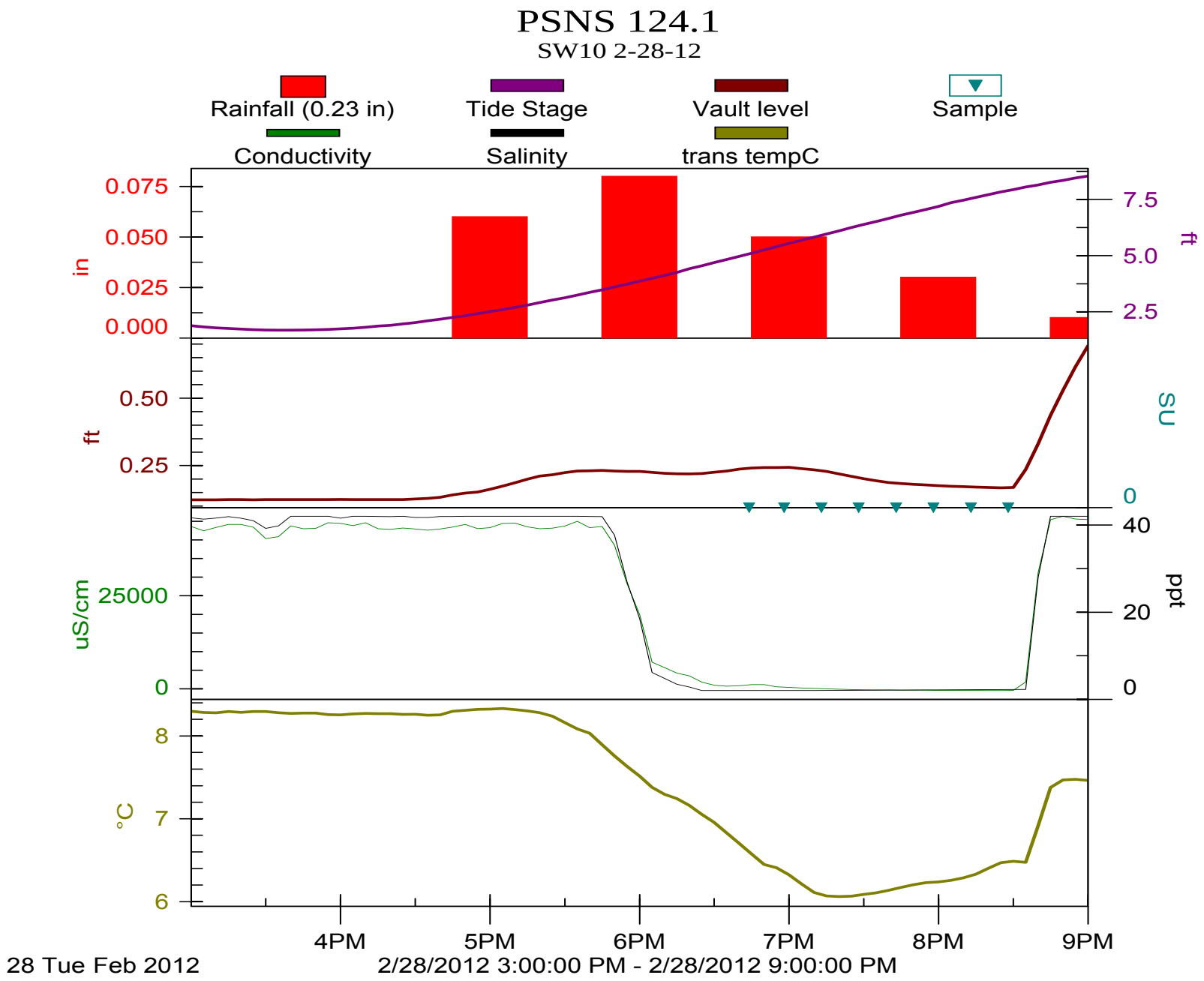
Stormwater Outfall Total Discharge Volume Estimation Equations

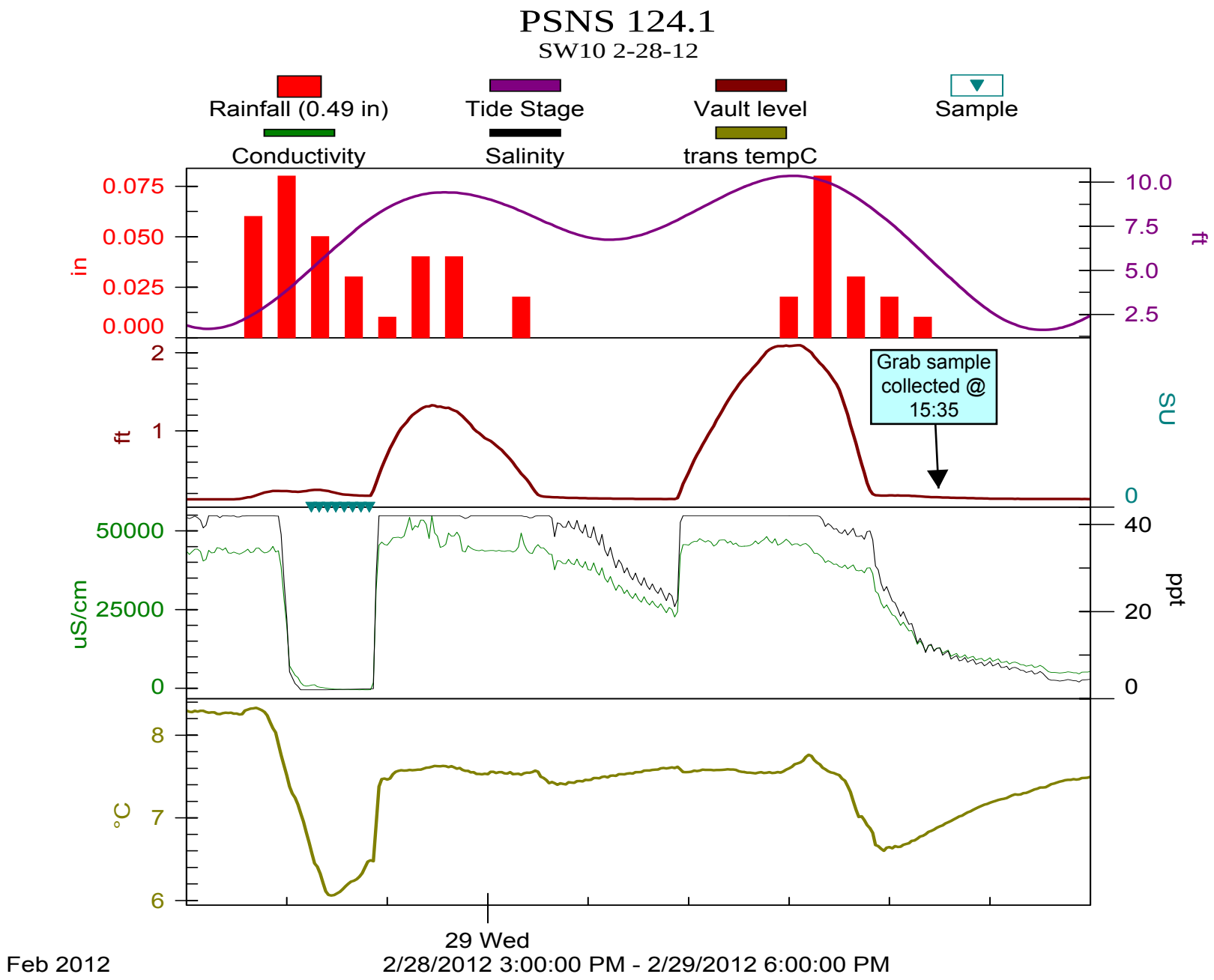
PSNS Drainage Basin	Total Basin Area (ft^2)	Type of Surface	Percentage of Drainage Basin Surface Type	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Area of Basin Surface Type with Maximum Coefficient Value Applied (ft^2)	[2]Total Discharge Volume (ft^3)
126	662,986	Impervious	98.55	653,373	0.6 – 0.9	588,036	R(591,881)
		Pervious	1.45	9,613	0.2 – 0.4	3,845	
124.1	116,000	Impervious	94.56	109,690	0.6 – 0.9	98,721	R(101,245)
		Pervious	5.44	6310	0.2 – 0.4	2,524	
124	454,000	Impervious	94.56	429,302	0.6 – 0.9	386,372	R(396,251)
		Pervious	5.44	24,698	0.2 – 0.4	9,879	
115.1	463,042	Impervious	97	449,104	0.6 – 0.9	361,422	R(366,390)
		Pervious	3	13,938	0.2 – 0.4	4,968	
84.1	23,958	Impervious	100	23,958	0.6 – 0.9	21,562	R(21,562)
15	4,018,862	Impervious	50	2,009,431	0.5 – 0.8	1,607,549	R(2,411,321)
		Pervious	50	2,009,431	0.25 – 0.4	803,772	

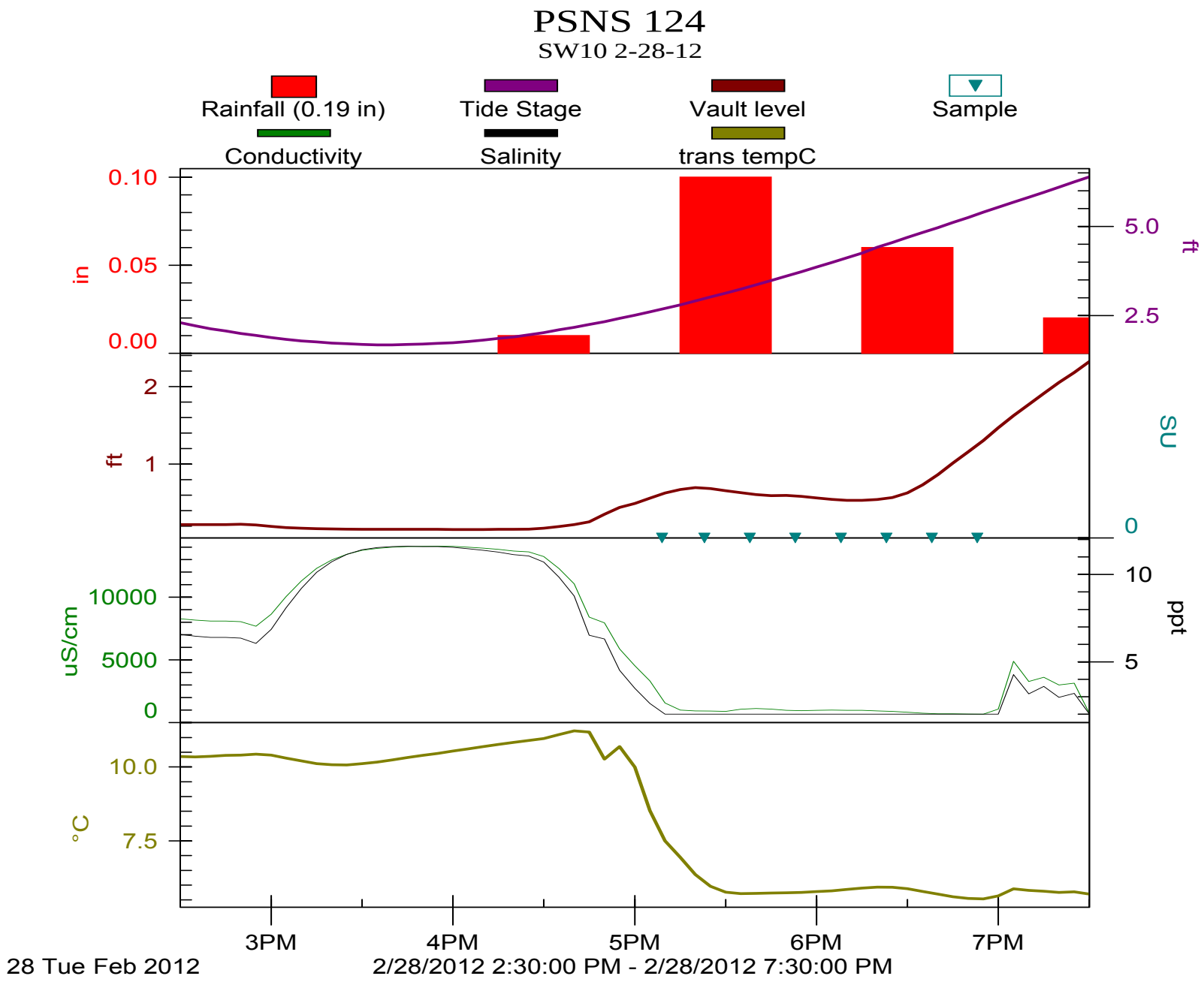
Calculation Worksheet:

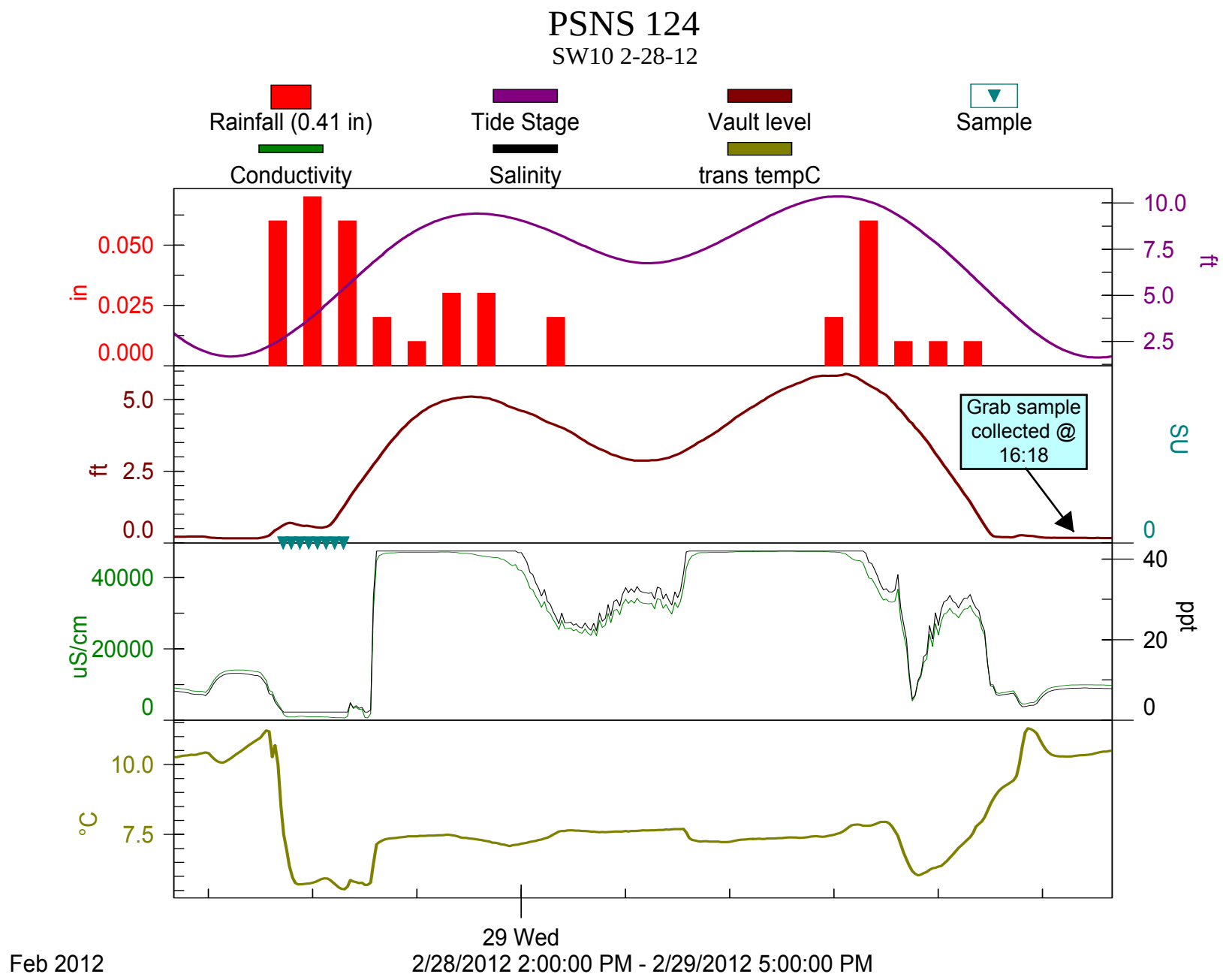
STATION	Combined Drainage Area (FT^2)	**ENTER: Smpl Evnt Rain Total (in)**	Sampl Evnt Rain Total (FT)	STE Runoff Vol. (gal)
126	591,881	0.45	0.0375	166,034
124.1	101,245	0.23	0.0192	14,516
124	396,251	0.19	0.0158	46,933
115.1	366,390	0.46	0.0383	105,064
84.1	21,562	0.55	0.0458	7,393
015	2,411,321	0.58	0.0483	871,833


PSNS 126
SW10 2-28-12
Rainfall (0.45 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.075
0.050
0.025
0.000
ft
10.0
7.5
5.0
2.5
ft
2
1
SU
0
Grab sample collected @ 15:58
uS/cm
50000
25000
0
ppt
2.2
2.0
1.8
°C
7.5
5.0
29 Wed
Feb 2012
2/28/2012 4:00:00 PM - 2/29/2012 6:00:00 PM


PSNS 124.1
SW10 2-28-12
Rainfall (0.23 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.075
0.050
0.025
0.000
in
7.5
5.0
2.5
ft
0.50
0.25
ft
SU
0
25000
0
uS/cm
40
20
0
ppt
8
7
6
°C
4PM
5PM
6PM
7PM
8PM
9PM
28 Tue Feb 2012
2/28/2012 3:00:00 PM - 2/28/2012 9:00:00 PM

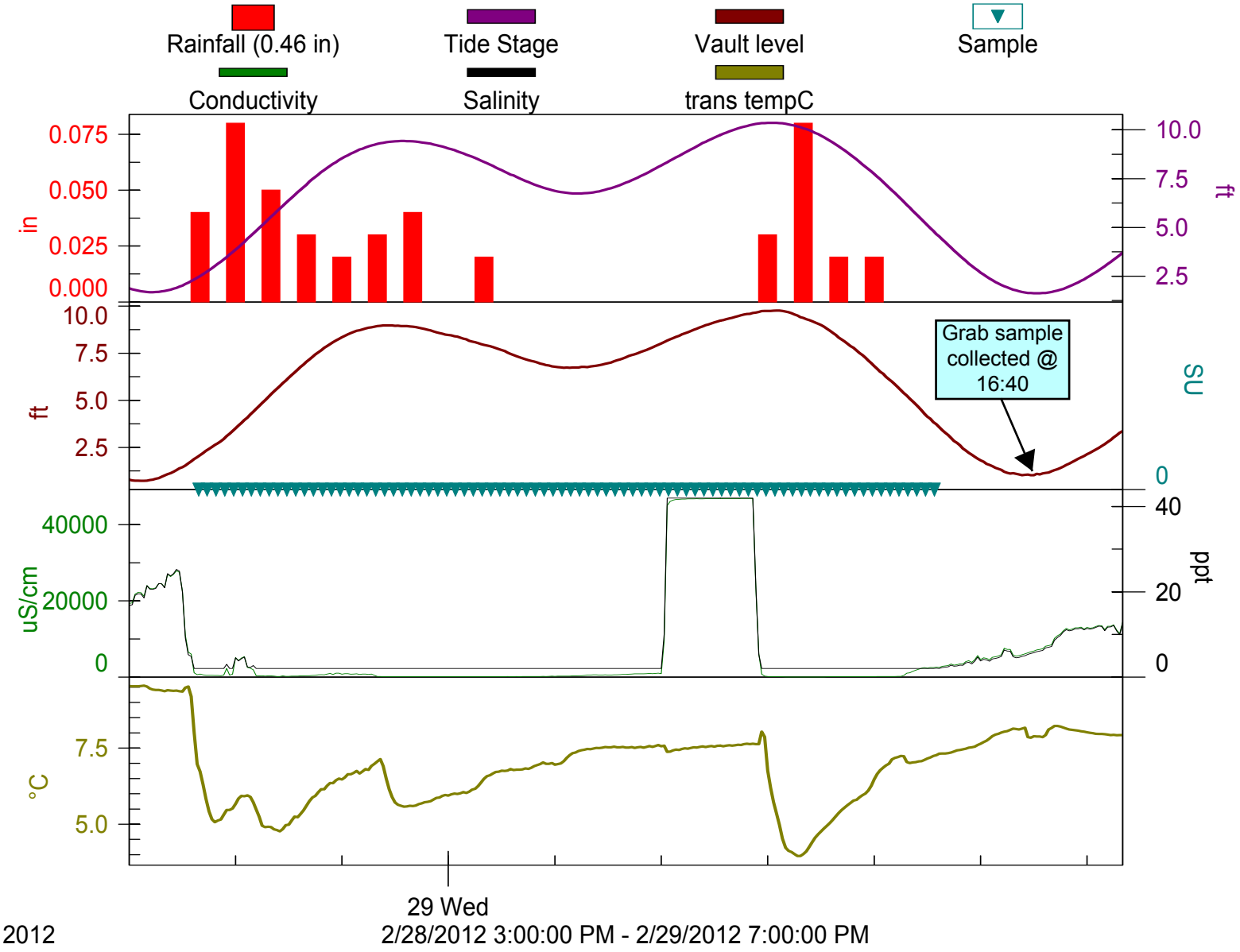

PSNS 124.1
SW10 2-28-12
Rainfall (0.49 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.075
0.050
0.025
0.000
ft
10.0
7.5
5.0
2.5
2
1
Grab sample collected @ 15:35
SU
0
uS/cm
50000
25000
0
ppt
40
20
0
°C
8
7
6
29 Wed
Feb 2012
2/28/2012 3:00:00 PM - 2/29/2012 6:00:00 PM

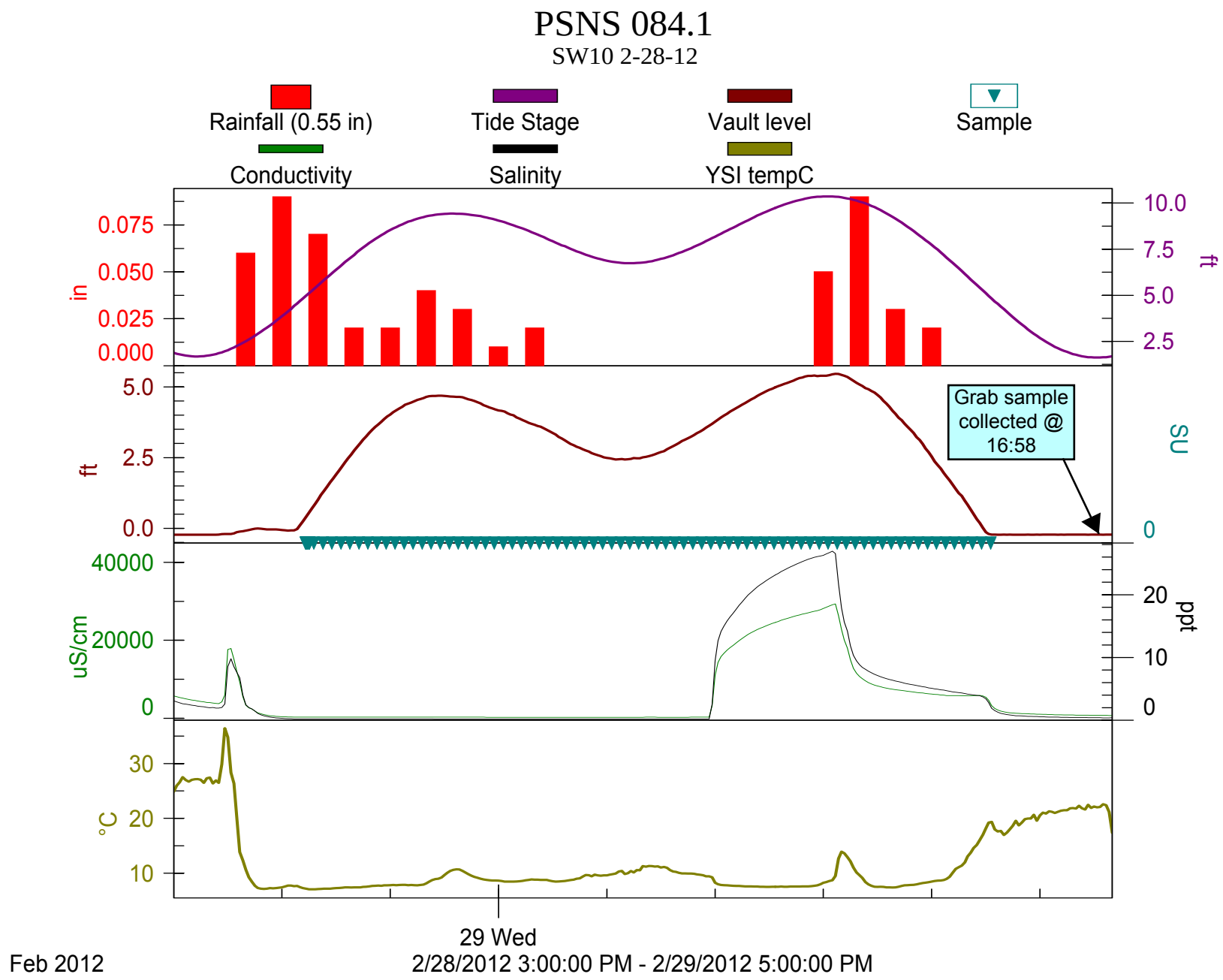

PSNS 124
SW10 2-28-12
Rainfall (0.19 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.10
0.05
0.00
in
5.0
2.5
ft
2
1
ft
SU
0
10000
5000
0
uS/cm
10
5
ppt
10.0
7.5
°C
3PM
4PM
5PM
6PM
7PM
28 Tue Feb 2012
2/28/2012 2:30:00 PM - 2/28/2012 7:30:00 PM


PSNS 124
SW10 2-28-12
Rainfall (0.41 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.050
0.025
0.000
ft
10.0
7.5
5.0
2.5
5.0
2.5
0.0
Grab sample collected @ 16:18
SU
0
uS/cm
40000
20000
0
ppt
40
20
0
°C
10.0
7.5
29 Wed
Feb 2012
2/28/2012 2:00:00 PM - 2/29/2012 5:00:00 PM

PSNS 115.1

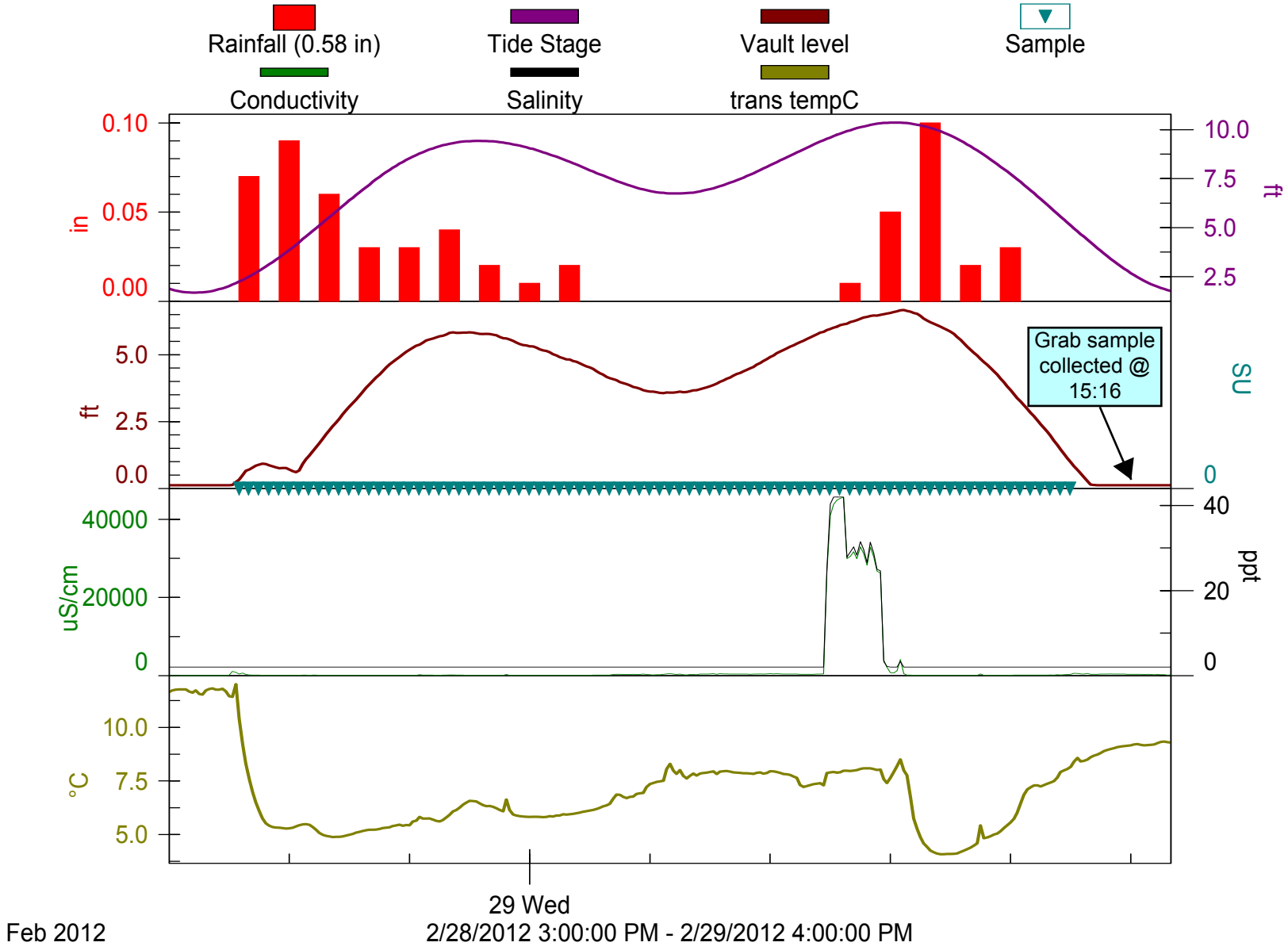
SW10 2-28-12

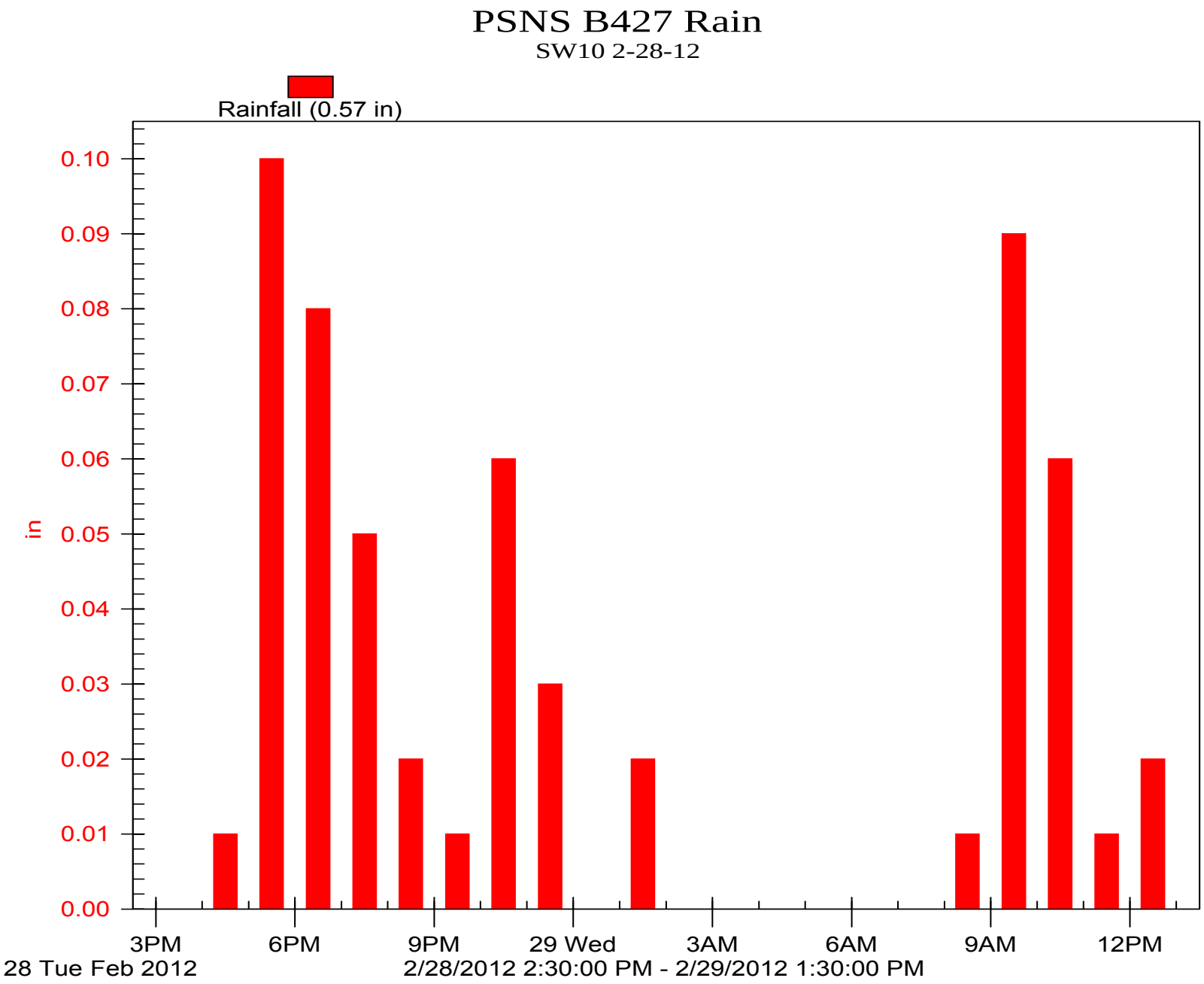



PSNS 084.1
SW10 2-28-12
Rainfall (0.55 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
YSI tempC
in
0.075
0.050
0.025
0.000
ft
10.0
7.5
5.0
2.5
ft
5.0
2.5
0.0
Grab sample collected @ 16:58
SU
0
uS/cm
40000
20000
0
ppt
20
10
0
°C
30
20
10
29 Wed
Feb 2012
2/28/2012 3:00:00 PM - 2/29/2012 5:00:00 PM

PSNS 015

SW10 2-28-12




PSNS B427 Rain
SW10 2-28-12
Rainfall (0.57 in)
in
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
3PM
6PM
9PM
29 Wed
3AM
6AM
9AM
12PM
28 Tue Feb 2012
2/28/2012 2:30:00 PM - 2/29/2012 1:30:00 PM

*** Model 6712 HW Rev: B0 SW Rev: 2.34.0000 ID 1313656803
> REPORT
SAMPLER ID# 1313656803 17:24 29-FEB-12
 Hardware: B0 Software: 2.34
********** PROGRAM SETTINGS **********

  PROGRAM NAME:
   "PSNS126DUP"
 SITE DESCRIPTION:
   "PSNS126DUP"

  UNITS SELECTED:
    LENGTH: ft

 24, 1000 ml BTLS
 19 ft SUCTION LINE
 13 ft SUCTION HEAD
0 RINSES, 0 RETRIES

 ONE-PART PROGRAM

     PACING:
   FLOW, EVERY
      1 PULSES
 SAMPLE AT START

   DISTRIBUTION:
 2 BOTTLES/SAMPLE
  8 SAMPLES/BOTTLE

     VOLUME:
  120 ml SAMPLES

     ENABLE:
 NONE PROGRAMMED

     ENABLE:
  ONCE ENABLED,
   STAY ENABLED
 SAMPLE AT ENABLE

     ENABLE:
0 PAUSE & RESUMES

 NO DELAY TO START

 LIQUID DETECT ON
QUICK VIEW/CHANGE

 TAKE MEASUREMENTS

EVERY 1 MINUTES

DUAL SAMPLER OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

NO PERIODIC
SERIAL OUTPUT

INTERROGATOR
CONNECTOR
POWER ALWAYS ON

NO RAIN GAUGE

NO SDI-12 SONDE
AUTO SDI-12 SCAN OFF

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS

NO EXTERNAL MODEM

NO ALARM
CONDITIONS SET

SAMPLER ID# 1313656803 17:24 29-FEB-12
Hardware: B0 Software: 2.34
********** SAMPLING RESULTS **********
SITE: PSNS126DUP
PROGRAM: PSNS126DUP
Program Started at 10:15 TU 28-FEB-12
Nominal Sample Volume = 120 ml

SAMPLE	BOTTLE	TIME	SOURCE	COUNT TO ERROR	LIQUID
		10:15	PGM DISABLED		
		16:53	PGM ENABLED		

1,8	1-2	16:53	E	501
2,8	1-2	17:07	F	500
3,8	1-2	17:22	F	507
4,8	1-2	17:37	F	503
5,8	1-2	17:52	F	509
6,8	1-2	18:07	F	509
7,8	1-2	18:22	F	507
8,8	1-2	18:37	F	509
1,8	3-4	18:52	F	507
2,8	3-4	19:07	F	509
3,8	3-4	19:22	F	507
4,8	3-4	19:37	F	507
5,8	3-4	19:52	F	506
6,8	3-4	20:07	F	507
7,8	3-4	20:22	F	503
8,8	3-4	20:37	F	498
1,8	5-6	20:52	F	495
2,8	5-6	21:07	F	497
3,8	5-6	21:22	F	493
4,8	5-6	21:37	F	494
5,8	5-6	21:52	F	491
6,8	5-6	22:07	F	495
7,8	5-6	22:22	F	492
8,8	5-6	22:37	F	495
1,8	7-8	22:52	F	495
2,8	7-8	23:07	F	495
3,8	7-8	23:22	F	497
4,8	7-8	23:37	F	497
5,8	7-8	23:52	F	495

---------- WE 29-FEB-12 ----------

6,8	7-8	00:07	F	494
7,8	7-8	00:22	F	497
8,8	7-8	00:37	F	497
1,8	9-10	00:52	F	495
2,8	9-10	01:07	F	497
3,8	9-10	01:22	F	495
4,8	9-10	01:37	F	503
5,8	9-10	01:52	F	503
6,8	9-10	02:07	F	503
7,8	9-10	02:22	F	507
8,8	9-10	02:37	F	503
1,8	11-12	02:52	F	507
2,8	11-12	03:07	F	501
3,8	11-12	03:22	F	501
4,8	11-12	03:37	F	503
5,8	11-12	03:52	F	507
6,8	11-12	04:07	F	501
7,8	11-12	04:22	F	502
8,8	11-12	04:37	F	503
1,8	13-14	04:52	F	503
2,8	13-14	05:07	F	500
3,8	13-14	05:22	F	500
4,8	13-14	05:37	F	497
5,8	13-14	05:52	F	497

6,8	13-14 06:07	F	497
7,8	13-14 06:22	F	493
8,8	13-14 06:37	F	492
1,8	15-16 06:52	F	489
2,8	15-16 07:07	F	491
3,8	15-16 07:22	F	491
4,8	15-16 07:37	F	491
5,8	15-16 07:52	F	491
6,8	15-16 08:07	F	489
7,8	15-16 08:22	F	486
8,8	15-16 08:37	F	489
1,8	17-18 08:52	F	486
2,8	17-18 09:07	F	488
3,8	17-18 09:22	F	491
4,8	17-18 09:37	F	489
5,8	17-18 09:52	F	491
6,8	17-18 10:07	F	491
7,8	17-18 10:22	F	491
8,8	17-18 10:37	F	495
1,8	19-20 10:52	F	497
2,8	19-20 11:07	F	497
3,8	19-20 11:22	F	503
4,8	19-20 11:37	F	503
5,8	19-20 11:52	F	504
6,8	19-20 12:07	F	504
7,8	19-20 12:22	F	504
8,8	19-20 12:37	F	503
1,8	21-22 12:52	F	502
2,8	21-22 13:07	F	503
3,8	21-22 13:22	F	503
4,8	21-22 13:37	F	503
5,8	21-22 13:52	F	503
6,8	21-22 14:07	F	504
7,8	21-22 14:22	F	503
8,8	21-22 14:37	F	503
1,8	23-24 14:52	F	503
2,8	23-24 15:07	F	503
3,8	23-24 15:22	F	503
4,8	23-24 15:37	F	507
5,8	23-24 15:52	F	503
6,8	23-24 16:07	F	505
7,8	23-24 16:22	F	503
8,8	23-24 16:37	F	504

16:38 PGM DONE 29-FEB

SOURCE E ==> ENABLE

SOURCE F ==> FLOW

*** Model 6700 HW Rev: B2 SW Rev: 3.26.0000 ID 3293179321
> REPORT
SAMPLER ID# 3293179321 17:32 29-FEB-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS124-1 "
SITE DESCRIPTION:
"PSNS124-1 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
56 ft SUCTION LINE
12 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED
SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 3293179321 17:32 29-FEB-12
Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS124-1
PROGRAM: PSNS124-1
Program Started at 11:00 TU 28-FEB-12
Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	COUNT TO ERROR	LIQUID
		11:00	PGM DISABLED		
		18:42	PGM ENABLED		
1,4	1	18:42	E		1343
2,4	1	18:56	F		1310
3,4	1	19:11	F		1313
4,4	1	19:26	F		1309
1,4	2	19:41	F		1310
2,4	2	19:56	F		1319
3,4	2	20:11	F		1321
4,4	2	20:26	F		1323
1,4	3	20:41	F		1343
2,4	3	20:56	F		1345
3,4	3	21:11	F		1327
4,4	3	21:26	F		1369
1,4	4	21:41	F		1301
2,4	4	21:56	F		1337
3,4	4	22:11	F		1351
4,4	4	22:26	F		1301
1,4	5	22:41	F		1313
2,4	5	22:56	F		1315

3,4	5	23:11	F	1313
4,4	5	23:26	F	1316
1,4	6	23:41	F	1325
2,4	6	23:56	F	1373

---------- WE 29-FEB-12 ----------

3,4	6	00:11	F	1385
4,4	6	00:26	F	1327
1,4	7	00:41	F	1321
2,4	7	00:56	F	1327
3,4	7	01:11	F	1391
4,4	7	01:26	F	1393
1,4	8	01:41	F	1331
2,4	8	01:56	F	1391
3,4	8	02:11	F	1339
4,4	8	02:26	F	1319
1,4	9	02:41	F	1385
2,4	9	02:56	F	1319
3,4	9	03:11	F	1361
4,4	9	03:26	F	1361
1,4	10	03:41	F	1357
2,4	10	03:56	F	1337
3,4	10	04:11	F	1397
4,4	10	04:26	F	1397
1,4	11	04:41	F	1361
2,4	11	04:56	F	1373
3,4	11	05:11	F	1319
4,4	11	05:26	F	1343
1,4	12	05:41	F	1379
2,4	12	05:56	F	1331
3,4	12	06:11	F	1337
4,4	12	06:26	F	1325
1,4	13	06:41	F	1345
2,4	13	06:56	F	1316
3,4	13	07:11	F	1319
4,4	13	07:26	F	1313
1,4	14	07:41	F	1333
2,4	14	07:56	F	1293
3,4	14	08:11	F	1303
4,4	14	08:26	F	1283
1,4	15	08:41	F	1301
2,4	15	08:56	F	1319
3,4	15	09:11	F	1313
4,4	15	09:26	F	1283
1,4	16	09:41	F	1307
2,4	16	09:56	F	1302
3,4	16	10:11	F	1313
4,4	16	10:26	F	1303
1,4	17	10:41	F	1295
2,4	17	10:56	F	1331
3,4	17	11:11	F	1331
4,4	17	11:26	F	1339
1,4	18	11:41	F	1351
2,4	18	11:56	F	1343
3,4	18	12:11	F	1331

4,4	18	12:26	F	1349
1,4	19	12:41	F	1331
2,4	19	12:56	F	1345
3,4	19	13:11	F	1325
4,4	19	13:26	F	1333
1,4	20	13:41	F	1331
2,4	20	13:56	F	1337
3,4	20	14:11	F	1323
4,4	20	14:26	F	1327
1,4	21	14:41	F	1325
2,4	21	14:56	F	1325
3,4	21	15:11	F	1319
4,4	21	15:26	F	1337
1,4	22	15:41	F	1335
2,4	22	15:56	F	1331
3,4	22	16:11	F	1331
4,4	22	16:26	F	1317
1,4	23	16:41	F	1319
2,4	23	16:56	F	1327
3,4	23	17:11	F	1331
4,4	23	17:26	F	1359

SOURCE E ==> ENABLE
SOURCE F ==> FLOW

*** Model 6700 HW Rev: B2 SW Rev: 3.26.0000 ID 3293179322
> REPORT
SAMPLER ID# 3293179322 17:39 29-FEB-12
 Hardware: B2   Software: 3.26
********** PROGRAM SETTINGS **********

  PROGRAM NAME:
   "PSNS 124 "
 SITE DESCRIPTION:
   "PSNS 124 "

  UNITS SELECTED:
    LENGTH: ft

 24, 1000 ml BTLS
 20 ft SUCTION LINE
 16 ft SUCTION HEAD
0 RINSES, 0 RETRIES

 ONE-PART PROGRAM

     PACING:
   FLOW, EVERY
      1 PULSES
 SAMPLE AT START

   DISTRIBUTION:
 4 SAMPLES/BOTTLE

     VOLUME:
 240 ml SAMPLES

     ENABLE:
 NONE PROGRAMMED

     ENABLE:
  ONCE ENABLED,
   STAY ENABLED
 SAMPLE AT ENABLE

     ENABLE:
0 PAUSE & RESUMES

 NO DELAY TO START

 LIQUID DETECT ON
   NO RAIN GAGE

   NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 3293179322 17:39 29-FEB-12
Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS 124
PROGRAM: PSNS 124
Program Started at 13:58 TU 28-FEB-12
Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		13:58	PGM DISABLED		
		17:07	PGM ENABLED		
1,4	1	17:07	E		566
2,4	1	17:21	F		561
3,4	1	17:36	F		567
4,4	1	17:51	F		569
1,4	2	18:06	F		567
2,4	2	18:21	F		567
3,4	2	18:36	F		567
4,4	2	18:51	F		561
1,4	3	19:06	F		557
2,4	3	19:21	F		555
3,4	3	19:36	F		549
4,4	3	19:51	F		549
1,4	4	20:06	F		551
2,4	4	20:21	F		544
3,4	4	20:36	F		543
4,4	4	20:51	F		543
1,4	5	21:06	F		537
2,4	5	21:21	F		539

3,4	5	21:36	F	537
4,4	5	21:51	F	539
1,4	6	22:06	F	539
2,4	6	22:21	F	537
3,4	6	22:36	F	537
4,4	6	22:51	F	532
1,4	7	23:06	F	537
2,4	7	23:21	F	534
3,4	7	23:36	F	539
4,4	7	23:51	F	537

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1,4	8	00:06	F	537
2,4	8	00:21	F	537
3,4	8	00:36	F	539
4,4	8	00:51	F	537
1,4	9	01:06	F	539
2,4	9	01:21	F	537
3,4	9	01:36	F	545
4,4	9	01:51	F	545
1,4	10	02:06	F	545
2,4	10	02:21	F	546
3,4	10	02:36	F	546
4,4	10	02:51	F	551
1,4	11	03:06	F	549
2,4	11	03:21	F	551
3,4	11	03:36	F	549
4,4	11	03:51	F	551
1,4	12	04:06	F	549
2,4	12	04:21	F	551
3,4	12	04:36	F	549
4,4	12	04:51	F	551
1,4	13	05:06	F	543
2,4	13	05:21	F	543
3,4	13	05:36	F	543
4,4	13	05:51	F	538
1,4	14	06:06	F	540
2,4	14	06:21	F	537
3,4	14	06:36	F	534
4,4	14	06:51	F	534
1,4	15	07:06	F	533
2,4	15	07:21	F	533
3,4	15	07:36	F	531
4,4	15	07:51	F	533
1,4	16	08:06	F	533
2,4	16	08:21	F	527
3,4	16	08:36	F	525
4,4	16	08:51	F	528
1,4	17	09:06	F	529
2,4	17	09:21	F	526
3,4	17	09:36	F	528
4,4	17	09:51	F	531
1,4	18	10:06	F	531
2,4	18	10:21	F	531
3,4	18	10:36	F	531

4,4	18	10:51	F	537
1,4	19	11:06	F	539
2,4	19	11:21	F	543
3,4	19	11:36	F	543
4,4	19	11:51	F	549
1,4	20	12:06	F	552
2,4	20	12:21	F	555
3,4	20	12:36	F	561
4,4	20	12:51	F	563
1,4	21	13:06	F	569
2,4	21	13:21	F	573
3,4	21	13:36	F	575
4,4	21	13:51	F	573
1,4	22	14:06	F	575
2,4	22	14:21	F	575
3,4	22	14:36	F	575
4,4	22	14:51	F	575
1,4	23	15:06	F	575
2,4	23	15:21	F	575
3,4	23	15:36	F	575
4,4	23	15:51	F	573
1,4	24	16:06	F	576
2,4	24	16:21	F	575
3,4	24	16:36	F	575
4,4	24	16:51	F	573

16:52 PGM DONE 29-FEB
SOURCE E ==> ENABLE
SOURCE F ==> FLOW

*** Model 6700 HW Rev: B2 SW Rev: 3.26.0000 ID 3293179316
> REPORT
SAMPLER ID# 3293179316 17:44 29-FEB-12
 Hardware: B2   Software: 3.26
********** PROGRAM SETTINGS **********

  PROGRAM NAME:
   "PSNS115-1 "
 SITE DESCRIPTION:
   "PSNS115-1 "

  UNITS SELECTED:
    LENGTH: ft

 24, 1000 ml BTLS
 44 ft SUCTION LINE
 21 ft SUCTION HEAD
0 RINSES, 0 RETRIES

 ONE-PART PROGRAM

     PACING:
   FLOW, EVERY
      1 PULSES
 SAMPLE AT START

   DISTRIBUTION:
 4 SAMPLES/BOTTLE

     VOLUME:
 240 ml SAMPLES

     ENABLE:
 NONE PROGRAMMED

     ENABLE:
  ONCE ENABLED,
   STAY ENABLED
 SAMPLE AT ENABLE

     ENABLE:
0 PAUSE & RESUMES

 NO DELAY TO START

 LIQUID DETECT ON
   NO RAIN GAGE

   NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 3293179316 17:44 29-FEB-12
Hardware: B2 Software: 3.26
********** SAMPLING RESULTS **********
SITE: PSNS115-1
PROGRAM: PSNS115-1
Program Started at 14:33 TU 28-FEB-12
Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		14:33	PGM DISABLED		
		16:56	PGM ENABLED		
1,4	1	16:56	E		1220
2,4	1	17:10	F		1220
3,4	1	17:25	F		1218
4,4	1	17:40	F		1200
1,4	2	17:55	F		1212
2,4	2	18:10	F		1188
3,4	2	18:25	F		1184
4,4	2	18:40	F		1172
1,4	3	18:55	F		1152
2,4	3	19:10	F		1153
3,4	3	19:25	F		1154
4,4	3	19:40	F		1148
1,4	4	19:55	F		1135
2,4	4	20:10	F		1129
3,4	4	20:25	F		1116
4,4	4	20:40	F		1112
1,4	5	20:55	F		1106
2,4	5	21:10	F		1105

3,4	5	21:25	F	1100
4,4	5	21:40	F	1098
1,4	6	21:55	F	1095
2,4	6	22:10	F	1093
3,4	6	22:25	F	1093
4,4	6	22:40	F	1093
1,4	7	22:55	F	1094
2,4	7	23:10	F	1099
3,4	7	23:25	F	1110
4,4	7	23:40	F	1099
1,4	8	23:55	F	1100

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2,4	8	00:10	F	1105
3,4	8	00:25	F	1105
4,4	8	00:40	F	1106
1,4	9	00:55	F	1117
2,4	9	01:10	F	1112
3,4	9	01:25	F	1122
4,4	9	01:40	F	1136
1,4	10	01:55	F	1128
2,4	10	02:10	F	1127
3,4	10	02:25	F	1137
4,4	10	02:40	F	1130
1,4	11	02:55	F	1142
2,4	11	03:10	F	1130
3,4	11	03:25	F	1130
4,4	11	03:40	F	1128
1,4	12	03:55	F	1129
2,4	12	04:10	F	1130
3,4	12	04:25	F	1125
4,4	12	04:40	F	1117
1,4	13	04:55	F	1136
2,4	13	05:10	F	1118
3,4	13	05:25	F	1116
4,4	13	05:40	F	1116
1,4	14	05:55	F	1110
2,4	14	06:10	F	1118
3,4	14	06:25	F	1113
4,4	14	06:40	F	1117
1,4	15	06:55	F	1105
2,4	15	07:10	F	1098
3,4	15	07:25	F	1101
4,4	15	07:40	F	1104
1,4	16	07:55	F	1110
2,4	16	08:10	F	1088
3,4	16	08:25	F	1093
4,4	16	08:40	F	1079
1,4	17	08:55	F	1070
2,4	17	09:10	F	1074
3,4	17	09:25	F	1082
4,4	17	09:40	F	1080
1,4	18	09:55	F	1087
2,4	18	10:10	F	1087
3,4	18	10:25	F	1081

4,4	18	10:40	F	1088
1,4	19	10:55	F	1092
2,4	19	11:10	F	1104
3,4	19	11:25	F	1110
4,4	19	11:40	F	1117
1,4	20	11:55	F	1129
2,4	20	12:10	F	1136
3,4	20	12:25	F	1140
4,4	20	12:40	F	1146
1,4	21	12:55	F	1160
2,4	21	13:10	F	1177
3,4	21	13:25	F	1215
4,4	21	13:40	F	1196
1,4	22	13:55	F	1213
2,4	22	14:10	F	1215
3,4	22	14:25	F	1225
4,4	22	14:40	F	1239
1,4	23	14:55	F	1249
2,4	23	15:10	F	1255
3,4	23	15:25	F	1255
4,4	23	15:40	F	1257
1,4	24	15:55	F	1261
2,4	24	16:10	F	1274
3,4	24	16:25	F	1261
4,4	24	16:40	F	1262

16:41 PGM DONE 29-FEB

SOURCE E ==> ENABLE

SOURCE F ==> FLOW

*** Model 6700 HW Rev: B2 SW Rev: 3.26.0000 ID 2425546782
SAMPLER ID# 2425546782 17:49 29-FEB-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS84-1 "
SITE DESCRIPTION:
"PSNS84-1 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
22 ft SUCTION LINE
15 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
NO SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED
SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF

BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 2425546782 17:49 29-FEB-12
Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS84-1
PROGRAM: PSNS84-1
Program Started at 15:05 TU 28-FEB-12
Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		15:05	PGM DISABLED		
		18:37	PGM ENABLED		
1,4	1	18:37	E		546
2,4	1	18:38	F		541
3,4	1	18:39	F		548
4,4	1	18:40	F		547
1,4	2	18:41	F		550
2,4	2	18:42	F		552
3,4	2	18:43	F		552
4,4	2	18:44	F		553
1,4	3	18:51	F		552
2,4	3	19:06	F		540
3,4	3	19:21	F		540
4,4	3	19:36	F		534
1,4	4	19:51	F		528
2,4	4	20:06	F		524
3,4	4	20:21	F		522
4,4	4	20:36	F		522
1,4	5	20:51	F		517
2,4	5	21:06	F		513
3,4	5	21:21	F		512

4,4	5	21:36	F	513
1,4	6	21:51	F	512
2,4	6	22:06	F	512
3,4	6	22:21	F	512
4,4	6	22:36	F	511
1,4	7	22:51	F	512
2,4	7	23:06	F	510
3,4	7	23:21	F	512
4,4	7	23:36	F	512
1,4	8	23:51	F	511

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2,4	8	00:06	F	513
3,4	8	00:21	F	513
4,4	8	00:36	F	514
1,4	9	00:51	F	517
2,4	9	01:06	F	518
3,4	9	01:21	F	520
4,4	9	01:36	F	522
1,4	10	01:51	F	520
2,4	10	02:06	F	524
3,4	10	02:21	F	524
4,4	10	02:36	F	525
1,4	11	02:51	F	524
2,4	11	03:06	F	526
3,4	11	03:21	F	526
4,4	11	03:36	F	528
1,4	12	03:51	F	526
2,4	12	04:06	F	526
3,4	12	04:21	F	526
4,4	12	04:36	F	521
1,4	13	04:51	F	519
2,4	13	05:06	F	519
3,4	13	05:21	F	518
4,4	13	05:36	F	520
1,4	14	05:51	F	517
2,4	14	06:06	F	518
3,4	14	06:21	F	520
4,4	14	06:36	F	516
1,4	15	06:51	F	516
2,4	15	07:06	F	511
3,4	15	07:21	F	512
4,4	15	07:36	F	512
1,4	16	07:51	F	508
2,4	16	08:06	F	510
3,4	16	08:21	F	509
4,4	16	08:36	F	507
1,4	17	08:51	F	507
2,4	17	09:06	F	507
3,4	17	09:21	F	506
4,4	17	09:36	F	505
1,4	18	09:51	F	501
2,4	18	10:06	F	507
3,4	18	10:21	F	512
4,4	18	10:36	F	514

1,4	19	10:51	F	514
2,4	19	11:06	F	520
3,4	19	11:21	F	520
4,4	19	11:36	F	526
1,4	20	11:51	F	526
2,4	20	12:06	F	532
3,4	20	12:21	F	534
4,4	20	12:36	F	538
1,4	21	12:51	F	539
2,4	21	13:06	F	548
3,4	21	13:21	F	551
4,4	21	13:36	F	560
1,4	22	13:51	F	558
2,4	22	14:06	F	558
3,4	22	14:21	F	564
4,4	22	14:36	F	560
1,4	23	14:51	F	559
2,4	23	15:06	F	558
3,4	23	15:21	F	560
4,4	23	15:36	F	555
1,4	24	15:51	F	558
2,4	24	16:06	F	560
3,4	24	16:21	F	558
4,4	24	16:36	F	558

16:36 PGM DONE 29-FEB
SOURCE E ==> ENABLE
SOURCE F ==> FLOW

SAMPLER ID# 2425481222 16:38 29-FEB-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS015 "
SITE DESCRIPTION:
"PSNS015 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
22 ft SUCTION LINE
18 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:

240 ml SAMPLES

ENABLE:

NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED
SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON

NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE

---
0 ANALOG OUTPUTS

NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 2425481222 16:38 29-FEB-12
Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********
SITE: PSNS015
PROGRAM: PSNS015
Program Started at 09:13 TU 28-FEB-12
Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		09:13	PGM DISABLED		
		16:43	PGM ENABLED		
1,4	1	16:43	E		832
2,4	1	16:57	F		828
3,4	1	17:12	F		826
4,4	1	17:27	F		830
1,4	2	17:42	F		834
2,4	2	17:57	F		835
3,4	2	18:12	F		831
4,4	2	18:27	F		816
1,4	3	18:42	F		816
2,4	3	18:57	F		812
3,4	3	19:12	F		804
4,4	3	19:27	F		792
1,4	4	19:42	F		790
2,4	4	19:57	F		788
3,4	4	20:12	F		774
4,4	4	20:27	F		773
1,4	5	20:42	F		768
2,4	5	20:57	F		772
3,4	5	21:12	F		768
4,4	5	21:27	F		762
1,4	6	21:42	F		760
2,4	6	21:57	F		757
3,4	6	22:12	F		760
4,4	6	22:27	F		764
1,4	7	22:42	F		762
2,4	7	22:57	F		760
3,4	7	23:12	F		762
4,4	7	23:27	F		761
1,4	8	23:42	F		757
2,4	8	23:57	F		768
---------- WE 29-FEB-12 ----------					
3,4	8	00:12	F		768
4,4	8	00:27	F		768
1,4	9	00:42	F		768
2,4	9	00:57	F		774
3,4	9	01:12	F		772
4,4	9	01:27	F		774
1,4	10	01:42	F		780
2,4	10	01:57	F		786
3,4	10	02:12	F		784
4,4	10	02:27	F		784
1,4	11	02:42	F		792
2,4	11	02:57	F		792

3,4	11	03:12	F		792	
4,4	11	03:27	F		787	
1,4	12	03:42	F		786	
2,4	12	03:57	F		788	
3,4	12	04:12	F		786	
4,4	12	04:27	F		784	
1,4	13	04:42	F		786	
2,4	13	04:57	F		782	
3,4	13	05:12	F		778	
4,4	13	05:27	F		773	
1,4	14	05:42	F		768	
2,4	14	05:57	F		772	
3,4	14	06:12	F		766	
4,4	14	06:27	F		766	
1,4	15	06:42	F		764	
2,4	15	06:57	F		760	
3,4	15	07:12	F		755	
4,4	15	07:27	F		760	
1,4	16	07:42	F		760	
2,4	16	07:57	F		760	
3,4	16	08:12	F		756	
4,4	16	08:27	F		757	
1,4	17	08:42	F		755	
2,4	17	08:57	F		748	
3,4	17	09:12	F		750	
4,4	17	09:27	F		750	
1,4	18	09:42	F		754	
2,4	18	09:57	F		754	
3,4	18	10:12	F		762	
4,4	18	10:27	F		760	
1,4	19	10:42	F		760	
2,4	19	10:57	F		768	
3,4	19	11:12	F		772	
4,4	19	11:27	F		775	
1,4	20	11:42	F		786	
2,4	20	11:57	F		790	
3,4	20	12:12	F		792	
4,4	20	12:27	F		798	
1,4	21	12:42	F		813	
2,4	21	12:57	F		822	
3,4	21	13:12	F		830	
4,4	21	13:27	F		836	
1,4	22	13:42	F		846	
2,4	22	13:57	F	NM		*
3,4	22	14:12	F	NL		*
4,4	22	14:27	F	NL		*
1,4	23	14:42	F	NL		*
2,4	23	14:57	F	NL		*
3,4	23	15:12	F	NL		*
4,4	23	15:27	F	NL		*
1,4	24	15:42	F	NL		*
2,4	24	15:57	F	NL		*
3,4	24	16:12	F	NL		*
4,4	24	16:27	F	NL		*

16:28 PGM DONE 29-FEB

SOURCE E ==> ENABLE
SOURCE F ==> FLOW
ERROR NL ==> NO LIQUID DETECTED!
ERROR NM ==> NO MORE LIQUID!

National Weather Service National Headquarters

National Weather Service

Area Forecast Discussion

Issued by NWS Seattle/Tacoma, WA

Current Version | Previous Version | Text Only | Print | Product List | Glossary Off
Versions: 1234567891011121314151617181920212223242526272829303132333435363 7

000
FXUS66 KSEW 281913 AAA
AFDSEW

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE SEATTLE WA
1110 AM PST TUE FEB 28 2012...UPDATED

.SYNOPSIS...A STRONG PACIFIC FRONTAL SYSTEM WILL BRING RAIN AND POSSIBLY A LITTLE SNOW TO WESTERN WASHINGTON THIS AFTERNOON AND TONIGHT. A COLD UPPER LEVEL LOW WILL REMAIN OVER THE AREA WEDNESDAY THEN SLIP EASTWARD THURSDAY...WHICH WILL ALLOW SCATTERED RAIN AND SNOW SHOWERS TO PERSIST. A WARM FRONT WILL BRING SOME RAIN TO THE AREA FRIDAY AND SATURDAY. A COLD FRONT WILL APPROACH THE AREA LATE THIS WEEKEND.

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.SHORT TERM...UPDATED THE FORECAST TO UPGRADE THE HOOD CANAL WINTER STORM WATCH TO A WINTER STORM WARNING. AS STATED BELOW THIS IS MAINLY FOR THE PORTION OF THE ZONES NEAREST THE OLYMPICS. THE ONLY CHANGE I MADE WAS TO MOVE THE WARNING TIME UP TO NOON RATHER THAN THE 4 PM START TIME AS THE PRECIPITATION IS MOVING IN QUICKLY. ALSO CUT IT OFF A FEW HOURS EARLY WEDNESDAY MORNING. NO OTHER CHANGES MADE TO THE FORECAST.

REMAINDER IS FROM PREVIOUS DISCUSSION...IR IMAGERY INDICATES RATHER STRONG SYSTEM APPROACHING THE WEST COAST WITH DEEP VORT CENTER GENERATING AN EXPANSIVE CLOUD SHIELD EAST OF 130W WHICH HAS SPREAD ACROSS THE REGION. THE MAIN AREA OF PRECIPITATION REMAINS JUST OFFSHORE ACCORDING TO THE COASTAL RADAR AS THE NEGATIVE TILTED FRONTAL SYSTEM APPROACHES. THE VORT CENTER IS DIVING FAR ENOUGH SOUTH THAT THE HEAVIEST PRECIPITATION WILL BE OVER OREGON AND CALIFORNIA WITH THE APPROACHING FRONTAL SYSTEM BUT THAT DOESN/T MEAN THAT WE WON/T GET OUR SHARE. MOST OF WESTERN WASHINGTON WILL SEE AT LEAST SOME PRECIPITATION WITH THE FRONT BUT THERE WILL BE A GOOD EAST TO WEST GRADIENT THANKS TO THE DRY EAST FLOW OFF THE CASCADES. THE CASCADES FOOTHILLS AREA (THINK ENUMCLAW NORTHBEND) WILL LIKELY SEE ONLY A FEW HUNDREDTHS THROUGH THE EVENING LATE TODAY INTO TONIGHT...AND THE CENTRAL SOUND JUST A COUPLE OF TENTHS OF AN INCH OF RAIN (THINK THE METRO AREA).

THE COAST WILL GET THE MOST LIQUID PRECIPITATION AS USUAL AND LIKELY AROUND 3/4 OF AN INCH. HOWEVER...THE PLACE TO WATCH TODAY IS THE HOOD CANAL AREA...BASICALLY WEST OF A SHELTON-BELFAIR LINE. THE LOWER AIR MASS IS COOL AND DRY WITH TEMPERATURES IN THE LOWER TO MID 30S AND DEWPOINTS IN THE MID 20S TO LOWER 30S. SOUTHEAST LOW LEVEL FLOW IN ADVANCE OF THE FRONT WILL CREATE UPSLOPE FLOW ALONG HOOD CANAL LATE THIS AFTERNOON INTO TONIGHT. MESOSCALE MODELS SHOW SIGNIFICANT QPF OVER THE AREA THROUGH ABOUT MIDNIGHT. INITIAL EVAPORATIVE COOLING AND CONTINUING HEAVIER PRECIP MAY BE ENOUGH TO DROP 1-8 INCHES OF SNOW ACROSS THE WESTERN PORTION OF THE ZONE...WITH A TIGHT GRADIENT IN ACCUMULATIONS FROM NEAR THE OLYMPIC FOOTHILLS TO POINTS FARTHER EAST. A WINTER STORM WATCH HAD BEEN ISSUED EARLIER THIS MORNING IN ANTICIPATION OF THIS. I STILL SEE THE POTENTIAL FOR THIS TO OCCUR...GENERALLY AFFECTING A RELATIVELY SMALL AREA...SO LATER THIS MORNING I WILL LIKELY UPGRADE THIS TO A WINTER STORM WARNING FOR A LIMITED PORTION OF THE HOOD CANAL ZONE.

MESOSCALE MODELS STILL SHOW STRONG PRESSURE GRADIENTS AND SOUTHEAST WINDS AFFECTING MAINLY THE COAST AND NORTHWEST INTERIOR THROUGH THIS EVENING. WINDS ARE PICKING UP THIS MORNING AND HAVE ALREADY REACHED GALE OVER THE INTERIOR WATERS SO THIS LOOKS LIKE IT IS MOVING RIGHT ALONG. FOR NOW...NO CHANGE IS PLANNED RELATED TO THE WIND ADVISORY.

FOR WEDNESDAY ONWARD...A DEEP 519 DM COLD UPPER LEVEL LOW WILL MOVE OVERHEAD THEN EAST ON THURSDAY. SNOW LEVELS WILL RANGE GENERALLY FROM 500 TO 1000 FEET DEPENDING ON THE TIME OF DAY...BUT IN THE UNSTABLE AIR MASS HEAVIER SHOWERS WILL LIKELY BRING SNOW DOWN TO SEA-LEVEL. THE SHOWERS WILL BE HIT-AND-MISS WITH A CONVERGENCE ZONE AND TERRAIN DRIVEN SHOWER BANDS PROBABLY RESULTING IN MORE PERSISTENT SHOWERS FOR SOME AREAS. NO REAL ACCUMULATION IS EXPECTED SINCE THE SNOW SHOULD MELT QUICKLY. SHOWERS SHOULD BEGIN DECREASING THURSDAY AS THE LOW MOVES EAST AND NORTHWEST FLOW DEVELOPS OVER THE AREA. CERNIGLIA

.LONG TERM...FROM PREVIOUS DISCUSSION...GFS/ECMWF BOTH HAVE STRONGER W FLOW DEVELOPING ACROSS THE NE PACIFIC ON FRIDAY...FLOWING OVER THE TOP OF A BROAD FLAT RIDGE OFFSHORE. THIS IS A GOOD WARM ADVECTION PATTERN. THE GFS IS MORE AGGRESSIVE WITH THE WARM ADVECTION...SHOWING 24-36 HOURS OF DECENT WARM ADVECTION FROM FRIDAY AFTERNOON THROUGH MOST OF SATURDAY. GFS 850 MB WINDS ONLY TOP OUT AT

W 35 KT FRIDAY NIGHT...SO THIS MORE LIKE MODERATE FLOW. THE ECMWF
SHOWS WEAKER WARM ADVECTION AND LESS PRECIP. BOTH MODELS AGREE THAT
A COLD FRONT WILL BE MOVING INTO THE AREA SUNDAY NIGHT AND MONDAY.
KAM

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.HYDROLOGY...
FLOODING IS NOT EXPECTED THROUGH EARLY NEXT WEEK.

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.AVIATION...RAIN ALONG THE COAST WILL SPREAD INLAND THIS
AFTERNOON/EVENING AS AN OCCLUDED FRONT MOVES IN. EXPECT GUSTY S/SE
FLOW AT THE SURFACE WITH HIGHEST WINDS ALONG THE COAST AND NORTH
INTERIOR. MAY SEE CIGS LOWER TO MVFR THIS EVENING. THE AIR MASS WILL
REMAIN COOL AND UNSTABLE OVERNIGHT WITH SNOW LEVELS NEAR THE
SURFACE. MAY SEE A -RASN MIX BUT ACCUMULATING SNOWFALL IS NOT
EXPECTED AT THE MAIN TERMINALS. 33

KSEA...CIGS WILL GRADUALLY LOWER TODAY AS A PAC SYSTEM MOVES INLAND.
RAIN WILL SPREAD TO THE PUGET SOUND AREA AROUND 00Z THIS
AFTERNOON...MVFR CONDITIONS POSSIBLE. S/SE FLOW WILL ALSO INCREASE
WITH GUSTS TO 20 KT. THE AIR MASS WILL REMAIN COOL AND UNSTABLE
TONIGHT WITH ISOLATED TO SCATTERED SHOWERS...POSSIBLE RAIN/SNOW MIX
IN THE REGION. HOWEVER...ACCUMULATING SNOWFALL AT SEATAC IS NOT
EXPECTED. 33

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.MARINE...THE SHORT TERM FORECAST REMAINS ON TRACK. A VIGOROUS PAC
SYSTEM WILL IMPACT THE REGION TODAY WITH INCREASING S/SE FLOW OVER
THE WATERS. GALE WARNINGS AND SMALL CRAFT ADVISORIES ARE POSTED FOR
THE AREA. THE OCCLUDED FRONT WILL MOVE INLAND AROUND 03Z TONIGHT
WITH WINDS EASING LATE THIS EVENING. ONSHORE FLOW WILL PREVAIL ON
WED AS THE SURFACE LOW WEAKENS/FILLS OVER THE NORTH COAST. THE NEXT
SYSTEM...A WEAK SURFACE TROUGH WILL REACH THE COAST FRI NIGHT. 33

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.SEW WATCHES/WARNINGS/ADVISORIES...
WA...WIND ADVISORY UNTIL 10 PM PST THIS EVENING FOR THE COAST AND
NORTHWEST INTERIOR.
WINTER STORM WATCH FOR HOOD CANAL LATE THIS AFTERNOON AND
TONIGHT.
WINTER WEATHER ADVISORY FOR THE CASCADES TONIGHT.

PZ...GALE WARNING COASTAL WATERS...EAST AND WEST ENTRANCE STRAIT
OF JUAN DE FUCA...NORTHERN INLAND WATERS AND ADMIRALTY INLET.
.SMALL CRAFT ADVISORY CENTRAL STRAIT JUAN DE FUCA AND PUGET
SOUND AND HOOD CANAL.
.SMALL CRAFT ADVISORY GRAYS HARBOR BAR FOR ROUGH CONDITIONS.

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Your National Weather Service forecast

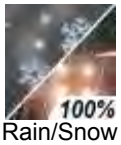
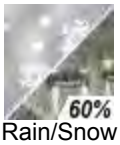
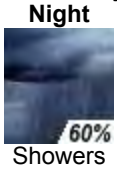
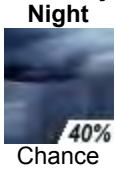
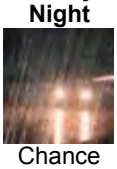
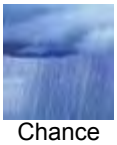
Bremerton WA

Enter Your "City, ST" or zip code Go BOOKMARK

NWS Seattle, WA
Point Forecast: Bremerton WA
47.56°N 122.62°W (Elev. 0 ft)

Mobile Weather Information | **En Español**
Last Update: 4:36 am PST Feb 28, 2012
Forecast Valid: 1pm PST Feb 28, 2012-6pm PST Mar 5, 2012

Forecast at a Glance

This Afternoon	Tonight	Wednesday	Wednesday Night	Thursday	Thursday Night	Friday	Friday Night	Saturday
 50%	 100%	 60%	 60%	 50%	 40%	 40%		
Chance Rain/Snow	Rain/Snow	Rain/Snow Likely	Showers Likely	Chance Showers	Chance Showers	Chance Rain	Chance Rain	Chance Showers
Hi 44 °F	Lo 33 °F	Hi 43 °F	Lo 35 °F	Hi 44 °F	Lo 37 °F	Hi 46 °F	Lo 39 °F	Hi 48 °F

Detailed 7-day Forecast

This Afternoon: A chance of rain and snow before 4pm, then a chance of rain. Snow level 300 feet. Cloudy, with a high near 44. South wind around 9 mph. Chance of precipitation is 50%. Little or no snow accumulation expected.

Tonight: Rain before 10pm, then rain, possibly mixed with snow. Snow level 500 feet. Low around 33. South wind between 10 and 15 mph. Chance of precipitation is 100%. Little or no snow accumulation expected.

Wednesday: Rain and snow showers likely, becoming all rain after 10am. Snow level 600 feet. Mostly cloudy, with a high near 43. South southwest wind between 3 and 10 mph. Chance of precipitation is 60%. Little or no snow accumulation expected.

Wednesday Night: Showers likely. Mostly cloudy, with a low around 35. Southwest wind between 9 and 11 mph. Chance of precipitation is 60%.

Thursday: A 50 percent chance of showers. Partly sunny, with a high near 44. South southwest wind between 5 and 11 mph.

Thursday Night: A 40 percent chance of showers. Mostly cloudy, with a low around 37.

Friday: A 40 percent chance of rain. Cloudy, with a high near 46.

Friday Night: A chance of rain. Mostly cloudy and breezy, with a low around 39.

Saturday: A chance of showers. Mostly cloudy and breezy, with a high near 48.

Saturday Night: A chance of showers. Mostly cloudy, with a low around 40.

Sunday: A chance of showers. Mostly cloudy, with a high near 47.

Detailed Point Forecast [Move Down]

Click Map for Forecast Disclaimer

Requested Location Forecast Area
Lat/Lon: 47.56°N 122.62°W **Elevation:**0 ft

XML

Current Conditions [Move Up]

Bremerton, Bremerton National Airport (KPWT)
Lat: 47.5 Lon: -122.75 Elev: 440
Last Update on 28 Feb 11:55 PST

Overcast

39°F (4°C)

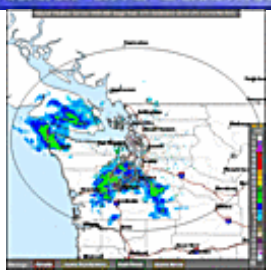
Humidity:	52 %
Wind Speed:	S 7 MPH
Barometer:	29.79 in (N/A mb)
Dewpoint:	23°F (-5°C)
Wind Chill:	34°F (1°C)
Visibility:	10.00 Miles

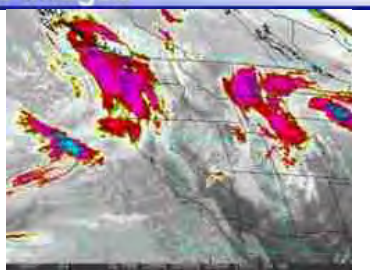
Sunday Night: Rain likely. Mostly cloudy, with a low around 38.

Monday: Showers likely. Mostly cloudy, with a high near 46.

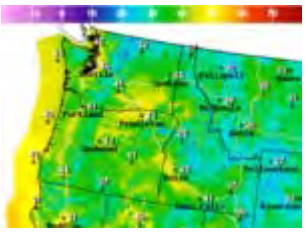
More Local Wx: **3 Day History:**

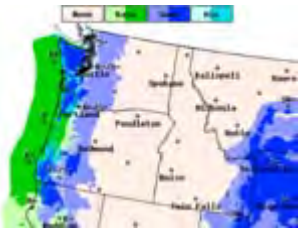
Radar and Satellite Images





National Digital Forecast Database





Additional Forecasts & Information

Zone Area Forecast for Seattle/Bremerton Area, WA

Forecast Discussion

Printable Forecast | Text Only Forecast

Hourly Weather Graph | Tabular Forecast

Quick Forecast

International System of Units | About Point Forecasts

Forecast Weather Table Interface

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Seattle, WA

Back to Previous Page

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Seattle, WA
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Point Forecast: Bremerton WA
47.56N 122.62W (Elev. 0 ft)

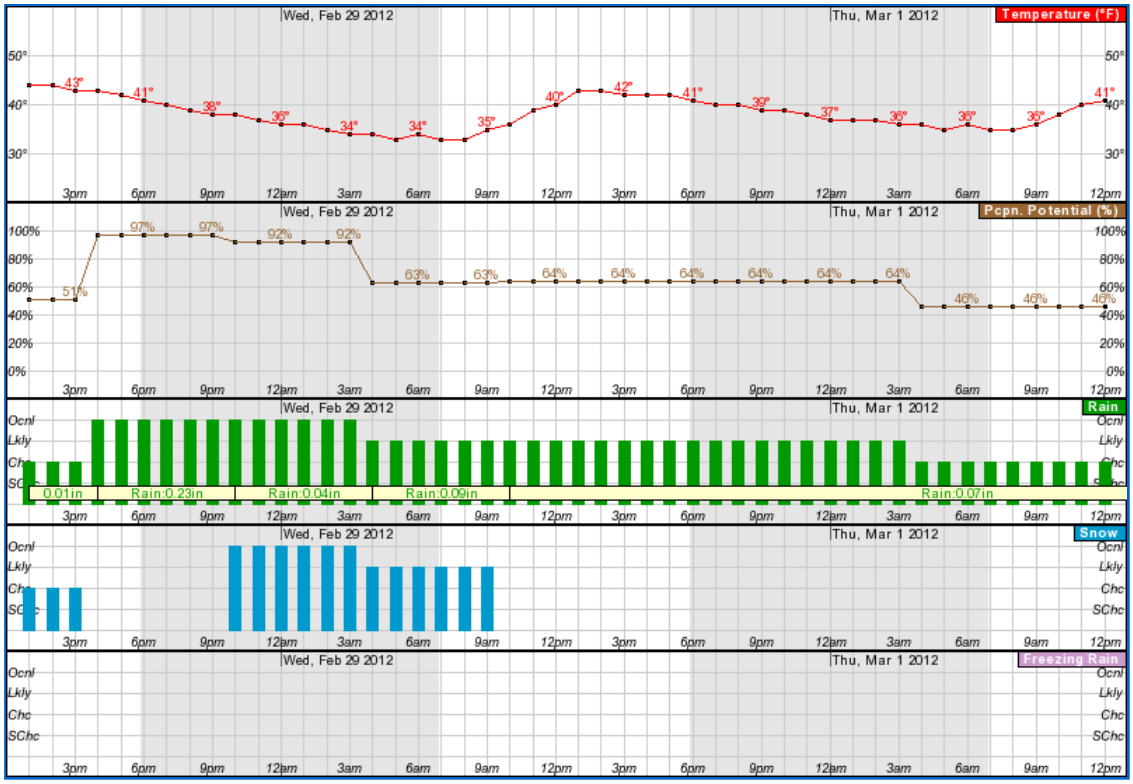
Last Update: 4:36 am PST Feb 28, 2012

Hourly Weather Forecast Graph

[dashes/dots] | [b/w] | [hide menu]

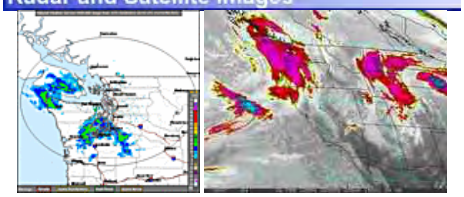
Weather Elements	Weather/Precipitation	Fire Weather
Temperature (°F)	Thunder	Mixing Height (x100ft)
Dewpoint (°F)	Rain	Haines Index
Wind Chill (°F)	Snow	Lightning Activity Level
Surface Wind mph	Freezing Rain	Trans. Wind mph
Sky Coverage	Sleet	
Precipitation Potential		
Relative Humidity		

48-Hour Period Starting: 1pm Tue, Feb 28 2012 Submit Back 2 Days Forward 2 Days



Thursday, March 1 at 6am
Temperature: 36 °F
Precipitation Potential: 46%
Rain: Chance (30%-50%) Snow: <10% Freezing Rain: <10%

Radar and Satellite Images



Additional Forecasts & Information

International System of Units | Forecast Discussion
7-Day Forecast | Tabular Forecast
Quick Forecast

Webmaster
NOAA's National Weather Service
Seattle, WA

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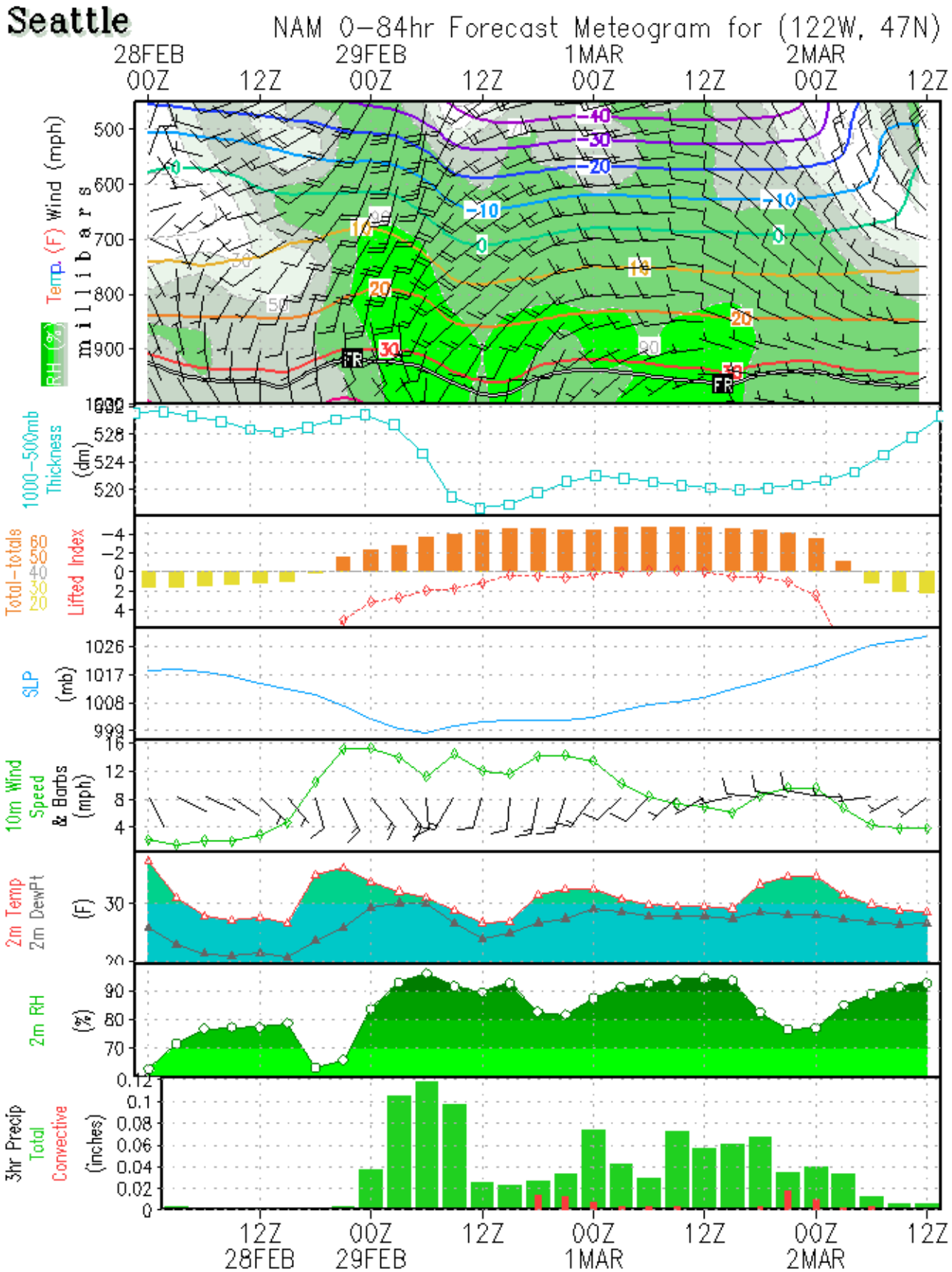
Forecast For Lat/Lon: 47.5620/-122.6230 (Elev. 0 ft)

Custom Weather Forecast Table

	Tue Feb 28							Wed Feb 29							Thu Mar 01								Fri Mar 02
Weather		Chance Rain and Snow		Rain		Rain and Snow		Likely Rain Showers and Snow Showers		Likely Rain Showers				Chance Rain Showers									
Daily-Temp	High **44** Low **31**							High **43** Low **33**							High **44** Low **35**								Low **37**
Chance of Precip	5%		50%		95%		90%	65%		65%		65%		65%	45%		45%		40%		40%		
Precip	0.00"		0.02"		0.23"		0.04"	0.09"		0.01"		0.01"		0.01"	0.01"		0.01"		0.01"		0.01"		
12-hr Snow Total	0"				0"			0"				0"			0"				0"				
Sig Wave Height	1'		2'		1'		2'	1'		1'		1'		1'	1'		1'		1'		1'		
3-Hour	5am	8am	11am	2pm	5pm	8pm	11pm	2am	5am	8am	11am	2pm	5pm	8pm	11pm	2am	5am	8am	11am	2pm	5pm	8pm	11pm	2am
Temp	32	32	35	44	43	40	38	36	34	33	36	43	42	40	39	37	36	35	38	44	43	41	40	39
Cloudiness	81%	81%	100%	100%	100%	100%	100%	100%	72%	72%	84%	84%	85%	85%	83%	83%	62%	62%	60%	60%	61%	61%	61%	61%
Dewpoint	31	30	33	38	37	38	37	34	33	32	34	37	37	38	37	35	35	35	37	42	40	38	37	36
Relative Humdity	96%	95%	93%	80%	81%	92%	96%	93%	96%	95%	93%	80%	81%	92%	96%	93%	98%	98%	97%	92%	89%	89%	89%	89%
Wind	S 5	S 8	S 14	S 9	S 13	S 10	SE 15	SW 10	S 9	S 10	S 3	SW 7	SW 9	SW 9	SW 12	SW 12	SW 12	SW 12	SW 5	SW 5	NW 2	NW 2	E 1	E 1
Snow Level (ft)	395	395	343	343	705	705	429	429	410	410	733	733	1340	1340	989	989	530	530	955	955	1605	1605	1282	1282


Seattle
NAM 0-84hr Forecast Meteogram for (122W, 47N)
28FEB 00Z
12Z
29FEB 00Z
12Z
1MAR 00Z
12Z
2MAR 00Z
12Z
RH (%) Temp. (F) Wind (mph)
millibars
500
600
700
800
900
1000
1000-500mb Thickness (dm)
528
524
520
Total-totals
Lifted Index
SLP (mb)
1026
1017
1008
999
10m Wind Speed & Barbs (mph)
16
12
8
4
2m Temp
2m DewPt
(F)
30
2m RH (%)
90
80
70
3hr Precip
Total
Convective
(inches)
0.12
0.1
0.08
0.06
0.04
0.02
0
12Z 28FEB
00Z 29FEB
12Z
00Z 1MAR
12Z
00Z 2MAR
12Z

Telemetry Data Summary Report
QAQC Data Notes from STE#10
Data review from 1/23/12 to 3/1/12

Site	Parameter	Issue	Start Date/Time	End Date/Time	G-A-R Level of Concern	Comments
15	Level	Negative Level	2/2/2012 18:40	2/2/2012 18:50	Green	10 minute significant negetaive level recorded (down to -33.4 ft)
15	Temperature	Missing Data	2/2/2012 18:40	2/2/2012 18:40	Green	5 min data gap for temp
15	Level	Level Drift	1/23/2012 0:00	2/2/2012 18:45	Red	Transducer level drifted up gradually during this period (base level from 0.4' to 1.3'); it was calibrated and corrected on 2/2/2012 @ 18:45)
15	Salinity	Null Data	2/2/2012 18:40	2/28/2012 13:45	Green	Salinity wasn't caluculated during low tide when the Condutivity sensor was dry and recording a negative level
84.1	YSI Temperature	Inaccurate Data	Entire Record	Entire Record	Amber	YSI tempertature doesn't track well with INW transducer temperature during dry conditions, and generally above 30 degrees C
115.1	Rainfall	Inaccurate Data	2/2/2012 15:25	2/2/2012 15:35	Amber	5.51'' of rain recorded in 15 mins.; likely due to calibration or error
124	Level	Inaccurate/Missing Data	2/4/2012 0:55	3/1/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124	Temperature	Inaccurate/Missing Data	2/4/2012 0:55	3/1/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124	Conductivity	Inaccurate/Missing Data	2/4/2012 0:55	3/1/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124	Salinity	Inaccurate/Missing Data	2/4/2012 0:55	3/1/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124.1	Level	Inaccurate/Missing Data	2/17/2012 18:15	2/17/2012 19:15	Amber	60 minute data gap (inaccurate negative value reported)
124.1	Temperature	Inaccurate/Missing Data	2/17/2012 18:15	2/17/2012 19:15	Amber	60 minute data gap
124.1	Conductivity	Inaccurate/Missing Data	2/17/2012 18:15	2/17/2012 19:15	Amber	60 minute data gap (inaccurate negative value reported)
124.1	Salinity	Inaccurate/Missing Data	2/17/2012 18:15	2/17/2012 19:15	Amber	60 minute data gap
124.1	Salinity	Null Data	1/25/2012 23:40	2/28/2012 20:30	Green	Salinity wasn't caluculated during low tide when the Condutivity sensor was dry and recording a negative level
126	Rainfall	Inaccurate/Missing Data	2/17/2012 15:10	2/17/2012 16:45	Green	95 minute data gap
126	Level	Inaccurate/Missing Data	2/17/2012 15:10	2/17/2012 16:45	Green	95 minute data gap
126	Temperature	Inaccurate/Missing Data	2/17/2012 15:10	2/17/2012 16:45	Green	95 minute data gap
126	Conductivity	Inaccurate/Missing Data	2/17/2012 15:10	2/17/2012 16:45	Green	95 minute data gap
126	Salinity	Inaccurate/Missing Data	2/17/2012 15:10	2/17/2012 16:45	Green	95 minute data gap

STORM EVENT REPORT SW11
For
Non-Dry Dock Stormwater Monitoring
Conducted at
Puget Sound Naval Shipyard
Bremerton, WA
Project ENVVEST Study Area

March 14, 2012

Puget Sound Naval Shipyard and Surrounding Area

PNNL Contract No.: N4523A10MP00034 Amendment 1

Cardno TEC
Shaping the Future

Pacific Northwest
NATIONAL LABORATORY

1.0 Introduction

Taylor/TEC conducted non-dry dock stormwater sampling tasks within the Puget Sound Naval Shipyard (PSNS) and adjacent areas within Naval Base Kitsap (NBK); collectively comprising the Project ENVVEST study area, between February 29th and March 15th 2012. This was the fourth of four scheduled events of the 2011-2012 project year – referred to as *Phase II*. Overall, this is the eleventh Stormwater (SW11) event of the project. A summary of the preparatory and sampling events, including site specific conditions that occurred during SW11 are presented in this report, with supporting information as attachments.

This SW11 Report is organized in the following manner and contains: Section 2, SW11 Event Summary; Section 3, Project Staff Participating in SW11; Section 4, Storm Event SW11 Preparatory Tasks; Section 5, Weather Forecast Information and SW11 Targeting Details; Section 6, Precipitation and SW11 Qualification Summary; Section 7, Sampling Information, Management and Validation; Section 8, Basin Runoff Calculations; Section 9, Descriptive Statistics and Discussion of Event Station Monitoring Data; Section 10, Notable Anomalies and Variations to the PWP; and Section 11, Action Items.

Attachments to this report include: Table A-1*, Storm Event Summary and Sampling Information, Validation Checklist* (spreadsheet); Stormwater Field Sampling Forms and Storm Controller Notes; Chain of Custody Forms; (basin) Runoff Calculation Worksheet; Station Hydrographs; Autosampler Reports; Weather Forecast Information and a Telemetry Data Summary Report.

2.0 SW11 Event Summary

Main SW11 details are provided below as a "*Quick Reference*":

- *Event/s Conducted:* SW11
- *Event Date/s:* maint. items; 2/29/12 through 3/7/12, station prep.; 3/8/12; and storm event tasks occurred between 3/14 – 3/15/12
- *Monitoring Stations Sampled:* PSNS015, 84.1, 115.1, 124, 124.1 and 126
- *Antecedent Conditions Met?:* Yes; ≤0.1" in prior 24 hrs and 0.0" in prior 6 hrs preceding the storm/sampling event at each station.
- *Start of Rainfall at PSNS Stations:* 3/14/12 between 0710 (PSNS015) and 0800 (PSNS115.1)
- *Sampling Period Duration Range:* start =3/14/12 @ 0845 (PSNS126 and 115.1) and stop = 3/15/12 @ 1658 (PSNS124). Max sampling duration = 31 hrs:13 mins @ PSNS115.1
- *Sampling Event Rainfall Total:* PSNSB427 = 1.42", PSNS126 = 1.29", PSNS124.1 = 1.52", PSNS124 = 1.23", PSNS115.1 = 1.17", PSNS084.1 = 1.58" and PSNS015 = 1.75"
- *Samples/Types Collected:* Grab and composite samples were collected at each station (one each at each station) for a total of 12 "normal" samples.
- *Quality Control (QC) Samples Collected:* One composite (PSNS015) and two grab (PSNS124.1 and 124) sample duplicates were collected during the SW11 event.

- *Based on consideration of storm event and sample validation information, were the samples collected during SW11 valid for project purposes? (Y / N, composite, grab or both):* Yes-both; all grab and composite samples collected during this event were valid.

See Table A-1; *Storm Event Summary and Sampling Information, Validation Checklist*, for additional event summary details.

3.0 Project Staff Participating in SW11

Taylor/TEC:

Dave Metallo – Project Manager, Storm Controller, Field Event and QC Manager

Brian Rupert – Field Team Leader

Bruce Beckwith – Field Team Member

Navy Personnel:

Bob Johnston – Project Technical Lead / Oversight / Grab sample collection lead

Larry Hsu – Project Manager, Field Team Member

Christine Gebhart – Assistant Program Manager, Field Team Member

Eric Mollerstuen – Field Team Member

4.0 Storm Event SW11 Preparatory Tasks

On February 28th, 2012 all six stormwater monitoring stations (PSNS015, PSNS08.1, PSNS115.1, PSNS124, PSNS124.1 and PSNS126) were reset and re-calibrated. The stations were also readied for storm event / stormwater sample collection on the same day. At this point all of the monitoring equipment was deemed to be functioning properly, was operational and "sample ready" (see Sections 1 and 2 of the attached *Stormwater Field Sampling Forms).*

All stations were programmed with pre-determined autosampler enable and pacing conditions set "high" to prevent premature enabling (*sample disable mode*), as directed by the Taylor/TEC Storm Controller. Station operation was passed to the Taylor /TEC Storm Controller to be managed via telemetry. Final enabling conditions were determined by the Storm Controller closer to the onset of the storm event.

5.0 Weather Forecast Information and SW11 Targeting Details

Between the end of SW10 (2/29/12 ~ 1400) and the just prior to the onset of SW11 (3/14/12 @ 0700) the average rainfall as measured at the six monitoring stations during this approximately 14 day period was 2.00". The Navy's rain gauge at Build 427 recorded a total of 2.47" during this period.

The last measureable runoff occurred approximately 18 to 34 hours prior to the SW11 event. Project qualifying antecedent dry period was met prior to the stations being armed on 3/14/12. A potentially qualifying storm event (event probability and forecast rainfall depth) was identified and

targeted for 3/14/12. Rain was forecast at between 90% to 100% probability for Wednesday 3/14/12, with 24-hour accumulations of between 1.13" to 1.41" into the later afternoon of the 15th.

The Nation Weather System (NWS) was one of the main sources used for the assessment of weather forecasting and conditions. Provided below is a link to the NWS-Bremerton, WA webpage; (http://forecast.weather.gov/MapClick.php?site=sew&textField1=47.56751&textField2=-122.63127&smap=1). A host of other internet available weather forecasting, observational and data sources were used for field and reporting purposes as appropriate Detailed *Weather Forecast Information* is attached to this report.

The NWS called for a vigorous frontal system to move through the area during the day (of the 14th) followed quickly by another weather system that night. Wet and occasionally windy weather and heavy mountain snow and snow down to within several hundred feet of sea-level was forecast for the Puget Sound area.

Routinely referenced weather models used to gain forecast information regarding the Pacific Northwest included the MM5-NAM http://www.atmos.washington.edu/mm5rt/rt/naminit.12km.html) and the GFS-WRF (http://www.atmos.washington.edu/mm5rt/rt/gfsinit.frame1.html) (both hosted by the University of WA and initialized for the PNW). Below is a synopsis of the model comparison for SW11:

"The models disagreed on the rain event start, with the NAM several hours earlier then the GFS. Both models have rain over the project area for the majority of the day on the 14th. Again the models differ slightly in the timing of a return to heavy/steady rain, with the NAM around 2200 on the 14th and the GFS at 0100 on the 15th. Both models show that once heavy/steady does return it will remain so until the 24-hr mark regarding the project autosamplers collection scheme."

Final sampler enabling conditions were appropriately set at each monitoring station early on morning of the 14th (*sample ready mode*). The enabling conditions at PSNS124.1 were re-fined at approximately 1240 on 3/14 to compensate for pipe water level conditions. Table 1 lists the final enabling conditions at each monitoring station that were used for SW11, along with the rainfall amounts in the 24 and 6 hour periods prior to the onset of the storm event.

Table 1. Monitoring Station Enabling Conditions

Station	Rainfall (in/hr)	Level (ft)	Conductivity (µS/cm)	Repeatable Conductivity Enable (Y/N)	[1]Pacing (min)	[2]Rainfall Prior to Event Start (24hr/6hr)
PSNS015	0.05	0.3	2000	N	15/30/15	0.08"/ 0.00"
PSNS084.1	0.05	0.3	2000	N	15/30/15	0.07"/ 0.00"
PSNS115.1	0.05	0.3	2000	N	15/30/15	0.05"/ 0.00"
PSNS124	0.05	0.3	2000	N	15/30/15	0.04"/ 0.00"

Table 1. Monitoring Station Enabling Conditions

Station	Rainfall (in/hr)	Level (ft)	Conductivity (µS/cm)	Repeatable Conductivity Enable (Y/N)	[1]Pacing (min)	[2]Rainfall Prior to Event Start (24hr/6hr)
PSNS124.1	0.05	0.2	2000	N	15/30/15	0.06"/ 0.00"
PSNS126	0.05	0.3	2000	N	15/30/15	0.05"/ 0.00"

[1]Pacing rates initially set at 15 minutes, changed to 30 minutes at ~ 1530 on 3/14 to compensate for storm conditions, then back to 15 minutes at ~ 0500 on 3/15

[2]Conditions as checked on 3/14/12 at ~0830; final enable conditions set at ~0455 (PSNS124.1 @ 1240)

6.0 Precipitation and SW11 Qualification Summary

Precipitation Summary:

Previous rainfall that caused runoff to occur (≥ 0.03" rainfall without 3-hr gap) prior to the onset of SW11 ranged from 18 hours at PSNS124.1 and 015 to 1:10 (days:hours) at PSNS126, 124 and 115.1 as measured by each stations rain gauge. Rain began to fall over the project site between 0710 and 0800 on March 14th. Table 2 details the period since last runoff, antecedent duration prior to the start of the storm event, as well as the rainfall start date/time at each monitoring station.

Table 2. Pre-Rain Event Conditions

Station	Last Runoff[1] (Date/Time)	Antecedent Duration (Days: Hrs)	Start of Rainfall (Date/Time)
PSNS015	3/13/12 12:30	0:18	3/14/12 7:10
PSNS084.1	3/13/12 12:25	0:19	3/14/12 7:45
PSNS115.1	3/12/12 21:25	1:10	3/14/12 8:00
PSNS124	3/12/12 21:35	1:10	3/14/12 7:55
PSNS124.1	3/13/12 13:00	0:18	3/14/12 7:20
PSNS126	3/12/12 21:30	1:10	3/14/12 7:50

[1]Last runoff period is defined as ≥ 0.03" of rainfall without a 3-hr gap

The rainfall intensities began in a light to moderate fashion. Operational checks during the mid- to late-morning of March 14th, via telemetry, revealed that all of the stations enabled their sampling routines as programmed; with rainfall, pipe level and conductivity values being in satisfaction of their threshold values, (as listed in Table 1) except for PSNS124.1. It was noted that the water level in the piping system associated with PSNS124.1 was not building to/exceeding its enabling condition (0.30') as expected. Therefore this station was "manually' started via telemetric control. Sampling began at PSNS124.1 at 1244 on the 14th.

Rainfall intensities remained low to moderate, but steady throughout the course of the SW11 event. There were a few hours of moderately heavy rainfall intensities noted at several of the monitoring stations during the second half of the rain event before the weather system passed by the project area; tailing very light rain intensities before ending completely around 1730 on March 15th.

Station sampling period rainfall totals ranged from 1.17" at PSNS115.1 to 1.75" at PSNS015. The Navy's rain gauge at B427 recorded 1.42" over the entire length of the sampling period for all project monitoring stations.

The sampling routines all ran their courses to completion (24 discrete composite bottles). Sampling durations (the range of time covering bottles used in the formulation of the overall station composite sample) ranged from 26:06(hrs:mins) at PSNS124 to 31:13(hrs:mins) at PSNS115.1.

Table 3 summarizes the sampling period start, sampling period end, sampling period duration as well as the total rainfall amounts for each monitoring station and the PSNS project gauge at B427 that occurred during the sampling period associated with SW11. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), attached to this report, provides additional sampling period rainfall information.

Table 3. Sampling Period Information and Rainfall Totals for Project Monitoring Stations

Station	Sampling Period Start (Date/Time)	Sampling Period End (Date/Time)	Sampling Period Duration (Hrs:Mins)	Total Sampling Period Rainfall (in)
PSNS015	3/14/12 10:18	3/15/2012 16:01	29:43	1.75
PSNS084.1	3/14/12 10:42	3/15/2012 16:56	30:14	1.58
PSNS115.1	3/14/12 8:45	3/15/2012 15:58	31:13	1.17
PSNS124	3/14/12 11:54	3/15/2012 14:00	26:06	1.23
PSNS124.1	3/14/12 12:44	3/15/2012 16:58	28:14	1.52
PSNS126	3/14/12 8:45	3/15/2012 15:29	30:44	1.29
[1]B427	3/14/12 8:45	3/15/2012 16:58	32:13	1.42

[1]B427 start/stop and duration incorporates the total span from all monitoring stations

SW11 Qualification Summary:

All storm qualification conditions were met for this event. Storm event qualification conditions included wet season event date range (Oct 1 – May 1), forecast probability (≥70%), forecasted

storm depth (≥0.1"), storm duration (≥2hrs) and runoff occurrence / hydrograph stage (elevated above base flow). Antecedent dry period (≤0.1" rain in previous 24hrs and 0" rain in previous 6hrs) qualification for SW11 was also met without condition, as described above. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist)*, documents the particular SW11 qualification criteria listed above.

7.0 Sampling Information, Management and Validation

Grab Sampling:

Grab sample collection was lead and performed by the Navy Team, with storm control assistance (limited to station status checks via telemetry) from Taylor/TEC as necessary. Grab sampling was conducted at all six of the monitoring stations. Grab samples were collected as per methodologies described in the 2011-12 Project Work Plan (PWP). Parameters included total petroleum hydrocarbons (NW-TPH-Dx) and fecal coliform. Grab samples were collected between 3/14 1420 (PSNS015) and 3/15 1658 (PSNS124.1). Attempts were made to coordinate the collection of grab samples with low or lower tidal conditions, ensuring that proper conductivity conditions would exist. Grab sampling times are indicated on the attached hydrographs to illustrate the water level stage during collection. Grab sample IDs, along with the other pertinent information is listed in the *Stormwater Field Sampling Forms* and in Table A-1 (both are attached). Table 4 summarizes these results.

Table 4. Grab Sampling Information

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Grab sample ID	SW11-003	SW11-007	SW11-005	SW11-004	SW11-002	SW11-001
Grab Date /Time	3/15/2012 15:42	3/15/2012 16:58	3/15/2012 16:26	3/15/2012 16:05	3/14/2012 14:55	3/14/2012 14:20
Grab sample conductivity value (μS/cm)	224	NA	7310	297	2.8	35.5
Hydrograph stage at grab collection	Falling Limb	Falling Limb	Falling Limb	Falling Limb	Intra-event Runoff	Intra-event Runoff
Grab parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

Composite Sampling:

Composite sample retrieval tasks and formulation procedures were managed and lead by Taylor/TEC with support from PNNL/MSL personnel as needed. Composite samples were collected from all six monitoring stations.

Composite samples were collected via autosamplers which were operated and synchronized by a custom designed telemetered water quality control system. The composite sample collection period and duration for each monitoring station is noted in Table 3.

Discrete sample (wedge) bottles from each station (contained in the autosampler bases) were brought back the C106 Stormwater Lab at B147 for processing. Composite formulation occurred on March 15th between 1830 and 2250. The numeric identification and amount of wedge bottles that were used for the composite sample formulation and those that were discarded were noted in Section 5 of the attached *Stormwater Field Sampling Forms*.

Methods used in preparation, autosampler collection, retrieval and formulation of the composite samples were conducted in a routine manner as per the 2011-12 PWP. Samplers at each station were enabled as per the conditions stated in Section 5 of this report. Composite sample parameters included: hardness, TOC, DOC, TSS, total and dissolved metals and turbidity.

The total number of discrete wedge bottles collected at each sampler, along with the total number of those bottles used in the station's composite sample is noted below in Table 5. Dividing the number of wedge bottles used in the composite sample formulation by the total number of wedge bottles collected during the span of the entire sampling period provides an estimation of the amount of time (as a percentage of that stations entire collection period) where freshwater (i.e. runoff) conditions occurred at each station during the corresponding sampling event period.

Specific details regarding the composite formulation, results from individual bench top testing of the discrete bottles, sample IDs, sample date/time and resultant overall conductivity and turbidity values, as well as the number of wedge bottles collected during the sampling event and those used for the composite sample formulation are detailed in the *Stormwater Field Sampling Forms, Chain-of-Custody (CoC)* forms and in Table A-1 (all are attached). Table 5 summarizes these results.

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Composite sample ID	SW11-013	SW11-014	SW11-015	SW11-012	SW11-011	SW11-009
Composite Date /Time	3/15/2012 15:29	3/15/2012 16:58	3/15/2012 14:00	3/15/2012 15:58	3/15/2012 16:56	3/15/2012 16:01
Overall Composite conductivity value (μS/cm)	192	190	521	293	142	83
Overall Composite turbidity value (NTU)	12	4	20	9	17	NA
Composite volume (ml)	8,700	8,400	5,500	7,800	8,700	6,000

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Number of Bottles Collected During Sampling Event	24	22	23	24	24	24
Number of Bottles Included in Composite Sample	23	18	12	21	22	24
Percentage of Total Sampling Period that Freshwater Conditions Occurred	96%	82%	52%	88%	92%	100%
Composite parameters collected per PSNS PWP?	Yes	Yes	Yes	Yes	Yes	Yes

All sampling and vault monitoring equipment operated as designed and programmed. Details pertaining to autosampler programming and event-specific operation of each monitoring stations' autosampler unit are contained in the attached *Sampler Reports*.

QC Samples:

During SW11 two grab and one composite duplicate samples were collected at PSNS124.1, 124 and 015 respectively. Table 6 summarizes the quality control sample collection information for SW11.

Table 6. Summary of Quality Control Sampling Information for SW11

Sample Collection Criteria:	PSNS124.1	PSNS124	PSNS015
Grab sample duplicate ID	SW11-008	SW11-006	
Grab sample duplicate date and time	3/15/2012 17:05	3/15/2012 16:30	
Grab sample duplicate conductivity value (μS/cm)	NA	7310	
Composite sample Duplicate ID			SW11-010
Composite sample duplicate date and time			3/15/2012 16:01
Overall Composite Duplicate conductivity value (μS/cm)			82
Overall Composite Duplicate turbidity value (NTU)			NA
Composite Duplicate volume (ml)			6,000

Sample Management:

All samples were handled and managed as per Section 9 of the 2011-12 PWP and in a manner acceptable and within industry standards regarding practices typical for tasks of this nature. Once

collected, both grab and composite samples were placed into coolers and put on ice and/or into the secure Stormwater Laboratory refrigerator to maintain temperatures between 2 and 6 °C.

All sample IDs, collection date and time, matrix, requested parameter analysis and other associated information were documented on *Chain of Custody* (*CoC) Forms* (attached). Samples were in direct control of project and/or laboratory personnel at all times. Samples were delivered to the testing facility, Battelle Marine Science Laboratory in Sequim, WA, in good, useable and properly chilled condition. Adequate sample volume was collected from the targeted stations to proceed with the scheduled analysis of all parameters per the 2011-12 PWP.

Sample Validation Summary:

All sample validation criteria were met for this event per Section 8.2.6 of the 2011-12 PWP. Prior to processing the samples and transferring custody to the analytical laboratory, the Taylor/TEC Field Event Lead validated the samples against certain criteria. These validation criteria included runoff occurrence / hydrograph stage, sample preparation and handling review, requested parameters, ≥2 hour sampling duration or 75% storm hydrograph coverage, minimum number of aliquots, minimum sample volume collected for required parameters, discrete and composite samples conductivity measurement results, quality control sample collection and anomalous conditions assessment. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), documents the particular SW-event qualification listed above.

8.0 Basin Runoff Calculations

Rainfall runoff volumes during the SW11 sampling period were calculated for each of the basins associated with the six Phase II monitoring stations. These calculations are based on the modified Runoff Coefficient Method (RCM) as described in Section 7.4 of the 2011-12 PWP.

The value ranges for the various land use/land cover categories assigned to each basin are listed in the attached *Runoff Calculation Tables*. Calculated runoff values are also presented in Table A-1 (*Storm Qualification and Sample Validation Information Checklist*) (attached). Table 7 summarizes the results from these calculations.

Table 7. Runoff Calculations

Station	Type of Surface	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Combined Drainage Area (Ft^2)	Sample Event Rain Total (In)	Sample Event Rain Total (Ft)	Sample Event Period Runoff Vol. (Gal)
126	Impervious	653,373	0.6 – 0.9	591,881	1.29	0.1075	475,965
	Pervious	9,613	0.2 – 0.4				
124.1	Impervious	109,690	0.6 – 0.9	101,245	1.52	0.1267	95,933
	Pervious	6310	0.2 – 0.4				
124	Impervious	429,302	0.6 – 0.9	396,251	1.23	0.1025	303,827
	Pervious	24,698	0.2 – 0.4				

Table 7. Runoff Calculations

Station	Type of Surface	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Combined Drainage Area (Ft^2)	Sample Event Rain Total (In)	Sample Event Rain Total (Ft)	Sample Event Period Runoff Vol. (Gal)
115.1	Impervious	449,104	0.6 – 0.9	366,390	1.17	0.0975	267,227
	Pervious	13,938	0.2 – 0.4				
84.1	Impervious	23,958	0.6 – 0.9	21,562	1.58	0.1317	21,237
	Impervious	2,009,431	0.5 – 0.8				
015	Pervious	2,009,431	0.25 – 0.4	2,411,321	1.75	0.1458	2,630,532
	Impervious	653,373	0.6 – 0.9				

9.0 Descriptive Statistics and Discussion of Event Station Monitoring Data

Descriptive statistics for the sampling period at each monitoring station are provided in Table 8, below. These statistics include minimum, maximum, average and median at static 1-hour interval periods for vault level, conductivity, salinity, transducer water temperature, YSI water temperature (PSNS084.1 only) and tidal stage. The method by which the rainfall statistics are calculated is on a "rolling 1-hour data window' in an attempt to provide a more accurate and representative assessment of the actual rainfall conditions. Sampling period rainfall totals are also included as part of each station's rainfall information.

Table 8. SW11 Sampling Period Rainfall and Vault Parameter Descriptive Statistics

Station ID	Statistics	Rainfall (1 hr) (in)	Vault level (ft)	Conductivity (uS/cm)	[1]Salinity (ppt)	trans temp (°C)	YSI temp (°C)	Tide Stage (ft)
PSNS126	**Min**	0.00	0.02	40	2.00	5.45		-0.32
	Max	0.19	3.91	47,708	42.00	10.93		11.36
	Average	0.04	1.44	2,382	3.77	8.44		6.91
	Median	0.02	1.06	134	2.00	8.45		7.94
	Storm Total	**1.29**						
PSNS124.1	**Min**	0.00	0.08	25	2.00	5.64		-0.32
	Max	0.27	3.25	46,199	42.00	8.48		10.74
	Average	0.04	1.06	10,080	10.80	7.45		6.06
	Median	0.03	0.33	218	2.00	7.53		7.12
	Storm Total	**1.52**						

Table 8. SW11 Sampling Period Rainfall and Vault Parameter Descriptive Statistics

Station ID	Statistics	Rainfall (1 hr) (in)	Vault level (ft)	Conductivity (uS/cm)	[1]Salinity (ppt)	trans temp (^{o}C)	YSI temp (^{o}C)	Tide Stage (ft)
PSNS124	**Min**	0.00	0.21	34	2.00	5.77		-0.32
	Max	0.19	7.31	43,343	42.00	10.15		11.36
	Average	0.04	4.26	13,464	13.53	8.17		7.21
	Median	0.03	4.88	2,995	2.34	8.11		8.10
	Storm Total	**1.23**						
PSNS115.1	**Min**	0.00	0.12	-143	2.00	4.75		-0.32
	Max	0.17	11.25	45,726	42.00	10.67		11.36
	Average	0.03	7.15	3,320	5.00	7.78		6.84
	Median	0.02	8.27	74	2.00	7.86		7.83
	Storm Total	**1.17**						
PSNS084.1	**Min**	0.00	-0.24	20	0.01	6.75	6.85	-0.32
	Max	0.22	7.00	49,504	48.44	16.70	16.97	11.36
	Average	0.05	3.55	4,365	4.27	9.90	10.02	6.68
	Median	0.03	4.13	133	0.09	9.35	9.46	7.70
	Storm Total	**1.58**						
PSNS015	**Min**	0.00	0.35	65	2.00	4.68		-0.32
	Max	0.21	8.28	32,975	31.69	10.93		11.36
	Average	0.05	4.78	2,287	3.80	7.84		6.84
	Median	0.04	5.51	117	2.00	7.85		7.83
	Storm Total	**1.75**						

[1]salinity calculations for PSNS126, 124.1, 124, 115.1 and 015 are based on an algorithm that has a lower range cut-off value of 2ppt. Actual field values may have been lower. The PSNS084.1 conductivity probe (YSI6820) utilized a different salinity algorithm function and thus is able to calculate lower low range salinity values.

Hydrograph Assessment:

The rainfall signatures for all monitoring stations showed similar bimodal patterns. The initial rainfall phase was followed by a very brief (one to two hours) intra-event period where rainfall intensity lessened or ceased, then follow by a second heavier intensity rainfall period that lasted

about twice as long as the initial phase. The Navy's rain gauge atop B427 also reflected this bimodal rainfall signature.

All of the monitoring stations showed freshwater pipe storage effects, except for PSNS124.1 and 124. These two stations had returns of tidal conditions within their piping systems, before again returning to freshwater conditions that dominated until the end of the sampling event. Hydrograph responses are considered to be typical for these stations.

As mentioned above, grab sampling information for SW11 is indicated on each of the station hydrographs. Composite sample markers have been applied to the hydrographs to indicate total collection time (i.e. sample event period). The monitoring station hydrographs, as well as the rainfall graph for B427, are attached.

Telemetry Data Summary Report: TDSR

A review of the telemetry data collected since SW10; from 3/1/12 to 3/16/12, including the SW11 event, was conducted. There were some minor anomalies in nearly all of the stations data sets due to maintenance and/or transducer replacement tasks and the seasonal time change.

Overall, data gaps and other anomalies during the SW11 storm event period were not noted. All sensors were in reasonable and accurate operation during SW11. A TDSR report (table), detailing the anomalies noted during SW11 and the period since the last sampling event is attached.

10.0 Notable Anomalies and Variations to the PWP

There were no major anomalies observed or otherwise noted after completion of the sampling event and review of the associated data that would have caused any of the SW11 samples to be non-representative of the conditions from which they were collected. As reported above, all intended and scheduled grab and composite samples were submitted to the PNNL MSL ("the Lab") within holding times and without incident. All support and sampling tasks, as well as collected samples, were managed as appropriate per the 2011-12 PWP.

There were, however, several minor anomalies that occurred during SW11. These were;

1. The "forced" enabling start of the PSNS124.1 sampler. It was noted that the water level in the piping system was not building to/exceeding its enabling condition (0.30') as expected. Therefore this station was "manually' started via telemetric control by lowering the enabling water level to 0.2'.
2. Pacing rates for each of the six stations were initially set at 15 minutes. Due to the particulars of the storm event; lessening in intensity after the initial front pushed through the project area, and wanting to make certain to capture the bulk of the second front , the pacing rates were adjusted to 30 minutes. After a certain period, based again on current event particulars at that time, the pacing rates were adjusted back to 15 minutes. Composite sample formulation accounted for these changes accordingly (see the

addendum to the field forms with detailed composite formulation notes). Table 9, below, provides an account of these pacing rates changes.

Table 9. SW11 Composite Sample Pacing Rate Information

Station ID	Pacing Rate Changed to 30 Min.s (Date/Time)	Bottle Where Change Occurred	Pacing Rate Switched Back to 15 Min.s (Date/Time)	Bottle Where Change Back Occurred
[1]PSNS015	3/14/12 1600	7/8	3/15/12 0430	13/14
PSNS084.1	3/14/12 1530	6	3/15/12 0500	13
PSNS115.1	3/14/12 1530	7	3/15/12 0500	14
PSNS124	3/14/12 1540	5	3/15/12 0500	12
PSNS124.1	3/14/12 1530	4	3/15/12 0500	11
PSNS126	3/14/12 1730	8	3/15/12 0430	14

[1]Duplicate collected at PSNS015; two bottle groups are collected at any one time; therefore any changes effect that pair

3. The grab sample at PSNS124 was collected from its monitoring station when conductivity was at 7310µS/cm. Logistics, coupled with the particulars of the SW11 rainfall event caused the collection of this grab sample under less than optimal conditions. In general high saline conditions (≥2000µS/cm) are avoided due to their effects on the analyses of metals and associated parameters. However, the SW11 grab sample parameter consisted of total petroleum hydrocarbon – which is not as effected by higher salinity than other project specific compounds of concern. Grab samples were submitted to the Lab, who in turn managed this analysis accordingly.
4. There were no / missing conductivity and turbidity values for the PSNS124.1 grab and PSNS015 composite samples, respectively. The exact reason/s for these omissions is unclear.
5. General maintenance issue – TEC had replaced all of the stainless steel bodied transducers with titanium units with corresponding titanium connectors, etc. prior to the SW11 sampling event. Some anomalies during early March, noted in the TDSR were caused by these activities. TEC conducted follw-up maintenance checks to ensure proper meter operations.

11.0 Action Items

Routine action items include resetting (reloading with bottles, charging batteries, back flushing with DI water, etc.) all six monitoring stations and re-stocking of sampling supplies. Routine station maintenance items (e.g. sensor cleaning and calibration, rain gauge maintenance, etc.) as well as storm set-up tasks will need to be completed as necessary.

Non-routine action items include planning for yearly monitoring station demobilization tasks. However, the Navy would like any remaining project resources to be focused on an attempt to collect data and samples from an additional “bonus” storm event. TEC is currently monitoring the weather forecasts and models for a targetable event.

In addition, TEC is planning to set up a field capable/deployable LISST particle analyzer at PSNS015. Use of the LISST analyzer will be the focus of the bonus sampling event.

The current focus of the field efforts will be in maintaining proper station and equipment operational status, data and resource management and storm-tracking tasks.

Figure 1. Phase II Stormwater Monitoring Locations within the Shipyard Boundary

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ATTACHMENTS

- Storm Event Summary and Sampling Information, Validation Checklist (Table A-1)
- Stormwater Field Sampling Forms and Controller Notes
- Chain-of-Custody Forms
- Runoff Calculation Worksheet
- Station Hydrographs
- Autosampler Reports
- Weather Forecast Information
- TDSR

Table A-1. PSNS Non-Dry Dock Stormwater Monitoring Tasks
Storm and Sample Information and Validation Checklist
Stormwater Sampling Event #11 (3/14/12)

This form acknowledges representativeness criteria described in the project PWP.
Mark with "Yes" to acknowledge acceptable, "No" for not acceptable, "NA" or "- -" if not applicable.

[1] Storm Event Data:	
Project Storm Event (SW) #	11
Event Forecast Probability (%)	90-100%
PSNS B427 Rain Gauge - Sample Event Total (in.)	1.42

Rainfall and Runoff Summary:	PSNS126	PSNS124.1	PSNS124	PSNS115.1	PSNS084.1	PSNS015
Last Runoff (≥ 0.03" rainfall without 3-hr gap) Prior to STE Start (Date/Time)	3/12/12 21:30	3/13/12 13:00	3/12/12 21:35	3/12/12 21:25	3/13/12 12:25	3/13/12 12:30
Antecedent Dry Period (days: hrs)	1:10	0:18	1:10	1:10	0:19	0:18
Rainfall Prior 24-hrs to Rain Event Start	0.05	0.06	0.04	0.05	0.07	0.08
Rainfall Prior 6-hrs to Rain Event Start	0.00	0.00	0.00	0.00	0.00	0.00
Start of Rainfall (Date/Time)	3/14/12 7:50	3/14/12 7:20	3/14/12 7:55	3/14/12 8:00	3/14/12 7:45	3/14/12 7:10
Sampling Period Start Date & Time	3/14/12 8:45	3/14/12 12:44	3/14/12 11:54	3/14/12 8:45	3/14/12 10:42	3/14/12 10:18
Sampling Period End Date & Time	3/15/2012 15:29	3/15/2012 16:58	3/15/2012 14:00	3/15/2012 15:58	3/15/2012 16:56	3/15/2012 16:01
Sampling Period Duration (hrs:mins)	30:44	28:14	26:06	31:13	30:14	29:43
Sampling Period Duration (hours)	30.73	28.23	26.10	31.22	30.23	29.72
Sampling Period Total Rainfall (in)	1.29	1.52	1.23	1.17	1.58	1.75
Sampling Period Max 1-hr Rainfall Intensity (in/hr)	0.19	0.27	0.19	0.17	0.22	0.21
Sampling Period Average 1-hr Rainfall Intensity (in/hr)	0.04	0.05	0.05	0.04	0.05	0.06
Runoff volume calculated for sampling period (gallons)	475,965	95,933	303,827	267,227	21,237	2,630,532
[1] Sample Collection Criteria:						
Grab sample ID	SW11-003	SW11-007	SW11-005	SW11-004	SW11-002	SW11-001
Grab Date /Time	3/15/2012 15:42	3/15/2012 16:58	3/15/2012 16:26	3/15/2012 16:05	3/14/2012 14:55	3/14/2012 14:20
Grab sample conductivity value (µS/cm)	224	NA	7310	297	2.8	35.5
Hydrograph stage at grab collection	Falling Limb	Falling Limb	Falling Limb	Falling Limb	Intra-event Runoff	Intra-event Runoff
Grab parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
Composite sample ID	SW11-013	SW11-014	SW11-015	SW11-012	SW11-011	SW11-009
Composite Date /Time	3/15/2012 15:29	3/15/2012 16:58	3/15/2012 14:00	3/15/2012 15:58	3/15/2012 16:56	3/15/2012 16:01
Overall Composite conductivity value (mS/cm)	192	190	521	293	142	83
Overall Composite turbidity value (NTU)	12	4	20	9	17	NA
Composite volume (ml)	8,700	8,400	5,500	7,800	8,700	6,000
Number of Bottles Collected During Sampling Event	24	22	23	24	24	24
Number of Bottles Included in Composite Sample	23	18	12	21	22	24
Percentage of Total Storm Period Duration Represented by Composite Sample	96%	82%	52%	88%	92%	100%
Composite parameters collected per PSNS PWP ?	Yes	Yes	Yes	Yes	Yes	Yes
[1] QC Sample Summary Information:						
Grab sample duplicate ID	N/A	SW11-008	SW11-006	N/A	N/A	N/A
Grab sample duplicate date and time	N/A	3/15/2012 17:05	3/15/2012 16:30	N/A	N/A	N/A
Grab sample duplicate conductivity value (µS/cm)	N/A	NA	7310	N/A	N/A	N/A
Composite sample duplicate ID	N/A	N/A	N/A	N/A	N/A	SW11-010
Composite sample duplicate date and time	N/A	N/A	N/A	N/A	N/A	3/15/2012 16:01
Overall Composite Duplicate conductivity value (µS/cm)	N/A	N/A	N/A	N/A	N/A	82
Overall Composite Duplicate turbidity value (NTU)	N/A	N/A	N/A	N/A	N/A	NA
Composite Duplicate volume (ml)	N/A	N/A	N/A	N/A	N/A	6,000
Associated Equipment Blank	SW08-005	SW08-006	SW08-002	SW08-001	SW08-003	SW08-004
[1] Storm and Sample Validation:						
Was the targeted STE antecedent or conditional antecedent qualified per PSNS PWP? (if no, then see next line)	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Was the antecedent overage amount greater than 10% of the total rain event ?	N/A	N/A	N/A	N/A	N/A	N/A
Was runoff occurring OR was the hydrograph at least 10% above background pipe level during grab collection ? If no, explain in summary narrative.	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were a minimum of 8 aliquots collected OR does the composite sample represent at least 75% of the stations storm event rain volume ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Were all 1-hr sampler bottles used for the Composite sample ≤2000 µS/cm ?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Did any anomalous conditions exist that could make samples non-representative? Explain if "Yes"	No	No	No	No	No	No
Based on consideration of the information above, was the sample collected during the STE valid for project purposes ? (Y / N, composite, grab or both)	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**	**Yes, both**

[1] If the answer to any of these questions is "No" OR indicate non-representative conditions, then these items should be explained in the Event Narrative.

Validation Check List Completed By: Brad Rwatshowski 3/27/12 **Reviewed By / Date:** Dave Metallo, LHG. 4/10/12

PSNS NDDSW Monitoring Project Storm Control Work Sheet *Sht Rev. 112111* Sheet 1 of 2

Date:	3.13			**Sampling Support Personnel:**	~~Meto~~ Rupert, Beckwith
STE #	11	**Antecedent Dry Cond. Met ?**	Conditions	**Tidal Info:**	3.14(wed) LL = -0.34' @ 1701, 3.15(Thurs) LL = 0.09' (1608)
Storm Controller:		Metallo		**Grab sampling Info.**	C106 to collect, Need (2) duplicates
Pre-Storm / Weather Details:	NAM: STE start ~0400 3/14, tails off, then gets heavy @ 0900, fluctuates until 2200; then steady until the 24-hr mark GFS: STE start ~0700 3/14, steady to ~1800, then tails off, then picks back up ~0100 3/15 & steady until 24-hr mark				

Telemetry Measurements:	**DATE/TIME (24HR)**											
STATION:	3.13.12 (1815)	3.14.12 (0445)	3.14.12 (0830)	3.14.12 (1240)	3.14.12 (1506)	3.14.12 (2240)	3.15.12 (0434)	3.15.12 (1102)	DL Timestamp		3.15.12 (1530)-(1558)	
PSNS015 Rain[1]	0/.18	0/	0/	.08/.39	.01/.51	.01/.66	.16/1.08	.01/1.46	Current		.01/2.12	
PSNS068 Level	0.25			4.96	0.47	6.48	5.20	7.89	PST		.49	
PSNS068 Cond.	554			81	164	119	71	74			173	
Smpl Marker	2			12	22	37	48 *	76			95	
PSNS084.1 Rain	0/.12	0/	0/	.01/.36	.02/.47	.02/5.16	0.13/.93	.01/1.32	Current		.01/1.88	
PSNS084.1 Level	-0.25			3.62	-0.20	5.16	3.74	6.66	PST		-0.21	
PSNS084.1 Cond.	1607			6602	454	87	33	26			195	
Smpl Marker	1			9	20	34	46 *	72			91	
PSNS115.1 Rain	0/.10	0/	0/	.01/.31	.01/.39	.01/.49	.10/.76	.01/1.00	1-hr		0/1.44	
PSNS115.1 Level	2.60			7.83	2.18	9.46	7.98	10.93	behind		3.04	
PSNS115.1 Cond.	13213			0①	1546	167	7	17			341	
Smpl Marker	1			13	23	38	50 *	76	4pm		95	
PSNS124 Rain	0/.08	0/	0/	.01/.31	.01/.39	.01/.49	.12/.78	0/1.04	Current		0/1.48	
PSNS124 Level	0.17			3.94	0.32	5.53	4.09	7.04	PST		0.28	
PSNS124 Cond.	14093			2076	3048	37100	462	75			3961	
Smpl Marker	3			7	17	29	42 *	67			87	
PSNS124.1 Rain	0/.14	0/	0/	.08/.41	.02/.50	.03/.65	.13/1.02	.01/1.26	Current		0/1.85	
PSNS124.1 Level	0.08			0.23	0.12	1.73	.40	3.20	~~DS~~ PST		0.08	
PSNS124.1 Cond.	40521			2107	194	45,700	318	66			175	
Smpl Marker	2			NA②	12	26	38 *	64	7		83	
PSNS126 Rain	0/.09	0/	0/	.06/.31	.01/.39	.01/.5	.12/.80	.01/1.13	1-Hr		0/1.59	
PSNS126 Level	-1.08	③0.00		0.23	.08	2.08	.49	3.54	behind		.05	
PSNS126 Cond.	619			87	155	888	57	184			175	
Smpl Marker	0			12	22	40	52 *	78	33		96	

[1]Rain depths are reported as 1-hr / 24-hr totals

① reset Cond. offset to +130 ② lowered enable level to 0.2' - enable @ ~1245 ③ Changed level offset from -1.13 to -0.04

* Changed pacing back to 15-min/smpl

PSNS NDDSW Monitoring Project Storm Control Work Sheet, Continued *Sht Rev. 112111* Sheet 2 of 2

Date:	3·13 & 3·14·12			**Sampling Support Personnel:**	Rupert, Beckwith
STE #	11	**Storm Controller:**	Metallo	**Strm Evnt Start / Stp**	Start: ~0930

Enabling Information:

Sample Staion:	PSNS015		PSNS084.1		PSNS115.1		PSNS124		PSNS124.1		PSNS126		
Rain enable (in/hr)	0.05		0.05		0.05		0.05		0.05		0.05		
Level Enable (ft)	0.3		0.3		0.3		0.3		0.3	0.2	0.3		
Cond. (µS/cm)	2000		2000		2000		2000		2000		2000		
Repeat. Cond Set ?	NO → 30 BTLS 7/8		NO		NO		NO		NO		NO		
Pacing Rate (min)	15 → ~~30~~ BTL 2		15	30 BTL 6	15	30 BTL 7	15	30 BTL 5	15	30 BTL 3&4	15	30 BTL 8	
Date	3·14·12		3·14·12		3·14·12		3·14·12		3·14·12	3·14·12	3·14·12		
Time	0445		0447		0449		0451		0453	1240	0455		
Comp Dup ? / where:			PSNS 015				**Grab Dup ? / where:**			~~015 & 84.1~~ 124 & 124.1			

EVENT NOTES:

- PSNS 115.1 Started (0944) 3·14·11
- ∇'ed 124.1 level enable to 0.2 because even with 0.08"/hr rain pipe level was not building beyond ~0.22'/0.23'
- Spoke w/ Navy (Johnston) ~ 1300; informed me that they wished to keep the samplers running until ~1800 3·15·12. Will adjust the pacing rates accordingly.
  - 015 – ∇'ed to 30 min pacing @ BTLS 7/8 ⟶ ∇'ed back to 15-min Smpl 48 BTL 13/14
  - PSNS 084.1 – ∇'ed to 30 min pacing @ BTL 6 ⟶ ∇'ed back to 15 min Smpl 46 BTL 11.5(12) - 13
  - 115.1 – @ BTL 7 ⟶ ∇'ed back to 15 min Smpl 50 BTL (12.5)(13) - 14
  - 124 – @ BTL 5 ⟶ ∇'ed back to 15 min Smpl 42 BTL 10.5(11) - 12
  - 124.1 – @ BTL 3&4 ⟶ ∇'ed back to 15 min Smpl 38 BTL 9.5(10) - 11
  - 126 – @ BTL 8 ⟶ ∇'ed back to 15-min Smpl 52 - BTL 14

PSNS STE #11

- Pre-event set-up (3·13·12) (~1815)

	Rain 0/24	Cond	Sal	Temp	Logger Bat	Sampler Batt
015	0/.18	554	2	9.87	13	12.80

* enable lvl = 5555 rain 0.03 cond 2k pacing 15 Smpl Mrk = 2 switches = 1,1,1,0
lvl. = 0.25'

084	0/.12	1607	1	23.78/23.52	12.53	12.73

Lvl. = -0.25' enable lvl = 555, rain = 0.03, cond. = 2k pacing = 15 Smp Mrk = 1
switches = 1,1,1,0

115	0/.10	13213	11.75	8.57	14.19	12.73

enable lvl = 555
rain = 0.03
cond = 2k
pacing 5 Smp Mrk = 1 Lvl = 2.60'
switches = 1,1,1,0

124	0/.08	14093	12	10.53	13.34	12.73

enable lvl = 555, rain 0.03 cond. = 2060
pacing = 15 Smp Mrk = 3 Lvl = 0.17'
all enable switches = 1,1,1,0

124.1	0/.14	40,521	40	8.0	14.51	12.85

enable lvl = 555, rain = 0.03, cond. = 2000
pacing = 15 Smp Mrk = 2 switches = 1,1,1,0
Lvl = 0.08'

126	0/.09	619	8.60		12.55	12.67

enable lvl = 55, rain = 0.03, cond. = 200
pacing = 15 Smp Mrk = 0 switches = 1,1,1,0

Lvl = -1.08'

PSNS STE#11

DL'ed W.F. 3/13/12 PM ✓T-D, ✓Hrly, ✓Text, ✓Diggrid, ✓M.G.

NAM ste starts ~0400 3/14, tails off, then gets heavy @ 0900, fluxes until 2200, then steady until the 24-hr mark

GFS: ste & start = 0700 3/14 steady to ~1800, picks back up ~0100 3/15 then steady until 24 hr-mark

Tide/S Wed 3/14 LL = -0.34' |701| Thur 3/15 LL = 0.09 @ 1608

~(0445) - Set current "real" trigger levels

- ∇'ed lvl offset @ 126 from -1.13 to -0.04 to have sensor read "0.00"
- Cond. values @ 015, 115, maybe another were in the 2k range w/ 3-6' of water in vault ???
- Reading southern PS but not at SY

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: PSNS 126	MH/CB#:	Loc. Descrip.	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection			
Personnel: B. Rupert	Weather: Sunny, temp 60's	Arrival Date/Time: 3/8/12 1358	
Carry-over maintenance to do prior to set-up: Added Refurbished Titanium Sensor to vault		last visit	done? X
Sampler Battery Voltage added 3/8/12	12.84	Changed? Y (N)	New voltage —
Modem Battery Voltage	12.37	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	ok	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Y
Trands. Cable OK?	Yes	Internal Sampler Tubing OK?	Y
Trands. Desiccant OK (Yes/No)	Y	Tubing Replaced? (Yes/No)	No
Telem. Box Desiccant OK (Yes/No)	Y	Normal Smpler Program or Dup. ?	Dup
Modem Status	operational	Bottles Loaded ?	Y
Notes (including channel condition):		Lid Status?	ON
		Backflushed with DI?	No
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	off.

Section 2. Storm Setup and Inspection			
Personnel: JS / BB	Weather: mostly cloudy	Arrival Date/Time: 3/13/12 9:15	
Sampler Battery Voltage	12.54	Changed? Y (N)	New voltage —
Modem Battery Voltage	12.25	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	Y	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	N – Ded
Transducer Cable OK?	Y	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y 240
Multi-meter Cable OK	Y	Program Reviewed (Yes/No), Dup ?	Y / No
Recorded Level (FT)	5.00	Lids off bottles?	Y
Measured Level (FT)	3.88	Diagnostics/Distrubutor arm check?	Y
Offset Diff (FT)	1.22	Backflush with DI?	Y
Level Adjusted ?	Y	Storm Reset (1, enter) Completed	Y
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	inhibited
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. = (>10% adj. offset); Offset =	New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) – None			

Section 3. Grab Sample Collection			
Personnel: Johnston / Mollerstuen	Weather: Rain stopped	Arrival Date/Time: 3/15/2012 1538	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	224
Grab Parameters Collected	TPH, Turb, FC	Salinity Reading (PPT):	
Grab Sample ID SW11Grab-005		Temp. Reading (°C):	9.9
Grab Date/Time	3/15/2012 1542	Turbidity Reading (NTU)	
Grab Dup ID		Equipment running correctly?	✓
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.) Rain just stopped; still flowing in main channel			

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PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: PSNS 126 continued from previous page

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: BR/BB	Weather: SUNNY, WINDY - 50's	Arrival Date/Time: 3/15/12 1745	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	3/14/12 6:45	Sampler Report Downloaded ?	Y - telem
Last Aliquot Taken (date/time, bott #, aliq #)			
Total Composite Sample Volume Collected	100% / Bottles 23 & 24 Empty		
Aliquots missed/NLD (date/time/bott #/aliq #)			
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor…)?	~~None~~ Typical		
Storm Contoller notified (Y or (N/A))?:	Which parameter?: NO		
Notes: NONE			
Maintenance Needed: NONE			

Section 5. Compositing Scheme and QC Sampling			
Personnel: BR/BB		Date/Time: 3/15/12 2100	
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)			
COND= YSI (New meter) TURB= 2100P Hach			
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1 11,000/12/N	7 111/10/Y	13 97/8/Y	19 149/40/Y
2 724/18/Y	8 176/6/Y	14 74/11/Y	20 227/20/Y
3 175/14/Y	9 165/5/Y	15 133/10/Y	21 147/12/Y
4 112/13/Y	10 309/5/Y	16 104/12/Y	22 228/12/Y
5 258/8/Y	11 280/4/Y	17 89/11/Y	23 240/14/Y
6 167/7/Y	12 124/5/Y	18 51/11/Y	24 276/6/Y
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)			
used Bottles 1-7 & 14-24 @ 300mL / bottles 8-13 @ 600mL			
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)			
COND= 192 µs/cm TURB=12 VOL= 8,700 Analysis = per 2011-12 PWP			
Composite Sample ID & Time:	SW11-015 1529		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

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PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

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Station: PSNS 124.1	MH/CB#:	Loc. Descrip.	Page: 1 of 2

pages per station

Section 1. Station Reset and Inspection

Personnel: B. Rupert	Weather: Sunny, temp 60's	Arrival Date/Time: 3/8/12 1420	
Carry-over maintenance to do prior to set-up: none			done? –
Sampler Battery Voltage added 3/8/12	12.98	Changed? Y (N)	New voltage –
Modem Battery Voltage	13.34	Changed? Y (N)	New voltage –
Sample Tubing & Strainer OK?	OK	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	OK
Trands. Cable OK?	OK	Internal Sampler Tubing OK?	OK
Trands. Desiccant OK (Yes/No)	OK	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	NO / changed	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	ON
		Backflushed with DI?	NO
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	off

Section 2. Storm Setup and Inspection

Personnel: JS / BB	Weather: Mostly cloudy	Arrival Date/Time: 3/13/12 09:45	
Sampler Battery Voltage	12.70	Changed? Y (N)	New voltage –
Modem Battery Voltage	12.74	Changed? Y (N)	New voltage –
Sample Tubing & Strainer OK?	Y	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	NO – Δed
Transducer Cable OK?	Y	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y 240
Multi-meter Cable OK	Y	Program Reviewed (Yes/No), Dup ?	Y / N
Recorded Level (FT)	4.25	Lids off bottles?	Y
Measured Level (FT)	4.17	Diagnostics/Distrubutor arm check?	Y
Offset Diff (FT)	.08	Backflush with DI?	Y
Level Adjusted ?	Y	Storm Reset (1, enter) Completed	Y
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	inhibited

Cond. Sonde Cal. Info. : Recorded Val. = Meas. Val. = Diff. = (>10% adj. offset); Offset = New Rec Val =

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) –

Section 3. Grab Sample Collection

Johnston / Mullerstein

Personnel: ~~Young / Hsu~~	Weather: ~~Rainy cold~~ Sun	Arrival Date/Time: 3/15/12 1655	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	
Grab Parameters Collected	TPH, Turb, ~~S...~~ FC	Salinity Reading (PPT):	
Grab Sample ID	SW/Grab-009	Temp. Reading (°C):	
Grab Date/Time	3/15/2012 1658	Turbidity Reading (NTU)	
Grab Dup ID	SWGrab-010	Equipment running correctly?	
Grab Dup Date/Time	3/15/2012 1705	Sampler Battery Voltage (Changed?):	

Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:

Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?

Notes: (what meter was used for site readings, etc.)
Sun out Rain stopped

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Station: PSNS 124.1 **continued from previous page** Page: 2 of 2

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: BR/BB	Weather: Sunny, windy 50's	Arrival Date/Time: 3/15/12	1800
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	3/14/12 12:44	Sampler Report Downloaded ?	Y-telem
Last Aliquot Taken (date/time, bott #, aliq #)			
Total Composite Sample Volume Collected	100% - Bottles 23 & 24 Empty		
Aliquots missed/NLD (date/time/bott #/aliq #)			
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor…)?	Typical		
Storm Contoller notified (Y or (N/A)?:	Which parameter?: NO		
Notes:	Notable Turdidity throughout most bottles		
Maintenance Needed:	None		

Section 5. Compositing Scheme and QC Sampling			
Personnel: BB/BR		Date/Time: 3/15/12	2200
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)	Cond = YSI (New meter) Turb = 2100p Hach		
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1 928/47/Y	7 38,000/61/N	13 54/11/Y	19 100/17/Y
2 219/65/Y	8 44,400/2/N	14 61/16/Y	20 166/15/Y
3 189/64/Y	9 43,650/3/N	15 41/54/Y	21 180/14/Y
4 219/62/Y	10 17,250/11/NO	16 71/30/Y	22 184/15/Y
5 217/56/Y	11 440/10/Y	17 74/26/Y	23 Empty
6 295/38/Y	12 58/10/Y	18 65/24/Y	24 Empty
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)	Useal bottles 1-3 & 11-22 @ 400mL/ Bottles 4-6 @ 800mL Bottles 7-10 notusel - cond to high		
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)	Cond = 190 us/cm Turb = 4 Vol = 8,400 Analysis = per 2011-12 PWP		
Composite Sample ID & Time:	SW11-016 (1658) 3/15/12		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

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Station: PSNS 124	MH/CB#:	Loc. Descrip.	Page: 1 of 2 pages per station

Section 1. Station Reset and Inspection

Personnel: BR | Weather: Sunny, 60's | Arrival Date/Time: 3/9/12 1445

Carry-over maintenance to do prior to set-up: | done?

Sampler Battery Voltage added 3/8/12	12.84	Changed? Y (N)	New voltage —
Modem Battery Voltage	13.56	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	OK
Trands. Cable OK?	OK	Internal Sampler Tubing OK?	OK
Trands. Desiccant OK (Yes/No)	OK	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	OK	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	ON
		Backflushed with DI?	NO
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	Off

Section 2. Storm Setup and Inspection

Personnel: IS / BB | Weather: cloudy | Arrival Date/Time: 3/13/12 10:10

Sampler Battery Voltage	12.76	Changed? Y (N)	New voltage —
Modem Battery Voltage	12.65	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	Y	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	NV - Ded
Transducer Cable OK?	Y	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y 240
Multi-meter Cable OK	Y	Program Reviewed (Yes/No), Dup ?	Y / N 3
Recorded Level (FT)	7.47	Lids off bottles?	Y
Measured Level (FT)	7.53	Diagnostics/Distrubutor arm check?	Y
Offset Diff (FT)	.10	Backflush with DI?	Y
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	Y
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	inhibited

Cond. Sonde Cal. Info. : Recorded Val. = Meas. Val. = Diff. = (>10% adj. offset); Offset = New Rec Val =

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) —

Section 3. Grab Sample Collection

Personnel: Johnston / Mollerstuen | Weather: Sun! | Arrival Date/Time: 3/15/12 1625

On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	7310
Grab Parameters Collected	TPH, Turb, FC	Salinity Reading (PPT):	
Grab Sample ID SW110715AB-007		Temp. Reading (°C):	10.2
Grab Date/Time	3/15/12 1626	Turbidity Reading (NTU)	
Grab Dup ID -008		Equipment running correctly?	
Grab Dup Date/Time	3/15/12 1630	Sampler Battery Voltage (Changed?):	

Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:

Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?	

Notes: (what meter was used for site readings, etc.)

Sun came out - Flow is very low marker still moving at bottom of <6"

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Station: PSNS 124 | **continued from previous page** | Page: 2 of 2

Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: BR/BB	Weather: Sunny, Windy 50's	Arrival Date/Time: 3/15/12 1815	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	3/14/12 11:54	Sampler Report Downloaded ?	Y-telem
Last Aliquot Taken (date/time, bott #, aliq #)			
Total Composite Sample Volume Collected	100% Bottle 23 1/2 full / 24 Empty		
Aliquots missed/NLD (date/time/bott #/aliq #)			
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)? Typical			
Storm Contoller notified (Y or (N/A))?:	Which parameter?: NO		
Notes: None			
Maintenance Needed: None			

Section 5. Compositing Scheme and QC Sampling			
Personnel: BR/BB		Date/Time: 3/15/12 2250	
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)			
Cond= YSI (new meter) Turb= 2100P Hach			
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1 860/17/ Y	7 23,000/6/ NO	13 2,070/ 7/ N	19 58/13/ Y
2 1515/13/ Y	8 26,250/ 2/ N	14 2,330/5/ N	20 1310/ 7/ Y
3 2470/19/ NO	9 41,300/ 3/ N	15 282/ 5/ Y	21 51080/ 10/ Y
4 4,080/9/ NO	10 16,000/ 5/ N	16 70/26/ Y	22 4900/40/ Y
5 4,050/9/ NO	11 660/ 9/ Y	17 63/31/ Y	23 1016/ 124/ Y
6 6,370/9/NO	12 440/ 8/ Y	18 74/24/ Y	24 Empty
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample) Used bottles ~~1-2~~ 1,2 & 12 & 15-20 @ 500mL/ Bottle 11 @ 100% / Bottle 23 not used as it was base flow Did not use bottles 3-10, 13, 14 & 21-22 Due to high Turbidity			
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis) Cond = 521 µS/cm Turb = 20 Vol. 5500 Analysis = per 2011-12 PWP			
Composite Sample ID & Time:	SW11-017 (1400) 3/15/12		
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

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Section 1. Station Reset and Inspection

Personnel: R. Rupert	Weather: Sunny, temp 60's	Arrival Date/Time: 1400 3/8/12	
Carry-over maintenance to do prior to set-up:			done?
Sampler Battery Voltage added 3/8/12	12.79	Changed? Y (N)	New voltage —
Modem Battery Voltage	13.51	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Yes
Trands. Cable OK?	OK	Internal Sampler Tubing OK?	OK
Trands. Desiccant OK (Yes/No)	OK	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	OK	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	ON
		Backflushed with DI?	NO
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	off

Section 2. Storm Setup and Inspection

Personnel: IS / BB	Weather: light rain	Arrival Date/Time: 3/13/12 10:25	
Sampler Battery Voltage	12.71	Changed? Y (N)	New voltage —
Modem Battery Voltage	13.31	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	Y	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	NO- Ded
Transducer Cable OK?	Y	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y 240
Multi-meter Cable OK	Y	Program Reviewed (Yes/No), Dup ?	Y / N
Recorded Level (FT)	10.79	Lids off bottles?	Y
Measured Level (FT)	10.71	Diagnostics/Distrubutor arm check?	Y
Offset Diff (FT)	.08	Backflush with DI?	Y
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	Y
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen…	disabled
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) —			

Section 3. Grab Sample Collection

Personnel: ~~Young / Hsu~~ Johnston / Mollenhauer	Weather: Rainy Cold Raining	Arrival Date/Time: ~~3/14/12 1510~~ 3/15/12 1600	
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	~~2700~~ 297
Grab Parameters Collected	TPH, Turb, FC	Salinity Reading (PPT):	
Grab Sample ID		Temp. Reading (°C):	~~7.8~~ 9.8
Grab Date/Time 3/15/12 1605	~~3/14/12 1518~~	Turbidity Reading (NTU)	
Grab Dup ID		Equipment running correctly?	
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:			
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.) (No sample conductivity too high 3/14/12) depth ~4ft Rainy 3/15 Dry			

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Section 4. Post-Storm Sample Collection (for grab, comp or both)			
Personnel: BR/BB	Weather: clear, sunny 50's	Arrival Date/Time: 3/15/12 1730	
Sampler Battery Voltage	Good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	3/14/12 8:45	Sampler Report Downloaded ?	Y - telem
Last Aliquot Taken (date/time, bott #, aliq #)			
Total Composite Sample Volume Collected	100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or (N/A))?:	Which parameter?: NA		
Notes:	NONE		
Maintenance Needed:	NONE		

Section 5. Compositing Scheme and QC Sampling			
Personnel: BR/BB		Date/Time: 3/15/12 2010	
Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)			
Cond = YSI (New mode) Turb = 2100P Hach			
Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):			
1 483/14/Y	7 800/5/Y	13 20/7/Y	19 19/17/Y
2 221/12/Y	8 8730/3/N	14 22/3/Y	20 36/10/Y
3 22/8/Y	9 9,220/3/Y	15 34/3/Y	21 60/7/Y
4 55/7/Y	10 1200/3/Y	16 22/4/Y	22 83/9/Y
5 1045/6/Y	11 223/2/Y	17 15/7/Y	23 403/8/Y
6 3,800/9/N	12 27/4/Y	18 17/40 Y	24 793/12/Y
Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample) usual bottles 1-5, 14-24 @ 300mL / bottles 7, 10, 11-13 @ 600mL Not used bottles 6, 8&9 - cond to high			
Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis) Cond = 793 ms/cm Turb = 9 VOL = 7,800 analysis = Per 2011-12 PWP			
Composite Sample ID & Time: SW11-014 (1558)			
Field Blank Collected? (date/time)	NO		
Blank ID:	NA		
Duplicate comp sample? Yes/No	NO		
Duplicate sample ID	NA		

NOTES:

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Section 1. Station Reset and Inspection

Personnel: B. Rupert Weather: Sunny, 60's Arrival Date/Time: 1500 3/8/12

Carry-over maintenance to do prior to set-up: done?

Sampler Battery Voltage added 3/8/12	12.83	Changed? Y (N)	New voltage —
Modem Battery Voltage	13.06	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	OK
Trands. Cable OK?	OK	Internal Sampler Tubing OK?	OK
Trands. Desiccant OK (Yes/No)	OK	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	No - changed	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	ON
		Backflushed with DI?	NO
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	off

Section 2. Storm Setup and Inspection

Personnel: IS / BB Weather: Cloudy Arrival Date/Time: 3/13/12 10:50

Sampler Battery Voltage	12.45	Changed? Y (N)	New voltage —
Modem Battery Voltage	12.59	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	Y	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	N/A - Bad
Transducer Cable OK?	Y	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y 240
Multi-meter Cable OK	Y	Program Reviewed (Yes/No), Dup ?	Y / N
Recorded Level (FT)	5.84	Lids off bottles?	Y
Measured Level (FT)	5.83	Diagnostics/Distrubutor arm check?	Y
Offset Diff (FT)	.01	Backflush with DI?	Y
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	Y
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	disabled

Cond. Sonde Cal. Info. : Recorded Val. = Meas. Val. = Diff. = (>10% adj. offset); Offset = New Rec Val =

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) —

Section 3. Grab Sample Collection

Personnel: Young / Hsu Weather: Rainy cold Arrival Date/Time: 3/14/12 1445

On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	2.8
Grab Parameters Collected		Salinity Reading (PPT):	
Grab Sample ID		Temp. Reading (°C):	7.2
Grab Date/Time	3/14/12 1455	Turbidity Reading (NTU)	
Grab Dup ID		Equipment running correctly?	
Grab Dup Date/Time	3/14/12 1455	Sampler Battery Voltage (Changed?):	

Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:

Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?

Notes: (what meter was used for site readings, etc.)

TAYLOR ASSOCIATES, INC.

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Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR/BB	Weather: clear, windy 50's	Arrival Date/Time: 1715 3/15/12	
Sampler Battery Voltage	good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	3/14/12 10:42	Sampler Report Downloaded ?	Yes - telem
Last Aliquot Taken (date/time, bott #, aliq #)			
Total Composite Sample Volume Collected	100%		
Aliquots missed/NLD (date/time/bott #/aliq #)	NONE		
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor...)?	Typical		
Storm Contoller notified (Y or N/A)?:	Which parameter?: NA		
Notes: Notable "floaters" IN first 5 bottles			
Maintenance Needed: NONE			

Section 5. Compositing Scheme and QC Sampling

Personnel: BB/BR — Date/Time: 3/15/12 1915

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond = YSI (new meter) Turb = 2100P Hach

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1	8,340/18/N	7 264/9/Y	13 27/12/Y	19 18/52/Y
2	449/30/Yes	8 219/8/Y	14 33/9/Y	20 19/22/Y
3	403/18/Y	9 133/8/Y	15 47/9/Y	21 45/12/Y
4	8,880/14/N	10 81/6/Y	16 36/12/Y	22 96/12/Y
5	580/14/Y	11 39/12/Y	17 22/26/Y	23 198/29/Y
6	183/15/Y	12 35/25/Y	18 17/19/Y	24 152/23/Y

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample) used 300 mL from bottles 2, 3 & 5, 13-24 / 600mL from ~~bottles~~ 6-12

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond = 142 µs/cm Turb = 17 Vol = 8,700 Analysis = per 2011-2012 AuP

Composite Sample ID & Time: SW11-013 (1656)

Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NA

NOTES:

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Station: PSNS 015	MH/CB#:	Loc. Descrip.	Page: 1 of 2

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Section 1. Station Reset and Inspection

Personnel: BIL	Weather: Sunny, 60's	Arrival Date/Time:	1515 3/9/12
Carry-over maintenance to do prior to set-up:			done?
Sampler Battery Voltage added 3/9/12		Changed? Y (N)	New voltage —
Modem Battery Voltage		Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	OK
Trands. Cable OK?	OK	Internal Sampler Tubing OK?	OK
Trands. Desiccant OK (Yes/No)	OK	Tubing Replaced? (Yes/No)	Yes
Telem. Box Desiccant OK (Yes/No)	OK	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition):		Lid Status?	ON
		Backflushed with DI?	~~Yes~~ NO
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	OFF

Section 2. Storm Setup and Inspection

Personnel: JS / BB	Weather: light rain	Arrival Date/Time:	3/13/12 11:10
Sampler Battery Voltage	12.76	Changed? Y (N)	New voltage —
Modem Battery Voltage	13.19	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	Y	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	NO - Ated
Transducer Cable OK?	Y	Aliquot Vol. Cal.'ed (Y/N & vol.)	Y 120
Multi-meter Cable OK	Y	Program Reviewed (Yes/No), Dup ?	Y / Y
Recorded Level (FT)	5.96	Lids off bottles?	Y
Measured Level (FT)	6.14	Diagnostics/Distrubutor arm check?	Y
Offset Diff (FT)	.18	Backflush with DI?	Y
Level Adjusted ?	Y	Storm Reset (1, enter) Completed	Y
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen...	disabled
Cond. Sonde Cal. Info. : Recorded Val. =	Meas. Val. =	Diff. =	(>10% adj. offset); Offset = New Rec Val =
Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) -	15.25 - 9.11 = 6.14	6.14 - 5.96 = .18	

Section 3. Grab Sample Collection

Personnel: Young / ~~Hsu~~ Hsu	Weather: Rainy Cold	Arrival Date/Time:	1415 3/14/12
On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	35.5
Grab Parameters Collected	TPH Fecal	Salinity Reading (PPT):	
Grab Sample ID		Temp. Reading (°C):	6.8
Grab Date/Time	3/14/12 1420	Turbidity Reading (NTU)	
Grab Dup ID		Equipment running correctly?	
Grab Dup Date/Time	3/14/12 1420	Sampler Battery Voltage (Changed?):	
Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:		bad color	
Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?
Notes: (what meter was used for site readings, etc.) YSI 30 used			

TAYLOR ASSOCIATES, INC.

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Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: BR/BB	Weather: Sunny, windy 50's	Arrival Date/Time: 1600 3/15/12	
Sampler Battery Voltage	good	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	good	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	NO		
Additional Dup Grab (IDs, date/time)	NO		
Composite Begin Time (date/time)	3/14/12 10:18	Sampler Report Downloaded ?	Yes - telem
Last Aliquot Taken (date/time, bott #, aliq #)			
Total Composite Sample Volume Collected	100% - Except bottles 1 & 2 (50%)		
Aliquots missed/NLD (date/time/bott #/aliq #) bottles 1 & 2 only half full			
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor…)? Typical			
Storm Contoller notified (Y or N/A)?: NA	Which parameter?: NA		
Notes: Notable "floaters" in Bottles # 3, 4, 14, 17, 18, 19, 21, 23 & 24			
Maintenance Needed: NONE			

Section 5. Compositing Scheme and QC Sampling

Personnel: BR/BB | Date/Time: 1830

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond = YSI (new one) Turb = 2100P Hach

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

2	230 / NA	Y	14	21 / NA	Y	1	43 / NA	Y	13	21 / NA	Y
4	103 / NA	Y	16	35 /	Y	3	85 /	Y	15	35 /	Y
6	105 / NA	Y	18	22 /	Y	5	100 /	Y	17	22 /	Y
8	102 /	Y	20	22 /	Y	7	159 /	Y	19	22 /	Y
10	134 /	Y	22	66 /	Y	9	141 /	Y	21	65 /	Y
12	42 /	Y	24	141 /	Y	11	42 /	Y	23	139 /	Y

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample) 2, 4, 6, 14, 16, 18, 20, 22, 24 400 mL; 8, 10 & 12 800 mL | Same for Dup 7, 9 & 11 800 mL

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis) SW11-011 = 83 Cond SW11-012 Dup = 82 Cond 6,000 mL for Each ~~from~~ Bottle

Composite Sample ID & Time:	SW11-011 1601 3/15/12
Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	Yes
Duplicate sample ID	SW11-012

NOTES:

SW11 Comp Samples

Formulation Notes:

015		DUP	
2	14	1	(13)
4	16	3	15
6	18	5	17
(8)	20	(7)	19
(10)	22	(9)	21
(12)	24	(11)	23

Keep all —

400-ml @ 15 min
800-ml @ 30 min
} 6000-ml per

84.1 ▽ 30 @ BTL 6 – 12 ▽ 15 @ 13

X	(7)	13	19
2	(8)	14	20
3	(9)	15	21
~~4~~	(10)	16	22
5	(11)	17	23
(6)	(12)	18	24

15 X 300
7 X 600
} 8700

Smpl time (16:56)

115.1 total rainfall 1.20"

∇ to 30 min BTL 7 – 13; ∇ied back to 15 min btl 14-24

1	(7)	(13)	19
2	~~(8)~~ ?	14	20
3	~~(9)~~ ?	15	21
4	(10)	16	22
5	(11)	17	23
~~6~~	(12)	18	24

16 x 300 4800
5 x 600 3000
} 7800-ml

Sample Time = 1558

126 total rain = 1.32"

∇'ed to 30 min @ BTL 8 – 13, ∇'ed back to 15 min 14-24

~~1~~	7	(13)	19
2	(8)	14	20
3	(9)	15	21
4	(10)	16	22
5	(11)	17	23
6	(12)	18	24

17 x 300 5100
6 x 600 3600
} 8700

124 total rain = 1.24"

∇'ed to 30 min @ BTL 5 – 11

~~1~~	~~7~~	~~13~~	19	9
2	~~8~~	~~14~~	20	~~10~~ x 500 4500 ~~5000~~ ~~4500~~
~~3~~	~~9~~	15	~~21~~	1 x 1000 1000
~~4~~	~~10~~	16	~~22~~	5500 -ml
~~5~~	11	17	23 ½	(1400)
~~6~~	12	18	24 empty	

D'ed to 30 min @ BTL 4-10

124.1 total rain = 1.53

1	~~7~~	13	19
2	~~8~~	14	20
3	~~9~~	15	21
(4)	~~10~~	16	22
(5)	11	17	23 empty
(6)	12	18	24 empty

$15^{\times 400}$ 6000
$3^{\times 800}$ 2400 } 8400

(1658)

SAMPLE CHAIN OF CUSTODY FORM
Date: 3/14/12
Page: 1 of 1
Project No.: N4523A10MP00034 Amend.1
Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Sample Label	Station ID	Collection Date/Time	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
SW11 (corrected db 3/16/12)																		
SW11-001 A	015	3/14/12 1420	SW						X						1	Grab	11	A } SW11-001
SW11-002 B	015 DUP	↓ ↓							X						1			B }
SW11-003 A	084.1	3/14/12 1455							X						1			A } SW11-002
SW11-004 B	084.1 DUP	↓ ↓							X						1			B } 3/16/12
SW11-005 3	126	3/15/12 1542							X						2			
SW11-006 4	115.1	3/15/12 1605							X						2			
SW11-007 5	124	3/15/12 1626							X						2			
SW11-008 6	124DUP	3/15/12 1630							X						2			
SW11-009 7	124.1	3/15/12 1658							X						2			
SW11-010 8	124.1 DUP	3/15/12 1705	↓						X						2	↓	↓	

Relinquished by: 3/16/12 0920
Signature Date Time
Brian Rupert Cardno TEC
Printed Name Company

Received by: 3/16/12 0920
Signature
JmBrandenberger
Printed Name

Total # of Containers:
Shipment Method: Hand delivery
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS
3) TAI

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/15/12

Page: 1 of 1

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle

Marine Sciences Laboratory

1529 West Sequim Bay Road

Laboratory: Battelle MSL

Attention: Jill Brandenberger

Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity ②						No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
SW11-009	SW11-~~004~~	PSNS 015	3/15/12 1601	SW	X	X	X	X	X								1	Comp	SW11	83 / NA①
010	SW11-~~012~~	PSNS 015 Dup	3/15/12 1601	SW	X	X	X	X	X								1	Comp	SW11	82 / NA①
011	SW11-~~013~~	PSNS 84.1	3/15/12 1656	SW	X	X	X	X	X								1	Comp	SW11	142 / 17
012	SW11-~~014~~	PSNS 115.1	3/15/12 1558	SW	X	X	X	X	X								1	Comp	SW11	293 / 9
013	SW11-~~015~~	PSNS 126	3/15/12 1529	SW	X	X	X	X	X								1	Comp	SW11	192 / 12
014	SW11-~~016~~	PSNS 124.1	3/15/12 1658	SW	X	X	X	X	X								1	Comp	SW11	190 / 4
015	SW11-~~017~~	PSNS 124	3/15/12 1400	SW	X	X	X	X	X								1	Comp	SW11	521 / 20

JB 3/16/12

Relinquished by: [signature] 3/16/12 0920
Signature Date Time
Brian Rupert CardnoTEC
Printed Name Company

Received by: [signature] 3/16/12 0920
Signature
JM Brandenberger
Printed Name

Total # of Containers:
Shipment Method: Hand Carry
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS
3) TAI

NA① - Did not have Turbidity meter during collection

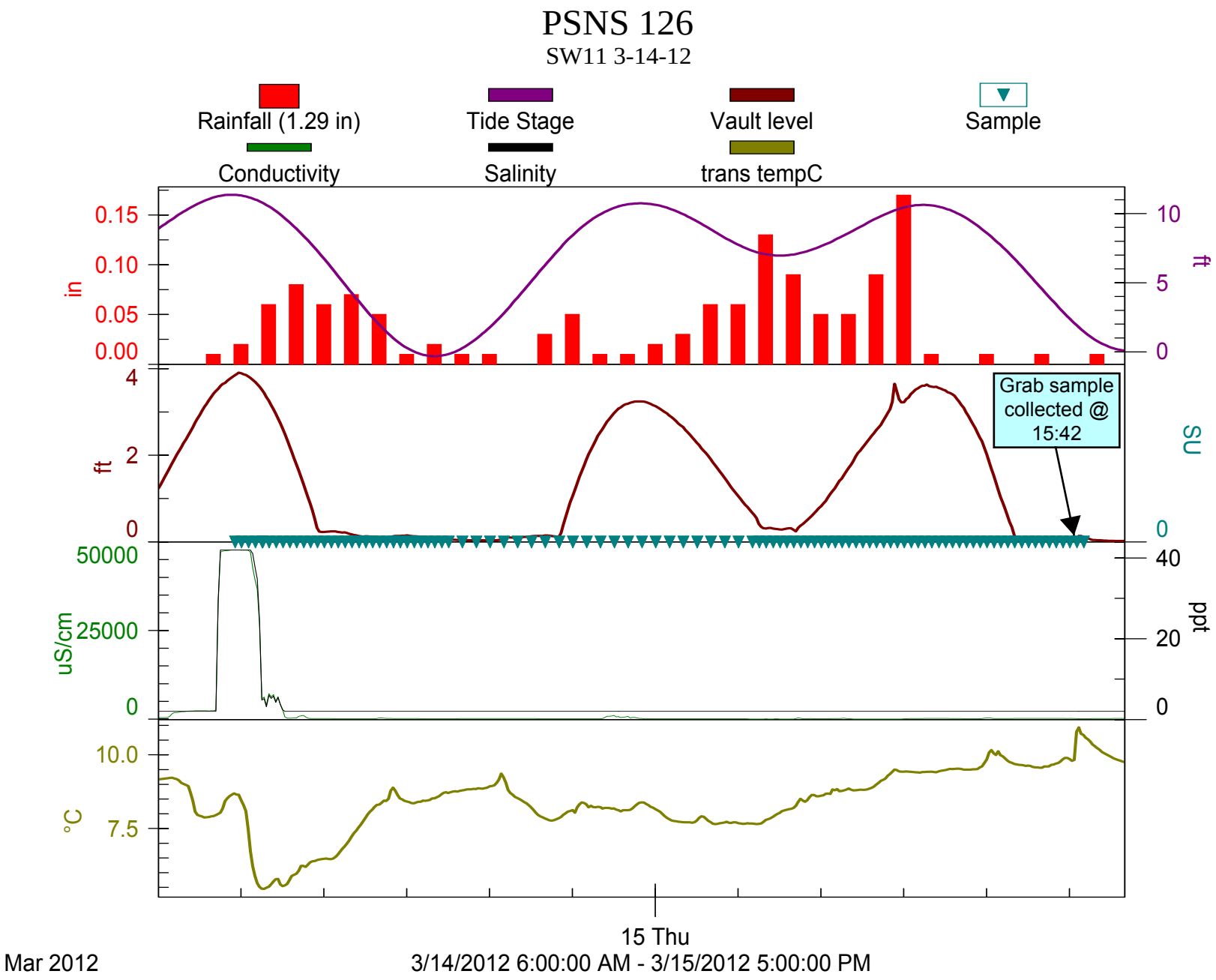
② Turbidity measured in SW Lab w/ Hach 2100P meter

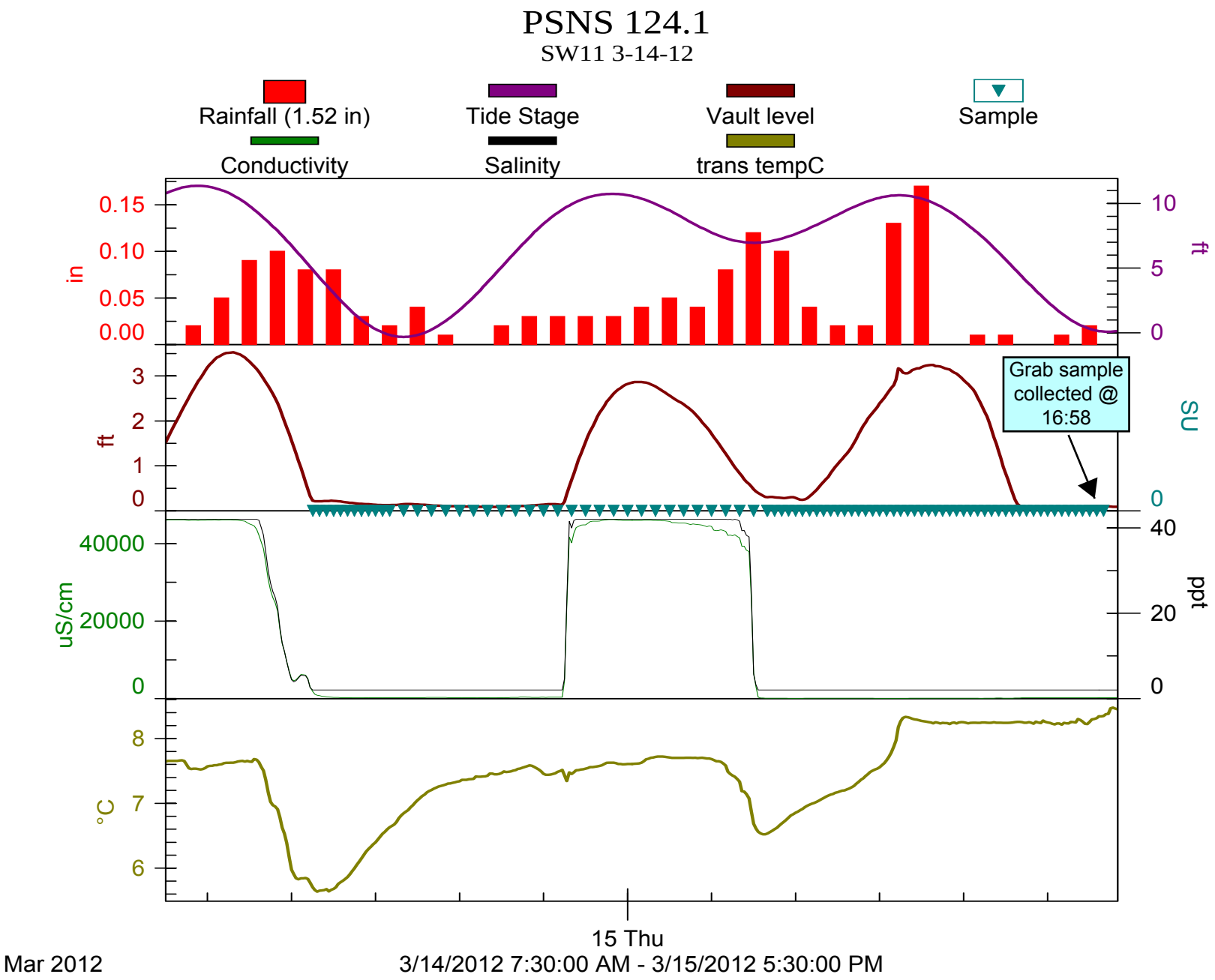
PSNS NDDSW Monitoring Stormwater Sampling Event #11 (3/14/12)
Stormwater Outfall Total Discharge Volume Estimation Equations

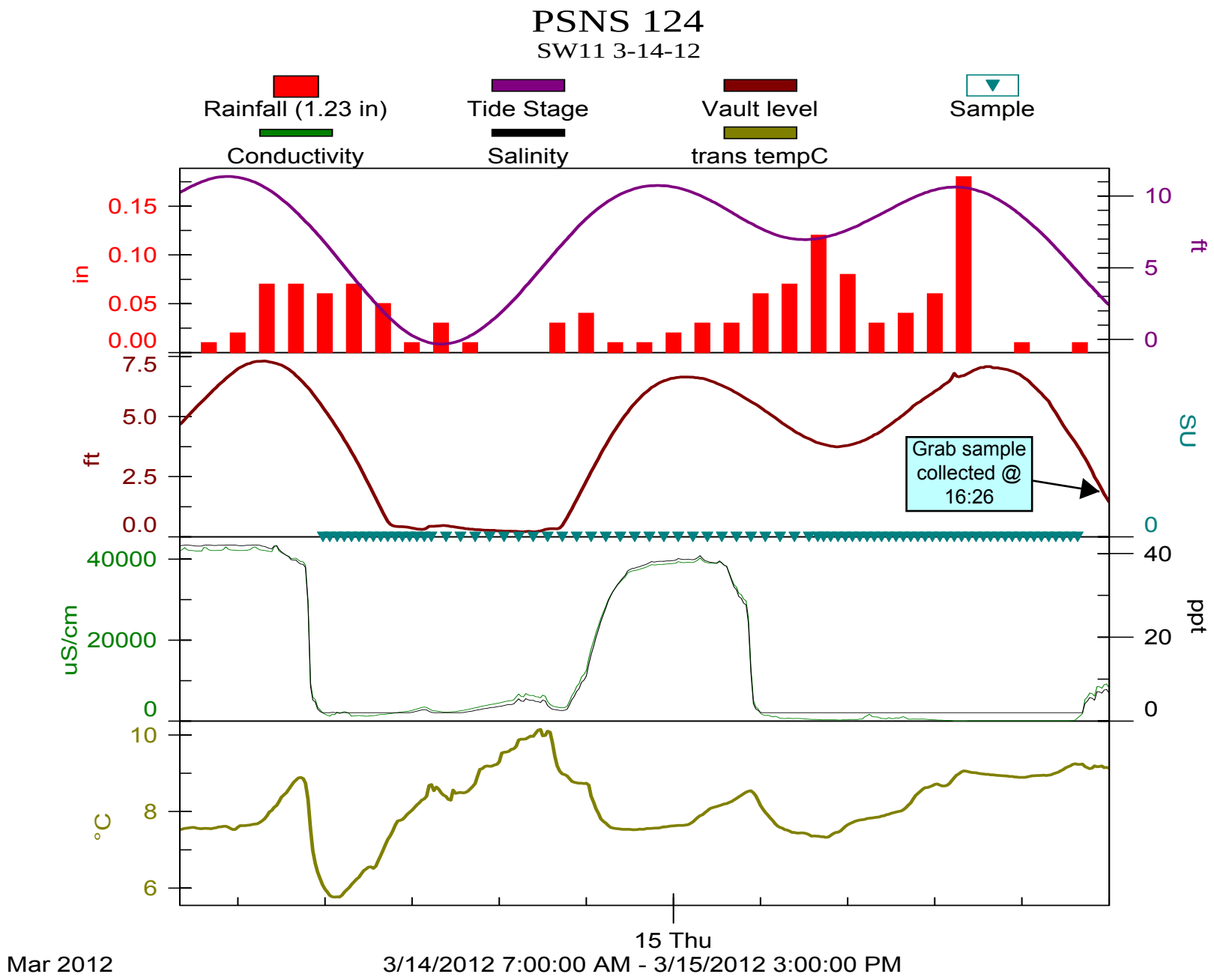
PSNS Drainage Basin	Total Basin Area (ft^2)	Type of Surface	Percentage of Drainage Basin Surface Type	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Area of Basin Surface Type with Maximum Coefficient Value Applied (ft^2)	[2]Total Discharge Volume (ft^3)
126	662,986	Impervious	98.55	653,373	0.6 – 0.9	588,036	R(591,881)
		Pervious	1.45	9,613	0.2 – 0.4	3,845	
124.1	116,000	Impervious	94.56	109,690	0.6 – 0.9	98,721	R(101,245)
		Pervious	5.44	6310	0.2 – 0.4	2,524	
124	454,000	Impervious	94.56	429,302	0.6 – 0.9	386,372	R(396,251)
		Pervious	5.44	24,698	0.2 – 0.4	9,879	
115.1	463,042	Impervious	97	449,104	0.6 – 0.9	361,422	R(366,390)
		Pervious	3	13,938	0.2 – 0.4	4,968	
84.1	23,958	Impervious	100	23,958	0.6 – 0.9	21,562	R(21,562)
15	4,018,862	Impervious	50	2,009,431	0.5 – 0.8	1,607,549	R(2,411,321)
		Pervious	50	2,009,431	0.25 – 0.4	803,772	

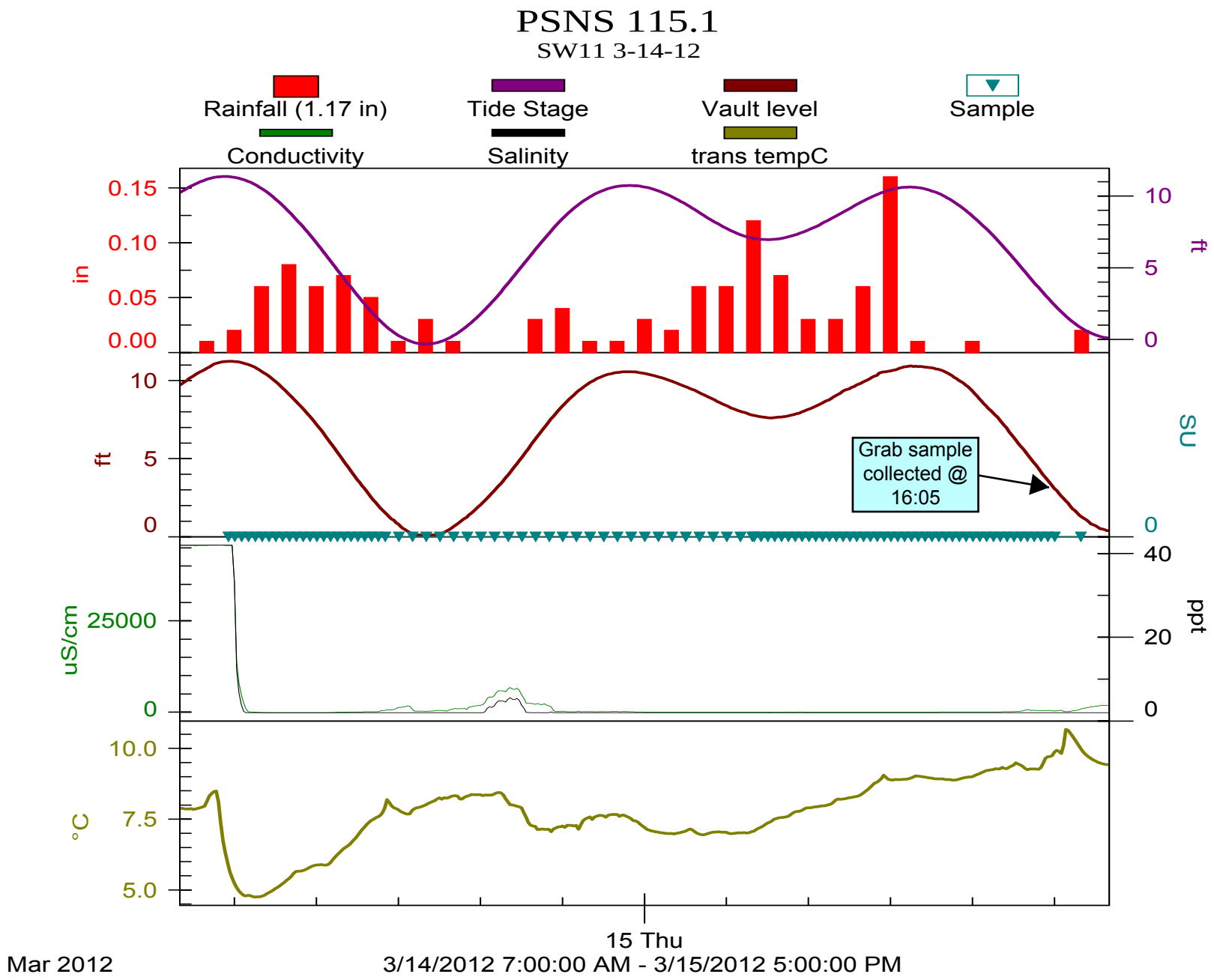
Calculation Worksheet:

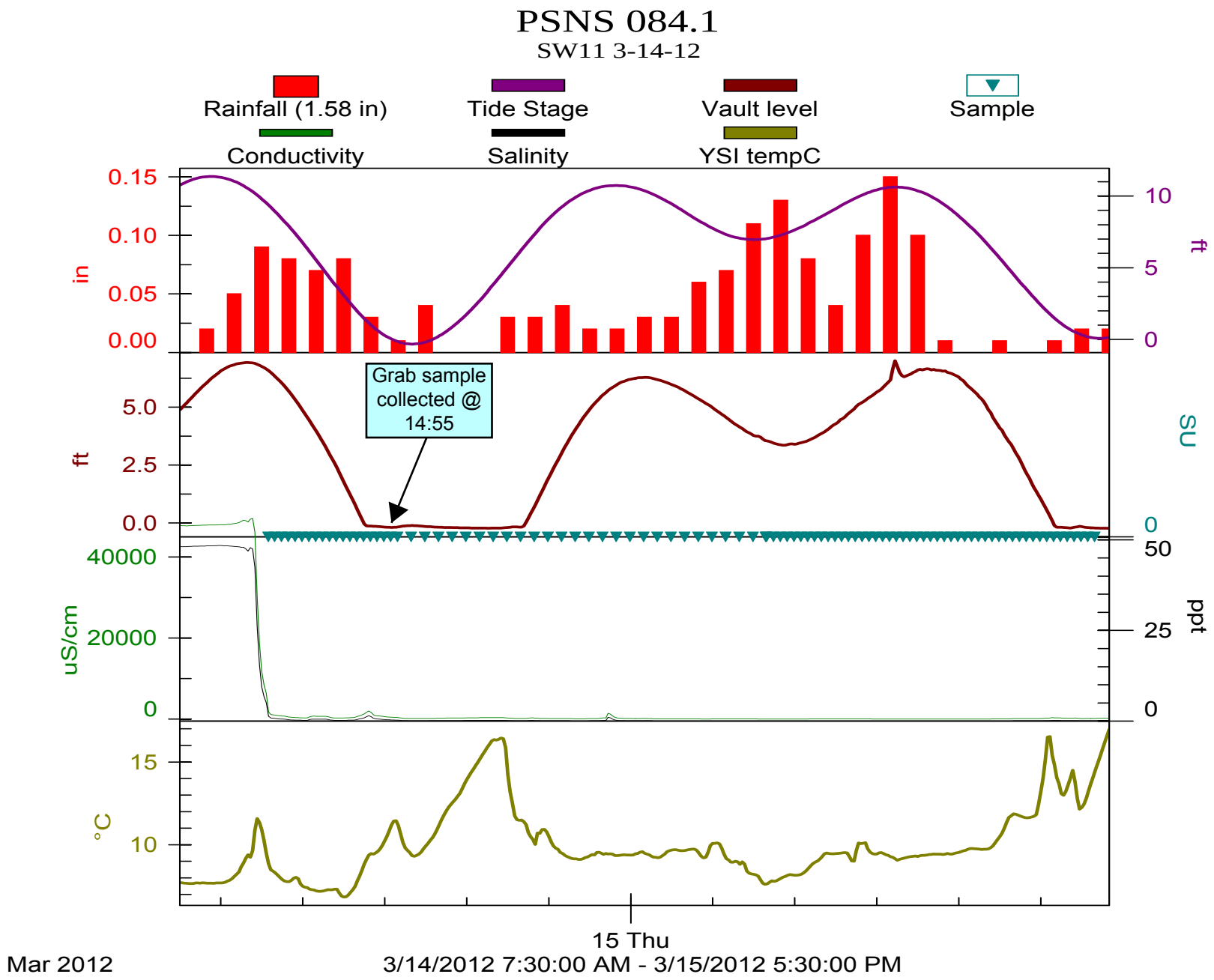
STATION	Combined Drainage Area (FT^2)	**ENTER: Smpl Evnt Rain Total (in)**	Sampl Evnt Rain Total (FT)	STE Runoff Vol. (gal)
126	591,881	1.29	0.1075	475,965
124.1	101,245	1.52	0.1267	95,933
124	396,251	1.23	0.1025	303,827
115.1	366,390	1.17	0.0975	267,227
84.1	21,562	1.58	0.1317	21,237
015	2,411,321	1.75	0.1458	2,630,532

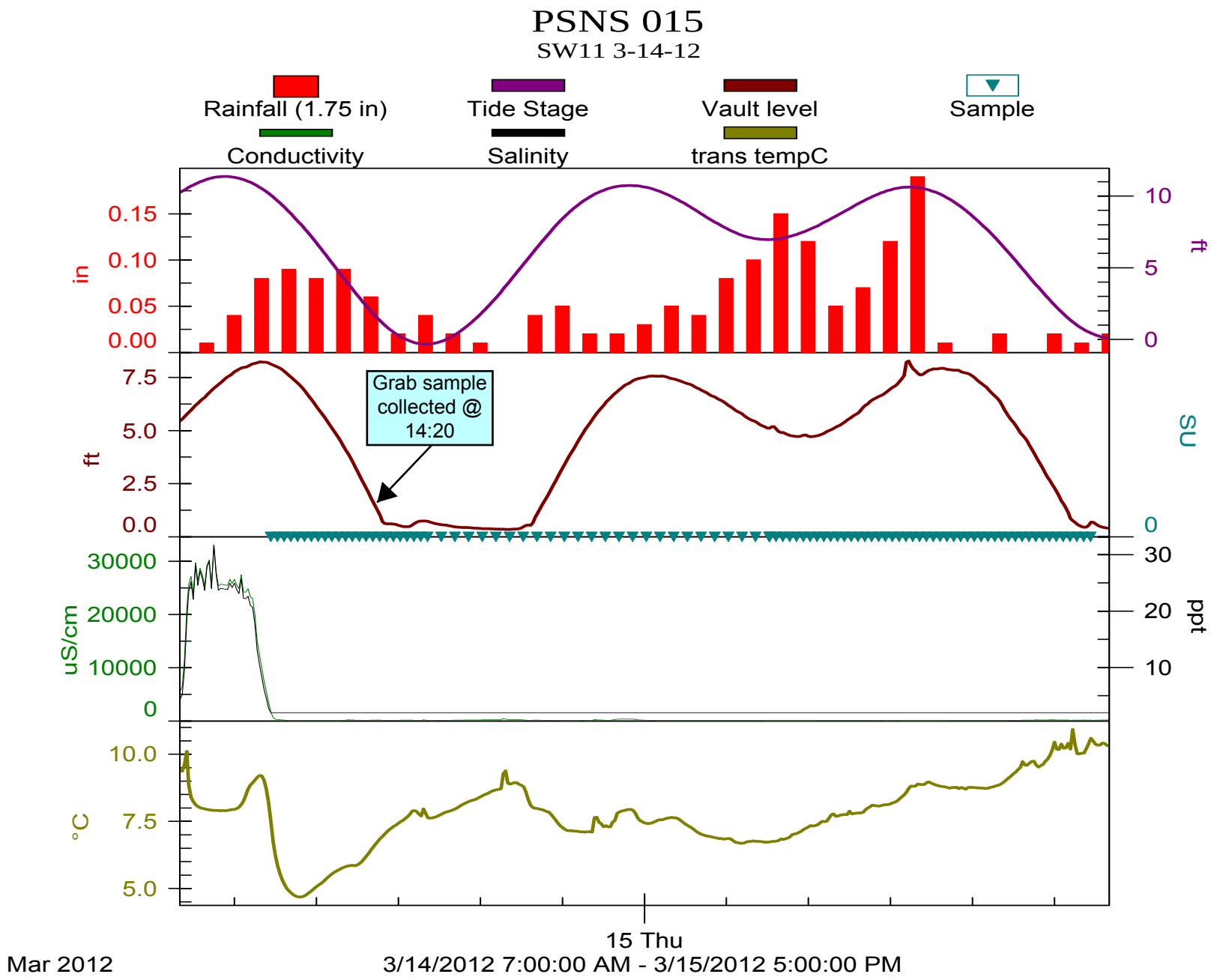

PSNS 126
SW11 3-14-12
Rainfall (1.29 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.15
0.10
0.05
0.00
ft
10
5
0
4
2
0
Grab sample collected @ 15:42
SU
0
uS/cm
50000
25000
0
ppt
40
20
0
°C
10.0
7.5
15 Thu
Mar 2012
3/14/2012 6:00:00 AM - 3/15/2012 5:00:00 PM

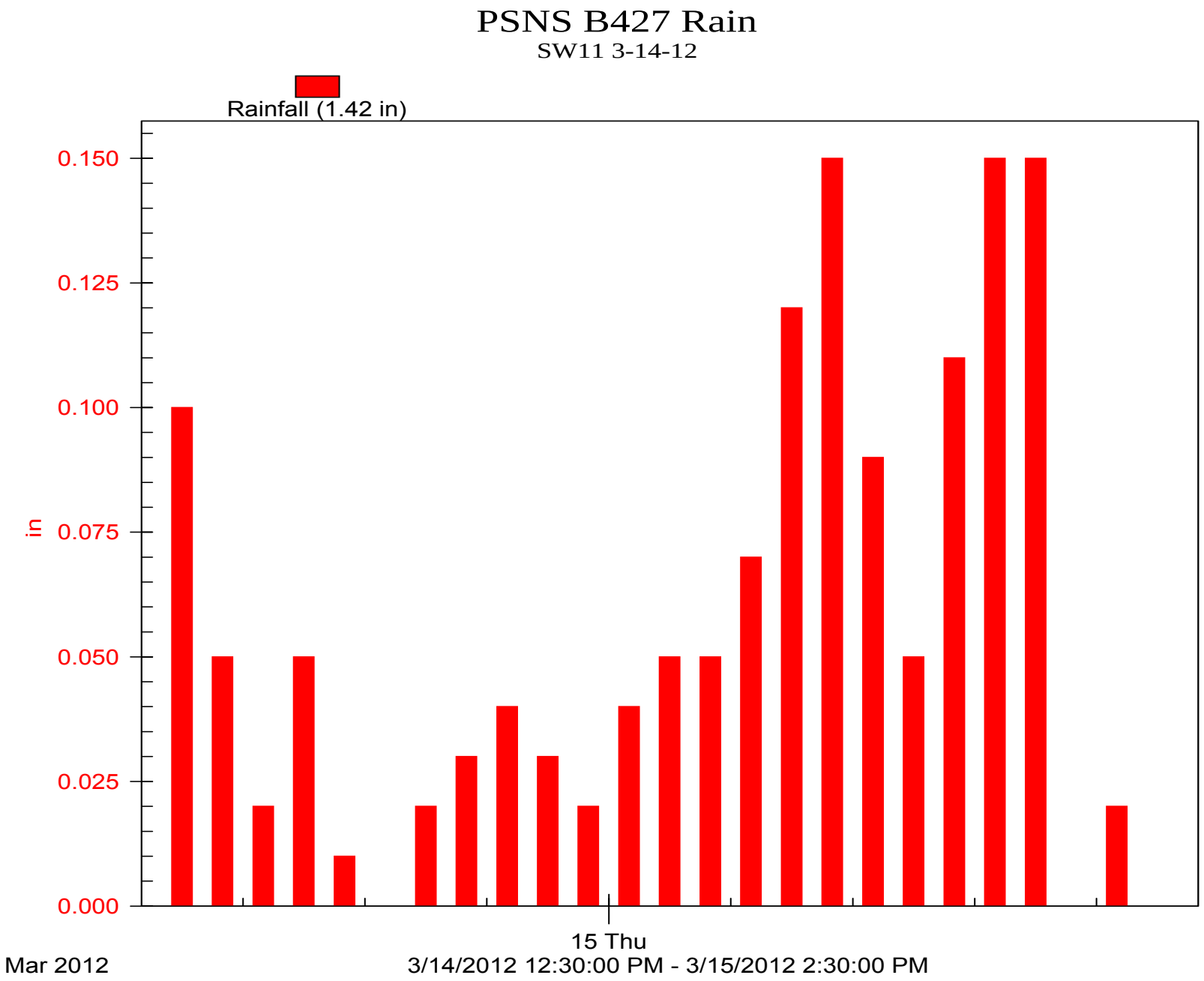

PSNS 124.1
SW11 3-14-12
Rainfall (1.52 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.15
0.10
0.05
0.00
ft
10
5
0
ft
3
2
1
0
Grab sample collected @ 16:58
SU
0
uS/cm
40000
20000
0
ppt
40
20
0
°C
8
7
6
15 Thu
Mar 2012
3/14/2012 7:30:00 AM - 3/15/2012 5:30:00 PM


PSNS 124
SW11 3-14-12
Rainfall (1.23 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.15
0.10
0.05
0.00
ft
10
5
0
ft
7.5
5.0
2.5
0.0
SU
0
Grab sample collected @ 16:26
uS/cm
40000
20000
0
ppt
40
20
0
°C
10
8
6
15 Thu
Mar 2012
3/14/2012 7:00:00 AM - 3/15/2012 3:00:00 PM


PSNS 115.1
SW11 3-14-12
Rainfall (1.17 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
10
5
0
ft
Grab sample collected @ 16:05
SU
0
40
20
0
ppt
25000
0
uS/cm
10.0
7.5
5.0
°C
15 Thu
Mar 2012
3/14/2012 7:00:00 AM - 3/15/2012 5:00:00 PM


PSNS 084.1
SW11 3-14-12
Rainfall (1.58 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
YSI tempC
0.15
0.10
0.05
0.00
in
10
5
0
ft
Grab sample collected @ 14:55
5.0
2.5
0.0
ft
SU
0
40000
20000
0
uS/cm
50
25
0
ppt
15
10
°C
15 Thu
Mar 2012
3/14/2012 7:30:00 AM - 3/15/2012 5:30:00 PM


PSNS 015
SW11 3-14-12
Rainfall (1.75 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.15
0.10
0.05
0.00
ft
10
5
0
ft
7.5
5.0
2.5
0.0
Grab sample collected @ 14:20
SU
0
uS/cm
30000
20000
10000
0
30
20
10
ppt
°C
10.0
7.5
5.0
15 Thu
Mar 2012
3/14/2012 7:00:00 AM - 3/15/2012 5:00:00 PM


PSNS B427 Rain
SW11 3-14-12
Rainfall (1.42 in)
0.150
0.125
0.100
0.075
0.050
0.025
0.000
in
15 Thu
Mar 2012
3/14/2012 12:30:00 PM - 3/15/2012 2:30:00 PM

SW11 015 Smplr Report

SAMPLER ID# 2425481222 16:04 15-MAR-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS015DUP"
SITE DESCRIPTION:
"PSNS015 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
21 ft SUCTION LINE
13 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START
-STRIBUTION:
2 BOTTLES/SAMPLE
8 SAMPLES/BOTTLE

VOLUME:
120 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED

SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 2425481222 16:04 15-MAR-12

SW11 015 Smplr Report

Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS015

PROGRAM: PSNS015DUP

Program Started at 11:32 TU 13-MAR-12

Nominal Sample Volume = 120 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO	LIQUID
		11:32	PGM DISABLED			
---------- WE 14-MAR-12 ----------						
		10:17	PGM ENABLED			
1,8	1-2	10:17	E	P		*
		10:18	POWER FAILED!			
		10:18	POWER RESTORED			
2,8	1-2	10:31	F	P		*
		10:32	POWER FAILED!			
		10:32	POWER RESTORED			
3,8	1-2	10:46	F	P		*
		10:47	POWER FAILED!			
		10:47	POWER RESTORED			
4,8	1-2	11:01	F	P		*
		11:02	POWER FAILED!			
		11:02	POWER RESTORED			
5,8	1-2	11:16	F		736	
6,8	1-2	11:31	F		735	
7,8	1-2	11:46	F		748	
8,8	1-2	12:01	F		754	
1,8	3-4	12:16	F		767	
2,8	3-4	12:31	F		768	
3,8	3-4	12:46	F		774	
4,8	3-4	13:01	F		780	
5,8	3-4	13:16	F		787	
6,8	3-4	13:31	F		796	
7,8	3-4	13:46	F		804	
8,8	3-4	14:01	F		810	
1,8	5-6	14:16	F		827	

2,8	5-6	14:31	F	832
3,8	5-6	14:46	F	834
4,8	5-6	15:01	F	834
5,8	5-6	15:16	F	838
6,8	5-6	15:31	F	834
7,8	5-6	15:46	F	828
8,8	5-6	16:01	F	833
1,8	7-8	16:31	F	828
2,8	7-8	17:01	F	832
3,8	7-8	17:31	F	829
4,8	7-8	18:01	F	828
5,8	7-8	18:31	F	834
6,8	7-8	19:01	F	828
7,8	7-8	19:31	F	823
8,8	7-8	20:01	F	814
1,8	9-10	20:31	F	804
2,8	9-10	21:01	F	785
3,8	9-10	21:31	F	772
4,8	9-10	22:01	F	760
5,8	9-10	22:31	F	751
6,8	9-10	23:01	F	749
7,8	9-10	23:31	F	743
---------- TH 15-MAR-12 ----------				
8,8	9-10	00:01	F	748
1,8	11-12	00:31	F	745
2,8	11-12	01:01	F	743
3,8	11-12	01:31	F	743
4,8	11-12	02:01	F	748
5,8	11-12	02:31	F	749
6,8	11-12	03:01	F	756
7,8	11-12	03:31	F	761
8,8	11-12	04:01	F	762
1,8	13-14	04:31	F	772
2,8	13-14	04:32	F	769
3,8	13-14	04:46	F	775
4,8	13-14	05:01	F	781
5,8	13-14	05:16	F	778
6,8	13-14	05:31	F	779

SW11 015 Smplr Report

7,8	13-14 05:46	F	779
8,8	13-14 06:01	F	780
1,8	15-16 06:16	F	784
2,8	15-16 06:31	F	780
3,8	15-16 06:46	F	778
4,8	15-16 07:01	F	781
5,8	15-16 07:16	F	775
6,8	15-16 07:31	F	772
7,8	15-16 07:46	F	772
8,8	15-16 08:01	F	766
1,8	17-18 08:16	F	762
2,8	17-18 08:31	F	763
3,8	17-18 08:46	F	762
4,8	17-18 09:01	F	755
5,8	17-18 09:16	F	752
6,8	17-18 09:31	F	748
7,8	17-18 09:46	F	755
8,8	17-18 10:01	F	757
1,8	19-20 10:16	F	751
2,8	19-20 10:31	F	750
3,8	19-20 10:46	F	743
4,8	19-20 11:01	F	749
5,8	19-20 11:16	F	751
6,8	19-20 11:31	F	749
7,8	19-20 11:46	F	750
8,8	19-20 12:01	F	754
1,8	21-22 12:16	F	756
2,8	21-22 12:31	F	762
3,8	21-22 12:46	F	767
4,8	21-22 13:01	F	766
5,8	21-22 13:16	F	772
6,8	21-22 13:31	F	778
7,8	21-22 13:46	F	780
8,8	21-22 14:01	F	790
1,8	23-24 14:16	F	797
2,8	23-24 14:31	F	809
3,8	23-24 14:46	F	816
4,8	23-24 15:01	F	823

SW11 015 Smplr Report

```
 5,8   23-24 15:16      F          833
 6,8   23-24 15:31      F          844
 7,8   23-24 15:46      F          845
 8,8   23-24 16:01      F          847
          16:02  PGM DONE 15-MAR
  SOURCE E  ==> ENABLE
  SOURCE F  ==> FLOW
   ERROR P  ==> POWER FAILED!
----------------------------------------
```

SW11 084.1 Smplr Report

SAMPLER ID# 2425546782 17:05 15-MAR-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS84-1 "
SITE DESCRIPTION:
"PSNS84-1 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
22 ft SUCTION LINE
15 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
NO SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED

SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 2425546782 17:05 15-MAR-12

SW11 084.1 Smplr Report

Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS84-1

PROGRAM: PSNS84-1

Program Started at 11:00 TU 13-MAR-12

Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		11:00	PGM DISABLED		
---------- WE 14-MAR-12 ----------					
		10:42	PGM ENABLED		
1,4	1	10:42	E		495
2,4	1	10:56	F		502
3,4	1	11:11	F		506
4,4	1	11:26	F		508
1,4	2	11:41	F		514
2,4	2	11:56	F		515
3,4	2	12:11	F		520
4,4	2	12:26	F		521
1,4	3	12:41	F		530
2,4	3	12:56	F		532
3,4	3	13:11	F		538
4,4	3	13:26	F		544
1,4	4	13:41	F		550
2,4	4	13:56	F		556
3,4	4	14:11	F		562
4,4	4	14:26	F		568
1,4	5	14:41	F		568
2,4	5	14:56	F		568
3,4	5	15:11	F		568
4,4	5	15:26	F		568
1,4	6	15:56	F		568
2,4	6	16:26	F		563
3,4	6	16:56	F		566
4,4	6	17:26	F		562
1,4	7	17:56	F		562

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2,4	7	18:26	F	562
3,4	7	18:56	F	562
4,4	7	19:26	F	562
1,4	8	19:56	F	562
2,4	8	20:26	F	545
3,4	8	20:56	F	536
4,4	8	21:26	F	527
1,4	9	21:56	F	524
2,4	9	22:26	F	520
3,4	9	22:56	F	509
4,4	9	23:26	F	512
1,4	10	23:56	F	508
---------- TH 15-MAR-12 ----------				
2,4	10	00:26	F	508
3,4	10	00:56	F	509
4,4	10	01:26	F	508
1,4	11	01:56	F	514
2,4	11	02:26	F	514
3,4	11	02:56	F	514
4,4	11	03:26	F	520
1,4	12	03:56	F	526
2,4	12	04:26	F	526
3,4	12	04:54	F	527
4,4	12	04:56	F	534
1,4	13	05:11	F	532
2,4	13	05:26	F	535
3,4	13	05:41	F	536
4,4	13	05:56	F	538
1,4	14	06:11	F	532
2,4	14	06:26	F	534
3,4	14	06:41	F	532
4,4	14	06:56	F	534
1,4	15	07:11	F	532
2,4	15	07:26	F	529
3,4	15	07:41	F	526
4,4	15	07:56	F	525
1,4	16	08:11	F	521
2,4	16	08:26	F	524

3,4	16	08:41	F	520
4,4	16	08:56	F	522
1,4	17	09:11	F	520
2,4	17	09:26	F	515
3,4	17	09:41	F	512
4,4	17	09:56	F	515
1,4	18	10:11	F	516
2,4	18	10:26	F	516
3,4	18	10:41	F	511
4,4	18	10:56	F	512
1,4	19	11:11	F	514
2,4	19	11:26	F	514
3,4	19	11:41	F	514
4,4	19	11:56	F	514
1,4	20	12:11	F	516
2,4	20	12:26	F	519
3,4	20	12:41	F	519
4,4	20	12:56	F	524
1,4	21	13:11	F	526
2,4	21	13:26	F	532
3,4	21	13:41	F	534
4,4	21	13:56	F	538
1,4	22	14:11	F	538
2,4	22	14:26	F	544
3,4	22	14:41	F	552
4,4	22	14:56	F	558
1,4	23	15:11	F	563
2,4	23	15:26	F	566
3,4	23	15:41	F	570
4,4	23	15:56	F	570
1,4	24	16:11	F	570
2,4	24	16:26	F	568
3,4	24	16:41	F	570
4,4	24	16:56	F	568

16:57 PGM DONE 15-MAR

SOURCE E ==> ENABLE

SOURCE F ==> FLOW

SW11 115.1 Smplr Report

SAMPLER ID# 3293179316 16:09 15-MAR-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS115-1 "
SITE DESCRIPTION:
"PSNS115-1 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
44 ft SUCTION LINE
21 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED

SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 3293179316 16:09 15-MAR-12

SW11 115.1 Smplr Report

Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS115-1

PROGRAM: PSNS115-1

Program Started at 10:39 TU 13-MAR-12

Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		10:39	PGM DISABLED		
---------- WE 14-MAR-12 ----------					
		09:44	PGM ENABLED		
1,4	1	09:44	E		1048
2,4	1	09:58	F		1057
3,4	1	10:13	F		1058
4,4	1	10:28	F		1062
1,4	2	10:43	F		1069
2,4	2	10:58	F		1080
3,4	2	11:13	F		1087
4,4	2	11:28	F		1099
1,4	3	11:43	F		1091
2,4	3	11:58	F		1106
3,4	3	12:13	F		1111
4,4	3	12:28	F		1116
1,4	4	12:43	F		1129
2,4	4	12:58	F		1140
3,4	4	13:13	F		1152
4,4	4	13:28	F		1171
1,4	5	13:43	F		1176
2,4	5	13:58	F		1188
3,4	5	14:13	F		1208
4,4	5	14:28	F		1207
1,4	6	14:43	F		1230
2,4	6	14:58	F		1236
3,4	6	15:13	F		1266
4,4	6	15:28	F		1273
1,4	7	15:58	F		1291

2,4	7	16:28	F	1320
3,4	7	16:58	F	1299
4,4	7	17:28	F	1331
1,4	8	17:58	F	1283
2,4	8	18:28	F	1267
3,4	8	18:58	F	1249
4,4	8	19:28	F	1219
1,4	9	19:58	F	1196
2,4	9	20:28	F	1176
3,4	9	20:58	F	1151
4,4	9	21:28	F	1125
1,4	10	21:58	F	1116
2,4	10	22:28	F	1098
3,4	10	22:58	F	1081
4,4	10	23:28	F	1086
1,4	11	23:58	F	1081
---------- TH 15-MAR-12 ----------				
2,4	11	00:28	F	1080
3,4	11	00:58	F	1074
4,4	11	01:28	F	1080
1,4	12	01:58	F	1086
2,4	12	02:28	F	1093
3,4	12	02:58	F	1098
4,4	12	03:28	F	1117
1,4	13	03:58	F	1122
2,4	13	04:28	F	1134
3,4	13	04:54	F	1128
4,4	13	04:58	F	1140
1,4	14	05:13	F	1139
2,4	14	05:28	F	1136
3,4	14	05:43	F	1140
4,4	14	05:58	F	1146
1,4	15	06:13	F	1147
2,4	15	06:28	F	1146
3,4	15	06:43	F	1148
4,4	15	06:58	F	1135
1,4	16	07:13	F	1122
2,4	16	07:28	F	1134

3,4	16	07:43	F	1128
4,4	16	07:58	F	1115
1,4	17	08:13	F	1118
2,4	17	08:28	F	1110
3,4	17	08:43	F	1109
4,4	17	08:58	F	1110
1,4	18	09:13	F	1106
2,4	18	09:28	F	1098
3,4	18	09:43	F	1369
4,4	18	09:58	F	1111
1,4	19	10:13	F	1093
2,4	19	10:28	F	1089
3,4	19	10:43	F	1093
4,4	19	10:58	F	1092
1,4	20	11:13	F	1092
2,4	20	11:28	F	1092
3,4	20	11:43	F	1094
4,4	20	11:58	F	1098
1,4	21	12:13	F	1098
2,4	21	12:28	F	1104
3,4	21	12:43	F	1111
4,4	21	12:58	F	1122
1,4	22	13:13	F	1129
2,4	22	13:28	F	1129
3,4	22	13:43	F	1140
4,4	22	13:58	F	1146
1,4	23	14:13	F	1172
2,4	23	14:28	F	1176
3,4	23	14:43	F	1181
4,4	23	14:58	F	1209
1,4	24	15:13	F	1214
2,4	24	15:28	F	1231
3,4	24	15:43	F	1231
4,4	24	15:58	F	1233

15:59 PGM DONE 15-MAR
SOURCE E ==> ENABLE
SOURCE F ==> FLOW

SW11 124 Smplr Report

SAMPLER ID# 3293179322 16:41 15-MAR-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS 124 "
SITE DESCRIPTION:
"PSNS 124 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
20 ft SUCTION LINE
16 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED

SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 3293179322 16:41 15-MAR-12

SW11 124 Smplr Report

Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS 124

PROGRAM: PSNS 124

Program Started at 10:21 TU 13-MAR-12

Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		10:21	PGM DISABLED		
---------- WE 14-MAR-12 ----------					
		11:54	PGM ENABLED		
1,4	1	11:54	E		521
2,4	1	12:08	F		522
3,4	1	12:23	F		527
4,4	1	12:38	F		528
1,4	2	12:53	F		537
2,4	2	13:08	F		539
3,4	2	13:23	F		545
4,4	2	13:38	F		552
1,4	3	13:53	F		557
2,4	3	14:08	F		563
3,4	3	14:23	F		563
4,4	3	14:38	F		563
1,4	4	14:53	F		563
2,4	4	15:08	F		564
3,4	4	15:23	F		569
4,4	4	15:38	F		564
1,4	5	16:08	F		561
2,4	5	16:38	F		564
3,4	5	17:08	F		563
4,4	5	17:38	F		563
1,4	6	18:08	F		563
2,4	6	18:38	F		564
3,4	6	19:08	F		564
4,4	6	19:38	F		567
1,4	7	20:08	F		563

2,4	7	20:38	F	557
3,4	7	21:08	F	546
4,4	7	21:38	F	539
1,4	8	22:08	F	533
2,4	8	22:38	F	527
3,4	8	23:08	F	522
4,4	8	23:38	F	519

---------- TH 15-MAR-12 ----------

1,4	9	00:08	F	521
2,4	9	00:38	F	522
3,4	9	01:08	F	520
4,4	9	01:38	F	520
1,4	10	02:08	F	525
2,4	10	02:38	F	527
3,4	10	03:08	F	527
4,4	10	03:38	F	533
1,4	11	04:08	F	533
2,4	11	04:38	F	539
3,4	11	04:56	F	539
4,4	11	05:08	F	539
1,4	12	05:23	F	539
2,4	12	05:38	F	545
3,4	12	05:53	F	545
4,4	12	06:08	F	545
1,4	13	06:23	F	540
2,4	13	06:38	F	540
3,4	13	06:53	F	540
4,4	13	07:08	F	539
1,4	14	07:23	F	534
2,4	14	07:38	F	534
3,4	14	07:53	F	534
4,4	14	08:08	F	533
1,4	15	08:23	F	533
2,4	15	08:38	F	528
3,4	15	08:53	F	531
4,4	15	09:08	F	527
1,4	16	09:23	F	522
2,4	16	09:38	F	522

3,4	16	09:53	F	527
4,4	16	10:08	F	521
1,4	17	10:23	F	521
2,4	17	10:38	F	521
3,4	17	10:53	F	522
4,4	17	11:08	F	521
1,4	18	11:23	F	521
2,4	18	11:38	F	521
3,4	18	11:53	F	522
4,4	18	12:08	F	528
1,4	19	12:23	F	527
2,4	19	12:38	F	527
3,4	19	12:53	F	533
4,4	19	13:08	F	533
1,4	20	13:23	F	539
2,4	20	13:38	F	541
3,4	20	13:53	F	540
4,4	20	14:08	F	545
1,4	21	14:23	F	554
2,4	21	14:38	F	556
3,4	21	14:53	F	563
4,4	21	15:08	F	571
1,4	22	15:23	F	577
2,4	22	15:38	F	577
3,4	22	15:53	F	577
4,4	22	16:08	F	575
1,2	23	16:23	F	577
2,2	23	16:38	F	577

SOURCE E ==> ENABLE
SOURCE F ==> FLOW

SW11 124.1 Smplr Report

SAMPLER ID# 3293179321 17:10 15-MAR-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS124-1 "
SITE DESCRIPTION:
"PSNS124-1 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
56 ft SUCTION LINE
12 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,

STAY ENABLED
SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SW11 124.1 Smplr Report

SAMPLER ID# 3293179321 17:10 15-MAR-12
Hardware: B2 Software: 3.26
********** SAMPLING RESULTS **********
SITE: PSNS124-1
PROGRAM: PSNS124-1
Program Started at 10:02 TU 13-MAR-12
Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		10:02	PGM DISABLED		
---------- WE 14-MAR-12 ----------					
		12:44	PGM ENABLED		
1,4	1	12:44	E		1320
2,4	1	12:58	F		1311
3,4	1	13:13	F		1303
4,4	1	13:28	F		1313
1,4	2	13:43	F		1314
2,4	2	13:58	F		1334
3,4	2	14:13	F		1316
4,4	2	14:28	F		1329
1,4	3	14:43	F		1319
2,4	3	14:58	F		1326
3,4	3	15:13	F		1346
4,4	3	15:28	F		1333
1,4	4	15:58	F		1314
2,4	4	16:28	F		1310
3,4	4	16:58	F		1330
4,4	4	17:28	F		1339
1,4	5	17:58	F		1340
2,4	5	18:28	F		1334
3,4	5	18:58	F		1326
4,4	5	19:28	F		1329
1,4	6	19:58	F		1332
2,4	6	20:28	F		1320
3,4	6	20:58	F		1331
4,4	6	21:28	F		1349

1,4	7	21:58	F	1327
2,4	7	22:28	F	1296
3,4	7	22:58	F	1297
4,4	7	23:28	F	1289
1,4	8	23:58	F	1285
---------- TH 15-MAR-12 ----------				
2,4	8	00:28	F	1281
3,4	8	00:58	F	1316
4,4	8	01:28	F	1280
1,4	9	01:58	F	1318
2,4	9	02:28	F	1294
3,4	9	02:58	F	1322
4,4	9	03:28	F	1327
1,4	10	03:58	F	1328
2,4	10	04:28	F	1349
3,4	10	04:57	F	1328
4,4	10	04:58	F	1356
1,4	11	05:13	F	1327
2,4	11	05:28	F	1375
3,4	11	05:43	F	1370
4,4	11	05:58	F	1345
1,4	12	06:13	F	1350
2,4	12	06:28	F	1333
3,4	12	06:43	F	1364
4,4	12	06:58	F	1341
1,4	13	07:13	F	1362
2,4	13	07:28	F	1322
3,4	13	07:43	F	1341
4,4	13	07:58	F	1329
1,4	14	08:13	F	1326
2,4	14	08:28	F	1322
3,4	14	08:43	F	1316
4,4	14	08:58	F	1320
1,4	15	09:13	F	1314
2,4	15	09:28	F	1321
3,4	15	09:43	F	1286
4,4	15	09:58	F	1316
1,4	16	10:13	F	1296

2,4	16	10:28	F	1302
3,4	16	10:43	F	1286
4,4	16	10:58	F	1285
1,4	17	11:13	F	1282
2,4	17	11:28	F	1305
3,4	17	11:43	F	1303
4,4	17	11:58	F	1292
1,4	18	12:13	F	1293
2,4	18	12:28	F	1310
3,4	18	12:43	F	1319
4,4	18	12:58	F	1322
1,4	19	13:13	F	1320
2,4	19	13:28	F	1328
3,4	19	13:43	F	1337
4,4	19	13:58	F	1338
1,4	20	14:13	F	1343
2,4	20	14:28	F	1367
3,4	20	14:43	F	1357
4,4	20	14:58	F	1363
1,4	21	15:13	F	1358
2,4	21	15:28	F	1363
3,4	21	15:43	F	1363
4,4	21	15:58	F	1345
1,4	22	16:13	F	1361
2,4	22	16:28	F	1360
3,4	22	16:43	F	1355
4,4	22	16:58	F	1349

SOURCE E ==> ENABLE
SOURCE F ==> FLOW

SW11 126 Smplr Report

SAMPLER ID# 1313656803 15:37 15-MAR-12
Hardware: B0 Software: 2.34
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS126 "
SITE DESCRIPTION:
"PSNS126 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
19 ft SUCTION LINE
13 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,

SW11 126 Smplr Report

STAY ENABLED
SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
QUICK VIEW/CHANGE

TAKE MEASUREMENTS
EVERY 1 MINUTES

DUAL SAMPLER OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

NO PERIODIC
SERIAL OUTPUT

INTERROGATOR
CONNECTOR
POWER ALWAYS ON

NO RAIN GAUGE

```
    ----------
  NO SDI-12 SONDE
AUTO SDI-12 SCAN OFF
    ----------
 I/O1= NONE
 I/O2= NONE
 I/O3= NONE
    ----------
  0 ANALOG OUTPUTS
    ----------
 NO EXTERNAL MODEM
    ----------
     NO ALARM
   CONDITIONS SET
    ----------
    ----------
----------------------------------------
SAMPLER ID# 1313656803  15:37 15-MAR-12
  Hardware:     B0  Software: 2.34
********** SAMPLING RESULTS **********
   SITE: PSNS126
PROGRAM: PSNS126
Program Started at 09:36 TU 13-MAR-12
Nominal Sample Volume =  240 ml
                            COUNT
                              TO
SAMPLE  BOTTLE TIME  SOURCE ERROR LIQUID
------- ------ ----      -- --    ------
           09:36  PGM DISABLED
------------ WE 14-MAR-12 ------------
           09:45  PGM ENABLED
  1,4     1   09:45      E          473
  2,4     1   09:59      F          473
  3,4     1   10:14      F          471
  4,4     1   10:29      F          475
  1,4     2   10:44      F          475
  2,4     2   10:59      F          475
  3,4     2   11:14      F          479
```

4,4	2	11:29	F	483
1,4	3	11:44	F	483
2,4	3	11:59	F	489
3,4	3	12:14	F	489
4,4	3	12:29	F	495
1,4	4	12:44	F	501
2,4	4	12:59	F	501
3,4	4	13:14	F	501
4,4	4	13:29	F	501
1,4	5	13:44	F	501
2,4	5	13:59	F	501
3,4	5	14:14	F	501
4,4	5	14:29	F	501
1,4	6	14:44	F	501
2,4	6	14:59	F	501
3,4	6	15:14	F	501
4,4	6	15:29	F	501
1,4	7	15:44	F	501
2,4	7	15:59	F	501
3,4	7	16:14	F	501
4,4	7	16:29	F	501
1,4	8	16:59	F	498
2,4	8	17:29	F	499
3,4	8	17:59	F	496
4,4	8	18:29	F	495
1,4	9	18:59	F	495
2,4	9	19:29	F	495
3,4	9	19:59	F	496
4,4	9	20:29	F	498
1,4	10	20:59	F	499
2,4	10	21:29	F	501
3,4	10	21:59	F	489
4,4	10	22:29	F	483
1,4	11	22:59	F	480
2,4	11	23:29	F	477
3,4	11	23:59	F	477
---------- TH 15-MAR-12 ----------				
4,4	11	00:29	F	477

SW11 126 Smplr Report

1,4	12	00:59	F	477
2,4	12	01:29	F	477
3,4	12	01:59	F	483
4,4	12	02:29	F	483
1,4	13	02:59	F	483
2,4	13	03:29	F	489
3,4	13	03:59	F	489
4,4	13	04:29	F	495
1,4	14	04:44	F	503
2,4	14	04:59	F	503
3,4	14	05:14	F	503
4,4	14	05:29	F	505
1,4	15	05:44	F	503
2,4	15	05:59	F	509
3,4	15	06:14	F	501
4,4	15	06:29	F	495
1,4	16	06:44	F	497
2,4	16	06:59	F	495
3,4	16	07:14	F	495
4,4	16	07:29	F	492
1,4	17	07:44	F	493
2,4	17	07:59	F	489
3,4	17	08:14	F	489
4,4	17	08:29	F	491
1,4	18	08:44	F	485
2,4	18	08:59	F	483
3,4	18	09:14	F	485
4,4	18	09:29	F	483
1,4	19	09:44	F	485
2,4	19	09:59	F	483
3,4	19	10:14	F	480
4,4	19	10:29	F	483
1,4	20	10:44	F	478
2,4	20	10:59	F	477
3,4	20	11:14	F	480
4,4	20	11:29	F	481
1,4	21	11:44	F	482
2,4	21	11:59	F	483

SW11 126 Smplr Report

3,4	21	12:14	F	483
4,4	21	12:29	F	486
1,4	22	12:44	F	489
2,4	22	12:59	F	489
3,4	22	13:14	F	492
4,4	22	13:29	F	493
1,4	23	13:44	F	499
2,4	23	13:59	F	501
3,4	23	14:14	F	501
4,4	23	14:29	F	502
1,4	24	14:44	F	501
2,4	24	14:59	F	503
3,4	24	15:14	F	503
4,4	24	15:29	F	503

15:30 PGM DONE 15-MAR

SOURCE E ==> ENABLE

SOURCE F ==> FLOW

National Weather Service National Headquarters

National Weather Service

Area Forecast Discussion

Issued by NWS Seattle/Tacoma, WA

Current Version | Previous Version | Text Only | Print | Product List | Glossary Off
Versions: 1234567891011121314151617181920212223242526272829 30

000
FXUS66 KSEW 141047
AFDSEW

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE SEATTLE WA
300 AM PDT WED MAR 14 2012

.SYNOPSIS...A VIGOROUS FRONTAL SYSTEM WILL MOVE THROUGH THE AREA TODAY...FOLLOWED QUICKLY BY ANOTHER WEATHER SYSTEM TONIGHT AND THURSDAY...FOR WET AND OCCASIONALLY WINDY WEATHER AND HEAVY SNOW IN THE MOUNTAINS. SHOWERY WEATHER WILL CONTINUE ON FRIDAY. THE WEATHER PATTERN WILL REMAIN ACTIVE ON SATURDAY AS ANOTHER STRONG SURFACE LOW MOVES INLAND.

&&

.SHORT TERM...THE UPPER TROUGH THAT MOVED THROUGH WESTERN WASHINGTON TUESDAY IS WELL EAST OF THE REGION NOW...AND THE NEXT FRONTAL SYSTEM IS APPROACHING FROM THE OFFSHORE WATERS. SO WE HAVE A BRIEF LULL IN THE ACTIVE WEATHER PATTERN EARLY THIS MORNING...WITH MAINLY CLOUDY SKIES AND SPOTTY LIGHT PRECIPITATION. A COLD AIR MASS REMAINS OVER THE FORECAST AREA WITH TEMPERATURES IN THE 30S AND THE SNOW LEVEL WITHIN A FEW HUNDRED FEET OF SEA LEVEL.

PRECIPITATION WILL SPREAD ACROSS WESTERN WASHINGTON THIS MORNING... AND THE SURFACE FRONT WILL SWING NORTHEAST ACROSS THE AREA THIS AFTERNOON. FAIRLY STRONG SOUTHEAST PRESSURE GRADIENTS ACROSS THE REGION SHOULD PRODUCE WIND ADVISORY WINDS (IE SUSTAINED UP TO 35 MPH AND GUSTS UP TO 55 MPH) IN THE COASTAL AND NORTHWEST INTERIOR ZONES. A WIND ADVISORY IS ALREADY IN EFFECT TODAY FOR THOSE AREA. IT WILL BE BREEZY TO WINDY ELSEWHERE.

THIS SYSTEM WILL REPLACE THE COLD AIR MASS WITH A MILDER ONE... HOWEVER AS PRECIPITATION STARTS THIS MORNING IT WILL STILL BE COLD ENOUGH FOR SNOW IN THE WESTERN WASHINGTON LOWLANDS. WITH ONE MAIN EXCEPTION...ACCUMULATIONS SHOULD BE LIMITED TO AROUND 1 INCH AS THE COLD LOW LEVEL AIR IS QUICKLY SCOURED AWAY. THE EXCEPTION IS THE AREA ALONG THE EAST SIDE OF THE OLYMPIC MOUNTAINS...IN OTHER WORDS THE HOOD CANAL AREA ZONE. COLD AIR IS NATURALLY TRAPPED THERE DURING LOW LEVEL EASTERLY FLOW AHEAD OF A FRONT...AND SIGNIFICANT PRECIPITATION AMOUNTS WILL OCCUR WHILE IT IS STILL THERE. A WINTER STORM WARNING IS IN EFFECT THERE FOR ACCUMULATIONS OF 2 TO 6 INCHES THIS MORNING.

ANOTHER STRONG FRONTAL SYSTEM...WHICH IS BEGINNING TO DEVELOP OUT NEAR 155W...WILL MOVE THROUGH WESTERN WASHINGTON TONIGHT AND THURSDAY. THIS FEATURE...ASSOCIATED WITH A STRONG WESTERLY JET... WILL BRING ANOTHER ROUND OF WINDY CONDITIONS ESPECIALLY TO THE COAST AND NORTHWEST INTERIOR. THE DEVELOPING SURFACE LOW IS FORECAST TO CURL NORTHEAST OUTSIDE OF 130W INTO HAIDA GWAII -- RECENTLY KNOWN AS THE QUEEN CHARLOTTES -- WHICH SUGGESTS HIGH WIND IS UNLIKELY FOR WESTERN WASHINGTON. SO WE WILL STAY WITH THE IDEA OF ANOTHER WIND ADVISORY LEVEL EVENT.

PRECIPITATION WITH THIS SYSTEM WILL ALSO BE SUBSTANTIAL FOR BOTH THE LOWLANDS AND THE MOUNTAINS. THE TWO SYSTEMS COMBINED WILL PRODUCE STORM TOTAL PRECIPITATION AMOUNTS OF 1 TO 2.5 INCHES FOR THE COASTAL...SOUTHWEST WASHINGTON...AND HOOD CANAL AREA ZONES AND ROUGHLY 0.5 TO 1.5 INCHES ELSEWHERE IN THE INTERIOR LOWLANDS. THE MOUNTAINS WILL GET 2 TO 5 INCHES OF PRECIPITATION AS THE SNOW LEVEL RISES GRADUALLY TO AROUND 4500 FT ON THURSDAY. A WINTER STORM WARNING IS IN EFFECT FOR THE MOUNTAINS ALREADY.

A COOL AND UNSTABLE AIR MASS WILL FOLLOW THE FRONT FOR THURSDAY NIGHT FOR WIDESPREAD SHOWERS. A SHOWERY REGIME WILL CONTINUE FRIDAY AHEAD OF ANOTHER DEVELOP SYSTEM OFFSHORE. THE SNOW LEVEL WILL FALL TO AROUND 2500 FT THURSDAY NIGHT AND FRIDAY. MCDONNAL

.LONG TERM...A FEW DAYS AGO IT LOOKED LIKE SATURDAY WOULD BE A COOL BUT RATHER QUIET DAY WITH A MIX OF LIGHT SHOWERS AND SOME SUN BREAKS. THE FORECAST HAS CHANGED THOUGH...AND IT COULD CHANGE MORE OVER THE NEXT DAY OR SO.

ON FRIDAY THERE WILL BE ANOTHER DEEP COLD UPPER TROUGH CENTERED OFFSHORE ALONG 140W...AND A VERY STRONG NORTHWEST JET OF 180 KT OR SO WILL BEGIN TO INTERACT WITH IT. ALL THE MODELS ARE FORECASTING THE DEVELOPMENT OF ANOTHER FRONTAL SYSTEM...BUT THEY ARE HAVING LOTS OF DIFFICULTY WITH STRENGTH...TIMING AND TRACK. SOME RUNS OF THE EUROPEAN MODEL HAVE INDICATED A WINDSTORM SCENARIO. I DO NOT FEEL ENOUGH CONFIDENCE TO MAKE LONG TERM FORECAST CHANGE AT THIS TIME...BUT IT WILL BE INTERESTING TO SEE HOW THIS DEVELOPS.

SUNDAY AND MAYBE MONDAY WILL PROBABLY BE QUIETER DAYS BEFORE ANOTHER STRONG FRONTAL SYSTEM ARRIVES TUESDAY...OR MAYBE IT WILL ARRIVE MONDAY. THE MODELS ARE TRENDING TOWARD THE IDEA OF A BRIEFER AND BRIEFER BREAK LATE THIS WEEKEND AND EARLY NEXT WEEK BEFORE A VERY ACTIVE WEATHER PATTERN RESUMES NEXT WEEK. MCDONNAL

&&

.HYDROLOGY...AS DISCUSSED ABOVE THE PRECIPITATION FROM THE STORM TODAY AND THE STORM TONIGHT AND THURSDAY WILL BE SUBSTANTIAL...WITH GENERALLY 2 TO 5 INCHES IN THE MOUNTAINS DURING A 48-HOUR PERIOD. THE HEAVIEST AMOUNTS WILL OCCUR OVER THE SOUTH SLOPES OF THE OLYMPICS...AND THE MEAN AREAL PRECIPITATION OVER THE SKOKOMISH RIVER BASIN WILL LIKELY BE AROUND 3 INCHES. THE SNOW LEVEL WILL GRADUALLY RISE TO AROUND 4500 FT THURSDAY.

EVEN WITH RELATIVELY LOW SNOW LEVELS DURING MOST OF THE EVENT... THERE IS SOMETHING LIKE A 20 PERCENT CHANCE THAT THE UNIQUELY FLOOD-PRONE SKOKOMISH RIVER WILL HAVE MINOR FLOODING ON THURSDAY. HOWEVER THE LATEST NORTHWEST RIVER FORECAST CENTER MODEL KEEPS IT BELOW FLOOD STAGE...SO WE FEEL IT DOES NOT WARRANT A FLOOD WATCH AT THIS TIME.

FLOODING IS NOT EXPECTED ON ANY OTHER RIVER IN THE FORECAST AREA DURING THE NEXT 7 DAYS. MCDONNAL

&&

.AVIATION...MODERATE SOUTHWESTERLY FLOW ALOFT WILL CONTINUE TODAY. AT THE SURFACE STRONG SOUTHEASTERLY GRADIENTS WILL PERSIST TODAY AS A FRONT MOVES INLAND. THE AIR MASS IS MOIST AND STABLE.

WESTERN WASHINGTON WILL BE BETWEEN SYSTEMS UNTIL 12Z-15Z. A STRONG WEATHER SYSTEM WILL REACH THE COAST WEDNESDAY MORNING AND MOVE INLAND DURING THE DAY. PRECIPITATION WILL BEGIN AS SNOW IN SOME AREAS BUT TURN TO ALL RAIN BY 18Z OR SO. CEILINGS WILL FALL FROM VFR TO MVFR EVERYWHERE.

KSEA...DISCUSSION ABOVE APPLIES. WINDS WILL BE SOUTHEAST 8-12 KT EARLY THIS MORNING RISING TO SOUTH 12G22 KT AFTER 18Z. CHB

&&

.MARINE...A STRONG WEATHER SYSTEM WILL MOVE ONSHORE THIS MORNING. STRONG SOUTHEAST GALES WILL RESULT OVER MOST WATERS TODAY. AFTER A RELATIVE LULL THIS EVENING...ANOTHER SYSTEM WILL BRING MORE SOUTHEAST GALES ON THURSDAY. A SURGE OF SOUTHWESTERLY WIND WILL FOLLOW ON FRIDAY.

THE FORECAST GETS HAZY AFTER THAT AS MODELS DIFFER SIGNIFICANTLY IN THE TRACK OF THE NEXT LOW. THE NEW GFS AND EURO MODELS MOVE THE LOW RIGHT OVER WESTERN WASHINGTON...MOVING FROM SOUTHWEST TO NORTHEAST. THIS IS A WINDY BUT NOT TOO WINDY SCENARIO. THE NEW NAM WANTS TO KEEP THE LOW IN OREGON. THIS STORM CERTAINLY BEARS WATCHING. CHB

&&

.SEW WATCHES/WARNINGS/ADVISORIES...
WA...WINTER STORM WARNING FOR THE CASCADES AND OLYMPICS THROUGH THROUGH THURSDAY.
.WINTER STORM WARNING FOR THE HOOD CANAL AREA THIS MORNING.
.WIND ADVISORY FOR THE COAST AND NORTH INTERIOR TODAY.
PZ...GALE WARNING ALL WATERS EXCEPT CENTRAL STRAIT AND PUGET SOUND.
SMALL CRAFT ADVISORY CENTRAL STRAIT AND PUGET SOUND.
SMALL CRAFT ADVISORY FOR ROUGH GRAYS HARBOR BAR.

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YOU CAN SEE AN ILLUSTRATED VERSION OF THE FORECAST DISCUSSION AT WWW.WEATHER.GOV/SEATTLE/GAFD/LATEST_WEBAFD.HTML.

Your National Weather Service forecast

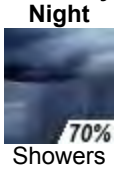
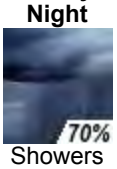
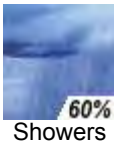
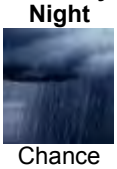
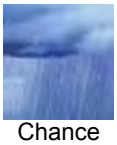
Bremerton WA

Enter Your "City, ST" or zip code Go BOOKMARK

NWS Seattle, WA
Point Forecast: Bremerton WA
47.56°N 122.62°W (Elev. 0 ft)

Mobile Weather Information | **En Español**
Last Update: 4:18 am PDT Mar 14, 2012
Forecast Valid: 10am PDT Mar 14, 2012-6pm PDT Mar 20, 2012

Forecast at a Glance

Today	Tonight	Thursday	Thursday Night	Friday	Friday Night	Saturday	Saturday Night	Sunday
								
90%	100%	100%	70%	70%	70%	60%		
Rain	Rain	Rain	Showers Likely	Showers Likely	Showers Likely	Showers Likely	Chance Showers	Chance Showers
Hi 43 °F	Lo 42 °F	Hi 49 °F	Lo 41 °F	Hi 47 °F	Lo 39 °F	Hi 45 °F	Lo 37 °F	Hi 46 °F

Detailed 7-day Forecast

Today: Rain. High near 43. South wind between 15 and 17 mph. Chance of precipitation is 90%.

Tonight: Rain. Low around 42. South southeast wind between 10 and 13 mph. Chance of precipitation is 100%.

Thursday: Rain. High near 49. South southwest wind between 10 and 16 mph. Chance of precipitation is 100%.

Thursday Night: Showers likely. Cloudy, with a low around 41. South southwest wind between 7 and 11 mph. Chance of precipitation is 70%.

Friday: Showers likely. Mostly cloudy, with a high near 47. South southwest wind between 8 and 10 mph. Chance of precipitation is 70%.

Friday Night: Showers likely. Mostly cloudy, with a low around 39. Chance of precipitation is 70%.

Saturday: Showers likely. Mostly cloudy, with a high near 45. Chance of precipitation is 60%.

Saturday Night: A chance of showers. Mostly cloudy, with a low around 37.

Sunday: A chance of showers. Partly sunny, with a high near 46.

Sunday Night: A chance of showers. Mostly cloudy, with a low around 37.

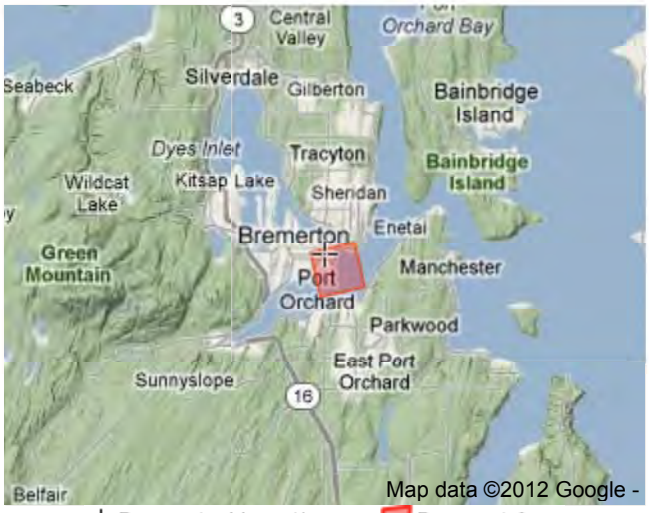
Monday: A chance of showers. Mostly cloudy, with a high near 46.

Monday Night: Rain likely. Mostly cloudy, with a low around 39.

Tuesday: Rain likely. Mostly cloudy, with a high near 46.

Detailed Point Forecast [Move Down]

Click Map for Forecast Disclaimer



Requested Location Forecast Area

Lat/Lon: 47.56°N 122.62°W **Elevation:**0 ft

XML

Current Conditions [Move Up]

Bremerton, Bremerton National Airport (KPWT)
Lat: 47.5 Lon: -122.75 Elev: 440
Last Update on 14 Mar 8:55 PDT

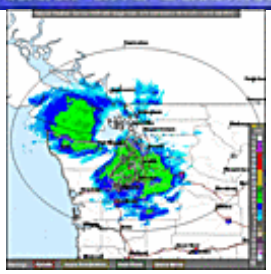
Overcast

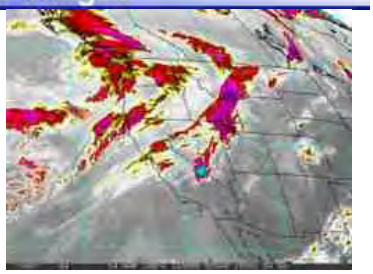
32°F (0°C)

Humidity:	80 %
Wind Speed:	calm
Barometer:	29.75 in (N/A mb)
Dewpoint:	27°F (-3°C)
Wind Chill:	32°F (0°C)
Visibility:	1.25 Miles

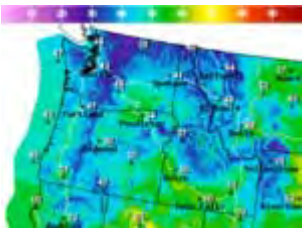
More Local Wx: 3 Day History:

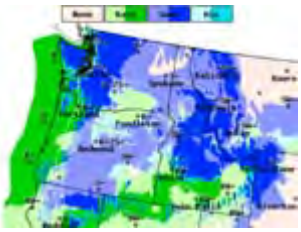
Radar and Satellite Images





National Digital Forecast Database





Additional Forecasts & Information

Zone Area Forecast for Seattle/Bremerton Area, WA

Forecast Discussion

Printable Forecast | Text Only Forecast

Hourly Weather Graph | Tabular Forecast

Quick Forecast

International System of Units | About Point Forecasts

Forecast Weather Table Interface

Webmaster
National Weather Service:
Seattle, WA

Back to Previous Page

National Weather Service Forecast Office
Seattle, WA
weather.gov

Home | News | Organization | Search for: NWS All NOAA Go

Point Forecast: Bremerton WA
47.56N 122.62W (Elev. 0 ft)

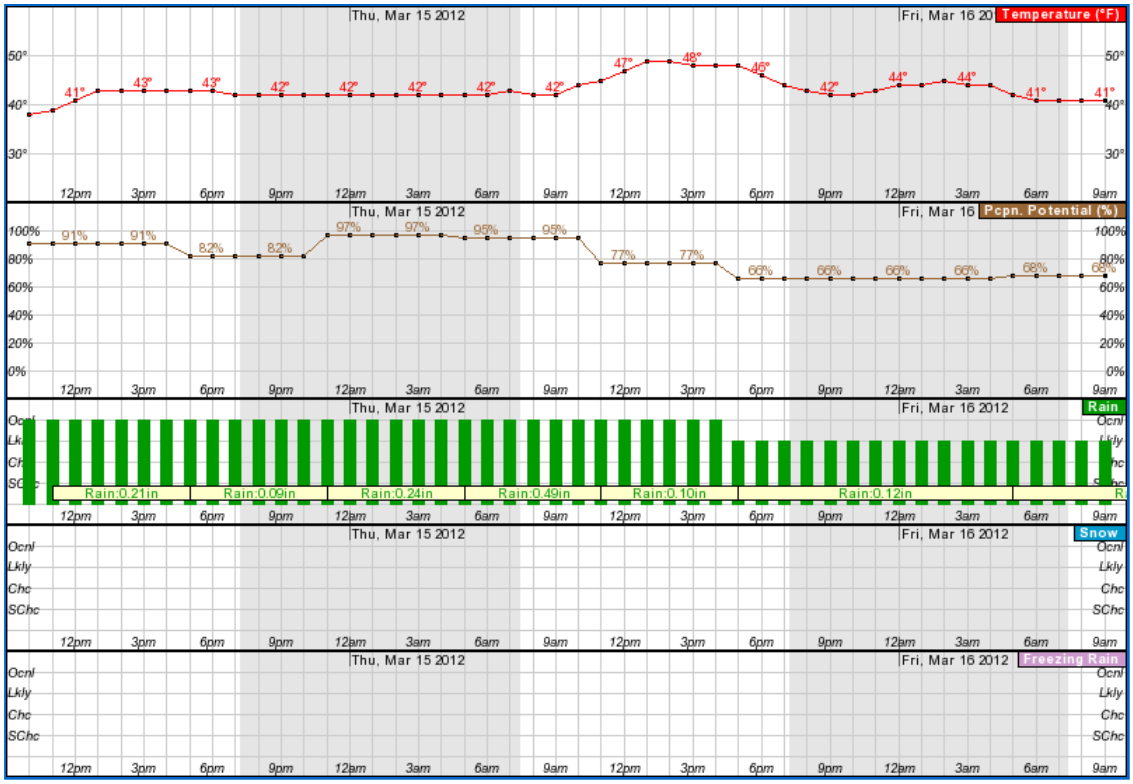
Last Update: 4:18 am PDT Mar 14, 2012

Hourly Weather Forecast Graph

[dashes/dots] | [b/w] | [hide menu]

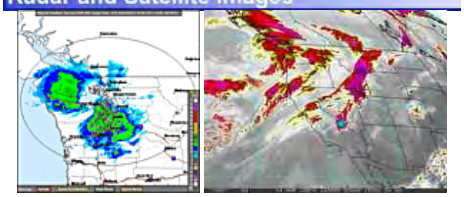
Weather Elements	Weather/Precipitation	Fire Weather
Temperature (°F)	Thunder	Mixing Height (x100ft)
Dewpoint (°F)	Rain	Haines Index
Wind Chill (°F)	Snow	Lightning Activity Level
Surface Wind mph	Freezing Rain	Trans. Wind mph
Sky Coverage	Sleet	
Precipitation Potential		
Relative Humidity		

48-Hour Period Starting: 10am Wed, Mar 14 2012 Submit Back 2 Days Forward 2 Days



Friday, March 16 at 1am
Temperature: 44 °F
Precipitation Potential: 66%
Rain: Likely (60%-70%) Snow: <10% Freezing Rain: <10%

Radar and Satellite Images



Additional Forecasts & Information

International System of Units | Forecast Discussion
7-Day Forecast | Tabular Forecast
Quick Forecast

Webmaster
NOAA's National Weather Service
Seattle, WA

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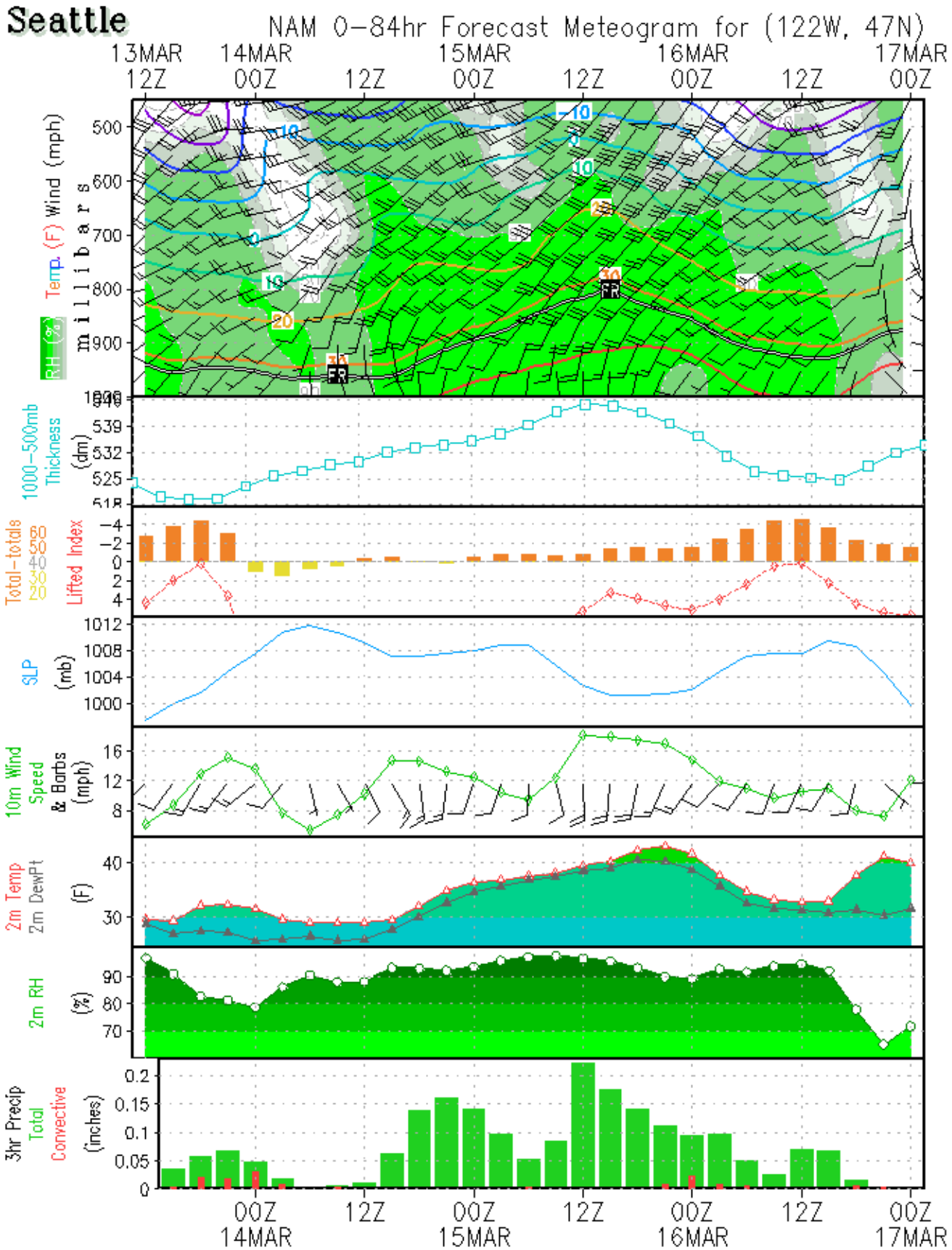
Forecast For Lat/Lon: 47.5620/-122.6230 (Elev. 0 ft)
Bremerton WA

Custom Weather Forecast Table

	Wed Mar 14							Thu Mar 15								Fri Mar 16								Sat Mar 17
Weather	Rain							Rain		Rain			Likely Rain Showers											
Daily-Temp	High **43** Low **36**							High **49** Low **42**								High **47** Low **41**								Low **39**
Chance of Precip	90%		90%		80%		95%	95%		75%		65%		65%		70%		70%		75%		75%		
Precip	0.28"		0.21"		0.09"		0.24"	0.49"		0.10"		0.06"		0.06"		0.01"		0.01"		0.23"		0.20"		
12-hr Snow Total	0"				0"			0"				0"				0"				0"				
3-Hour	5am	8am	11am	2pm	5pm	8pm	11pm	2am	5am	8am	11am	2pm	5pm	8pm	11pm	2am	5am	8am	11am	2pm	5pm	8pm	11pm	2am
Temp	37	36	39	43	43	42	42	42	42	42	45	49	48	43	43	45	42	41	44	47	46	41	41	43
Cloudiness	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	97%	97%	97%	97%	81%	81%	81%	81%	78%	78%	78%	78%
Dewpoint	34	34	37	39	39	41	41	40	39	39	42	45	44	43	42	42	37	38	41	41	40	39	38	39
Relative Humdity	88%	92%	92%	86%	87%	94%	94%	91%	87%	90%	90%	86%	87%	98%	96%	89%	83%	89%	89%	80%	81%	90%	90%	87%
Wind	SE 15	S 16	S 15	S 17	S 13	S 10	SE 12	S 13	S 14	S 16	SW 10	S 13	S 12	SW 12	S 8	SW 7	S 8	S 10	S 8	S 9	E 9	E 9	S 7	S 7
Snow Level (ft)	511	511	1878	1878	2378	2378	3833	3833	4737	4737	4276	4276	3525	3525	2576	2576	2102	2102	2274	2274	2574	2574	2308	2308


Seattle
NAM 0-84hr Forecast Meteogram for (122W, 47N)
13MAR 12Z
14MAR 00Z
12Z
15MAR 00Z
12Z
16MAR 00Z
12Z
17MAR 00Z
RH (%)
Temp. (F)
Wind (mph)
millibars
500
600
700
800
900
1000-500mb Thickness (dm)
539
532
525
Total-totals
Lifted Index
SLP (mb)
1012
1008
1004
1000
10m Wind Speed & Barbs (mph)
16
12
8
2m Temp
2m DewPt
(F)
40
30
2m RH
(%)
90
80
70
3hr Precip
Total
Convective
(inches)
0.2
0.15
0.1
0.05
0
00Z 14MAR
12Z
00Z 15MAR
12Z
00Z 16MAR
12Z
00Z 17MAR

Telemetry Data Summary Report
QAQC Data Notes from STE#11
Data review from 3/1/12 to 3/16/12

Site	Parameter	Issue	Start Date/Time	End Date/Time	GAR Level of Concern	Comments
15	Level	Missing Data	3/2/2012 17:15	3/7/2012 22:10	Amber	Missing data due (likely) due to sensor removal, rebuild, and reinstall
15	Temperature	Missing Data	3/2/2012 17:15	3/7/2012 22:10	Amber	Missing data due (likely) due to sensor removal, rebuild, and reinstall
15	Salinity	Missing Data	3/2/2012 17:15	3/7/2012 22:10	Amber	Missing data due (likely) due to sensor removal, rebuild, and reinstall
15	Conductivity	Missing Data	3/2/2012 17:15	3/7/2012 22:10	Amber	Missing data due (likely) due to sensor removal, rebuild, and reinstall
15	Rainfall	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
15	Level	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
15	Temperature	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
15	Salinity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
15	Conductivity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
84.1	Rainfall	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
84.1	Level	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
84.1	Temperature	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
84.1	Salinity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
84.1	Conductivity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
115.1	Level	Missing Data	3/6/2012 15:25	3/6/2012 15:40	Green	20 minute data gap
115.1	Salinity	Missing Data	3/6/2012 15:25	3/6/2012 15:40	Green	20 minute data gap
115.1	Conductivity	Missing Data	3/6/2012 15:25	3/6/2012 15:40	Green	20 minute data gap
124	Level	Inaccurate/Missing Data	3/1/2012 0:00	3/6/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124	Temperature	Inaccurate/Missing Data	3/1/2012 0:00	3/6/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124	Conductivity	Inaccurate/Missing Data	3/1/2012 0:00	3/6/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124	Salinity	Inaccurate/Missing Data	3/1/2012 0:00	3/6/2012 13:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124	Rainfall	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124	Level	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124	Temperature	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124	Salinity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124	Conductivity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124	Level	Level Drift	3/8/2012 20:45	4/20/2012 14:35	Amber	Transducer level drifted up gradually during this period (base level from 0.04' to 0.14'); after 4/20/12 it returns to a base level around 0.00 when dry
124.1	Level	Inaccurate/Missing Data	3/2/2012 15:35	3/7/2012 21:15	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124.1	Temperature	Inaccurate/Missing Data	3/2/2012 15:35	3/7/2012 21:15	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124.1	Conductivity	Inaccurate/Missing Data	3/2/2012 15:35	3/7/2012 21:15	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124.1	Salinity	Inaccurate/Missing Data	3/2/2012 15:35	3/7/2012 21:15	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
124.1	Rainfall	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124.1	Level	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124.1	Temperature	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124.1	Salinity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
124.1	Conductivity	Missing Data	3/12/2012 0:05	3/12/2012 1:00	Green	Missing Data due to DST switch
126	Rainfall	Inaccurate/Missing Data	3/2/2012 14:55	3/7/2012 18:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
126	Level	Inaccurate/Missing Data	3/2/2012 14:55	3/7/2012 18:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
126	Temperature	Inaccurate/Missing Data	3/2/2012 14:55	3/7/2012 18:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
126	Conductivity	Inaccurate/Missing Data	3/2/2012 18:55	3/7/2012 18:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
126	Salinity	Inaccurate/Missing Data	3/2/2012 19:40	3/7/2012 18:55	Amber	Data during this period is inaccurate and/or missing due to sensor removal, rebuild, and reinstall
126	Level	Negative Level	3/13/2012 10:45	3/14/2012 3:50	Red	Seemingly inaccurate negative level readings

STORM EVENT REPORT SW12
For
Non-Dry Dock Stormwater Monitoring
Conducted at
Puget Sound Naval Shipyard
Bremerton, WA
Project ENVVEST Study Area

April 19, 2012

Puget Sound Naval Shipyard and Surrounding Area

PNNL Contract No.: N4523A10MP00034 Amendment 1

Cardno TEC
Shaping the Future

Pacific Northwest
NATIONAL LABORATORY

1.0 Introduction

Taylor/TEC conducted non-dry dock stormwater sampling tasks within the Puget Sound Naval Shipyard (PSNS) and adjacent areas within Naval Base Kitsap (NBK); collectively comprising the Project ENVVEST study area, between March 16th and April 20th 2012. This was the fifth event (additional event) of the 2011-2012 project year – referred to as *Phase II*. Overall, this is the twelfth Stormwater (SW12) event of the project. A summary of the preparatory and sampling events, including site specific conditions that occurred during SW12 are presented in this report, with supporting information as attachments.

This SW12 Report is organized in the following manner and contains: Section 2, SW12 Event Summary; Section 3, Project Staff Participating in SW12; Section 4, Storm Event SW12 Preparatory Tasks; Section 5, Weather Forecast Information and SW12 Targeting Details; Section 6, Precipitation and SW12 Qualification Summary; Section 7, Sampling Information, Management and Validation; Section 8, Basin Runoff Calculations; Section 9, Descriptive Statistics and Discussion of Event Station Monitoring Data; Section 10, Notable Anomalies and Variations to the PWP; and Section 11, Action Items.

Attachments to this report include: Table A-1*, Storm Event Summary and Sampling Information, Validation Checklist* (spreadsheet); Stormwater Field Sampling Forms and Storm Controller Notes; Chain of Custody Forms; (basin) Runoff Calculation Worksheet; Station Hydrographs; Autosampler Reports; Weather Forecast Information and a Telemetry Data Summary Report.

2.0 SW12 Event Summary

Main SW12 details are provided below as a "*Quick Reference*":

- *Event/s Conducted:* SW12
- *Event Date/s:* maint. items; 3/16 through 4/12, station prep.; 4/13; and storm event tasks occurring between 4/18 and 4/20/12
- *Monitoring Stations Sampled:* PSNS015 only
- *Antecedent Conditions Met?:* Yes; ≤0.1" in prior 24 hrs and 0.0" in prior 6 hrs preceding the storm/sampling event at each station.
- *Start of Rainfall at PSNS Stations:* 4/19/12 1535 (PSNS015)
- *Sampling Period Duration Range:* start = 4/19/12 @ 1732 and stop = 4/20/12 @ 1037; Max sampling duration = 17 hrs:05 mins (PSNS015)
- *Sampling Event Rainfall Total:* PSNSB427 = 0.47" and PSNS015 = 0.46"
- *Samples/Types Collected:* One overall and 18 discrete hourly (single wedge bottle) composite samples (pollutograph samples) were collected and individually analyzed. Also – a vault sediment sample (SQV07-006) was collected. No grab samples collected.

- *Quality Control (QC) Samples Collected:* No duplicate or other QC samples were collected during the SW12 event.
- *Based on consideration of storm event and sample validation information, were the samples collected during SW12 valid for project purposes? (Y / N, composite, grab or both):* Yes-composite; all composite samples collected during this event were valid.
- *Special Note:* A Laser In-Situ Scattering and Transmissiometry (LISST) analyzer from Sequoia Scientific (www.sequoiasci.com) was deployed on 4/13/12, prior to the SW12 event. The LISST-StreamSide unit was used to generate real-time stormwater runoff sediment data.

See Table A-1; *Storm Event Summary and Sampling Information, Validation Checklist*, for additional event summary details.

3.0 Project Staff Participating in SW12

Taylor/TEC:

Dave Metallo – Project Manager, Storm Controller, Field Event and QC Manager

Brian Rupert – Field Team Leader

Curtis Nickerson – Program Manager (LISST deployment only)

Ian Sahlberg – Field Team Member (LISST deployment only)

PNNL:

Jill Brandenberger – Project Manager, QC Manager, Project Chemist

Navy Personnel:

Bob Johnston – Project Technical Lead / Oversight / Grab sample collection lead

4.0 Storm Event SW12 Preparatory Tasks

On April 13th, 2012 monitoring station PSNS015 was reset and its sensors re-calibrated. The station was also readied for storm event / stormwater sample collection on the same day. A portable LISST-StreamSide stormwater runoff sediment analyzer was also deployed at this station, calibrated and made operational. At this point all of the monitoring equipment was deemed to be functioning properly, was operational and "sample ready" (see Sections 1 and 2 of the attached *Stormwater Field Sampling Forms).*

The station was programmed with pre-determined autosampler enable and pacing conditions set "high" to prevent premature enabling (*sample disable mode*), as directed by the Taylor/TEC Storm Controller. Station operation was passed to the Taylor /TEC Storm Controller to be managed via telemetry. Final enabling conditions were determined by the Storm Controller closer to the onset of the storm event.

5.0 Weather Forecast Information and SW12 Targeting Details

Between the end of SW11 (3/16/12 ~ 1900) and the just prior to the onset of SW12 (4/19/12 ~ 1500) the rainfall as measured at PSNS015 during this approximately 34 day period was 3.95". The Navy's rain gauge at Build 427 recorded a total of 4.02" during the same period.

The last measureable runoff occurred approximately 34 hours prior to the start of SW12 event. Project qualifying antecedent dry period was met prior to the stations being armed on 4/19/12. A potentially qualifying storm event (event probability and forecast rainfall depth) was identified and targeted as rain was forecast at between 85 to 95% probability for Thursday 4/19/12, with 24-hour accumulations of 0.68" into Friday, late morning – early afternoon, the 20th.

The Nation Weather System (NWS) was one of the main sources used for the assessment of weather forecasting and conditions. Provided below is a link to the NWS-Bremerton, WA webpage; (http://forecast.weather.gov/MapClick.php?site=sew&textField1=47.56751&textField2=-122.63127&smap=1). A host of other internet available weather forecasting, observational and data sources were used for field and reporting purposes as appropriate Detailed *Weather Forecast Information* is attached to this report.

The NWS called for a frontal system that will reach western Washington by this afternoon and evening (4/19). The front will move through the area Friday morning (4/20). A weak high pressure system will build later Friday into Saturday (4/21).

Routinely referenced weather models used to gain forecast information regarding the Pacific Northwest included the MM5-NAM http://www.atmos.washington.edu/mm5rt/rt/naminit.12km.html) and the GFS-WRF (http://www.atmos.washington.edu/mm5rt/rt/gfsinit.frame1.html) (both hosted by the University of WA and initialized for the PNW). Below is a synopsis of the model comparison for SW12:

"Models are in broad agreement regarding timing (and rain depth) with steady rain beginning in the Puget Sound region early to mid-afternoon (1300-1400) and increasing through early this evening. Rainfall will be more generous with this system across the lowlands than previous systems. Widespread amounts of a half inch and locally higher should be expected through this evening...then additional amounts with the cold front late tonight/Friday morning."

Final sampler enabling conditions were appropriately set at the monitoring station around noon of 4/18 (*sample ready mode*). Table 1 lists the final enabling conditions at the PSNS015 monitoring station used for SW12, along with the rainfall amounts in the 24 and 6 hour periods prior to the onset of the storm event.

Table 1. Monitoring Station Enabling Conditions

Station	Rainfall (in/hr)	Level (ft)	Conductivity (µS/cm)	Repeatable Conductivity Enable (Y/N)	Sample Pacing Rate (min)	[2]Rainfall Prior to Event Start (24hr/6hr)
PSNS015	0.03	0.3	2000	N	15	0.00"/ 0.00"

[1]Conditions as checked on 4/19/12 at ~1029; final enable conditions set 4/18/12 ~1200

6.0 Precipitation and SW12 Qualification Summary

Precipitation Summary:

Previous rainfall that caused runoff to occur (≥ 0.03" rainfall without 3-hr gap) prior to the onset of SW12 was 34 hours as measured by the PSNS015 rain gauge. Rain began to fall over the project site at 1535 on April 19th. Table 2 details the period since last runoff, antecedent duration prior to the start of the storm event, as well as the rainfall start date/time at each monitoring station.

Table 2. Pre-Rain Event Conditions

Station	Last Runoff[1] (Date/Time)	Antecedent Duration (Days: Hrs)	Start of Rainfall (Date/Time)
PSNS015	4/18/12 4:40	1:10	4/19/12 15:35

[1]Last runoff period is defined as ≥ 0.03" of rainfall without a 3-hr gap

Rainfall intensity began in a light to moderate fashion. Operational checks during the late-afternoon early-evening of April 19th, via telemetry, revealed that the station had enabled its sampling routine as programmed; with rainfall, pipe level and conductivity values being in satisfaction of their threshold values, (as listed in Table 1).

Rainfall intensities remained low during most of the SW12 event, but steady for the first 7 to 8 hours. Rainfall then became sporadic before the weather system passed by the project area; tailing very light rain intensities before ending completely around 1030 on 4/20.

PSNS015 sampling period rainfall total was 0.46". The Navy's rain gauge at B427 recorded 0.47" for the same length of sampling period.

The sampling routine was manually stopped at bottle 19 at approximately 1150 on 4/20. Sampling duration (the range of time covering bottles used in the formulation of the overall station composite sample) was 17:05 (hours: mins).

Table 3 summarizes the sampling period start, end and duration as well as the total rainfall amounts for PSNS015 and the gauge at B427 that occurred during the SW12 sampling period. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), attached to this report, provides additional sampling period rainfall information.

Table 3. Sampling Period Information and Rainfall Totals for Project Monitoring Stations

Station	Sampling Period Start (Date/Time)	Sampling Period End (Date/Time)	Sampling Period Duration (Hrs:Mins)	Total Sampling Period Rainfall (in)
PSNS015	4/19/12 17:32	4/20/2012 10:37	17:05	0.46
B427	4/19/12 17:32	4/20/2012 10:37	17:05	0.47

[1]B427 start/stop and duration incorporates the total span from all monitoring stations utilized during the SW event

SW12 Qualification Summary:

All storm qualification conditions were met for this event. Storm event qualification conditions included wet season event date range (Oct 1 – May 1), forecast probability (≥70%), forecasted storm depth (≥0.1"), storm duration (≥2hrs) and runoff occurrence / hydrograph stage (elevated above base flow). Antecedent dry period (≤0.1" rain in previous 24hrs and 0" rain in previous 6hrs) qualification for SW12 was also met without condition, as described above. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist)*, documents the particular SW12 qualification criteria listed above.

7.0 Sampling Information, Management and Validation

Grab Sampling:

No stormwater grab samples were collected during the SW12 event. However, a vault sediment grab sample was collected from the PSNS015 vault prior to the SW12 event, during the installation of the LISST-StreamSide sensor. Sediment sampling was conducted as per methodologies described in the 2011-12 Project Work Plan (PWP). Parameters included total metals. The grab sample was collected on 4/13/12 at approximately 1400. Grab sample ID, along with the other pertinent information is listed on the *Stormwater Field Sampling and CoC Forms* and in Table A-1 (all are attached). Table 4 summarizes these results.

Table 4. Grab Sampling Information

Station	Grab Sample Type	Grab Sample ID	Grab Date /Time	Grab parameters collected per PSNS PWP?
PSNS015	Sediment	SQV07-006	4/13/2012 (~1400)	YES

Composite Sampling:

Composite sample retrieval tasks and formulation procedures were managed and lead by Taylor/TEC with support from PNNL/MSL personnel as needed. Composite samples were collected from only PSNS015 during this event.

Composite samples were collected via an autosampler which was operated and synchronized by a custom designed telemetered water quality control system. The composite sample collection

period and duration is noted in Table 3. The autosampler was enabled as per the conditions stated in Section 5 of this report. Composite sample parameters included: hardness, TOC, DOC, TSS, total and dissolved metals and turbidity.

Discrete sample (wedge) bottles (contained in the autosampler bases) were brought back the C106 Stormwater Lab at B147 for processing. Composite formulation occurred on April 20th. The numeric identification and amount of wedge bottles that were used for the overall composite sample formulation and those that were discarded were noted in Section 5 of the attached *Stormwater Field Sampling Forms*.

Methods used in preparation, autosampler collection, retrieval and formulation of the composite samples were conducted in a manner consistent with the 2011-12 PWP. However, a modified compositing scheme was employed for this event. A smaller than usual amount (~70ml) was extracted from each of the 14 qualifying wedge bottle. This ~908ml was placed into a common container for typical composite sample analysis. The remaining water from each of the 18 total wedge bottles collected during the event was separately prepared for individual (single bottle) analysis. Individual analysis of each wedge bottle was completed to produced an event pollutograph.

The total number of discrete wedge bottles collected, along with the total number of those bottles used in the station's composite sample is noted below in Table 5. Dividing the number of wedge bottles used in the composite sample formulation by the total number of wedge bottles collected during the span of the entire sampling period provides an estimation of the amount of time (as a percentage of that stations entire collection period) where freshwater (i.e. runoff) conditions occurred at each station during the corresponding sampling event period.

Specific details regarding the composite formulation, results from individual bench top testing of the discrete bottles, sample IDs, sample date/time and resultant overall conductivity and turbidity values, as well as the number of wedge bottles collected during the sampling event and those used for the composite sample formulation are detailed in the *Stormwater Field Sampling Forms, Chain-of-Custody (CoC)* forms and in Table A-1 (all are attached). Table 5 summarizes these results.

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS015
Composite sample ID	SW12-020
Composite Date /Time	4/20/2012 10:37
Overall Composite conductivity value (μS/cm)	338
Overall Composite turbidity value (NTU)	17
Composite volume (ml)	980

Table 5. Composite Sampling Details

Sample Collection Criteria:	PSNS015
Number of Bottles Collected During Sampling Event	18
Number of Bottles Included in Composite Sample	14
Percentage of Total Sampling Period that Freshwater Conditions Occurred	78%
Composite parameters collected per PSNS PWP?	Yes

All sampling and vault monitoring equipment operated as designed and programmed. Details pertaining to programming and event-specific operation of the autosampler unit are contained in the attached *Sampler Report*.

QC Samples:

No QC samples were collected during SW12. Table 6 summarizes the quality control sample collection information for SW12.

Table 6. Summary of Quality Control Sampling Information for SW12

Sample Collection Criteria:	PSNS015
Grab sample duplicate ID	N/A
Grab sample duplicate date and time	N/A
Grab sample duplicate conductivity value (μS/cm)	N/A
Composite sample Duplicate ID	N/A
Composite sample duplicate date and time	N/A
Overall Composite Duplicate conductivity value (μS/cm)	N/A
Overall Composite Duplicate turbidity value (NTU)	N/A
Composite Duplicate volume (ml)	N/A

Sample Management:

All samples were handled and managed as per Section 9 of the 2011-12 PWP and in a manner acceptable and within industry standards regarding practices typical for tasks of this nature. Once collected, both grab and composite samples were placed into coolers and put on ice and/or into the secure Stormwater Laboratory refrigerator to maintain temperatures between 2 and 6 °C.

All sample IDs, collection date and time, matrix, requested parameter analysis and other associated information were documented on *Chain of Custody* (*CoC) Forms* (attached). Samples were in direct control of project and/or laboratory personnel at all times. Samples were delivered to the testing facility, Battelle Marine Science Laboratory in Sequim, WA, in good, useable and

properly chilled condition. Adequate sample volume was collected from the targeted stations to proceed with the scheduled analysis of all parameters per the 2011-12 PWP.

Sample Validation Summary:

All sample validation criteria were met for this event per Section 8.2.6 of the 2011-12 PWP. Prior to processing the samples and transferring custody to the analytical laboratory, the Taylor/TEC Field Event Lead validated the samples against certain criteria. These validation criteria included runoff occurrence / hydrograph stage, sample preparation and handling review, requested parameters, ≥2 hour sampling duration or 75% storm hydrograph coverage, minimum number of aliquots, minimum sample volume collected for required parameters, discrete and composite samples conductivity measurement results, quality control sample collection and anomalous conditions assessment. Table A-1 (*Storm Event Summary and Sampling Information, Validation Checklist*), documents the particular SW-event qualification listed above.

8.0 Basin Runoff Calculations

Rainfall runoff volumes during the SW12 sampling period were calculated for each of the basins associated with the six Phase II monitoring stations. These calculations are based on the modified Runoff Coefficient Method (RCM) as described in Section 7.4 of the 2011-12 PWP.

The value ranges for the various land use/land cover categories assigned to each basin are listed in the attached *Runoff Calculation Tables*. Calculated runoff values are also presented in Table A-1 (*Storm Qualification and Sample Validation Information Checklist*) (attached). Table 7 summarizes the results from these calculations.

Table 7. Runoff Calculations

Station	Type of Surface	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Combined Drainage Area (Ft^2)	Sample Event Rain Total (In)	Sample Event Rain Total (Ft)	Sample Event Period Runoff Vol. (Gal)
015	Pervious	2,009,431	0.25 – 0.4	2,411,321	0.46	0.0383	691,454
	Impervious	653,373	0.6 – 0.9				

9.0 Descriptive Statistics and Discussion of Event Station Monitoring Data

Descriptive statistics for the sampling period at the PSNS015 monitoring station are provided in Table 8, below. These statistics include minimum, maximum, average and median at static 1-hour interval periods for vault level, conductivity, salinity, transducer water temperature, and tidal stage. The method by which the rainfall statistics are calculated is on a “rolling 1-hour data window’ in an attempt to provide a more accurate and representative assessment of the actual rainfall conditions. Sampling period rainfall totals are also included as part of the station’s rainfall information.

Table 8. SW12 Sampling Period Rainfall and Vault Parameter Descriptive Statistics

Station ID	Statistics	Rainfall (1 hr) (in)	Vault level (ft)	Conductivity (uS/cm)	[1]Salinity (ppt)	trans temp (^{o}C)	YSI temp (^{o}C)	Tide Stage (ft)
PSNS015	**Min**	0.00	0.18	53	2.00	9.94		0.46
	Max	0.13	7.43	45,658	42.00	16.17		10.99
	Average	0.02	4.02	7,188	7.63	12.45		7.17
	Median	0.01	4.30	333	2.00	12.83		7.81
	Storm Total	0.46						

[1]salinity calculations for 015 are based on an algorithm that has a lower range cut-off value of 2ppt. Actual field values may have been lower.

Hydrograph Assessment:

SW12 was a relatively straightforward event with one main frontal push of rainfall across the project area, beginning with moderate intensity lasting for about four hours, then tailing to low intensity rainfall for another nine hours, before lessening even further in the final four hours of the event. The rainfall signature showed this single frontal phase reflected in PSNS015 hydrograph. The Navy's rain gauge atop B427 also reflected a very similar rainfall signature.

The hydrograph showed freshwater pipe storage effects until the rainfall intensity decreased to the point that runoff could not overcome the tidal effect on the piping system. A return to higher conductivity conditions was noted towards the latter portion of the sampling period. Composite sample markers have been applied to the hydrographs to indicate total collection time (i.e. sample event period).

As mentioned above, a LISST StreamSide sensor was installed at PSNS015 and was collecting data during the SW12 event. A hydrograph displaying stormwater runoff sediment information generated during the event is provided. In addition to rainfall, conductivity and vault (water) level, the hydrograph displays mean grain size as well as three major grain size fractions. These size fractionations include clay/silt (<63µm), very fine/fine grain sand (64-234µm) and medium grain sand (235-386µm). Additional information and interpretation regarding the LISST data will be included in the 2011-12 Annual Report. The monitoring station hydrographs, as well as the rainfall graph for B427, are attached.

Telemetry Data Summary Report: TDSR

A review of the telemetry data collected since SW11; from 3/16/12 to 4/24/12, including the SW12 event, was conducted. There were some minor anomalies in nearly all of the stations data sets, mainly due to the Daylight Savings Time change, transducer maintenance/replacement tasks or stations being demobilized and taken offline for the monitoring season.

Overall, there were no data anomalies at PSNS015 during the SW12 event.

All sensors were in reasonable and accurate operation during SW12. A TDSR report (table), detailing the anomalies noted during SW12 and the period since the last sampling event is attached.

10.0 Notable Anomalies and Variations to the PWP

There were no major anomalies observed or otherwise noted after completion of the sampling event and review of the associated data that would have caused any of the SW12 samples to be non-representative of the conditions from which they were collected. As reported above, all intended and scheduled grab and composite samples were submitted to the PNNL MSL ("the Lab") within holding times and without incident. All support and sampling tasks, as well as collected samples, were managed as appropriate per the 2011-12 PWP.

A listing of the minor anomaly that occurred during SW12 is included below. This was;

1. During the course of the SW12, while interacting with the PSNS015 station via telemetry a communication issue developed that prevented the Storm Controller from viewing real-time vault and rainfall data as well the ability to control any of the autosampler functions. Field staff was deployed early on the morning of 4/20 to attempt to troubleshoot the issue. The modem was power cycled several times – however, this did not remedy the situation. Since the storm event was nearly over and that the sampler was operating correctly it was decided to leave the system operate in this manner until it either ran its programming course or was manually shut-off. No impacts to the sampler or samples resulted and after the event was completed the communication issue was fixed.

11.0 Action Items

This was the last sampling event for the 2011-12 season. The current focus of the field efforts will be in properly demobilizing the monitoring stations and associated equipment.

Figure 1. Phase II Stormwater Monitoring Locations within the Shipyard Boundary

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ATTACHMENTS

- Storm Event Summary and Sampling Information, Validation Checklist (Table A-1)
- Stormwater Field Sampling Forms and Controller Notes
- Chain-of-Custody Forms
- Runoff Calculation Worksheet
- Station Hydrographs
- Autosampler Reports
- Weather Forecast Information
- TDSR

Table A-1. PSNS Non-Dry Dock Stormwater Monitoring Tasks
Storm and Sample Information and Validation Checklist
Stormwater Sampling Event #12 (4/19/12)

This form acknowledges representativeness criteria described in the project PWP.
Mark with "Yes" to acknowledge acceptable, "No" for not acceptable, "NA" or "- -" if not applicable.

[1] *Storm Event Data:*	
Project Storm Event (SW) #	12
Event Forecast Probability (%)	85-95%
PSNS B427 Rain Gauge - Sample Event Total (in.)	0.47
Rainfall and Runoff Summary:	**PSNS015**
Last Runoff (≥ 0.03" rainfall without 3-hr gap) Prior to STE Start (Date/Time)	4/18/12 4:40
Antecedent Dry Period (days: hrs)	1:10
Rainfall Prior 24-hrs to Rain Event Start	0.00
Rainfall Prior 6-hrs to Rain Event Start	0.00
Start of Rainfall (Date/Time)	4/19/12 15:35
Sampling Period Start Date & Time	4/19/12 17:32
Sampling Period End Date & Time	4/20/2012 10:37
Sampling Period Duration (hrs:mins)	17:05
Sampling Period Duration (hours)	17.08
Sampling Period Total Rainfall (in)	0.46
Sampling Period Max 1-hr Rainfall Intensity (in/hr)	0.13
Sampling Period Average 1-hr Rainfall Intensity (in/hr)	0.02
Runoff volume calculated for sampling period (gallons)	691,454
[1] *Sample Collection Criteria:*	
Grab sample ID	Not Collected
Grab Date /Time	N/A
Grab sample conductivity value (µS/cm)	N/A
Hydrograph stage at grab collection	N/A
Grab parameters collected per PSNS PWP ?	N/A
Composite sample ID	SW12-020
Composite Date /Time	4/20/2012 10:37
Overall Composite conductivity value (µS/cm)	338
Overall Composite turbidity value (NTU)	17
Composite volume (ml)	980
Number of Bottles Collected During Sampling Event	18
Number of Bottles Included in Composite Sample	14
Percentage of Total Storm Period Duration Represented by Composite Sample	78%
Composite parameters collected per PSNS PWP ?	Yes
[1] *QC Sample Summary Information:*	
Grab sample duplicate ID	N/A
Grab sample duplicate date and time	N/A
Grab sample duplicate conductivity value (µS/cm)	N/A
Composite sample duplicate ID	N/A
Composite sample duplicate date and time	N/A
Overall Composite Duplicate conductivity value (µS/cm)	N/A
Overall Composite Duplicate turbidity value (NTU)	N/A
Composite Duplicate volume (ml)	N/A
Associated Equipment Blank	SW08-004
[1] *Storm and Sample Validation:*	
Was the targeted STE antecedent or conditional antecedent qualified per PSNS PWP? (if no, then see next line)	**Yes**
Was the antecedent overage amount greater than 10% of the total rain event ?	N/A
Was runoff occurring OR was the hydrograph at least 10% above background pipe level during grab collection ? If no, explain in summary narrative.	**Yes**
Were a minimum of 8 aliquots collected OR does the composite sample represent at least 75% of the stations storm event rain volume ?	**Yes**
Were all 1-hr sampler bottles used for the Composite sample ≤2000 µS/cm ?	**Yes**
Did any anomalous conditions exist that could make samples non-representative? Explain if "Yes"	No
Based on consideration of the information above, was the sample collected during the STE valid for project purposes ? (Y / N, composite, grab or both)	**Yes, both**

[1] If the answer to any of these questions is "No" OR indicate non-representative conditions, then these items should be explained in the Event Narrative.

Validation Check List Completed By: Brad Kwasnowski **Reviewed By /** _____

PSNS NDDSW Monitoring Project Storm Control Work Sheet *Sht Rev. 112111* Sheet 1 of 2

Date:	4/18/12			**Sampling Support Personnel:**	Rupert
STE #	12 (BONUS)	**Antecedent Dry Cond. Met ?**	Yes	**Tidal Info:**	4.19.12 (1114) 0.88' L 4.20.12 (0452) 11.14'H, (1141) 0.25' L
Storm Controller:	Metallo			**Grab sampling Info.**	None scheduled
Pre-Storm / Weather Details:	*Sampling only at PSNS015. GFS: event start (1400) 4.19.12 to (1800) = 0.38", 0900-1200 on 4.20 + 0.16" ~ .54" total; NAM: event start (1300) 4.19.12 to (2000) = 0.36", 0000-0700 4.20 = 0.04 ~ .40 total; NWS predicting 0.68" b/w 1200 4.19 & 1700 4.20				

Telemetry Measurements:	**DATE/TIME (24HR)**												
STATION:	4-18-12 (1200)	4-19-12 (1029)	(1200)	(1430)	(1600)	(1749)	(1930)	(2030) ~~(193~~	4-20 (0800)	4-20 (1149)			
PSNS015 Rain[1]	0/.13	0/.10	0/0	0/0	.04/.04	.07/.22	.03/.29	Connection Issues lost-comm	Comm. Not yet restored				
PSNS015 Level	0.18	0.19	0.19	2.40	5.66	7.04	5.67			0.19			
PSNS015 Cond.	53	56.44	1143	9697	31804	328	167			52.99			
Smpl Marker	5①	5	5	5	5	7	14						
PSNS084.1 Rain													
PSNS084.1 Level													
PSNS084.1 Cond.													
Smpl Marker													
PSNS115.1 Rain										*Storm has ended and			
PSNS115.1 Level										Sampler stopped ~1150 @			
PSNS115.1 Cond.										BTL 19 (2/4)			
Smpl Marker													
PSNS124 Rain													
PSNS124 Level													
PSNS124 Cond.													
Smpl Marker													
PSNS124.1 Rain													
PSNS124.1 Level													
PSNS124.1 Cond.													
Smpl Marker													
PSNS126 Rain													
PSNS126 Level													
PSNS126 Cond.													
Smpl Marker													

[1]Rain dephs are reported as 1-hr / 24-hr totals

① Smpl mrker (5) as a result of sampler calibration

PSNS NDDSW Monitoring Project Storm Control Work Sheet, Continued *Sht Rev. 112111* Sheet 2 of 2

Date:	4·18·12			**Sampling Support Personnel:**	Rupert
STE #	12 (Bonus)	**Storm Controller:**	Metallo	**Strm Evnt Start / Stp**	4-19-12 ~~(1754)~~ 1727 4-20-12 (~1150)

Enabling Information:

Sample Staion:	PSNS015		PSNS084.1		PSNS115.1		PSNS124		PSNS124.1		PSNS126		
Rain enable (in/hr)	0.03												
Level Enable (ft)	0.3												
Cond. (µS/cm)	2000												
Repeat. Cond Set ?	No												
Pacing Rate (min)	15												
Date	4·18·11												
Time	1200												
Comp Dup ? / where:			NONE collected				**Grab Dup ? / where:**			NONE collected			

EVENT NOTES:

Batt Levels:
4/18/12 logger 13.72
smplr 12.80

4/19/12 logger 14.13
smplr 12.79

Storm Summary:
Storm rainfall = 0.46"
Sample period rainfall = 0.28"

— This event (#12-Bonus) is being conducted at PSNS015 only. There has been a LISST Streamside analyzer installed (4/13) and is collecting data since 4/13 and throughout the storm event period.

— ~(1930) 4-19 datalogger developed communication issue (due to "hang up" w/ terminal emulator function). Sent Rupert to site to check things out. Power cycled the modem several times - but to no avail. Decided not to power cycle the datalogger mid-storm. Will have Rupert take additional actions in the morning if comm hasn't been re-established. ~0800 4/20 comm still not re-est'ed - will wait out remainder of storm and have Rupert call me from the site to work through comm issues.

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-Dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

ver.020411

Station: O15	MH/CB#:	Loc. Descrip. McDonalds

Page: 1 of 2 *pages per station*

Section 1. Station Reset and Inspection

Personnel: BR/IS/DM/CN Weather: Sunny, temp 60's Arrival Date/Time: 1330 4/13/12

Carry-over maintenance to do prior to set-up: none done?

Sampler Battery Voltage NO Battery	~~12.55~~ BA	Changed? Y N ~~added new~~	New voltage —
Modem Battery Voltage	13.94	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Info.**	
Transducer & Telemetry System Info.		Time Display OK? (Yes/No)	Yes/ OK
Trands. Cable OK?	OK	Internal Sampler Tubing OK?	OK
Trands. Desiccant OK (Yes/No)	OK	Tubing Replaced? (Yes/No)	NO
Telem. Box Desiccant OK (Yes/No)	OK	Normal Smpler Program or Dup. ?	Normal
Modem Status	Operational	Bottles Loaded ?	Yes
Notes (including channel condition): New off set = + 0.17		Lid Status?	ON
		Backflushed with DI?	NO
		Suction line & quick connect attached?	Yes
		Smplr Status (on/off) / last screen..	off

Section 2. Storm Setup and Inspection

Personnel: BR Weather: Sunny, winds 10 mph Arrival Date/Time: 4/18/12 @ 1300

Sampler Battery Voltage	12.55	Changed? Y (N) added	New voltage —
Modem Battery Voltage	13.65	Changed? Y (N)	New voltage —
Sample Tubing & Strainer OK?	OK	**Sampler Setup**	
Transducer & Multi-meter Setup		Time/Date Display OK? (Yes/No)	OK
Transducer Cable OK?	OK	Aliquot Vol. Cal.'ed (Y/N & vol.)	Yes (5 tries)
Multi-meter Cable OK	OK	Program Reviewed (Yes/No), Dup ?	Normal
Recorded Level (FT)	13.85	Lids off bottles?	Yes
Measured Level (FT)	13.85	Diagnostics/Distrubutor arm check?	Yes
Offset Diff (FT)	0	Backflush with DI?	NO
Level Adjusted ?	NO	Storm Reset (1, enter) Completed	Yes
Cond. Sonde Type (YSI6820 or INW-CT2X)	INW	Last screen... Prgm Dis 1317	~~Pre~~ 4/18/12

Cond. Sonde Cal. Info. : Recorded Val. = Meas. Val. = Diff. = (>10% adj. offset); Offset = New Rec Val =

Notes: (e.g. enabling values, cond cal. meter make/model/ser#, etc.) offset not changed / left at +0.17

Section 3. Grab Sample Collection

Personnel: Weather: Arrival Date/Time:

On Composite... (Bottle #/ Aliq #)		Conductivity Reading (µS/cm):	
Grab Parameters Collected		Salinity Reading (PPT):	
Grab Sample ID		Temp. Reading (°C):	
Grab Date/Time	NA	Turbidity Reading (NTU)	
Grab Dup ID		Equipment running correctly?	
Grab Dup Date/Time		Sampler Battery Voltage (Changed?):	

Sample Observations (notify storm controller if sample turbidity, odor, color, foam, or sheen look out of the ordinary): which?:

Storm Contoller notified (Y or N/A)?:		Grab MS/MSD Collected ? Y / N	Ice OK?	

Notes: (what meter was used for site readings, etc.)

NO Grabs collected as part of Bonus Storm.

TAYLOR ASSOCIATES, INC.

PSNS NPDES Non-dry Dock Monitoring and Support | **Telemetry, 24-1L bottle set-up** | **Taylor Associates, Inc.**

Station: 015 *continued from previous page* Page: 2 of 2

Section 4. Post-Storm Sample Collection (for grab, comp or both)

Personnel: Bill / & Bob	Weather: Overcast / Light Rain	Arrival Date/Time: 4/20/12 @ 1130	
Sampler Battery Voltage	Cover removed	Changed? Y (N)	New voltage —
Telemtery Battery Voltage	Cover	Changed? Y (N)	New voltage —
Additional Grabs (IDs, date/time)	—		
Additional Dup Grab (IDs, date/time)	—		
Composite Begin Time (date/time)	1732	Sampler Report Downloaded ?	Y
Last Aliquot Taken (date/time, bott #, aliq #)	4/20/12 @ 1037 bottle 18 20/4 last aliquot		
Total Composite Sample Volume Collected			
Aliquots missed/NLD (date/time/bott #/aliq #)	19-24 Empty bottle 18 1/2 full		
-16 110% full -			
Channel Condition / Observations (oil/sheen, floatables, turbidity, suspended solids, discoloration, odor…)?	NO major observations / Typical		
Storm Contoller notified (Y or (N/A))?:	Which parameter?: NO		
Notes: None	Manual Stop @ 1139		
Maintenance Needed: None			

Section 5. Compositing Scheme and QC Sampling

Personnel: BR / Jill B | Date/Time: 4/20/12

Conductivity & Turbidity Meter/s Info.(Manuf., Model, Serial#, Cal.info.)

Cond = EC300 / Turbidity 2100P Hach

Conductivity & Turbidity Testing (List ind. smplr bottle; cond. reading in µS/cm; turb. reading in NTU; will ind. smpl be included in comp smpl Y/N):

1 1,200/42/Y	7 417/9/Y	~~13 15,750/8/N~~	19 E
2 70/25/Y	8 228/13/Y	14 1,065/10/Y	20 E
3 42/16/Y	9 581/11/Y	15 311/8/Y	21 E
4 67/17/Y	~~10 8,300/10/N~~	16 236/33/Y	22 E
5 168/20/Y	~~11 40,100/6/N~~	17 158/12/Y	23 E
6 304/18/Y	~~12 42,350/4/N~~	18 186/9/1/2 mL	24 E

Brief Description of Compositing Scheme: (include what bottles, based on bench-top screening above, where used for the overall composite sample)

used 70 mL from 14 bottles / Total = 980 mL

Overall Composite Info. (include conductivity and turbidity measurements, volume and requested analysis)

Cond = 338 Turb = 17 Vol = ~~500~~ 980 mL Analysis = Per 2011-12 prop

Composite Sample ID & Time:	SW12-019 (1037) 4/20/12
Field Blank Collected? (date/time)	NO
Blank ID:	NA
Duplicate comp sample? Yes/No	NO
Duplicate sample ID	NO

NOTES:

(4/4 9:17)

SAMPLE CHAIN OF CUSTODY FORM

Date:
Page: Page / of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW12

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TPH	TME/DME	DME				No. containers	Sample Type (grab vs. Comp)	Storm#	Notes/Comments
	3174 TOT DISS																	
133	SW12-001 134	PSNS015 - 1	4/20/12 1037	SW			X	X	X	X					3	comp	SW12	
135	SW12-002 136	PSNS015 - 2		SW			X	X		X					3		SW12	
137	SW12-003 138	PSNS015 - 3		SW			X	X		X					3		SW12	Amphiode
139	SW12-004 140	PSNS015 - 4		SW			X	X		X					3		SW12	
141	SW12-005 142	PSNS015 - 5		SW			X	X		X					3		SW12	Debris; organic + Detritus
143	SW12-006 144	PSNS015 - 6		SW			X	X		X					3		SW12	Debris; organic (soil/grass)
145	SW12-007 146	PSNS015 - 7		SW			X	X		X					3		SW12	
147	SW12-008 148	PSNS015 - 8		SW			X	X		X					3		SW12	
149	SW12-009 ~~146~~ 150	PSNS015 - 9		SW			X	X		X					3		SW12	
151	SW12-010 ~~150~~ 152	PSNS015 - 10		SW			X	X		X					3		SW12	Amphiode
153	SW12-011 154	PSNS015 - 11		SW			X	X		X					3		SW12	
155	SW12-012 156	PSNS015 - 12		SW			X	X		X					3		SW12	
157	SW12-013 158	PSNS015 - 13		SW			X	X		X					3		SW12	Amphiode

Relinquished by: _____ 4/20/12 1750
Signature Date Time
Jim Brandenberger PNNL
Printed Name Company

Received by: _____ 4/20/12 1830
Signature
C. Sullivan MSL
Printed Name

Total # of Containers
Shipment Method:
Hand Delivered to MSL

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL
2) CAS

xg 4/24/12

SAMPLE CHAIN OF CUSTODY FORM

Date:
Page: Page of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW12

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TPH	TME/DME	DME					No. containers	Sample Type (grab vs. Comp)	Storm#	Notes/Comments
SW12-014	PSNS01S-14	4/20/12 1037	SW			X	X		X						3	comp	SW12	
SW12-015	PSNS01S-15		SW			X	X		X						3		SW12	
SW12-016	PSNS01S-16		SW			X	X		X						3		SW12	Debris, organic & Detritus
SW12-017	PSNS01S-17		SW			X	X		X						3		SW12	Small amount of Detritus
SW12-018	PSNS01S-18		SW			X	X		X						3		SW12	
SW12-019	PSNS01S	4/13/12	SW						X						1	grab	SW12	vault sediment
SW12-020	PSNS01S	4/20/12 1037	SW			X	X		X						3	comp	SW12	storm comp
SW12-021			SW														SW12	
SW12-022			SW														SW12	
SW12-023			SW														SW12	
SW12-024			SW														SW12	
SW12-025			SW														SW12	
	SQV07-006	4/23/12																

Relinquished by: _____ 4/20/12 1750
Signature Date Time
Jim Brandenberger PNNL
Printed Name Company

Received by: _____ 4/20/12 1830
Signature
C Susuki MSL
Printed Name

Total # of Containers
Shipment Method:
Hand Delivered to MSL

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Printed Name

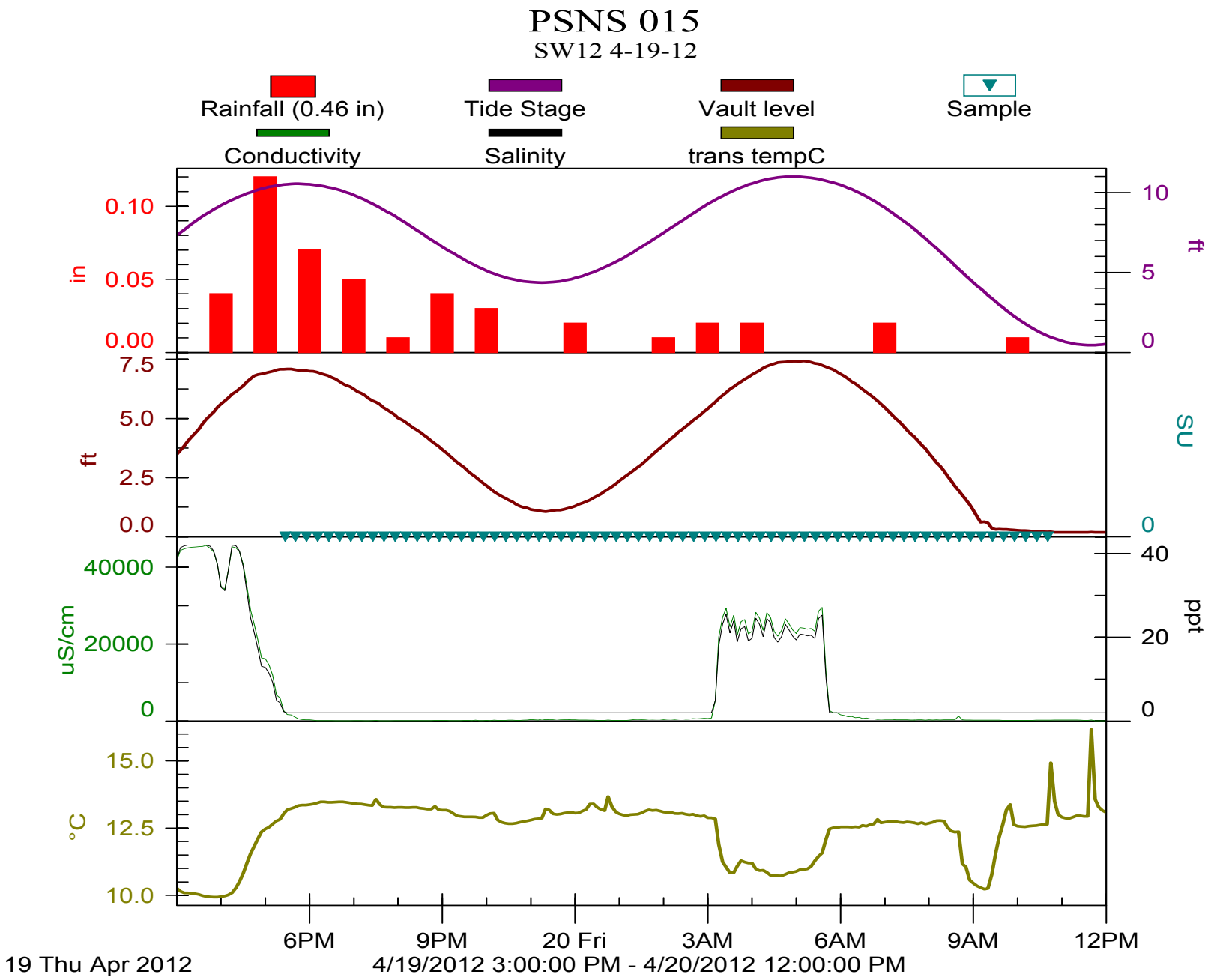
Sample Disposition:
Distribution:
1) PNNL
2) CAS

PSNS NDDSW Monitoring Stormwater Sampling Event #12 (4/19/12)
Stormwater Outfall Total Discharge Volume Estimation Equations

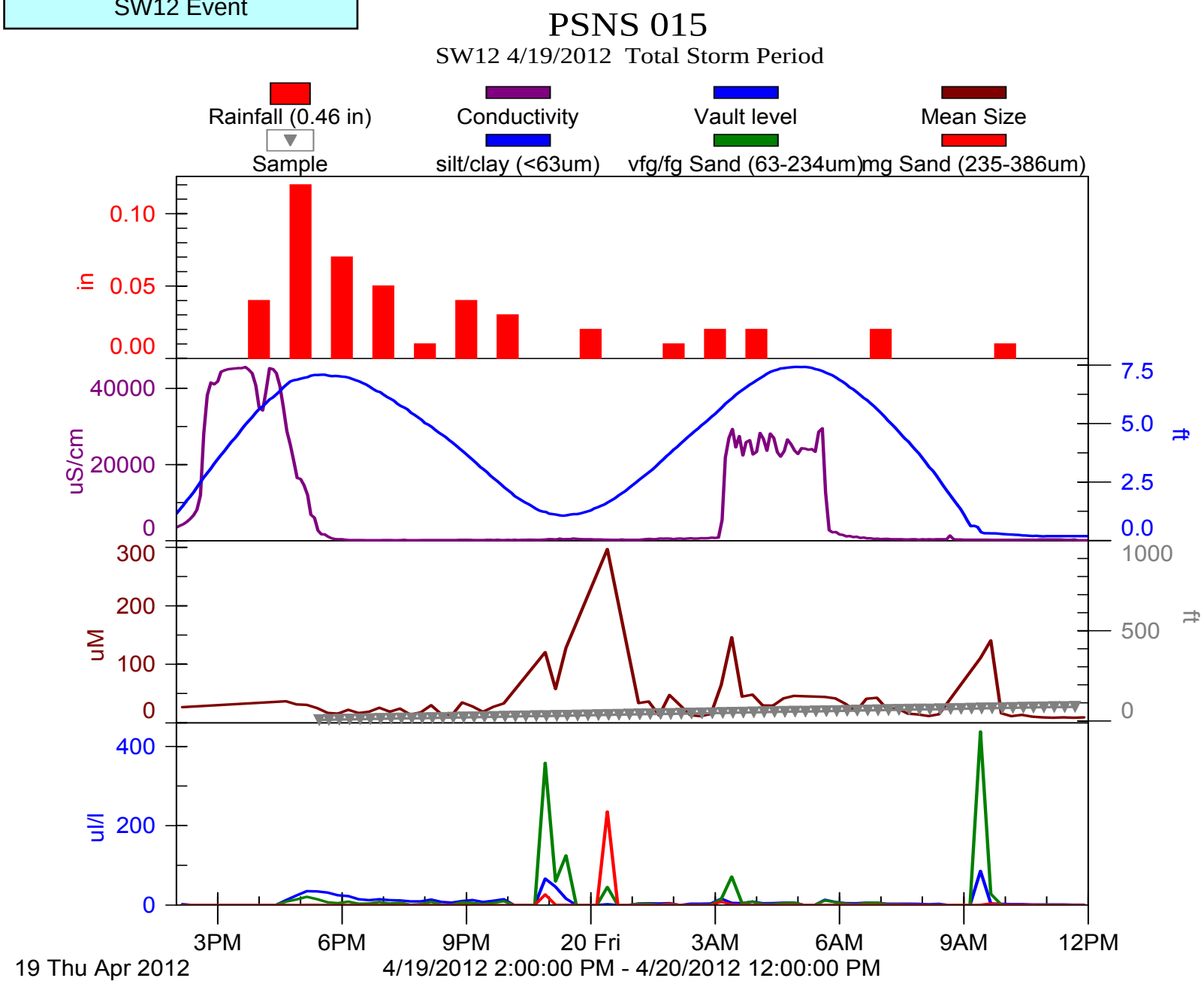
PSNS Drainage Basin	Total Basin Area (ft^2)	Type of Surface	Percentage of Drainage Basin Surface Type	Area of Basin Surface Type (ft^2)	[1]Runoff Coefficient Range	Area of Basin Surface Type with Maximum Coefficient Value Applied (ft^2)	[2]Total Discharge Volume (ft^3)
126	662,986	Impervious	98.55	653,373	0.6 – 0.9	588,036	R(591,881)
		Pervious	1.45	9,613	0.2 – 0.4	3,845	
124.1	116,000	Impervious	94.56	109,690	0.6 – 0.9	98,721	R(101,245)
		Pervious	5.44	6310	0.2 – 0.4	2,524	
124	454,000	Impervious	94.56	429,302	0.6 – 0.9	386,372	R(396,251)
		Pervious	5.44	24,698	0.2 – 0.4	9,879	
115.1	463,042	Impervious	97	449,104	0.6 – 0.9	361,422	R(366,390)
		Pervious	3	13,938	0.2 – 0.4	4,968	
84.1	23,958	Impervious	100	23,958	0.6 – 0.9	21,562	R(21,562)
15	4,018,862	Impervious	50	2,009,431	0.5 – 0.8	1,607,549	R(2,411,321)
		Pervious	50	2,009,431	0.25 – 0.4	803,772	

Calculation Worksheet:

STATION	Combined Drainage Area (FT^2)	**ENTER: Smpl Evnt Rain Total (in)**	Sampl Evnt Rain Total (FT)	STE Runoff Vol. (gal)
126	591,881	0.00	0.0000	0
124.1	101,245	0.00	0.0000	0
124	396,251	0.00	0.0000	0
115.1	366,390	0.00	0.0000	0
84.1	21,562	0.00	0.0000	0
015	2,411,321	0.46	0.0383	691,454

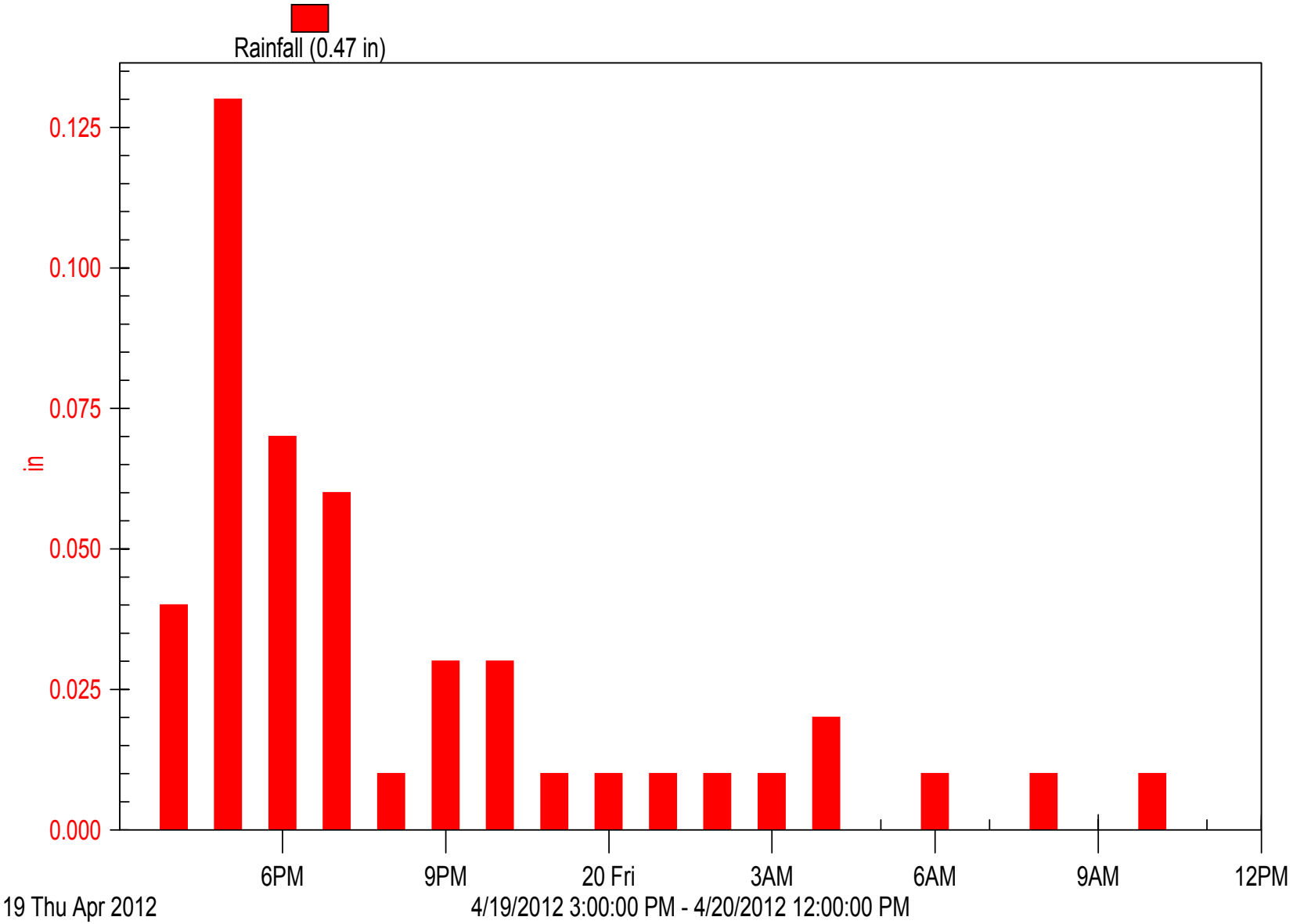

PSNS 015
SW12 4-19-12
Rainfall (0.46 in)
Tide Stage
Vault level
Sample
Conductivity
Salinity
trans tempC
in
0.10
0.05
0.00
ft
10
5
0
ft
7.5
5.0
2.5
0.0
SU
0
uS/cm
40000
20000
0
ppt
40
20
0
°C
15.0
12.5
10.0
6PM
9PM
20 Fri
3AM
6AM
9AM
12PM
19 Thu Apr 2012
4/19/2012 3:00:00 PM - 4/20/2012 12:00:00 PM

LISST-StreamSide Data for the SW12 Event



PSNS B427 Rain

SW12 4-19-12



STE#12 PSNS015

SAMPLER ID# 2425481222 11:48 20-APR-12
Hardware: B2 Software: 3.26
********** PROGRAM SETTINGS **********

PROGRAM NAME:
"PSNS015 "
SITE DESCRIPTION:
"PSNS015 "

UNITS SELECTED:
LENGTH: ft

24, 1000 ml BTLS
22 ft SUCTION LINE
18 ft SUCTION HEAD
0 RINSES, 0 RETRIES

ONE-PART PROGRAM

PACING:
FLOW, EVERY
1 PULSES
SAMPLE AT START

DISTRIBUTION:
4 SAMPLES/BOTTLE

VOLUME:
240 ml SAMPLES

ENABLE:
NONE PROGRAMMED

ENABLE:
ONCE ENABLED,
STAY ENABLED

SAMPLE AT ENABLE

ENABLE:
0 PAUSE & RESUMES

NO DELAY TO START

LIQUID DETECT ON
NO RAIN GAGE

NO YSI SONDE

MASTER/SLAVE OFF
BTL FULL DETECT OFF
TIMED BACKLIGHT

EVENT MARK SENT
DURING PUMP CYCLE

PUMP COUNTS FOR
EACH PURGE CYCLE:
200 PRE-SAMPLE
AUTO POST-SAMPLE

I/O1= NONE
I/O2= NONE
I/O3= NONE
---
0 ANALOG OUTPUTS
NO PERIODIC
SERIAL OUTPUT

NO DIALOUT
CONDITIONS SET

SAMPLER ID# 2425481222 11:48 20-APR-12

STE#12 PSNS015

Hardware: B2 Software: 3.26

********** SAMPLING RESULTS **********

SITE: PSNS015

PROGRAM: PSNS015

Program Started at 13:17 WE 18-APR-12

Nominal Sample Volume = 240 ml

SAMPLE	BOTTLE	TIME	SOURCE	ERROR	COUNT TO LIQUID
		13:17	PGM DISABLED		
---------- TH 19-APR-12 ----------					
		17:23	PGM ENABLED		
1,4	1	17:23	E		750
2,4	1	17:37	F		749
3,4	1	17:52	F		747
4,4	1	18:07	F		748
1,4	2	18:22	F		749
2,4	2	18:37	F		754
3,4	2	18:52	F		753
4,4	2	19:07	F		759
1,4	3	19:22	F		761
2,4	3	19:37	F		766
3,4	3	19:52	F		770
4,4	3	20:07	F		773
1,4	4	20:22	F		776
2,4	4	20:37	F		777
3,4	4	20:52	F		781
4,4	4	21:07	F		784
1,4	5	21:22	F		790
2,4	5	21:37	F		797
3,4	5	21:52	F		803
4,4	5	22:07	F		812
1,4	6	22:22	F		813
2,4	6	22:37	F		820
3,4	6	22:52	F		815
4,4	6	23:07	F		821
1,4	7	23:22	F		816

2,4	7	23:37	F	819
3,4	7	23:52	F	814
---------- FR 20-APR-12 ----------				
4,4	7	00:07	F	814
1,4	8	00:22	F	807
2,4	8	00:37	F	803
3,4	8	00:52	F	801
4,4	8	01:07	F	795
1,4	9	01:22	F	790
2,4	9	01:37	F	789
3,4	9	01:52	F	785
4,4	9	02:07	F	778
1,4	10	02:22	F	775
2,4	10	02:37	F	768
3,4	10	02:52	F	766
4,4	10	03:07	F	767
1,4	11	03:22	F	761
2,4	11	03:37	F	761
3,4	11	03:52	F	759
4,4	11	04:07	F	755
1,4	12	04:22	F	749
2,4	12	04:37	F	745
3,4	12	04:52	F	748
4,4	12	05:07	F	747
1,4	13	05:22	F	746
2,4	13	05:37	F	743
3,4	13	05:52	F	745
4,4	13	06:07	F	749
1,4	14	06:22	F	749
2,4	14	06:37	F	755
3,4	14	06:52	F	757
4,4	14	07:07	F	761
1,4	15	07:22	F	767
2,4	15	07:37	F	768
3,4	15	07:52	F	778
4,4	15	08:07	F	786
1,4	16	08:22	F	790
2,4	16	08:37	F	805

STE#12 PSNS015

```
 3,4   16   08:52     F  NM       *
 4,4   16   09:07     F         827
 1,4   17   09:22     F         826
 2,4   17   09:37     F         823
 3,4   17   09:52     F         823
 4,4   17   10:07     F         826
 1,4   18   10:22     F  NM       *
 2,4   18   10:37     F  NM       *
 3,4   18   10:52     F  NL       *
 4,4   18   11:07     F  NL       *
 1,2   19   11:22     F  NL       *
 2,2   19   11:37     F  NL       *
          11:39  MANUAL PAUSE
          11:39  PGM STOPPED 20-APR
  SOURCE E  ==> ENABLE
  SOURCE F  ==> FLOW
   ERROR NL ==> NO LIQUID DETECTED!
   ERROR NM ==> NO MORE LIQUID!
---------------------------------------
```

National Weather Service National Headquarters

National Weather Service

Area Forecast Discussion

Issued by NWS Seattle/Tacoma, WA

Current Version | Previous Version | Text Only | Print | Product List | Glossary Off
Versions: 1234567891011121314151617181920212223242526272829303132333435 36

000
FXUS66 KSEW 191548
AFDSEW

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE SEATTLE WA
845 AM PDT THU APR 19 2012...CORRECTED

.SYNOPSIS...A FRONTAL SYSTEM WILL REACH WESTERN WASHINGTON THIS AFTERNOON AND EVENING. THE FRONT WILL MOVE THROUGH THE AREA FRIDAY MORNING. WEAK HIGH PRESSURE WILL BUILD LATER FRIDAY INTO SATURDAY. AN UPPER TROUGH WILL DEVELOP OVER THE PACIFIC NORTHWEST NEXT WEEK.

&&

.SHORT TERM...IR SATELLITE IMAGE SHOWS BRIGHTER CLOUD TOPS ASSOCIATED WITH THE WARM FRONTAL MOISTURE APPROACHING THE COAST THIS MORNING. A FEW SHOWERS IN ADVANCE OF THE MAIN BULK OF MOISTURE HAVE ALREADY SKIRTED THROUGH WRN OREGON AND SW WA THIS MORNING. MODELS INDICATE THE STEADIER RAINFALL WILL REACH THE COAST BY MIDDAY AND QUICKLY SPREAD INLAND. MODELS ARE IN BROAD AGREEMENT REGARDING TIMING WITH STEADY RAIN BEGINNING IN THE PUGET SOUND REGION EARLY TO MID AFTERNOON AND INCREASING THROUGH EARLY THIS EVENING. RAINFALL WILL BE MORE GENEROUS WITH THIS SYSTEM ACROSS THE LOWLANDS THAN PREVIOUS SYSTEMS. WIDESPREAD AMOUNTS OF A HALF INCH AND LOCALLY HIGHER SHOULD BE EXPECTED THROUGH THIS EVENING...THEN ADDITIONAL AMOUNTS WITH THE COLD FRONT LATE TONIGHT/FRIDAY MORNING. HEAVIER RAINFALL ACROSS THE SW INTERIOR AND PUGET SOUND WILL LIFT FURTHER NWD BY LATE THIS EVENING THEN SLIDE SWD AGAIN WITH THE FRONT EARLY FRIDAY MORNING. MODELS ARE NOT IN GOOD AGREEMENT AS TO HOW QUICKLY THIS FRONT MOVES OUT OF THE AREA. THE ECMWF IS THE FASTEST WHILE THE GFS SHOWS A DYING FRONT LINGERING INTO EARLY SATURDAY. THE AVERAGE OF THE MODELS THE PAST SEVERAL RUNS INDICATE THE ECMWF SOLUTION MAKES THE MOST SENSE.

HIGH PRESSURE CENTERED OVER THE EXTREME DESERT SW WILL BUILD NWD SATURDAY AND SUNDAY. THIS SHOULD PROVIDE MOSTLY DRY WEATHER FOR THE AREA. HOWEVER...MODELS HAVE NOTABLY BACKED OFF ON THE STRENGTH OF THE RIDGE WHICH IS NOW CENTERED FURTHER S THAN THE FOUR CORNERS REGION THAT THE MODELS INDICATED THE LAST COUPLE DAYS. WHILE A DRY AND WARMER SATURDAY APPEARS TO BE A SAFE BET...THE SUNDAY FORECAST IS SOMEWHAT TRICKIER. IF THE RIDGE FLATTENS AND MOVES OFF TO THE E A LITTLE QUICKER...THEN MOIST SW FLOW COULD BRING SOME LIGHT RAIN TO THE COAST AND OLYMPIC PENINSULA...AND POSSIBLY EVEN TO AREAS FURTHER INLAND. WATCHING HOW MODELS HAVE VARIED THE PAST COUPLE DAYS AND ALSO THE GENERAL PATTERN MAKES ME BELIEVE DRY WEATHER WILL HOLD ACROSS THE AREA WITH JUST A CHANCE OF SOME LIGHT RAIN SKIRTING THE COAST AND MAYBE OLYMPICS...IF ANY RAIN AT ALL. IF THE MOISTURE REMAINS MOSTLY OFFSHORE...SUNDAY COULD IN FACT BE THE WARMEST DAY. THE 60S IN THE FORECAST AREA FINE FOR NOW BUT I COULD ENVISION THE GREATER PUGET SOUND REGION REACHING NEAR 70. MERCER

.LONG TERM...PREVIOUS DISCUSSION FOLLOWS...DETAILS OF HOW MUCH MOISTURE KICKS OUT OF THE WEAK UPPER TROUGH SUNDAY AND MONDAY KEEPS CHANGING. THE LATEST 00Z GFS HAS THE TROUGH MOVING THROUGH THE REGION MONDAY AND A NEW PRETTY VIGOROUS LOOKING UPPER TROUGH DEVELOPING IN THE NE PAC TUE AND WED...SO THE FIRST HALF OF NEXT WEEK IS LIKELY TO BE COOL AND WET. THE MOSTLY CLOUDY/CHANCE OF SHOWERS THAT IS IN THE FCST NOW PROBABLY NEEDS A PUSH TOWARD AT LEAST A COUPLE PERIODS OF MORE ORGANIZED PRECIPITATION. 19

&&

.AVIATION...WESTERLY FLOW ALOFT OVER THE PACIFIC NORTHWEST THIS MORNING WITH A WEAK UPPER RIDGE JUST OFFSHORE. THE RIDGE WILL MOVE INLAND TODAY...THEN THE FLOW WILL INCREASE AND BACK TO SOUTHWEST AS A FRONT MOVES THROUGH THE REGION LATE TODAY AND TONIGHT. THE AIR MASS WILL BE STABLE AND WITH MID LEVEL MOISTURE THIS MORNING...THEN BECOME MOIST ALL LEVELS BY AFTERNOON.

MOSTLY VFR SKIES ACROSS WESTERN WASHINGTON THIS MORNING...BUT THERE IS A MIX OF CONDITIONS WITH LOCAL IFR CEILINGS AND ISOLATED FOG AT THE MOST FOG-PRONE SPOTS. MID LEVEL CLOUDS WILL INCREASE LATE THIS MORNING...AND RAIN WITH THE INCOMING FRONT WILL REACH THE COAST BEFORE NOON AND SPREAD INLAND DURING THE AFTERNOON. CONDITIONS SHOULD DETERIORATE TO MVFR AND LOCAL IFR RATHER QUICKLY THIS AFTERNOON. MOIST ONSHORE FLOW WILL MEAN LITTLE IMPROVEMENT BEHIND THE FRONT LATER TONIGHT.

KSEA...RAIN WILL BEGIN AT KSEA AROUND 2 PM TODAY WITH MVFR CONDITIONS LIKELY BY 5 PM. MCDONNAL/13

&&

.MARINE...A FRONT WILL MOVE INTO THE WASHINGTON COASTAL WATERS LATE TODAY AND INLAND ACROSS WESTERN WASHINGTON TONIGHT. THE FRONT SHOULD BRING SMALL CRAFT ADVISORY SOUTHERLY WINDS TO THE COASTAL WATERS AND MOST INLAND WATERS ZONES...FOLLOWED BY WESTERLY SMALL CRAFT ADVISORY WINDS TONIGHT IN THE CENTRAL STRAIT OF JUAN DE FUCA AND EAST ENTRANCE.

HIGH PRESSURE WILL BUILD OVER THE PACIFIC NORTHWEST OFFSHORE WATERS IN THE WAKE OF THE FRONT LATE TONIGHT AND FRIDAY. THE HIGH WILL SHIFT INLAND FRIDAY NIGHT AND SATURDAY...AND A WEAK FRONT COULD BRUSH THE FORECAST AREA SUNDAY. ONSHORE FLOW WILL DEVELOP MONDAY.
MCDONNAL

&&

.SEW WATCHES/WARNINGS/ADVISORIES...
WA...NONE.
PZ...SMALL CRAFT ADVISORY ALL WATERS.

$$

FOR THE GRAPHICAL AFD VISIT...
WWW.WEATHER.GOV/SEATTLE/GAFD/LATEST_WEBAFD.HTML

Your National Weather Service forecast

Bremerton WA

Enter Your "City, ST" or zip code Go

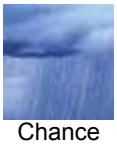
BOOKMARK

NWS Seattle, WA

Point Forecast: Bremerton WA
47.56°N 122.62°W (Elev. 0 ft)

Mobile Weather Information | **En Español**
Last Update: 5:11 am PDT Apr 19, 2012
Forecast Valid: 12pm PDT Apr 19, 2012-6pm PDT Apr 25, 2012

Forecast at a Glance

This Afternoon	Tonight	Friday	Friday Night	Saturday	Saturday Night	Sunday	Sunday Night	Monday
								
Rain Likely	Rain	Showers	Mostly Cloudy	Partly Sunny	Mostly Cloudy	Mostly Cloudy	Chance Showers	Chance Showers
Hi 57 °F	Lo 48 °F	Hi 56 °F	Lo 47 °F	Hi 59 °F	Lo 47 °F	Hi 61 °F	Lo 49 °F	Hi 59 °F

Detailed 7-day Forecast

This Afternoon: Rain likely. Cloudy, with a high near 57. South wind around 7 mph. Chance of precipitation is 70%.

Tonight: Rain. Low around 48. South southwest wind between 5 and 14 mph. Chance of precipitation is 100%.

Friday: Showers, mainly before 11am. High near 56. Southwest wind at 7 mph becoming northeast. Chance of precipitation is 90%.

Friday Night: Mostly cloudy, with a low around 47. Calm wind.

Saturday: Partly sunny, with a high near 59. North northeast wind between 5 and 7 mph.

Saturday Night: Mostly cloudy, with a low around 47.

Sunday: Mostly cloudy, with a high near 61.

Sunday Night: A chance of showers. Mostly cloudy, with a low around 49.

Monday: A chance of showers. Mostly cloudy, with a high near 59.

Monday Night: A chance of showers. Mostly cloudy, with a low around 45.

Tuesday: A chance of showers. Mostly cloudy, with a high near 56.

Tuesday Night: A chance of showers. Mostly cloudy, with a low around 45.

Wednesday: A chance of showers. Mostly cloudy, with a high near 57.

Detailed Point Forecast [Move Down]

Click Map for Forecast Disclaimer

Requested Location Forecast Area

Lat/Lon: 47.56°N 122.62°W **Elevation:**0 ft

XML

Current Conditions [Move Up]

Bremerton, Bremerton National Airport (KPWT)
Lat: 47.5 Lon: -122.75 Elev: 440
Last Update on 19 Apr 10:55 PDT
Observation Quality is Caution

Mostly Cloudy

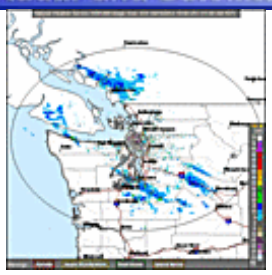
36°F

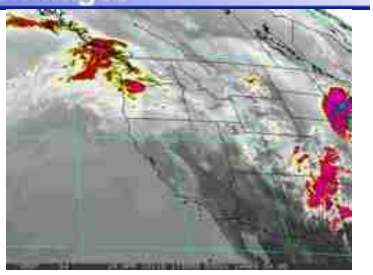
Humidity:	100 %
Wind Speed:	SSW 5 MPH
Barometer:	30.09 in (N/A mb)
Dewpoint:	36°F (2°C)
Wind Chill:	32°F (0°C)

(2°C) **Visibility**: 10.00 Miles

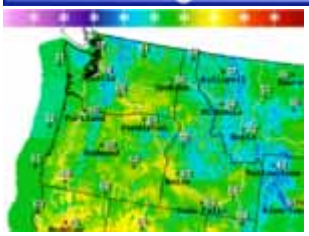
More Local Wx: **3 Day History:**

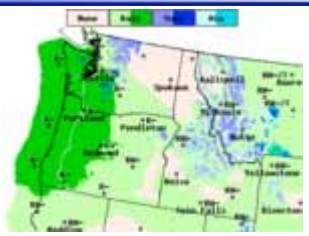
Radar and Satellite Images





National Digital Forecast Database





Additional Forecasts & Information

Zone Area Forecast for Seattle/Bremerton Area, WA

Forecast Discussion

Printable Forecast | Text Only Forecast

Hourly Weather Graph | Tabular Forecast

Quick Forecast

International System of Units | About Point Forecasts

Forecast Weather Table Interface

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National Weather Service:
Seattle, WA

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National Weather Service Forecast Office
Seattle, WA

Home News Organization Search for: NWS All NOAA Go

Point Forecast: Bremerton WA
47.56N 122.62W (Elev. 0 ft)

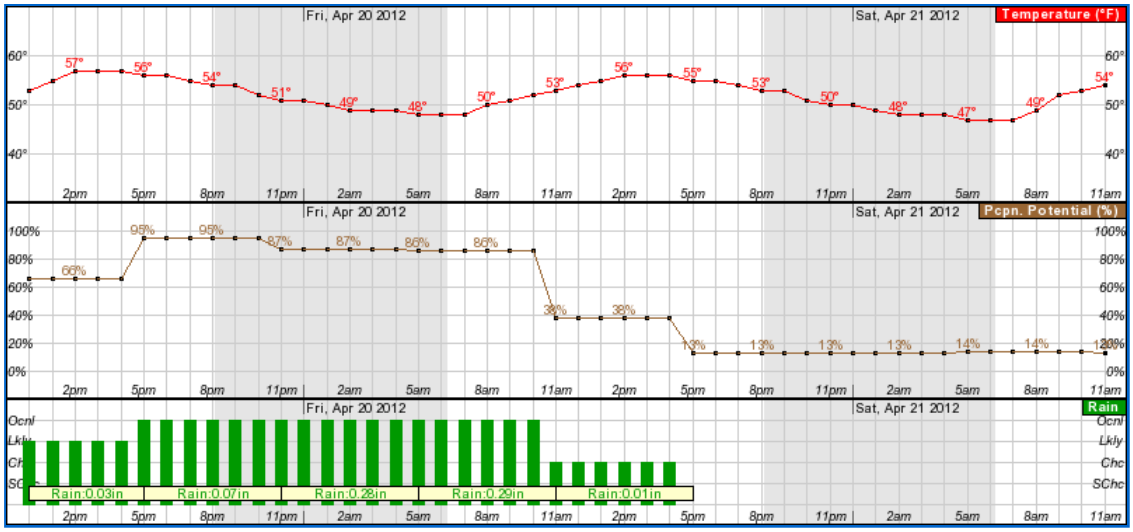
Last Update: 5:11 am PDT Apr 19, 2012

Hourly Weather Forecast Graph

[dashes/dots] | [b/w] | [hide menu]

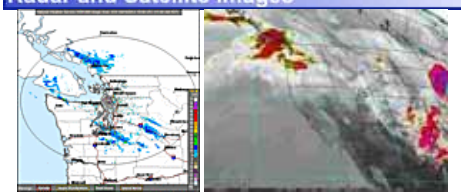
Weather Elements	Weather/Precipitation	Fire Weather
☑ Temperature (°F)	☐ Thunder	☐ Mixing Height (x100ft)
☐ Dewpoint (°F)	☑ Rain	☐ Haines Index
☐ Wind Chill (°F)	☐ Snow	☐ Lightning Activity Level
☐ Surface Wind mph	☐ Freezing Rain	☐ Trans. Wind mph
☐ Sky Coverage	☐ Sleet	
☑ Precipitation Potential		
☐ Relative Humidity		

48-Hour Period Starting: 12pm Thu, Apr 19 2012 Submit Back 2 Days Forward 2 Days



Saturday, April 21 at 9am
Temperature: 52 °F
Precipitation Potential: 14%
Rain: <10%

Radar and Satellite Images



Additional Forecasts & Information

International System of Units
7-Day Forecast
Forecast Discussion
Tabular Forecast
Quick Forecast

Webmaster
NOAA's National Weather Service
Seattle, WA

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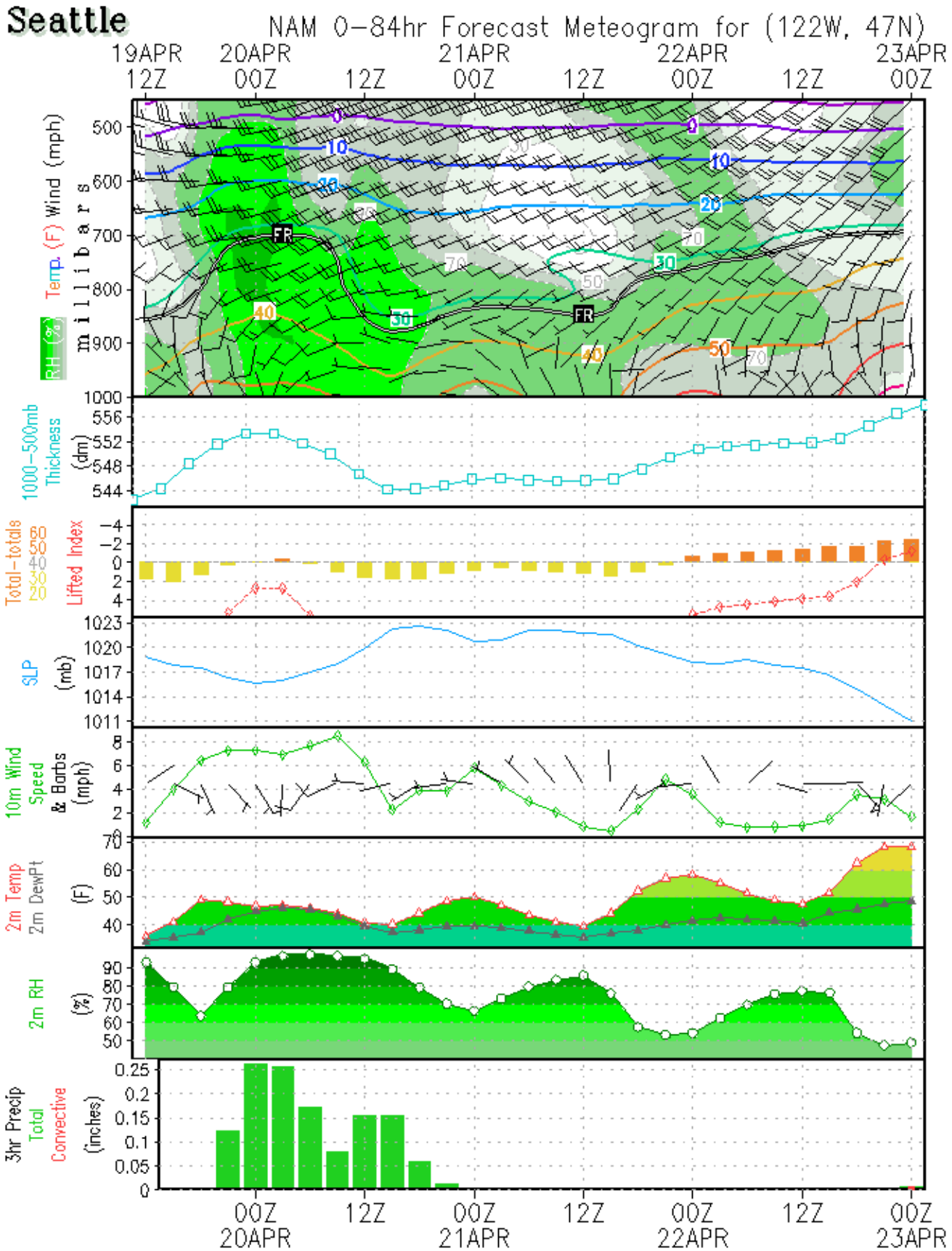
Forecast For Lat/Lon: 47.5620/-122.6230 (Elev. 0 ft)
Bremerton WA

Custom Weather Forecast Table

	Thu Apr 19							Fri Apr 20							Sat Apr 21
Weather	Likely Rain			Rain			Rain	Chance Rain Showers							
Daily-Temp	High **57** Low **43**							High **56** Low **48**							Low **47**
Chance of Precip	15%	65%		95%	85%		85%	40%		15%	15%				
Precip	0.00"	0.04"		0.07"	0.28"		0.29"	0.01"		0.00"	0.00"				
12-hr Snow Total	0"			0"			0"			0"					
3-Hour	5am	8am	11am	2pm	5pm	8pm	11pm	2am	5am	8am	11am	2pm	5pm	8pm	11pm	2am
Temp	43	46	51	57	56	54	51	49	48	50	53	56	55	53	50	48
Cloudiness	57%	57%	100%	100%	100%	100%	100%	100%	91%	91%	74%	74%	60%	60%	60%	60%
Dewpoint	42	44	45	47	47	47	47	47	47	47	47	47	47	47	46	46
Relative Humdity	96%	93%	80%	69%	72%	77%	86%	93%	96%	89%	80%	72%	74%	80%	86%	93%
Wind	S	E	SE	S	S	S	S	SW	SW	NE	NE	SE	S	S	N	N
	3	3	6	7	5	14	12	8	5	6	7	3	2	2	2	2
Snow Level (ft)	3189	3189	5152	5152	8191	8191	8433	8433	7005	7005	4886	4886	4833	4833	5452	5452


Seattle
NAM 0-84hr Forecast Meteogram for (122W, 47N)
19APR 12Z
20APR 00Z
12Z
21APR 00Z
12Z
22APR 00Z
12Z
23APR 00Z
RH (%)
Temp. (F)
Wind (mph)
millibars
500
600
700
800
900
1000
1000-500mb Thickness (dm)
556
552
548
544
Total-totals
Lifted Index
SLP (mb)
1023
1020
1017
1014
1011
10m Wind Speed & Barbs (mph)
2m Temp
2m DewPt
(F)
2m RH (%)
3hr Precip
Total
Convective
(inches)
0.25
0.2
0.15
0.1
0.05
0
00Z 20APR
12Z
00Z 21APR
12Z
00Z 22APR
12Z
00Z 23APR

Telemetry Data Summary Report
QAQC Data Notes from SW12
Data review from 3/16/12 to 4/24/12

Site	Parameter	Issue	Start Date/Time	End Date/Time	GAR Level of Concern	Comments
15	Level	Level Drift	3/13/2012 13:45	4/13/2012 15:15	Amber	Transducer level drifted up gradually during this period (base level from approx. 0.06' to 0.25'); from 4/13/12 15:15 to the end of record it recorded a base level of approx. 0.19'))
84.1	YSI Temperature	Inconsistent Data	Entire Record	Entire Record	Amber	YSI temperature doesn't track well with INW transducer temperature during dry conditions, and generally above 30 degrees C
84.1	All	End of Data		4/5/2012 11:25	Green	End of data record
115.1	Rainfall	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
115.1	Level	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
115.1	Temperature	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
115.1	Salinity	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
115.1	Conductivity	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
115.1	Conductivity	Inaccurate Data	Low Tide	Low Tide	Green	Negative measurements recorded during low-low tides on 4/6, 4/11, 4/12, and 4/20…disregard as error due to sensor being in air
115.1	Salinity	Null Data	Low Tide	Low Tide	Green	No measurements recorded during low-low tides on 4/6, 4/11, 4/12, and 4/20…disregard as error due to the Conductivity sensor recording negative values
126	Rainfall	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
126	Level	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
126	Temperature	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
126	Salinity	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch
126	Conductivity	Missing Data	3/16/2012 9:00	3/16/2012 9:55	Green	Missing Data due to DST switch

APPENDIX B

Analytical Chemistry Data Reports

SW08 Through SW12

Analytical Chemistry Data Package

Project: Non-Dry Dock Stormwater SW08 - November 21, 2011 and Equipment Blanks Chemical Analyses

Battelle Project No. 54220
CF No. 3174

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, WA 98382
PM: Jill Brandenberger
(360) 681-4564

CHEMISTRY ANALYSIS
DATA PACKAGE CONTENTS

Non-Dry Dock Stormwater
SW08 November 21, 2011 and
Equipment Blanks (EB)
Chemical Analyses

Chemistry Analysis Summaries

Sample Custody Information

CVAF Analysis of Samples for Hg

Analytical raw data available upon request

ICP-MS Analysis of Samples for Metals

Analytical raw data available upon request

Analysis of TPH, TOC/DOC, TSS, Hardness

Analytical raw data available upon request

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011_SW08
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	MSL Code	Collection Date	Hg	As	Ag	Al	Cd
			Instrument:			*CVAF*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Freshwater)						0.0001	0.03	0.002	0.3	0.004
Freshwater Reporting Limit (MDL* 3.18)						0.0003	0.1	0.006	1.0	0.01
SW08										
SW08-0013	PSNS015	TME	Composite_equal_time	3174*79	11/22/11	0.0266	0.689	0.0196	408	0.0518
SW08-0014	PSNS015	DME	Composite_equal_time	3174*80	11/22/11	0.00325	0.542	0.002 J	30.2	0.0264
SW08-0015	PSNS084.1	TME	Composite_equal_time	3174*81	11/22/11	0.00409	0.947	0.0190	292	0.163
SW08-0016	PSNS084.1	DME	Composite_equal_time	3174*82	11/22/11	0.00123	0.840	0.00230 J	19.5	0.106
SW08-0017	PSNS115.1	TME	Composite_equal_time	3174*83	11/22/11	0.0168	2.65	0.0739	311	0.531
SW08-0018	PSNS115.1	DME	Composite_equal_time	3174*84	11/22/11	0.00194	2.22	0.0106	6.47	0.270
SW08-0019	PSNS124	TME	Composite_equal_time	3174*85	11/22/11	0.0188	2.21	0.0457	197	0.380
SW08-0020	PSNS124	DME	Composite_equal_time	3174*86	11/22/11	0.00183	1.53	0.00371 J	7.00	0.181
SW08-0021	PSNS124.1	TME	Composite_equal_time	3174*87	11/22/11	0.00701	0.987	0.0311	293	1.02
SW08-0022	PSNS124.1	DME	Composite_equal_time	3174*88	11/22/11	0.00271	0.646	0.002 U	15.4	0.566
SW08-0023	PSNS126	TME	Composite_equal_time	3174*89	11/22/11	0.00568	3.50	0.0418	124	0.202
SW08-0024	PSNS126	DME	Composite_equal_time	3174*90	11/22/11	0.00213	3.28	0.0193	15.3	0.129
Equipment Blanks										
SW08-001	PSNS 115.1	TME	Composite_equal_time	3174*73	10/31/11	0.000116 J	0.03 U	0.00225 J	0.3 U	0.004 U
SW08-002	PSNS 124	TME	Composite_equal_time	3174*74	10/31/11	0.000158 J	0.03 U	0.002 U	0.323 J	0.004 U
SW08-003	PSNS 84.1	TME	Composite_equal_time	3174*75	11/01/11	0.000176 J	0.03 U	0.002 U	0.375 J	0.004 U
SW08-004	PSNS 015	TME	Composite_equal_time	3174*76	11/01/11	0.000205 J	0.03 U	0.002 U	0.837 J	0.004 U
SW08-005	PSNS 126	TME	Composite_equal_time	3174*77	11/02/11	0.000242 J	0.03 U	0.002 U	0.3 U	0.004 U
SW08-006	PSNS 124.1	TME	Composite_equal_time	3174*78	11/02/11	0.000179 J	0.03 U	0.002 U	0.3 U	0.004 U

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Non-Dry Dock Stormwater
ENVVEST 2011_SW08
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	**MSL Code**	**Cr**	**Cu**	**Pb**	**Zn**	CVAF Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*		
Laboratory Achieved Detection Limits (Freshwater)					0.08	0.007	0.002	0.05		
Freshwater Reporting Limit (MDL* 3.18)					0.3	0.02	0.006	0.2		
SW08										
SW08-0013	PSNS015	TME	Composite_equal_time	3174*79	2.32	8.05	8.96	56.8	122011HGA	121911-6100
SW08-0014	PSNS015	DME	Composite_equal_time	3174*80	1.49	3.94	2.35	39.7	122011HGA	121911-6100
SW08-0015	PSNS084.1	TME	Composite_equal_time	3174*81	3.10	14.7	3.88	137	122011HGA	121911-6100
SW08-0016	PSNS084.1	DME	Composite_equal_time	3174*82	2.20	7.33	0.207	116	122011HGA	121911-6100
SW08-0017	PSNS115.1	TME	Composite_equal_time	3174*83	14.9	33.5	16.6	206	122011HGA	121911-6100
SW08-0018	PSNS115.1	DME	Composite_equal_time	3174*84	12.6	9.04	0.472	139	122011HGA	121911-6100
SW08-0019	PSNS124	TME	Composite_equal_time	3174*85	7.08	74.2	8.63	114	122011HGA	121911-6100
SW08-0020	PSNS124	DME	Composite_equal_time	3174*86	5.00	19.6	0.245	64.6	122011HGA	121911-6100
SW08-0021	PSNS124.1	TME	Composite_equal_time	3174*87	8.03	43.6	12.9	201	122011HGA	121911-6100
SW08-0022	PSNS124.1	DME	Composite_equal_time	3174*88	3.62	12.2	0.606	127	122011HGA	121911-6100
SW08-0023	PSNS126	TME	Composite_equal_time	3174*89	2.22	16.9	4.50	80.3	122011HGA	121911-6100
SW08-0024	PSNS126	DME	Composite_equal_time	3174*90	1.56	11.4	0.359	61.5	122011HGA	121911-6100
Equipment Blanks										
SW08-001	PSNS 115.1	TME	Composite_equal_time	3174*73	0.08 U	0.0333	0.00209 J	0.104 J	122011HGA	121911-6100
SW08-002	PSNS 124	TME	Composite_equal_time	3174*74	0.08 U	0.0784	0.00540 J	0.398	122011HGA	121911-6100
SW08-003	PSNS 84.1	TME	Composite_equal_time	3174*75	0.08 U	0.245	0.00526 J	0.247	122011HGA	121911-6100
SW08-004	PSNS 015	TME	Composite_equal_time	3174*76	0.08 U	0.239	0.0183	0.478	122011HGA	121911-6100
SW08-005	PSNS 126	TME	Composite_equal_time	3174*77	0.08 U	0.0636	0.00448 J	0.133 J	122011HGA	121911-6100
SW08-006	PSNS 124.1	TME	Composite_equal_time	3174*78	0.08 U	0.0747	0.0181	0.0865 J	122011HGA	121911-6100

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Non-Dry Dock Stormwater
ENVVEST 2011_SW08

Station Code	Type Name	Collection Date	Analysis Date	Analysis Method	Component	Units	Result		Detection Limit	Reporting Limit
PSNS015	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	3.39	=	0.07	0.50
PSNS084.1	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	2.27	=	0.07	0.50
PSNS115.1	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.28	=	0.07	0.50
PSNS124	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.34	=	0.07	0.50
PSNS124.1	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.43	=	0.07	0.50
PSNS126	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	2.52	=	0.07	0.50
PSNS015	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Total Organic	mg/L	3.34	=	0.07	0.50
PSNS084.1	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Total Organic	mg/L	2.48	=	0.07	0.50
PSNS115.1	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Total Organic	mg/L	1.65	=	0.07	0.50
PSNS124	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Total Organic	mg/L	1.79	=	0.07	0.50
PSNS124.1	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Total Organic	mg/L	1.47	=	0.07	0.50
PSNS126	Composite_equal_time	11/22/2011	11/30/2011	SM 5310 C	Carbon, Total Organic	mg/L	2.60	=	0.07	0.50
PSNS015	Composite_equal_time	11/22/2011	12/01/2011	SM 2340 C	Hardness, Total as CaCO3	mg/L	25.2	=	0.8	2.0
PSNS084.1	Composite_equal_time	11/22/2011	12/01/2011	SM 2340 C	Hardness, Total as CaCO3	mg/L	28.4	=	0.8	2.0
PSNS115.1	Composite_equal_time	11/22/2011	12/01/2011	SM 2340 C	Hardness, Total as CaCO3	mg/L	162	=	0.8	2.0
PSNS124	Composite_equal_time	11/22/2011	12/01/2011	SM 2340 C	Hardness, Total as CaCO3	mg/L	66.8	=	0.8	2.0
PSNS124.1	Composite_equal_time	11/22/2011	12/01/2011	SM 2340 C	Hardness, Total as CaCO3	mg/L	28.4	=	0.8	2.0
PSNS126	Composite_equal_time	11/22/2011	12/01/2011	SM 2340 C	Hardness, Total as CaCO3	mg/L	29.2	=	0.8	2.0
PSNS015	Composite_equal_time	11/22/2011	11/29/2011	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	18.0	=		5.0
PSNS084.1	Composite_equal_time	11/22/2011	11/29/2011	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	9.0	=		5.0
PSNS115.1	Composite_equal_time	11/22/2011	11/29/2011	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	28.5	=		5.0
PSNS124	Composite_equal_time	11/22/2011	11/29/2011	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	19.5	=		5.0
PSNS124.1	Composite_equal_time	11/22/2011	11/29/2011	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	12.0	=		5.0
PSNS126	Composite_equal_time	11/22/2011	11/29/2011	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	8.0	=		5.0
PSNS015	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	140	=, J	12	270
PSNS015	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	360	=, J	20	530
PSNS115.1	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	67	=, J	12	270
PSNS115.1	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	200	=, J	21	540
PSNS084.1	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	120	=, J	12	270
PSNS084.1	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	290	=, J	20	530
PSNS124	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	69	=, J	12	270
PSNS124	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	200	=, J	20	530
PSNS124.1	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	110	=, J	12	260
PSNS124.1	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	280	=, J	20	520
PSNS126	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	120	=, J	12	260
PSNS126	Grab	11/22/2011	12/01/2011	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	270	=, J	20	520
Equipment Blanks										
EB_SW08-007	Grab	11/02/2011	11/10/2011	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	14	=, J	12	280
EB_SW08-007	Grab	11/02/2011	11/10/2011	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	35	=, J	21	550

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Non-Dry Dock Stormwater
ENVVEST 2011_SW08
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	MSL Code	As	Ag	Al	Cd	Cr	Cu	Pb	Zn	ICP-MS Batch ID
				Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	
Laboratory Achieved Detection Limits (Freshwater)					0.03	0.002	0.3	0.004	0.08	0.007	0.002	0.05	
Freshwater Reporting Limit (MDL* 3.18)					0.1	0.006	1.0	0.01	0.3	0.02	0.006	0.2	
METHOD BLANKS													
MB-1		TME	Freshwater	TRM Blank R1	0.03 U	0.002 U	0.3 U	0.004 U	0.08 U	0.007 U	0.002 U	0.05 U	121911-6100
MB-2		TME	Freshwater	TRM Blank R2	0.03 U	0.002 U	0.3 U	0.004 U	0.08 U	0.007 U	0.002 U	0.05 U	121911-6100
LABORATORY CONTROL SAMPLES													
Spiking Level					**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	
LCS-1		TME	Freshwater	TRM LCS R1	2.01	1.93	2.25	2.01	2.05	2.00	2.05	2.03	121911-6100
LCS-2		TME	Freshwater	TRM LCS R2	2.02	1.93	2.16	2.04	2.00	1.97	2.05	2.01	121911-6100
				Percent Recovery, LCS	**101%**	**97%**	**113%**	**101%**	**103%**	**100%**	**103%**	**102%**	
				Percent Recovery, LCS	**101%**	**97%**	**108%**	**102%**	**100%**	**99%**	**103%**	**101%**	
MATRIX SPIKE RESULTS													
SW08-0014	PSNS015	DME	Composite_equal_time	3174*80	0.542	0.002 U	30.2	0.0264	1.49	3.94	2.35	39.7	121911-6100
MS		DME	Composite_equal_time	3174*80 MS	2.66	1.73	81.0	2.06	3.58	5.85	4.42	90.7	121911-6100
MSD		DME	Composite_equal_time	3174*80 MSD	2.65	1.78	80.3	2.08	3.46	5.92	4.35	90.7	121911-6100
				Spiking Level	2	2	50	2	2	2	2	50	
				Percent Recovery, MS	**106%**	**87%**	**102%**	**102%**	**105%**	**96%**	**104%**	**102%**	
				Percent Recovery, MSD	**105%**	**89%**	**100%**	**103%**	**99%**	**99%**	**100%**	**102%**	
				RPD	**0.5%**	**2.8%**	**1.4%**	**1.0%**	**5.9%**	**3.6%**	**3.4%**	**0.0%**	
REPLICATE PRECISION													
SW08-0015	PSNS084.1	TME	Composite_equal_time	3174*81	0.947	0.0190	292	0.163	3.10	14.7	3.88	137	121911-6100
DUP	PSNS032	TME	Composite_equal_time	3174*81r2	0.966	0.0202	305	0.158	3.25	15.0	3.88	140	121911-6100
				Mean	*0.957*	*0.0196*	*299*	*0.161*	*3.18*	*14.9*	*3.88*	*139*	
				RPD	**2.0%**	**6.1%**	**4.4%**	**3.1%**	**4.7%**	**2.0%**	**0.0%**	**2.2%**	
STANDARD REFERENCE MATERIAL, Seawater													
SRM 1640-1		TME	Freshwater	TRM 1640 R1 10x	26.7	6.38	57.5	23.0	38.8	88.4	28.3	57.4	121911-6100
SRM 1640-2		TME	Freshwater	TRM 1640 R2 10x	26.3	6.35	59.7	23.5	37.9	86.0	28.0	57.2	121911-6100
				Certified Value	**26.7**	**7.62**	**52.0**	**22.8**	**38.6**	**85.2**	**27.9**	**53.2**	
				PD	**0.1%**	**16.3%**	**10.6%**	**0.9%**	**1%**	**3.8%**	**1.5%**	**7.9%**	
				PD	**1.4%**	**16.7%**	**14.8%**	**3.1%**	**2%**	**0.9%**	**0.4%**	**7.5%**	

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Non-Dry Dock Stormwater
ENVVEST 2011_SW08
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	MSL Code	Hg	CVAF Batch ID
				Instrument:	*CVAF*	
Laboratory Achieved Detection Limits					**0.0001**	
Reporting Limit (MDL* 3.18)					**0.0003**	
METHOD BLANKS						
MB-1		TME	Freshwater	MB1_121911	0.0001 U	122011HGA
MB-2		TME	Freshwater	MB2_121911	0.0001 U	122011HGA
MB-3		TME	Freshwater	MB3_121911	0.0001 U	122011HGA
LABORATORY CONTROL SAMPLES						
Spiking Level					0.00496	
LCS (1)		TME	Freshwater	OPR 121911 run1	0.00524	122011HGA
LCS (2)		TME	Freshwater	OPR 121911 run2	0.00525	122011HGA
LCS Blank (1)		TME	Freshwater	Blank121911	0.000142 J	122011HGA
				Percent Recovery, LCS 1	**103%**	
				Percent Recovery, LCS 2	**103%**	
SW08-0014	PSNS015	DME	Composite_equal_time	3174*80	0.00325	122011HGA
MS1	PSNS015	DME	Composite_equal_time	3174*80 MS	0.0140	122011HGA
MSD1	PSNS015	DME	Composite_equal_time	3174*80 MSD	0.0151	122011HGA
				Spiking Level, MS	0.0110	
				Spiking Level, MSD	0.0113	
				Percent Recovery, MS	**98%**	
				Percent Recovery, MSD	**105%**	
				RPD	**7.0%**	
SW08-0021	PSNS124.1	TME	Composite_equal_time	3174*87	0.00701	122011HGA
MS2	PSNS124.1	TME	Composite_equal_time	3174*87 MS	0.0338	122011HGA
MSD2	PSNS124.1	TME	Composite_equal_time	3174*87 MSD	0.0345	122011HGA
				Spiking Level, MS	0.0271	
				Spiking Level, MSD	0.0274	
				Percent Recovery, MS	**99%**	
				Percent Recovery, MSD	**100%**	
				RPD	**1.3%**	
REPLICATE PRECISION						
SW08-0013	PSNS015	TME	Composite_equal_time	3174*79	0.0266	122011HGA
DUP	PSNS015	TME	Composite_equal_time	3174*79r2	0.0210	122011HGA
				Mean	*0.0238*	
				RPD	**24%**	
STANDARD REFERENCE MATERIAL						
SRM 1641 (1)		TME	Freshwater	1641d 121911	1601	122011HGA
				Certified Value	**1590**	
				range	**±18**	
	SRM 1641 (1)			**PD**	**1%**	

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ENVVEST 2011_SW08
Metals in Water

DATA QUALIFIERS:

c	Exceeds DQO but meets contingency criteria of either:
1	SRM certified <10x MDL
2	Insufficient spiking level relative to native sample concentrations
3	Sample concentration <10x MDL
U	Analyte not detected at or above the MDL, MDL reported
J	Analyte detected above the MDL, but less than the RL
N	Spiked sample recovery outside QC criterion of 70-130%
&	Accuracy result outside QC criterion of ≤20% PD
*	Precision result outside QC criterion of <30%
NS	Sample not spiked for this analyte
B	Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value
b	Data are blank corrected using the batch specific procedural blank
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern inidicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
ND	Not detected

Notes:

Composite_equal_time	Equal portion composite of time integrated sample (ISCO samples)
NC	Not Certified
--	Not analyzed
NA	Not applicable/available
TME	Total Metals Fraction
DME	Dissolved Metals Fraction
2	Sample specific MDLs and RLs reported

QA/QC NARRATIVE

PROJECT: Non-Dry Dock Stormwater Sampling for SW08

PARAMETER: Total and Dissolved Metals – Al, Ag, As, Cd, Cr, Cu, Pb, Zn, Hg

LABORATORY: Battelle Marine Sciences Laboratory (MSL), Sequim, Washington

MATRIX: Stormwater (as a freshwater matrix)

SAMPLE CUSTODY AND PROCESSING:

Samples were collected from stormwater outfalls located within the Confined Industrial Area (CIA) and Naval Base Kitsap (NBK) at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) by TEC, MSL, and the U.S. Navy. This storm is the first of the 2011-12 storm season and outfalls include a combination of new outfall basins and additional sampling of outfalls collected during the 2010-11 storm season. The repeated outfalls include PSNS015 and PSNS126. The new outfalls include PSNS084.1, PSNS115.1, PSNS124, and PSNS124.1. Two types of samples were collected and reported in this delivery group. The first were various equipment blanks to ensure the Teflon tubing, polycarbonate wedge bottles, composite glass jar, and final sample containers would not significantly contribute metals to the composite samples. The second were stormwater composite samples collected from those stations during SW08. The storm event identified as SW08 began on November 21, 2011 with the composites ending 24 hours later.

Samples were collected and analyzed in accordance with the Quality Assurance Project Plan (Taylor Associates, Inc. and PNNL 2011 and amended 2012). Two types of samples were to be collected during the storm. The first was a time proportionate composite sample collected using an ISCO sampler at each of the six outfall locations. The second was a grab sample collected during the storm event in amber glass jars provided by Columbia Analytical Services (CAS) for total petroleum hydrocarbons (TPH). The individual time interval composites collected in the 24 wedge bottles inside the ISCO sampler were carried back to the stormwater lab at PSNS & IMF and composited into a single event mean composite (EMC) in a pre-cleaned glass jar. All samples were hand delivered within 24 hours of collection to MSL.

Upon receipt at MSL, the condition of all the samples were verified as acceptable and tracked back to the field chain of custody (COC). In the clean laboratory at MSL, each glass composite sample jar was shaken vigorously (prior and between aliquot removal) and aliquots were poured into the following types of containers:

1. 500 mL Teflon bottle for total metals (TME),
2. 500 mL 0.45µm polyvinylidene fluoride (PVDF) filter unit, vacuum filtered in a class 100 clean bench and then poured into a 500 mL Teflon bottle for dissolved metals,
3. 250 mL low-density polyethylene (LDPE) bottle provided by CAS that included a nitric acid preservative for samples to be analyzed for hardness (HRD),
4. 500 mL LDPE container with sulfuric acid preservative provided by CAS for the analysis of total organic carbon (TOC),
5. 60 mL syringe and ashed glass fiber filter (GFF) in a cleaned filter holder. An aliquot of the sample was filtered into a 250 mL LDPE container with sulfuric acid preservative provided by CAS for the analysis of dissolved organic carbon (DOC),
6. 500 mL or 1L LDPE bottle provided by CAS for the analysis of total suspended solids (TSS), and turbidity was measured in the field.

The total metal fractions and dissolved metal fractions were each acidified inside a Class 100 clean bench to a pH of < 2.0 with double distilled nitric acid. The samples were then assigned a Battelle Central File (CF) identification number (3174) and were entered into Battelle's sample tracking system. The composite aliquots for TOC, DOC, hardness, and TSS were all forwarded to CAS for analysis. The quality control narrative for these parameters was provided separately.

QA/QC NARRATIVE

The following lists information on sample receipt and processing activities:

Sample Receipt Dates:	EB:11/03/2011 SW08: 11/23/11
Cooler temp. on arrival	All coolers were at 4.0±2°C
Collection dates	Various see table
CVAF analysis dates (Hg)	12/20/11
TRM Prep/Freshwater Analysis by ICP-MS (As, Ag, Al, Cd, Cr, Cu, Pb, Zn)	12/19/11

QA/QC DATA QUALITY OBJECTIVES:

Analyte	Analytical Method for Seawater	MS Range of Recovery	SRM Percent Difference	Replicate Precision	Method Detection Limits (µg/L)	Reporting Limits (µg/L)
Aluminum	ICP-MS	70-130%	≤20%	≤30%	0.3	1.0
Arsenic	ICP-MS	70-130%	≤20%	≤30%	0.03	0.1
Cadmium	ICP-MS	70-130%	≤20%	≤30%	0.004	0.01
Chromium	ICP-MS	70-130%	≤20%	≤30%	0.08	0.3
Copper	ICP-MS	70-130%	≤20%	≤30%	0.007	0.02
Lead	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Silver	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Zinc	ICP-MS	70-130%	≤20%	≤30%	0.05	0.2
Mercury	CVAF	70-130%	≤20%	≤30%	0.0001	0.0003

METHODS: Samples were analyzed for nine metals: aluminum (Al), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), silver (Ag), zinc (Zn), and mercury (Hg). Samples were submitted for analyses following two methods. All samples were analyzed for Hg by Cold Vapor Atomic Fluorescence (CVAF) in accordance with Battelle SOP *MSL-I-013*, *Total Mercury in Aqueous Samples by CVAF*, following EPA Method 1631 revision E.

All samples were analyzed for other metals by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) in accordance with Battelle SOP *MSL-I-022, Determination of Elements in Aqueous and Digestate Samples by ICP/MS.* The base methods for this procedure are EPA Method 1638 and EPA Method 1640. All samples were digested following the total metal recoverable (TRM) method established in EPA Method 1640 prior to analysis by ICP-MS. In summary, this preparation brings the pH of the sample to 2% and heats the capped samples for 2.5 hours in a 85˚C oven to solubilize particulates. Both the filtered and unfiltered fractions were prepared using this method to destroy any colloidal particles remaining in the filtered (aka. Dissolved) fraction. All results were reported in units of µg/L. Data are not blank corrected.

HOLDING TIMES: All samples were analyzed within the established holding times of 90 days for Hg and six months for all other metals.

QA/QC NARRATIVE

DETECTION LIMITS: Laboratory method detection limits (MDLs) for TRM freshwater were reported from the MDL study (annually verified) as determined by seven replicates of deionized water spiked at appropriate concentrations and prepared using the TRM method. Reporting limits are determined as 3.18 times the laboratory achieved MDL. The data are evaluated and flagged as follows:

U Analyte not detected at or above the MDL, MDL reported
J Analyte detected above the MDL, but less than the RL
N Spiked sample recovery outside QC criterion of 70-130%
& Accuracy result outside QC criterion of ≤20% PD
* Precision result outside QC criterion of <30%
B Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value
c Exceeds data quality objective but meets contingency criterion
b Result is reagent blank corrected using the batch specific blank (BMRB)

METHOD BLANKS: A minimum of one method blank was prepared and analyzed by each instrument with each analytical batch. The method blanks were all less than the RL.

LABORATORY CONTROL SAMPLES: A minimum of one LCS (OPR or blank spike) was prepared and analyzed with each analytical batch of 20 or fewer samples. Percent recoveries for LCS samples were within the QC acceptance criterion of 70% to 130% for all metals. They also met a secondary criterion of ± 15% recovery for metals of concern.

MATRIX SPIKE ACCURACY: A minimum of one set of duplicate matrix spikes (MS/MSD) was prepared and analyzed with each analytical batch of 20 or fewer samples. Percent recoveries for matrix spikes were within the QC limits of 70% to 130% for all metals.

REPLICATE PRECISION: Laboratory precision was expressed as the relative percent difference (RPD) between laboratory duplicates. The RPD values for the laboratory duplicates were within the QC acceptance criterion of ±30% for all metals detected above the RL.

STANDARD REFERENCE MATERIAL ACCURACY: Standard reference materials (SRM) were prepared and analyzed with each analytical batch at a minimum frequency of 1 per 20 or fewer samples. Analytical accuracy was expressed as the percent difference (PD) between the measured and the certified value. The freshwater SRMs were 1641d for Hg and 1640 for all other metals. The differences were within the QC acceptance criterion of ≤20%.

REFERENCE: Taylor Associates, Inc. – Division of TEC, Inc. and Pacific Northwest National Laboratory (2011). Non-Dry Dock Stormwater Monitoring Conducted at Puget Sound Naval Shipyard Bremerton, WA, Project ENVVEST Study Area. Document prepared for the United States Navy Puget Sound Naval Shipyard.

SAMPLE CHAIN OF CUSTODY FORM

Date:
Page: 1 of 1
Project No.: N4523A10MP00034 Amend.1
Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Updates & Changed per JMB request 11/30/11

Sample Label	Station ID	Collection Date/Time	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity ①	Total metals	Organics			No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
SW08-0001	PSNS015	11/22/11 (0932)	Water						X						2	Grab	8	61.6 µS/cm, 9.63 NTU
SW08-0002	PSNS115.1	11/22/11 (0850)	Water						X						2	Grab	8	98.9 µS/cm, 8.60 NTU
SW08-0003	PSNS084.1	11/22/11 (0906)	Water						X						2	Grab	8	98.6 µS/cm, 3.12 NTU
SW08-0004	PSNS124	11/22/11 (0930)	Water						X						2	Grab	8	42.8 µS/cm, 506 NTU
SW08-0005	PSNS124.1	11/22/11 (0948)	Water						X						2	Grab	8	6.09 µS/cm, 559 NTU
SW08-0006	PSNS126	11/22/11 (1000)	Water						X						2	Grab	8	534 µS/cm, 6.51 NTU
SW08-0007	PSNS015	11/22/11 (0938)	Water	X	X	X	X	X							1	Comp	8	182 µS/cm, 16 NTU
SW08-0008	PSNS084.1	11/22/11 (0936)	Water	X	X	X	X	X							1	Comp	8	270 µS/cm, 11 NTU
SW08-0009	PSNS115.1	11/22/11 (0936)	Water	X	X	X	X	X							1	Comp	8	1692 µS/cm, 4 NTU
SW08-0010	PSNS124	11/22/11 (0934)	Water	X	X	X	X	X							1	Comp	8	651 µS/cm, 10 NTU
SW08-0011	PSNS124.1	11/22/11 (0933)	Water	X	X	X	X	X							1	Comp	8	
SW08-0012	PSNS126	11/22/11 (0927)	Water	X	X	X	X	X							1	Comp	8	
	015	11/10/11 (2230)	Sed								X	X			1	Grab	Pre 8	Sed. Sample 015

see below

Relinquished by: Brian Rupert	11/22/11	1820	Received by: Li-Jung Kuo 11/23/11
Signature / Printed Name	Date / Company	Time	Signature / Printed Name
Relinquished by:			Received by:
Signature / Printed Name	Date / Company	Time	Signature / Printed Name

Total # of Containers:
Shipment Method: Hand delivered & split @ MSL
Sample Disposition:
Distribution:
1) PNNL
2) CAS
3) TAI

① Turbidity measurements conducted ~~on~~ at Navy SW Lab w/ Hach 2100P benchtop meter

NOTE: sed sample should be logged in as CF 3259, part of SQV07

Station Log

Sample Collector	Johnston, Mulbarger	PSNS Project ENVVEST		Page___ of ____
Sampling Team	Gebhart	Ambient Monitoring		11/22/2011
Organization				FCSW2011_11_22
Use pre-assigned id	m/dd/yy hh:mm/dd/yy hh:mm			

StationID	Time Arrive Date/Time (11/22/2011)	Time Leave Date/Time	Station Type	LAT	LONG	Remarks/ Comments
PSNS015	0820	0832	SW	sampled for TPH, FC, Cond, Sal		SW08-0001A Two bottles SW08-0001B 500ml Amber bottle
PSNS115.1	0841	0850	SW	TPH, FC, Cond/T, Turb		SW08-002A SW08-002B
PSNS084.1	0900	0906	SW	TPH, FC, Cond/T, Turb		SW08-003A SW08-003B
PSNS124	0916	0930	SW	TPH, FC, Cond/T, Turb		SW08-004A SW08-004B
PSNS124.1	0938	0948	SW	TPH, FC, Cond/T, Turb		SW08-005A SW08-005B
PSNS126	0950	1000	SW	TPH, FC+FCDUP, Cond/T, Turb		SW08-006A SW08-006B

Station Type: Marine (M), Nearshore (NS), Stream (S), Stormwater (SW), Outfall (OF), Mussel (Mussel), Sediment (Sed); Other - specify

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/22/2011
Page: 1 of 1
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0013	PSNS015	11/22/11 0938	SW					x							1	comp	SW08	3174*79
SW08-0014	PSNS015	11/22/11 0938	SW						x						1	comp	SW08	3174*80
SW08-0015	PSNS084.1	11/22/11 0936	SW					x							1	comp	SW08	3174*81
SW08-0016	PSNS084.1	11/22/11 0936	SW						x						1	comp	SW08	3174*82
SW08-0017	PSNS115.1	11/22/11 0936	SW					x							1	comp	SW08	3174*83
SW08-0018	PSNS115.1	11/22/11 0936	SW						x						1	comp	SW08	3174*84
SW08-0019	PSNS124	11/22/11 0934	SW					x							1	comp	SW08	3174*85
SW08-0020	PSNS124	11/22/11 0934	SW						x						1	comp	SW08	3174*86
SW08-0021	PSNS124.1	11/22/11 0933	SW					x							1	comp	SW08	3174*87
SW08-0022	PSNS124.1	11/22/11 0933	SW						x						1	comp	SW08	3174*88
SW08-0023	PSNS126	11/22/11 0927	SW					x							1	comp	SW08	3174*89
SW08-0024	PSNS126	11/22/11 0927	SW						x						1	comp	SW08	3174*90
--end--																		

Relinquished by: [signature] 11/23/11 1140.
Signature Date Time
LT-Jung Kuo Battelle
Printed Name Company

Received by: [signature] 11/23/11
Signature
C. Susuki 1160
Printed Name

Total # of Containers
Shipment Method:
Retained at Battelle ✓
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/28/2011
Page: 1 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Changed per JMB (11/27) request 11/30/11 *

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0001 0051	PSNS015	11/22/11 0938	SW							X					1	comp	SW08	
SW08-0002 0052	PSNS084.1	11/22/11 0936	SW							X					1	comp	SW08	
SW08-0003 0053	PSNS115.1	11/22/11 0936	SW							X					1	comp	SW08	
SW08-0004 0054	PSNS124	11/22/11 0934	SW							X					1	comp	SW08	
SW08-0005 0055	PSNS124.1	11/22/11 0933	SW							X					1	comp	SW08	
SW08-0006 0056	PSNS126	11/22/11 0927	SW							X					1	comp	SW08	
SW08-0027	PSNS015	11/22/11 0938	SW	x											1	comp	SW08	SW08-0007
SW08-0028	PSNS015	11/22/11 0938	SW		x										1	comp	SW08	SW08-0007
SW08-0029	PSNS015	11/22/11 0938	SW			x									1	comp	SW08	SW08-0007
SW08-0030	PSNS015	11/22/11 0938	SW				x								1	comp	SW08	SW08-0007
SW08-0031	PSNS084.1	11/22/11 0936	SW	x											1	comp	SW08	SW08-0008
SW08-0032	PSNS084.1	11/22/11 0936	SW		x										1	comp	SW08	SW08-0008
SW08-0033	PSNS084.1	11/22/11 0936	SW			x									1	comp	SW08	SW08-0008
SW08-0034	PSNS084.1	11/22/11 0936	SW				x								1	comp	SW08	SW08-0008

Relinquished by: [signature] 11/28/11 1500
Signature Date Time
C.Susuck MSL to Fedex
Printed Name Company

Received by:
Signature
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL
2) CAS

* emailed CAS updated copy 11/30/11

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/28/2011
Page: 2 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0035	PSNS115.1	11/22/11 0936	SW	x											1	comp	SW08	SW08-0009
SW08-0036	PSNS115.1	11/22/11 0936	SW		x										1	comp	SW08	SW08-0009
SW08-0037	PSNS115.1	11/22/11 0936	SW			x									1	comp	SW08	SW08-0009
SW08-0038	PSNS115.1	11/22/11 0936	SW				x								1	comp	SW08	SW08-0009
SW08-0039	PSNS124	11/22/11 0934	SW	x											1	comp	SW08	SW08-0010
SW08-0040	PSNS124	11/22/11 0934	SW		x										1	comp	SW08	SW08-0010
SW08-0041	PSNS124	11/22/11 0934	SW			x									1	comp	SW08	SW08-0010
SW08-0042	PSNS124	11/22/11 0934	SW				x								1	comp	SW08	SW08-0010
SW08-0043	PSNS124.1	11/22/11 0933	SW	x											1	comp	SW08	SW08-0011
SW08-0044	PSNS124.1	11/22/11 0933	SW		x										1	comp	SW08	SW08-0011
SW08-0045	PSNS124.1	11/22/11 0933	SW			x									1	comp	SW08	SW08-0011
SW08-0046	PSNS124.1	11/22/11 0933	SW				x								1	comp	SW08	SW08-0011
SW08-0047	PSNS126	11/22/11 0927	SW	x											1	comp	SW08	SW08-0012
SW08-0048	PSNS126	11/22/11 0927	SW		x										1	comp	SW08	SW08-0012

Relinquished by: [signature] 11/28/11 1500
Signature Date Time
C. Suslick MSL
Printed Name Company

Received by:
Signature
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL
2) CAS

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/28/2011
Page: 3 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0049	PSNS126	11/22/11 0927	SW			x									1	comp	SW08	SW08-0012
SW08-0050	PSNS126	11/22/11 0927	SW				x								1	comp	SW08	SW08-0012
--end--																		

Relinquished by: [signature] 11/28/11 1500
Signature Date Time
C. Susuicn MSL
Printed Name Company

Received by:
Signature
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 11/23/2011
Batch: 9
Login Designee: Brandenberger

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **Non-dry dock Storm water - SW08 (Nov 2011)**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW08-0013	PSNS015	3174*79	WAT	Prep Lab, K-4-C	Total Metals	11/22/11
SW08-0014	PSNS015	3174*80	WAT	Prep Lab, K-4-C	Dissolved Metals	11/22/11
SW08-0015	PSNS084.1	3174*81	WAT	Prep Lab, K-4-C	Total Metals	11/22/11
SW08-0016	PSNS084.1	3174*82	WAT	Prep Lab, K-4-C	Dissolved Metals	11/22/11
SW08-0017	PSNS115.1	3174*83	WAT	Prep Lab, K-4-C	Total Metals	11/22/11
SW08-0018	PSNS115.1	3174*84	WAT	Prep Lab, K-4-C	Dissolved Metals	11/22/11
SW08-0019	PSNS124	3174*85	WAT	Prep Lab, K-4-C	Total Metals	11/22/11
SW08-0020	PSNS124	3174*86	WAT	Prep Lab, K-4-C	Dissolved Metals	11/22/11
SW08-0021	PSNS124.1	3174*87	WAT	Prep Lab, K-4-C	Total Metals	11/22/11
SW08-0022	PSNS124.1	3174*88	WAT	Prep Lab, K-4-C	Dissolved Metals	11/22/11
SW08-0023	PSNS126	3174*89	WAT	Prep Lab, K-4-C	Total Metals	11/22/11
SW08-0024	PSNS126	3174*90	WAT	Prep Lab, K-4-C	Dissolved Metals	11/22/11

Sediment sample should be logged in with CF3259

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3174 Sample No(s): 79 -92- 90 Batch: SW08

Project Name: 2011 Storm Water Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: _____ WP# _____

Yes	No	
☐	☐	Navy-type Project (requires high-level sample tracking procedures)
☐	☐	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☐	☐	Filter Samples:	*Amount:* Entire sample	Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)		
☐	☐	Special instructions:		

Sample Preservation Instructions: _____

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☑	☐	Custody seal present Seal intact? YES NO
except SW08-011 ☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each)
☑	☐	☐	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)
☑	☐	☐	Were all chain of custody forms signed and dated?
☑	☐	☐	Were samples filtered at MSL? (Metals portion; Samples were split for all param. @ MSL)

SW08-011 1.4, 4.5, 6.7 °C

3.1, 4.8, 10.7 °C

>10.

Sample condition(s): (Acceptable) Other (explain): SW08-011 only has one bag of ice.

Container type: Teflon Poly (Glass) Cap. Vial Other: _____

Notes: _____

Completed By: _____ Date/Time: 11/23/11 1900

SAMPLE PRESERVATION

☐	Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)		
☐	Random pH checked for ~10% of samples (use dip paper)	Sample IDs:	
☐	Complete pH check required for project (use pH meter and record on pH Record form)		
☐	Sample(s) were preserved at MSL		
Type: ☑	0.2% HNO3	Notes: Optima	Lot# 121010
☐	0.5% HCl (Hg samples)	Notes:	Lot#
☑	Refrigerate/Freeze (Wet SED)	Notes: Metals acidified 11/23/11; CAS param Stored in Walk-in Coldroom	
☐	Other	Notes:	

Completed By: _____ Date/Time: 12:05 11/23/11

Storage Shelf: KHC

K 1111586

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/28/2011
Page: 1 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0001	PSNS015	11/22/11 0938	SW							X					1	comp	SW08	
SW08-0002	PSNS084.1	11/22/11 0936	SW							X					1	comp	SW08	
SW08-0003	PSNS115.1	11/22/11 0936	SW							X					1	comp	SW08	
SW08-0004	PSNS124	11/22/11 0934	SW							X					1	comp	SW08	
SW08-0005	PSNS124.1	11/22/11 0933	SW							X					1	comp	SW08	
SW08-0006	PSNS126	11/22/11 0927	SW							X					1	comp	SW08	
SW08-0027	PSNS015	11/22/11 0938	SW	x											1	comp	SW08	SW08-0007
SW08-0028	PSNS015	11/22/11 0938	SW		x										1	comp	SW08	SW08-0007
SW08-0029	PSNS015	11/22/11 0938	SW			x									1	comp	SW08	SW08-0007
SW08-0030	PSNS015	11/22/11 0938	SW				x								1	comp	SW08	SW08-0007
SW08-0031	PSNS084.1	11/22/11 0936	SW	x											1	comp	SW08	SW08-0008
SW08-0032	PSNS084.1	11/22/11 0936	SW		x										1	comp	SW08	SW08-0008
SW08-0033	PSNS084.1	11/22/11 0936	SW			x									1	comp	SW08	SW08-0008
SW08-0034	PSNS084.1	11/22/11 0936	SW				x								1	comp	SW08	SW08-0008

Relinquished by: [signature] 11/28/11 1500
Signature Date Time
C. Sulick MSL to Fedex
Printed Name Company

Received by: [signature] 11/29/11
Signature
SCHOLF 0920
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL
2) CAS

NOTE: Sample Labels SW08-0001 thru -0006 should be SW08-0051 thru -0056 per email communication dtd 30 Nov 2011.

8

K1111586

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/28/2011
Page: 2 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0035	PSNS115.1	11/22/11 0936	SW	x											1	comp	SW08	SW08-0009
SW08-0036	PSNS115.1	11/22/11 0936	SW		x										1	comp	SW08	SW08-0009
SW08-0037	PSNS115.1	11/22/11 0936	SW			x									1	comp	SW08	SW08-0009
SW08-0038	PSNS115.1	11/22/11 0936	SW				x								1	comp	SW08	SW08-0009
SW08-0039	PSNS124	11/22/11 0934	SW	x											1	comp	SW08	SW08-0010
SW08-0040	PSNS124	11/22/11 0934	SW		x										1	comp	SW08	SW08-0010
SW08-0041	PSNS124	11/22/11 0934	SW			x									1	comp	SW08	SW08-0010
SW08-0042	PSNS124	11/22/11 0934	SW				x								1	comp	SW08	SW08-0010
SW08-0043	PSNS124.1	11/22/11 0933	SW	x											1	comp	SW08	SW08-0011
SW08-0044	PSNS124.1	11/22/11 0933	SW		x										1	comp	SW08	SW08-0011
SW08-0045	PSNS124.1	11/22/11 0933	SW			x									1	comp	SW08	SW08-0011
SW08-0046	PSNS124.1	11/22/11 0933	SW				x								1	comp	SW08	SW08-0011
SW08-0047	PSNS126	11/22/11 0927	SW	x											1	comp	SW08	SW08-0012
SW08-0048	PSNS126	11/22/11 0927	SW		x										1	comp	SW08	SW08-0012

Relinquished by: [signature] 11/28/11 1500
Signature Date Time
C. Suslick MSL
Printed Name Company

Received by: [signature] 11/29/11
Signature
Swolf 0920
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

6

K1111584

SAMPLE CHAIN OF CUSTODY FORM

Date: 11/28/2011
Page: 3 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-0049	PSNS126	11/22/11 0927	SW			x									1	comp	SW08	SW08-0012
SW08-0050	PSNS126	11/22/11 0927	SW				x								1	comp	SW08	SW08-0012
--end--																		

Relinquished by: [signature] 11/28/11 1500
Signature Date Time
C. SUSLICK MSL
Printed Name Company

Received by: [signature] 11/29/11
Signature
S WOLF 0920
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL
2) CAS

10

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC HJ

Client / Project: Battelle Service Request *K11* 11584

Received: 11/29/11 Opened: 11/29/11 By: SDW Unloaded: 11/29/11 By: SDW

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.3	1.0	316		7977 7182 0784	
-0.1	1.4	294		7977 7182 0681	

7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions:

Recd 2 bottles for TPH samples (not one).

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 11/3/2011
Batch: 8
Login Designee: Brandenberger

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **Non-dry dock Storm water - SW08 (Nov 2011)**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW08-001	PSNS 115.1 EB	3174-73	WAT	Lab 227	Total Metals	10/31/11
SW08-002	PSNS 124 EB	3174-74	WAT	Lab 227	Total Metals	10/31/11
SW08-003	PSNS 84.1 EB	3174-75	WAT	Lab 227	Total Metals	11/01/11
SW08-004	PSNS 015 EB	3174-76	WAT	Lab 227	Total Metals	11/01/11
SW08-005	PSNS 126 EB	3174-77	WAT	Lab 227	Total Metals	11/02/11
SW08-006	PSNS 124.1 EB	3174-78	WAT	Lab 227	Total Metals	11/02/11

SOP#: MSL-A-001

SAMPLE CHAIN OF CUSTODY FORM

Date:

Page: 1 of 1

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

	Sample Label	Station ID	Collection Date/Time	Matrix	Analyze parameters per QAPP/SAP: Hardness	TOC	DOC	TSS	TME/~~DME~~	TPH	Turbidity					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. Reading µS/cm
3174- 73	SW08-001	115.1 EB	10/31/11 @ 0155	water					X							1			
74	-002	124 EB	10/31/11 @ 0410	water					X							1			
75	-003	~~015~~ 84.1 EB	11/1/11 @ 0320	|					X							1			
76	-004	015 EB	11/1/11 @ 0545	|					X							1			
77	-005	126 EB	11/2/11 @ 1100	|					X							1			
78	-006	124.1 EB	11/2/11 @ 1215	|					X							1			
	-007	EB	11/2/11 @ 1330	|						X						2			Ship to CAS

Relinquished by:	11/3/11	0600	Received by:	11/3/11 1800
Signature	Date	Time	Signature	
Brian Rupert	TEC Inc		JMBrandenberger	
Printed Name	Company		Printed Name	
Relinquished by:			Received by:	
Signature	Date	Time	Signature	
Printed Name	Company		Printed Name	

Total # of Containers:

Shipment Method:

Sample Disposition:

Distribution:
1) PNNL — TME
2) CAS — TPH
3) TAI

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: _____ Sample No(s): _____ Batch: _____

Project Name: 2011 Stormwater Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: water - DI WP# _____

Yes	No	
☐	☑	Navy-type Project (requires high-level sample tracking procedures)
☐	☑	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☐	☑	Filter Samples: Amount: Entire sample Half of sample
☐	☑	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
☑	☐	Special instructions: split samples

Sample Preservation Instructions: 0.2% HNO3

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☑	Custody seal present Seal intact? YES NO
☐	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) 4.5, 1.5 °C (if multiple coolers, note temp. of each) 3.8, 4.9 °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)
☑	☐	☐	Were all chain of custody forms signed and dated?
☐	☑	☐	Were samples filtered at MSL?

Comment/Remedy: _____

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly (Glass) Cap. Vial Other:

Notes: _____

Completed By: _____ Date/Time: 11/3/11 1800

SAMPLE PRESERVATION

☐		Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)		
☐		Random pH checked for ~10% of samples (use dip paper)	Sample IDs:	
☐		Complete pH check required for project (use pH meter and record on pH Record form)		
☑ KC		Sample(s) were preserved at MSL		
Type:	☑ KC	0.2% HNO3	Notes: Optima	Lot# 1210040
	☐	0.5% HCl (Hg samples)	Notes:	Lot#
	☐	Refrigerate/Freeze	Notes:	
	☐	Other	Notes:	

Completed By: _____ Date/Time: 11/4/11 11:00 AM

Storage Shelf: L-6-B

KC 11/4/11

SAMPLE CHAIN OF CUSTODY FORM

1C1110840

Date: 11/4/2011
Page: 1 of 1
Project No.: 54220
Project: Non-dry Dock Stormwater SW08

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW08-007	EB	11/02/11 1330	SW							X					2		SW08	

Relinquished by:
Signature — 11/4/2011 Date — 1500 Time
C. Suslick — Printed Name — Battelle MSL Company

Received by:
To Fedex
Signature
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by:
Signature — Date — Time
Printed Name — Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS
3) TAI

11/5/11 0845

8

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC HH

Client / Project: Battelle Service Request K11 10840

Received: 11/5/11 Opened: 11/5/11 By: JA Unloaded: 11/6/11 By: JA

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
2.7	/	289			✓

7. Packing material used. *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other* Brown Paper
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

Page 1 of _____

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Battelle	**Service Request No.:**	K1111586
Project:	Non-dry Dock Stormwater SW08	**Date Received:**	11/29/11
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Thirty water samples were received for analysis at Columbia Analytical Services on 11/29/11. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

Diesel Range Organics by NWTPH-Dx

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel Range Organics and Residual Range Organics in sample SW08-0056 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of these samples were observed.

Approved by Howard Holmes **Date** 12-14-11

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11

Analysis Method: SM 2340 C

Units: mg/L
Basis: NA

Hardness, Total as CaCO3

Sample Name	Lab Code	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
SW08-0027	K1111586-007	**25.2**		2.0	0.8	1	NA	12/1/11 03:30	
SW08-0031	K1111586-011	**28.4**		2.0	0.8	1	NA	12/1/11 03:30	
SW08-0035	K1111586-015	**162**		2.0	0.8	1	NA	12/1/11 03:30	
SW08-0039	K1111586-019	**66.8**		2.0	0.8	1	NA	12/1/11 03:30	
SW08-0043	K1111586-023	**28.4**		2.0	0.8	1	NA	12/1/11 03:30	
SW08-0047	K1111586-027	**29.2**		2.0	0.8	1	NA	12/1/11 03:30	
Method Blank	K1111586-MB1	ND	U	2.0	0.8	1	NA	12/1/11 03:30	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 12/ 1/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0027
Lab Code: K1111586-007

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0027DUP Duplicate Sample K1111586-007DUP6 Result	Average	RPD	RPD Limit
Hardness, Total as CaCO3	SM 2340 C	2.0	0.8	25.2	26.0	25.6	3	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Analyzed: 12/ 1/11

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

		Lab Control Sample K1111586-LCS1			
Analyte Name	**Method**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**
Hardness, Total as CaCO3	SM 2340 C	43.2	43.4	100	90 - 116

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11

Analysis Method: SM 2540 D

Units: mg/L
Basis: NA

Solids, Total Suspended (TSS)

Sample Name	Lab Code	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
SW08-0030	K1111586-010	**18.0**		5.0		1	NA	11/29/11 16:10	
SW08-0034	K1111586-014	**9.0**		5.0		1	NA	11/29/11 16:10	
SW08-0038	K1111586-018	**28.5**		5.0		1	NA	11/29/11 16:10	
SW08-0042	K1111586-022	**19.5**		5.0		1	NA	11/29/11 16:10	
SW08-0046	K1111586-026	**12.0**		5.0		1	NA	11/29/11 16:10	
SW08-0050	K1111586-030	**8.0**		5.0		1	NA	11/29/11 16:10	
Method Blank	K1111586-MB1	ND	U	5.0		1	NA	11/29/11 16:10	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: NA
Date Received: NA
Date Analyzed: 11/29/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1110647-039

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	Batch QCDUP Duplicate Sample K1110647-039DUP1 Result	Average	RPD	RPD Limit
Solids, Total Suspended (TSS)	SM 2540 D	13		36	39	37.4	7	10

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Analyzed: 11/29/11

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

Analyte Name	Method	Lab Control Sample K1111586-LCS2 Result	Spike Amount	% Rec	% Rec Limits
Solids, Total Suspended (TSS)	SM 2540 D	242	240	101	80 - 115

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11

Units: mg/L
Basis: NA

Analysis Method: SM 5310 C

Carbon, Dissolved Organic (DOC)

Sample Name	Lab Code	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
SW08-0029	K1111586-009	**3.39**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0033	K1111586-013	**2.27**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0037	K1111586-017	**1.28**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0041	K1111586-021	**1.34**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0045	K1111586-025	**1.43**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0049	K1111586-029	**2.52**		0.50	0.07	1	NA	11/30/11 13:44	
Method Blank	K1111586-MB1	ND	U	0.50	0.07	1	NA	11/30/11 13:44	
Method Blank	K1111586-MB2	ND	U	0.50	0.07	1	NA	11/30/11 13:44	
Method Blank	K1111586-MB3	ND	U	0.50	0.07	1	NA	12/2/11 15:04	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0029
Lab Code: K1111586-009

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0029DUP Duplicate Sample K1111586-009DUP8 Result	Average	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.07	3.39	3.13	3.26	8	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0033
Lab Code: K1111586-013

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0033DUP Duplicate Sample K1111586-013DUP10 Result	Average	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.07	2.27	2.10	2.19	8	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0037
Lab Code: K1111586-017

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0037DUP Duplicate Sample K1111586-017DUP12 Result	Average	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.07	1.28	1.28	1.28	<1	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0041
Lab Code: K1111586-021

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0041DUP Duplicate Sample K1111586-021DUP14 Result	Average	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.07	1.34	1.43	1.39	6	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0045
Lab Code: K1111586-025

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0045DUP Duplicate Sample K1111586-025DUP16 Result	Average	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.07	1.43	1.41	1.42	1	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0049
Lab Code: K1111586-029

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0049DUP Duplicate Sample K1111586-029DUP18 Result	Average	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	SM 5310 C	0.50	0.07	2.52	2.37	2.45	6	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Matrix Spike Summary
General Chemistry Parameters

Sample Name: SW08-0029
Lab Code: K1111586-009

Units: mg/L
Basis: NA

Analytical Method: SM 5310 C

SW08-0029MS
Matrix Spike
K1111586-009MS4

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Dissolved Organic (DOC)	3.39	28.2	25.0	99	83 - 117

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Analyzed: 11/30/11

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

Analyte Name	Method	Lab Control Sample K1111586-LCS1 Result	Spike Amount	% Rec	% Rec Limits
Carbon, Dissolved Organic (DOC)	SM 5310 C	26.3	26.0	101	83 - 117

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Analyzed: 11/30/11

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

		Lab Control Sample K1111586-LCS2			
Analyte Name	**Method**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**
Carbon, Dissolved Organic (DOC)	SM 5310 C	25.9	26.0	99	83 - 117

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Analyzed: 12/ 2/11

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

		Lab Control Sample K1111586-LCS3			
Analyte Name	**Method**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**
Carbon, Dissolved Organic (DOC)	SM 5310 C	24.8	26.0	96	83 - 117

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586

Continuing Calibration Verification (CCV) Summary
Carbon, Dissolved Organic (DOC)

Analytical Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	271463	KQ1113136-24	11/30/11 13:44	25.0	23.4	94	90 - 110
CCV2	271463	KQ1113136-25	11/30/11 13:44	25.0	23.6	94	90 - 110
CCV3	271463	KQ1113136-26	11/30/11 13:44	25.0	23.4	93	90 - 110
CCV4	271463	KQ1113136-27	11/30/11 13:44	25.0	23.1	93	90 - 110
CCV5	271833	KQ1113210-07	12/2/11 15:04	25.0	23.7	95	90 - 110
CCV6	271833	KQ1113210-08	12/2/11 15:04	25.0	23.4	94	90 - 110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586

Continuing Calibration Blank (CCB) Summary
Carbon, Dissolved Organic (DOC)

Analytical Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MDL	MRL	Result	Q
CCB1	271463	KQ1113136-28	11/30/11 13:44	0.07	0.50	**0.21**	J
CCB2	271463	KQ1113136-29	11/30/11 13:44	0.07	0.50	ND	U
CCB3	271463	KQ1113136-30	11/30/11 13:44	0.07	0.50	ND	U
CCB4	271463	KQ1113136-31	11/30/11 13:44	0.07	0.50	ND	U
CCB5	271833	KQ1113210-09	12/2/11 15:04	0.07	0.50	ND	U
CCB6	271833	KQ1113210-10	12/2/11 15:04	0.07	0.50	ND	U

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11

Units: mg/L
Basis: NA

Analysis Method: SM 5310 C

Carbon, Total Organic

Sample Name	Lab Code	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Note
SW08-0028	K1111586-008	**3.34**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0032	K1111586-012	**2.48**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0036	K1111586-016	**1.65**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0040	K1111586-020	**1.79**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0044	K1111586-024	**1.47**		0.50	0.07	1	NA	11/30/11 13:44	
SW08-0048	K1111586-028	**2.60**		0.50	0.07	1	NA	11/30/11 13:44	
Method Blank	K1111586-MB1	ND	U	0.50	0.07	1	NA	11/30/11 13:44	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0028
Lab Code: K1111586-008

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0028DUP Duplicate Sample K1111586-008DUP7 Result	Average	RPD	RPD Limit
Carbon, Total Organic	SM 5310 C	0.50	0.07	3.34	3.35	3.34	<1	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0032
Lab Code: K1111586-012

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0032DUP Duplicate Sample K1111586-012DUP9 Result	Average	RPD	RPD Limit
Carbon, Total Organic	SM 5310 C	0.50	0.07	2.48	2.33	2.41	6	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0036
Lab Code: K1111586-016

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0036DUP Duplicate Sample K1111586-016DUP11 Result	Average	RPD	RPD Limit
Carbon, Total Organic	SM 5310 C	0.50	0.07	1.65	1.61	1.63	2	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0040
Lab Code: K1111586-020

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0040DUP Duplicate Sample K1111586-020DUP13 Result	Average	RPD	RPD Limit
Carbon, Total Organic	SM 5310 C	0.50	0.07	1.79	1.77	1.78	1	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0044
Lab Code: K1111586-024

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0044DUP Duplicate Sample K1111586-024DUP15 Result	Average	RPD	RPD Limit
Carbon, Total Organic	SM 5310 C	0.50	0.07	1.47	1.54	1.50	5	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SW08-0048
Lab Code: K1111586-028

Units: mg/L
Basis: NA

Analyte Name	Method	MRL	MDL	Sample Result	SW08-0048DUP Duplicate Sample K1111586-028DUP17 Result	Average	RPD	RPD Limit
Carbon, Total Organic	SM 5310 C	0.50	0.07	2.60	2.66	2.63	2	33

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/11
Date Received: 11/29/11
Date Analyzed: 11/30/11

Matrix Spike Summary
General Chemistry Parameters

Sample Name: SW08-0028
Lab Code: K1111586-008

Units: mg/L
Basis: NA

Analytical Method: SM 5310 C

SW08-0028MS
Matrix Spike
K1111586-008MS3

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	3.34	28.5	25.0	101	83 - 117

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Analyzed: 11/30/11

Lab Control Sample Summary
General Chemistry Parameters

Units: mg/L
Basis: NA

Analyte Name	Method	Lab Control Sample K1111586-LCS1 Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	SM 5310 C	25.9	26.0	99	83 - 117

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586

Continuing Calibration Verification (CCV) Summary
Carbon, Total Organic

Analytical Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	271464	KQ1113138-13	11/30/11 13:44	25.0	23.4	94	90 - 110
CCV2	271464	KQ1113138-14	11/30/11 13:44	25.0	23.4	93	90 - 110
CCV3	271464	KQ1113138-15	11/30/11 13:44	25.0	23.1	93	90 - 110
CCV4	271464	KQ1113138-16	11/30/11 13:44	25.0	23.3	93	90 - 110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic

Analytical Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MDL	MRL	Result	Q
CCB1	271464	KQ1113138-17	11/30/11 13:44	0.07	0.50	**0.21**	J
CCB2	271464	KQ1113138-18	11/30/11 13:44	0.07	0.50	ND	U
CCB3	271464	KQ1113138-19	11/30/11 13:44	0.07	0.50	ND	U
CCB4	271464	KQ1113138-20	11/30/11 13:44	0.07	0.50	ND	U

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Service Request: K1111586

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
SW08-0051	K1111586-001	11/22/2011	11/29/2011
SW08-0052	K1111586-002	11/22/2011	11/29/2011
SW08-0053	K1111586-003	11/22/2011	11/29/2011
SW08-0054	K1111586-004	11/22/2011	11/29/2011
SW08-0055	K1111586-005	11/22/2011	11/29/2011
SW08-0056	K1111586-006	11/22/2011	11/29/2011
SW08-0056	KWG1112166-1	11/22/2011	11/29/2011

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Shaul Miller

Date: 12/21/11 Title: _____

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Collected: 11/22/2011
Date Received: 11/29/2011

Diesel and Residual Range Organics

Sample Name: SW08-0051
Lab Code: K1111586-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**140**	J	270	12	1	11/30/11	12/01/11	KWG1112166	
Residual Range Organics (RRO)	**360**	J	530	20	1	11/30/11	12/01/11	KWG1112166	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	111	50-150	12/01/11	Acceptable
n-Triacontane	116	50-150	12/01/11	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Collected:**	11/22/2011
Sample Matrix:	Water	**Date Received:**	11/29/2011

Diesel and Residual Range Organics

Sample Name:	SW08-0052	**Units:**	ug/L
Lab Code:	K1111586-002	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**67**	J	270	12	1	11/30/11	12/01/11	KWG1112166	
Residual Range Organics (RRO)	**200**	J	540	21	1	11/30/11	12/01/11	KWG1112166	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	102	50-150	12/01/11	Acceptable
n-Triacontane	104	50-150	12/01/11	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Collected:**	11/22/2011
Sample Matrix:	Water	**Date Received:**	11/29/2011

Diesel and Residual Range Organics

Sample Name:	SW08-0053	**Units:**	ug/L
Lab Code:	K1111586-003	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**120**	J	270	12	1	11/30/11	12/01/11	KWG1112166	
Residual Range Organics (RRO)	**290**	J	530	20	1	11/30/11	12/01/11	KWG1112166	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	106	50-150	12/01/11	Acceptable
n-Triacontane	108	50-150	12/01/11	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Collected:**	11/22/2011
Sample Matrix:	Water	**Date Received:**	11/29/2011

Diesel and Residual Range Organics

Sample Name:	SW08-0054	**Units:**	ug/L
Lab Code:	K1111586-004	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**69**	J	270	12	1	11/30/11	12/01/11	KWG1112166	
Residual Range Organics (RRO)	**200**	J	530	20	1	11/30/11	12/01/11	KWG1112166	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	101	50-150	12/01/11	Acceptable
n-Triacontane	107	50-150	12/01/11	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Collected:**	11/22/2011
Sample Matrix:	Water	**Date Received:**	11/29/2011

Diesel and Residual Range Organics

Sample Name:	SW08-0055	**Units:**	ug/L
Lab Code:	K1111586-005	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**110**	J	260	12	1	11/30/11	12/01/11	KWG1112166	
Residual Range Organics (RRO)	**280**	J	520	20	1	11/30/11	12/01/11	KWG1112166	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	104	50-150	12/01/11	Acceptable
n-Triacontane	110	50-150	12/01/11	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Collected:**	11/22/2011
Sample Matrix:	Water	**Date Received:**	11/29/2011

Diesel and Residual Range Organics

Sample Name:	SW08-0056	**Units:**	ug/L
Lab Code:	K1111586-006	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**120**	J	260	12	1	11/30/11	12/01/11	KWG1112166	
Residual Range Organics (RRO)	**270**	J	520	20	1	11/30/11	12/01/11	KWG1112166	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	110	50-150	12/01/11	Acceptable
n-Triacontane	113	50-150	12/01/11	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1112166-3	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	11/30/11	12/01/11	KWG1112166	
Residual Range Organics (RRO)	**35**	J	500	19	1	11/30/11	12/01/11	KWG1112166	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	112	50-150	12/01/11	Acceptable
n-Triacontane	118	50-150	12/01/11	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
SW08-0051	K1111586-001	111	116
SW08-0052	K1111586-002	102	104
SW08-0053	K1111586-003	106	108
SW08-0054	K1111586-004	101	107
SW08-0055	K1111586-005	104	110
SW08-0056	K1111586-006	110	113
SW08-0056DUP	KWG1112166-1	112	118
Method Blank	KWG1112166-3	112	118
Lab Control Sample	KWG1112166-2	121	125

Surrogate Recovery Control Limits (%)

Sur1 =	o-Terphenyl	50-150
Sur2 =	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Extracted: 11/30/2011
Date Analyzed: 12/01/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: SW08-0056
Lab Code: K1111586-006

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1112166

Analyte Name	MRL	MDL	Sample Result	SW08-0056DUP KWG1112166-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	12	120	88	100	32 #	30
Residual Range Organics (RRO)	520	20	270	200	230	29 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1111586
Date Extracted: 11/30/2011
Date Analyzed: 12/01/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1112166

Analyte Name	Lab Control Sample KWG1112166-2 Lab Control Spike Result	Expected	%Rec	%Rec Limits
Diesel Range Organics (DRO)	1920	1600	120	46-140
Residual Range Organics (RRO)	864	800	108	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Extracted:**	11/30/2011
Sample Matrix:	Water	**Date Analyzed:**	12/01/2011
		Time Analyzed:	20:33

Method Blank Summary
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Instrument ID:**	GC21
Lab Code:	KWG1112166-3	**File ID:**	J:\GC21\DATA\120111B\1201F015.D
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1112166

This Method Blank applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Lab Control Sample	KWG1112166-2	J:\GC21\DATA\120111B\1201F013.D	12/01/11	20:11
SW08-0052	K1111586-002	J:\GC21\DATA\120111B\1201F021.D	12/01/11	21:39
SW08-0055	K1111586-005	J:\GC21\DATA\120111B\1201F023.D	12/01/11	22:01
SW08-0051	K1111586-001	J:\GC21\DATA\120111B\1201F025.D	12/01/11	22:23
SW08-0053	K1111586-003	J:\GC21\DATA\120111B\1201F027.D	12/01/11	22:45
SW08-0054	K1111586-004	J:\GC21\DATA\120111B\1201F029.D	12/01/11	23:07
SW08-0056	K1111586-006	J:\GC21\DATA\120111B\1201F031.D	12/01/11	23:28
SW08-0056DUP	KWG1112166-1	J:\GC21\DATA\120111B\1201F033.D	12/01/11	23:50

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1111586
Project:	Non-dry Dock Stormwater SW08/54220	**Date Extracted:**	11/30/2011
Sample Matrix:	Water	**Date Analyzed:**	12/01/2011
		Time Analyzed:	20:11

Lab Control Sample Summary
Diesel and Residual Range Organics

Sample Name:	Lab Control Sample	**Instrument ID:**	GC21
Lab Code:	KWG1112166-2	**File ID:**	J:\GC21\DATA\120111B\1201F013.D
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1112166

This Lab Control Sample applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Method Blank	KWG1112166-3	J:\GC21\DATA\120111B\1201F015.D	12/01/11	20:33
SW08-0052	K1111586-002	J:\GC21\DATA\120111B\1201F021.D	12/01/11	21:39
SW08-0055	K1111586-005	J:\GC21\DATA\120111B\1201F023.D	12/01/11	22:01
SW08-0051	K1111586-001	J:\GC21\DATA\120111B\1201F025.D	12/01/11	22:23
SW08-0053	K1111586-003	J:\GC21\DATA\120111B\1201F027.D	12/01/11	22:45
SW08-0054	K1111586-004	J:\GC21\DATA\120111B\1201F029.D	12/01/11	23:07
SW08-0056	K1111586-006	J:\GC21\DATA\120111B\1201F031.D	12/01/11	23:28
SW08-0056DUP	KWG1112166-1	J:\GC21\DATA\120111B\1201F033.D	12/01/11	23:50

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Level ID	File ID
A	J:\GC21\DATA\071111B-NW\0711F037.D
B	J:\GC21\DATA\071111B-NW\0711F039.D
C	J:\GC21\DATA\071111B-NW\0711F041.D
D	J:\GC21\DATA\071111B-NW\0711F043.D
E	J:\GC21\DATA\071111B-NW\0711F045.D
F	J:\GC21\DATA\071111B-NW\0711F047.D
G	J:\GC21\DATA\071111B-NW\0711F057.D
H	J:\GC21\DATA\071111B-NW\0711F059.D
I	J:\GC21\DATA\071111B-NW\0711F061.D
J	J:\GC21\DATA\071111B-NW\0711F063.D
K	J:\GC21\DATA\071111B-NW\0711F065.D
L	J:\GC21\DATA\071111B-NW\0711F067.D
M	J:\GC21\DATA\071111B-NW\0711F069.D
N	J:\GC21\DATA\071111B-NW\0711F071.D

Analyte Name	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF
Diesel Range Organics (DRO)							H	50	699	I	200	712	J	500	777
	K	2000	797	L	5000	768	M	20000	802	N	50000	809			
Residual Range Organics (RRO)				B	50	588	C	200	510	D	500	513	E	2000	500
	F	5000	545												
o-Terphenyl				G	1.0	988	H	2.5	1000	I	10	998	J	25	1040
	K	100	1100	L	250	1020									
n-Triacontane				G	1.0	803	H	2.5	840	I	10	840	J	25	875
	K	100	936	L	250	872									

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Analyte Name	Compound Type	Calibration Evaluation				
		Fit Type	Eval.	Eval. Result	Q	Control Criteria
Diesel Range Organics (DRO)	MS	AverageRF	% RSD	5.7		≤ 20
Residual Range Organics (RRO)	MS	AverageRF	% RSD	6.8		≤ 20
o-Terphenyl	SURR	AverageRF	% RSD	4.0		≤ 20
n-Triacontane	SURR	AverageRF	% RSD	5.3		≤ 20

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586
Calibration Date: 07/12/2011
Date Analyzed: 07/12/2011

Second Source Calibration Verification
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration ID: CAL10701
Units: ppm

File ID: J:\GC21\DATA\071111B-NW\0711F053.D
J:\GC21\DATA\071111B-NW\0711F073.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	SSV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	990	767	761	-1	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1100	531	562	6	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

† **SPCC Compound** ‡ **CCC Compound**

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586
Date Analyzed: 12/01/2011

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1112511
Units: ppm

File ID: J:\GC21\DATA\120111B\1201F007.D
J:\GC21\DATA\120111B\1201F009.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	767	847	11	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1000	531	530	0	NA	± 15 %	AverageRF
o-Terphenyl	50	54	1030	1100	7	NA	± 15 %	AverageRF
n-Triacontane	50	55	861	941	9	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1111586
Date Analyzed: 12/02/2011

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1112511
Units: ppm

File ID: J:\GC21\DATA\120111B\1201F035.D
J:\GC21\DATA\120111B\1201F037.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	767	828	8	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	990	531	526	-1	NA	± 15 %	AverageRF
o-Terphenyl	50	53	1030	1080	5	NA	± 15 %	AverageRF
n-Triacontane	50	56	861	957	11	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Battelle	**Service Request No.:**	K1110840
Project:	Non-dry Dock Stormwater SW08	**Date Received:**	11/5/11
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

One water sample was received for analysis at Columbia Analytical Services on 11/5/11. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

No anomalies associated with the analysis of these samples were observed.

Approved by Howard Holmes **Date** 11-10-11

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1110840
Date Collected: 11/02/2011
Date Received: 11/05/2011

Diesel and Residual Range Organics

Sample Name: SW08-007
Lab Code: K1110840-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**14**	J	280	12	1	11/08/11	11/10/11	KWG1111409	
Residual Range Organics (RRO)	**35**	J	550	21	1	11/08/11	11/10/11	KWG1111409	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	90	50-150	11/10/11	Acceptable
n-Triacontane	88	50-150	11/10/11	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1110840
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1111409-5

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	11/08/11	11/10/11	KWG1111409	
Residual Range Organics (RRO)	ND	U	500	19	1	11/08/11	11/10/11	KWG1111409	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	106	50-150	11/10/11	Acceptable
n-Triacontane	103	50-150	11/10/11	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1110840

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
Batch QC	K1110642-001	80	77
Batch QC	K1110811-003	117	112
SW08-007	K1110840-001	90	88
Batch QCDUP	KWG1111409-3	95	92
Method Blank	KWG1111409-5	106	103
Batch QCMS	KWG1111409-1	123	121
Batch QCDMS	KWG1111409-2	116	114
Lab Control Sample	KWG1111409-4	121	119

Surrogate Recovery Control Limits (%)

Sur1 =	o-Terphenyl	50-150
Sur2 =	n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1110840
Date Extracted: 11/08/2011
Date Analyzed: 11/11/2011

Matrix Spike/Duplicate Matrix Spike Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1110811-003

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1111409

Analyte Name	Sample Result	Batch QCMS KWG1111409-1 Matrix Spike Result	Matrix Spike Expected	Matrix Spike %Rec	Batch QCDMS KWG1111409-2 Duplicate Matrix Spike Result	Duplicate Matrix Spike Expected	Duplicate Matrix Spike %Rec	%Rec Limits	RPD	RPD Limit
Diesel Range Organics (DRO)	430	4890	3480	128	4870	3400	130	28-176	0	30
Residual Range Organics (RRO)	370	2220	1740	106	2240	1700	110	45-140	1	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1110840
Date Extracted: 11/08/2011
Date Analyzed: 11/10/2011

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1110642-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1111409

Analyte Name	MRL	MDL	Sample Result	Batch QCDUP KWG1111409-3 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	12	ND	ND	ND	-	30
Residual Range Organics (RRO)	520	20	ND	26	NC	NC	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1110840
Date Extracted: 11/08/2011
Date Analyzed: 11/10/2011

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1111409

Analyte Name	Lab Control Sample KWG1111409-4 Lab Control Spike Result	Expected	%Rec	%Rec Limits
Diesel Range Organics (DRO)	2120	1600	133	46-140
Residual Range Organics (RRO)	912	800	114	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1110840
Project:	Non-dry Dock Stormwater SW08/54220	**Date Extracted:**	11/08/2011
Sample Matrix:	Water	**Date Analyzed:**	11/10/2011
		Time Analyzed:	03:48

Method Blank Summary
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Instrument ID:**	GC21
Lab Code:	KWG1111409-5	**File ID:**	J:\GC21\DATA\110911F\1109F040.D
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1111409

This Method Blank applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Lab Control Sample	KWG1111409-4	J:\GC21\DATA\110911F\1109F038.D	11/10/11	03:26
Batch QC	K1110642-001	J:\GC21\DATA\110911F\1109F042.D	11/10/11	04:10
Batch QCDUP	KWG1111409-3	J:\GC21\DATA\110911F\1109F044.D	11/10/11	04:32
SW08-007	K1110840-001	J:\GC21\DATA\110911F\1109F056.D	11/10/11	06:44
Batch QC	K1110811-003	J:\GC21\DATA\111111F\1111F014.D	11/11/11	20:29
Batch QCMS	KWG1111409-1	J:\GC21\DATA\111111F\1111F016.D	11/11/11	20:51
Batch QCDMS	KWG1111409-2	J:\GC21\DATA\111111F\1111F018.D	11/11/11	21:13

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1110840
Project:	Non-dry Dock Stormwater SW08/54220	**Date Extracted:**	11/08/2011
Sample Matrix:	Water	**Date Analyzed:**	11/10/2011
		Time Analyzed:	03:26

Lab Control Sample Summary
Diesel and Residual Range Organics

Sample Name:	Lab Control Sample	**Instrument ID:**	GC21
Lab Code:	KWG1111409-4	**File ID:**	J:\GC21\DATA\110911F\1109F038.D
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1111409

This Lab Control Sample applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Method Blank	KWG1111409-5	J:\GC21\DATA\110911F\1109F040.D	11/10/11	03:48
Batch QC	K1110642-001	J:\GC21\DATA\110911F\1109F042.D	11/10/11	04:10
Batch QCDUP	KWG1111409-3	J:\GC21\DATA\110911F\1109F044.D	11/10/11	04:32
SW08-007	K1110840-001	J:\GC21\DATA\110911F\1109F056.D	11/10/11	06:44
Batch QC	K1110811-003	J:\GC21\DATA\111111F\1111F014.D	11/11/11	20:29
Batch QCMS	KWG1111409-1	J:\GC21\DATA\111111F\1111F016.D	11/11/11	20:51
Batch QCDMS	KWG1111409-2	J:\GC21\DATA\111111F\1111F018.D	11/11/11	21:13

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10661
Instrument ID: GC21

Column: ZB-1

Level ID	File ID
A	J:\GC21\DATA\071111F\0711F036.D
B	J:\GC21\DATA\071111F\0711F038.D
C	J:\GC21\DATA\071111F\0711F040.D
D	J:\GC21\DATA\071111F\0711F042.D
E	J:\GC21\DATA\071111F\0711F044.D
F	J:\GC21\DATA\071111F\0711F046.D
G	J:\GC21\DATA\071111F\0711F056.D
H	J:\GC21\DATA\071111F\0711F058.D
I	J:\GC21\DATA\071111F\0711F060.D
J	J:\GC21\DATA\071111F\0711F062.D
K	J:\GC21\DATA\071111F\0711F064.D
L	J:\GC21\DATA\071111F\0711F066.D
M	J:\GC21\DATA\071111F\0711F068.D
N	J:\GC21\DATA\071111F\0711F070.D

Analyte Name	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF
Diesel Range Organics (DRO)				G	20	779	H	50	795	I	200	747	J	500	809
	K	2000	847	L	5000	869	M	20000	863	N	50000	907			
Residual Range Organics (RRO)				B	50	627	C	200	597	D	500	551	E	2000	588
	F	5000	645												
o-Terphenyl				G	1.0	1040	H	2.5	1100	I	10	1040	J	25	1090
	K	100	1150	L	250	1150									
n-Triacontane				G	1.0	894	H	2.5	932	I	10	878	J	25	939
	K	100	972	L	250	976									

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10661
Instrument ID: GC21

Column: ZB-1

Analyte Name	Compound Type	Calibration Evaluation				
		Fit Type	Eval.	Eval. Result	Q	Control Criteria
Diesel Range Organics (DRO)	MS	AverageRF	% RSD	6.5		≤ 20
Residual Range Organics (RRO)	MS	AverageRF	% RSD	6.1		≤ 20
o-Terphenyl	SURR	AverageRF	% RSD	4.5		≤ 20
n-Triacontane	SURR	AverageRF	% RSD	4.3		≤ 20

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840
Calibration Date: 07/12/2011
Date Analyzed: 07/12/2011

Second Source Calibration Verification
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration ID: CAL10661
Units: ppm

File ID: J:\GC21\DATA\071111F\0711F052.D
J:\GC21\DATA\071111F\0711F072.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	SSV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	827	844	2	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1000	602	599	0	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

† **SPCC Compound** ‡ **CCC Compound**

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840
Date Analyzed: 11/10/2011

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10661
Analysis Lot: KWG1111583
Units: ppm

File ID: J:\GC21\DATA\110911F\1109F032.D
J:\GC21\DATA\110911F\1109F034.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	827	926	12	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1000	602	609	1	NA	± 15 %	AverageRF
o-Terphenyl	50	55	1100	1210	11	NA	± 15 %	AverageRF
n-Triacontane	50	52	932	967	4	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840
Date Analyzed: 11/10/2011

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10661
Analysis Lot: KWG1111583
Units: ppm

File ID: J:\GC21\DATA\110911F\1109F062.D
J:\GC21\DATA\110911F\1109F064.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	827	947	14	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1000	602	612	2	NA	± 15 %	AverageRF
o-Terphenyl	50	57	1100	1250	14	NA	± 15 %	AverageRF
n-Triacontane	50	55	932	1020	10	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840
Date Analyzed: 11/11/2011

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10661
Analysis Lot: KWG1111603
Units: ppm

File ID: J:\GC21\DATA\111111F\1111F008.D
J:\GC21\DATA\111111F\1111F010.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	827	903	9	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	970	602	582	-3	NA	± 15 %	AverageRF
o-Terphenyl	50	53	1100	1170	7	NA	± 15 %	AverageRF
n-Triacontane	50	46	932	866	-7	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840
Date Analyzed: 11/12/2011

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10661
Analysis Lot: KWG1111603
Units: ppm

File ID: J:\GC21\DATA\111111F\1111F034.D
J:\GC21\DATA\111111F\1111F036.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	827	925	12	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1000	602	631	5	NA	± 15 %	AverageRF
o-Terphenyl	50	55	1100	1200	9	NA	± 15 %	AverageRF
n-Triacontane	50	56	932	1040	11	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840

Analysis Run Log
Diesel and Residual Range Organics

Analysis Method: NWTPH-Dx

Analysis Lot: KWG1111583
Instrument ID: GC21
Column: ZB-1

File ID	Sample Name	Lab Code	Date Analysis Started	Start Time	Q	Date Analysis Finished	Finish Time
1109F032.D	Continuing Calibration Verification	KWG1111583-1	11/10/2011	02:20		11/10/2011	02:36
1109F034.D	Continuing Calibration Verification	KWG1111583-1	11/10/2011	02:42		11/10/2011	02:58
1109F036.D	Instrument Blank	KWG1111583-3	11/10/2011	03:04		11/10/2011	03:20
1109F038.D	Lab Control Sample	KWG1111409-4	11/10/2011	03:26		11/10/2011	03:42
1109F040.D	Method Blank	KWG1111409-5	11/10/2011	03:48		11/10/2011	04:04
1109F042.D	Batch QC	K1110642-001	11/10/2011	04:10		11/10/2011	04:26
1109F044.D	Batch QCDUP	KWG1111409-3	11/10/2011	04:32		11/10/2011	04:48
1109F046.D	ZZZZZZ	ZZZZZZ	11/10/2011	04:54		11/10/2011	05:10
1109F048.D	ZZZZZZ	ZZZZZZ	11/10/2011	05:16		11/10/2011	05:32
1109F050.D	ZZZZZZ	ZZZZZZ	11/10/2011	05:38		11/10/2011	05:54
1109F052.D	ZZZZZZ	ZZZZZZ	11/10/2011	06:00		11/10/2011	06:16
1109F054.D	ZZZZZZ	ZZZZZZ	11/10/2011	06:22		11/10/2011	06:38
1109F056.D	SW08-007	K1110840-001	11/10/2011	06:44		11/10/2011	07:00
1109F058.D	ZZZZZZ	ZZZZZZ	11/10/2011	07:06		11/10/2011	07:22
1109F060.D	ZZZZZZ	ZZZZZZ	11/10/2011	07:27		11/10/2011	07:43
1109F062.D	Continuing Calibration Verification	KWG1111583-2	11/10/2011	07:50		11/10/2011	08:06
1109F064.D	Continuing Calibration Verification	KWG1111583-2	11/10/2011	08:12		11/10/2011	08:28
1109F066.D	Instrument Blank	KWG1111583-4	11/10/2011	08:33		11/10/2011	08:49

Results flagged with an asterisk (*) indicate the holding time was exceeded for the analysis

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220

Service Request: K1110840

Analysis Run Log
Diesel and Residual Range Organics

Analysis Method: NWTPH-Dx

Analysis Lot: KWG1111603
Instrument ID: GC21
Column: ZB-1

File ID	Sample Name	Lab Code	Date Analysis Started	Start Time	Q	Date Analysis Finished	Finish Time
1111F008.D	Continuing Calibration Verification	KWG1111603-1	11/11/2011	19:22		11/11/2011	19:38
1111F010.D	Continuing Calibration Verification	KWG1111603-1	11/11/2011	19:44		11/11/2011	20:00
1111F012.D	Instrument Blank	KWG1111603-3	11/11/2011	20:06		11/11/2011	20:22
1111F014.D	Batch QC	K1110811-003	11/11/2011	20:29		11/11/2011	20:45
1111F016.D	Batch QCMS	KWG1111409-1	11/11/2011	20:51		11/11/2011	21:07
1111F018.D	Batch QCDMS	KWG1111409-2	11/11/2011	21:13		11/11/2011	21:29
1111F020.D	ZZZZZZ	ZZZZZZ	11/11/2011	21:35		11/11/2011	21:51
1111F022.D	ZZZZZZ	ZZZZZZ	11/11/2011	21:57		11/11/2011	22:13
1111F024.D	ZZZZZZ	ZZZZZZ	11/11/2011	22:19		11/11/2011	22:35
1111F026.D	ZZZZZZ	ZZZZZZ	11/11/2011	22:41		11/11/2011	22:57
1111F028.D	ZZZZZZ	ZZZZZZ	11/11/2011	23:04		11/11/2011	23:20
1111F030.D	ZZZZZZ	ZZZZZZ	11/11/2011	23:26		11/11/2011	23:42
1111F032.D	ZZZZZZ	ZZZZZZ	11/11/2011	23:48		11/12/2011	00:04
1111F034.D	Continuing Calibration Verification	KWG1111603-2	11/12/2011	00:10		11/12/2011	00:26
1111F036.D	Continuing Calibration Verification	KWG1111603-2	11/12/2011	00:32		11/12/2011	00:48
1111F038.D	Instrument Blank	KWG1111603-4	11/12/2011	00:54		11/12/2011	01:10

Results flagged with an asterisk (*) indicate the holding time was exceeded for the analysis

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW08/54220
Sample Matrix: Water

Service Request: K1110840
Date Extracted: 11/08/2011

Extraction Prep Log
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Extraction Lot: KWG1111409
Level: Low

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Volume	% Solids	Note
SW08-007	K1110840-001	11/02/11	11/05/11	460mL	1mL	NA	
Batch QCDUP	KWG1111409-3	NA	NA	490mL	1mL	NA	
Method Blank	KWG1111409-5	NA	NA	1000mL	2mL	NA	
Batch QC	K1110642-001	NA	NA	490mL	1mL	NA	
Batch QC	K1110811-003	NA	NA	470mL	1mL	NA	
Batch QCMS	KWG1111409-1	NA	NA	460mL	1mL	NA	
Batch QCDMS	KWG1111409-2	NA	NA	470mL	1mL	NA	
Lab Control Sample	KWG1111409-4	NA	NA	1000mL	2mL	NA	

Results flagged with an asterisk (*) indicate the holding time was exceeded for the analysis

Analytical Chemistry Data Package

Project: Non-Dry Dock Stormwater SW09 - January 21, 2012 Chemical Analyses

Battelle Project No. 54220/62375
CF No. 3174

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, WA 98382
PM: Jill Brandenberger
(360) 681-4564

CHEMISTRY ANALYSIS
DATA PACKAGE CONTENTS

Non-Dry Dock Stormwater
SW09 January 21, 2012
Chemical Analyses

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW09
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	MSL Code	Collection Date	Hg	As	Ag	Al	Cd
			Instrument:			*CVAF*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Freshwater)						0.0001	0.03	0.002	0.3	0.004
Freshwater Reporting Limit (MDL* 3.18)						0.0003	0.1	0.006	1.0	0.01
SW09										
SW09-0041	PSNS084.1	TME	Composite_equal_time	3174*91	01/21/12	0.00455	0.768	0.0134	436	0.255
SW09-0042	PSNS084.1	DME	Composite_equal_time	3174*92	01/21/12	0.00124	0.489	0.002 U	20.9	0.112
SW09-0043	PSNS115.1	TME	Composite_equal_time	3174*93	01/21/12	0.0186	1.80	0.106	394	0.496
SW09-0044	PSNS115.1	DME	Composite_equal_time	3174*94	01/21/12	0.00153	0.455	0.00354 J	10.2	0.170
SW09-0045	PSNS124.1	TME	Composite_equal_time	3174*95	01/21/12	0.00568	0.724	0.0191	348	0.631
SW09-0046	PSNS124.1	DME	Composite_equal_time	3174*96	01/21/12	0.00130	0.532	0.002 U	14.3	0.309
SW09-0047	PSNS126	TME	Composite_equal_time	3174*97	01/21/12	0.00396	2.14	0.0175	163	0.130
SW09-0048	PSNS126	DME	Composite_equal_time	3174*98	01/21/12	0.00185	2.03	0.002 U	12.8	0.0724
SW09-0049	PSNS126Dup	TME	Composite_equal_time	3174*99	01/21/12	0.00591	2.11	0.0212	146	0.134
SW09-0050	PSNS126Dup	DME	Composite_equal_time	3174*100	01/21/12	0.00175	2.10	0.00265 J	16.0	0.0823
SW09-0051	PSNS124	TME	Composite_equal_time	3174*101	01/21/12	0.00727	1.58	0.0179	136	0.286
SW09-0052	PSNS124	DME	Composite_equal_time	3174*102	01/21/12	0.00198	1.37	0.002 U	7.39	0.207
SW09-0053	PSNS015	TME	Composite_equal_time	3174*103	01/21/12	0.0261	0.741	0.0163	1130	0.0842
SW09-0054	PSNS015	DME	Composite_equal_time	3174*104	01/21/12	0.00180	0.503	0.002 U	33.3	0.0386

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW09
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	**MSL Code**	**Cr**	**Cu**	**Pb**	**Zn**	CVAF Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*		
Laboratory Achieved Detection Limits (Freshwater)					0.08	0.007	0.002	0.05		
Freshwater Reporting Limit (MDL* 3.18)					0.3	0.02	0.006	0.2		
SW09										
SW09-0041	PSNS084.1	TME	Composite_equal_time	3174*91	3.96	21.1	8.91	169	013012HGA	020212-6100
SW09-0042	PSNS084.1	DME	Composite_equal_time	3174*92	1.05	4.41	0.248	120	013012HGA	020212-6100
SW09-0043	PSNS115.1	TME	Composite_equal_time	3174*93	6.33	51.0	35.7	177	013012HGA	020212-6100
SW09-0044	PSNS115.1	DME	Composite_equal_time	3174*94	0.851	7.47	0.438	98.3	013012HGA	020212-6100
SW09-0045	PSNS124.1	TME	Composite_equal_time	3174*95	5.94	35.6	13.7	184	013012HGA	020212-6100
SW09-0046	PSNS124.1	DME	Composite_equal_time	3174*96	1.97	7.65	0.371	115	013012HGA	020212-6100
SW09-0047	PSNS126	TME	Composite_equal_time	3174*97	1.83	8.98	3.52	61.9	013012HGA	020212-6100
SW09-0048	PSNS126	DME	Composite_equal_time	3174*98	1.54	4.78	0.255	48.1	013012HGA	020212-6100
SW09-0049	PSNS126Dup	TME	Composite_equal_time	3174*99	2.09	9.47	3.78	62.8	013012HGA	020212-6100
SW09-0050	PSNS126Dup	DME	Composite_equal_time	3174*100	1.89	4.89	0.299	48.8	013012HGA	020212-6100
SW09-0051	PSNS124	TME	Composite_equal_time	3174*101	6.14	39.5	4.95	76.6	013012HGA	020212-6100
SW09-0052	PSNS124	DME	Composite_equal_time	3174*102	5.33	16.1	0.193	54.5	013012HGA	020212-6100
SW09-0053	PSNS015	TME	Composite_equal_time	3174*103	3.20	9.74	9.47	69.1	013012HGA	020212-6100
SW09-0054	PSNS015	DME	Composite_equal_time	3174*104	1.70	2.80	0.393	37.7	013012HGA	020212-6100

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW09

Station Code	Sample ID	Type Name	Collection Date	Analysis Date	Analysis Method	Component	Units	Result		Detection Limit	Reporting Limit
PSNS015	SW09-0039	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.41	=	0.07	0.50
PSNS015	SW09-0038	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.68	=	0.07	0.50
PSNS015	SW09-0037	Composite_equal_time	01/21/2012	01/27/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	24.8	=	0.8	2.0
PSNS015	SW09-0040	Composite_equal_time	01/21/2012	01/26/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	36.0	=	5.0	5.0
PSNS015	SW09-005	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	150	=, J	11	240
PSNS015	SW09-005	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	650	=, O	19	480
PSNS084.1	SW09-0015	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.00	=	0.07	0.50
PSNS084.1	SW09-0014	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.23	=	0.07	0.50
PSNS084.1	SW09-0013	Composite_equal_time	01/21/2012	01/27/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	16.8	=	0.8	2.0
PSNS084.1	SW09-0016	Composite_equal_time	01/21/2012	01/26/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	17.0	=	5.0	5.0
PSNS084.1	SW09-004	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	210	=, J	11	240
PSNS084.1	SW09-004	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	630	=, O	19	480
PSNS115.1	SW09-0019	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	0.98	=	0.07	0.50
PSNS115.1	SW09-0018	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.12	=	0.07	0.50
PSNS115.1	SW09-0017	Composite_equal_time	01/21/2012	01/27/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	12.0	=	0.8	2.0
PSNS115.1	SW09-0020	Composite_equal_time	01/21/2012	01/26/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	25.0	=	5.0	5.0
PSNS115.1	SW09-006	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	65	=, J	11	240
PSNS115.1	SW09-006	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	210	=, J	19	480
PSNS124	SW09-0035	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	0.89	=	0.07	0.50
PSNS124	SW09-0034	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.03	=	0.07	0.50
PSNS124	SW09-0033	Composite_equal_time	01/21/2012	01/27/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	97.6	=	0.8	2.0
PSNS124	SW09-0036	Composite_equal_time	01/21/2012	01/26/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	9.0	=	5.0	5.0
PSNS124	SW09-003	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	95	=, J	11	240
PSNS124	SW09-003	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	280	=, J	19	480
PSNS124.1	SW09-0023	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.07	=	0.07	0.50
PSNS124.1	SW09-0022	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.03	=	0.07	0.50
PSNS124.1	SW09-0021	Composite_equal_time	01/21/2012	01/27/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	28.4	=	0.8	2.0
PSNS124.1	SW09-0024	Composite_equal_time	01/21/2012	01/26/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	12.5	=	5.0	5.0
PSNS124.1	SW09-002	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	150	=, J	12	280
PSNS124.1	SW09-002	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	530	=, J	21	550
PSNS126	SW09-0027	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.03	=	0.07	0.50
PSNS126	SW09-0026	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.11	=	0.07	0.50
PSNS126	SW09-0025	Composite_equal_time	01/21/2012	01/27/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	26.0	=	0.8	2.0
PSNS126	SW09-0028	Composite_equal_time	01/21/2012	01/26/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	5.0	=	5.0	5.0
PSNS126	SW09-001	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	72	=, J	13	290
PSNS126	SW09-001	Grab	01/20/2012	02/02/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	210	=, J	22	580
PSNS126Dup	SW09-0031	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.09	=	0.07	0.50
PSNS126Dup	SW09-0030	Composite_equal_time	01/21/2012	01/24/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.22	=	0.07	0.50
PSNS126Dup	SW09-0029	Composite_equal_time	01/21/2012	01/27/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	28.8	=	0.8	2.0
PSNS126Dup	SW09-0032	Composite_equal_time	01/21/2012	01/26/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	10.0	=	5.0	5.0

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW09
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	MSL Code	As	Ag	Al	Cd	Cr	Cu	Pb	Zn	ICP-MS Batch ID
				Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	
Laboratory Achieved Detection Limits (Freshwater)					0.03	0.002	0.3	0.004	0.08	0.007	0.002	0.05	
Freshwater Reporting Limit (MDL* 3.18)					0.1	0.006	1.0	0.01	0.3	0.02	0.006	0.2	
METHOD BLANKS													
MB-1		TME	Freshwater	TRM Blank R1	0.03 U	0.002 U	0.422 J	0.004 U	0.08 U	0.007 U	0.002 U	0.0643 J	020212-6100
LABORATORY CONTROL SAMPLES													
Spiking Level					**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	
LCS-1		TME	Freshwater	TRM LCS R1	1.96	1.94	2.45	2.01	1.91	1.98	1.95	1.94	020212-6100
				Percent Recovery, LCS	**98%**	**97%**	**101%**	**101%**	**96%**	**99%**	**98%**	**94%**	
MATRIX SPIKE RESULTS													
SW09-0054	PSNS015	DME	Composite_equal_time	3174*104	0.503	0.002 U	33.3	0.0386	1.70	2.80	0.393	37.7	020212-6100
MS		DME	Composite_equal_time	3174*104 MS	2.63	1.72	81.5	2.10	3.79	4.68	2.44	89.2	020212-6100
MSD		DME	Composite_equal_time	3174*104 MSD	2.59	1.73	81.6	2.07	3.73	4.64	2.42	87.9	020212-6100
				Spiking Level	2	2	50	2	2	2	2	50	
				Percent Recovery, MS	**106%**	**86%**	**96%**	**103%**	**105%**	**94%**	**102%**	**103%**	
				Percent Recovery, MSD	**104%**	**87%**	**97%**	**102%**	**102%**	**92%**	**101%**	**100%**	
				RPD	**1.9%**	**0.6%**	**0.2%**	**1.5%**	**2.9%**	**2.2%**	**1.0%**	**2.6%**	
REPLICATE PRECISION													
SW09-0053	PSNS015	TME	Composite_equal_time	3174*103	0.741	0.0163	1130	0.0842	3.20	9.74	9.47	69.1	020212-6100
DUP	PSNS015	TME	Composite_equal_time	3174*103r2	0.724	0.0278	1070	0.082	3.12	9.73	9.46	68.2	020212-6100
				Mean	*0.733*	*0.0221*	*1100*	*0.083*	*3.16*	*9.74*	*9.47*	*68.7*	
				RPD	**2.3%**	**52.2%** *	**5.5%**	**3.1%**	**2.5%**	**0.1%**	**0.1%**	**1.3%**	
SW09-0054	PSNS015	DME	Composite_equal_time	3174*104	0.503	0.002 U	33.3	0.0386	1.70	2.80	0.393	37.7	020212-6100
DUP	PSNS015	DME	Composite_equal_time	3174*104r2	0.513	0.002 U	32.6	0.0354	1.78	2.80	0.387	37.8	020212-6100
				Mean	*0.508*	*NA*	*33.0*	*0.0370*	*1.74*	*2.80*	*0.390*	*37.8*	
				RPD	**2.0%**	**NA**	**2.1%**	**8.6%**	**4.6%**	**0.0%**	**1.5%**	**0.3%**	
STANDARD REFERENCE MATERIAL, Seawater													
SRM 1640-1		TME	Freshwater	TRM 1640_020212	26.2	6.35	56.0	23.2	38.0	86.6	27.7	56.2	020212-6100
				Certified Value	**26.67**	**7.62**	**52.0**	**22.8**	**38.6**	**85.2**	**27.9**	**53.2**	
				PD	**1.8%**	**16.7%**	**7.7%**	**1.8%**	**2%**	**1.6%**	**0.7%**	**5.6%**	

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW09
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	MSL Code	Hg	CVAF Batch ID
				Instrument:	*CVAF*	
Laboratory Achieved Detection Limits					**0.0001**	
Reporting Limit (MDL* 3.18)					**0.0003**	
METHOD BLANKS						
MB-1		TME	Freshwater	MB1_012912	0.000102 J	013012HGA
MB-2		TME	Freshwater	MB2_012912	0.0001 U	013012HGA
MB-3		TME	Freshwater	MB3_012912	0.0001 U	013012HGA
LABORATORY CONTROL SAMPLES						
Spiking Level					0.00496	
LCS (1)		TME	Freshwater	OPR 012912 run1	0.00495	013012HGA
LCS (2)		TME	Freshwater	OPR 012912 run2	0.00493	013012HGA
LCS Blank (1)		TME	Freshwater	Blank012912	0.000196	013012HGA
				Percent Recovery, LCS 1	**96%**	
				Percent Recovery, LCS 2	**95%**	
SW09-0042	PSNS084.1	DME	Composite_equal_time	3174*92	0.00124	013012HGA
MS1	PSNS084.1	DME	Composite_equal_time	3174*92 MS	0.0123	013012HGA
MSD1	PSNS084.1	DME	Composite_equal_time	3174*92 MSD	0.0127	013012HGA
				Spiking Level, MS	0.0114	
				Spiking Level, MSD	0.0116	
				Percent Recovery, MS	**97%**	
				Percent Recovery, MSD	**99%**	
				RPD	**1.8%**	
SW09-0051	PSNS124	TME	Composite_equal_time	3174*101	0.00727	013012HGA
MS2	PSNS124	TME	Composite_equal_time	3174*101 MS	0.0277	013012HGA
MSD2	PSNS124	TME	Composite_equal_time	3174*101 MSD	0.0284	013012HGA
				Spiking Level, MS	0.0201	
				Spiking Level, MSD	0.0207	
				Percent Recovery, MS	**102%**	
				Percent Recovery, MSD	**102%**	
				RPD	**0.4%**	
REPLICATE PRECISION						
SW09-0053	PSNS015	TME	Composite_equal_time	3174*103	0.0261	013012HGA
DUP	PSNS015	TME	Composite_equal_time	3174*103r2	0.0239	013012HGA
				Mean	*0.0250*	
				RPD	**9%**	
SW09-0054	PSNS015	DME	Composite_equal_time	3174*104	0.00180	013012HGA
DUP	PSNS015	TME	Composite_equal_time	3174*104r2	0.00164	013012HGA
				Mean	*0.00172*	
				RPD	**9%**	
STANDARD REFERENCE MATERIAL						
SRM 1641 (1)		TME	Freshwater	1641d 012912	1627	
				Certified Value	**1590**	
				range	**±18**	
	SRM 1641 (1)			**PD**	**2%**	

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW09
Metals in Water

DATA QUALIFIERS:

c	Exceeds DQO but meets contingency criteria of either:
1	SRM certified <10x MDL
2	Insufficient spiking level relative to native sample concentrations
3	Sample concentration <10x MDL
U	Analyte not detected at or above the MDL, MDL reported
J	Analyte detected above the MDL, but less than the RL
N	Spiked sample recovery outside QC criterion of 70-130%
&	Accuracy result outside QC criterion of ≤20% PD
*	Precision result outside QC criterion of <30%
NS	Sample not spiked for this analyte
B	Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value
b	Data are blank corrected using the batch specific procedural blank
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern inidicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
ND	Not detected

Notes:

Composite_equal_time	Equal portion composite of time integrated sample (ISCO samples)
NC	Not Certified
--	Not analyzed
NA	Not applicable/available
TME	Total Metals Fraction
DME	Dissolved Metals Fraction
2	Sample specific MDLs and RLs reported

QA/QC NARRATIVE

PROJECT: Non-Dry Dock Stormwater Sampling for SW09

PARAMETER: Total and Dissolved Metals – Al, Ag, As, Cd, Cr, Cu, Pb, Zn, Hg

LABORATORY: Battelle Marine Sciences Laboratory (MSL), Sequim, Washington

MATRIX: Stormwater (as a freshwater matrix)

SAMPLE CUSTODY AND PROCESSING:

Samples were collected from stormwater outfalls located within the Confined Industrial Area (CIA) and Naval Base Kitsap (NBK) at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) by TEC, MSL, and the U.S. Navy. This storm is the second of the 2011-12 storm season. The outfalls include PSNS015, PSNS126, PSNS084.1, PSNS115.1, PSNS124, and PSNS124.1. This sample delivery includes grab and stormwater composite samples collected from those stations during SW09. The storm event identified as SW09 began on January 20, 2011 with the composites ending 24 hours later.

Samples were collected and analyzed in accordance with the Quality Assurance Project Plan (Taylor Associates, Inc. and PNNL 2011 and amended 2012). Two types of samples were to be collected during the storm. The first was a time proportionate composite sample collected using an ISCO sampler at each of the six outfall locations. The second was a grab sample collected during the storm event in amber glass jars provided by Columbia Analytical Services (CAS) for total petroleum hydrocarbons (TPH). The individual time paced composites collected in the 24 wedge bottles were carried back to the stormwater lab at PSNS & IMF and composited into a single event mean composite (EMC) in a pre-cleaned glass jar. All samples were hand delivered within 24 hours of collection to MSL.

Upon receipt at MSL, the condition of all the samples were verified as acceptable and tracked back to the field chain of custody (COC). In the clean laboratory at MSL, each glass composite sample jar was shaken vigorously (prior and between aliquot removal) and aliquots were poured into the following types of containers:

1. 500 mL Teflon bottle for total metals (TME),
2. 500 mL 0.45µm polyvinylidene fluoride (PVDF) filter unit, vacuum filtered in a class 100 clean bench and then poured into a 500 mL Teflon bottle for dissolved metals,
3. 250 mL low-density polyethylene (LDPE) bottle provided by CAS that included a nitric acid preservative for samples to be analyzed for hardness (HRD),
4. 500 mL LDPE container with sulfuric acid preservative provided by CAS for the analysis of total organic carbon (TOC),
5. 60 mL syringe and ashed glass fiber filter (GFF) in a cleaned filter holder. An aliquot of the sample was filtered into a 250 mL LDPE container with sulfuric acid preservative provided by CAS for the analysis of dissolved organic carbon (DOC),
6. 500 mL or 1L LDPE bottle provided by CAS for the analysis of total suspended solids (TSS), and turbidity was measured in the field.

The total metal fractions and dissolved metal fractions were each acidified inside a Class 100 clean bench to a pH of < 2.0 with double distilled nitric acid. The samples were then assigned a Battelle Central File (CF) identification number (3174) and were entered into Battelle's sample tracking system. The composite aliquots for TOC, DOC, hardness, and TSS were all forwarded to CAS for analysis. The quality control narrative for these parameters was provided separately.

QA/QC NARRATIVE

The following lists information on sample receipt and processing activities:

Sample Receipt Dates:	SW09: 01/21/12
Cooler temp. on arrival	All coolers were at 4.0±2°C
Collection dates	01/21/12
CVAF analysis dates (Hg)	01/30/12
TRM Prep/Freshwater Analysis by ICP-MS (As, Ag, Al, Cd, Cr, Cu, Pb, Zn)	02/02/12

QA/QC DATA QUALITY OBJECTIVES:

Analyte	Analytical Method for Seawater	MS Range of Recovery	SRM Percent Difference	Replicate Precision	Method Detection Limits (µg/L)	Reporting Limits (µg/L)
Aluminum	ICP-MS	70-130%	≤20%	≤30%	0.3	1.0
Arsenic	ICP-MS	70-130%	≤20%	≤30%	0.03	0.1
Cadmium	ICP-MS	70-130%	≤20%	≤30%	0.004	0.01
Chromium	ICP-MS	70-130%	≤20%	≤30%	0.08	0.3
Copper	ICP-MS	70-130%	≤20%	≤30%	0.007	0.02
Lead	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Silver	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Zinc	ICP-MS	70-130%	≤20%	≤30%	0.05	0.2
Mercury	CVAF	70-130%	≤20%	≤30%	0.0001	0.0003

METHODS: Samples were analyzed for nine metals: aluminum (Al), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), silver (Ag), zinc (Zn), and mercury (Hg). Samples were submitted for analyses following two methods. All samples were analyzed for Hg by Cold Vapor Atomic Fluorescence (CVAF) in accordance with Battelle SOP *MSL-I-013*, *Total Mercury in Aqueous Samples by CVAF*, following EPA Method 1631 revision E.

All samples were analyzed for other metals by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) in accordance with Battelle SOP *MSL-I-022, Determination of Elements in Aqueous and Digestate Samples by ICP/MS.* The base methods for this procedure are EPA Method 1638 and EPA Method 1640. All samples were digested following the total metal recoverable (TRM) method established in EPA Method 1640 prior to analysis by ICP-MS. In summary, this preparation brings the pH of the sample to 2% and heats the capped samples for 2.5 hours in a 85˚C oven to solubilize particulates. Both the filtered and unfiltered fractions were prepared using this method to destroy any colloidal particles remaining in the filtered (aka. dissolved) fraction. All results were reported in units of µg/L. Data are not blank corrected.

HOLDING TIMES: All samples were analyzed within the established holding times of 90 days for Hg and six months for all other metals.

QA/QC NARRATIVE

DETECTION LIMITS: Laboratory method detection limits (MDLs) for TRM freshwater were reported from the MDL study (annually verified) as determined by seven replicates of deionized water spiked at appropriate concentrations and prepared using the TRM method. Reporting limits are determined as 3.18 times the laboratory achieved MDL. The data are evaluated and flagged as follows:

U Analyte not detected at or above the MDL, MDL reported
J Analyte detected above the MDL, but less than the RL
N Spiked sample recovery outside QC criterion of 70-130%
& Accuracy result outside QC criterion of ≤20% PD
* Precision result outside QC criterion of <30%
B Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value
c Exceeds data quality objective but meets contingency criterion

METHOD BLANKS: A minimum of one method blank was prepared and analyzed by each instrument with each analytical batch. The method blanks were all less than the RL.

LABORATORY CONTROL SAMPLES: A minimum of one LCS (OPR or blank spike) was prepared and analyzed with each analytical batch of 20 or fewer samples. Percent recoveries for LCS samples were within the QC acceptance criterion of 70% to 130% for all metals. They also met a secondary criterion of ± 15% recovery for metals of concern.

MATRIX SPIKE ACCURACY: A minimum of one set of duplicate matrix spikes (MS/MSD) was prepared and analyzed with each analytical batch of 20 or fewer samples. Percent recoveries for matrix spikes were within the QC limits of 70% to 130% for all metals.

REPLICATE PRECISION: Laboratory precision was expressed as the relative percent difference (RPD) between laboratory duplicates. Two sets of duplicates were prepared, one on a total fraction and one on the dissolved fraction. This was used to evaluate previous heterogeneity issues notes for Hg. The RPD values for the laboratory duplicates were within the QC acceptance criterion of ±30% for all metals detected above the RL, with the exception of one replicate for Ag (52% RPD). Acceptable precision for Ag was demonstrated by the duplicate matrix spikes (0.6%).

STANDARD REFERENCE MATERIAL ACCURACY: Standard reference materials (SRM) were prepared and analyzed with each analytical batch at a minimum frequency of 1 per 20 or fewer samples. Analytical accuracy was expressed as the percent difference (PD) between the measured and the certified value. The freshwater SRMs were 1641d for Hg and 1640 for all other metals. The differences were within the QC acceptance criterion of ≤20%.

REFERENCE: Taylor Associates, Inc. – Division of TEC, Inc. and Pacific Northwest National Laboratory (2011). Non-Dry Dock Stormwater Monitoring Conducted at Puget Sound Naval Shipyard Bremerton, WA, Project ENVVEST Study Area. Document prepared for the United States Navy Puget Sound Naval Shipyard.

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/21/2012
Page: _____ of _____
Project No.: N4523A10MP00034 Amend.1
Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Sample Label	Station ID	Collection Date/Time (1/21/2012)	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity ①					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings	
SW09-0007	PSNS 084.1	1023	SW	X	X	X	X	X							1	C	09	178	23
SW09-0008	PSNS 115.1	0949	SW	X	X	X	X	X							1	C	09	112	14
SW09-0009	PSNS 124.1	0127	SW	X	X	X	X	X							1	C	09	333	27
SW09-0010	PSNS 126	1158	SW	X	X	X	X	X							1	C	09	267	8
SW09-0011	PSNS 126 DUP	1158	SW	X	X	X	X	X							1	C	09	302	8
SW09-0012	PSNS 124	0905	SW	X	X	X	X	X							1	C	09	1695	8
SW09-0013	PSNS 015	0957	SW	X	X	X	X	X							1	C	09	233	39

DM

Relinquished by: _____ 1/21/12 2200
Signature Date Time
Brian Rupert TEC
Printed Name Company

Received by: _____ 1/21/12 2200
Signature
JM Brandenberger
Printed Name

Total # of Containers:
Shipment Method:
Sample Disposition:

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Printed Name

Distribution:
1) PNNL
2) CAS
3) TAI

① Turbidity measured at Navy Stormwater Lab during comp'ing session

SAMPLE CHAIN OF CUSTODY FORM

Stormwater Event #09

Date: 1/20/2012
Page: 1 of 1
Project No.: N4523A10MP00034 Amend.1
Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Sample Label	Station ID	1/20/2012 Collection Date/Time	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings		Temp °C
																		BJB NTU	BJB µS/cm	
SW09-001	PSNS126	1700	SW						X						2	Grab	09	91.7	6.56	2.8
SW09-002	PSNS124.1	1715	SW						X						2	Grab	09	980	36.1	2.6
SW09-003	PSNS124	1730	SW						X						1	Grab	09	1719	21.4	4.4
SW09-004	PSNS84.1	1745	SW						X						1	Grab	09	*1070	11.5	3.0
SW09-005	PSNS015	1800	SW						X						1	Grab	09	300	41.4	2.3
SW09-006	PSNS115.1	1827	SW						X						1	Grab	09	176	7.59	2.1
																		µS/cm	NTU	
																		*floating stuff		

Relinquished by: BG Beckwith 1/21/12 1800
Signature Date Time
BG Beckwith TEC
Printed Name Company

Received by: 1/21/12 1800
Signature
Brian Rupert
Printed Name

Total # of Containers:
Shipment Method:
Sample Disposition:

Relinquished by: 1/21/12 2200
Signature Date Time
Brian Rupert TEL
Printed Name Company

Received by: 1/21/12 2200
Signature
JM Brandenberger
Printed Name

Distribution:
1) PNNL
2) CAS
3) TAI

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/1/2112 1/21/12 & date

Page: 1 of 1

Project No.: 54220

Project: Non-dry Dock Stormwater SW09

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW09-0041	PSNS084.1	1/21/2012 1023	SW					x							1	comp	SW09	3174*91
SW09-0042	PSNS084.1	1/21/2012 1023	SW						x						1	comp	SW09	3174*92
SW09-0043	PSNS115.1	1/21/2012 0949	SW					x							1	comp	SW09	3174*93
SW09-0044	PSNS115.1	1/21/2012 0949	SW						x						1	comp	SW09	3174*94
SW09-0045	PSNS124.1	1/21/2012 0127	SW					x							1	comp	SW09	3174*95
SW09-0046	PSNS124.1	1/21/2012 0127	SW						x						1	comp	SW09	3174*96
SW09-0047	PSNS126	1/21/2012 1158	SW					x							1	comp	SW09	3174*97
SW09-0048	PSNS126	1/21/2012 1158	SW						x						1	comp	SW09	3174*98
SW09-0049	PSNS126Dup	1/21/2012 1158	SW					x							1	comp	SW09	3174*99
SW09-0050	PSNS126Dup	1/21/2012 1158	SW						x						1	comp	SW09	3174*100
SW09-0051	PSNS124	1/21/2012 0905	SW					x							1	comp	SW09	3174*101
SW09-0052	PSNS124	1/21/2012 0905	SW						x						1	comp	SW09	3174*102
SW09-0053	PSNS015	1/21/2012 0957	SW					x							1	comp	SW09	3174*103
SW09-0054	PSNS015	1/21/2012 0957	SW						x						1	comp	SW09	3174*104

Relinquished by: NA
Signature Date Time
Printed Name Company

Received by: 1/21/12
Signature 2205
Printed Name

Total # of Containers
Shipment Method:
Retained at Battelle
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 1/21/2012
Batch: 10
Login Designee: Brandenberger

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **Non-dry dock Storm water - SW09 (Jan 2012)**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW09-0041	PSNS084.1	3174*91	WAT	Prep Lab, L-5-D	Total Metals	01/21/12
SW09-0042	PSNS084.1	3174*92	WAT	Prep Lab, L-5-D	Dissolved Metals	01/21/12
SW09-0043	PSNS115.1	3174*93	WAT	Prep Lab, L-5-D	Total Metals	01/21/12
SW09-0044	PSNS115.1	3174*94	WAT	Prep Lab, L-5-D	Dissolved Metals	01/21/12
SW09-0045	PSNS124.1	3174*95	WAT	Prep Lab, L-5-D	Total Metals	01/21/12
SW09-0046	PSNS124.1	3174*96	WAT	Prep Lab, L-5-D	Dissolved Metals	01/21/12
SW09-0047	PSNS126	3174*97	WAT	Prep Lab, L-5-D	Total Metals	01/21/12
SW09-0048	PSNS126	3174*98	WAT	Prep Lab, L-5-D	Dissolved Metals	01/21/12
SW09-0049	PSNS126Dup	3174*99	WAT	Prep Lab, L-5-D	Total Metals	01/21/12
SW09-0050	PSNS126Dup	3174*100	WAT	Prep Lab, L-5-D	Dissolved Metals	01/21/12
SW09-0051	PSNS124	3174*101	WAT	Prep Lab, L-5-D	Total Metals	01/21/12
SW09-0052	PSNS124	3174*102	WAT	Prep Lab, L-5-D	Dissolved Metals	01/21/12
SW09-0053	PSNS015	3174*103	WAT	Prep Lab, L-5-D	Total Metals	01/21/12
SW09-0054	PSNS015	3174*104	WAT	Prep Lab, L-5-D	Dissolved Metals	01/21/12

SOP#: MSL-A-001

LOG-IN CHECKLIST SW09 Reference SOP# MSL-A-001

Central File #: 3174 Sample No(s): 91-104 Batch: 10 (SW09)

Project Name: Non Dry Dock SW (SW09 Project Manager: JMS

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: WP#

Yes	No	
☐	☑	Navy-type Project (requires high-level sample tracking procedures)
☐	☑	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

☑	☐	Filter Samples:	*Amount:* Entire sample	Half of sample
☐	☑	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)		
☑	☐	Special instructions: split per QAPP		

Sample Preservation Instructions: various

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box	
☐	☐	☑	Custody seal present	Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each)	4.0 °C °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy:	
☑	☐	☐	Were all chain of custody forms signed and dated?	
☑	☐	☐	Were samples filtered at MSL?	

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly (Glass) Cap. Vial Other:

Notes:

Completed By: [signature] Date/Time: 1/21/12 2205

SAMPLE PRESERVATION

☐		Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)		
☐		Random pH checked for ~10% of samples (use dip paper)	Sample IDs:	
☐		Complete pH check required for project (use pH meter and record on pH Record form)		
☐		Sample(s) were preserved at MSL		
Type:	☑	0.2% HNO3	Notes: TME/OME	Lot# 121020
	☐	0.5% HCl (Hg samples)	Notes:	Lot#
	☑	~~Refrigerate~~/Freeze	Notes: TSS/Nut TOC/DOC/Hardness/TPH	
	☐	Other	Notes:	

Completed By: [signature] Date/Time: 1/21/12 0115

Storage Shelf: prep lab - L-5-D

SAMPLE CHAIN OF CUSTODY FORM

Date: ~~1/1/2112~~ 1/21/12 8

Page: 1 of 3

Project No.: 54220

Project: Non-dry Dock Stormwater SW09

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW09-001	PSNS126	1/20/2012 1700	SW							X					1	grab	SW09	
SW09-002	PSNS124.1	1/20/2012 1715	SW							X					1	grab	SW09	
SW09-003	PSNS124	1/20/2012 1730	SW							X					1	grab	SW09	
SW09-004	PSNS084.1	1/20/2012 1745	SW							X					1	grab	SW09	
SW09-005	PSNS015	1/20/2012 1800	SW							X					1	grab	SW09	
SW09-006	PSNS115.1	1/20/2012 1827	SW							X					1	grab	SW09	
SW09-0013	PSNS084.1	1/21/2012 1023	SW	x											1	comp	SW09	SW09-007
SW09-0014	PSNS084.1	1/21/2012 1023	SW		x										1	comp	SW09	SW09-007
SW09-0015	PSNS084.1	1/21/2012 1023	SW			x									1	comp	SW09	SW09-007
SW09-0016	PSNS084.1	1/21/2012 1023	SW				x								1	comp	SW09	SW09-007
SW09-0017	PSNS115.1	1/21/2012 0949	SW	x											1	comp	SW09	SW09-008
SW09-0018	PSNS115.1	1/21/2012 0949	SW		x										1	comp	SW09	SW09-008
SW09-0019	PSNS115.1	1/21/2012 0949	SW			x									1	comp	SW09	SW09-008
SW09-0020	PSNS115.1	1/21/2012 0949	SW				x								1	comp	SW09	SW09-008

Relinquished by: _____ 1/23/2012 13:10
Signature Date Time

Li-Jung Kuo Battelle
Printed Name Company

Received by: _____
Signature

Printed Name

Total # of Containers

Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by: _____
Signature Date Time

Printed Name Company

Received by: _____
Signature

Printed Name

Distribution:
1) PNNL
2) CAS

SAMPLE CHAIN OF CUSTODY FORM

Date: ~~1/1/2112~~ 1/21/12

Page: 2 of 3

Project No.: 54220

Project: Non-dry Dock Stormwater SW09

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW09-0021	PSNS124.1	1/21/2012 0127	SW	x											1	comp	SW09	SW09-009
SW09-0022	PSNS124.1	1/21/2012 0127	SW		x										1	comp	SW09	SW09-009
SW09-0023	PSNS124.1	1/21/2012 0127	SW			x									1	comp	SW09	SW09-009
SW09-0024	PSNS124.1	1/21/2012 0127	SW				x								1	comp	SW09	SW09-009
SW09-0025	PSNS126	1/21/2012 1158	SW	x											1	comp	SW09	SW09-010
SW09-0026	PSNS126	1/21/2012 1158	SW		x										1	comp	SW09	SW09-010
SW09-0027	PSNS126	1/21/2012 1158	SW			x									1	comp	SW09	SW09-010
SW09-0028	PSNS126	1/21/2012 1158	SW				x								1	comp	SW09	SW09-010
SW09-0029	PSNS126Dup	1/21/2012 1158	SW	x											1	comp	SW09	SW09-011
SW09-0030	PSNS126Dup	1/21/2012 1158	SW		x										1	comp	SW09	SW09-011
SW09-0031	PSNS126Dup	1/21/2012 1158	SW			x									1	comp	SW09	SW09-011
SW09-0032	PSNS126Dup	1/21/2012 1158	SW				x								1	comp	SW09	SW09-011
SW09-0033	PSNS124	1/21/2012 0905	SW	x											1	comp	SW09	SW09-012
SW09-0034	PSNS124	1/21/2012 0905	SW		x										1	comp	SW09	SW09-012

Relinquished by: _____ 1/21/12 13:10
Signature Date Time
LT-Jung Kuo Battelle
Printed Name Company

Received by: _____
Signature
_____
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by: _____
Signature Date Time
_____
Printed Name Company

Received by: _____
Signature
_____
Printed Name

Distribution:
1) PNNL
2) CAS

SAMPLE CHAIN OF CUSTODY FORM

Date: ~~1/1/2112~~ 1/21/12

Page: 3 of 3

Project No.: 54220

Project: Non-dry Dock Stormwater SW09

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW09-0035	PSNS124	1/21/2012 0905	SW			x									1	comp	SW09	SW09-012
SW09-0036	PSNS124	1/21/2012 0905	SW				x								1	comp	SW09	SW09-012
SW09-0037	PSNS015	1/21/2012 0957	SW	x												comp	SW09	SW09-013
SW09-0038	PSNS015	1/21/2012 0957	SW		x											comp	SW09	SW09-013
SW09-0039	PSNS015	1/21/2012 0957	SW			x										comp	SW09	SW09-013
SW09-0040	PSNS015	1/21/2012 0957	SW				x									comp	SW09	SW09-013
--end--																		

Relinquished by: _____ 1/23/2012 13:18
Signature Date Time

L7-Jung Kwo Battelle
Printed Name Company

Received by: _____
Signature

_____
Printed Name

Total # of Containers

Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by: _____
Signature Date Time

_____
Printed Name Company

Received by: _____
Signature

_____
Printed Name

Distribution:
1) PNNL
2) CAS

K1200620

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/1/2112
Page: 1 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW09

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
1	SW09-001	PSNS126	1/20/2012 1700	SW							X					1	grab	SW09	
2	SW09-002	PSNS124.1	1/20/2012 1715	SW							X					1	grab	SW09	
3	SW09-003	PSNS124	1/20/2012 1730	SW							X					1	grab	SW09	
4	SW09-004	PSNS084.1	1/20/2012 1745	SW							X					1	grab	SW09	
5	SW09-005	PSNS015	1/20/2012 1800	SW							X					1	grab	SW09	
6	SW09-006	PSNS115.1	1/20/2012 1827	SW							X					1	grab	SW09	
7	SW09-0013	PSNS084.1	1/21/2012 1023	SW	x											1	comp	SW09	SW09-007
8	SW09-0014	PSNS084.1	1/21/2012 1023	SW		x										1	comp	SW09	SW09-007
9	SW09-0015	PSNS084.1	1/21/2012 1023	SW			x									1	comp	SW09	SW09-007
10	SW09-0016	PSNS084.1	1/21/2012 1023	SW				x								1	comp	SW09	SW09-007
11	SW09-0017	PSNS115.1	1/21/2012 0949	SW	x											1	comp	SW09	SW09-008
12	SW09-0018	PSNS115.1	1/21/2012 0949	SW		x										1	comp	SW09	SW09-008
13	SW09-0019	PSNS115.1	1/21/2012 0949	SW			x									1	comp	SW09	SW09-008
14	SW09-0020	PSNS115.1	1/21/2012 0949	SW				x								1	comp	SW09	SW09-008

Relinquished by: _____ 1/23/2012 13:10
Signature Date Time
LT-Jung Kwo Battelle
Printed Name Company

Received by: _____ 1/24/12
Signature
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

8

K1200620

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/1/2112
Page: 2 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW09

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
15	SW09-0021	PSNS124.1	1/21/2012 0127	SW	x											1	comp	SW09	SW09-009
16	SW09-0022	PSNS124.1	1/21/2012 0127	SW		x										1	comp	SW09	SW09-009
17	SW09-0023	PSNS124.1	1/21/2012 0127	SW			x									1	comp	SW09	SW09-009
18	SW09-0024	PSNS124.1	1/21/2012 0127	SW				x								1	comp	SW09	SW09-009
19	SW09-0025	PSNS126	1/21/2012 1158	SW	x											1	comp	SW09	SW09-010
20	SW09-0026	PSNS126	1/21/2012 1158	SW		x										1	comp	SW09	SW09-010
21	SW09-0027	PSNS126	1/21/2012 1158	SW			x									1	comp	SW09	SW09-010
22	SW09-0028	PSNS126	1/21/2012 1158	SW				x								1	comp	SW09	SW09-010
23	SW09-0029	PSNS126Dup	1/21/2012 1158	SW	x											1	comp	SW09	SW09-011
24	SW09-0030	PSNS126Dup	1/21/2012 1158	SW		x										1	comp	SW09	SW09-011
25	SW09-0031	PSNS126Dup	1/21/2012 1158	SW			x									1	comp	SW09	SW09-011
26	SW09-0032	PSNS126Dup	1/21/2012 1158	SW				x								1	comp	SW09	SW09-011
27	SW09-0033	PSNS124	1/21/2012 0905	SW	x											1	comp	SW09	SW09-012
28	SW09-0034	PSNS124	1/21/2012 0905	SW		x										1	comp	SW09	SW09-012

Relinquished by: [signature] 1/23/12 13:10
Signature Date Time
LT-Jung Kuo Battelle
Printed Name Company

Received by: [signature] 1/24/12 0900
Signature
Jsell
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

9

K1200620

SAMPLE CHAIN OF CUSTODY FORM

Date: 1/1/2112
Page: 3 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW09

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
29	SW09-0035	PSNS124	1/21/2012 0905	SW			x									1	comp	SW09	SW09-012
30	SW09-0036	PSNS124	1/21/2012 0905	SW				x								1	comp	SW09	SW09-012
31	SW09-0037	PSNS015	1/21/2012 0957	SW	x												comp	SW09	SW09-013
32	SW09-0038	PSNS015	1/21/2012 0957	SW		x											comp	SW09	SW09-013
33	SW09-0039	PSNS015	1/21/2012 0957	SW			x										comp	SW09	SW09-013
34	SW09-0040	PSNS015	1/21/2012 0957	SW				x									comp	SW09	SW09-013
	--end--																		

Relinquished by: [signature] 1/23/2012 13:10
Signature Date Time
L7-Jung Kwo Battelle
Printed Name Company

Received by: [signature] 1/24/12 0810
Signature
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

10

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC HF

Client / Project: Battelle Service Request K12 1206 20

Received: 1/24/12 Opened: 1/24/12 By: AJ Unloaded: 1/24/12 By: AJ

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where?_____

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
2.6	—	274		7931 4690 7456	
1.5		299		7931 4690 7331	

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* hard ice packs
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Notes, Discrepancies, & Resolutions:*_____

Page ____ *of* ____

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Battelle	**Service Request No.:**	K1200620
Project:	Non-dry Dock Stormwater SW09	**Date Received:**	1/24/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Thirty-four water samples were received for analysis at Columbia Analytical Services on 1/24/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Dissolved Organic Carbon by Standard Method 5310 C:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Dissolved Organic Carbon in samples SW09-0019 and SW09-0023 were not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of these samples were observed.

Diesel Range Organics by EPA Method 8015

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of Diesel Range Organics and Residual Range Organics in sample SW09-001 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of these samples were observed.

Approved by Howard Holmes **Date** 2-8-12

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	01/21/12
Sample Matrix:	Water	**Date Received:**	01/24/12
Analysis Method:	SM 2340 C	**Units:**	mg/L
		Basis:	NA

Hardness, Total as CaCO3

Sample Name	Lab Code	Result		MRL	MDL	Dil.	Date Analyzed	Q
SW09-0013	K1200620-007	**16.8**		2.0	0.8	1	01/27/12 10:00	
SW09-0017	K1200620-011	**12.0**		2.0	0.8	1	01/27/12 10:00	
SW09-0021	K1200620-015	**28.4**		2.0	0.8	1	01/27/12 10:00	
SW09-0025	K1200620-019	**26.0**		2.0	0.8	1	01/27/12 10:00	
SW09-0029	K1200620-023	**28.8**		2.0	0.8	1	01/27/12 10:00	
SW09-0033	K1200620-027	**97.6**		2.0	0.8	1	01/27/12 10:00	
SW09-0037	K1200620-031	**24.8**		2.0	0.8	1	01/27/12 10:00	
Method Blank	K1200620-MB1	ND	U	2.0	0.8	1	01/27/12 10:00	

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	01/21/12
Sample Matrix:	Water	**Date Received:**	01/24/12
		Date Analyzed:	01/27/12

Replicate Sample Summary
Hardness, Total EDTA Titration, 20th ed

Sample Name:	SW09-0013	**Units:**	mg/L
Lab Code:	K1200620-007	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K1200620-007DUP20 Result	Average	RPD	RPD Limit
Hardness, Total as CaCO3	SM 2340 C	2.0	0.8	16.8	16.0	16.4	5	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed 1/31/2012 3:57:32 PM

Superset Reference: 12-0000201085 rev 00

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Analyzed: 01/27/12

Lab Control Sample Summary
General Chemistry Parameters

Analysis Method: SM 2340 C

Units: mg/L
Basis: NA
Analysis Lot: 277938

Lab Control Sample
K1200620-LCS2

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Hardness, Total as CaCO3	44.0	43.4	101	90-116

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Superset Reference: 12-0000201085 rev 00

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	01/21/12
Sample Matrix:	Water	**Date Received:**	01/24/12
Analysis Method:	SM 2540 D	**Units:**	mg/L
		Basis:	NA

Solids, Total Suspended (TSS)

Sample Name	Lab Code	Result		MRL	MDL	Dil.	Date Analyzed	Q
SW09-0016	K1200620-010	**17.0**		5.0	-	1	01/26/12 12:05	
SW09-0020	K1200620-014	**25.0**		5.0	-	1	01/26/12 12:05	
SW09-0024	K1200620-018	**12.5**		5.0	-	1	01/26/12 12:05	
SW09-0028	K1200620-022	**5.0**		5.0	-	1	01/26/12 12:05	
SW09-0032	K1200620-026	**10.0**		5.0	-	1	01/26/12 12:05	
SW09-0036	K1200620-030	**9.0**		5.0	-	1	01/26/12 12:05	
SW09-0040	K1200620-034	**36.0**		5.0	-	1	01/26/12 12:05	
Method Blank	K1200620-MB1	ND	U	5.0	-	1	01/26/12 12:05	
Method Blank	K1200620-MB2	ND	U	5.0	-	1	01/26/12 12:05	

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Analysis Method:	SM 2540 D	**Units:**	mg/L
		Basis:	NA

Duplicate Sample Summary
Solids, Total Suspended (TSS)

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1200578-004DUP15	5.0		ND	ND	NC	NC	10	01/26/12
Batch QC	K1200594-001DUP18	5.0		5.5	5.0	5.25	10	10	01/26/12

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed 1/31/2012 3:57:32 PM

Superset Reference: 12-0000201085 rev 00

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Analyzed: 01/26/12

Lab Control Sample Summary
General Chemistry Parameters

Analysis Method: SM 2540 D

Units: mg/L
Basis: NA
Analysis Lot: 277793

Lab Control Sample
K1200620-LCS2

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Solids, Total Suspended (TSS)	308	305	101	85-111

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Superset Reference: 12-0000201085 rev 00

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	01/21/12
Sample Matrix:	Water	**Date Received:**	01/24/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Carbon, Dissolved Organic (DOC)

Sample Name	Lab Code	Result		MRL	MDL	Dil.	Date Analyzed	Q
SW09-0015	K1200620-009	**1.00**		0.50	0.07	1	01/24/12 16:21	
SW09-0019	K1200620-013	**0.98**		0.50	0.07	1	01/24/12 16:21	
SW09-0023	K1200620-017	**1.07**		0.50	0.07	1	01/24/12 16:21	
SW09-0027	K1200620-021	**1.03**		0.50	0.07	1	01/24/12 16:21	
SW09-0031	K1200620-025	**1.09**		0.50	0.07	1	01/24/12 16:21	
SW09-0035	K1200620-029	**0.89**		0.50	0.07	1	01/24/12 16:21	
SW09-0039	K1200620-033	**1.41**		0.50	0.07	1	01/24/12 16:21	
Method Blank	K1200620-MB1	ND	U	0.50	0.07	1	01/24/12 16:21	

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	01/21/12
Sample Matrix:	Water	**Date Received:**	01/24/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Duplicate Sample Summary
Carbon, Dissolved Organic (DOC)

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
SW09-0015	K1200620-009DUP22	0.50	0.07	1.00	1.03	1.02	3	10	01/24/12
SW09-0019	K1200620-013DUP24	0.50	0.07	0.98	0.82	0.898	18 *	10	01/24/12
SW09-0023	K1200620-017DUP26	0.50	0.07	1.07	0.95	1.01	12 *	10	01/24/12
SW09-0027	K1200620-021DUP28	0.50	0.07	1.03	0.96	0.999	7	10	01/24/12
SW09-0031	K1200620-025DUP30	0.50	0.07	1.09	1.06	1.08	2	10	01/24/12
SW09-0035	K1200620-029DUP32	0.50	0.07	0.89	0.94	0.917	5	10	01/24/12
SW09-0039	K1200620-033DUP34	0.50	0.07	1.41	1.46	1.44	4	10	01/24/12

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000201085 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: 01/21/12
Date Received: 01/24/12
Date Analyzed: 01/24/12

Matrix Spike Summary
Dissolved Organic Carbon (DOC), Persulfate-Ultraviolet or Heated-Persulfate Oxidation 20th Ed.

Sample Name: SW09-0015
Lab Code: K1200620-009
Analysis Method: SM 5310 C

Units: mg/L
Basis: NA

Matrix Spike
K1200620-009MS6

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Dissolved Organic (DOC)	1.00	26.8	25.0	103	60-134

Results flagged with an asterisk (*) indicate values outside control criteria.

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000201085 rev 00

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Analyzed: 01/24/12

Lab Control Sample Summary
General Chemistry Parameters

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 277500

Lab Control Sample
K1200620-LCS2

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Dissolved Organic (DOC)	22.2	22.7	98	87-112

Client: Battelle Marine Sciences Lab **Service Request:** K1200620
Project: Non-dry Dock Stormwater SW09/54220

Continuing Calibration Verification (CCV) Summary

Carbon, Dissolved Organic (DOC)

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	277500	KQ1200715-03	01/24/12 16:21	25.0	24.2	97	90-110
CCV2	277500	KQ1200715-04	01/24/12 16:21	25.0	24.3	97	90-110
CCV3	277500	KQ1200715-05	01/24/12 16:21	25.0	23.9	96	90-110
CCV4	277500	KQ1200715-06	01/24/12 16:21	25.0	24.1	97	90-110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220

Service Request: K1200620

Continuing Calibration Blank (CCB) Summary
Carbon, Dissolved Organic (DOC)

Analysis Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	277500	KQ1200715-07	01/24/12 16:21	0.50	0.07	0.14	J
CCB2	277500	KQ1200715-08	01/24/12 16:21	0.50	0.07	ND	U
CCB3	277500	KQ1200715-09	01/24/12 16:21	0.50	0.07	ND	U
CCB4	277500	KQ1200715-10	01/24/12 16:21	0.50	0.07	ND	U

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	01/21/12
Sample Matrix:	Water	**Date Received:**	01/24/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Carbon, Total Organic

Sample Name	Lab Code	Result		MRL	MDL	Dil.	Date Analyzed	Q
SW09-0014	K1200620-008	**1.23**		0.50	0.07	1	01/24/12 16:21	
SW09-0018	K1200620-012	**1.12**		0.50	0.07	1	01/24/12 16:21	
SW09-0022	K1200620-016	**1.03**		0.50	0.07	1	01/24/12 16:21	
SW09-0026	K1200620-020	**1.11**		0.50	0.07	1	01/24/12 16:21	
SW09-0030	K1200620-024	**1.22**		0.50	0.07	1	01/24/12 16:21	
SW09-0034	K1200620-028	**1.03**		0.50	0.07	1	01/24/12 16:21	
SW09-0038	K1200620-032	**1.68**		0.50	0.07	1	01/24/12 16:21	
Method Blank	K1200620-MB1	ND	U	0.50	0.07	1	01/24/12 16:21	
Method Blank	K1200620-MB2	ND	U	0.50	0.07	1	01/24/12 16:21	

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	01/21/12
Sample Matrix:	Water	**Date Received:**	01/24/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Duplicate Sample Summary
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
SW09-0014	K1200620-008DUP21	0.50	0.07	1.23	1.23	1.23	<1	10	01/24/12
SW09-0018	K1200620-012DUP23	0.50	0.07	1.12	1.04	1.08	7	10	01/24/12
SW09-0022	K1200620-016DUP25	0.50	0.07	1.03	1.04	1.04	1	10	01/24/12
SW09-0026	K1200620-020DUP27	0.50	0.07	1.11	1.15	1.13	4	10	01/24/12
SW09-0030	K1200620-024DUP29	0.50	0.07	1.22	1.20	1.21	1	10	01/24/12
SW09-0034	K1200620-028DUP31	0.50	0.07	1.03	1.06	1.05	3	10	01/24/12
SW09-0038	K1200620-032DUP33	0.50	0.07	1.68	1.67	1.67	<1	10	01/24/12

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000201085 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: N/A
Date Received: N/A
Date Analyzed: 01/24/12

Duplicate Matrix Spike Summary
Total Organic Carbon (TOC), Persulfate-Ultraviolet or Heated-Persulfate Oxidation 20th Ed.

Sample Name: Batch QC
Lab Code: K1200252-012
Analysis Method: SM 5310 C

Units: mg/L
Basis: NA

		Matrix Spike K1200252-012MS1			Duplicate Matrix Spike K1200252-012DMS1					
Analyte Name	Sample Result	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
Carbon, Total Organic	0.13	25.4	25.0	101	24.9	25.0	99	60-134	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000201085 rev 00

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	01/24/12

Matrix Spike Summary
Total Organic Carbon (TOC), Persulfate-Ultraviolet or Heated-Persulfate Oxidation 20th Ed.

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1200471-003	**Basis:**	NA
Analysis Method:	SM 5310 C		

Matrix Spike
K1200471-003MS2

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits	RPD Limit
Carbon, Total Organic	0.20	25.9	25.0	103	60-134	

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000201085 rev 00

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	01/24/12

Matrix Spike Summary
Total Organic Carbon (TOC), Persulfate-Ultraviolet or Heated-Persulfate Oxidation 20th Ed.

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1200496-001	**Basis:**	NA
Analysis Method:	SM 5310 C		

Matrix Spike
K1200496-001MS3

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits	RPD Limit
Carbon, Total Organic	5	508	500	101	60-134	

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000201085 rev 00

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	01/24/12

Matrix Spike Summary
Total Organic Carbon (TOC), Persulfate-Ultraviolet or Heated-Persulfate Oxidation 20th Ed.

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1200531-001	**Basis:**	NA
Analysis Method:	SM 5310 C		

Matrix Spike
K1200531-001MS4

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits	RPD Limit
Carbon, Total Organic	0.93	26.1	25.0	101	60-134	

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000201085 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Analyzed: 01/24/12

Duplicate Lab Control Sample Summary
Total Organic Carbon (TOC), Persulfate-Ultraviolet or Heated-Persulfate Oxidation 20th Ed.

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 277499

	Lab Control Sample K1200620-LCS1			Duplicate Lab Control Sample K1200620-DLCS1					
Analyte Name	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
Carbon, Total Organic	22.3	22.7	98	21.9	22.7	96	87-112	2	20

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Analyzed: 01/24/12

Lab Control Sample Summary
General Chemistry Parameters

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 277499

Lab Control Sample
K1200620-LCS2

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	22.1	22.7	97	87-112

Client: Battelle Marine Sciences Lab **Service Request:** K1200620
Project: Non-dry Dock Stormwater SW09/54220

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	277499	KQ1200713-03	01/24/12 16:21	25.0	24.2	97	90-110
CCV2	277499	KQ1200713-04	01/24/12 16:21	25.0	24.1	97	90-110
CCV3	277499	KQ1200713-05	01/24/12 16:21	25.0	24.4	98	90-110
CCV4	277499	KQ1200713-06	01/24/12 16:21	25.0	24.3	97	90-110
CCV5	277499	KQ1200713-07	01/24/12 16:21	25.0	23.9	96	90-110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220

Service Request: K1200620

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic

Analysis Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	277499	KQ1200713-08	01/24/12 16:21	0.50	0.07	0.14	J
CCB2	277499	KQ1200713-09	01/24/12 16:21	0.50	0.07	ND	U
CCB3	277499	KQ1200713-10	01/24/12 16:21	0.50	0.07	0.11	J
CCB4	277499	KQ1200713-11	01/24/12 16:21	0.50	0.07	ND	U
CCB5	277499	KQ1200713-12	01/24/12 16:21	0.50	0.07	ND	U

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Service Request: K1200620

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
SW09-001	K1200620-001	01/20/2012	01/24/2012
SW09-002	K1200620-002	01/20/2012	01/24/2012
SW09-003	K1200620-003	01/20/2012	01/24/2012
SW09-004	K1200620-004	01/20/2012	01/24/2012
SW09-005	K1200620-005	01/20/2012	01/24/2012
SW09-006	K1200620-006	01/20/2012	01/24/2012
SW09-001	KWG1201126-1	01/20/2012	01/24/2012

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature:_____ Name:_____

Date:_____ Title:_____

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: 01/20/2012
Date Received: 01/24/2012

Diesel and Residual Range Organics

Sample Name: SW09-001
Lab Code: K1200620-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**72**	J	290	13	1	01/31/12	02/02/12	KWG1201126	
Residual Range Organics (RRO)	**210**	J	580	22	1	01/31/12	02/02/12	KWG1201126	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	96	50-150	02/02/12	Acceptable
n-Triacontane	103	50-150	02/02/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: 01/20/2012
Date Received: 01/24/2012

Diesel and Residual Range Organics

Sample Name: SW09-002
Lab Code: K1200620-002

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**150**	J	280	12	1	01/31/12	02/02/12	KWG1201126	
Residual Range Organics (RRO)	**530**	J	550	21	1	01/31/12	02/02/12	KWG1201126	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	102	50-150	02/02/12	Acceptable
n-Triacontane	106	50-150	02/02/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: 01/20/2012
Date Received: 01/24/2012

Diesel and Residual Range Organics

Sample Name: SW09-003
Lab Code: K1200620-003

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**95**	J	240	11	1	01/31/12	02/02/12	KWG1201126	
Residual Range Organics (RRO)	**280**	J	480	19	1	01/31/12	02/02/12	KWG1201126	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	101	50-150	02/02/12	Acceptable
n-Triacontane	106	50-150	02/02/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: 01/20/2012
Date Received: 01/24/2012

Diesel and Residual Range Organics

Sample Name: SW09-004
Lab Code: K1200620-004

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**210**	J	240	11	1	01/31/12	02/02/12	KWG1201126	
Residual Range Organics (RRO)	**630**	O	480	19	1	01/31/12	02/02/12	KWG1201126	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	98	50-150	02/02/12	Acceptable
n-Triacontane	103	50-150	02/02/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: 01/20/2012
Date Received: 01/24/2012

Diesel and Residual Range Organics

Sample Name: SW09-005
Lab Code: K1200620-005

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**150**	J	240	11	1	01/31/12	02/02/12	KWG1201126	
Residual Range Organics (RRO)	**650**	O	480	19	1	01/31/12	02/02/12	KWG1201126	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	97	50-150	02/02/12	Acceptable
n-Triacontane	104	50-150	02/02/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: 01/20/2012
Date Received: 01/24/2012

Diesel and Residual Range Organics

Sample Name: SW09-006
Lab Code: K1200620-006

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**65**	J	240	11	1	01/31/12	02/02/12	KWG1201126	
Residual Range Organics (RRO)	**210**	J	480	19	1	01/31/12	02/02/12	KWG1201126	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	97	50-150	02/02/12	Acceptable
n-Triacontane	105	50-150	02/02/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1201126-3

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	01/31/12	02/02/12	KWG1201126	
Residual Range Organics (RRO)	**25**	J	500	19	1	01/31/12	02/02/12	KWG1201126	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	99	50-150	02/02/12	Acceptable
n-Triacontane	98	50-150	02/02/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
SW09-001	K1200620-001	96	103
SW09-002	K1200620-002	102	106
SW09-003	K1200620-003	101	106
SW09-004	K1200620-004	98	103
SW09-005	K1200620-005	97	104
SW09-006	K1200620-006	97	105
SW09-001DUP	KWG1201126-1	99	104
Method Blank	KWG1201126-3	99	98
Lab Control Sample	KWG1201126-2	103	102

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Extracted: 01/31/2012
Date Analyzed: 02/02/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: SW09-001
Lab Code: K1200620-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1201126

Analyte Name	MRL	MDL	Sample Result	SW09-001DUP KWG1201126-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	12	72	74	73	3 #	30
Residual Range Organics (RRO)	520	20	210	190	200	6 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Extracted: 01/31/2012
Date Analyzed: 02/02/2012

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1201126

Analyte Name	Lab Control Sample KWG1201126-2 Lab Control Spike Result	Expected	%Rec	%Rec Limits
Diesel Range Organics (DRO)	1540	1600	96	46-140
Residual Range Organics (RRO)	700	800	87	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Extracted:**	01/31/2012
Sample Matrix:	Water	**Date Analyzed:**	02/02/2012
		Time Analyzed:	03:34

Method Blank Summary
Diesel and Residual Range Organics

Sample Name:	Method Blank	**Instrument ID:**	GC21
Lab Code:	KWG1201126-3	**File ID:**	J:\GC21\DATA\020112B-NW\0201F033.D
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1201126

This Method Blank applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Lab Control Sample	KWG1201126-2	J:\GC21\DATA\020112B-NW\0201F031.D	02/02/12	03:12
SW09-001	K1200620-001	J:\GC21\DATA\020112B-NW\0201F039.D	02/02/12	04:39
SW09-001DUP	KWG1201126-1	J:\GC21\DATA\020112B-NW\0201F041.D	02/02/12	05:01
SW09-006	K1200620-006	J:\GC21\DATA\020112B-NW\0201F043.D	02/02/12	05:23
SW09-002	K1200620-002	J:\GC21\DATA\020112B-NW\0201F045.D	02/02/12	05:44
SW09-003	K1200620-003	J:\GC21\DATA\020112B-NW\0201F047.D	02/02/12	06:06
SW09-005	K1200620-005	J:\GC21\DATA\020112B-NW\0201F049.D	02/02/12	06:28
SW09-004	K1200620-004	J:\GC21\DATA\020112B-NW\0201F051.D	02/02/12	06:49

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1200620
Project:	Non-dry Dock Stormwater SW09/54220	**Date Extracted:**	01/31/2012
Sample Matrix:	Water	**Date Analyzed:**	02/02/2012
		Time Analyzed:	03:12

Lab Control Sample Summary
Diesel and Residual Range Organics

Sample Name:	Lab Control Sample	**Instrument ID:**	GC21
Lab Code:	KWG1201126-2	**File ID:**	J:\GC21\DATA\020112B-NW\0201F031.D
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1201126

This Lab Control Sample applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Method Blank	KWG1201126-3	J:\GC21\DATA\020112B-NW\0201F033.D	02/02/12	03:34
SW09-001	K1200620-001	J:\GC21\DATA\020112B-NW\0201F039.D	02/02/12	04:39
SW09-001DUP	KWG1201126-1	J:\GC21\DATA\020112B-NW\0201F041.D	02/02/12	05:01
SW09-006	K1200620-006	J:\GC21\DATA\020112B-NW\0201F043.D	02/02/12	05:23
SW09-002	K1200620-002	J:\GC21\DATA\020112B-NW\0201F045.D	02/02/12	05:44
SW09-003	K1200620-003	J:\GC21\DATA\020112B-NW\0201F047.D	02/02/12	06:06
SW09-005	K1200620-005	J:\GC21\DATA\020112B-NW\0201F049.D	02/02/12	06:28
SW09-004	K1200620-004	J:\GC21\DATA\020112B-NW\0201F051.D	02/02/12	06:49

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220

Service Request: K1200620
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Level ID	File ID
A	J:\GC21\DATA\071111B-NW\0711F037.D
B	J:\GC21\DATA\071111B-NW\0711F039.D
C	J:\GC21\DATA\071111B-NW\0711F041.D
D	J:\GC21\DATA\071111B-NW\0711F043.D
E	J:\GC21\DATA\071111B-NW\0711F045.D
F	J:\GC21\DATA\071111B-NW\0711F047.D
G	J:\GC21\DATA\071111B-NW\0711F057.D
H	J:\GC21\DATA\071111B-NW\0711F059.D

Level ID	File ID
I	J:\GC21\DATA\071111B-NW\0711F061.D
J	J:\GC21\DATA\071111B-NW\0711F063.D
K	J:\GC21\DATA\071111B-NW\0711F065.D
L	J:\GC21\DATA\071111B-NW\0711F067.D
M	J:\GC21\DATA\071111B-NW\0711F069.D
N	J:\GC21\DATA\071111B-NW\0711F071.D

Analyte Name	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF
Diesel Range Organics (DRO)							H	50	699	I	200	712	J	500	777
	K	2000	797	L	5000	768	M	20000	802	N	50000	809			
Residual Range Organics (RRO)				B	50	588	C	200	510	D	500	513	E	2000	500
	F	5000	545												
o-Terphenyl				G	1.0	988	H	2.5	1000	I	10	998	J	25	1040
	K	100	1100	L	250	1020									
n-Triacontane				G	1.0	803	H	2.5	840	I	10	840	J	25	875
	K	100	936	L	250	872									

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220

Service Request: K1200620
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Analyte Name	Compound Type	Calibration Evaluation				
		Fit Type	Eval.	Eval. Result	Q	Control Criteria
Diesel Range Organics (DRO)	MS	AverageRF	% RSD	5.7		≤ 20
Residual Range Organics (RRO)	MS	AverageRF	% RSD	6.8		≤ 20
o-Terphenyl	SURR	AverageRF	% RSD	4.0		≤ 20
n-Triacontane	SURR	AverageRF	% RSD	5.3		≤ 20

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220

Service Request: K1200620
Calibration Date: 07/12/2011
Date Analyzed: 07/12/2011

Second Source Calibration Verification
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration ID: CAL10701
Units: ppm

File ID: J:\GC21\DATA\071111B-NW\0711F053.D
J:\GC21\DATA\071111B-NW\0711F073.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	SSV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	990	767	761	-1	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1100	531	562	6	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

† **SPCC Compound** ‡ **CCC Compound**

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220

Service Request: K1200620
Date Analyzed: 02/02/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1201222
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\020112B-NW\0201F025.D
J:\GC21\DATA\020112B-NW\0201F027.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	792	3	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	980	531	519	-2	NA	± 15 %	AverageRF
o-Terphenyl	50	51	1030	1040	1	NA	± 15 %	AverageRF
n-Triacontane	50	51	861	872	1	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220

Service Request: K1200620
Date Analyzed: 02/02/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1201222
Units: ppm

File ID: J:\GC21\DATA\020112B-NW\0201F061.D
J:\GC21\DATA\020112B-NW\0201F063.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	980	767	753	-2	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	970	531	514	-3	NA	± 15 %	AverageRF
o-Terphenyl	50	49	1030	1000	-2	NA	± 15 %	AverageRF
n-Triacontane	50	52	861	887	3	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Service Request: K1200620

Analysis Run Log
Diesel and Residual Range Organics

Analysis Method: NWTPH-Dx
Analysis Lot: KWG1201222
Instrument ID: GC21
Column: ZB-1

File ID	Sample Name	Lab Code	Date Analysis Started	Start Time	Q	Date Analysis Finished	Finish Time
0201F025.D	Continuing Calibration Verification	KWG1201222-1	2/2/2012	02:06		2/2/2012	02:22
0201F027.D	Continuing Calibration Verification	KWG1201222-1	2/2/2012	02:28		2/2/2012	02:44
0201F029.D	Instrument Blank	KWG1201222-3	2/2/2012	02:50		2/2/2012	03:06
0201F031.D	Lab Control Sample	KWG1201126-2	2/2/2012	03:12		2/2/2012	03:28
0201F033.D	Method Blank	KWG1201126-3	2/2/2012	03:34		2/2/2012	03:50
0201F035.D	ZZZZZZ	ZZZZZZ	2/2/2012	03:55		2/2/2012	04:11
0201F037.D	ZZZZZZ	ZZZZZZ	2/2/2012	04:17		2/2/2012	04:33
0201F039.D	SW09-001	K1200620-001	2/2/2012	04:39		2/2/2012	04:55
0201F041.D	SW09-001DUP	KWG1201126-1	2/2/2012	05:01		2/2/2012	05:17
0201F043.D	SW09-006	K1200620-006	2/2/2012	05:23		2/2/2012	05:39
0201F045.D	SW09-002	K1200620-002	2/2/2012	05:44		2/2/2012	06:00
0201F047.D	SW09-003	K1200620-003	2/2/2012	06:06		2/2/2012	06:22
0201F049.D	SW09-005	K1200620-005	2/2/2012	06:28		2/2/2012	06:44
0201F051.D	SW09-004	K1200620-004	2/2/2012	06:49		2/2/2012	07:05
0201F053.D	ZZZZZZ	ZZZZZZ	2/2/2012	07:11		2/2/2012	07:27
0201F061.D	Continuing Calibration Verification	KWG1201222-2	2/2/2012	08:39		2/2/2012	08:55
0201F063.D	Continuing Calibration Verification	KWG1201222-2	2/2/2012	09:01		2/2/2012	09:17
0201F065.D	Instrument Blank	KWG1201222-4	2/2/2012	09:23		2/2/2012	09:39

Results flagged with an asterisk (*) indicate the holding time was exceeded for the analysis

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW09/54220
Sample Matrix: Water

Service Request: K1200620
Date Extracted: 01/31/2012

Extraction Prep Log
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Extraction Lot: KWG1201126
Level: Low

Sample Name	Lab Code	Date Collected	Date Received	Sample Amount	Final Volume	% Solids	Note
SW09-001	K1200620-001	01/20/12	01/24/12	435mL	1mL	NA	
SW09-002	K1200620-002	01/20/12	01/24/12	460mL	1mL	NA	
SW09-003	K1200620-003	01/20/12	01/24/12	1060mL	2mL	NA	
SW09-004	K1200620-004	01/20/12	01/24/12	1060mL	2mL	NA	
SW09-005	K1200620-005	01/20/12	01/24/12	1060mL	2mL	NA	
SW09-006	K1200620-006	01/20/12	01/24/12	1050mL	2mL	NA	
SW09-001DUP	KWG1201126-1	01/20/12	01/24/12	490mL	1mL	NA	
Method Blank	KWG1201126-3	NA	NA	1000mL	2mL	NA	
Lab Control Sample	KWG1201126-2	NA	NA	1000mL	2mL	NA	

Results flagged with an asterisk (*) indicate the holding time was exceeded for the analysis

Analytical Chemistry Data Package

Project: Non-Dry Dock Stormwater
SW10 – February 29, 2012
SW11 – March 15, 2012
Chemical Analyses

Battelle Project No. 54220/62375
CF No. 3174

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, WA 98382
PM: Jill Brandenberger
(360) 681-4564

CHEMISTRY ANALYSIS
DATA PACKAGE CONTENTS

Non-Dry Dock Stormwater
SW10 February 29, 2012
SW11 March 15, 2012
Chemical Analyses

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	MSL Code	Collection Date	Hg	As	Ag	Al	Cd
			Instrument:			*CVAF*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Freshwater)						0.0001	0.03	0.002	0.3	0.004
Freshwater Reporting Limit (MDL* 3.18)						0.0003	0.1	0.006	1.0	0.01
SW10										
SW10-043	PSNS015	TME	Composite_equal_time	3174-105 R1	02/29/12	0.0119	0.615	0.0173	443	0.207
SW10-044	PSNS015	DME	Composite_equal_time	3174-106	02/29/12	0.00281	0.513	0.00579 J	38.5	0.0325
SW10-045	PSNS084.1	TME	Composite_equal_time	3174-107	02/29/12	0.00381	1.56	0.0217	189	0.150
SW10-046	PSNA084.1	DME	Composite_equal_time	3174-108	02/29/12	0.00171	1.46	0.00795	23.1	0.101
SW10-047	PSNS126	TME	Composite_equal_time	3174-109	02/29/12	0.0159	6.22	0.190	127	0.256
SW10-048	PSNS126	DME	Composite_equal_time	3174-110	02/29/12	0.00982	6.34	0.128	17.0	0.194
SW10-049	PSNS126DUP	TME	Composite_equal_time	3174-111	02/29/12	0.0167	6.48	0.197	142	0.276
SW10-050	PSNS126DUP	DME	Composite_equal_time	3174-112	02/29/12	0.0103	6.05	0.131	19.4	0.184
SW10-051	PSNS124	TME	Composite_equal_time	3174-113	02/29/12	0.0476	7.69	0.170	336	0.945
SW10-052	PSNS124	DME	Composite_equal_time	3174-114	02/29/12	0.0151	7.32	0.0913	25.7	0.319
SW10-053	PSNS115.1	TME	Composite_equal_time	3174-115	02/29/12	0.0118	1.22	0.0529	64.8	0.232
SW10-054	PSNS115.1	DME	Composite_equal_time	3174-116	02/29/12	0.00357	1.21	0.0235	9.47	0.194
SW10-055	PSNS124.1	TME	Composite_equal_time	3174-117	02/29/12	0.00330	1.62	0.0230	152	0.640
SW10-056	PSNS124.1	DME	Composite_equal_time	3174-118	02/29/12	0.00357	1.55	0.00455 J	20.8	0.486
SW10-101	Anderson Creek-Blank	TME	Grab	3174-119 SUP	02/29/12	0.0001 U	0.03 U	0.002 U	0.3 U	0.004 U
SW10-102	Gorst Creek	TME	Grab	3174-120 SUP	02/29/12	0.00217	0.426	0.002 U	161	0.00600 J
SW10-103	Anderson Creek	TME	Grab	3174-121 SUP	02/29/12	0.00427	0.484	0.00578 J	1440 E	0.0223
SW10-104	Annapolis Creek	TME	Grab	3174-122 SUP	02/29/12	0.00535	0.514	0.00366 J	404	0.0157
SW10-105	Blackjack Creek	TME	Grab	3174-123 SUP	02/29/12	0.00500	1.11	0.00651	594	0.0110

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	**MSL Code**	**Cr**	**Cu**	**Pb**	**Zn**	CVAF Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*		
Laboratory Achieved Detection Limits (Freshwater)					0.08	0.007	0.002	0.05		
Freshwater Reporting Limit (MDL* 3.18)					0.3	0.02	0.006	0.2		
SW10										
SW10-043	PSNS015	TME	Composite_equal_time	3174-105 R1	1.92	8.71	8.40	74.8	032912HGA	032612-6100
SW10-044	PSNS015	DME	Composite_equal_time	3174-106	0.876	4.91	1.39	57.2	032912HGA	032612-6100
SW10-045	PSNS084.1	TME	Composite_equal_time	3174-107	2.09	19.1	4.33	157	032912HGA	032612-6100
SW10-046	PSNA084.1	DME	Composite_equal_time	3174-108	1.03	11.0	0.375	134	032912HGA	032612-6100
SW10-047	PSNS126	TME	Composite_equal_time	3174-109	1.54	27.0	3.00	75.4	032912HGA	032612-6100
SW10-048	PSNS126	DME	Composite_equal_time	3174-110	0.951	23.6	0.327	61.0	032912HGA	032612-6100
SW10-049	PSNS126DUP	TME	Composite_equal_time	3174-111	1.52	27.3	3.13	79.5	032912HGA	032612-6100
SW10-050	PSNS126DUP	DME	Composite_equal_time	3174-112	0.888	23.1	0.380	58.7	032912HGA	032612-6100
SW10-051	PSNS124	TME	Composite_equal_time	3174-113	5.66	170	14.5	408	032912HGA	032612-6100
SW10-052	PSNS124	DME	Composite_equal_time	3174-114	1.61	107	0.694	145	032912HGA	032612-6100
SW10-053	PSNS115.1	TME	Composite_equal_time	3174-115	1.65	22.7	2.59	127	032912HGA	032612-6100
SW10-054	PSNS115.1	DME	Composite_equal_time	3174-116	0.987	17.5	0.487	117	032912HGA	032612-6100
SW10-055	PSNS124.1	TME	Composite_equal_time	3174-117	4.57	34.6	6.04	100	032912HGA	032612-6100
SW10-056	PSNS124.1	DME	Composite_equal_time	3174-118	2.82	20.3	0.631	71.1	032912HGA	032612-6100
SW10-101	Anderson Creek-Blank	TME	Grab	3174-119 SUP	0.245 J	0.185	0.002 U	0.173 J	040312HGA	032612-6100
SW10-102	Gorst Creek	TME	Grab	3174-120 SUP	2.24	1.55	0.225	1.67	040312HGA	032612-6100
SW10-103	Anderson Creek	TME	Grab	3174-121 SUP	4.14	3.96	0.716	6.68	040312HGA	032612-6100
SW10-104	Annapolis Creek	TME	Grab	3174-122 SUP	1.93	2.52	0.867	8.67	040312HGA	032612-6100
SW10-105	Blackjack Creek	TME	Grab	3174-123 SUP	2.86	1.80	0.665	5.32	040312HGA	032612-6100

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	MSL Code	Collection Date	Hg	As	Ag	Al	Cd
			Instrument:			*CVAF*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Freshwater)						0.0001	0.03	0.002	0.3	0.004
Freshwater Reporting Limit (MDL* 3.18)						0.0003	0.1	0.006	1.0	0.01
SW11										
SW11-044	PSNS015	TME	Composite_equal_time	3174-119	03/15/12	0.0210	0.606	0.0280	851	0.0891
SW11-045	PSNS015	DME	Composite_equal_time	3174-120	03/15/12	0.00216	0.356	0.00313 J	46.8	0.0308
SW11-046	PSNS015DUP	TME	Composite_equal_time	3174-121	03/15/12	0.0312	0.609	0.0350	939	0.0797
SW11-047	PSNS015DUP	DME	Composite_equal_time	3174-122	03/15/12	0.00221	0.380	0.00336 J	47.4	0.0258
SW11-048	PSNS84.1	TME	Composite_equal_time	3174-123	03/15/12	0.00400	0.985	0.0183	230	0.171
SW11-049	PSNS84.1	DME	Composite_equal_time	3174-124	03/15/12	0.000958	0.818	0.00552 J	16.2	0.0976
SW11-050	PSNS115.1	TME	Composite_equal_time	3174-125	03/15/12	0.00912	1.16	0.0666	303	0.512
SW11-051	PSNS115.1	DME	Composite_equal_time	3174-126	03/15/12	0.00175	0.826	0.0113	12.0	0.228
SW11-052	PSNS126	TME	Composite_equal_time	3174-127	03/15/12	0.0126	4.05	0.148	162	0.254
SW11-053	PSNS126	DME	Composite_equal_time	3174-128	03/15/12	0.00420	3.79	0.0664	15.0	0.121
SW11-054	PSNS124.1	TME	Composite_equal_time	3174-129	03/15/12	0.00652	0.932	0.0399	314	1.21
SW11-055	PSNS124.1	DME	Composite_equal_time	3174-130	03/15/12	0.00178	0.606	0.00532 J	21.3	0.535
SW11-056	PSNS124	TME	Composite_equal_time	3174-131	03/15/12	0.0171	1.37	0.227	273	0.585
SW11-057	PSNS124	DME	Composite_equal_time	3174-132	03/15/12	0.00187	0.851	0.0139	11.5	0.218

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Type Name	**MSL Code**	**Cr**	**Cu**	**Pb**	**Zn**	CVAF Batch ID	ICP-MS Batch ID
				Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*		
Laboratory Achieved Detection Limits (Freshwater)					0.08	0.007	0.002	0.05		
Freshwater Reporting Limit (MDL* 3.18)					0.3	0.02	0.006	0.2		
SW11										
SW11-044	PSNS015	TME	Composite_equal_time	3174-119	2.56	10.8	13.1	68.0	032912HGA	032612-6100
SW11-045	PSNS015	DME	Composite_equal_time	3174-120	0.917	3.07	0.880	35.5	032912HGA	032612-6100
SW11-046	PSNS015DUP	TME	Composite_equal_time	3174-121	2.63	12.0	14.3	72.5	040312HGA	032612-6100
SW11-047	PSNS015DUP	DME	Composite_equal_time	3174-122	0.899	3.11	0.845	35.7	040312HGA	032612-6100
SW11-048	PSNS84.1	TME	Composite_equal_time	3174-123	1.88	17.3	5.18	135	040312HGA	032612-6100
SW11-049	PSNS84.1	DME	Composite_equal_time	3174-124	0.732	5.88	0.201	106	040312HGA	032612-6100
SW11-050	PSNS115.1	TME	Composite_equal_time	3174-125	2.90	33.0	11.8	190	040312HGA	032612-6100
SW11-051	PSNS115.1	DME	Composite_equal_time	3174-126	0.764	8.57	0.339	119	040312HGA	032612-6100
SW11-052	PSNS126	TME	Composite_equal_time	3174-127	1.59	15.9	4.56	76.6	040312HGA	032612-6100
SW11-053	PSNS126	DME	Composite_equal_time	3174-128	0.720	9.98	0.290	49.2	040312HGA	032612-6100
SW11-054	PSNS124.1	TME	Composite_equal_time	3174-129	8.07	57.5	14.8	201	040312HGA	032612-6100
SW11-055	PSNS124.1	DME	Composite_equal_time	3174-130	1.70	12.1	0.797	106	040312HGA	032612-6100
SW11-056	PSNS124	TME	Composite_equal_time	3174-131	4.65	54.2	10.4	153	040312HGA	032612-6100
SW11-057	PSNS124	DME	Composite_equal_time	3174-132	1.05	15.3	0.260	68.6	040312HGA	032612-6100

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11

Station Code	Type Name	Collection Date	Analysis Date	Analysis Method	Component	Units	Result		Detection Limit	Reporting Limit
SW10										
PSNS124.1	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	280	=,H	11	250
PSNS124.1	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	650	=,O	19	500
PSNS126	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	87	=,J	12	270
PSNS126	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	270	=,J	20	530
PSNS126 Dup	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	73	=,J	11	250
PSNS126 Dup	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	260	=,J	19	500
PSNS124	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	85	=,J	12	260
PSNS124	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	180	=,J	20	520
PSNS 115.1	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	72	=,J	11	250
PSNS 115.1	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	170	=,J	19	500
PSNS084.1	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	200	=,J	12	260
PSNS084.1	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	720	=,O	20	520
PSNS015	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	89	=,J	12	270
PSNS015	Grab	02/29/2012	03/09/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	230	=,J	20	530
PSNS015	Composite_equal_time	02/29/2012	03/09/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	30.0	=	0.8	2.0
PSNS015	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Total Organic	mg/L	2.71	=	0.07	0.50
PSNS015	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	2.30	=	0.07	0.50
PSNS015	Composite_equal_time	02/29/2012	03/06/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	13.0	=	5.0	5.0
PSNS084.1	Composite_equal_time	02/29/2012	03/09/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	21.2	=	0.8	2.0
PSNS084.1	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Total Organic	mg/L	2.21	=	0.07	0.50
PSNS084.1	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.85	=	0.07	0.50
PSNS084.1	Composite_equal_time	02/29/2012	03/06/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	6.0	=	5.0	5.0
PSNS126	Composite_equal_time	02/29/2012	03/09/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	44.8	=	0.8	2.0
PSNS126	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Total Organic	mg/L	17.7	=	0.07	0.50
PSNS126	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	15.7	=	0.07	0.50
PSNS126	Composite_equal_time	02/29/2012	03/06/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	9.5	=	5.0	5.0
PSNS126DUP	Composite_equal_time	02/29/2012	03/09/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	45.6	=	0.8	2.0
PSNS126DUP	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Total Organic	mg/L	18.3	=	0.07	0.50
PSNS126DUP	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	16.1	=	0.07	0.50
PSNS126DUP	Composite_equal_time	02/29/2012	03/06/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	10.5	=	5.0	5.0
PSNS124	Composite_equal_time	02/28/2012	03/09/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	109	=	0.8	2.0
PSNS124	Composite_equal_time	02/28/2012	03/05/2012	SM 5310 C	Carbon, Total Organic	mg/L	33.9	=	0.07	0.50
PSNS124	Composite_equal_time	02/28/2012	03/05/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	31.5	=	0.07	0.50
PSNS124	Composite_equal_time	02/28/2012	03/06/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	48.0	=	5.0	5.0

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Station Code	Type Name	Collection Date	Analysis Date	Analysis Method	Component	Units	Result		Detection Limit	Reporting Limit
PSNS115.1	Composite_equal_time	02/29/2012	03/09/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	50.0	=	0.8	2.0
PSNS115.1	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Total Organic	mg/L	2.86	=	0.07	0.50
PSNS115.1	Composite_equal_time	02/29/2012	03/05/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	2.30	=	0.07	0.50
PSNS115.1	Composite_equal_time	02/29/2012	03/06/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	ND	ND	5.0	5.0
PSNS124.1	Composite_equal_time	02/28/2012	03/09/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	90.0	=	0.8	2.0
PSNS124.1	Composite_equal_time	02/28/2012	03/05/2012	SM 5310 C	Carbon, Total Organic	mg/L	3.04	=	0.07	0.50
PSNS124.1	Composite_equal_time	02/28/2012	03/05/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	2.77	=	0.07	0.50
PSNS124.1	Composite_equal_time	02/28/2012	03/06/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	8.0	=	5.0	5.0
SW11										
PSNS015	Grab	03/14/2012	03/22/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	110	=,J	12	270
PSNS015	Grab	03/14/2012	03/22/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	330	=,J	20	530
PSNS84.1	Grab	03/14/2012	03/22/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	130	=,J	12	270
PSNS84.1	Grab	03/14/2012	03/22/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	250	=,J	20	530
PSNS126	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	190	=,J	13	290
PSNS126	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	780	=,Z	22	570
PSNS115.1	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	110	=,J	12	270
PSNS115.1	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	330	=,J	21	540
PSNS124	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	390	=,H	12	270
PSNS124	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	1100	=,O	20	530
PSNS124DUP	Grab	03/15/2012	03/23/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	570	=,H	12	280
PSNS124DUP	Grab	03/15/2012	03/23/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	2500	=,O	21	550
PSNS124.1	Grab	03/15/2012	03/23/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	600	=,H	12	280
PSNS124.1	Grab	03/15/2012	03/23/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	2600	=,O	21	550
PSNS124.1DUP	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Diesel Range Organics (DRO)	ug/L	350	=,H	13	280
PSNS124.1DUP	Grab	03/15/2012	03/22/2012	NWTPH-Dx	Residual Range Organics (RRO)	ug/L	1000	=,O	22	560
PSNS015	Composite_equal_time	03/15/2012	03/28/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	20.0	=	0.8	2.0
PSNS015	Composite_equal_time	03/15/2012	03/29/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.62	=	0.07	0.50
PSNS015	Composite_equal_time	03/15/2012	03/21/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.57	=	0.07	0.50
PSNS015	Composite_equal_time	03/15/2012	03/21/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	39.0	=	5.0	5.0
PSNS015DUP	Composite_equal_time	03/15/2012	03/28/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	20.4	=	0.8	2.0
PSNS015DUP	Composite_equal_time	03/15/2012	03/29/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.82	=	0.07	0.50
PSNS015DUP	Composite_equal_time	03/15/2012	03/21/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.64	=	0.07	0.50
PSNS015DUP	Composite_equal_time	03/15/2012	03/21/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	44.0	=	5.0	5.0

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Station Code	Type Name	Collection Date	Analysis Date	Analysis Method	Component	Units	Result		Detection Limit	Reporting Limit
PSNS84.1	Composite_equal_time	03/15/2012	03/28/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	20.0	=	0.8	2.0
PSNS84.1	Composite_equal_time	03/15/2012	03/29/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.26	=	0.07	0.50
PSNS84.1	Composite_equal_time	03/15/2012	03/21/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.84	=	0.07	0.50
PSNS84.1	Composite_equal_time	03/15/2012	03/21/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	19.5	=	5.0	5.0
PSNS115.1	Composite_equal_time	03/15/2012	03/28/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	30.8	=	0.8	2.0
PSNS115.1	Composite_equal_time	03/15/2012	03/29/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.28	=	0.07	0.50
PSNS115.1	Composite_equal_time	03/15/2012	03/21/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.26	=	0.07	0.50
PSNS115.1	Composite_equal_time	03/15/2012	03/21/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	20.5	=	5.0	5.0
PSNS126	Composite_equal_time	03/15/2012	03/28/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	30.0	=	0.8	2.0
PSNS126	Composite_equal_time	03/15/2012	03/29/2012	SM 5310 C	Carbon, Total Organic	mg/L	3.75	=	0.07	0.50
PSNS126	Composite_equal_time	03/15/2012	03/21/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	4.22	=	0.07	0.50
PSNS126	Composite_equal_time	03/15/2012	03/21/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	16.0	=	5.0	5.0
PSNS124.1	Composite_equal_time	03/15/2012	03/28/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	22.0	=	0.8	2.0
PSNS124.1	Composite_equal_time	03/15/2012	03/29/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.71	=	0.07	0.50
PSNS124.1	Composite_equal_time	03/15/2012	03/21/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.56	=	0.07	0.50
PSNS124.1	Composite_equal_time	03/15/2012	03/21/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	20.5	=	5.0	5.0
PSNS124	Composite_equal_time	03/15/2012	03/28/2012	SM 2340 C	Hardness, Total as CaCO3	mg/L	50.0	=	0.8	2.0
PSNS124	Composite_equal_time	03/15/2012	03/29/2012	SM 5310 C	Carbon, Total Organic	mg/L	1.93	=	0.07	0.50
PSNS124	Composite_equal_time	03/15/2012	03/21/2012	SM 5310 C	Carbon, Dissolved Organic (DOC)	mg/L	1.20	=	0.07	0.50
PSNS124	Composite_equal_time	03/15/2012	03/21/2012	SM 2540 D	Solids, Total Suspended (TSS)	mg/L	27.5	=	5.0	5.0

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	MSL Code	As	Ag	Al	Cd	Cr	Cu	Pb	Zn	ICP-MS Batch ID
				Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	
Laboratory Achieved Detection Limits (Freshwater)					0.03	0.002	0.3	0.004	0.08	0.007	0.002	0.05	
Freshwater Reporting Limit (MDL* 3.18)					0.1	0.006	1.0	0.01	0.3	0.02	0.006	0.2	
METHOD BLANKS													
MB-1		TME	Freshwater	TRM Blank R1	0.03 U	0.002 U	0.3 U	0.004 U	0.161 J	0.007 U	0.002 U	0.05 U	032612-6100
MB-2		TME	Freshwater	TRM Blank R2	0.03 U	0.002 U	0.3 U	0.004 U	0.188 J	0.007 U	0.002 U	0.05 U	032612-6100
LABORATORY CONTROL SAMPLES													
Spiking Level					**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	
LCS-1		TME	Freshwater	TRM LCS R1	1.95	1.92	1.89	2.00	2.01	1.90	2.00	1.94	032612-6100
				Percent Recovery, LCS	**98%**	**96%**	**95%**	**100%**	**101%**	**95%**	**100%**	**97%**	
Spiking Level					**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	
LCS-2		TME	Freshwater	TRM LCS R2	1.95	1.95	2.02	1.97	2.14	1.96	1.98	1.94	032612-6100
				Percent Recovery, LCS	**98%**	**98%**	**101%**	**99%**	**107%**	**98%**	**99%**	**97%**	
MATRIX SPIKE RESULTS													
SW10-048	PSNS126	DME	Composite_equal_time	3174-110	6.34	0.128	17.0	0.194	0.951	23.6	0.327	61.0	032612-6100
MS	PSNS126	DME	Composite_equal_time	3174-110 MS	8.37	2.09	72.1	2.22	3.01	75.1	2.46	112	032612-6100
MSD	PSNS126	DME	Composite_equal_time	3174-110 MSD	8.53	2.12	71.5	2.29	3.08	75.1	2.47	113	032612-6100
				Spiking Level	2	2	50	2	2	50	2	50	
				Percent Recovery, MS	**102%**	**105%**	**110%**	**101%**	**103%**	**103%**	**107%**	**102%**	
				Percent Recovery, MSD	**110%**	**106%**	**109%**	**105%**	**106%**	**103%**	**107%**	**104%**	
				RPD	**7.6%**	**1.4%**	**1.1%**	**3.4%**	**3.3%**	**0.0%**	**0.5%**	**1.9%**	
SW11-047	PSNS015DUP	DME	Composite_equal_time	3174-122	0.380	0.00336 J	47.4	0.0258	0.899	3.11	0.845	35.7	032612-6100
MS	PSNS015DUP	DME	Composite_equal_time	3174-122 MS	2.39	1.95	96.3	2.05	2.90	5.04	2.87	82.8	032612-6100
MSD	PSNS015DUP	DME	Composite_equal_time	3174-122 MSD	2.30	1.89	97.7	1.97	2.87	4.86	2.83	84.5	032612-6100
				Spiking Level	2	2	50	2	2	2	2	50	
				Percent Recovery, MS	**101%**	**98%**	**98%**	**101%**	**100%**	**97%**	**101%**	**94%**	
				Percent Recovery, MSD	**96%**	**95%**	**101%**	**97%**	**99%**	**88%**	**99%**	**98%**	
				RPD	**4.6%**	**3.1%**	**2.8%**	**4.0%**	**1.5%**	**9.8%**	**2.0%**	**3.5%**	
REPLICATE PRECISION													
SW10-043	PSNS015	TME	Composite_equal_time	3174-105 R1	0.615	0.0173	443	0.207	1.92	8.71	8.40	74.8	032612-6100
DUP	PSNS015	TME	Composite_equal_time	3174-105 R2	0.601	0.0162	426	0.211	1.84	8.42	8.13	72.3	032612-6100
				Mean	*0.608*	*0.0168*	*435*	*0.209*	*1.88*	*8.57*	*8.27*	*73.6*	032612-6100
				RPD	**2.3%**	**6.6%**	**3.9%**	**1.9%**	**4.3%**	**3.4%**	**3.3%**	**3.4%**	
SW11-048	PSNS84.1	TME	Composite_equal_time	3174-123	0.985	0.0183	230	0.171	1.88	17.3	5.18	135	032612-6100
DUP	PSNS84.1	TME	Composite_equal_time	3174-123r2	1.01	0.0198	231	0.166	1.86	17.3	5.18	134	032612-6100
				Mean	*0.998*	*0.0191*	*231*	*0.169*	*1.87*	*17.3*	*5.18*	*135*	032612-6100
				RPD	**2.5%**	**7.9%**	**0.4%**	**3.0%**	**1.1%**	**0.0%**	**0.0%**	**0.7%**	
STANDARD REFERENCE MATERIAL, Seawater													
SRM 1640a-1		TME	Freshwater	TRM 1640a 10x R1	7.60	7.31	48.5	3.72	38.4	77.4	11.4	53.4	032612-6100
SRM 1640a-2		TME	Freshwater	TRM 1640a 10x R2	7.49	7.34	53.0	3.69	41.4	81.3	11.4	53.1	032612-6100
				Certified Value	**8.08**	**8.081**	**53.0**	**4.0**	**40.54**	**85.8**	**12.1**	**55.64**	
				PD	**5.9%**	**9.5%**	**8.5%**	**6.8%**	**5.3%**	**9.7%**	**5.8%**	**4.0%**	
				PD	**7.2%**	**9.2%**	**0.0%**	**7.6%**	**2.1%**	**5.2%**	**5.8%**	**4.6%**	

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	MSL Code	Hg	CVAF Batch ID
				Instrument:	*CVAF*	
Laboratory Achieved Detection Limits					**0.0001**	
Reporting Limit (MDL* 3.18)					**0.0003**	
METHOD BLANKS						
MB-1		TME	Freshwater	MB1_032912	0.0001 U	032912HGA
MB-2		TME	Freshwater	MB2_032912	0.0001 U	032912HGA
MB-3		TME	Freshwater	MB3_032912	0.0001 U	032912HGA
MB-1		TME	Freshwater	MB1_040312	0.0001 U	040312HGA
MB-2		TME	Freshwater	MB2_040312	0.0001 U	040312HGA
MB-3		TME	Freshwater	MB3_040312	0.0001 U	040312HGA
LABORATORY CONTROL SAMPLES						
Spiking Level					0.00496	
LCS (1)		TME	Freshwater	OPR 032812 run1	0.00521	032912HGA
LCS (2)		TME	Freshwater	OPR 032812 run2	0.00515	032912HGA
LCS Blank (1)		TME	Freshwater	Blank 032812	0.0001 U	032912HGA
				Percent Recovery, LCS 1	**105%**	
				Percent Recovery, LCS 2	**104%**	
Spiking Level					0.00496	
LCS (1)		TME	Freshwater	OPR 040212 run1	0.00504	040312HGA
LCS (2)		TME	Freshwater	OPR 040212 run2	0.00496	040312HGA
LCS Blank (1)		TME	Freshwater	Blank 040212	0.0001 U	040312HGA
				Percent Recovery, LCS 1	**102%**	
				Percent Recovery, LCS 2	**100%**	
MS1	PSNS015	DME	Composite_equal_time	3174-106 MS	0.0142	032912HGA
MSD1	PSNS015	DME	Composite_equal_time	3174-106 MSD	0.0145	032912HGA
SW10-044	PSNS015	DME	Composite_equal_time	3174-106	0.00281	032912HGA
				Spiking Level, MS	0.0112	
				Spiking Level, MSD	0.0111	
				Percent Recovery, MS	**101%**	
				Percent Recovery, MSD	**106%**	
				RPD	**4.1%**	
MS2	PSNS126DUP	DME	Composite_equal_time	3174-112 MS	0.0220	032912HGA
MSD2	PSNS126DUP	DME	Composite_equal_time	3174-112 MSD	0.0222	032912HGA
SW10-050	PSNS126DUP	DME	Composite_equal_time	3174-112	0.0103	032912HGA
				Spiking Level, MS	0.0115	
				Spiking Level, MSD	0.0112	
				Percent Recovery, MS	**102%**	
				Percent Recovery, MSD	**106%**	
				RPD	**3.8%**	
MS1	PSNS126	TME	Composite_equal_time	3174-127 MS	0.0344	040312HGA
MSD1	PSNS126	TME	Composite_equal_time	3174-127 MSD	0.0390	040312HGA
SW11-052	PSNS126	TME	Composite_equal_time	3174-127	0.0126	040312HGA
				Spiking Level, MS	0.0238	
				Spiking Level, MSD	0.0239	
				Percent Recovery, MS	**92%**	
				Percent Recovery, MSD	**111%**	
				RPD	**18.9%**	

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	MSL Code	Hg	CVAF Batch ID
				Instrument:	*CVAF*	
Laboratory Achieved Detection Limits					**0.0001**	
Reporting Limit (MDL* 3.18)					**0.0003**	
MS2	PSNS124.1	DME	Composite_equal_time	3174-130 MS	0.0163	040312HGA
MSD2	PSNS124.1	DME	Composite_equal_time	3174-130 MSD	0.0170	040312HGA
SW11-055	PSNS124.1	DME	Composite_equal_time	3174-130	0.00178	040312HGA
				Spiking Level, MS	0.0149	
				Spiking Level, MSD	0.0145	
				Percent Recovery, MS	**97%**	
				Percent Recovery, MSD	**105%**	
				RPD	**7.3%**	
REPLICATE PRECISION						
SW10-043	PSNS015	TME	Composite_equal_time	3174-105 R1	0.0119	032912HGA
DUP	PSNS015	TME	Composite_equal_time	3174-105 R2	0.0154	032912HGA
				Mean	*0.0136*	
				RPD	**26%**	
SW10-043	PSNS015	TME	Composite_equal_time	3174-105 R1re	0.0115	032912HGA
DUP	PSNS015	TME	Composite_equal_time	3174-105 R2re	0.0148	032912HGA
				Mean	*0.0131*	
				RPD	**25%**	
SW11-048	PSNS84.1	TME	Composite_equal_time	3174-123	0.00400	040312HGA
DUP	PSNS84.1	TME	Composite_equal_time	3174-123r2	0.00416	040312HGA
				Mean	*0.00408*	
				RPD	**4%**	
STANDARD REFERENCE MATERIAL						
SRM 1641 (1)		TME	Freshwater	1641d 032812	1637	032912HGA
SRM 1641 (1)		TME	Freshwater	1641d 040212	1550	040312HGA
				Certified Value	**1590**	
				range	**±18**	
	SRM 1641 (1)			**PD**	**3%**	
	SRM 1641 (2)			**PD**	**3%**	

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW10 and SW11
Metals in Water

DATA QUALIFIERS:

c	Exceeds DQO but meets contingency criteria of either:
1	SRM certified <10x MDL
2	Insufficient spiking level relative to native sample concentrations
3	Sample concentration <10x MDL
U	Analyte not detected at or above the MDL, MDL reported
J	Analyte detected above the MDL, but less than the RL
N	Spiked sample recovery outside QC criterion of 70-130%
&	Accuracy result outside QC criterion of ≤20% PD
*	Precision result outside QC criterion of <30%
NS	Sample not spiked for this analyte
B	Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value
b	Data are blank corrected using the batch specific procedural blank
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern inidicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
ND	Not detected
Z	The chromatographic fingerprint of the sample does not resemble a pertroleum product.
E	Reported result exceeds linear range; use with caution

Notes:

Composite_equal_time	Equal portion composite of time integrated sample (ISCO samples)
NC	Not Certified
--	Not analyzed
NA	Not applicable/available
TME	Total Metals Fraction
DME	Dissolved Metals Fraction
2	Sample specific MDLs and RLs reported

QA/QC NARRATIVE

PROJECT: Non-Dry Dock Stormwater Sampling for SW10 and SW11

PARAMETER: Total and Dissolved Metals – Al, Ag, As, Cd, Cr, Cu, Pb, Zn, Hg

LABORATORY: Battelle Marine Sciences Laboratory (MSL), Sequim, Washington

MATRIX: Stormwater (as a freshwater matrix)

SAMPLE CUSTODY AND PROCESSING:

Samples were collected from stormwater outfalls located within the Confined Industrial Area (CIA) and Naval Base Kitsap (NBK) at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) by TEC, MSL, and the U.S. Navy. These storms are the third and fourth of the 2011-12 storm season. The outfalls include PSNS015, PSNS126, PSNS084.1, PSNS115.1, PSNS124, and PSNS124.1. This sample delivery groups includes grab and stormwater composite samples collected from those stations during SW10 and SW11 plus additional samples collected by the USGS from surrounding streams during SW10.

The storm event identified as SW10 began on February 28, 2012 with the composites ending 24 hours later. The storm event identified as SW11 began on March 14, 2012 with the composites ending 24 hours later. Five supplemental samples were collected by USGS during SW10 and received at MSL on 03/2/12. They were collected from the streams in the area as grab samples during the SW10 event. The samples were collected using a 10-ft section of PFA tubing, and C-flex tubing cleaned at the Wisconsin Mercury Research Lab (WMRL). The samples were collected in Apex HDPE bottles as they came from the manufacturers. A field blank was provided by USGS since the HDPE bottles were not specifically cleaned for trace metal samples. The blank was collected by pumping WMRL blank water from the 2-L PETG bottle through the PFA and C-FLex into the respective bottles. Water was pumped peristaltically from the centroid of the stream into the 1-L PETG, 250-ml and 500-ml Apex HDPE bottles using clean hands dirty hands and stored on ice until shipment to MSL.

All samples, except those collected by USGS (separate project), were collected and analyzed in accordance with the Quality Assurance Project Plan (Taylor Associates, Inc. and PNNL 2011 and amended 2012). Two types of samples were collected during the storm. The first was a time proportionate composite sample collected using an ISCO sampler at each of the six outfall locations. The second was a grab sample collected during the storm event in amber glass jars provided by Columbia Analytical Services (CAS) for total petroleum hydrocarbons (TPH). The individual time paced composites collected in the 24 wedge bottles were carried back to the stormwater lab at PSNS & IMF and composited into a single event mean composite (EMC) in a pre-cleaned glass jar. All samples were hand delivered within 24 hours of collection to MSL.

Upon receipt at MSL, the condition of all the samples were verified as acceptable and tracked back to the field chain of custody (COC). In the clean laboratory at MSL, each glass composite sample jar was shaken vigorously (prior and between aliquot removal) and aliquots were poured into the following types of containers:

1. 500 mL Teflon bottle for total metals (TME),
2. 500 mL 0.45µm polyvinylidene fluoride (PVDF) filter unit, vacuum filtered in a class 100 clean bench and then poured into a 500 mL Teflon bottle for dissolved metals,
3. 250 mL low-density polyethylene (LDPE) bottle provided by CAS that included a nitric acid preservative for samples to be analyzed for hardness (HRD),
4. 500 mL LDPE container with sulfuric acid preservative provided by CAS for the analysis of total organic carbon (TOC),
5. 60 mL syringe and ashed glass fiber filter (GFF) in a cleaned filter holder. An aliquot of the sample was filtered into a 250 mL LDPE container with sulfuric acid preservative provided by CAS for the analysis of dissolved organic carbon (DOC),

QA/QC NARRATIVE

6. 500 mL or 1L LDPE bottle provided by CAS for the analysis of total suspended solids (TSS), and turbidity was measured in the field.

The total metal fractions and dissolved metal fractions were each acidified inside a Class 100 clean bench to a pH of < 2.0 with double distilled nitric acid. The samples were then assigned a Battelle Central File (CF) identification number (3174) and were entered into Battelle's sample tracking system. The composite aliquots for TOC, DOC, hardness, and TSS were all forwarded to CAS for analysis. The quality control narrative for these parameters was provided separately.

The following lists information on sample receipt and processing activities:

Sample Receipt Dates:	SW10: 03/01/12 and 03/02/12 SW11: 03/16/12
Cooler temp. on arrival	All coolers were at 4.0±2°C
Collection dates	02/29/12 and 03/15/12
CVAF analysis dates (Hg)	03/29/12 and 04/03/12
TRM Prep/Freshwater Analysis by ICP-MS (As, Ag, Al, Cd, Cr, Cu, Pb, Zn)	03/26/12

QA/QC DATA QUALITY OBJECTIVES:

Analyte	Analytical Method for Seawater	MS Range of Recovery	SRM Percent Difference	Replicate Precision	Method Detection Limits (µg/L)	Reporting Limits (µg/L)
Aluminum	ICP-MS	70-130%	≤20%	≤30%	0.3	1.0
Arsenic	ICP-MS	70-130%	≤20%	≤30%	0.03	0.1
Cadmium	ICP-MS	70-130%	≤20%	≤30%	0.004	0.01
Chromium	ICP-MS	70-130%	≤20%	≤30%	0.08	0.3
Copper	ICP-MS	70-130%	≤20%	≤30%	0.007	0.02
Lead	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Silver	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Zinc	ICP-MS	70-130%	≤20%	≤30%	0.05	0.2
Mercury	CVAF	70-130%	≤20%	≤30%	0.0001	0.0003

METHODS:

Samples were analyzed for nine metals: aluminum (Al), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), silver (Ag), zinc (Zn), and mercury (Hg). Samples were submitted for analyses following two methods. All samples were analyzed for Hg by Cold Vapor Atomic Fluorescence (CVAF) in accordance with Battelle SOP *MSL-I-013*, *Total Mercury in Aqueous Samples by CVAF*, following EPA Method 1631 revision E.

All samples were analyzed for other metals by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) in accordance with Battelle SOP *MSL-I-022, Determination of Elements in Aqueous and Digestate Samples by ICP/MS.* The base methods for this procedure are EPA Method 1638 and EPA Method 1640. All samples were digested following the total metal recoverable (TRM) method established in EPA Method 1640 prior to analysis by ICP-MS. In summary, this preparation brings the pH of the sample to 2% and heats the capped samples for 2.5 hours in a 85˚C oven to solubilize

particulates. Both the filtered and unfiltered fractions were prepared using this method to destroy any colloidal particles remaining in the filtered (aka. dissolved) fraction. All results were reported in units of µg/L. Data are not blank corrected.

HOLDING TIMES: All samples were analyzed within the established holding times of 90 days for Hg and six months for all other metals.

DETECTION LIMITS: Laboratory method detection limits (MDLs) for TRM freshwater were reported from the MDL study (annually verified) as determined by seven replicates of deionized water spiked at appropriate concentrations and prepared using the TRM method. Reporting limits are determined as 3.18 times the laboratory achieved MDL. The data are evaluated and flagged as follows:

- U Analyte not detected at or above the MDL, MDL reported
- J Analyte detected above the MDL, but less than the RL
- N Spiked sample recovery outside QC criterion of 70-130%
- & Accuracy result outside QC criterion of ≤20% PD
- * Precision result outside QC criterion of <30%
- B Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value
- E Reported result exceeds linear range; use with caution
- c Exceeds data quality objective but meets contingency criterion

METHOD BLANKS: A minimum of one method blank was prepared and analyzed by each instrument with each analytical batch. The method blanks were all less than the RL.

LABORATORY CONTROL SAMPLES: A minimum of one LCS (OPR or blank spike) was prepared and analyzed with each analytical batch of 20 or fewer samples. Percent recoveries for LCS samples were within the QC acceptance criterion of 70% to 130% for all metals. They also met a secondary criterion of ± 15% recovery for metals of concern.

MATRIX SPIKE ACCURACY: A minimum of one set of duplicate matrix spikes (MS/MSD) was prepared and analyzed with each analytical batch of 20 or fewer samples. Percent recoveries for matrix spikes were within the QC limits of 70% to 130% for all metals.

REPLICATE PRECISION: Laboratory precision was expressed as the relative percent difference (RPD) between laboratory duplicates. The RPD values for the laboratory duplicates were within the QC acceptance criterion of ±30% for all metals detected above the RL. The sample collected from PSNS015 was used for one duplicate to evaluate previous heterogeneity issues notes for Hg. The duplicate for PSNS015 illustrated a higher RPD for Hg only, as was noted in previous analyses for this site. Two pairs of duplicates were analyzed, and although the results (26% and 25% RPD) still meet the acceptance criteria, typical analytical precision is <5%. This confirms that the site is highly variable and grab sampling should be considered with caution due to representation issues.

STANDARD REFERENCE MATERIAL ACCURACY: Standard reference materials (SRM) were prepared and analyzed with each analytical batch at a minimum frequency of 1 per 20 or fewer samples. Analytical accuracy was expressed as the percent difference (PD) between the measured and the certified value. The freshwater SRMs were 1641d for Hg and 1640a for all other metals. The differences were within the QC acceptance criterion of ≤20%.

ANALYTICAL NOTES: One result for Al (Anderson Creek grab sample, 3174-121SUP) exceeded the linear range for the analytical batch. The result was flagged "E" and should be used with caution; however, both high level spikes (HLS) recovered well (400ppb = 93% recovery and 1000ppb = 106% recovery), and demonstrate good linearity, supporting the reported concentration.

QA/QC NARRATIVE

REFERENCES: Taylor Associates, Inc. – Division of TEC, Inc. and Pacific Northwest National Laboratory (2011). Non-Dry Dock Stormwater Monitoring Conducted at Puget Sound Naval Shipyard Bremerton, WA, Project ENVVEST Study Area. Document prepared for the United States Navy Puget Sound Naval Shipyard.

SAMPLE CHAIN OF CUSTODY FORM

Date: 2/29/2012 2pm 1

Page: 1 of 2 1

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

JMB 3/1/12 Labels changed per QAPP (no G or C) SW10- Sample Label	Station ID	2/29/2012 Collection Date/Time	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity-①						No. containers	Sample Type (Grab vs. Comp)	Storm#	COND µS	NTU	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
SW106-001	PSNS 124.1	1535	SW						X							2	G	SW10	2882	62.8	
SW106-002	PSNS 126	1558	SW						X							2	G	SW10	338	2.72	
SW106-003	PSNS 126 DUP	1600	SW						X							2	G	SW10			
SW106-004	PSNS 124	1618	SW						X							2	G	SW10	5180	321	smelled @ exhaust
SW106-005	PSNS 115.1	1640	SW						X							2	G	SW10	2840	2.81	
SW106-006	PSNS084.1	1658	SW						X							2	G	SW10	253	5.72	bank in Sample
SW106-007	PSNS015	1720	SW						X							2	G	SW10	405	16.2	
SW10C-0018	PSNS015	1327	SW	X	X	X	X	X								1	C	SW10	222	17	
SW10C-0029	PSNS084.1	1336	SW	X	X	X	X	X								1	C	SW10	146	16	
SW10C-0037 10	PSNS ~~115.1~~ 126	1237	SW	X	X	X	X	X								1	C	SW10	245	8	
SW10C-0041 11	PSNS 126 DUP	↓ 1237	SW	X	X	X	X	X								1	C	SW10	252	8	
② SW10C-0051 12	PSNS124	2-28-12 (1851)	SW	X	X	X	X	X								1	C	SW10	1162	20	* Very low Samp. Vol.
SW10C-0061 13	PSNS 115.1	2-29-12 (1340)	SW	X	X	X	X	X								1	C	SW10	493	7	
③ SW10C-0071 14	PSNS 124.1	2-28-12 (2026)	SW	X	X	X	X	X								1	C	SW10	1493	15	

Relinquished by: RK Fuller — Signature — 2/29/2012 — Date — 1825 — Time — Printed Name — Company

Received by: BG Beckwith — Signature — Printed Name

Total # of Containers:

Shipment Method: Hand carry

Sample Disposition:

Relinquished by: BG Beckwith — Signature — 3/1/2012 — Date — 1000 — Time — BG Beckwith — Printed Name — Cardno TEC — Company

Received by: Signature — Jim Brandenberger PNNL — Printed Name — 3/1/12 1000

Distribution:
1) PNNL
2) CAS
3) TAI

① Turbidity measured in SW Lab w/ Hach 2100P meter

② Very low Sample vol. >2000ml

③ Extremely low Sample vol. ~~>~~ 1000 ml

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/1/2012
Page: 1 of 1
Project No.: 54220
Project: Non-dry Dock Stormwater SW10

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW10-043	PSNS015	02/29/12 1327	SW					x							1	comp	SW10	3174*105
SW10-044	PSNS015	02/29/12 1327	SW						x						1	comp	SW10	3174*106
SW10-045	PSNS084.1	02/29/12 1336	SW					x							1	comp	SW10	3174*107
SW10-046	PSNS084.1	02/29/12 1336	SW						x						1	comp	SW10	3174*108
SW10-047	PSNS126	02/29/12 1237	SW					x							1	comp	SW10	3174*109
SW10-048	PSNS126	02/29/12 1237	SW						x						1	comp	SW10	3174*110
SW10-049	PSNS126DUP	02/29/12 1237	SW					x							1	comp	SW10	3174*111
SW10-050	PSNS126DUP	02/29/12 1237	SW						x						1	comp	SW10	3174*112
SW10-051	PSNS124	02/28/12 1851	SW					x							1	comp	SW10	3174*113
SW10-052	PSNS124	02/28/12 1851	SW						x						1	comp	SW10	3174*114
SW10-053	PSNS115.1	02/29/12 1340	SW					x							1	comp	SW10	3174*115
SW10-054	PSNS115.1	02/29/12 1340	SW						x						1	comp	SW10	3174*116
SW10-055	PSNS124.1	02/28/12 2026	SW					x							1	comp	SW10	3174*117
SW10-056	PSNS124.1	02/28/12 2026	SW						x						1	comp	SW10	3174*118

Relinquished by: _____ 3/1/12 1000
Signature Date Time
Jon Brandenberger PNNL
Printed Name Company

Received by: _____
Signature
Printed Name

Total # of Containers
Shipment Method:
Retained at PNNL
Sample Disposition:

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Printed Name

Distribution:
1) PNNL

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 3/1/2012
Batch: 11
Login Designee: Brandenberger

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Non-Dry Dock Storm water - SW10**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW10-043	PSNS015	3174-105	SW	K-4-D	Total Metals	02/29/12
SW10-044	PSNS015	3174-106	SW	K-4-D	Dissolved Metals	02/29/12
SW10-045	PSNS084.1	3174-107	SW	K-4-D	Total Metals	02/29/12
SW10-046	PSNA084.1	3174-108	SW	K-4-D	Dissolved Metals	02/29/12
SW10-047	PSNS126	3174-109	SW	K-4-D	Total Metals	02/29/12
SW10-048	PSNS126	3174-110	SW	K-4-D	Dissolved Metals	02/29/12
SW10-049	PSNS126DUP	3174-111	SW	K-4-D	Total Metals	02/29/12
SW10-050	PSNS126DUP	3174-112	SW	K-4-D	Dissolved Metals	02/29/12
SW10-051	PSNS124	3174-113	SW	K-4-D	Total Metals	02/29/12
SW10-052	PSNS124	3174-114	SW	K-4-D	Dissolved Metals	02/29/12
SW10-053	PSNS115.1	3174-115	SW	K-4-D	Total Metals	02/29/12
SW10-054	PSNS115.1	3174-116	SW	K-4-D	Dissolved Metals	02/29/12
SW10-055	PSNS124.1	3174-117	SW	K-4-D	Total Metals	02/29/12
SW10-056	PSNS124.1	3174-118	SW	K-4-D	Dissolved Metals	02/29/12

SW = STORMWATER

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3174 Sample No(s): 105-118 Batch: 19

Project Name: SW10 Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: storm water WP#

Yes	No	
[ ]	[✓]	Navy-type Project (requires high-level sample tracking procedures)
[ ]	[✓]	USDA Samples (see Compliance Agreement Checklist)
[✓]	[ ]	Filter Samples: Amount: Entire sample Half of sample
[ ]	[✓]	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
[✓]	[ ]	Special instructions: split

PM Verification:

Sample Preservation Instructions: various

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
[ ]	[ ]	[✓]	Custody seal present Seal intact? YES NO
[✓]	[ ]	[ ]	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each) 6 coolers ±4 °C; °C
[ ]	[ ]	[✓]	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy:
[✓]	[ ]	[ ]	Were all chain of custody forms signed and dated?
[✓]	[ ]	[ ]	Were samples filtered at MSL?

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly (Glass) Cap. Vial Other:

Notes:

Completed By: [signature] Date/Time: 3/1/12 1000

SAMPLE PRESERVATION

- [ ] Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)
- [ ] Random pH checked for ~10% of samples (use dip paper) Sample IDs:
- [ ] Complete pH check required for project (use pH meter and record on pH Record form)
- [KL] Sample(s) were preserved at MSL

Type:

[KL]	0.2% HNO3	Notes: Optima	Lot# 1211020
[ ]	0.5% HCl (Hg samples)	Notes:	Lot#
[ ]	Refrigerate/Freeze	Notes:	
[ ]	Other	Notes:	

Completed By: [signature] Date/Time: 3/1/12 17:50

Storage Shelf: K-4-D

Battelle Marine Sciences Labs, 1529 West Sequim Bay Rd, Sequim, Washington 98362 PH: (360) 681-4565

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/1/2012
Page: 1 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW10

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW10-001	PSNS124.1	02/29/12 1535	SW							X					2	grab	SW10	
SW10-002	PSNS126	02/29/12 1558	SW							X					2	grab	SW10	
SW10-003	PSNS126 Dup	02/29/12 1600	SW							X					2	grab	SW10	
SW10-004	PSNS124	02/29/12 1618	SW							X					2	grab	SW10	
SW10-005	PSNS 115.1	02/29/12 1640	SW							X					2	grab	SW10	
SW10-006	PSNS084.1	02/29/12 1658	SW							X					2	grab	SW10	
SW10-007	PSNS015	02/29/12 1720	SW							X					2	grab	SW10	
SW10-015	PSNS015	02/29/12 1327	SW	x											1	comp	SW10	
SW10-016	PSNS015	02/29/12 1327	SW		x										1	comp	SW10	
SW10-017	PSNS015	02/29/12 1327	SW			x									1	comp	SW10	
SW10-018	PSNS015	02/29/12 1327	SW				x								1	comp	SW10	
SW10-019	PSNS084.1	02/29/12 1336	SW	x											1	comp	SW10	
SW10-020	PSNS084.1	02/29/12 1336	SW		x										1	comp	SW10	
SW10-021	PSNS084.1	02/29/12 1336	SW			x									1	comp	SW10	

Relinquished by: [signature] 3/2/12 1500
Signature Date Time
C. SUSLICK Battelle MSL
Printed Name Company

Received by: FedEx
Signature
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

2 Coolers

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/1/2012
Page: 2 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW10

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW10-022	PSNS084.1	02/29/12 1336	SW				X								1	comp	SW10	
SW10-023	PSNS126	02/29/12 1237	SW	x											1	comp	SW10	
SW10-024	PSNS126	02/29/12 1237	SW		x										1	comp	SW10	
SW10-025	PSNS126	02/29/12 1237	SW			x									1	comp	SW10	
SW10-026	PSNS126	02/29/12 1237	SW				x								1	comp	SW10	
SW10-027	PSNS126DUP	02/29/12 1237	SW	x											1	comp	SW10	
SW10-028	PSNS126DUP	02/29/12 1237	SW		x										1	comp	SW10	
SW10-029	PSNS126DUP	02/29/12 1237	SW			x									1	comp	SW10	
SW10-030	PSNS126DUP	02/29/12 1237	SW				x								1	comp	SW10	
SW10-031	PSNS124	02/28/12 1851	SW	x											1	comp	SW10	
SW10-032	PSNS124	02/28/12 1851	SW		x										1	comp	SW10	
SW10-033	PSNS124	02/28/12 1851	SW			x									1	comp	SW10	
SW10-034	PSNS124	02/28/12 1851	SW				x								1	comp	SW10	
SW10-035	PSNS115.1	02/29/12 1340	SW	X											1	comp	SW10	

Relinquished by: [signature] 3/2/12 1500
Signature Date Time
C. Sulich Battelle
Printed Name Company

Received by: FEDEX
Signature
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/1/2012
Page: 3 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW10

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW10-036	PSNS115.1	02/29/12 1340	SW		X										1	comp	SW10	
SW10-037	PSNS115.1	02/29/12 1340	SW			X									1	comp	SW10	
SW10-038	PSNS115.1	02/29/12 1340	SW				X								1	comp	SW10	
SW10-039	PSNS124.1	02/28/12 2026	SW	X											1	comp	SW10	
SW10-040	PSNS124.1	02/28/12 2026	SW		X										1	comp	SW10	
SW10-041	PSNS124.1	02/28/12 2026	SW			X									1	comp	SW10	
SW10-042	PSNS124.1	02/28/12 2026	SW				X								1	comp	SW10	
--end--																		

Relinquished by: _____ 3/2/12 1500
Signature Date Time
C. Sublett Battelle
Printed Name Company

Received by: FEDEX
Signature
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

K1201959

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/1/2012
Page: 1 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW10

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW10-001	PSNS124.1	02/29/12 1535	SW							X					2	grab	SW10	
SW10-002	PSNS126	02/29/12 1558	SW							X					2	grab	SW10	
SW10-003	PSNS126 Dup	02/29/12 1600	SW							X					2	grab	SW10	
SW10-004	PSNS124	02/29/12 1618	SW							X					2	grab	SW10	
SW10-005	PSNS 115.1	02/29/12 1640	SW							X					2	grab	SW10	
SW10-006	PSNS084.1	02/29/12 1658	SW							X					2	grab	SW10	
SW10-007	PSNS015	02/29/12 1720	SW							X					2	grab	SW10	
SW10-015	PSNS015	02/29/12 1327	SW	x											1	comp	SW10	
SW10-016	PSNS015	02/29/12 1327	SW		x										1	comp	SW10	
SW10-017	PSNS015	02/29/12 1327	SW			x									1	comp	SW10	
SW10-018	PSNS015	02/29/12 1327	SW				x								1	comp	SW10	
SW10-019	PSNS084.1	02/29/12 1336	SW	x											1	comp	SW10	
SW10-020	PSNS084.1	02/29/12 1336	SW		x										1	comp	SW10	
SW10-021	PSNS084.1	02/29/12 1336	SW			x									1	comp	SW10	

8

Relinquished by:
[signature] 3/2/12 1500
Signature Date Time
C. SUSLICK Battelle MSL
Printed Name Company

Received by:
FedEx
Signature
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
[signature]
Signature
Brad Aboin 3-5-12
Printed Name 900

Sample Disposition:
Distribution:
1) PNNL
2) CAS

2 Coolers

IC1201959

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/1/2012
Page: 2 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW10

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW10-022	PSNS084.1	02/29/12 1336	SW				X								1	comp	SW10	
SW10-023	PSNS126	02/29/12 1237	SW	x											1	comp	SW10	
SW10-024	PSNS126	02/29/12 1237	SW		x										1	comp	SW10	
SW10-025	PSNS126	02/29/12 1237	SW			x									1	comp	SW10	
SW10-026	PSNS126	02/29/12 1237	SW				x								1	comp	SW10	
SW10-027	PSNS126DUP	02/29/12 1237	SW	x											1	comp	SW10	
SW10-028	PSNS126DUP	02/29/12 1237	SW		x										1	comp	SW10	
SW10-029	PSNS126DUP	02/29/12 1237	SW			x									1	comp	SW10	
SW10-030	PSNS126DUP	02/29/12 1237	SW				x								1	comp	SW10	
SW10-031	PSNS124	02/28/12 1851	SW	x											1	comp	SW10	
SW10-032	PSNS124	02/28/12 1851	SW		x										1	comp	SW10	
SW10-033	PSNS124	02/28/12 1851	SW			x									1	comp	SW10	
SW10-034	PSNS124	02/28/12 1851	SW				x								1	comp	SW10	
SW10-035	PSNS115.1	02/29/12 1340	SW	X											1	comp	SW10	

Relinquished by: [signature] 3/2/12 1500
Signature Date Time
C. SUSLICK Battelle
Printed Name Company

Received by: FEDEX
Signature
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by: [signature] 3-3-12 0100
Signature
Brad Tobin
Printed Name

Distribution:
1) PNNL
2) CAS

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K12D1959

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/1/2012
Page: 3 of 3
Project No.: 54220
Project: Non-dry Dock Stormwater SW10

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW10-036	PSNS115.1	02/29/12 1340	SW		X										1	comp	SW10	
SW10-037	PSNS115.1	02/29/12 1340	SW			X									1	comp	SW10	
SW10-038	PSNS115.1	02/29/12 1340	SW				X								1	comp	SW10	
SW10-039	PSNS124.1	02/28/12 2026	SW	X											1	comp	SW10	
SW10-040	PSNS124.1	02/28/12 2026	SW		X										1	comp	SW10	
SW10-041	PSNS124.1	02/28/12 2026	SW			X									1	comp	SW10	
SW10-042	PSNS124.1	02/28/12 2026	SW				X								1	comp	SW10	
--end--																		

Relinquished by: _____ 3/2/12 1500
Signature Date Time
C. Sustich Battelle
Printed Name Company

Received by: FEDEX
Signature
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS
Sample Disposition:

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Bruce Tubin 3-3-12 0900
Printed Name

Distribution:
1) PNNL
2) CAS

10

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC AH

Client / Project: Battelle Service Request K12 01959

Received: 3-3-12 Opened: 3-3-12 By: BT Unloaded: 3-3-12 By: BT

1. Samples were received via? *Mail* ***Fed Ex*** *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) ***Cooler*** *Box* *Envelope* *Other*______ *NA*
3. Were custody seals on coolers? NA Y **N** If yes, how many and where?______

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID **NA**	Tracking Number	NA	Filed
4.7	2.1	302				Y
3.3	1.9	315				X

7. Packing material: ***Inserts*** *Baggies* ***Bubble Wrap*** ***Gel Packs*** *Wet Ice* *Dry Ice* *Sleeves* ______
8. Were custody papers properly filled out (ink, signed, etc.)? NA **Y** N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA **Y** N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA **Y** N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA **Y** N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA **Y** N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA **Y** N
14. Were VOA vials received without headspace? *Indicate in the table below.* **NA** Y N
15. Was C12/Res negative? **NA** Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

*Notes, Discrepancies, & Resolutions:*______

*Page*____ *of*____

SAMPLE CHAIN OF CUSTODY FORM

Date: _Febraury 29, 2011_____ Rec'd 3/2/12 EG

COC Number: 253 552 1781

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382

Project No.: USGS D6M11

Project Name: Mercury Burden on Organisms

Project Manager: Jill Brandenberger
Phone: (360) 681-3668

EVENT: Wet Weather Sampling

Laboratory: Battelle MSL
Address: 1529 W. Sequim Bay Road
Sequim, WA 98382

Attention: Jill Brandenberger

Testing Parameters

Observations, Instructions

Lab. Use only: Lab ID	Sample ID	Sample Lable	Collection Date/Time	Matrix	Metals (TMF)	TOC	No. of containers	StationID	Comments
SW10-101	3174.119	Anderson Creek	Feb 29, 2011 1201		X	X	2	Blank	Samples of Opportunity
102	120	Gorst Creek	Feb 29, 2011 1200				2	12072370	collected for TSS
103	121	Anderson Creek	Feb 29, 2011 1345				2	12072430	Check Blank for suitability of bottle type
104	122	Annapolis Creek	Feb 29, 2011 1500				2	12072520	
SW10-105	3174.123	Blackjack Creek	Feb 29, 2011 1645		X	X	2	12072510	
					EG 3/2/12		EG		

I believe date should be 2012 — EG 3/2/12

NOTE: Samples are for Metals & TOC per PM EG 3/2/12

TOC split taken @ MSL EG

Relinquished by: _____ Signature
Anthony J. Paulson Printed Name
3/1/2011 Date
USGS Company
1:00 Time

Received by: _____ Signature
MLFMcGehee Printed Name
03/02/12 1100

Total # of Containers : Cooler
Shipment Met Triple Bagged Over Ice in Cooler
Shipment Method: Poly bottle EG

Relinquished by: _____ Signature
_____ Printed Name
_____ Date
_____ Company
_____ Time

Received by: _____ Signature
_____ Printed Name

Sample Disposition:

Distribution:
1) 2 copies to the Laboratory
2) 1 copy to project manager
3) Return completed original to Battelle Marine Sciences Laboratory

Appendix A. Description of stream and stormwater drainage outfall stations, Watershed Sources Project, Sinclair Inlet, Washington, May 2008 through February 2010.

[**Study site name:** Location of study sites are shown in figure 2-3. **Field Identifier:** Shortened Study Site Name for field use. PSNS, Puget Sound Naval Shipyard. **USGS Site identifier:** Unique number for each site based on latitude and longitude of the site. First six digits are latitude, next seven digits are longitude, and final two digits are a sequence number to uniquely identify each site. **Latitude and longitude:** Latitude and longitude at site, in degrees, minutes, and seconds referenced to NAD 83.]

Study Site Name	Field Identifier	USGS Site identifier	Sample date	Latitude	Longitude
Stream Sites					
Gorst Creek at W. Belfair Valley Rd. at Gorst, WA	Gorst	12072370	05/09/08 07/14/08	473145.4	1224230.6
Anderson Creek nr SW Cook Rd nr Gorst, WA	Anderson	12072430	05/08/08 07/15/08	473125.4	1224059.7
Blackjack Creek at mouth at Port Orchard, WA	Blackjack	12072510	05/07/08 07/14/08	473232.5	1223738.4
Annapolis Creek at Arnold Ave. at Annapolis, WA	Anapolis	12072520	05/09/08 07/15/08	473248.6	1223705.4
Olney Creek at WWTP at Annapolis, WA	Olney	12072530	05/08/08 07/14/08	473244.4	1223645.4
Storm Water Sites					
Drainage outfall at navy city recycle near Gorst, WA	Navy City	473144122415401	01/07/09	473144.9	1224153.8
PSNS015 Storm vault A42 PIPE 4 NR BREMERTON WA	PSNS 015	473329122390304	01/07/09	473333.9	1223747.8
PSNS124 Storm vault I/55-9 NR BREMERTON WA	PSNS 124	473336122374701	01/07/09	473340.3	1223748.2
PSNS124.1 Storm vault J/56-1 NR BREMERTON WA	PSNS 124.1	473336122374401	01/07/09	473339.9	1223744.7
Storm outfall at sheridan Rd. near Bremerton, WA	Sheridan Road	473510122384701	01/08/09	473510	1223847
Stormwater outfall at Port Orchard boat ramp	PO boat ramp	473225122382801	01/08/09	473222.9	1223828.7
PSNS 015-2253	PSNS 015-2253*	473322122390201	12/29/09 03/31/10	473322.6	1223902.9

* PSNS 015-2253 is not the NPDES site for the PSNS-015 storm drain, 2253 is the label of the manhole vault.

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 3/2/2012
Batch: 12
Login Designee: McGahan
Project: **Envvest SW10**

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW10-101	Anderson Creek-Blank	3174-119	water	Prep Lab K-4-C, TOC Deep Freezer	Metals, TOC	02/29/12
SW10-102	Gorst Creek	3174-120	water	Prep Lab K-4-C, TOC Deep Freezer	Metals, TOC	02/29/12
SW10-103	Anderson Creek	3174-121	water	Prep Lab K-4-C, TOC Deep Freezer	Metals, TOC	02/29/12
SW10-104	Annapolis Creek	3174-122	water	Prep Lab K-4-C, TOC Deep Freezer	Metals, TOC	02/29/12
SW10-105	Blackjack Creek	3174-123	water	Prep Lab K-4-C, TOC Deep Freezer	Metals, TOC	02/29/12

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3174 Sample No(s): 119-123 Batch: 12

Project Name: SWID Envirest Project Manager: Brandenberger

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: _____ WP# _____

Yes	No		
☐	☐	Navy-type Project (requires high-level sample tracking procedures)	
☐	☐	USDA Samples (see Compliance Agreement Checklist)	PM Verification:
☐	☐	Filter Samples:	Amount: Entire sample Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)	
☐	☐	Special instructions:	

Sample Preservation Instructions: _____

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box	
☐	☒	☐	Custody seal present	Seal intact? YES NO
☒	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each)	5.1 °C °C
☐	☐	☒	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy:	
☒	☐	☐	Were all chain of custody forms signed and dated?	
☐	☒	☐	Were samples filtered at MSL?	

Sample condition(s): (Acceptable) Other (explain):

Container type: Teflon Poly Glass Cap. Vial Other:

Notes: 500 mL Poly - Field Samples Blank = 250 mL Poly & Bottle

Completed By: [signature] Date/Time: 03/02/12 1100

SAMPLE PRESERVATION

☐ Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)

☐ Random pH checked for ~10% of samples (use dip paper) Sample IDs: _____

☐ Complete pH check required for project (use pH meter and record on pH Record form)

☒ Sample(s) were preserved at MSL

Type: ☒	0.2% HNO3	Notes: optima	Lot# 121020
☐	0.5% HCl (Hg samples)	Notes:	Lot#
☐	Refrigerate/Freeze	Notes:	
☐	Other	Notes: DOC to dump for Eb	

Completed By: [signature] Date/Time: 3/2/12 15:30

Storage Shelf: K-4-D

KC 3/2/12

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/14/12

Page: 1 of 1

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle

Marine Sciences Laboratory

1529 West Sequim Bay Road

Laboratory: Battelle MSL

Attention: Jill Brandenberger

Phone: (360) 681-4564

Sample Label	Station ID	Collection Date/Time	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity					No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
SW11 (Corrected db 3/16/12)																		
SW11-001 A	015	3/14/12 1420	SW						X						1	Grab	11	A } SW11-001
SW11-002 B	015 DUP	↓ ↓							X						1			B }
SW11-003 A	084.1	3/14/12 1455							X						1			A } SW11-002
SW11-004 B	084.1 DUP	↓ ↓							X						1			B } 3/16/12
SW11-005 3	126	3/15/12 1542							X						2			
SW11-006 4	115.1	3/15/12 1605							X						2			
SW11-007 5	124	3/15/12 1626							X						2			
SW11-008 6	124DUP	3/15/12 1630							X						2			
SW11-009 7	124.1	3/15/12 1658							X						2			
SW11-010 8	124.1 DUP	3/15/12 1705	↓						X						2	↓	↓	

Relinquished by: _____ 3/16/12 0920

Signature Date Time

Brian Rupert Cardno TEC

Printed Name Company

Received by: _____ 3/16/12 0920

Signature

JM Brandenberger

Printed Name

Total # of Containers:

Shipment Method: Hand delivery

Sample Disposition:

Relinquished by: _____

Signature Date Time

_____

Printed Name Company

Received by: _____

Signature

_____

Printed Name

Distribution:

1) PNNL

2) CAS

3) TAI

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/15/12

Page: 1 of 1

Project No.: N4523A10MP00034 Amend.1

Project: PSNSNon-dry Dock SW 2010

Battelle

Marine Sciences Laboratory

1529 West Sequim Bay Road

Laboratory: Battelle MSL

Attention: Jill Brandenberger

Phone: (360) 681-4564

	Sample Label	Station ID	Collection Date/Time	Matrix	Analyze parameters per QAP/FSP: Hardness	TOC	DOC	TSS	TME/DME	TPH	Turbidity (2)						No. containers	Sample Type (Grab vs. Comp)	Storm#	Notes / Comp. Cond. (µS/cm) and Turb. (NTU) Readings
SW11 009	SW11-0004	PSNS 015	3/15/12 1600	SW	X	X	X	X	X								1	Comp	SW11	83/NA(1)
010	SW11-012	PSNS 015 Dup	3/15/12 1601	SW	X	X	X	X	X								1	Comp	SW11	82/NA(1)
011	SW11-013	PSNS 84.1	3/15/12 1656	SW	X	X	X	X	X								1	Comp	SW11	142/17
012	SW11-014	PSNS 115.1	3/15/12 1558	SW	X	X	X	X	X								1	Comp	SW11	293/9
013	SW11-015	PSNS 126	3/15/12 1529	SW	X	X	X	X	X								1	Comp	SW11	192/12
014	SW11-016	PSNS 124.1	3/15/12 1658	SW	X	X	X	X	X								1	Comp	SW11	190/4
015	SW11-017	PSNS 124	3/15/12 1490	SW	X	X	X	X	X								1	Comp	SW11	521/20
SJ 3/16/12																				

Relinquished by: Signature	3/16/12 Date	0920 Time	Received by: Signature
Brian Rupert Printed Name	CardnoTEC Company		JM Brandenberger Printed Name
Relinquished by: Signature	Date	Time	Received by: Signature
Printed Name	Company		Printed Name

Total # of Containers:

Shipment Method: Hand Carry

Sample Disposition:

Distribution:
1) PNNL
2) CAS
3) TAI

NA(1) - Did not have Turbidity meter during collection

(2) Turbidity measured in SW Lab w/ Hach 2100p meter

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/16/2012
Page: 1 of 1
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW11

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW11-044	PSNS015	3/15/12 1601	SW					x							1	comp	SW11	3174*119
SW11-045	PSNS015	3/15/12 1601	SW						x						1	comp	SW11	3174*120
SW11-046	PSNS015DUP	3/15/12 1601	SW					x							1	comp	SW11	3174*121
SW11-047	PSNS015DUP	3/15/12 1601	SW						x						1	comp	SW11	3174*122
SW11-048	PSNS84.1	3/15/12 1656	SW					x							1	comp	SW11	3174*123
SW11-049	PSNS84.1	3/15/12 1656	SW						x						1	comp	SW11	3174*124
SW11-050	PSNS115.1	3/15/12 1558	SW					x							1	comp	SW11	3174*125
SW11-051	PSNS115.1	3/15/12 1558	SW						x						1	comp	SW11	3174*126
SW11-052	PSNS126	3/15/12 1529	SW					x							1	comp	SW11	3174*127
SW11-053	PSNS126	3/15/12 1529	SW						x						1	comp	SW11	3174*128
SW11-054	PSNS124.1	3/15/12 1658	SW					x							1	comp	SW11	3174*129
SW11-055	PSNS124.1	3/15/12 1658	SW						x						1	comp	SW11	3174*130
SW11-056	PSNS124	3/15/12 1400	SW					x							1	comp	SW11	3174*131
SW11-057	PSNS124	3/15/12 1400	SW						x						1	comp	SW11	3174*132

Relinquished by: [signature] 3/16/12 1700
Signature Date Time
Jill Brandenberger
Printed Name Company

Received by: [signature] 3/16/12
Signature
C. Sussman 1700
Printed Name

Total # of Containers
~~Shipment Method:~~
Retained at PNNL

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 3/16/2012
Batch: 12
Login Designee: Brandenberger/Suslick

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Non-Dry Dock Storm water - SW11 (March 2012)**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW11-044	PSNS015	3174*119	Water	Prep Lab	Total Metals	03/15/12
SW11-045	PSNS015	3174*120	Water	Prep Lab	Dissolved Metals	03/15/12
SW11-046	PSNS015DUP	3174*121	Water	Prep Lab	Total Metals	03/15/12
SW11-047	PSNS015DUP	3174*122	Water	Prep Lab	Dissolved Metals	03/15/12
SW11-048	PSNS84.1	3174*123	Water	Prep Lab	Total Metals	03/15/12
SW11-049	PSNS84.1	3174*124	Water	Prep Lab	Dissolved Metals	03/15/12
SW11-050	PSNS115.1	3174*125	Water	Prep Lab	Total Metals	03/15/12
SW11-051	PSNS115.1	3174*126	Water	Prep Lab	Dissolved Metals	03/15/12
SW11-052	PSNS126	3174*127	Water	Prep Lab	Total Metals	03/15/12
SW11-053	PSNS126	3174*128	Water	Prep Lab	Dissolved Metals	03/15/12
SW11-054	PSNS124.1	3174*129	Water	Prep Lab	Total Metals	03/15/12
SW11-055	PSNS124.1	3174*130	Water	Prep Lab	Dissolved Metals	03/15/12
SW11-056	PSNS124	3174*131	Water	Prep Lab	Total Metals	03/15/12
SW11-057	PSNS124	3174*132	Water	Prep Lab	Dissolved Metals	03/15/12

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3174 Sample No(s): 119 - 132 Batch: 12

Project Name: ENWEST SW11 Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: Water WP#: ______

Yes	No	
☐	☐	Navy-type Project (requires high-level sample tracking procedures)
☐	☐	USDA Samples (see Compliance Agreement Checklist)

PM Verification:

Yes	No	
☐	☐	Filter Samples: *Amount:* Entire sample Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
☐	☐	Special instructions: ______

Sample Preservation Instructions: ______

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Hand delivered

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☑	Custody seal present Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) >4°C °C (if multiple coolers, note temp. of each) ______ °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy: ______
☑	☐	☐	Were all chain of custody forms signed and dated?
☑	☐	☐	Were samples filtered at MSL? as noted

Sample condition(s): (Acceptable) Other (explain):

Container type: (Teflon) (Poly) (Glass) Cap. Vial Other:

Notes: ______

Completed By: ______ Date/Time: 3/16/12 0920

SAMPLE PRESERVATION

☐ Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)

☐ Random pH checked for ~10% of samples (use dip paper) Sample IDs: ______

☐ Complete pH check required for project (use pH meter and record on pH Record form)

☐ Sample(s) were preserved at MSL

Type:		Notes:	Lot#
☑	0.2% HNO_3	Metals	1211020
☐	0.5% HCl (Hg samples)		
☑	Refrigerate/Freeze	Conv. to CDS	
☐	Other		

Completed By: ______ Date/Time: 3/16/12 1800

Storage Shelf: ______

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/16/2012
Page: 1 of 1
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW11

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW11-001	PSNS015	3/14/12 1420	SW							X					2	grab	SW11	
SW11-002	PSNS84.1	3/14/12 1455	SW							X					2	grab	SW11	
SW11-003	PSNS126	3/15/12 1542	SW							X					2	grab	SW11	
SW11-004	PSNS115.1	3/15/12 1605	SW							X					2	grab	SW11	
SW11-005	PSNS124	3/15/12 1626	SW							X					2	grab	SW11	
SW11-006	PSNS124DUP	3/15/12 1630	SW							X					2	grab	SW11	
SW11-007	PSNS124.1	3/15/12 1658	SW							X					2	grab	SW11	
SW11-008	PSNS124.1DUP	3/15/12 1705	SW							X					2	grab	SW11	

Relinquished by: [signature] 3/16/12 1500
Signature Date Time
C. Swanson MSL
Printed Name Company

Received by:
Signature
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/16/2012
Page: 2 of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW11

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW11-030	PSNS115.1	3/15/12 1558	SW			X									1	comp	SW11	
SW11-031	PSNS115.1	3/15/12 1558	SW				X								1	comp	SW11	
SW11-032	PSNS126	3/15/12 1529	SW	X											1	comp	SW11	
SW11-033	PSNS126	3/15/12 1529	SW		X										1	comp	SW11	
SW11-034	PSNS126	3/15/12 1529	SW			X									1	comp	SW11	
SW11-035	PSNS126	3/15/12 1529	SW				X								1	comp	SW11	
SW11-036	PSNS124.1	3/15/12 1658	SW	X											1	comp	SW11	
SW11-037	PSNS124.1	3/15/12 1658	SW		X										1	comp	SW11	
SW11-038	PSNS124.1	3/15/12 1658	SW			X									1	comp	SW11	
SW11-039	PSNS124.1	3/15/12 1658	SW				X								1	comp	SW11	
SW11-040	PSNS124	3/15/12 1400	SW	X											1	comp	SW11	
SW11-041	PSNS124	3/15/12 1400	SW		X										1	comp	SW11	
SW11-042	PSNS124	3/15/12 1400	SW			X									1	comp	SW11	
SW11-043	PSNS124	3/15/12 1400	SW				X								1	comp	SW11	

Relinquished by: _____ Signature _____ Date _____ Time
_____ Printed Name _____ Company

Received by: _____ Signature
_____ Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by: _____ Signature _____ Date _____ Time
_____ Printed Name _____ Company

Received by: _____ Signature
_____ Printed Name

Distribution:
1) PNNL
2) CAS

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/16/2012
Page: 1 of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW11

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW11-016	PSNS015	3/15/12 1601	SW	X											1	comp	SW11	
SW11-017	PSNS015	3/15/12 1601	SW		X										1	comp	SW11	
SW11-018	PSNS015	3/15/12 1601	SW			X									1	comp	SW11	
SW11-019	PSNS015	3/15/12 1601	SW				X								1	comp	SW11	
SW11-020	PSNS015DUP	3/15/12 1601	SW	X											1	comp	SW11	
SW11-021	PSNS015DUP	3/15/12 1601	SW		X										1	comp	SW11	
SW11-022	PSNS015DUP	3/15/12 1601	SW			X									1	comp	SW11	
SW11-023	PSNS015DUP	3/15/12 1601	SW				X								1	comp	SW11	
SW11-024	PSNS84.1	3/15/12 1656	SW	X											1	comp	SW11	
SW11-025	PSNS84.1	3/15/12 1656	SW		X										1	comp	SW11	
SW11-026	PSNS84.1	3/15/12 1656	SW			X									1	comp	SW11	
SW11-027	PSNS84.1	3/15/12 1656	SW				X								1	comp	SW11	
SW11-028	PSNS115.1	3/15/12 1558	SW	X											1	comp	SW11	
SW11-029	PSNS115.1	3/15/12 1558	SW		X										1	comp	SW11	

Relinquished by: _____ Signature _____ Date _____ Time
_____ Printed Name _____ Company

Received by: _____ Signature
_____ Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS

Sample Disposition:

Relinquished by: _____ Signature _____ Date _____ Time
_____ Printed Name _____ Company

Received by: _____ Signature
_____ Printed Name

Distribution:
1) PNNL
2) CAS

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/16/2012
Page: 1 of 1
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW11

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
SW11-001	PSNS015	3/14/12 1420	SW							X					2	grab	SW11	
SW11-002	PSNS84.1	3/14/12 1455	SW							X					2	grab	SW11	
SW11-003	PSNS126	3/15/12 1542	SW							X					2	grab	SW11	
SW11-004	PSNS115.1	3/15/12 1605	SW							X					2	grab	SW11	
SW11-005	PSNS124	3/15/12 1626	SW							X					2	grab	SW11	
SW11-006	PSNS124DUP	3/15/12 1630	SW							X					2	grab	SW11	
SW11-007	PSNS124.1	3/15/12 1658	SW							X					2	grab	SW11	
SW11-008	PSNS124.1DUP	3/15/12 1705	SW							X					2	grab	SW11	

Relinquished by: _____ 3/16/12 1500
Signature Date Time
C. Snyder MSL
Printed Name Company

Received by: _____ 3.17.12 815
Signature
brad Dorin ALS Columbia
Printed Name

Total # of Containers
Shipment Method:
Fedex to CAS
Sample Disposition:

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

8

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC HA

Client / Project: Battelle Marine Sciences Service Request K12 02461

Received: 3.17.12 Opened: 3.17.12 By: BT Unloaded: 3.17.12 By: BT

1. Samples were received via? *Mail* *(Fed Ex)* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *(Cooler)* *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number	NA	Filed
3.0	2.2	315				X

7. Packing material: *(Inserts)* *Baggies* *Bubble Wrap* *(Gel Packs)* *(Wet Ice)* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* (NA) Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

Page _____ *of* _____

K1203509

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/19/2012
Page: 1 of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW11

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
1	SW11-016	PSNS015	3/15/12 1601	SW	X											1	comp	SW11	
2	SW11-017	PSNS015	3/15/12 1601	SW		X										1	comp	SW11	
3	SW11-018	PSNS015	3/15/12 1601	SW			X									1	comp	SW11	
4	SW11-019	PSNS015	3/15/12 1601	SW				X								1	comp	SW11	
5	SW11-020	PSNS015DUP	3/15/12 1601	SW	X											1	comp	SW11	
6	SW11-021	PSNS015DUP	3/15/12 1601	SW		X										1	comp	SW11	
7	SW11-022	PSNS015DUP	3/15/12 1601	SW			X									1	comp	SW11	
8	SW11-023	PSNS015DUP	3/15/12 1601	SW				X								1	comp	SW11	
9	SW11-024	PSNS84.1	3/15/12 1656	SW	X											1	comp	SW11	
10	SW11-025	PSNS84.1	3/15/12 1656	SW		X										1	comp	SW11	
11	SW11-026	PSNS84.1	3/15/12 1656	SW			X									1	comp	SW11	
12	SW11-027	PSNS84.1	3/15/12 1656	SW				X								1	comp	SW11	
13	SW11-028	PSNS115.1	3/15/12 1558	SW	X											1	comp	SW11	
14	SW11-029	PSNS115.1	3/15/12 1558	SW		X										1	comp	SW11	

Relinquished by:
Signature: [signature] Date: 3/19/12 Time: 1341
Printed Name: JM Brandenberger Company: PNNL

Received by:
Signature: [signature]
Printed Name: SWCF 3/20/12 0920

Total # of Containers
Shipment Method: Fedex to CAS

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL
2) CAS

8

K1202509

SAMPLE CHAIN OF CUSTODY FORM

Date: 3/19/2012
Page: 2 of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW11

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TME/DME	DME	TPH					No. containers	Sample Type (grab vs. Comp)	Storm#	Lab Code
15	SW11-030	PSNS115.1	3/15/12 1558	SW			X									1	comp	SW11	
16	SW11-031	PSNS115.1	3/15/12 1558	SW				X								1	comp	SW11	
17	SW11-032	PSNS126	3/15/12 1529	SW	X											1	comp	SW11	
18	SW11-033	PSNS126	3/15/12 1529	SW		X										1	comp	SW11	
19	SW11-034	PSNS126	3/15/12 1529	SW			X									1	comp	SW11	
20	SW11-035	PSNS126	3/15/12 1529	SW				X								1	comp	SW11	
21	SW11-036	PSNS124.1	3/15/12 1658	SW	X											1	comp	SW11	
22	SW11-037	PSNS124.1	3/15/12 1658	SW		X										1	comp	SW11	
23	SW11-038	PSNS124.1	3/15/12 1658	SW			X									1	comp	SW11	
24	SW11-039	PSNS124.1	3/15/12 1658	SW				X								1	comp	SW11	
25	SW11-040	PSNS124	3/15/12 1400	SW	X											1	comp	SW11	
26	SW11-041	PSNS124	3/15/12 1400	SW		X										1	comp	SW11	
27	SW11-042	PSNS124	3/15/12 1400	SW			X									1	comp	SW11	
28	SW11-043	PSNS124	3/15/12 1400	SW				X								1	comp	SW11	

Relinquished by: [signature] 3/19/12 1341
Signature Date Time
Jill Brandenberger PNNL
Printed Name Company

Received by: [signature]
Signature
[signature] 3/20/12 0920
Printed Name

Total # of Containers
Shipment Method: Fedex to CAS
Sample Disposition:

Relinquished by:
Signature Date Time
Printed Name Company

Received by:
Signature
Printed Name

Distribution:
1) PNNL
2) CAS

6

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC# H0

Client / Project: Battelle Service Request K12 07609

Received: 3/20/12 Opened: 3/20/12 By: SRW Unloaded: 3/20/12 By: SRW

1. Samples were received via? *Mail* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Cooler Temp °C	Temp Blank °C	Thermometer ID	Cooler/COC ID (NA)	Tracking Number	NA	Filed
-0.2	1.4	313		7933 5476 3432		
1.5		310		" " 3400		

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* _____
8. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA (Y) N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
14. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
15. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____

Page _____ *of* _____

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Battelle	**Service Request No.:**	K1201959
Project:	Non-dry Dock Stormwater SW10	**Date Received:**	3/3/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Forty-two water samples were received for analysis at Columbia Analytical Services on 3/3/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Total Suspended Solids by Standard Method 2540 D:
The Relative Percent Difference (RPD) for the replicate analysis of Total Suspended Solids in the Batch QC sample was outside the normal CAS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of these samples were observed.

Diesel Range Organics by EPA Method 8015

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) criterion for the replicate analysis of DRO (Diesel Range Organics) and RRO (Residual Range Organics) in sample SW10-001 and SW10-002 was not applicable because the analyte concentration was not significantly greater than the Method Reporting Limit (MRL). Analytical values derived from measurements close to the detection limit are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

No other anomalies associated with the analysis of these samples were observed.

Approved by _____ **Date** 3-19-12

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project:	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/28/12 - 02/29/12
Sample Matrix:	Water	**Date Received:**	03/3/12
Analysis Method:	SM 2340 C	**Units:**	mg/L
		Basis:	NA

Hardness, Total as CaCO3

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW10-015	K1201959-008	**30.0**	2.0	0.8	1	03/09/12 10:00	
SW10-019	K1201959-012	**21.2**	2.0	0.8	1	03/09/12 10:00	
SW10-023	K1201959-016	**44.8**	2.0	0.8	1	03/09/12 10:00	
SW10-027	K1201959-020	**45.6**	2.0	0.8	1	03/09/12 10:00	
SW10-031	K1201959-024	**109**	2.0	0.8	1	03/09/12 10:00	
SW10-035	K1201959-028	**50.0**	2.0	0.8	1	03/09/12 10:00	
SW10-039	K1201959-032	**90.0**	2.0	0.8	1	03/09/12 10:00	
Method Blank	K1201959-MB1	ND U	2.0	0.8	1	03/09/12 10:00	
Method Blank	K1201959-MB2	ND U	2.0	0.8	1	03/09/12 10:00	

COLUMBIA ANALYTICAL SERVICES, INC.

Now part of the ALS Group

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/29/12
Sample Matrix:	Water	**Date Received:**	03/03/12
		Date Analyzed:	03/09/12

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	SW10-015	**Units:**	mg/L
Lab Code:	K1201959-008	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K1201959-008DUP6 Result	Average	RPD	RPD Limit
Hardness, Total as CaCO3	SM 2340 C	2.0	0.8	30.0	30.0	30.0	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000204887 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Analyzed: 03/09/12

Lab Control Sample Summary
Hardness, Total as CaCO3

Analysis Method: SM 2340 C

Units: mg/L
Basis: NA
Analysis Lot: 282981

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1201959-LCS2	89.2	86.3	103	90-116
Lab Control Sample	K1201959-LCS3	88.0	86.3	102	90-116

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project:	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/28/12 - 02/29/12
Sample Matrix:	Water	**Date Received:**	03/3/12
Analysis Method:	SM 2540 D	**Units:**	mg/L
		Basis:	NA

Solids, Total Suspended (TSS)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW10-018	K1201959-011	**13.0**	5.0	-	1	03/06/12 16:20	
SW10-022	K1201959-015	**6.0**	5.0	-	1	03/06/12 16:20	
SW10-026	K1201959-019	**9.5**	5.0	-	1	03/06/12 16:20	
SW10-030	K1201959-023	**10.5**	5.0	-	1	03/06/12 16:20	
SW10-034	K1201959-027	**48.0**	5.0	-	1	03/06/12 16:20	
SW10-038	K1201959-031	ND U	5.0	-	1	03/06/12 16:20	
SW10-042	K1201959-035	**8.0**	5.0	-	1	03/06/12 16:20	
Method Blank	K1201959-MB1	ND U	5.0	-	1	03/06/12 16:20	

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	03/06/12

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1201908-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K1201908-001DUP5 Result	Average	RPD	RPD Limit
Solids, Total Suspended (TSS)	SM 2540 D	10	-	86	105	95.5	20 *	10

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000204887 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Analyzed: 03/06/12

Lab Control Sample Summary
Solids, Total Suspended (TSS)

Analysis Method: SM 2540 D

Units: mg/L
Basis: NA
Analysis Lot: 282542

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1201959-LCS2	300	305	98	85-111

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project:	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/28/12 - 02/29/12
Sample Matrix:	Water	**Date Received:**	03/3/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Carbon, Dissolved Organic (DOC)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW10-017	K1201959-010	**2.30**	0.50	0.07	1	03/05/12 17:05	
SW10-021	K1201959-014	**1.85**	0.50	0.07	1	03/05/12 17:05	
SW10-025	K1201959-018	**15.7**	0.50	0.07	1	03/05/12 17:05	
SW10-029	K1201959-022	**16.1**	0.50	0.07	1	03/05/12 17:05	
SW10-033	K1201959-026	**31.5**	0.50	0.07	1	03/05/12 17:05	
SW10-037	K1201959-030	**2.30**	0.50	0.07	1	03/05/12 17:05	
SW10-041	K1201959-034	**2.77**	0.50	0.07	1	03/05/12 17:05	
Method Blank	K1201959-MB1	ND U	0.50	0.07	1	03/05/12 17:05	
Method Blank	K1201959-MB2	ND U	0.50	0.07	1	03/05/12 17:05	

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/28/12 - 02/29/12
Sample Matrix:	Water	**Date Received:**	03/03/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Duplicate Sample Summary
Carbon, Dissolved Organic (DOC)

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
SW10-017	K1201959-010DUP8	0.50	0.07	2.30	2.39	2.35	4	10	03/05/12
SW10-021	K1201959-014DUP10	0.50	0.07	1.85	1.77	1.81	5	10	03/05/12
SW10-025	K1201959-018DUP12	0.50	0.07	15.7	15.8	15.7	<1	10	03/05/12
SW10-029	K1201959-022DUP14	0.50	0.07	16.1	16.2	16.2	1	10	03/05/12
SW10-033	K1201959-026DUP16	0.50	0.07	31.5	32.2	31.8	2	10	03/05/12
SW10-037	K1201959-030DUP18	0.50	0.07	2.30	2.39	2.35	4	10	03/05/12
SW10-041	K1201959-034DUP20	0.50	0.07	2.77	2.72	2.74	2	10	03/05/12

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Superset Reference: 12-0000204887 rev 00

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project:	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/29/12
Sample Matrix:	Water	**Date Received:**	03/03/12
		Date Analyzed:	03/5/12

Matrix Spike Summary
Carbon, Dissolved Organic (DOC)

Sample Name:	SW10-017	**Units:**	mg/L
Lab Code:	K1201959-010	**Basis:**	NA
Analysis Method:	SM 5310 C		

Matrix Spike
K1201959-010MS3

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Dissolved Organic (DOC)	2.30	25.4	25.0	92	60-134

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Analyzed: 03/05/12

Duplicate Lab Control Sample Summary
General Chemistry Parameters

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 282378

	Lab Control Sample K1201959-LCS1			Duplicate Lab Control Sample K1201959-DLCS1					
Analyte Name	Result	Spike Amount	% Rec	Result	Spike Amount	% Rec	% Rec Limits	RPD	RPD Limit
Carbon, Dissolved Organic (DOC)	20.6	22.7	91	20.4	22.7	90	87-112	1	33

Client: Battelle Marine Sciences Lab **Service Request:** K1201959
Project: Non-dry Dock Stormwater SW10/54220

Continuing Calibration Verification (CCV) Summary

Carbon, Dissolved Organic (DOC)

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	282378	KQ1202328-18	03/05/12 17:05	25.0	24.5	98	90-110
CCV2	282378	KQ1202328-19	03/05/12 17:05	25.0	23.9	96	90-110
CCV3	282378	KQ1202328-20	03/05/12 17:05	25.0	24.8	99	90-110
CCV4	282378	KQ1202328-21	03/05/12 17:05	25.0	25.0	100	90-110
CCV5	282378	KQ1202328-22	03/05/12 17:05	25.0	24.7	99	90-110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959

Continuing Calibration Blank (CCB) Summary
Carbon, Dissolved Organic (DOC)

Analysis Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	282378	KQ1202328-23	03/05/12 17:05	0.50	0.07	ND	U
CCB2	282378	KQ1202328-24	03/05/12 17:05	0.50	0.07	ND	U
CCB3	282378	KQ1202328-25	03/05/12 17:05	0.50	0.07	ND	U
CCB4	282378	KQ1202328-26	03/05/12 17:05	0.50	0.07	ND	U
CCB5	282378	KQ1202328-27	03/05/12 17:05	0.50	0.07	0.08	J

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project:	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/28/12 - 02/29/12
Sample Matrix:	Water	**Date Received:**	03/3/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Carbon, Total Organic

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW10-016	K1201959-009	**2.71**	0.50	0.07	1	03/05/12 17:05	
SW10-020	K1201959-013	**2.21**	0.50	0.07	1	03/05/12 17:05	
SW10-024	K1201959-017	**17.7**	0.50	0.07	1	03/05/12 17:05	
SW10-028	K1201959-021	**18.3**	0.50	0.07	1	03/05/12 17:05	
SW10-032	K1201959-025	**33.9**	0.50	0.07	1	03/05/12 17:05	
SW10-036	K1201959-029	**2.86**	0.50	0.07	1	03/05/12 17:05	
SW10-040	K1201959-033	**3.04**	0.50	0.07	1	03/05/12 17:05	
Method Blank	K1201959-MB1	ND U	0.50	0.07	1	03/05/12 17:05	

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/28/12 - 02/29/12
Sample Matrix:	Water	**Date Received:**	03/03/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Duplicate Sample Summary
Carbon, Total Organic

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
SW10-016	K1201959-009DUP7	0.50	0.07	2.71	2.83	2.77	4	10	03/05/12
SW10-020	K1201959-013DUP9	0.50	0.07	2.21	2.38	2.29	7	10	03/05/12
SW10-024	K1201959-017DUP11	0.50	0.07	17.7	17.9	17.8	1	10	03/05/12
SW10-028	K1201959-021DUP13	0.50	0.07	18.3	17.6	18.0	4	10	03/05/12
SW10-032	K1201959-025DUP15	0.50	0.07	33.9	34.4	34.2	1	10	03/05/12
SW10-036	K1201959-029DUP17	0.50	0.07	2.86	2.78	2.82	3	10	03/05/12
SW10-040	K1201959-033DUP19	0.50	0.07	3.04	3.18	3.11	4	10	03/05/12

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Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project:	Non-dry Dock Stormwater SW10/54220	**Date Collected:**	02/29/12
Sample Matrix:	Water	**Date Received:**	03/03/12
		Date Analyzed:	03/5/12

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	SW10-016	**Units:**	mg/L
Lab Code:	K1201959-009	**Basis:**	NA
Analysis Method:	SM 5310 C		

Matrix Spike
K1201959-009MS2

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	2.71	27.0	25.0	97	60-134

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Analyzed: 03/05/12

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 282377

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1201959-LCS2	20.5	22.7	90	87-112

Client: Battelle Marine Sciences Lab **Service Request:** K1201959
Project: Non-dry Dock Stormwater SW10/54220

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	282377	KQ1202324-11	03/05/12 17:05	25.0	24.5	98	90-110
CCV2	282377	KQ1202324-12	03/05/12 17:05	25.0	25.0	100	90-110
CCV3	282377	KQ1202324-13	03/05/12 17:05	25.0	24.7	99	90-110
CCV4	282377	KQ1202324-14	03/05/12 17:05	25.0	25.0	100	90-110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic

Analysis Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	282377	KQ1202324-15	03/05/12 17:05	0.50	0.07	ND	U
CCB2	282377	KQ1202324-16	03/05/12 17:05	0.50	0.07	ND	U
CCB3	282377	KQ1202324-17	03/05/12 17:05	0.50	0.07	0.08	J
CCB4	282377	KQ1202324-18	03/05/12 17:05	0.50	0.07	ND	U

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
SW10-001	K1201959-001	02/29/2012	03/03/2012
SW10-002	K1201959-002	02/29/2012	03/03/2012
SW10-003	K1201959-003	02/29/2012	03/03/2012
SW10-004	K1201959-004	02/29/2012	03/03/2012
SW10-005	K1201959-005	02/29/2012	03/03/2012
SW10-006	K1201959-006	02/29/2012	03/03/2012
SW10-007	K1201959-007	02/29/2012	03/03/2012
SW10-001	KWG1202421-1	02/29/2012	03/03/2012
SW10-002	KWG1202421-2	02/29/2012	03/03/2012

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: _____

Date: 3/6/12 Title: _____

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: 02/29/2012
Date Received: 03/03/2012

Diesel and Residual Range Organics

Sample Name: SW10-001
Lab Code: K1201959-001

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**280**	H	250	11	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**650**	O	500	19	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	97	50-150	03/09/12	Acceptable
n-Triacontane	103	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: 02/29/2012
Date Received: 03/03/2012

Diesel and Residual Range Organics

Sample Name: SW10-002
Lab Code: K1201959-002

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**87**	J	270	12	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**270**	J	530	20	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	107	50-150	03/09/12	Acceptable
n-Triacontane	115	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: 02/29/2012
Date Received: 03/03/2012

Diesel and Residual Range Organics

Sample Name: SW10-003
Lab Code: K1201959-003

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**73**	J	250	11	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**260**	J	500	19	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	103	50-150	03/09/12	Acceptable
n-Triacontane	112	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: 02/29/2012
Date Received: 03/03/2012

Diesel and Residual Range Organics

Sample Name: SW10-004
Lab Code: K1201959-004

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**85**	J	260	12	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**180**	J	520	20	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	103	50-150	03/09/12	Acceptable
n-Triacontane	110	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: 02/29/2012
Date Received: 03/03/2012

Diesel and Residual Range Organics

Sample Name: SW10-005
Lab Code: K1201959-005

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**72**	J	250	11	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**170**	J	500	19	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	95	50-150	03/09/12	Acceptable
n-Triacontane	100	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: 02/29/2012
Date Received: 03/03/2012

Diesel and Residual Range Organics

Sample Name: SW10-006
Lab Code: K1201959-006

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**200**	J	260	12	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**720**	O	520	20	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	92	50-150	03/09/12	Acceptable
n-Triacontane	98	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: 02/29/2012
Date Received: 03/03/2012

Diesel and Residual Range Organics

Sample Name: SW10-007
Lab Code: K1201959-007

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**89**	J	270	12	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**230**	J	530	20	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	88	50-150	03/09/12	Acceptable
n-Triacontane	94	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Collected: NA
Date Received: NA

Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1202421-4

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	03/08/12	03/09/12	KWG1202421	
Residual Range Organics (RRO)	**31**	J	490	19	1	03/08/12	03/09/12	KWG1202421	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	96	50-150	03/09/12	Acceptable
n-Triacontane	97	50-150	03/09/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
SW10-001	K1201959-001	97	103
SW10-002	K1201959-002	107	115
SW10-003	K1201959-003	103	112
SW10-004	K1201959-004	103	110
SW10-005	K1201959-005	95	100
SW10-006	K1201959-006	92	98
SW10-007	K1201959-007	88	94
SW10-001DUP	KWG1202421-1	92	99
SW10-002DUP	KWG1202421-2	98	105
Method Blank	KWG1202421-4	96	97
Lab Control Sample	KWG1202421-3	103	101

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Extracted: 03/08/2012
Date Analyzed: 03/09/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: SW10-001
Lab Code: K1201959-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1202421

Analyte Name	MRL	MDL	Sample Result	SW10-001DUP KWG1202421-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	12	280	280	280	1 #	30
Residual Range Organics (RRO)	520	20	650	650	650	1 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Extracted: 03/08/2012
Date Analyzed: 03/09/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: SW10-002
Lab Code: K1201959-002

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1202421

Analyte Name	MRL	MDL	Sample Result	SW10-002DUP KWG1202421-2 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	270	12	87	75	81	15 #	30
Residual Range Organics (RRO)	530	20	270	270	270	2 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Extracted: 03/08/2012
Date Analyzed: 03/09/2012

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1202421

Analyte Name	Lab Control Sample KWG1202421-3 Lab Control Spike Result	Expected	%Rec	%Rec Limits
Diesel Range Organics (DRO)	1690	1600	106	46-140
Residual Range Organics (RRO)	770	800	96	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220
Sample Matrix: Water

Service Request: K1201959
Date Extracted: 03/08/2012
Date Analyzed: 03/09/2012
Time Analyzed: 01:21

Method Blank Summary
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1202421-4

Instrument ID: GC21
File ID: J:\GC21\DATA\030812B-NW\0308F047.D

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1202421

This Method Blank applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Lab Control Sample	KWG1202421-3	J:\GC21\DATA\030812B-NW\0308F045.D	03/09/12	00:59
SW10-002	K1201959-002	J:\GC21\DATA\030812B-NW\0308F053.D	03/09/12	02:27
SW10-002DUP	KWG1202421-2	J:\GC21\DATA\030812B-NW\0308F055.D	03/09/12	02:50
SW10-003	K1201959-003	J:\GC21\DATA\030812B-NW\0308F057.D	03/09/12	03:12
SW10-004	K1201959-004	J:\GC21\DATA\030812B-NW\0308F059.D	03/09/12	03:34
SW10-005	K1201959-005	J:\GC21\DATA\030812B-NW\0308F061.D	03/09/12	03:55
SW10-007	K1201959-007	J:\GC21\DATA\030812B-NW\0308F063.D	03/09/12	04:18
SW10-001	K1201959-001	J:\GC21\DATA\030812B-NW\0308F077.D	03/09/12	06:52
SW10-001DUP	KWG1202421-1	J:\GC21\DATA\030812B-NW\0308F079.D	03/09/12	07:13
SW10-006	K1201959-006	J:\GC21\DATA\030812B-NW\0308F083.D	03/09/12	07:57

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1201959
Project:	Non-dry Dock Stormwater SW10/54220	**Date Extracted:**	03/08/2012
Sample Matrix:	Water	**Date Analyzed:**	03/09/2012
		Time Analyzed:	00:59

Lab Control Sample Summary
Diesel and Residual Range Organics

Sample Name:	Lab Control Sample	**Instrument ID:**	GC21
Lab Code:	KWG1202421-3	**File ID:**	J:\GC21\DATA\030812B-NW\0308F045.D
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx	**Extraction Lot:**	KWG1202421

This Lab Control Sample applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Method Blank	KWG1202421-4	J:\GC21\DATA\030812B-NW\0308F047.D	03/09/12	01:21
SW10-002	K1201959-002	J:\GC21\DATA\030812B-NW\0308F053.D	03/09/12	02:27
SW10-002DUP	KWG1202421-2	J:\GC21\DATA\030812B-NW\0308F055.D	03/09/12	02:50
SW10-003	K1201959-003	J:\GC21\DATA\030812B-NW\0308F057.D	03/09/12	03:12
SW10-004	K1201959-004	J:\GC21\DATA\030812B-NW\0308F059.D	03/09/12	03:34
SW10-005	K1201959-005	J:\GC21\DATA\030812B-NW\0308F061.D	03/09/12	03:55
SW10-007	K1201959-007	J:\GC21\DATA\030812B-NW\0308F063.D	03/09/12	04:18
SW10-001	K1201959-001	J:\GC21\DATA\030812B-NW\0308F077.D	03/09/12	06:52
SW10-001DUP	KWG1202421-1	J:\GC21\DATA\030812B-NW\0308F079.D	03/09/12	07:13
SW10-006	K1201959-006	J:\GC21\DATA\030812B-NW\0308F083.D	03/09/12	07:57

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Level ID	File ID
A	J:\GC21\DATA\071111B-NW\0711F037.D
B	J:\GC21\DATA\071111B-NW\0711F039.D
C	J:\GC21\DATA\071111B-NW\0711F041.D
D	J:\GC21\DATA\071111B-NW\0711F043.D
E	J:\GC21\DATA\071111B-NW\0711F045.D
F	J:\GC21\DATA\071111B-NW\0711F047.D
G	J:\GC21\DATA\071111B-NW\0711F057.D
H	J:\GC21\DATA\071111B-NW\0711F059.D
J	J:\GC21\DATA\071111B-NW\0711F063.D
K	J:\GC21\DATA\071111B-NW\0711F065.D
L	J:\GC21\DATA\071111B-NW\0711F067.D
M	J:\GC21\DATA\071111B-NW\0711F069.D
N	J:\GC21\DATA\071111B-NW\0711F071.D
I	J:\GC21\DATA\071111B-NW\0711F061.D

Analyte Name	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF
Diesel Range Organics (DRO)							H	50	699	I	200	712	J	500	777
	K	2000	797	L	5000	768	M	20000	802	N	50000	809			
Residual Range Organics (RRO)				B	50	588	C	200	510	D	500	513	E	2000	500
	F	5000	545												
o-Terphenyl				G	1.0	988	H	2.5	1000	I	10	998	J	25	1040
	K	100	1100	L	250	1020									
n-Triacontane				G	1.0	803	H	2.5	840	I	10	840	J	25	875
	K	100	936	L	250	872									

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Analyte Name	Compound Type	Calibration Evaluation				
		Fit Type	Eval.	Eval. Result	Q	Control Criteria
Diesel Range Organics (DRO)	MS	AverageRF	% RSD	5.7		≤ 20
Residual Range Organics (RRO)	MS	AverageRF	% RSD	6.8		≤ 20
o-Terphenyl	SURR	AverageRF	% RSD	4.0		≤ 20
n-Triacontane	SURR	AverageRF	% RSD	5.3		≤ 20

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959
Calibration Date: 07/12/2011
Date Analyzed: 07/12/2011

Second Source Calibration Verification
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration ID: CAL10701
Units: ppm

File ID: J:\GC21\DATA\071111B-NW\0711F053.D
J:\GC21\DATA\071111B-NW\0711F073.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	SSV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	990	767	761	-1	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1100	531	562	6	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

† SPCC Compound

‡ CCC Compound

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959
Date Analyzed: 03/08/2012 - 03/09/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1202464
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\030812B-NW\0308F039.D
J:\GC21\DATA\030812B-NW\0308F041.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	802	5	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	960	531	511	-4	NA	± 15 %	AverageRF
o-Terphenyl	50	52	1030	1060	3	NA	± 15 %	AverageRF
n-Triacontane	50	52	861	903	5	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959
Date Analyzed: 03/09/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1202464
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\030812B-NW\0308F069.D
J:\GC21\DATA\030812B-NW\0308F071.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	767	844	10	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	960	531	510	-4	NA	± 15 %	AverageRF
o-Terphenyl	50	54	1030	1100	7	NA	± 15 %	AverageRF
n-Triacontane	50	54	861	931	8	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW10/54220

Service Request: K1201959
Date Analyzed: 03/09/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1202464
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\030812B-NW\0308F087.D
J:\GC21\DATA\030812B-NW\0308F089.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1100	767	806	5	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	980	531	519	-2	NA	± 15 %	AverageRF
o-Terphenyl	50	52	1030	1070	4	NA	± 15 %	AverageRF
n-Triacontane	50	54	861	928	8	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Battelle	**Service Request No.:**	K1202461
Project:	Non-dry Dock Stormwater SW11	**Date Received:**	3/17/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Eight water samples were received for analysis at Columbia Analytical Services on 3/17/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Diesel Range Organics by NWTPH-Dx

No anomalies associated with the analysis of these samples were observed.

Approved by Howard Holmes **Date** 4-1-12

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461

Cover Page - Organic Analysis Data Package
Diesel and Residual Range Organics

Sample Name	Lab Code	Date Collected	Date Received
SW11-001	K1202461-001	03/14/2012	03/17/2012
SW11-002	K1202461-002	03/14/2012	03/17/2012
SW11-003	K1202461-003	03/15/2012	03/17/2012
SW11-004	K1202461-004	03/15/2012	03/17/2012
SW11-005	K1202461-005	03/15/2012	03/17/2012
SW11-006	K1202461-006	03/15/2012	03/17/2012
SW11-007	K1202461-007	03/15/2012	03/17/2012
SW11-008	K1202461-008	03/15/2012	03/17/2012
SW11-001	KWG1202820-2	03/14/2012	03/17/2012

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: LISA HARRIS

Date: March 30, 2012 Title: Scientist

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202461
Project:	Non-dry Dock Stormwater SW11/54220 / 62375	**Date Collected:**	03/14/2012
Sample Matrix:	Storm water	**Date Received:**	03/17/2012

Diesel and Residual Range Organics

Sample Name:	SW11-001	**Units:**	ug/L
Lab Code:	K1202461-001	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**110**	J	270	12	1	03/19/12	03/22/12	KWG1202820	
Residual Range Organics (RRO)	**330**	J	530	20	1	03/19/12	03/22/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	03/22/12	Acceptable
n-Triacontane	77	50-150	03/22/12	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202461
Project:	Non-dry Dock Stormwater SW11/54220 / 62375	**Date Collected:**	03/14/2012
Sample Matrix:	Storm water	**Date Received:**	03/17/2012

Diesel and Residual Range Organics

Sample Name:	SW11-002	**Units:**	ug/L
Lab Code:	K1202461-002	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**130**	J	270	12	1	03/19/12	03/22/12	KWG1202820	
Residual Range Organics (RRO)	**250**	J	530	20	1	03/19/12	03/22/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	82	50-150	03/22/12	Acceptable
n-Triacontane	88	50-150	03/22/12	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202461
Project:	Non-dry Dock Stormwater SW11/54220 / 62375	**Date Collected:**	03/15/2012
Sample Matrix:	Storm water	**Date Received:**	03/17/2012

Diesel and Residual Range Organics

Sample Name:	SW11-003	**Units:**	ug/L
Lab Code:	K1202461-003	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**190**	J	290	13	1	03/19/12	03/22/12	KWG1202820	
Residual Range Organics (RRO)	**780**	Z	570	22	1	03/19/12	03/22/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	03/22/12	Acceptable
n-Triacontane	84	50-150	03/22/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Collected: 03/15/2012
Date Received: 03/17/2012

Diesel and Residual Range Organics

Sample Name: SW11-004
Lab Code: K1202461-004

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**110**	J	270	12	1	03/19/12	03/22/12	KWG1202820	
Residual Range Organics (RRO)	**330**	J	540	21	1	03/19/12	03/22/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	70	50-150	03/22/12	Acceptable
n-Triacontane	76	50-150	03/22/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Collected: 03/15/2012
Date Received: 03/17/2012

Diesel and Residual Range Organics

Sample Name: SW11-005
Lab Code: K1202461-005

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**390**	H	270	12	1	03/19/12	03/22/12	KWG1202820	
Residual Range Organics (RRO)	**1100**	O	530	20	1	03/19/12	03/22/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	78	50-150	03/22/12	Acceptable
n-Triacontane	84	50-150	03/22/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Collected: 03/15/2012
Date Received: 03/17/2012

Diesel and Residual Range Organics

Sample Name: SW11-006
Lab Code: K1202461-006

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**570**	H	280	12	1	03/19/12	03/23/12	KWG1202820	
Residual Range Organics (RRO)	**2500**	O	550	21	1	03/19/12	03/23/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	03/23/12	Acceptable
n-Triacontane	84	50-150	03/23/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Collected: 03/15/2012
Date Received: 03/17/2012

Diesel and Residual Range Organics

Sample Name: SW11-007
Lab Code: K1202461-007

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**600**	H	280	12	1	03/19/12	03/23/12	KWG1202820	
Residual Range Organics (RRO)	**2600**	O	550	21	1	03/19/12	03/23/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	81	50-150	03/23/12	Acceptable
n-Triacontane	89	50-150	03/23/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Collected: 03/15/2012
Date Received: 03/17/2012

Diesel and Residual Range Organics

Sample Name: SW11-008
Lab Code: K1202461-008

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	**350**	H	280	13	1	03/19/12	03/22/12	KWG1202820	
Residual Range Organics (RRO)	**1000**	O	560	22	1	03/19/12	03/22/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	76	50-150	03/22/12	Acceptable
n-Triacontane	83	50-150	03/22/12	Acceptable

Comments:

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202461
Project:	Non-dry Dock Stormwater SW11/54220 / 62375	**Date Collected:**	NA
Sample Matrix:	Storm water	**Date Received:**	NA

Diesel and Residual Range Organics

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG1202820-4	**Basis:**	NA
Extraction Method:	Method	**Level:**	Low
Analysis Method:	NWTPH-Dx		

Analyte Name	Result	Q	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Diesel Range Organics (DRO)	ND	U	250	11	1	03/19/12	03/21/12	KWG1202820	
Residual Range Organics (RRO)	**25**	J	500	19	1	03/19/12	03/21/12	KWG1202820	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
o-Terphenyl	83	50-150	03/21/12	Acceptable
n-Triacontane	90	50-150	03/21/12	Acceptable

Comments:

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Water

Service Request: K1202461

Surrogate Recovery Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
Batch QC	K1202250-001	80	89
SW11-001	K1202461-001	70	77
SW11-002	K1202461-002	82	88
SW11-003	K1202461-003	76	84
SW11-004	K1202461-004	70	76
SW11-005	K1202461-005	78	84
SW11-006	K1202461-006	76	84
SW11-007	K1202461-007	81	89
SW11-008	K1202461-008	76	83
Batch QCDUP	KWG1202820-1	80	89
SW11-001DUP	KWG1202820-2	75	82
Method Blank	KWG1202820-4	83	90
Lab Control Sample	KWG1202820-3	89	92

Surrogate Recovery Control Limits (%)

Sur1 = o-Terphenyl	50-150
Sur2 = n-Triacontane	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Water

Service Request: K1202461
Date Extracted: 03/19/2012
Date Analyzed: 03/22/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: Batch QC
Lab Code: K1202250-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1202820

Analyte Name	MRL	MDL	Sample Result	Batch QCDUP KWG1202820-1 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	260	12	97	110	100	9 #	30
Residual Range Organics (RRO)	520	20	87	96	91	9 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Extracted: 03/19/2012
Date Analyzed: 03/22/2012

Duplicate Sample Summary
Diesel and Residual Range Organics

Sample Name: SW11-001
Lab Code: K1202461-001

Units: ug/L
Basis: NA

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1202820

Analyte Name	MRL	MDL	Sample Result	SW11-001DUP KWG1202820-2 Duplicate Sample Result	Average	Relative Percent Difference	RPD Limit
Diesel Range Organics (DRO)	270	12	110	120	110	10 #	30
Residual Range Organics (RRO)	530	20	330	260	290	25 #	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Extracted: 03/19/2012
Date Analyzed: 03/21/2012

Lab Control Spike Summary
Diesel and Residual Range Organics

Extraction Method: Method
Analysis Method: NWTPH-Dx

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG1202820

Analyte Name	Lab Control Sample KWG1202820-3 Lab Control Spike Result	Expected	%Rec	%Rec Limits
Diesel Range Organics (DRO)	3320	3200	104	46-140
Residual Range Organics (RRO)	1520	1600	95	45-159

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Extracted: 03/19/2012
Date Analyzed: 03/21/2012
Time Analyzed: 23:37

Method Blank Summary
Diesel and Residual Range Organics

Sample Name: Method Blank
Lab Code: KWG1202820-4

Instrument ID: GC21
File ID: J:\GC21\DATA\032112B\0321F015.D

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1202820

This Method Blank applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Lab Control Sample	KWG1202820-3	J:\GC21\DATA\032112B\0321F013.D	03/21/12	23:15
Batch QC	K1202250-001	J:\GC21\DATA\032112B\0321F025.D	03/22/12	01:27
Batch QCDUP	KWG1202820-1	J:\GC21\DATA\032112B\0321F027.D	03/22/12	01:49
SW11-001	K1202461-001	J:\GC21\DATA\032112B\0321F045.D	03/22/12	05:06
SW11-001DUP	KWG1202820-2	J:\GC21\DATA\032112B\0321F047.D	03/22/12	05:28
SW11-002	K1202461-002	J:\GC21\DATA\032112B\0321F049.D	03/22/12	05:50
SW11-003	K1202461-003	J:\GC21\DATA\032112B\0321F051.D	03/22/12	06:12
SW11-004	K1202461-004	J:\GC21\DATA\032112B\0321F053.D	03/22/12	06:34
SW11-008	K1202461-008	J:\GC21\DATA\032112B\0321F067.D	03/22/12	09:08
SW11-005	K1202461-005	J:\GC21\DATA\032112B\0321F069.D	03/22/12	09:30
SW11-006	K1202461-006	J:\GC21\DATA\032212B\0322F047.D	03/23/12	02:06
SW11-007	K1202461-007	J:\GC21\DATA\032212B\0322F049.D	03/23/12	02:28

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375
Sample Matrix: Storm water

Service Request: K1202461
Date Extracted: 03/19/2012
Date Analyzed: 03/21/2012
Time Analyzed: 23:15

Lab Control Sample Summary
Diesel and Residual Range Organics

Sample Name: Lab Control Sample
Lab Code: KWG1202820-3

Instrument ID: GC21
File ID: J:\GC21\DATA\032112B\0321F013.D

Extraction Method: Method
Analysis Method: NWTPH-Dx

Level: Low
Extraction Lot: KWG1202820

This Lab Control Sample applies to the following analyses:

Sample Name	Lab Code	File ID	Date Analyzed	Time Analyzed
Method Blank	KWG1202820-4	J:\GC21\DATA\032112B\0321F015.D	03/21/12	23:37
Batch QC	K1202250-001	J:\GC21\DATA\032112B\0321F025.D	03/22/12	01:27
Batch QCDUP	KWG1202820-1	J:\GC21\DATA\032112B\0321F027.D	03/22/12	01:49
SW11-001	K1202461-001	J:\GC21\DATA\032112B\0321F045.D	03/22/12	05:06
SW11-001DUP	KWG1202820-2	J:\GC21\DATA\032112B\0321F047.D	03/22/12	05:28
SW11-002	K1202461-002	J:\GC21\DATA\032112B\0321F049.D	03/22/12	05:50
SW11-003	K1202461-003	J:\GC21\DATA\032112B\0321F051.D	03/22/12	06:12
SW11-004	K1202461-004	J:\GC21\DATA\032112B\0321F053.D	03/22/12	06:34
SW11-008	K1202461-008	J:\GC21\DATA\032112B\0321F067.D	03/22/12	09:08
SW11-005	K1202461-005	J:\GC21\DATA\032112B\0321F069.D	03/22/12	09:30
SW11-006	K1202461-006	J:\GC21\DATA\032212B\0322F047.D	03/23/12	02:06
SW11-007	K1202461-007	J:\GC21\DATA\032212B\0322F049.D	03/23/12	02:28

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Level ID	File ID
A	J:\GC21\DATA\071111B-NW\0711F037.D
B	J:\GC21\DATA\071111B-NW\0711F039.D
C	J:\GC21\DATA\071111B-NW\0711F041.D
D	J:\GC21\DATA\071111B-NW\0711F043.D
E	J:\GC21\DATA\071111B-NW\0711F045.D
F	J:\GC21\DATA\071111B-NW\0711F047.D
G	J:\GC21\DATA\071111B-NW\0711F057.D
H	J:\GC21\DATA\071111B-NW\0711F059.D

Level ID	File ID
I	J:\GC21\DATA\071111B-NW\0711F061.D
J	J:\GC21\DATA\071111B-NW\0711F063.D
K	J:\GC21\DATA\071111B-NW\0711F065.D
L	J:\GC21\DATA\071111B-NW\0711F067.D
M	J:\GC21\DATA\071111B-NW\0711F069.D
N	J:\GC21\DATA\071111B-NW\0711F071.D

Analyte Name	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF	Level ID	Amt	RF
Diesel Range Organics (DRO)							H	50	699	I	200	712	J	500	777
	K	2000	797	L	5000	768	M	20000	802	N	50000	809			
Residual Range Organics (RRO)				B	50	588	C	200	510	D	500	513	E	2000	500
	F	5000	545												
o-Terphenyl				G	1.0	988	H	2.5	1000	I	10	998	J	25	1040
	K	100	1100	L	250	1020									
n-Triacontane				G	1.0	803	H	2.5	840	I	10	840	J	25	875
	K	100	936	L	250	872									

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Calibration Date: 07/12/2011

Initial Calibration Summary
Diesel and Residual Range Organics

Calibration ID: CAL10701
Instrument ID: GC21

Column: ZB-1

Analyte Name	Compound Type	Calibration Evaluation				
		Fit Type	Eval.	Eval. Result	Q	Control Criteria
Diesel Range Organics (DRO)	MS	AverageRF	% RSD	5.7		≤ 20
Residual Range Organics (RRO)	MS	AverageRF	% RSD	6.8		≤ 20
o-Terphenyl	SURR	AverageRF	% RSD	4.0		≤ 20
n-Triacontane	SURR	AverageRF	% RSD	5.3		≤ 20

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Calibration Date: 07/12/2011
Date Analyzed: 07/12/2011

Second Source Calibration Verification
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration ID: CAL10701
Units: ppm

File ID: J:\GC21\DATA\071111B-NW\0711F053.D
J:\GC21\DATA\071111B-NW\0711F073.D

Column ID: ZB-1

Analyte Name	Expected	Result	Average RF	SSV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	990	767	761	-1	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	1100	531	562	6	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

† SPCC Compound ‡ CCC Compound

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Date Analyzed: 03/21/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1203223
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\032112B\0321F007.D
J:\GC21\DATA\032112B\0321F009.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	786	2	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	950	531	505	-5	NA	± 15 %	AverageRF
o-Terphenyl	50	51	1030	1040	1	NA	± 15 %	AverageRF
n-Triacontane	50	52	861	889	3	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Date Analyzed: 03/22/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1203223
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\032112B\0321F033.D
J:\GC21\DATA\032112B\0321F035.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	782	2	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	950	531	503	-5	NA	± 15 %	AverageRF
o-Terphenyl	50	50	1030	1040	1	NA	± 15 %	AverageRF
n-Triacontane	50	53	861	905	5	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Date Analyzed: 03/22/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1203223
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\032112B\0321F055.D
J:\GC21\DATA\032112B\0321F057.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	783	2	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	960	531	509	-4	NA	± 15 %	AverageRF
o-Terphenyl	50	50	1030	1040	1	NA	± 15 %	AverageRF
n-Triacontane	50	53	861	909	6	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202461
Project:	Non-dry Dock Stormwater SW11/54220 / 62375	**Date Analyzed:**	03/22/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type:	External Standard	**Calibration Date:**	07/12/2011
Analysis Method:	NWTPH-Dx	**Calibration ID:**	CAL10701
		Analysis Lot:	KWG1203223
		Units:	ppm
File ID:	J:\GC21\DATA\032112B\0321F071.D J:\GC21\DATA\032112B\0321F073.D	**Column ID:**	ZB-1

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	772	1	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	990	531	526	-1	NA	± 15 %	AverageRF
o-Terphenyl	50	50	1030	1020	0	NA	± 15 %	AverageRF
n-Triacontane	50	52	861	899	4	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Date Analyzed: 03/23/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1202964
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\032212B\0322F041.D
J:\GC21\DATA\032212B\0322F043.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	764	0	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	970	531	515	-3	NA	± 15 %	AverageRF
o-Terphenyl	50	49	1030	1010	-1	NA	± 15 %	AverageRF
n-Triacontane	50	52	861	896	4	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220 / 62375

Service Request: K1202461
Date Analyzed: 03/23/2012

Continuing Calibration Verification Summary
Diesel and Residual Range Organics

Calibration Type: External Standard
Analysis Method: NWTPH-Dx

Calibration Date: 07/12/2011
Calibration ID: CAL10701
Analysis Lot: KWG1202964
Units: ppm
Column ID: ZB-1

File ID: J:\GC21\DATA\032212B\0322F051.D
J:\GC21\DATA\032212B\0322F053.D

Analyte Name	Expected	Result	Average RF	CCV RF	%D	%Drift	Criteria	Curve Fit
Diesel Range Organics (DRO)	1000	1000	767	789	3	NA	± 15 %	AverageRF
Residual Range Organics (RRO)	1000	940	531	501	-6	NA	± 15 %	AverageRF
o-Terphenyl	50	51	1030	1040	1	NA	± 15 %	AverageRF
n-Triacontane	50	53	861	911	6	NA	± 15 %	AverageRF

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Battelle	**Service Request No.:**	K1202509
Project:	Non-dry Dock Stormwater SW11	**Date Received:**	3/20/12
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier IV validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Twenty-eight water samples were received for analysis at Columbia Analytical Services on 3/20/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

Approved by Howard Holmes **Date** 4-2-12

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project:	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
Analysis Method:	SM 2340 C	**Units:**	mg/L
		Basis:	NA

Hardness, Total as CaCO3

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW11-016	K1202509-001	**20.0**	2.0	0.8	1	03/28/12 09:00	
SW11-020	K1202509-005	**20.4**	2.0	0.8	1	03/28/12 09:00	
SW11-024	K1202509-009	**20.0**	2.0	0.8	1	03/28/12 09:00	
SW11-028	K1202509-013	**30.8**	2.0	0.8	1	03/28/12 09:00	
SW11-032	K1202509-017	**30.0**	2.0	0.8	1	03/28/12 09:00	
SW11-036	K1202509-021	**22.0**	2.0	0.8	1	03/28/12 09:00	
SW11-040	K1202509-025	**50.0**	2.0	0.8	1	03/28/12 09:00	
Method Blank	K1202509-MB	ND U	2.0	0.8	1	03/28/12 09:00	

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
		Date Analyzed:	03/28/12

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	SW11-032	**Units:**	mg/L
Lab Code:	K1202509-017	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K1202509-017DUP10 Result	Average	RPD	RPD Limit
Hardness, Total as CaCO3	SM 2340 C	2.0	0.8	30.0	30.4	30.2	1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000206369 rev 00

QA/QC Report

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220/62375
Sample Matrix: Water

Service Request: K1202509
Date Analyzed: 03/28/12

Lab Control Sample Summary
Hardness, Total as CaCO3

Analysis Method: SM 2340 C

Units: mg/L
Basis: NA
Analysis Lot: 285179

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1202509-LCS1	90.8	86.3	105	90-116

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project:	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
Analysis Method:	SM 2540 D	**Units:**	mg/L
		Basis:	NA

Solids, Total Suspended (TSS)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW11-019	K1202509-004	**39.0**	5.0	-	1	03/21/12 12:05	
SW11-023	K1202509-008	**44.0**	5.0	-	1	03/21/12 12:05	
SW11-027	K1202509-012	**19.5**	5.0	-	1	03/21/12 12:05	
SW11-031	K1202509-016	**20.5**	5.0	-	1	03/21/12 12:05	
SW11-035	K1202509-020	**16.0**	5.0	-	1	03/21/12 12:05	
SW11-039	K1202509-024	**20.5**	5.0	-	1	03/21/12 12:05	
SW11-043	K1202509-028	**27.5**	5.0	-	1	03/21/12 12:05	
Method Blank	K1202509-MB	ND U	5.0	-	1	03/21/12 12:05	

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	03/21/12

Replicate Sample Summary
General Chemistry Parameters

Sample Name:	Batch QC	**Units:**	mg/L
Lab Code:	K1202546-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	MDL	Sample Result	Duplicate Sample K1202546-001DUP23 Result	Average	RPD	RPD Limit
Solids, Total Suspended (TSS)	SM 2540 D	5.0	-	16.5	ND	NC	NC	10

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Superset Reference: 12-0000206369 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220/62375
Sample Matrix: Water

Service Request: K1202509
Date Analyzed: 03/21/12

Lab Control Sample Summary
Solids, Total Suspended (TSS)

Analysis Method: SM 2540 D

Units: mg/L
Basis: NA
Analysis Lot: 284358

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1202509-LCS1	300	305	98	85-111

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project:	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Carbon, Total Organic

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW11-017	K1202509-002	**1.62**	0.50	0.07	1	03/29/12 23:00	
SW11-021	K1202509-006	**1.82**	0.50	0.07	1	03/29/12 23:00	
SW11-025	K1202509-010	**1.26**	0.50	0.07	1	03/29/12 23:00	
SW11-029	K1202509-014	**1.28**	0.50	0.07	1	03/29/12 23:00	
SW11-033	K1202509-018	**3.75**	0.50	0.07	1	03/29/12 23:00	
SW11-037	K1202509-022	**1.71**	0.50	0.07	1	03/29/12 23:00	
SW11-041	K1202509-026	**1.93**	0.50	0.07	1	03/29/12 23:00	
Method Blank	K1202509-MB1	ND U	0.50	0.07	1	03/21/12 19:09	
Method Blank	K1202509-MB2	ND U	0.50	0.07	1	03/29/12 23:00	

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Duplicate Sample Summary
Carbon, Total Organic

Sample Name:	Lab Code:	LOQ	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
SW11-017	K1202509-002DUP2	0.50	0.07	1.62	1.67	1.65	3	10	03/21/12
SW11-017	K1202509-002DUP3	0.50	0.07	1.62	1.63	1.63	<1	10	03/29/12
SW11-021	K1202509-006DUP6	0.50	0.07	1.82	1.72	1.77	5	10	03/21/12
SW11-021	K1202509-006DUP7	0.50	0.07	1.82	1.76	1.79	3	10	03/29/12
SW11-025	K1202509-010DUP10	0.50	0.07	1.26	1.31	1.28	4	10	03/29/12
SW11-025	K1202509-010DUP9	0.50	0.07	1.26	1.32	1.29	5	10	03/21/12
SW11-029	K1202509-014DUP12	0.50	0.07	1.28	1.29	1.29	<1	10	03/21/12
SW11-029	K1202509-014DUP13	0.50	0.07	1.28	1.30	1.29	1	10	03/29/12
SW11-033	K1202509-018DUP16	2.5	0.4	3.75	3.7	3.74	<1	10	03/21/12
SW11-033	K1202509-018DUP17	0.50	0.07	3.75	3.85	3.80	3	10	03/29/12
SW11-037	K1202509-022DUP19	0.50	0.07	1.71	1.60	1.65	7	10	03/21/12
SW11-037	K1202509-022DUP20	0.50	0.07	1.71	1.63	1.67	5	10	03/29/12
SW11-041	K1202509-026DUP22	0.50	0.07	1.93	1.78	1.85	8	10	03/21/12
SW11-041	K1202509-026DUP23	0.50	0.07	1.93	1.98	1.96	3	10	03/29/12

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QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project:	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
		Date Analyzed:	03/29/12

Matrix Spike Summary
Carbon, Total Organic

Sample Name:	SW11-017	**Units:**	mg/L
Lab Code:	K1202509-002	**Basis:**	NA
Analysis Method:	SM 5310 C		

Matrix Spike
K1202509-002MS1

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Total Organic	1.62	26.8	25.0	101	60-134

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Superset Reference: 12-0000206369 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220/62375
Sample Matrix: Water

Service Request: K1202509
Date Analyzed: 03/21/12

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 284408

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1202509-LCS1	18.9	22.7	83 *	87-112
Lab Control Sample	K1202509-LCS2	22.3	22.7	98	87-112

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220/62375
Sample Matrix: Water

Service Request: K1202509
Date Analyzed: 03/29/12

Lab Control Sample Summary
Carbon, Total Organic

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 285428

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1202509-LCS3	22.5	22.7	99	87-112

Client: Battelle Marine Sciences Lab **Service Request:** K1202509
Project: Non-dry Dock Stormwater SW11/54220/62375

Continuing Calibration Verification (CCV) Summary

Carbon, Total Organic

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	284408	KQ1202921-20	03/21/12 19:09	25.0	24.7	99	90-110
CCV2	284408	KQ1202921-21	03/21/12 19:09	25.0	24.4	98	90-110
CCV3	284408	KQ1202921-22	03/21/12 19:09	25.0	24.5	98	90-110
CCV4	284408	KQ1202921-27	03/21/12 19:09	25.0	24.6	99	90-110
CCV5	285428	KQ1203306-19	03/29/12 23:00	25.0	24.9	100	90-110
CCV6	285428	KQ1203306-20	03/29/12 23:00	25.0	24.9	100	90-110
CCV7	285428	KQ1203306-21	03/29/12 23:00	25.0	24.8	99	90-110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220/62375

Service Request: K1202509

Continuing Calibration Blank (CCB) Summary
Carbon, Total Organic

Analysis Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	284408	KQ1202921-23.R01	03/21/12 19:09	0.50	0.07	0.13	J
CCB2	284408	KQ1202921-24.R01	03/21/12 19:09	0.50	0.07	ND	U
CCB3	284408	KQ1202921-25.R01	03/21/12 19:09	0.50	0.07	0.09	J
CCB4	284408	KQ1202921-28.R01	03/21/12 19:09	0.50	0.07	ND	U
CCB5	285428	KQ1203306-22	03/29/12 23:00	0.50	0.07	ND	U
CCB6	285428	KQ1203306-23	03/29/12 23:00	0.50	0.07	ND	U
CCB7	285428	KQ1203306-24	03/29/12 23:00	0.50	0.07	ND	U

Analytical Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project:	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Carbon, Dissolved Organic (DOC)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
SW11-018	K1202509-003	**1.57**	0.50	0.07	1	03/21/12 19:09	
SW11-022	K1202509-007	**1.64**	0.50	0.07	1	03/21/12 19:09	
SW11-026	K1202509-011	**1.84**	0.50	0.07	1	03/21/12 19:09	
SW11-030	K1202509-015	**1.26**	0.50	0.07	1	03/21/12 19:09	
SW11-034	K1202509-019	**4.22**	0.50	0.07	1	03/21/12 19:09	
SW11-038	K1202509-023	**1.56**	0.50	0.07	1	03/21/12 19:09	
SW11-042	K1202509-027	**1.20**	0.50	0.07	1	03/21/12 19:09	
Method Blank	K1202509-MB	ND U	0.50	0.07	1	03/21/12 19:09	

COLUMBIA ANALYTICAL SERVICES, INC.

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QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
Analysis Method:	SM 5310 C	**Units:**	mg/L
		Basis:	NA

Duplicate Sample Summary
Carbon, Dissolved Organic (DOC)

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
SW11-018	K1202509-003DUP3	0.50	0.07	1.57	1.58	1.57	<1	10	03/21/12
SW11-022	K1202509-007DUP5	0.50	0.07	1.64	1.54	1.59	7	10	03/21/12
SW11-026	K1202509-011DUP7	0.50	0.07	1.84	1.84	1.84	<1	10	03/21/12
SW11-030	K1202509-015DUP9	0.50	0.07	1.26	1.21	1.24	4	10	03/21/12
SW11-034	K1202509-019DUP12	0.50	0.07	4.22	4.32	4.27	2	10	03/21/12
SW11-038	K1202509-023DUP14	0.50	0.07	1.56	1.51	1.53	3	10	03/21/12
SW11-042	K1202509-027DUP16	0.50	0.07	1.20	1.24	1.22	3	10	03/21/12

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Superset Reference: 12-0000206369 rev 00

QA/QC Report

Client:	Battelle Marine Sciences Lab	**Service Request:**	K1202509
Project:	Non-dry Dock Stormwater SW11/54220/62375	**Date Collected:**	03/15/12
Sample Matrix:	Water	**Date Received:**	03/20/12
		Date Analyzed:	03/21/12

Matrix Spike Summary
Carbon, Dissolved Organic (DOC)

Sample Name:	SW11-018	**Units:**	mg/L
Lab Code:	K1202509-003	**Basis:**	NA
Analysis Method:	SM 5310 C		

Matrix Spike
K1202509-003MS1

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Carbon, Dissolved Organic (DOC)	1.57	26.2	25.0	98	60-134

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Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Superset Reference: 12-0000206369 rev 00

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220/62375
Sample Matrix: Water

Service Request: K1202509
Date Analyzed: 03/21/12

Lab Control Sample Summary
Carbon, Dissolved Organic (DOC)

Analysis Method: SM 5310 C

Units: mg/L
Basis: NA
Analysis Lot: 284409

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1202509-LCS1	22.4	22.7	99	87-112

Client: Battelle Marine Sciences Lab **Service Request:** K1202509
Project: Non-dry Dock Stormwater SW11/54220/62375

Continuing Calibration Verification (CCV) Summary

Carbon, Dissolved Organic (DOC)

Analysis Method: SM 5310 C **Units:** mg/L

	Analysis Lot	Lab Code	Date Analyzed	True Value	Measured Value	Percent Recovery	Acceptance Limits
CCV1	284409	KQ1202922-11	03/21/12 19:09	25.0	24.7	99	90-110
CCV2	284409	KQ1202922-12	03/21/12 19:09	25.0	24.4	98	90-110
CCV3	284409	KQ1202922-13	03/21/12 19:09	25.0	24.5	98	90-110
CCV4	284409	KQ1202922-14	03/21/12 19:09	25.0	24.6	99	90-110

Client: Battelle Marine Sciences Lab
Project: Non-dry Dock Stormwater SW11/54220/62375

Service Request: K1202509

Continuing Calibration Blank (CCB) Summary
Carbon, Dissolved Organic (DOC)

Analysis Method: SM 5310 C

Units: mg/L

	Analysis Lot	Lab Code	Date Analyzed	MRL	MDL	Result	Q
CCB1	284409	KQ1202922-15	03/21/12 19:09	0.50	0.07	0.13	J
CCB2	284409	KQ1202922-16	03/21/12 19:09	0.50	0.07	ND	U
CCB3	284409	KQ1202922-17	03/21/12 19:09	0.50	0.07	0.09	J
CCB4	284409	KQ1202922-18	03/21/12 19:09	0.50	0.07	ND	U

Analytical Chemistry Data Package

Project: Non-Dry Dock Stormwater SW12 Bonus Storm (April 2012) Chemical Analyses

Battelle Project No. 54220/62375
CF No. 3174

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, WA 98382
PM: Jill Brandenberger
(360) 681-4564

CHEMISTRY ANALYSIS
DATA PACKAGE CONTENTS

Non-Dry Dock Stormwater
SW12 Bonus Storm (April 2012)
Chemical Analyses

Analytical raw data available upon request

BATTELLE MARINE SCIENCE LABORATORIES
1529 West Sequim Bay Road
Sequim, Washington 98382-9099
360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	Collection Date	Used in Comp	**Conductivity**	**Turbidity**	**TSS**	**OC**	**OC**	
					Instrument:			*Probe (µS/cm)*	*Probe (NTU)*	mg/L	HTCO (mg/L)	HTCO (µM)	
Laboratory Achieved Detection Limits (Seawater)										0.49	0.030	2.5	
Seawater Reporting Limit (MDL* 3.18)											0.095	8.0	
Laboratory Achieved Detection Limits (Freshwater)										0.49	0.030	2.5	
Freshwater Reporting Limit (MDL* 3.18)											0.095	8.0	
SW12													
SW12-001	PSNS015-1	Total	composite_time	Freshwater	3174-133	04/20/12	Y	1200	42	41.8	--	--	
SW12-001	PSNS015-1	Diss	composite_time	Freshwater	3174-134	04/20/12	--	--	--	--	4.01	334	
SW12-002	PSNS015-2	Total	composite_time	Freshwater	3174-135	04/20/12	Y	70	25	23.3	--	--	
SW12-002	PSNS015-2	Diss	composite_time	Freshwater	3174-136	04/20/12	--	--	--	--	3.47	289	
SW12-003	PSNS015-3	Total	composite_time	Freshwater	3174-137	04/20/12	Y	42	16	14.6	--	--	
SW12-003	PSNS015-3	Diss	composite_time	Freshwater	3174-138	04/20/12	--	--	--	--	3.71	309	E
SW12-004	PSNS015-4	Total	composite_time	Freshwater	3174-139	04/20/12	Y	67	17	11.9	--	--	
SW12-004	PSNS015-4	Diss	composite_time	Freshwater	3174-140	04/20/12	--	--	--	--	3.27	273	
SW12-005	PSNS015-5	Total	composite_time	Freshwater	3174-141	04/20/12	Y	168	20	58.3	--	--	
SW12-005	PSNS015-5	Diss	composite_time	Freshwater	3174-142	04/20/12	--	--	--	--	4.67	389	E
SW12-006	PSNS015-6	Total	composite_time	Freshwater	3174-143	04/20/12	Y	304	18	13.8	--	--	
SW12-006	PSNS015-6	Diss	composite_time	Freshwater	3174-144	04/20/12	--	--	--	--	3.10	258	
SW12-007	PSNS015-7	Total	composite_time	Freshwater	3174-145	04/20/12	Y	417	9	3.34	--	--	
SW12-007	PSNS015-7	Diss	composite_time	Freshwater	3174-146	04/20/12	--	--	--	--	4.55	379	E
SW12-008	PSNS015-8	Total	composite_time	Freshwater	3174-147	04/20/12	Y	228	13	6.34	--	--	
SW12-008	PSNS015-8	Diss	composite_time	Freshwater	3174-148	04/20/12	--	--	--	--	3.22	268	
SW12-009	PSNS015-9	Total	composite_time	Freshwater	3174-149	04/20/12	Y	581	11	5.70	--	--	
SW12-009	PSNS015-9	Diss	composite_time	Freshwater	3174-150	04/20/12	--	--	--	--	3.27	272	
SW12-010	PSNS015-10	Total	composite_time	Seawater	3174-151	04/20/12	N	8300	10	10.6	--	--	
SW12-010	PSNS015-10	Diss	composite_time	Seawater	3174-152	04/20/12	--	--	--	--	3.12	260	
SW12-011	PSNS015-11	Total	composite_time	Seawater	3174-153	04/20/12	N	40100	6	6.57	--	--	
SW12-011	PSNS015-11	Diss	composite_time	Seawater	3174-154	04/20/12	--	--	--	--	1.87	155	
SW12-012	PSNS015-12	Total	composite_time	Seawater	3174-155	04/20/12	N	42350	4	4.14	--	--	
SW12-012	PSNS015-12	Diss	composite_time	Seawater	3174-156	04/20/12	--	--	--	--	1.36	113	
SW12-013	PSNS015-13	Total	composite_time	Seawater	3174-157	04/20/12	N	15750	8	1.90	--	--	
SW12-013	PSNS015-13	Diss	composite_time	Seawater	3174-158	04/20/12	--	--	--	--	2.96	247	
SW12-014	PSNS015-14	Total	composite_time	Freshwater	3174-159	04/20/12	Y	1065	10	2.95	--	--	
SW12-014	PSNS015-14	Diss	composite_time	Freshwater	3174-160	04/20/12	--	--	--	--	3.14	262	

BATTELLE MARINE SCIENCE LABORATORIES
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360/681-4564

Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	**Hg**	**As**	**Ag**	**Al**	**Cd**
					Instrument:	*CVAF*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Seawater)						0.0001	NA	**0.0042**	**2.14**	**0.00110**
Seawater Reporting Limit (MDL* 3.18)						0.00032	NA	**0.013**	**6.8**	**0.0035**
Laboratory Achieved Detection Limits (Freshwater)						0.0001	0.03	0.002	0.3	0.004
Freshwater Reporting Limit (MDL* 3.18)						0.0003	0.1	0.006	1.0	0.01
SW12										
SW12-001	PSNS015-1	Total	composite_time	Freshwater	3174-133	0.0197	1.85	0.0296	1040	0.117
SW12-001	PSNS015-1	Diss	composite_time	Freshwater	3174-134	0.00340	1.55	0.00369 J	25.6	0.0569
SW12-002	PSNS015-2	Total	composite_time	Freshwater	3174-135	0.0119	0.513	0.0192	571	0.0594
SW12-002	PSNS015-2	Diss	composite_time	Freshwater	3174-136	0.00304	0.366	0.002 U	31.8	0.0183
SW12-003	PSNS015-3	Total	composite_time	Freshwater	3174-137	0.0137	0.454	0.0138	409	0.0459
SW12-003	PSNS015-3	Diss	composite_time	Freshwater	3174-138	0.00258	0.370	0.00311 J	27.8	0.0146
SW12-004	PSNS015-4	Total	composite_time	Freshwater	3174-139	0.0396	0.504	0.0331	329	0.0453
SW12-004	PSNS015-4	Diss	composite_time	Freshwater	3174-140	0.00371	0.394	0.00241 J	26.2	0.0260
SW12-005	PSNS015-5	Total	composite_time	Freshwater	3174-141	0.0478	0.707	0.0433	507	0.0588
SW12-005	PSNS015-5	Diss	composite_time	Freshwater	3174-142	0.00434	0.508	0.00249 J	24.4	0.0198
SW12-006	PSNS015-6	Total	composite_time	Freshwater	3174-143	0.0257	0.760	0.0241	380	0.0722
SW12-006	PSNS015-6	Diss	composite_time	Freshwater	3174-144	0.00309	0.677	0.00448 J	22.7	0.0261
SW12-007	PSNS015-7	Total	composite_time	Freshwater	3174-145	0.0129	0.923	0.0144	243	0.0378
SW12-007	PSNS015-7	Diss	composite_time	Freshwater	3174-146	0.00527	0.848	0.00427 J	33.9	0.0284
SW12-008	PSNS015-8	Total	composite_time	Freshwater	3174-147	0.0103	0.678	0.0148	284	0.0463
SW12-008	PSNS015-8	Diss	composite_time	Freshwater	3174-148	0.00343	0.649	0.00474 J	46.2	0.0314
SW12-009	PSNS015-9	Total	composite_time	Freshwater	3174-149	0.0142	1.15	0.0133	265	0.0408
SW12-009	PSNS015-9	Diss	composite_time	Freshwater	3174-150	0.00529	1.08	0.00531 J	43.2	0.0332
SW12-010	PSNS015-10	Total	composite_time	Seawater	3174-151	0.0219	NA	0.0512 b	171 b	0.0962 b
SW12-010	PSNS015-10	Diss	composite_time	Seawater	3174-152	0.00497	NA	0.00526 Jb	11.5 b	0.0732 b
SW12-011	PSNS015-11	Total	composite_time	Seawater	3174-153	0.0173	NA	0.0225 b	111 b	0.224 b
SW12-011	PSNS015-11	Diss	composite_time	Seawater	3174-154	0.00237	NA	0.0042 Ub	5.25 Jb	0.204 b
SW12-012	PSNS015-12	Total	composite_time	Seawater	3174-155	0.0101	NA	0.0122 Jb	90.9 b	0.141 b
SW12-012	PSNS015-12	Diss	composite_time	Seawater	3174-156	0.00131	NA	0.0042 Ub	4.11 Jb	0.128 b
SW12-013	PSNS015-13	Total	composite_time	Seawater	3174-157	0.0143	NA	0.0204 b	184 b	0.128 b
SW12-013	PSNS015-13	Diss	composite_time	Seawater	3174-158	0.00549	NA	0.00519 Jb	12.7 b	0.120 b
SW12-014	PSNS015-14	Total	composite_time	Freshwater	3174-159	0.0140	1.22	0.0125	260	0.0382
SW12-014	PSNS015-14	Diss	composite_time	Freshwater	3174-160	0.00525	1.19	0.00493 J	28.5	0.0301

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	**Cr**	**Cu**	**Pb**	**Zn**
					Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Seawater)						**0.0293**	**0.0351**	**0.0019**	**0.0263**
Seawater Reporting Limit (MDL* 3.18)						**0.093**	**0.11**	**0.0060**	**0.084**
Laboratory Achieved Detection Limits (Freshwater)						0.08	0.007	0.002	0.05
Freshwater Reporting Limit (MDL* 3.18)						0.3	0.02	0.006	0.2
SW12									
SW12-001	PSNS015-1	Total	composite_time	Freshwater	3174-133	2.69	17.4	14.4	76.2
SW12-001	PSNS015-1	Diss	composite_time	Freshwater	3174-134	0.949	7.43	0.872	43.7
SW12-002	PSNS015-2	Total	composite_time	Freshwater	3174-135	1.61	12.3	9.77	62.6
SW12-002	PSNS015-2	Diss	composite_time	Freshwater	3174-136	0.746	6.02	1.18	34.2
SW12-003	PSNS015-3	Total	composite_time	Freshwater	3174-137	1.28	9.88	9.39	57.1
SW12-003	PSNS015-3	Diss	composite_time	Freshwater	3174-138	0.715	5.77	1.54	37.5
SW12-004	PSNS015-4	Total	composite_time	Freshwater	3174-139	1.36	11.2	9.73	70.6
SW12-004	PSNS015-4	Diss	composite_time	Freshwater	3174-140	0.801	7.18	2.28	52.5
SW12-005	PSNS015-5	Total	composite_time	Freshwater	3174-141	1.93	14.8	12.3	84.8
SW12-005	PSNS015-5	Diss	composite_time	Freshwater	3174-142	0.782	7.38	1.67	54.0
SW12-006	PSNS015-6	Total	composite_time	Freshwater	3174-143	1.60	12.6	9.75	76.1
SW12-006	PSNS015-6	Diss	composite_time	Freshwater	3174-144	0.950	7.08	1.84	51.8
SW12-007	PSNS015-7	Total	composite_time	Freshwater	3174-145	1.73	9.47	6.12	64.4
SW12-007	PSNS015-7	Diss	composite_time	Freshwater	3174-146	1.39	7.13	2.22	55.6
SW12-008	PSNS015-8	Total	composite_time	Freshwater	3174-147	1.63	10.1	7.06	92.8
SW12-008	PSNS015-8	Diss	composite_time	Freshwater	3174-148	1.21	7.22	2.32	79.2
SW12-009	PSNS015-9	Total	composite_time	Freshwater	3174-149	1.87	9.67	6.45	82.1
SW12-009	PSNS015-9	Diss	composite_time	Freshwater	3174-150	1.40	7.32	2.18	72.2
SW12-010	PSNS015-10	Total	composite_time	Seawater	3174-151	1.37 b	8.95 b	6.43 b	92.0 b
SW12-010	PSNS015-10	Diss	composite_time	Seawater	3174-152	0.698 b	4.49 b	1.49 b	71.0 b
SW12-011	PSNS015-11	Total	composite_time	Seawater	3174-153	0.420 b	3.49 b	2.70 b	70.5 b
SW12-011	PSNS015-11	Diss	composite_time	Seawater	3174-154	0.119 b	1.68 b	0.470 b	65.1 b
SW12-012	PSNS015-12	Total	composite_time	Seawater	3174-155	0.378 b	2.87 b	1.91 b	32.8 b
SW12-012	PSNS015-12	Diss	composite_time	Seawater	3174-156	0.138 b	1.41 b	0.301 b	30.3 b
SW12-013	PSNS015-13	Total	composite_time	Seawater	3174-157	0.968 b	7.73 b	5.07 b	83.3 b
SW12-013	PSNS015-13	Diss	composite_time	Seawater	3174-158	0.694 b	5.45 b	1.34 b	79.4 b
SW12-014	PSNS015-14	Total	composite_time	Freshwater	3174-159	1.39	10.7	6.08	69.9
SW12-014	PSNS015-14	Diss	composite_time	Freshwater	3174-160	1.02	8.06	1.79	61.7

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	CVAF Batch ID	ICP-MS Batch ID	TSS Nucleopore	HTCO
					Instrument:				
Laboratory Achieved Detection Limits (Seawater)									
Seawater Reporting Limit (MDL* 3.18)									
Laboratory Achieved Detection Limits (Freshwater)									
Freshwater Reporting Limit (MDL* 3.18)									
SW12									
SW12-001	PSNS015-1	Total	composite_time	Freshwater	3174-133	060612HGA	061112-6100	042712TSS	
SW12-001	PSNS015-1	Diss	composite_time	Freshwater	3174-134	060612HGA	061112-6100		DOC061912
SW12-002	PSNS015-2	Total	composite_time	Freshwater	3174-135	060612HGA	061112-6100	042712TSS	
SW12-002	PSNS015-2	Diss	composite_time	Freshwater	3174-136	060612HGA	061112-6100		DOC061912
SW12-003	PSNS015-3	Total	composite_time	Freshwater	3174-137	060612HGA	061112-6100	042712TSS	
SW12-003	PSNS015-3	Diss	composite_time	Freshwater	3174-138	060612HGA	061112-6100		DOC061512
SW12-004	PSNS015-4	Total	composite_time	Freshwater	3174-139	060612HGA	061112-6100	042712TSS	
SW12-004	PSNS015-4	Diss	composite_time	Freshwater	3174-140	060612HGA	061112-6100		DOC061512
SW12-005	PSNS015-5	Total	composite_time	Freshwater	3174-141	060612HGA	061112-6100	042712TSS	
SW12-005	PSNS015-5	Diss	composite_time	Freshwater	3174-142	060612HGA	061112-6100		DOC061612
SW12-006	PSNS015-6	Total	composite_time	Freshwater	3174-143	060612HGA	061112-6100	042712TSS	
SW12-006	PSNS015-6	Diss	composite_time	Freshwater	3174-144	060612HGA	061112-6100		DOC061512
SW12-007	PSNS015-7	Total	composite_time	Freshwater	3174-145	060612HGA	061112-6100	042712TSS	
SW12-007	PSNS015-7	Diss	composite_time	Freshwater	3174-146	060612HGA	061112-6100		DOC061612
SW12-008	PSNS015-8	Total	composite_time	Freshwater	3174-147	060612HGA	061112-6100	042712TSS	
SW12-008	PSNS015-8	Diss	composite_time	Freshwater	3174-148	060612HGA	061112-6100		DOC061512
SW12-009	PSNS015-9	Total	composite_time	Freshwater	3174-149	060612HGA	061112-6100	042712TSS	
SW12-009	PSNS015-9	Diss	composite_time	Freshwater	3174-150	060612HGA	061112-6100		DOC061912
SW12-010	PSNS015-10	Total	composite_time	Seawater	3174-151	060612HGA	062712-6100	042712TSS	
SW12-010	PSNS015-10	Diss	composite_time	Seawater	3174-152	060612HGA	062712-6100		DOC061512
SW12-011	PSNS015-11	Total	composite_time	Seawater	3174-153	061212HGA	062712-6100	042712TSS	
SW12-011	PSNS015-11	Diss	composite_time	Seawater	3174-154	061212HGA	062712-6100		DOC061512
SW12-012	PSNS015-12	Total	composite_time	Seawater	3174-155	061212HGA	062712-6100	042712TSS	
SW12-012	PSNS015-12	Diss	composite_time	Seawater	3174-156	061212HGA	062712-6100		DOC061512
SW12-013	PSNS015-13	Total	composite_time	Seawater	3174-157	061212HGA	062712-6100	042712TSS	
SW12-013	PSNS015-13	Diss	composite_time	Seawater	3174-158	061212HGA	062712-6100		DOC061512
SW12-014	PSNS015-14	Total	composite_time	Freshwater	3174-159	061212HGA	061112-6100	042712TSS	
SW12-014	PSNS015-14	Diss	composite_time	Freshwater	3174-160	061212HGA	061112-6100		DOC061512

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	Collection Date	Used in Comp	**Conductivity**	**Turbidity**	**TSS**	**OC**	**OC**	
					Instrument:			*Probe (µS/cm)*	*Probe (NTU)*	mg/L	HTCO (mg/L)	HTCO (µM)	
Laboratory Achieved Detection Limits (Seawater)										0.49	0.030	2.5	
Seawater Reporting Limit (MDL* 3.18)											0.095	8.0	
Laboratory Achieved Detection Limits (Freshwater)										0.49	0.030	2.5	
Freshwater Reporting Limit (MDL* 3.18)											0.095	8.0	
SW12-015	PSNS015-15	Total	composite_time	Freshwater	3174-161	04/20/12	Y	311	8	5.57	--	--	
SW12-015	PSNS015-15	Diss	composite_time	Freshwater	3174-162	04/20/12	--	--	--	--	3.44	287	E
SW12-016	PSNS015-16	Total	composite_time	Freshwater	3174-163	04/20/12	Y	236	33	181	--	--	
SW12-016	PSNS015-16	Diss	composite_time	Freshwater	3174-164	04/20/12	--	--	--	--	1.65	137	
SW12-017	PSNS015-17	Total	composite_time	Freshwater	3174-165	04/20/12	Y	158	12	8.41	--	--	
SW12-017	PSNS015-17	Diss	composite_time	Freshwater	3174-166	04/20/12	--	--	--	--	3.45	287	E
SW12-018	PSNS015-18	Total	composite_time	Freshwater	3174-167	04/20/12	Y	186	9	8.90	--	--	
SW12-018	PSNS015-18	Diss	composite_time	Freshwater	3174-168	04/20/12	--	--	--	--	4.38	365	E
SW12-020	PSNS015-COMP	Total	Composite_equal_time	Freshwater	3174-169	04/20/12	--	338	17	60.3	--	--	
SW12-020	PSNS015-COMP	Diss	Composite_equal_time	Freshwater	3174-170	04/20/12	--	--	--	--	3.07	255	

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	**Hg**	**As**	**Ag**	**Al**	**Cd**
					Instrument:	*CVAF*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Seawater)						0.0001	NA	**0.0042**	**2.14**	**0.00110**
Seawater Reporting Limit (MDL* 3.18)						0.00032	NA	**0.013**	**6.8**	**0.0035**
Laboratory Achieved Detection Limits (Freshwater)						0.0001	0.03	0.002	0.3	0.004
Freshwater Reporting Limit (MDL* 3.18)						0.0003	0.1	0.006	1.0	0.01
SW12-015	PSNS015-15	Total	composite_time	Freshwater	3174-161	0.0124	0.709	0.0118	158	0.0394
SW12-015	PSNS015-15	Diss	composite_time	Freshwater	3174-162	0.00283	0.673	0.00332 J	22.0	0.0329
SW12-016	PSNS015-16	Total	composite_time	Freshwater	3174-163	0.271	1.41	0.129	1480	0.125
SW12-016	PSNS015-16	Diss	composite_time	Freshwater	3174-164	0.0130	0.725	0.002 U	16.6	0.0200
SW12-017	PSNS015-17	Total	composite_time	Freshwater	3174-165	0.0284	0.667	0.0242	189	0.0434
SW12-017	PSNS015-17	Diss	composite_time	Freshwater	3174-166	0.00835	0.600	0.00926	36.0	0.0279
SW12-018	PSNS015-18	Total	composite_time	Freshwater	3174-167	0.0126	0.661	0.0220	143	0.0470
SW12-018	PSNS015-18	Diss	composite_time	Freshwater	3174-168	0.00723	0.626	0.0103	34.1	0.0282
SW12-020	PSNS015-COMP	Total	Composite_equal_time	Freshwater	3174-169	0.0462	1.01	0.0445	592	0.0610
SW12-020	PSNS015-COMP	Diss	Composite_equal_time	Freshwater	3174-170	0.00398	0.812	0.00468 J	26.4	0.0277

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	**Cr**	**Cu**	**Pb**	**Zn**
					Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*
Laboratory Achieved Detection Limits (Seawater)						**0.0293**	**0.0351**	**0.0019**	**0.0263**
Seawater Reporting Limit (MDL* 3.18)						**0.093**	**0.11**	**0.0060**	**0.084**
Laboratory Achieved Detection Limits (Freshwater)						0.08	0.007	0.002	0.05
Freshwater Reporting Limit (MDL* 3.18)						0.3	0.02	0.006	0.2
SW12-015	PSNS015-15	Total	composite_time	Freshwater	3174-161	0.970	8.95	8.34	98.5
SW12-015	PSNS015-15	Diss	composite_time	Freshwater	3174-162	0.774	6.71	3.55	87.6
SW12-016	PSNS015-16	Total	composite_time	Freshwater	3174-163	3.38	28.5	22.5	108
SW12-016	PSNS015-16	Diss	composite_time	Freshwater	3174-164	0.411	2.96	0.350	22.1
SW12-017	PSNS015-17	Total	composite_time	Freshwater	3174-165	0.971	8.69	5.40	80.7
SW12-017	PSNS015-17	Diss	composite_time	Freshwater	3174-166	0.687	6.07	1.58	65.7
SW12-018	PSNS015-18	Total	composite_time	Freshwater	3174-167	1.06	10.0	5.70	80.7
SW12-018	PSNS015-18	Diss	composite_time	Freshwater	3174-168	0.740	7.51	2.29	68.0
SW12-020	PSNS015-COMP	Total	Composite_equal_time	Freshwater	3174-169	2.32	14.4	12.0	78.4
SW12-020	PSNS015-COMP	Diss	Composite_equal_time	Freshwater	3174-170	0.888	6.89	1.55	48.7

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water

Sample ID - Metals	Station Code	Fraction Total/Diss	Type Name	Matrix	MSL Code	CVAF Batch ID	ICP-MS Batch ID	TSS Nucleopore	HTCO
					Instrument:				
Laboratory Achieved Detection Limits (Seawater)									
Seawater Reporting Limit (MDL* 3.18)									
Laboratory Achieved Detection Limits (Freshwater)									
Freshwater Reporting Limit (MDL* 3.18)									
SW12-015	PSNS015-15	Total	composite_time	Freshwater	3174-161	061212HGA	061112-6100	042712TSS	
SW12-015	PSNS015-15	Diss	composite_time	Freshwater	3174-162	061212HGA	061112-6100		DOC061612
SW12-016	PSNS015-16	Total	composite_time	Freshwater	3174-163	061212HGA	061112-6100	042712TSS	
SW12-016	PSNS015-16	Diss	composite_time	Freshwater	3174-164	061212HGA	061112-6100		DOC061512
SW12-017	PSNS015-17	Total	composite_time	Freshwater	3174-165	061212HGA	061112-6100	042712TSS	
SW12-017	PSNS015-17	Diss	composite_time	Freshwater	3174-166	061212HGA	061112-6100		DOC061612
SW12-018	PSNS015-18	Total	composite_time	Freshwater	3174-167	061212HGA	061112-6100	042712TSS	
SW12-018	PSNS015-18	Diss	composite_time	Freshwater	3174-168	061212HGA	061112-6100		DOC061612
SW12-020	PSNS015-COMP	Total	Composite_equal_time	Freshwater	3174-169	061212HGA	061112-6100	042712TSS	
SW12-020	PSNS015-COMP	Diss	Composite_equal_time	Freshwater	3174-170	061212HGA	061112-6100		DOC061512

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	Matrix	MSL Code	As	Ag	Al	Cd	Cr	Cu	Pb	Zn	ICP-MS Batch ID
					Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	
Laboratory Achieved Detection Limits (Seawater)						NA	**0.0042**	**2.14**	**0.00110**	**0.0293**	**0.0351**	**0.0019**	**0.0263**	
Seawater Reporting Limit (MDL* 3.18)						NA	**0.013**	**6.8**	**0.0035**	**0.093**	**0.11**	**0.0060**	**0.084**	
Laboratory Achieved Detection Limits (Freshwater)						0.03	0.002	0.3	0.004	0.08	0.007	0.002	0.05	
Freshwater Reporting Limit (MDL* 3.18)						0.1	0.006	1.0	0.01	0.3	0.02	0.006	0.2	
METHOD BLANKS														
MB-1		Total		Freshwater	TRM Blank R1	0.03 U	0.002 U	0.3 U	0.004 U	0.08 U	0.007 U	0.002 U	0.05 U	061112-6100
MB-2		Total		Freshwater	TRM Blank R2	0.03 U	0.002 U	0.3 U	0.004 U	0.201 J	0.007 U	0.002 U	0.05 U	061112-6100
MB-1		Total		Seawater	DI Blank R2	NA	0.0000 U	0.550 U	0.00001 U	0.0443 J	0.0381 J	0.00144 U	0.0786 J	062712-6100
MB-2		Total		Seawater	DI Blank R3	NA	0.0002 U	0.484 U	0.00012 U	0.0375 J	0.0492 J	0.00222 J	0.0803 J	062712-6100
MB-3		Total		Seawater	DI Blank R4	NA	0.0000 U	0.488 U	0.00001 U	0.0450 J	0.0351 J	0.00156 U	0.123	062712-6100
MEAN REAGENT BLANK				*Seawater*	***BMRB_062712***	*NA*	*0.0001 U*	*0.507 U*	*0.00005 U*	*0.0423 J*	*0.0408 J*	*0.00174 U*	*0.0940*	
LABORATORY CONTROL SAMPLES														
Spiking Level						**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	
LCS-1		Total		Freshwater	TRM LCS R1	1.98	2.00	2.01	1.93	2.04	2.08	1.99	1.93	061112-6100
					Percent Recovery, LCS	**99%**	**100%**	**101%**	**97%**	**102%**	**104%**	**100%**	**97%**	
Spiking Level						**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	
LCS-2		Total		Freshwater	TRM LCS R2	1.88	1.96	2.07	1.93	2.11	2.02	1.99	1.93	061112-6100
					Percent Recovery, LCS	**94%**	**98%**	**104%**	**97%**	**106%**	**101%**	**100%**	**97%**	
Spiking Level						**NA**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	
LCS Blank		Total		Seawater	SB Blank R1	NA	0.0042 Ub	0.252 b	0.0555 b	0.127 b	0.246 b	0.00147 b	0.194 b	062712-6100
LCS		Total		Seawater	SB LCS	NA	1.74	2.08 b	1.87 b	2.07 b	2.06 b	1.93 b	1.89 b	062712-6100
LCSD		Total		Seawater	SB LCSD	NA	1.85	2.29 b	1.97 b	2.17 b	2.20 b	2.04 b	1.96 b	062712-6100
					Percent Recovery, LCS	NA	**87%**	**92%**	**91%**	**97%**	**91%**	**96%**	**85%**	
					Percent Recovery, LCSD	NA	**92%**	**102%**	**96%**	**102%**	**98%**	**102%**	**88%**	
					RPD	NA	**6.1%**	**10.8%**	**5.4%**	**5.0%**	**7.4%**	**5.6%**	**4.1%**	
MATRIX SPIKE RESULTS														
SW12-001	PSNS015-1	Diss	composite_time	Freshwater	3174-134	1.55	0.00369 J	25.6	0.0569	0.949	7.43	0.872	43.7	061112-6100
MS					3174-134 MS	3.56	1.81	137	1.98	2.99	9.49	3.00	145	061112-6100
MSD					3174-134MSd	3.59	1.81	139	1.97	3.02	9.48	2.98	147	061112-6100
					Spiking Level	2	2	100	2	2	2	2	100	
					Percent Recovery, MS	**101%**	**91%**	**111%**	**96%**	**102%**	**103%**	**106%**	**101%**	
					Percent Recovery, MSD	**102%**	**91%**	**113%**	**96%**	**104%**	**103%**	**105%**	**103%**	
					RPD	**1.5%**	**0.0%**	**1.8%**	**0.5%**	**1.5%**	**0.5%**	**0.9%**	**2.0%**	
SW12-003	PSNS015-3	Total	composite_time	Freshwater	3174-137	0.454	0.0138	409	0.0459	1.28	9.88	9.39	57.1	061112-6100
MS					3174-137MS	94.5	0.0125	500	97.7	98.5	110	110	155	061112-6100
MSD					3174-137MSD	95.4	0.0105	516	98.5	98.6	111	111	155	061112-6100
					Spiking Level	100	NA	100	100	100	100	100	100	
					Percent Recovery, MS	**94%**	NA	**91%**	**98%**	**97%**	**100%**	**101%**	**98%**	
					Percent Recovery, MSD	**95%**	NA	**107%**	**98%**	**97%**	**101%**	**102%**	**98%**	
					RPD	**1.0%**	NA	**16%**	**0.8%**	**0.1%**	**1.0%**	**1.0%**	**0.0%**	

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	Matrix	**MSL Code**	**As**	**Ag**	**Al**	**Cd**	**Cr**	**Cu**	**Pb**	**Zn**	ICP-MS Batch ID
					Instrument:	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	
Laboratory Achieved Detection Limits (Seawater)						NA	**0.0042**	**2.14**	**0.00110**	**0.0293**	**0.0351**	**0.0019**	**0.0263**	
Seawater Reporting Limit (MDL* 3.18)						NA	**0.013**	**6.8**	**0.0035**	**0.093**	**0.11**	**0.0060**	**0.084**	
Laboratory Achieved Detection Limits (Freshwater)						0.03	0.002	0.3	0.004	0.08	0.007	0.002	0.05	
Freshwater Reporting Limit (MDL* 3.18)						0.1	0.006	1.0	0.01	0.3	0.02	0.006	0.2	
SW12-017	PSNS015-17	Diss	composite_time	Freshwater	3174-166	0.600	0.00926	36.0	0.0279	0.687	6.07	1.58	65.7	061112-6100
MS					3174-166 MS	2.47	1.90	37.8	1.92	2.57	7.93	3.58	162	061112-6100
MSD					3174-166MSD	2.52	1.93	37.6	1.97	2.61	8.00	3.56	162	061112-6100
					Spiking Level	2	2	2	2	2	2	2	100	
					Percent Recovery, MS	**94%**	**95%**	**90%**	**95%**	**94%**	**93%**	**100%**	**96%**	
					Percent Recovery, MSD	**96%**	**97%**	**80%**	**97%**	**96%**	**97%**	**99%**	**96%**	
					RPD	**2.6%**	**1.6%**	**12%**	**2.6%**	**2.1%**	**3.7%**	**1.0%**	**0.0%**	
REPLICATE PRECISION														
SW12-007	PSNS015-7	Total	composite_time	Freshwater	3174-145	0.923	0.0144	243	0.0378	1.73	9.47	6.12	64.4	061112-6100
DUP	PSNS015-7	Total	composite_time	Freshwater	3174-145r2	0.874	0.0164	236	0.0387	1.73	9.36	6.12	64.1	061112-6100
					Mean	*0.899*	*0.0154*	*240*	*0.0383*	*1.73*	*9.42*	*6.12*	*64.3*	061112-6100
					RPD	**5.5%**	**13%**	**2.9%**	**2.4%**	**0.0%**	**1.2%**	**0.0%**	**0.5%**	
SW12-015	PSNS015-15	Diss	composite_time	Freshwater	3174-162	0.673	0.00332 J	22.0	0.0329	0.774	6.71	3.55	87.6	061112-6100
DUP	PSNS015-15	Diss	composite_time	Freshwater	3174-162r2	0.654	0.00405 J	21.8	0.0335	0.745	6.82	3.56	87.5	061112-6100
					Mean	*0.664*	*0.00369 J*	*21.9*	*0.0332*	*0.760*	*6.77*	*3.56*	*87.6*	061112-6100
					RPD	**2.9%**	**20%**	**0.9%**	**1.8%**	**3.8%**	**1.6%**	**0.3%**	**0.1%**	
STANDARD REFERENCE MATERIAL														
SRM 1640a-1		Total		Freshwater	TRM 1640a 10x R1	7.72	8.03	54.9	3.99	41.0	88.3	12.3	56.0	061112-6100
SRM 1640a-2		Total		Freshwater	TRM 1640a 10x R2	7.61	7.78	56.6	3.94	41.6	87.1	12.4	55.1	061112-6100
					Certified Value	**8.08**	**8.081**	**53.0**	**4.0**	**40.54**	**85.8**	**12.1**	**55.64**	
					PD	**4.4%**	**0.6%**	**3.6%**	**0.1%**	**1.1%**	**3.0%**	**1.6%**	**0.6%**	
					PD	**5.8%**	**3.7%**	**6.8%**	**1.3%**	**2.6%**	**1.6%**	**2.5%**	**1.0%**	
STANDARD REFERENCE MATERIAL, Seawater														
SRM CASS-5		Total		Seawater	CASS-5 062712	NA	0.0042 Ub	2.14 Ub	0.0237 b	0.160 b	0.457 b	0.00966 b	0.582 b	062712-6100
					Certified Value	NA	NC	NC	**0.0215**	**0.106**	**0.38**	**0.011**	**0.719**	
					PD	NA	--	--	**10%**	**51%** c	**20%**	**12%**	**19%**	
SRM SLEW-2		Total		Seawater	SLEW-3 062712	NA	0.0042 Ub	2.14 Ub	0.0478 b	0.203 b	1.50 b	0.00669 b	0.194 b	062712-6100
					Certified Value	NA	NC	NC	**0.0480**	**0.183**	**1.55**	**0.009**	**0.201**	
					PD	NA	--	--	**1%**	**11%**	**3%**	**26%** c	**3%**	

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	Matrix	MSL Code	Hg	CVAF Batch ID
					Instrument:	*CVAF*	
Laboratory Achieved Detection Limits						**0.0001**	
Reporting Limit (MDL* 3.18)						**0.0003**	
METHOD BLANKS							
MB-1		Total		Freshwater	Method Blank1	0.0001 U	060612HGA
MB-2		Total		Freshwater	Method Blank2	0.0001 U	060612HGA
MB-3		Total		Freshwater	Method Blank3	0.0001 U	060612HGA
MB-1		Total		Freshwater	Method Blank1	0.0001 U	061212HGA
MB-2		Total		Freshwater	Method Blank2	0.0001 U	061212HGA
MB-3		Total		Freshwater	Method Blank3	0.0001 U	061212HGA
LABORATORY CONTROL SAMPLES							
Spiking Level						0.00496	
LCS (1)		Total		Freshwater	OPR 060512 run1	0.00519	060612HGA
LCS (2)		Total		Freshwater	OPR 060512 run2	0.00531	060612HGA
LCS Blank (1)		Total		Freshwater	BLANK 060512	0.000129 J	060612HGA
					Percent Recovery, LCS 1	**102%**	
					Percent Recovery, LCS 2	**105%**	
Spiking Level						0.00496	
LCS (1)		Total		Freshwater	OPR 061112 run1	0.00524	061212HGA
LCS (2)		Total		Freshwater	OPR 061112 run2	0.00513	061212HGA
LCS Blank (1)		Total		Freshwater	BLANK 061112	0.0001 U	061212HGA
					Percent Recovery, LCS 1	**106%**	
					Percent Recovery, LCS 2	**103%**	
MATRIX SPIKES							
MS1	PSNS015-2	Total	composite_time	Freshwater	3174-135 ms	0.0248	060612HGA
MSD1	PSNS015-2	Total	composite_time	Freshwater	3174-135 msd	0.0252	060612HGA
SW12-002	PSNS015-2	Total	composite_time	Freshwater	3174-135	0.0119	060612HGA
					Spiking Level, MS	0.0132	
					Spiking Level, MSD	0.0134	
					Percent Recovery, MS	**98%**	
					Percent Recovery, MSD	**99%**	
					RPD	**1.0%**	
MS2	PSNS015-9	Total	composite_time	Freshwater	3174-149 MS	0.0459	060612HGA
MSD2	PSNS015-9	Total	composite_time	Freshwater	3174-149 MSD	0.0446	060612HGA
SW12-009	PSNS015-9	Total	composite_time	Freshwater	3174-149	0.0142	060612HGA
					Spiking Level, MS	0.0279	
					Spiking Level, MSD	0.0288	
					Percent Recovery, MS	**114%**	
					Percent Recovery, MSD	**106%**	
					RPD	**7.5%**	
MS1	PSNS015-14	Total	composite_time	Freshwater	3174-159 MS	0.0235	061212HGA
MSD1	PSNS015-14	Total	composite_time	Freshwater	3174-159 MSD	0.0244	061212HGA
SW12-014	PSNS015-14	Total	composite_time	Freshwater	3174-159	0.0140	061212HGA
					Spiking Level, MS	0.0103	
					Spiking Level, MSD	0.0107	
					Percent Recovery, MS	**92%**	
					Percent Recovery, MSD	**97%**	
					RPD	**4.9%**	

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water
UNITS: µg/L

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Sample Type	Matrix	**MSL Code**	**Hg**	CVAF Batch ID
					Instrument:	*CVAF*	
Laboratory Achieved Detection Limits						**0.0001**	
Reporting Limit (MDL* 3.18)						**0.0003**	
MS2	PSNS015-COMP	Total	Composite_equal_time	Freshwater	3174-169 MS	0.0718	061212HGA
MSD2	PSNS015-COMP	Total	Composite_equal_time	Freshwater	3174-169 MSD	0.0741	061212HGA
SW12-020	PSNS015-COMP	Total	Composite_equal_time	Freshwater	3174-169	0.0462	061212HGA
					Spiking Level, MS	0.0266	
					Spiking Level, MSD	0.0257	
					Percent Recovery, MS	**96%**	
					Percent Recovery, MSD	**108%**	
					RPD	**11.9%**	
REPLICATE PRECISION							
SW12-004	PSNS015-4	Total	composite_time	Freshwater	3174-139	0.0396	060612HGA
DUP	PSNS015-4	Total	composite_time	Freshwater	3174-139r2	0.0401	060612HGA
					Mean	*0.0398*	
					RPD	**1%**	
SW12-016	PSNS015-16	Total	composite_time	Freshwater	3174-163	0.271	061212HGA
DUP	PSNS015-16	Total	composite_time	Freshwater	3174-163r2	0.264	061212HGA
					Mean	*0.267*	
					RPD	**2%**	
SW12-016	PSNS015-16	Total	composite_time	Freshwater	3174-163	0.271	061212HGA
DUP	PSNS015-16	Total	composite_time	Freshwater	3174-163r2	0.260	061212HGA
					Mean	*0.266*	
					RPD	**4%**	
STANDARD REFERENCE MATERIAL							
SRM 1641 (1)		Total		Freshwater	1641d 060512	1638	060612HGA
SRM 1641 (1)		Total		Freshwater	1641d 061112	1681	061212HGA
					Certified Value	**1590**	
					range	**±18**	
	SRM 1641 (1)				**PD**	**3%**	
	SRM 1641 (2)				**PD**	**6%**	

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
QC Sample Results for TOC/DOC by HTCO

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Matrix	MSL Code	TOC/DOC mg/L	TOC/DOC µM		Batch ID
Laboratory Achieved Detection Limits (Seawater)					**0.030**	**2.5**		
Seawater Reporting Limit (MDL* 3.18)					**0.095**	**8.0**		
				Instrument:	HTCO	HTCO		
Method Blanks								
MB			DIWater	MB_DIW061512r1	0.030	2.5	U	DOC061512
MB			DIWater	MB_DIW061512r2	0.030	2.5	U	DOC061512
MB			DIWater	MB_DIW061612	0.0667	5.56	J	DOC061612
MB			DIWater	MB_DIW061912	0.030	2.5	U	DOC061912
MB			DIWater	MB_DIW062012	0.030	2.5	U	DOC062012
Consensus Value for Interlaboratory Sample[2]								
CRM-11		DOC	Seawater	UM CRM0615R1	0.524	43.6		DOC061512
CRM-12		DOC	Seawater	UM CRM0615R2	0.523	43.5		DOC061512
CRM-13		DOC	Seawater	UM CRM0619R1	0.505	42.1		DOC061912
CRM-14		DOC	Seawater	UM CRM0619R2	0.493	41.1		DOC061912
				Average Consensus Value	0.510	42.5		
				Range	0.492-0.528	41-44		
CRM-11				**PD**	**2.7%**	**2.7%**		
CRM-12				**PD**	**2.5%**	**2.5%**		
CRM-13				**PD**	**1.0%**	**1.0%**		
CRM-14				**PD**	**3.4%**	**3.4%**		
CALIBRATION RESULTS								
ICV/CCV-1				CCV	1.05	87.3		DOC061512
ICV/CCV-2				CCV	1.07	89.2		DOC061512
ICV/CCV-3				CCV	0.98	82.0		DOC061912
ICV/CCV-4				CCV	1.02	84.7		DOC061912
ICV/CCV-5				CCV-5 ppm	4.86	405		DOC061912
ICV/CCV-6				CCV-5ppm	4.88	406		DOC061512
ICV/CCV-7				CCV-5ppm	4.90	408		DOC061612
ICV/CCV-8				ICV	0.98	81.5		DOC061512
ICV/CCV-9				ICV	1.05	87.2		DOC061912
				TRUE VALUE	**1 or 5**			
ICV/CCV-1				**% RECOVERY**	**105%**			
ICV/CCV-2				**% RECOVERY**	**107%**			
ICV/CCV-3				**% RECOVERY**	**98%**			
ICV/CCV-4				**% RECOVERY**	**102%**			
ICV/CCV-5				**% RECOVERY**	**97%**			
ICV/CCV-6				**% RECOVERY**	**98%**			
ICV/CCV-7				**% RECOVERY**	**98%**			
ICV/CCV-8				**% RECOVERY**	**98%**			
ICV/CCV-9				**% RECOVERY**	**105%**			

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
QC Sample Results for TSS

Sample ID - Metals	Station Code	Fraction (Total/Diss)	Matrix	**MSL Code**	**TSS**		**Units**	Batch ID
				Method:	SM2540D - Mod			
				MDL	*0.49*		mg/L	
Method Blanks								
MB1		Total	Freshwater	Blank042712r1	0.49	U	mg/L	042712TSS
MB2		Total	Freshwater	Blank042712r2	0.49	U	mg/L	042712TSS
MB3		Total	Freshwater	Blank042712r3	0.49	U	mg/L	042712TSS
LABORATORY CONTROL SAMPLES								
LCS-1		Total	Freshwater	LCS042712r1	34.8		mg/L	042712TSS
LCS-2		Total	Freshwater	LCS042712r2	38.4		mg/L	042712TSS
				TRUE VALUE	**40**		mg/L	
	LCS-1			**% RECOVERY**	**87%**			
	LCS-2			**% RECOVERY**	**96%**			

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Non-Dry Dock Stormwater
ENVVEST 2011-12_SW12 (Bonus Storm)
Metals in Water

DATA QUALIFIERS:

c	Exceeds DQO but meets contingency criteria of either:
1	SRM certified <10x MDL
2	Insufficient spiking level relative to native sample concentrations
3	Sample concentration <10x MDL
U	Analyte not detected at or above the MDL, MDL reported
J	Analyte detected above the MDL, but less than the RL
N	Spiked sample recovery outside QC criterion of 70-130%
&	Accuracy result outside QC criterion of ≤20% PD
*	Precision result outside QC criterion of <30%
NS	Sample not spiked for this analyte
B	Analyte detected in the method blank > RL
	and sample concentration < 10 times detected blank value
b	Data are blank corrected using the batch specific procedural blank
ND	Not detected
E	Estimated, sample container cracked

Notes:

Composite_equal_time	Equal portion composite of time integrated sample (ISCO samples)
Composite_time	A time integrated sample. One bottle generated by the ISCO sampler.
NC	Not Certified
--	Not analyzed
NA	Not applicable/available
Total	Total or unfiltered fraction
Diss	Dissolved or fraction filtered

QA/QC NARRATIVE

PROJECT: Non-Dry Dock Stormwater Sampling for SW12
PARAMETER: Total and Dissolved Metals – Al, Ag, As, Cd, Cr, Cu, Pb, Zn, Hg; dissolved organic carbon (DOC); and total suspended solids (TSS)
LABORATORY: Battelle Marine Sciences Laboratory (MSL), Sequim, Washington
MATRIX: Stormwater (with select seawater and freshwater matrices)

SAMPLE CUSTODY AND PROCESSING:

Samples were collected from stormwater outfalls located within the Confined Industrial Area (CIA) and Naval Base Kitsap (NBK) at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) by TEC, MSL, and the U.S. Navy during the 2011-12 storm season. The following narrative addresses the collection of the bonus storm at the PSNS015 outfall. This outfall was selected for a special study to determine the concentrations of metals during the progression of the storm, as well as the composite similar to those reported for previous storms. The samples were collected as dicrete intervals of the storm collected by the ISCO and also composited as described in the sampling and analysis plan (SAP; Taylor Associates, Inc. – Division of TEC, Inc. and Pacific Northwest National Laboratory 2011).

The storm event identified as SW12 began on April 19, 2012 and ended on April 20, 2012. The samples were collected in individual ISCO wedge bottles as described in the SAP and Addendum A written for this storm (Taylor Associates, Inc. and PNNL 2011 and appended to this narrative). Two types of composite samples were collected during the storm. The first was a time proportionate discrete sample from 18 intervals of the storm. Each interval represents a time composite of one hour of the storm. The second was a storm event composite to represent the average concentration of the entire storm. The individual time paced composites collected in the 18 wedge bottles were carried back to the stormwater lab at PSNS & IMF and sub-sampled for total and dissolved metals, TSS and DOC. The remaining samples from the discrete fractions were composited into a single event mean composite (EMC) in a pre-cleaned glass jar following the same protocol as all Phase I and II sampling. The samples were hand delivered within 24 hours of collection to MSL.

Upon receipt at MSL, the condition of all the samples were verified as acceptable and tracked back to the field chain of custody (COC). In the clean laboratory at MSL, the glass composite sample jar and the Teflon total metals container were shaken vigorously before pouring an aliquot into a 0.45µm polyvinylidene fluoride (PVDF) filter unit for filtration. Each sample was vacuum filtered in a class 100 clean bench and the filtrate was poured into a 500 mL Teflon bottle for dissolved metals (DME). The total and dissolved metal fractions were each acidified inside a Class 100 clean bench to a pH of < 2.0 with double distilled nitric acid. The samples were then assigned a MSL Central File (CF) identification number (3174) and were entered into Battelle's sample tracking system. The composite aliquots for DOC were stored frozen and TSS was stored at 4.0±2°C.

The following lists information on sample receipt and processing activities:

Sample Receipt Dates:	SW12: 04/20/12
Cooler temp. on arrival	All coolers were at 4.0±2°C
Collection dates	04/19/12 and 04/20/12
TSS analysis dates	04/27/12
DOC analysis dates	06/15/12, 06/16/12, 06/19/12, 06/20/12
CVAF analysis dates (Hg)	06/06/12 and 06/12/12
TRM Prep/Freshwater Analysis by ICP-MS (As, Ag, Al, Cd, Cr, Cu, Pb, Zn)	06/11/12
Fe/Pd Prep/seawater Analysis by ICP-MS (Ag, Al, Cd, Cr, Cu, Pb, Zn)	06/26-27/12

QA/QC NARRATIVE

QA/QC DATA QUALITY OBJECTIVES:

FRESHWATER

Analyte	Analytical Method for Seawater	MS Range of Recovery	SRM Percent Difference	Replicate Precision	Method Detection Limits (µg/L)	Reporting Limits (µg/L)
Aluminum	ICP-MS	70-130%	≤20%	≤30%	0.3	1.0
Arsenic	ICP-MS	70-130%	≤20%	≤30%	0.03	0.1
Cadmium	ICP-MS	70-130%	≤20%	≤30%	0.004	0.01
Chromium	ICP-MS	70-130%	≤20%	≤30%	0.08	0.3
Copper	ICP-MS	70-130%	≤20%	≤30%	0.007	0.02
Lead	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Silver	ICP-MS	70-130%	≤20%	≤30%	0.002	0.006
Zinc	ICP-MS	70-130%	≤20%	≤30%	0.05	0.2
Mercury	CVAF	70-130%	≤20%	≤30%	0.0001	0.00032
TSS	SM2540D	NA	≤20%	≤30%	0.49 mg/L	0.49 mg/L
DOC	HTCO	NA	≤20%	≤30%	0.03 mg/L	0.095 mg/L

SEAWATER (only if different than freshwater)

Analyte	Analytical Method for Seawater	MS Range of Recovery	SRM Percent Difference	Replicate Precision	Method Detection Limits (µg/L)	Reporting Limits (µg/L)
Aluminum	ICP-MS	70-130%	≤20%	≤30%	2.14	6.8
Arsenic	NA	NA	NA	NA	NA	NA
Cadmium	ICP-MS	70-130%	≤20%	≤30%	0.0011	0.0035
Chromium	ICP-MS	70-130%	≤20%	≤30%	0.0293	0.093
Copper	ICP-MS	70-130%	≤20%	≤30%	0.0351	0.11
Lead	ICP-MS	70-130%	≤20%	≤30%	0.0019	0.0060
Silver	ICP-MS	70-130%	≤20%	≤30%	0.0042	0.013
Zinc	ICP-MS	70-130%	≤20%	≤30%	0.0263	0.084
Mercury	CVAF	70-130%	≤20%	≤30%	0.0001	0.00032

METHODS: Samples were analyzed for nine metals: aluminum (Al), arsenic (As – only in freshwater), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), silver (Ag), zinc (Zn), and mercury (Hg). Samples were submitted for analyses by the following preparation and analytical methods. All samples were analyzed for Hg by Cold Vapor Atomic Fluorescence (CVAF) in accordance with Battelle SOP *MSL-I-013*, *Total Mercury in Aqueous Samples by CVAF*, following EPA Method 1631 revision E.

All samples for other metals were analyzed by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) in accordance with Battelle SOP *MSL-I-022, Determination of Elements in Aqueous and Digestate Samples by ICP/MS.* The base methods for this procedure are EPA Method 1638 and EPA Method 1640. Freshwater samples (defined as salinity < 2ppt) were digested following the total metal recoverable (TRM) method established in EPA Method 1640 prior to analysis by ICP-MS. In summary, this preparation brings the pH of the sample to 2% and heats the capped samples for 2.5 hours in a 85˚C oven to solubilize particulates. Both the filtered and unfiltered fractions were prepared using this method to destroy any colloidal particles remaining in the filtered (aka. dissolved) fraction.

Seawater samples were preconcentrated via a precipitation step followed by reconstituted in a salt free solution in accordance with Battelle SOP *MSL-I-025,*

Methods of Sample Preconcentration: Iron and Palladium/APDC Coprecipitation and Borohydride Reductive Precipitation for Trace Metals Analysis in Water.
Preconcentrated seawater samples were analyzed for Al, Ag, Cd, Cr, Cu, Pb and Zn by ICP-MS as described above.

All results were reported in units of µg/L.Seawater data are reported as reagent corrected for the metals requiring Fe/Pd preconcentration (Al, Ag, Cd, Cr, Cu, Pb, and Zn) and denoted with a b-flag. The required preconcentration procedure for ICP-MS analyses includes the addition of chelating agents to induce precipitation of metals under specific conditions. Subsequently, reagents added to the samples should be of the purest quality to result in zero addition of metals to the seawater samples. Required reagents have trace impurities of these metals; therefore, the data are blank corrected for these elements. Results were corrected using the mean batch reagent blank identified for each preparation batch as BMRB_analysis date and provided in the table identified as the QC Results for ICP-MS.

The conductivity and turbidity data were recorded in the field using probes as described by Taylor Associates, Inc. – Division of TEC, Inc. and Pacific Northwest National Laboratory (2011). The TSS samples were analyzed at MSL following SM2540D using a gravimetric analysis with modification to use a nucleopore membrane. The data are reported in units of mg/L.

The DOC samples were analyzed using a High Temperature Catalytic Oxidation (HTCO) method. The instrument is specially equipped with high-salt sample combustion tube kit and halogen scrubber for seawater analysis. Seawater samples were acidified to pH <2 by concentrated hydrochloric acid (trace metal grade, Fisher Chemical) prior to analysis then sparged for 2 min to remove inorganic carbon (IC). The non-purgeable organic carbons (NPOC) in samples were further converted to CO_2 by oxidation at 680°C with a platinum catalyst. A non-dispersive infrared detector (NDIR) was used to detect the converted CO_2 for quantification of NPOC. The data are reported as both mg/L and µM.

HOLDING TIMES: All samples were analyzed within the established holding times of 90 days for Hg, six months for all other metals, and 7 days for TSS.

DETECTION LIMITS: Laboratory method detection limits (MDLs) for both TRM freshwater and Fe/Pd seawater were reported from the MDL study (annually verified) as determined by seven replicates of deionized water and Sequim Bay seawater, respectively. Reporting limits were determined as 3.18 times the laboratory achieved MDL. The data are evaluated and flagged as follows:

- U Analyte not detected at or above the MDL, MDL reported
- J Analyte detected above the MDL, but less than the RL
- N Spiked sample recovery outside QC criterion of 70-130%
- & Accuracy result outside QC criterion of ≤20% PD
- * Precision result outside QC criterion of <30%
- B Analyte detected in the method blank > RL and sample concentration < 10 times detected blank value
- E Reported result exceeds linear range; use with caution
- c Exceeds data quality objective but meets contingency criterion

METHOD BLANKS: A minimum of one method blank was prepared and analyzed by each instrument with each analytical batch. The freshwater method blanks were all less than the RL. For seawater, a minimum of three method blanks were analyzed by each instrument with each analytical batch for metals. The average method blank for each batch was less than the RL for all metals except Zn. The seawater preconcentration procedure required to

remove salt interferences prior to ICP-MS analyses includes the addition of chelating agents to induce precipitation of metals under specific conditions as discussed in the method section above. The data were evaluated and qualified with a "B" if the sample concentration was less than ten times the mean detected blank detected above the RL for the analytical batch. The reagent blank correction takes into consideration the detected blank for each batch and the data should be reported as corrected in order to more accurately represent the true sample concentrations.

The method blank for TSS is a nucleopore filter taken through the analytical process with each batch of samples. The blanks were all less than the MDL. For DOC, low carbon water (LCW) was purchased from University of Miami and analyzed as part of the HTCO calibration curve to demonstrate that the instrumentation was not contributing carbon.

LABORATORY CONTROL SAMPLES: For freshwater, a minimum of one LCS (OPR or blank spike) was prepared and analyzed with each analytical batch of 20 or fewer samples. For seawater, the LCS matrix for the seawater samples was Sequim Bay Seawater prepared as both spiked and unspiked samples. Percent recoveries for LCS samples were within the QC acceptance criterion of 70% to 130% for all metals. They also met a secondary criterion of ± 15% recovery for metals of concern.

MATRIX SPIKE ACCURACY: A minimum of one set of duplicate matrix spikes (MS/MSD) was prepared and analyzed with each analytical batch of 20 or fewer samples. Percent recoveries for matrix spikes were within the QC limits of 70% to 130% for all metals.

REPLICATE PRECISION: Laboratory precision was expressed as the relative percent difference (RPD) between laboratory duplicates. The RPD values for the laboratory duplicates were within the QC acceptance criterion of ±30% for all metals detected above the RL.

STANDARD REFERENCE MATERIAL ACCURACY: Standard reference materials (SRM – if available) were prepared and analyzed with each analytical batch at a minimum frequency of 1 per 20 or fewer samples. Analytical accuracy was expressed as the percent difference (PD) between the measured and the certified value. The freshwater SRMs were 1641d for Hg and 1640a for all other metals. The differences were within the QC acceptance criterion of ≤20%.

For seawater, the SRM for Hg was also 1641d, as no seawater SRM was available. Three different SRMs were analyzed for the other metals. The freshwater SRM 1640a demonstrated analytical accuracy for each batch analyzed by ICP-MS. Percent recoveries were within the QC acceptance criterion. There are no seawater SRMs certified for Ag or Al. High purity standards and the freshwater SRM were used to evaluate analytical accuracy.

Two seawater SRMs were analyzed with each batch. The primary SRM was the coastal SRM CASS-5 and the secondary was the estuarine SRM SLEW-3. Both were prepared with each batch of preconcentrated samples. The PDs were within the QC criterion for all metals certified greater than 10x the MDL. In CASS-5, Cr is certified less than 10x the MDL and SLEW-3 was used to demonstrate acceptable accuracy.

There are no SRMs available for TOC or DOC. University of Miami provides a laboratory consensus value for DOC in estuarine water http://yyy.rsmas.miami.edu/groups/biogeochem/CRM.html. The average of the reference value range was used to calculate the PD for each replicate. The PD ranged from 1-3.4%.

QA/QC NARRATIVE

REFERENCES: Taylor Associates, Inc. – Division of TEC, Inc. and Pacific Northwest National Laboratory (2011). Non-Dry Dock Stormwater Monitoring Conducted at Puget Sound Naval Shipyard Bremerton, WA, Project ENVVEST Study Area. Document prepared for the United States Navy Puget Sound Naval Shipyard.

DISCUSSION:

The interpretation of the results will be provided in the annual non-dry dock stormwater report available in September 2012. However, some data are plotted in order to provide guidance on next steps during the Phase III planning meeting in August 2012. Figure 1 illustrates the results of the precipitation (inches), water level in the pipe (ft.), total concentration of particles as measured by the Laser In-Situ Scattering and Transmissometry (LISST; µL/L) and mean particle size (µm) of the stormwater during the SW12 event. The *in-situ* sensors also collected conductivity and more detailed size measurements of particles during the progression of the storm. The LISST data is reported as 32 size classification; however, the data were grouped into three size classes for easier visualization. The size classes were < 63 µm (silt/clay), 63-234 µm (very fine and fine sand), and 234-386 µm (medium sand).

These *in-situ* measurements were then plotted again the concentrations of DOC and particulate and dissolved Hg (Figure 2) determined during the intervals of the storm. The total recoverable Hg concentrations are equal to the top of the stacked bars. The *in-situ* measurements were collected at roughly 15 minute intervals, while the chemistry data were determined from the one hour composites collected by the ISCO. The data show that as the rainfall begins you have smaller particles moving through the outfall and the Hg concentration does not begin to increase until about 4 hours into the storm event. The first increase in Hg occurs around the time there is a peak in the size and volume of particles moving through the outfall around 23:00 to 24:00. By this time the precipitation volumes have begun to decrease and the tide begins to move into the pipe with conductivity rising around 03:00. While the denser salt water is filling the pipe, the fresh stormwater is trapped behind the salt water and the DOC concentrations are closer to those measured in the ambient seawater (~1-2 mg/L). As the tide recedes, the DOC goes up there is a peak in the total Hg concentration along with a high concentration of particles of the silt/clay and fine sand size. After this peak, the Hg concentrations go down. However, the portion of the total Hg that is in the dissolved phase increases to as much as 57% compared to earlier values averaging 23%. The pulse of particulates traveling through the pipe during the collection of interval 16 around 0900 on 20 April is reflected in all the metals as spike in the particulate fraction (see Figure 3 for Cu).

Coupling the stormwater chemistry data with the storm drain data will provide additional information on the nature of the types of particles moving through the stormwater system at PSNS015. The annual report of progress will include the chemistry results from the storms drain sediment collected at PSNS015 and several other outfalls in both the CIA and NBK portions of PSNS.

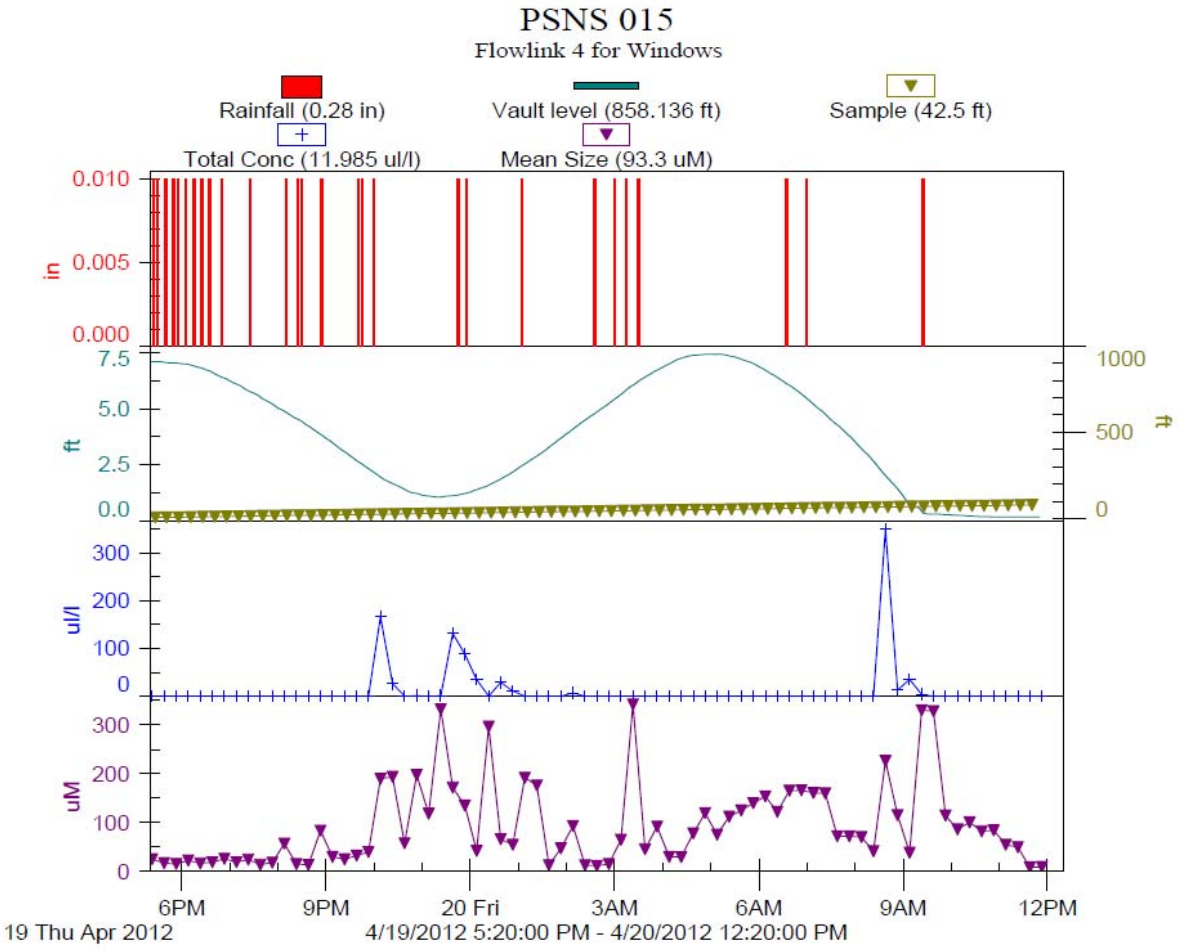

Figure 1. From top to bottom, graphs of the precipitation (inches), water level in the pipe (ft.), total concentration of particles as measured by the Laser In-Situ Scattering and Transmissometry (LISST; µL/L) and mean particle size (µm) of the stormwater during the SW12 event.

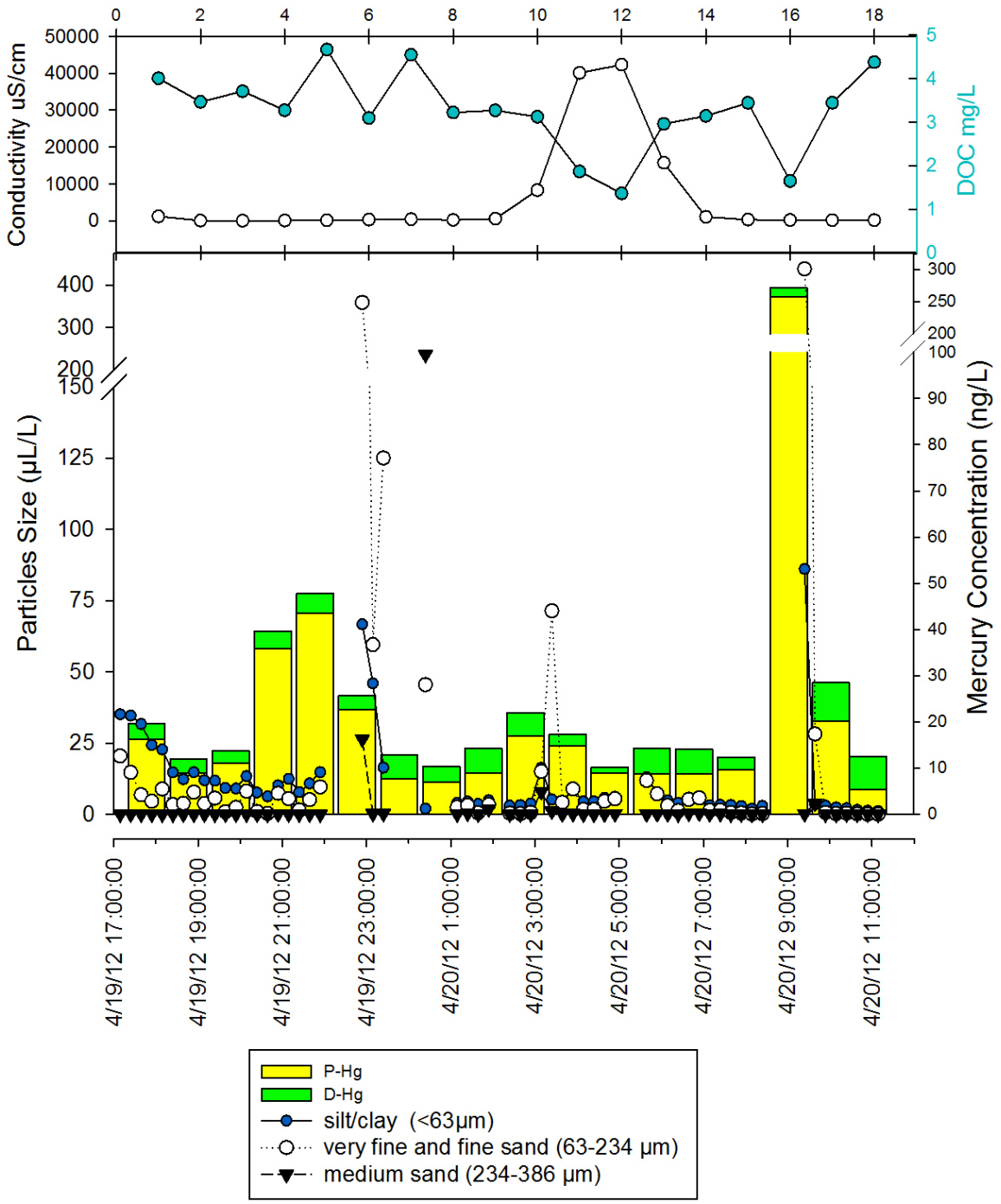

Figure 2. The top graph is the conductivity and dissolved organic carbon (DOC) during the storm event starting April 19, 2012. The bottom graph includes the concentrations of particulate mercury (P-Hg), dissolved Hg (D-Hg), silt/clay, fine sand, and medium sand. The top of the bar presents total recoverable Hg.

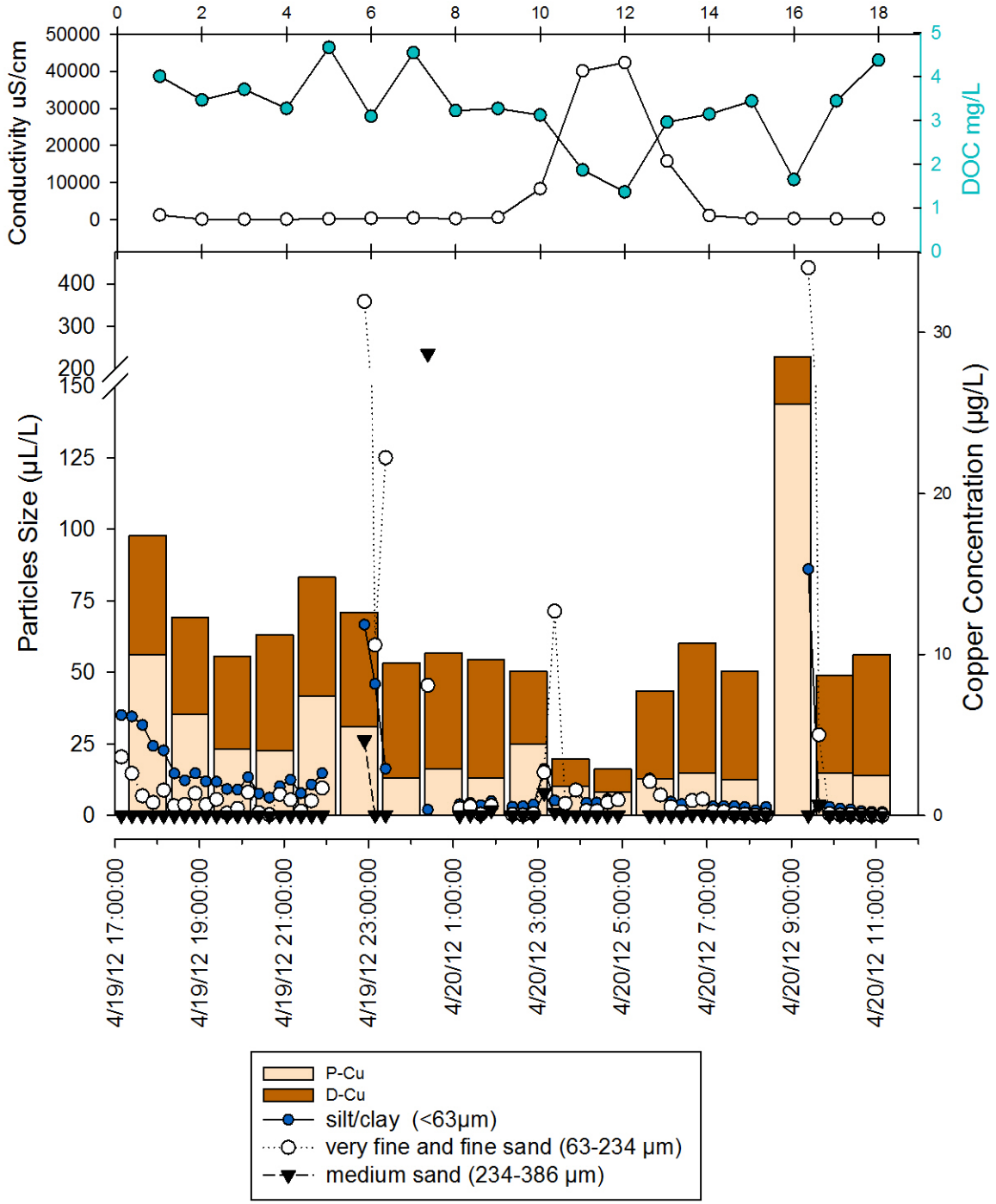

Figure 3. The top graph is the conductivity and dissolved organic carbon (DOC) during the storm event starting April 19, 2012. The bottom graph includes the concentrations of particulate copper (P-Cu), dissolved Cu (D-Cu), silt/clay, fine sand, and medium sand. The top of the bar presents total recoverable Cu.

PNNL Project No. 54220

AMENDMENT TO PERFORMANCE WORK STATEMENT
TASK 2 OF THE ENVVEST WATERSHED SCALE STUDY
AMENDMENT 7 TITLE: PHASE II NON-DRY DOCK STORMWATER MONITORING FOR PSNS&IMF, BREMERTON, WA
ADDENDUM A
DATE: 3/22/12

1. INTRODUCTION

This addendum modifies the existing Phase II Non-Dry Dock Stormwater Monitoring project by adding a bonus stormwater sample collected from PSNS015 outfall. This does not add funding to the existing project, but supplements the scope. The funding for the supplemental scope will be provided from two areas within the scoped work: 1) cost savings from the field collection tasks and 2) the reduced number of sediment samples available for collection within the storm drains. Specific tasking for the collection and analyses of the bonus storm sample are provided below.

2. SPECIFIC TASKS

The storm targeting, qualification criteria, collection methods, and retrieval procedures will remain consistent with the 2012 Project Work Plan and Phase II statement of work. One stormwater sample will be collected from PSNS015 prior to May 1, 2012. If a storm meeting the desired qualifications does not occur prior to this date, then the supplemental sampling will be canceled. This provides sufficient time for the chemical analyses, demobilization, and annual report production to occur within FY12.

2.1 Task 1: Field Collection and Processing

The collection protocol will follow the existing statement of work and 2012 project work plan (PWP), but only one storm will be collected at PSNS015 during or immediately following periods of higher high tide (if possible) and no grab samples are planned. The 24 wedge bottles will be deployed as detailed in the PWP and retrieved after collection of a storm anticipated to yield > 1 inch of rain in a 24 hour period. The 24 wedge bottles will be taken to the stormwater lab and aliquots removed from each wedge bottle as listed in Table 1. After removal of the aliquot, the procedure for compositing will remain consistent with the PWP (e.g. conductivity & turbidity analyses to determine samples included in the composite).

The composite sample will be created in a pre-cleaned glass jar as detailed in the PWP and delivered to PNNL. The composite will be aliquoted at MSL for a subset of the parameters as detailed in Table 1. All other sampling procedures for telemetry[1] and data processing will remain the same as described in the PWP.

Table 1. Bonus PSNS015 Analytical Parameter List for both Wedge Bottles and Composite.

Sample Type	Parameter	Bottle Type	Volume (mL)	#
Wedge Bottle	Total and Dissolved Metals	Teflon	250mL (half filtered at lab for dissolved)	48 (24 field & 24 lab)

[1] If possible, a laser in situ scattering transmissometry (LISST) sensor capable of measuring the size-dependent settling velocity distribution of suspended particles will be added to the in situ sensors at PSNS015 for this storm event.

Wedge Bottle	TSS	LDPE	500mL	24
Wedge Bottle	DOC	Glass	125mL (filtered in field)	24
Collected at MSL from Composite Sample				
Comp	Total and Dissolved Metals	Teflon	500mL (half filtered at lab for dissolved)	2
Comp	TSS	LDPE	500mL	1
Comp	DOC	Glass	125mL	1

2.2 Task 2: Reports

A storm event (STE) report and chemistry report will be provided for the bonus storm. The data will be incorporated into the annual report and other deliverables as appropriate.

SAMPLE CHAIN OF CUSTODY FORM

Date:
Page: Page / of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW12

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

	Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TPH	TME/DME	DME				No. containers	Sample Type (grab vs. Comp)	Storm#	Notes/Comments
	3174 TOT DISS																	
133	SW12-001 134	PSNS015 - 1	4/20/12 1037	SW			X	X	X	X					3	comp	SW12	
135	SW12-002 136	PSNS015 - 2		SW			X	X		X					3		SW12	
137	SW12-003 138	PSNS015 - 3		SW			X	X		X					3		SW12	Amphiode
139	SW12-004 140	PSNS015 - 4		SW			X	X		X					3		SW12	
141	SW12-005 142	PSNS015 - 5		SW			X	X		X					3		SW12	Debris; organic + Detritus
143	SW12-006 144	PSNS015 - 6		SW			X	X		X					3		SW12	Debris; organic (soil/grass)
145	SW12-007 146	PSNS015 - 7		SW			X	X		X					3		SW12	
147	SW12-008 148	PSNS015 - 8		SW			X	X		X					3		SW12	
149	SW12-009 ~~150~~ 152	PSNS015 - 9		SW			X	X		X					3		SW12	
151	SW12-010 ~~152~~ 154	PSNS015 - 10		SW			X	X		X					3		SW12	Amphiode
153	SW12-011 154	PSNS015 - 11		SW			X	X		X					3		SW12	
155	SW12-012 156	PSNS015 - 12		SW			X	X		X					3		SW12	
157	SW12-013 158	PSNS015 - 13		SW			X	X		X					3		SW12	Amphiode

Relinquished by: _____ Signature; 4/20/12 Date; 1750 Time
Jim Brandenberger Printed Name; PNNL Company

Received by: _____ Signature; 4/20/12 1830
C. Sustian Printed Name; MSL

Total # of Containers
Shipment Method: Hand Delivered to MSL
Sample Disposition:
Distribution:
1) PNNL
2) CAS

Relinquished by: _____ Signature; Date; Time
Printed Name; Company

Received by: _____ Signature
Printed Name

xg 4/21/12

SAMPLE CHAIN OF CUSTODY FORM

Date:
Page: Page of 2
Project No.: 54220 / 62375
Project: Non-dry Dock Stormwater SW12

SW = Stormwater

Battelle
Marine Sciences Laboratory
1529 West Sequim Bay Road
Laboratory: Battelle MSL
Attention: Jill Brandenberger
Phone: (360) 681-4564

Analyze parameters per QAP/FSP

Sample Label	Station ID	Collection Date/Time	Matrix	Hardness	TOC	DOC	TSS	TPH	TME/DME	DME					No. containers	Sample Type (grab vs. Comp)	Storm#	Notes/Comments
SW12-014	PSNS01S-14	4/20/12 1037	SW			X	X		X						3	comp	SW12	
SW12-015	PSNS01S-15		SW			X	X		X						3		SW12	
SW12-016	PSNS01S-16		SW			X	X		X						3		SW12	Debris, organic & Detritus
SW12-017	PSNS01S-17		SW			X	X		X						3		SW12	Small amount of Detritus
SW12-018	PSNS01S-18		SW			X	X		X						3		SW12	
SW12-019	PSNS01S	4/13/12	SW						X						1	grab	SW12	vault sediment
SW12-020	PSNS01S	4/20/12 1037	SW			X	X		X						3	comp	SW12	storm comp
SW12-021			SW														SW12	
SW12-022			SW														SW12	
SW12-023			SW														SW12	
SW12-024			SW														SW12	
SW12-025			SW														SW12	
	SQV07-006	4/23/12																

Relinquished by: _____ 4/20/12 1750
Signature Date Time
Jim Brandenberger PNNL
Printed Name Company

Received by: _____ 4/20/12 1830
Signature
C Susuki MSL
Printed Name

Total # of Containers
Shipment Method:
Hand Delivered to MSL

Relinquished by: _____
Signature Date Time
Printed Name Company

Received by: _____
Signature
Printed Name

Sample Disposition:
Distribution:
1) PNNL
2) CAS

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 4/20/2012
Batch: 13
Login Designee: Suslick

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Non-Dry Dock Storm Water - SW12**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW12-001	PSNS015-1	3174-133	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-001	PSNS015-1	3174-134	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-002	PSNS015-2	3174-135	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-002	PSNS015-2	3174-136	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-003	PSNS015-3	3174-137	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-003	PSNS015-3	3174-138	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-004	PSNS015-4	3174-139	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-004	PSNS015-4	3174-140	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-005	PSNS015-5	3174-141	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-005	PSNS015-5	3174-142	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-006	PSNS015-6	3174-143	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-006	PSNS015-6	3174-144	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-007	PSNS015-7	3174-145	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-007	PSNS015-7	3174-146	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-008	PSNS015-8	3174-147	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-008	PSNS015-8	3174-148	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-009	PSNS015-9	3174-149	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-009	PSNS015-9	3174-150	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-010	PSNS015-10	3174-151	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-010	PSNS015-10	3174-152	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12

SOP#: MSL-A-001

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 4/20/2012
Batch: 13
Login Designee: Suslick

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Non-Dry Dock Storm Water - SW12**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW12-011	PSNS015-11	3174-153	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-011	PSNS015-11	3174-154	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-012	PSNS015-12	3174-155	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-012	PSNS015-12	3174-156	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-013	PSNS015-13	3174-157	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-013	PSNS015-13	3174-158	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-014	PSNS015-14	3174-159	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-014	PSNS015-14	3174-160	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-015	PSNS015-15	3174-161	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-015	PSNS015-15	3174-162	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-016	PSNS015-16	3174-163	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-016	PSNS015-16	3174-164	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-017	PSNS015-17	3174-165	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-017	PSNS015-17	3174-166	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-018	PSNS015-18	3174-167	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-018	PSNS015-18	3174-168	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-020	PSNS015-COMP	3174-169	WAT	Prep Lab, K-1-B/C	Total Metals	04/20/12
SW12-020	PSNS015-COMP	3174-170	WAT	Prep Lab, K-1-B/C	Dissolved Metals	04/20/12
SW12-019	VAULT Sediment - see CF#3259		SED	Walkin Freezer	Metals	04/13/12

SOP#: MSL-A-001

SAMPLE LOGIN

Pacific Northwest NATIONAL LABORATORY | Battelle The Business of Innovation

Project Manager: Brandenberger
Date Received: 4/20/2012
Batch: 13
Login Designee: Suslick

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Project: **ENVVEST Non-Dry Dock Storm Water - SW12**

Sponsor ID	Site Description	Battelle Code	Matrix	Storage Location	Requested Parameters	Collection Date
SW12-001	PSNS015-1	3174-133	WAT	Walkin cold room	TSS	04/20/12
SW12-002	PSNS015-2	3174-135	WAT	Walkin cold room	TSS	04/20/12
SW12-003	PSNS015-3	3174-137	WAT	Walkin cold room	TSS	04/20/12
SW12-004	PSNS015-4	3174-139	WAT	Walkin cold room	TSS	04/20/12
SW12-005	PSNS015-5	3174-141	WAT	Walkin cold room	TSS	04/20/12
SW12-006	PSNS015-6	3174-143	WAT	Walkin cold room	TSS	04/20/12
SW12-007	PSNS015-7	3174-145	WAT	Walkin cold room	TSS	04/20/12
SW12-008	PSNS015-8	3174-147	WAT	Walkin cold room	TSS	04/20/12
SW12-009	PSNS015-9	3174-149	WAT	Walkin cold room	TSS	04/20/12
SW12-010	PSNS015-10	3174-151	WAT	Walkin cold room	TSS	04/20/12
SW12-011	PSNS015-11	3174-153	WAT	Walkin cold room	TSS	04/20/12
SW12-012	PSNS015-12	3174-155	WAT	Walkin cold room	TSS	04/20/12
SW12-013	PSNS015-13	3174-157	WAT	Walkin cold room	TSS	04/20/12
SW12-014	PSNS015-14	3174-159	WAT	Walkin cold room	TSS	04/20/12
SW12-015	PSNS015-15	3174-161	WAT	Walkin cold room	TSS	04/20/12
SW12-016	PSNS015-16	3174-163	WAT	Walkin cold room	TSS	04/20/12
SW12-017	PSNS015-17	3174-165	WAT	Walkin cold room	TSS	04/20/12
SW12-018	PSNS015-18	3174-167	WAT	Walkin cold room	TSS	04/20/12
SW12-020	PSNS015-COMP	3174-169	WAT	Walkin cold room	TSS	04/20/12

SOP#: MSL-A-001

SAMPLE LOGIN

Project Manager: Brandenberger
Date Received: 4/20/2012
Batch: 13
Login Designee: Suslick

Project: **ENVVEST Non-Dry Dock Storm Water - SW12**

Marine Sciences Laboratory
1529 West Sequim Bay Road
Sequim, Washington 98382
PH: (360) 681-4565

Sponsor ID	Site Description	Battelle Code		Matrix	Storage Location	Requested Parameters	Collection Date
			Updated Code - should reflect the dissolved portion of the sample (CS, 8/2/12)				
SW12-001	PSNS015-1	3174-133	3174-134	WAT	Walkin Freezer	DOC	04/20/12
SW12-002	PSNS015-2	3174-135	3174-136	WAT	Walkin Freezer	DOC	04/20/12
SW12-003	PSNS015-3	3174-137	3174-138	WAT	Walkin Freezer	DOC	04/20/12
SW12-004	PSNS015-4	3174-139	3174-140	WAT	Walkin Freezer	DOC	04/20/12
SW12-005	PSNS015-5	3174-141	3174-142	WAT	Walkin Freezer	DOC	04/20/12
SW12-006	PSNS015-6	3174-143	3174-144	WAT	Walkin Freezer	DOC	04/20/12
SW12-007	PSNS015-7	3174-145	3174-146	WAT	Walkin Freezer	DOC	04/20/12
SW12-008	PSNS015-8	3174-147	3174-148	WAT	Walkin Freezer	DOC	04/20/12
SW12-009	PSNS015-9	3174-149	3174-150	WAT	Walkin Freezer	DOC	04/20/12
SW12-010	PSNS015-10	3174-151	3174-152	WAT	Walkin Freezer	DOC	04/20/12
SW12-011	PSNS015-11	3174-153	3174-154	WAT	Walkin Freezer	DOC	04/20/12
SW12-012	PSNS015-12	3174-155	3174-156	WAT	Walkin Freezer	DOC	04/20/12
SW12-013	PSNS015-13	3174-157	3174-158	WAT	Walkin Freezer	DOC	04/20/12
SW12-014	PSNS015-14	3174-159	3174-160	WAT	Walkin Freezer	DOC	04/20/12
SW12-015	PSNS015-15	3174-161	3174-162	WAT	Walkin Freezer	DOC	04/20/12
SW12-016	PSNS015-16	3174-163	3174-164	WAT	Walkin Freezer	DOC	04/20/12
SW12-017	PSNS015-17	3174-165	3174-166	WAT	Walkin Freezer	DOC	04/20/12
SW12-018	PSNS015-18	3174-167	3174-168	WAT	Walkin Freezer	DOC	04/20/12
SW12-020	PSNS015-COMP	3174-169	3174-170	WAT	Walkin Freezer	DOC	04/20/12

SOP#: MSL-A-001

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 3174 Sample No(s): 133-170 Batch: 13

Project Name: SW12 Project Manager: JMB

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: ____ WP# ____

Yes	No	
☐	☐	Navy-type Project (requires high-level sample tracking procedures)
☐	☐	USDA Samples (see Compliance Agreement Checklist)
☐	☐	Filter Samples: *Amount:* Entire sample Half of sample
☐	☐	Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Login Lab)
☐	☐	Special instructions:

PM Verification:

Sample Preservation Instructions:

See LIMS for archive/disposal information

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
☐	☐	☑	Custody seal present Seal intact? YES NO
☑	☐	☐	Cooler temperature (acceptable range: 4±2°C or solids:frozen) (if multiple coolers, note temp. of each) hand delivered 4±2° °C; ___ °C
☐	☐	☑	Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc) Comment/Remedy:
☑	☐	☐	Were all chain of custody forms signed and dated?
☑	☐	☐	Were samples filtered at MSL? (as noted on CoC)

Sample condition(s): (Acceptable) Other (explain):

Container type: (Teflon) (Poly) (Glass) Cap. Vial Other:

Notes:

Completed By: [signature] Date/Time: 4/20/12 1800

SAMPLE PRESERVATION

☐ Sample(s) were preserved prior to arrival at MSL (noted on CoC / Sample / per PM Instruction)

☐ Random pH checked for ~10% of samples (use dip paper) Sample IDs:

☐ Complete pH check required for project (use pH meter and record on pH Record form)

☐ Sample(s) were preserved at MSL

Type:

	Type	Notes	Lot#
☑	0.2% HNO3	Optima	1211090
☐	0.5% HCl (Hg samples)		
☑	Refrigerate/Freeze		
☐	Other		

Completed By: [signature] Date/Time: 4/20/12 1830

Storage Shelf: Met - Lab 231, TSS - Walk-in Cooler, DOC Walk-in FZR

Battelle Marine Sciences Labs, 1529 West Sequim Bay Rd, Sequim, Washington 98362 PH: (360) 681-4565

APPENDIX C

Loading Tables

SW08 Through SW12

Station	Basin Area ft^2	Basin Area acres	%TIA	%Pervious	RC_imp	RC_p	Total Discharge Vol ($ft.^3$)	Primary Work Activity
PSNS126	662986	15.22	98.55%	1.45%	0.9	0.4	591,881	Material storage
PSNS096	717872	16.48	97.00%	3.00%	0.9	0.4	635,317	Vessel maintenance
PSNS082.5	87120	2.00	100.00%	0.00%	0.95		82,764	Vessel, equipment and materials recycling
PSNS081.1	965294	22.16	97.00%	3.00%	0.9	0.22	849,073	Non-aircraft carrier support services
PSNS032	208653	4.79	97.00%	3.00%	0.9	0.4	184,658	Aircraft carrier support services
PSNS015	4018862	92.26	50.00%	50.00%	0.8	0.4	2,411,317	Municipal/commercial/residential
PSNS008	553650	12.71	94.00%	6.00%	0.8	0.4	429,632	Parking/steam plant/truck traffic
PSNS084.1	23958	0.55	100%	0.00%	0.9		21,562	Vehicle and equip. traffic, rad. work builds, outside equip. storage, paint shop, recycling, indust. waste pretreatment
PSNS115.1	463042	10.63	97%	3.00%	0.9	0.4	366,390	Materials storage (outdoors), various shops and training center, water front support activities
PSNS124	454000	10.42	94.56%	5.44%	0.9	0.4	386,251	Material storage, Pipe/Boiler/Forge/ Nuclear Repair Shops, Chem Lab, DD3 cutting facility
PSNS124.1	116000	2.66	94.56%	5.44%	0.9	0.4	101,245	Dry-dock support activities, crane, vehicle and equipment traffic, laydown and staging areas

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR Ag	0.0196	µg/L	NA	no	0.203
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR Ag	0.0163	µg/L	NA	no	0.120
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR Ag	0.0173	µg/L	NA	no	0.057
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR Ag	0.0280	µg/L	NA	no	0.279
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR Ag	0.0445	µg/L	NA	no	0.116
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR Ag	0.0190	µg/L	NA	no	0.002
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR Ag	0.0134	µg/L	NA	no	0.001
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR Ag	0.0217	µg/L	NA	no	0.001
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR Ag	0.0183	µg/L	NA	no	0.001
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR Ag	0.0739	µg/L	NA	no	0.093
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR Ag	0.106	µg/L	NA	no	0.107
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR Ag	0.0529	µg/L	NA	no	0.021
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR Ag	0.0666	µg/L	NA	no	0.067
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR Ag	0.0457	µg/L	NA	no	0.052
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR Ag	0.0179	µg/L	NA	no	0.020
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR Ag	0.170	µg/L	NA	no	0.030
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR Ag	0.227	µg/L	NA	no	0.261
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR Ag	0.0311	µg/L	NA	no	0.015
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR Ag	0.0191	µg/L	NA	no	0.005
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR Ag	0.0230	µg/L	NA	no	0.001
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR Ag	0.0399	µg/L	NA	no	0.014
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR Ag	0.0418	µg/L	NA	no	0.079
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR Ag	0.0175	µg/L	NA	no	0.025
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR Ag	0.190	µg/L	NA	no	0.119
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR Ag	0.148	µg/L	NA	no	0.267
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR As	0.689	µg/L	69	no	7.135
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR As	0.741	µg/L	69	no	5.439
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR As	0.615	µg/L	69	no	2.030
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR As	0.606	µg/L	69	no	6.034
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR As	1.01	µg/L	69	no	2.644
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR As	0.947	µg/L	69	no	0.081
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR As	0.768	µg/L	69	no	0.044
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR As	1.56	µg/L	69	no	0.044
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR As	0.985	µg/L	69	no	0.079
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR As	2.65	µg/L	69	no	3.322
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR As	1.80	µg/L	69	no	1.821
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR As	1.22	µg/L	69	no	0.485
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR As	1.16	µg/L	69	no	1.173
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR As	2.21	µg/L	69	no	2.521
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR As	1.58	µg/L	69	no	1.743
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR As	7.69	µg/L	69	no	1.366
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR As	1.37	µg/L	69	no	1.576
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR As	0.987	µg/L	69	no	0.469
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR As	0.724	µg/L	69	no	0.195
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR As	1.62	µg/L	69	no	0.089
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR As	0.932	µg/L	69	no	0.338
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR As	3.50	µg/L	69	no	6.648
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR As	2.14	µg/L	69	no	3.079
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR As	6.22	µg/L	69	no	3.909
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR As	4.05	µg/L	69	no	7.297
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR Cd	0.0518	µg/L	NA	no	0.536
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR Cd	0.0842	µg/L	NA	no	0.618
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR Cd	0.2070	µg/L	NA	no	0.683

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR Cd	0.0891	µg/L	NA	no	0.887
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR Cd	0.0610	µg/L	NA	no	0.160
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR Cd	0.163	µg/L	NA	no	0.014
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR Cd	0.255	µg/L	NA	no	0.015
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR Cd	0.150	µg/L	NA	no	0.004
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR Cd	0.171	µg/L	NA	no	0.014
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR Cd	0.531	µg/L	NA	no	0.666
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR Cd	0.496	µg/L	NA	no	0.502
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR Cd	0.232	µg/L	NA	no	0.092
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR Cd	0.512	µg/L	NA	no	0.518
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR Cd	0.380	µg/L	NA	no	0.433
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR Cd	0.286	µg/L	NA	no	0.316
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR Cd	0.945	µg/L	NA	no	0.168
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR Cd	0.585	µg/L	NA	no	0.673
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR Cd	1.02	µg/L	NA	no	0.485
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR Cd	0.631	µg/L	NA	no	0.170
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR Cd	0.640	µg/L	NA	no	0.035
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR Cd	1.21	µg/L	NA	no	0.439
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR Cd	0.202	µg/L	NA	no	0.384
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR Cd	0.130	µg/L	NA	no	0.187
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR Cd	0.256	µg/L	NA	no	0.161
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR Cd	0.254	µg/L	NA	no	0.458
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR Cr	2.32	µg/L	NA	no	24.026
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR Cr	3.20	µg/L	NA	no	23.489
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR Cr	1.92	µg/L	NA	no	6.336
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR Cr	2.56	µg/L	NA	no	25.492
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR Cr	2.32	µg/L	NA	no	6.072
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR Cr	3.10	µg/L	NA	no	0.267
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR Cr	3.96	µg/L	NA	no	0.228
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR Cr	2.09	µg/L	NA	no	0.058
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR Cr	1.88	µg/L	NA	no	0.151
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR Cr	14.9	µg/L	NA	no	18.679
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR Cr	6.33	µg/L	NA	no	6.403
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR Cr	1.65	µg/L	NA	no	0.656
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR Cr	2.90	µg/L	NA	no	2.934
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR Cr	7.08	µg/L	NA	no	8.077
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR Cr	6.14	µg/L	NA	no	6.775
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR Cr	5.66	µg/L	NA	no	1.006
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR Cr	4.65	µg/L	NA	no	5.348
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR Cr	8.03	µg/L	NA	no	3.818
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR Cr	5.94	µg/L	NA	no	1.604
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR Cr	4.57	µg/L	NA	no	0.251
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR Cr	8.07	µg/L	NA	no	2.931
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR Cr	2.22	µg/L	NA	no	4.217
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR Cr	1.83	µg/L	NA	no	2.633
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR Cr	1.54	µg/L	NA	no	0.968
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR Cr	1.59	µg/L	NA	no	2.865
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR Cu	8.05	µg/L	5.8	yes	83.365
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR Cu	9.74	µg/L	5.8	yes	71.494
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR Cu	8.71	µg/L	5.8	yes	28.745
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR Cu	10.8	µg/L	5.8	yes	107.543
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR Cu	14.4	µg/L	5.8	yes	37.691
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR Cu	14.7	µg/L	5.8	yes	1.264

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR Cu	21.1	µg/L	5.8	yes	1.213
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR Cu	19.1	µg/L	5.8	yes	0.535
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR Cu	17.3	µg/L	5.8	yes	1.391
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR Cu	33.5	µg/L	5.8	yes	41.997
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR Cu	51.0	µg/L	5.8	yes	51.590
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR Cu	22.7	µg/L	5.8	yes	9.028
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR Cu	33.0	µg/L	5.8	yes	33.382
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR Cu	74.2	µg/L	5.8	yes	84.644
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR Cu	39.5	µg/L	5.8	yes	43.583
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR Cu	170	µg/L	5.8	yes	30.202
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR Cu	54.2	µg/L	5.8	yes	62.336
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR Cu	43.6	µg/L	5.8	yes	20.729
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR Cu	35.6	µg/L	5.8	yes	9.611
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR Cu	34.6	µg/L	5.8	yes	1.901
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR Cu	57.5	µg/L	5.8	yes	20.881
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR Cu	16.9	µg/L	5.8	yes	32.101
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR Cu	8.98	µg/L	5.8	yes	12.918
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR Cu	27.0	µg/L	5.8	yes	16.970
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR Cu	15.9	µg/L	5.8	yes	28.647
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR Hg	26.6	ng/L	2100	no	0.275
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR Hg	26.1	ng/L	2100	no	0.192
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR Hg	11.9	ng/L	2100	no	0.039
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR Hg	21.0	ng/L	2100	no	0.209
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR Hg	46.2	ng/L	2100	no	0.121
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR Hg	4.09	ng/L	2100	no	0.000
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR Hg	4.55	ng/L	2100	no	0.000
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR Hg	3.81	ng/L	2100	no	0.000
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR Hg	4.00	ng/L	2100	no	0.000
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR Hg	16.8	ng/L	2100	no	0.021
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR Hg	18.6	ng/L	2100	no	0.019
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR Hg	11.8	ng/L	2100	no	0.005
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR Hg	9.12	ng/L	2100	no	0.009
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR Hg	18.8	ng/L	2100	no	0.021
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR Hg	7.27	ng/L	2100	no	0.008
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR Hg	47.6	ng/L	2100	no	0.008
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR Hg	17.1	ng/L	2100	no	0.020
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR Hg	7.01	ng/L	2100	no	0.003
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR Hg	5.68	ng/L	2100	no	0.002
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR Hg	3.30	ng/L	2100	no	0.000
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR Hg	6.52	ng/L	2100	no	0.002
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR Hg	5.68	ng/L	2100	no	0.011
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR Hg	3.96	ng/L	2100	no	0.006
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR Hg	15.9	ng/L	2100	no	0.010
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR Hg	12.6	ng/L	2100	no	0.023
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR Pb	8.96	µg/L	221	no	92.789
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR Pb	9.47	µg/L	221	no	69.512
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR Pb	8.40	µg/L	221	no	27.722
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR Pb	13.1	µg/L	221	no	130.445
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR Pb	12.0	µg/L	221	no	31.409
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR Pb	3.88	µg/L	221	no	0.334
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR Pb	8.91	µg/L	221	no	0.512
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR Pb	4.33	µg/L	221	no	0.121
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR Pb	5.18	µg/L	221	no	0.416

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR Pb	16.6	µg/L	221	no	20.811
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR Pb	35.7	µg/L	221	no	36.113
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR Pb	2.59	µg/L	221	no	1.030
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR Pb	11.8	µg/L	221	no	11.936
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR Pb	8.63	µg/L	221	no	9.845
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR Pb	4.95	µg/L	221	no	5.462
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR Pb	14.5	µg/L	221	no	2.576
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR Pb	10.4	µg/L	221	no	11.961
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR Pb	12.9	µg/L	221	no	6.133
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR Pb	13.7	µg/L	221	no	3.699
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR Pb	6.04	µg/L	221	no	0.332
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR Pb	14.8	µg/L	221	no	5.375
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR Pb	4.50	µg/L	221	no	8.548
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR Pb	3.52	µg/L	221	no	5.064
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR Pb	3.00	µg/L	221	no	1.886
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR Pb	4.56	µg/L	221	no	8.216
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	TR Zn	56.8	µg/L	95	no	588.218
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	TR Zn	69.1	µg/L	95	no	507.208
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	TR Zn	74.8	µg/L	95	no	246.858
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	TR Zn	68.0	µg/L	95	no	677.120
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	TR Zn	78.4	µg/L	95	no	205.207
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	TR Zn	137	µg/L	95	yes	11.781
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	TR Zn	169	µg/L	95	yes	9.717
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	TR Zn	157	µg/L	95	yes	4.394
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	TR Zn	135	µg/L	95	yes	10.853
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	TR Zn	206	µg/L	95	yes	258.251
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	TR Zn	177	µg/L	95	yes	179.047
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	TR Zn	127	µg/L	95	yes	50.509
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	TR Zn	190	µg/L	95	yes	192.197
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	TR Zn	114	µg/L	95	yes	130.047
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	TR Zn	76.6	µg/L	95	no	84.517
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	TR Zn	408	µg/L	95	yes	72.486
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	TR Zn	153	µg/L	95	yes	175.967
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	TR Zn	201	µg/L	95	yes	95.562
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	TR Zn	184	µg/L	95	yes	49.675
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	TR Zn	100	µg/L	95	yes	5.495
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	TR Zn	201	µg/L	95	yes	72.992
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	TR Zn	80.3	µg/L	95	no	152.529
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	TR Zn	61.9	µg/L	95	no	89.048
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	TR Zn	75.4	µg/L	95	no	47.389
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	TR Zn	76.6	µg/L	95	no	138.012

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d Ag	0.002	µg/L			0.021
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d Ag	0.002	µg/L			0.015
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d Ag	0.00579	µg/L			0.019
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d Ag	0.00313	µg/L			0.031
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d Ag	0.00468	µg/L			0.012
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d Ag	0.0023	µg/L			0.000
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d Ag	0.002	µg/L			0.000
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d Ag	0.00795	µg/L			0.000
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d Ag	0.00552	µg/L			0.000
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d Ag	0.0106	µg/L			0.013
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d Ag	0.00354	µg/L			0.004
PSNS115.1	2/29/2012	SW10	0.46	s	14,045	397711	d Ag	0.0235	µg/L			0.009
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d Ag	0.0113	µg/L			0.011
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d Ag	0.00371	µg/L			0.004
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d Ag	0.002	µg/L			0.002
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d Ag	0.0913	µg/L			0.016
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d Ag	0.0139	µg/L			0.016
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d Ag	0.002	µg/L			0.001
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d Ag	0.002	µg/L			0.001
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d Ag	0.00455	µg/L			0.000
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d Ag	0.00532	µg/L			0.002
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d Ag	0.0193	µg/L			0.037
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d Ag	0.0020	µg/L			0.003
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d Ag	0.128	µg/L			0.080
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d Ag	0.0664	µg/L			0.120
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d As	0.542	µg/L			5.613
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d As	0.503	µg/L			3.692
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d As	0.513	µg/L			1.693
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d As	0.356	µg/L			3.545
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d As	0.812	µg/L			2.125
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d As	0.840	µg/L			0.072
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d As	0.489	µg/L			0.028
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d As	1.46	µg/L			0.041
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d As	0.818	µg/L			0.066
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d As	2.22	µg/L			2.783
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d As	0.455	µg/L			0.460
PSNS115.1	2/29/2012	SW10	0.46	s	14,045	397711	d As	1.21	µg/L			0.481
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d As	0.826	µg/L			0.836
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d As	1.53	µg/L			1.745
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d As	1.37	µg/L			1.512
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d As	7.32	µg/L			1.300
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d As	0.851	µg/L			0.979
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d As	0.646	µg/L			0.307
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d As	0.532	µg/L			0.144
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d As	1.55	µg/L			0.085
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d As	0.606	µg/L			0.220
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d As	3.28	µg/L			6.230
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d As	2.03	µg/L			2.920
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d As	6.34	µg/L			3.985
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d As	3.79	µg/L			6.829
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d Cd	0.0264	µg/L			0.273
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d Cd	0.0386	µg/L			0.283
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d Cd	0.0325	µg/L			0.107

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d Cd	0.0308	µg/L			0.307
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d Cd	0.0277	µg/L			0.073
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d Cd	0.106	µg/L			0.009
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d Cd	0.112	µg/L			0.006
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d Cd	0.101	µg/L			0.003
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d Cd	0.0976	µg/L			0.008
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d Cd	0.270	µg/L			0.338
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d Cd	0.170	µg/L			0.172
PSNS115.1	2/29/2012	SW10	0.46	s	14,045	397711	d Cd	0.194	µg/L			0.077
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d Cd	0.228	µg/L			0.231
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d Cd	0.181	µg/L			0.206
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d Cd	0.207	µg/L			0.228
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d Cd	0.319	µg/L			0.057
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d Cd	0.218	µg/L			0.251
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d Cd	0.566	µg/L			0.269
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d Cd	0.309	µg/L			0.083
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d Cd	0.486	µg/L			0.027
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d Cd	0.535	µg/L			0.194
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d Cd	0.129	µg/L			0.245
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d Cd	0.0724	µg/L			0.104
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d Cd	0.194	µg/L			0.122
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d Cd	0.121	µg/L			0.218
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d Cr	1.49	µg/L			15.430
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d Cr	1.70	µg/L			12.478
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d Cr	0.876	µg/L			2.891
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d Cr	0.917	µg/L			9.131
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d Cr	0.888	µg/L			2.324
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d Cr	2.20	µg/L			0.189
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d Cr	1.05	µg/L			0.060
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d Cr	1.03	µg/L			0.029
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d Cr	0.732	µg/L			0.059
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d Cr	12.6	µg/L			15.796
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d Cr	0.851	µg/L			0.861
PSNS115.1	2/29/2012	SW10	0.46	s	14,045	397711	d Cr	0.987	µg/L			0.393
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d Cr	0.764	µg/L			0.773
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d Cr	5.00	µg/L			5.704
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d Cr	5.33	µg/L			5.881
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d Cr	1.61	µg/L			0.286
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d Cr	1.05	µg/L			1.208
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d Cr	3.62	µg/L			1.721
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d Cr	1.97	µg/L			0.532
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d Cr	2.82	µg/L			0.155
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d Cr	1.70	µg/L			0.617
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d Cr	1.56	µg/L			2.963
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d Cr	1.54	µg/L			2.215
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d Cr	0.951	µg/L			0.598
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d Cr	0.720	µg/L			1.297
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d Cu	3.94	µg/L			40.802
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d Cu	2.80	µg/L			20.553
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d Cu	4.91	µg/L			16.204
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d Cu	3.07	µg/L			30.570
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d Cu	6.89	µg/L			18.034
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d Cu	7.33	µg/L			0.630

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d Cu	4.41	µg/L			0.254
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d Cu	11.0	µg/L			0.308
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d Cu	5.88	µg/L			0.473
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d Cu	9.04	µg/L			11.333
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d Cu	7.47	µg/L			7.556
PSNS115.1	2/29/2012	SW10	0.46	s	14,045	397711	d Cu	17.5	µg/L			6.960
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d Cu	8.57	µg/L			8.669
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d Cu	19.6	µg/L			22.359
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d Cu	16.1	µg/L			17.764
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d Cu	107	µg/L			19.010
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d Cu	15.3	µg/L			17.597
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d Cu	12.2	µg/L			5.800
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d Cu	7.65	µg/L			2.065
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d Cu	20.3	µg/L			1.115
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d Cu	12.1	µg/L			4.394
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d Cu	11.4	µg/L			21.654
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d Cu	4.78	µg/L			6.876
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d Cu	23.6	µg/L			14.833
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d Cu	10.0	µg/L			17.981
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d Hg	3.25	ng/L			0.034
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d Hg	1.80	ng/L			0.013
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d Hg	2.81	ng/L			0.009
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d Hg	2.16	ng/L			0.022
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d Hg	3.98	ng/L			0.010
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d Hg	1.23	ng/L			0.000
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d Hg	1.24	ng/L			0.000
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d Hg	1.71	ng/L			0.000
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d Hg	0.958	ng/L			0.000
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d Hg	1.94	ng/L			0.002
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d Hg	1.53	ng/L			0.002
PSNS115.1	2/29/2012	SW10	0.46	S	14,045	397711	d Hg	3.57	ng/L			0.001
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d Hg	1.75	ng/L			0.002
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d Hg	1.83	ng/L			0.002
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d Hg	1.98	ng/L			0.002
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d Hg	15.1	ng/L			0.003
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d Hg	1.87	ng/L			0.002
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d Hg	2.71	ng/L			0.001
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d Hg	1.30	ng/L			0.000
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d Hg	3.57	ng/L			0.000
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d Hg	1.78	ng/L			0.001
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d Hg	2.13	ng/L			0.004
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d Hg	1.85	ng/L			0.003
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d Hg	9.82	ng/L			0.006
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d Hg	4.20	ng/L			0.008
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d Pb	2.35	µg/L			24.336
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d Pb	0.393	µg/L			2.885
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d Pb	1.39	µg/L			4.587
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d Pb	0.880	µg/L			8.763
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d Pb	1.55	µg/L			4.057
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d Pb	0.207	µg/L			0.018
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d Pb	0.248	µg/L			0.014
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d Pb	0.375	µg/L			0.010
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d Pb	0.201	µg/L			0.016

Station	Date	Storm ID	Rain (inches)	Storm Size	Runoff Vol (ft^3)	Runoff Vol (L)	Parameter	EMC	EMC Units	Draft Permit	Exceed Draft	load (g)
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d Pb	0.472	µg/L			0.592
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d Pb	0.438	µg/L			0.443
PSNS115.1	2/29/2012	SW10	0.46	s	14,045	397711	d Pb	0.487	µg/L			0.194
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d Pb	0.339	µg/L			0.343
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d Pb	0.245	µg/L			0.279
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d Pb	0.193	µg/L			0.213
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d Pb	0.694	µg/L			0.123
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d Pb	0.260	µg/L			0.299
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d Pb	0.606	µg/L			0.288
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d Pb	0.371	µg/L			0.100
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d Pb	0.631	µg/L			0.035
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d Pb	0.797	µg/L			0.289
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d Pb	0.359	µg/L			0.682
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d Pb	0.255	µg/L			0.367
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d Pb	0.327	µg/L			0.206
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d Pb	0.290	µg/L			0.522
PSNS015	11/22/2011	SW08	1.82	L	365,717	10355952	d Zn	39.7	µg/L			411.131
PSNS015	1/21/2012	SW09	1.29	L	259,217	7340209	d Zn	37.7	µg/L			276.726
PSNS015	2/29/2012	SW10	0.58	M	116,547	3300247	d Zn	57.2	µg/L			188.774
PSNS015	3/15/2012	SW11	1.75	L	351,651	9957647	d Zn	35.5	µg/L			353.496
PSNS015	4/20/2012	SW12	0.46	S	92,434	2617438	d Zn	48.7	µg/L			127.469
PSNS084.1	11/22/2011	SW08	1.69	L	3,037	85989	d Zn	116	µg/L			9.975
PSNS084.1	1/21/2012	SW09	1.13	L	2,030	57497	d Zn	120	µg/L			6.900
PSNS084.1	2/29/2012	SW10	0.55	M	988	27986	d Zn	134	µg/L			3.750
PSNS084.1	3/15/2012	SW11	1.58	L	2,839	80391	d Zn	106	µg/L			8.521
PSNS115.1	11/22/2011	SW08	1.45	L	44,272	1253645	d Zn	139	µg/L			174.257
PSNS115.1	1/21/2012	SW09	1.17	L	35,723	1011564	d Zn	98.3	µg/L			99.437
PSNS115.1	2/29/2012	SW10	0.46	s	14,045	397711	d Zn	117	µg/L			46.532
PSNS115.1	3/15/2012	SW11	1.17	L	35,723	1011564	d Zn	119	µg/L			120.376
PSNS124	11/22/2011	SW08	1.22	L	40,286	1140760	d Zn	64.6	µg/L			73.693
PSNS124	1/21/2012	SW09	1.18	L	38,965	1103357	d Zn	54.5	µg/L			60.133
PSNS124	2/29/2012	SW10	0.19	S	6,274	177661	d Zn	145	µg/L			25.761
PSNS124	3/15/2012	SW11	1.23	L	40,616	1150110	d Zn	68.6	µg/L			78.898
PSNS124.1	11/22/2011	SW08	1.99	L	16,790	475433	d Zn	127	µg/L			60.380
PSNS124.1	1/21/2012	SW09	1.13	L	9,534	269972	d Zn	115	µg/L			31.047
PSNS124.1	2/29/2012	SW10	0.23	s	1,941	54949	d Zn	71	µg/L			3.907
PSNS124.1	3/15/2012	SW11	1.52	L	12,824	363146	d Zn	106	µg/L			38.493
PSNS126	11/22/2011	SW08	1.36	L	67,080	1899489	d Zn	61.5	µg/L			116.819
PSNS126	1/21/2012	SW09	1.03	L	50,803	1438585	d Zn	48.1	µg/L			69.196
PSNS126	2/29/2012	SW10	0.45	S	22,196	628507	d Zn	61.0	µg/L			38.339
PSNS126	3/15/2012	SW11	1.29	L	63,627	1801724	d Zn	49.2	µg/L			88.645

APPENDIX D

LISST Data SW12
*Summary Table
*Fraction Table

Appendix D: LISST-StreamSide Data File Summary Table

date/time	Total Conc. µL/L	Mean Size microns	silt/clay (<63µm) µL/L	very fined & fine sand (63-234µm) µL/L	medium sand (234-386µm) µL/L
4/18/12 13:54	9.67	57.39	4.00	5.16	0.52
4/18/12 14:09	13.94	53.22	6.35	7.32	0.26
4/18/12 14:24	8.81	103.83	2.12	6.09	0.60
4/18/12 14:39	8.82	112.84	1.87	6.29	0.67
4/18/12 14:54	8.97	116.65	1.82	6.38	0.77
4/18/12 15:09	9.42	128.14	1.57	6.96	0.89
4/18/12 15:24	8.99	137.06	1.27	6.86	0.86
4/18/12 15:39	8.85	134.03	1.32	6.69	0.84
4/18/12 15:54	8.37	135.70	1.24	6.35	0.79
4/18/12 16:09	8.54	138.49	1.20	6.50	0.84
4/18/12 16:24	8.91	142.42	1.15	6.85	0.90
4/18/12 16:39	9.15	142.04	1.18	7.11	0.86
4/18/12 16:54	9.76	145.94	1.15	7.67	0.94
4/18/12 17:09	10.53	146.82	1.20	8.33	0.99
4/18/12 17:24	10.81	143.11	1.33	8.49	0.99
4/18/12 17:39	10.70	144.33	1.29	8.41	1.00
4/18/12 17:54	10.11	138.85	1.35	7.86	0.91
4/18/12 18:09	9.16	135.41	1.33	7.02	0.81
4/18/12 18:24	9.36	134.36	1.40	7.12	0.84
4/18/12 18:39	8.78	129.19	1.45	6.57	0.75
4/18/12 18:54	8.02	125.15	1.43	5.90	0.69
4/18/12 19:09	7.45	118.17	1.53	5.31	0.61
4/18/12 19:24	7.50	104.08	1.93	4.95	0.62
4/18/12 19:39	5.15	67.91	1.95	3.14	0.07
4/18/12 19:54	3.94	36.99	2.09	1.83	0.02
4/18/12 20:09	4.02	32.45	2.32	1.69	0.01
4/19/12 1:39	1.40	7.53	1.40	0.00	0.00
4/19/12 1:54	1.45	15.61	1.45	0.00	0.00
4/19/12 2:54	4.35	38.92	2.47	1.85	0.03
4/19/12 7:24	2.79	31.24	1.92	0.62	0.24
4/19/12 9:09	6.89	22.77	6.37	0.52	0.00
4/19/12 9:24	7.55	39.19	5.01	2.54	0.00
4/19/12 10:09	10.55	56.99	4.66	5.89	0.00
4/19/12 10:24	1.24	14.24	1.24	0.00	0.00
4/19/12 10:39	1.13	14.35	1.13	0.00	0.00
4/19/12 10:54	4.37	37.72	3.87	0.50	0.00
4/19/12 11:09	0.87	13.56	0.87	0.00	0.00
4/19/12 11:24	0.95	14.11	0.95	0.00	0.00
4/19/12 11:39	0.83	13.97	0.83	0.00	0.00
4/19/12 11:54	0.85	14.35	0.85	0.00	0.00

Appendix D: LISST-StreamSide Data File Summary Table

date/time	Total Conc. µL/L	Mean Size microns	silt/clay (<63µm) µL/L	very fined & fine sand (63-234µm) µL/L	medium sand (234-386µm) µL/L
4/19/12 12:09	1.69	20.52	1.68	0.00	0.00
4/19/12 12:24	2.71	30.85	2.60	0.10	0.00
4/19/12 12:39	0.86	15.50	0.86	0.00	0.00
4/19/12 12:54	0.94	17.29	0.94	0.00	0.00
4/19/12 13:09	3.03	36.95	2.66	0.37	0.00
4/19/12 13:24	0.89	17.07	0.89	0.00	0.00
4/19/12 13:39	9.56	38.13	5.61	3.95	0.00
4/19/12 13:54	4.43	46.42	2.27	2.15	0.01
4/19/12 14:09	3.09	26.80	2.32	0.77	0.00
4/19/12 16:39	21.05	36.79	12.32	8.74	0.00
4/19/12 16:54	38.26	31.40	23.97	14.29	0.00
4/19/12 17:09	55.51	30.66	35.06	20.45	0.00
4/19/12 17:24	49.25	25.08	34.55	14.70	0.00
4/19/12 17:39	38.46	16.81	31.62	6.84	0.00
4/19/12 17:54	28.83	15.48	24.29	4.54	0.00
4/19/12 18:09	31.53	22.24	22.71	8.82	0.00
4/19/12 18:24	18.04	16.56	14.66	3.38	0.00
4/19/12 18:39	16.07	18.91	12.27	3.81	0.00
4/19/12 18:54	22.52	25.56	14.76	7.74	0.02
4/19/12 19:09	15.66	18.98	11.88	3.77	0.00
4/19/12 19:24	17.38	24.17	11.76	5.61	0.01
4/19/12 19:39	10.03	13.76	9.17	0.86	0.00
4/19/12 19:54	11.47	18.11	9.06	2.40	0.01
4/19/12 20:09	21.49	30.07	13.38	8.09	0.01
4/19/12 20:24	8.52	14.36	7.60	0.92	0.00
4/19/12 20:39	6.52	13.39	6.22	0.30	0.00
4/19/12 20:54	17.53	34.72	10.11	7.37	0.06
4/19/12 21:09	17.87	28.03	12.44	5.43	0.00
4/19/12 21:24	9.23	18.64	7.73	1.50	0.00
4/19/12 21:39	15.87	27.49	10.79	5.08	0.00
4/19/12 21:54	24.29	32.98	14.74	9.55	0.00
4/19/12 22:54	451.50	120.73	66.68	358.48	26.34
4/19/12 23:09	105.60	57.72	45.92	59.48	0.20
4/19/12 23:24	141.55	128.47	16.30	125.03	0.22
4/20/12 0:24	283.35	297.28	1.98	45.45	235.92
4/20/12 1:09	6.43	33.77	3.92	2.50	0.01
4/20/12 1:24	7.95	36.57	4.45	3.16	0.34
4/20/12 1:39	4.04	12.70	3.56	0.48	0.00
4/20/12 1:54	10.15	47.39	4.93	3.40	1.83
4/20/12 2:24	3.39	12.76	3.01	0.38	0.00

Appendix D: LISST-StreamSide Data File Summary Table

date/time	Total Conc. µL/L	Mean Size microns	silt/clay (<63µm) µL/L	very fined & fine sand (63-234µm) µL/L	medium sand (234-386µm) µL/L
4/20/12 2:39	3.38	11.38	3.20	0.18	0.00
4/20/12 2:54	4.40	15.06	3.75	0.64	0.00
4/20/12 3:09	39.20	64.76	16.27	15.00	7.93
4/20/12 3:24	77.75	146.19	5.24	71.40	1.11
4/20/12 3:39	8.83	44.92	4.55	4.19	0.08
4/20/12 3:54	17.88	48.20	8.81	8.87	0.20
4/20/12 4:09	6.13	29.55	4.45	1.67	0.00
4/20/12 4:24	6.10	29.40	4.48	1.62	0.00
4/20/12 4:39	10.29	41.77	5.72	4.52	0.05
4/20/12 4:54	11.71	46.12	6.09	5.45	0.17
4/20/12 5:39	24.82	44.00	12.88	11.87	0.07
4/20/12 5:54	14.93	41.94	7.66	7.14	0.13
4/20/12 6:09	7.95	32.43	4.79	3.06	0.09
4/20/12 6:24	5.26	19.58	3.97	1.26	0.03
4/20/12 6:39	11.34	41.19	5.82	5.20	0.32
4/20/12 6:54	11.92	42.88	5.88	5.69	0.35
4/20/12 7:09	4.64	23.65	3.14	1.38	0.12
4/20/12 7:24	4.84	24.76	3.25	1.38	0.20
4/20/12 7:39	3.83	15.68	3.24	0.58	0.01
4/20/12 7:54	3.33	14.40	2.90	0.44	0.00
4/20/12 8:09	1.94	11.45	1.86	0.08	0.00
4/20/12 8:24	3.13	14.70	2.92	0.21	0.00
4/20/12 9:24	524.20	111.00	86.05	438.00	0.15
4/20/12 9:39	35.49	140.85	3.50	28.16	3.83
4/20/12 9:54	3.58	16.18	2.95	0.60	0.02
4/20/12 10:09	2.54	11.24	2.35	0.19	0.00
4/20/12 10:24	2.44	13.68	2.11	0.33	0.00
4/20/12 10:39	1.59	10.71	1.48	0.10	0.01
4/20/12 10:54	1.26	9.37	1.22	0.04	0.00
4/20/12 11:09	1.11	8.60	1.11	0.00	0.00
4/20/12 11:24	1.05	9.27	1.04	0.01	0.00
4/20/12 11:39	0.85	8.40	0.85	0.00	0.00
4/20/12 11:54	0.78	9.20	0.78	0.00	0.00

Appendix D: LISST-StreamSide Data File

Fraction:			1	2	3	4	5	6	7
	Total Conc.	Mean Size	2.06	2.43	2.87	3.39	4.01	4.73	5.59
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/18/12 13:54	9.67	57.39	0.2306	0.1466	0.1181	0.0977	0.1018	0.1506	0.2050
4/18/12 14:09	13.94	53.22	0.0823	0.0800	0.0859	0.1019	0.1385	0.2078	0.2635
4/18/12 14:24	8.81	103.83	0.0004	0.0012	0.0031	0.0113	0.0380	0.0751	0.0913
4/18/12 14:39	8.82	112.84	0.0000	0.0001	0.0003	0.0028	0.0233	0.0687	0.0886
4/18/12 14:54	8.97	116.65	0.0000	0.0001	0.0003	0.0031	0.0258	0.0721	0.0875
4/18/12 15:09	9.42	128.14	0.0000	0.0000	0.0001	0.0015	0.0185	0.0628	0.0810
4/18/12 15:24	8.99	137.06	0.0000	0.0000	0.0000	0.0005	0.0108	0.0478	0.0660
4/18/12 15:39	8.85	134.03	0.0000	0.0000	0.0000	0.0008	0.0139	0.0540	0.0705
4/18/12 15:54	8.37	135.70	0.0000	0.0000	0.0000	0.0004	0.0100	0.0468	0.0652
4/18/12 16:09	8.54	138.49	0.0000	0.0000	0.0000	0.0003	0.0082	0.0442	0.0619
4/18/12 16:24	8.91	142.42	0.0000	0.0000	0.0000	0.0002	0.0074	0.0429	0.0623
4/18/12 16:39	9.15	142.04	0.0000	0.0000	0.0000	0.0002	0.0065	0.0397	0.0597
4/18/12 16:54	9.76	145.94	0.0000	0.0000	0.0000	0.0001	0.0056	0.0377	0.0584
4/18/12 17:09	10.53	146.82	0.0000	0.0000	0.0000	0.0002	0.0069	0.0397	0.0596
4/18/12 17:24	10.81	143.11	0.0000	0.0000	0.0000	0.0004	0.0094	0.0441	0.0634
4/18/12 17:39	10.70	144.33	0.0000	0.0000	0.0000	0.0005	0.0109	0.0457	0.0603
4/18/12 17:54	10.11	138.85	0.0000	0.0000	0.0000	0.0009	0.0136	0.0502	0.0651
4/18/12 18:09	9.16	135.41	0.0000	0.0000	0.0000	0.0008	0.0125	0.0490	0.0656
4/18/12 18:24	9.36	134.36	0.0000	0.0000	0.0001	0.0015	0.0162	0.0519	0.0654
4/18/12 18:39	8.78	129.19	0.0000	0.0000	0.0001	0.0016	0.0163	0.0512	0.0650
4/18/12 18:54	8.02	125.15	0.0000	0.0000	0.0002	0.0019	0.0178	0.0528	0.0664
4/18/12 19:09	7.45	118.17	0.0000	0.0001	0.0003	0.0027	0.0210	0.0580	0.0700
4/18/12 19:24	7.50	104.08	0.0002	0.0007	0.0021	0.0090	0.0354	0.0740	0.0867
4/18/12 19:39	5.15	67.91	0.0046	0.0091	0.0155	0.0322	0.0645	0.0954	0.1051
4/18/12 19:54	3.94	36.99	0.1051	0.0783	0.0703	0.0665	0.0766	0.1132	0.1457
4/18/12 20:09	4.02	32.45	0.1247	0.0905	0.0800	0.0745	0.0850	0.1262	0.1619
4/19/12 1:39	1.40	7.53	0.1878	0.0944	0.0643	0.0428	0.0380	0.0561	0.0810
4/19/12 1:54	1.45	15.61	0.0028	0.0055	0.0093	0.0195	0.0402	0.0621	0.0708
4/19/12 2:54	4.35	38.92	0.0073	0.0124	0.0195	0.0370	0.0714	0.1117	0.1302
4/19/12 7:24	2.79	31.24	0.0274	0.0275	0.0299	0.0357	0.0484	0.0726	0.0934
4/19/12 9:09	6.89	22.77	0.0039	0.0089	0.0169	0.0414	0.0976	0.1599	0.1892
4/19/12 9:24	7.55	39.19	0.0002	0.0008	0.0024	0.0100	0.0376	0.0750	0.0929
4/19/12 10:09	10.55	56.99	0.0000	0.0000	0.0000	0.0003	0.0025	0.0102	0.0211
4/19/12 10:24	1.24	14.24	0.0002	0.0008	0.0025	0.0104	0.0353	0.0532	0.0491
4/19/12 10:39	1.13	14.35	0.0002	0.0008	0.0025	0.0104	0.0341	0.0491	0.0431
4/19/12 10:54	4.37	37.72	0.0000	0.0001	0.0003	0.0020	0.0114	0.0250	0.0311
4/19/12 11:09	0.87	13.56	0.0001	0.0006	0.0021	0.0093	0.0309	0.0395	0.0313
4/19/12 11:24	0.95	14.11	0.0001	0.0004	0.0015	0.0082	0.0317	0.0423	0.0324
4/19/12 11:39	0.83	13.97	0.0000	0.0002	0.0009	0.0063	0.0290	0.0380	0.0273
4/19/12 11:54	0.85	14.35	0.0000	0.0003	0.0010	0.0063	0.0265	0.0361	0.0285
4/19/12 12:09	1.69	20.52	0.0004	0.0015	0.0039	0.0137	0.0369	0.0457	0.0398
4/19/12 12:24	2.71	30.85	0.0000	0.0001	0.0006	0.0037	0.0180	0.0300	0.0295
4/19/12 12:39	0.86	15.50	0.0000	0.0001	0.0006	0.0051	0.0259	0.0330	0.0234
4/19/12 12:54	0.94	17.29	0.0000	0.0001	0.0004	0.0040	0.0234	0.0311	0.0227

Appendix D: LISST-StreamSide Data File

Fraction:			1	2	3	4	5	6	7
	Total Conc.	Mean Size	2.06	2.43	2.87	3.39	4.01	4.73	5.59
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/19/12 13:09	3.03	36.95	0.0000	0.0000	0.0001	0.0008	0.0074	0.0167	0.0185
4/19/12 13:24	0.89	17.07	0.0000	0.0001	0.0004	0.0041	0.0229	0.0300	0.0214
4/19/12 13:39	9.56	38.13	0.0014	0.0037	0.0078	0.0227	0.0647	0.1258	0.1679
4/19/12 13:54	4.43	46.42	0.0096	0.0127	0.0169	0.0263	0.0442	0.0706	0.0899
4/19/12 14:09	3.09	26.80	0.0085	0.0114	0.0154	0.0245	0.0421	0.0675	0.0851
4/19/12 16:39	21.05	36.79	0.0627	0.0754	0.0936	0.1335	0.2086	0.3219	0.4107
4/19/12 16:54	38.26	31.40	0.3082	0.2908	0.3061	0.3538	0.4700	0.7034	0.9134
4/19/12 17:09	55.51	30.66	0.5032	0.4706	0.4937	0.5691	0.7564	1.1319	1.4451
4/19/12 17:24	49.25	25.08	0.6800	0.6042	0.6131	0.6784	0.8759	1.3079	1.6681
4/19/12 17:39	38.46	16.81	1.1576	0.9319	0.8802	0.8862	1.0554	1.5188	1.8774
4/19/12 17:54	28.83	15.48	1.1164	0.8306	0.7447	0.7025	0.7980	1.1495	1.4547
4/19/12 18:09	31.53	22.24	0.9408	0.6919	0.6149	0.5737	0.6471	0.9368	1.2041
4/19/12 18:24	18.04	16.56	0.8145	0.5510	0.4633	0.4036	0.4336	0.6293	0.8226
4/19/12 18:39	16.07	18.91	0.6766	0.4489	0.3727	0.3198	0.3410	0.5001	0.6667
4/19/12 18:54	22.52	25.56	0.7295	0.5059	0.4329	0.3866	0.4272	0.6343	0.8317
4/19/12 19:09	15.66	18.98	0.6236	0.4234	0.3580	0.3151	0.3441	0.5104	0.6789
4/19/12 19:24	17.38	24.17	0.5876	0.3969	0.3354	0.2960	0.3268	0.4959	0.6743
4/19/12 19:39	10.03	13.76	0.5152	0.3357	0.2748	0.2313	0.2423	0.3530	0.4742
4/19/12 19:54	11.47	18.11	0.5057	0.3269	0.2668	0.2241	0.2354	0.3467	0.4690
4/19/12 20:09	21.49	30.07	0.4689	0.3368	0.2946	0.2700	0.3032	0.4518	0.6126
4/19/12 20:24	8.52	14.36	0.4520	0.2836	0.2263	0.1845	0.1895	0.2792	0.3843
4/19/12 20:39	6.52	13.39	0.3527	0.2148	0.1684	0.1347	0.1373	0.2062	0.2919
4/19/12 20:54	17.53	34.72	0.3820	0.2597	0.2210	0.1974	0.2214	0.3426	0.4728
4/19/12 21:09	17.87	28.03	0.2407	0.1813	0.1639	0.1568	0.1826	0.2789	0.3936
4/19/12 21:24	9.23	18.64	0.3074	0.2008	0.1654	0.1410	0.1514	0.2306	0.3276
4/19/12 21:39	15.87	27.49	0.2676	0.1922	0.1683	0.1546	0.1750	0.2672	0.3801
4/19/12 21:54	24.29	32.98	0.2776	0.2103	0.1904	0.1820	0.2111	0.3205	0.4543
4/19/12 22:54	451.50	120.73	0.0000	0.0000	0.0000	0.0000	0.0005	0.0191	0.1611
4/19/12 23:09	105.60	57.72	0.2454	0.2815	0.3290	0.4254	0.5910	0.8244	0.9994
4/19/12 23:24	141.55	128.47	0.1176	0.1328	0.1527	0.1928	0.2629	0.3652	0.4366
4/20/12 0:24	283.35	297.28	0.1799	0.1418	0.1453	0.1747	0.2726	0.4919	0.4300
4/20/12 1:09	6.43	33.77	0.1536	0.0921	0.0712	0.0559	0.0565	0.0864	0.1296
4/20/12 1:24	7.95	36.57	0.4090	0.1915	0.1257	0.0806	0.0706	0.1094	0.1730
4/20/12 1:39	4.04	12.70	0.3792	0.1824	0.1221	0.0802	0.0714	0.1098	0.1695
4/20/12 1:54	10.15	47.39	0.3661	0.1961	0.1430	0.1057	0.1054	0.1715	0.2651
4/20/12 2:24	3.39	12.76	0.3326	0.1561	0.1024	0.0655	0.0572	0.0883	0.1387
4/20/12 2:39	3.38	11.38	0.3231	0.1557	0.1045	0.0691	0.0623	0.0971	0.1511
4/20/12 2:54	4.40	15.06	0.3355	0.1673	0.1147	0.0778	0.0711	0.1099	0.1686
4/20/12 3:09	39.20	64.76	0.2077	0.1855	0.1894	0.2120	0.2801	0.4392	0.6031
4/20/12 3:24	77.75	146.19	0.5205	0.1118	0.0507	0.0235	0.0218	0.0633	0.1627
4/20/12 3:39	8.83	44.92	0.0214	0.0250	0.0309	0.0443	0.0721	0.1226	0.1704
4/20/12 3:54	17.88	48.20	0.0836	0.0839	0.0935	0.1181	0.1742	0.2878	0.3913
4/20/12 4:09	6.13	29.55	0.0043	0.0080	0.0137	0.0297	0.0670	0.1224	0.1634
4/20/12 4:24	6.10	29.40	0.0018	0.0043	0.0087	0.0238	0.0648	0.1253	0.1647

Appendix D: LISST-StreamSide Data File

Fraction:			1	2	3	4	5	6	7
	Total Conc.	Mean Size	2.06	2.43	2.87	3.39	4.01	4.73	5.59
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/20/12 4:39	10.29	41.77	0.0292	0.0350	0.0438	0.0640	0.1056	0.1782	0.2400
4/20/12 4:54	11.71	46.12	0.0410	0.0458	0.0552	0.0773	0.1249	0.2146	0.2912
4/20/12 5:39	24.82	44.00	0.1089	0.1242	0.1486	0.2016	0.2993	0.4366	0.5062
4/20/12 5:54	14.93	41.94	0.1436	0.1243	0.1247	0.1370	0.1794	0.2829	0.3833
4/20/12 6:09	7.95	32.43	0.1440	0.1152	0.1087	0.1100	0.1338	0.2034	0.2724
4/20/12 6:24	5.26	19.58	0.2024	0.1405	0.1207	0.1087	0.1219	0.1863	0.2551
4/20/12 6:39	11.34	41.19	0.2374	0.1736	0.1551	0.1469	0.1717	0.2638	0.3541
4/20/12 6:54	11.92	42.88	0.2724	0.1843	0.1562	0.1390	0.1560	0.2442	0.3429
4/20/12 7:09	4.64	23.65	0.2704	0.1549	0.1169	0.0894	0.0891	0.1364	0.1961
4/20/12 7:24	4.84	24.76	0.2986	0.1618	0.1174	0.0855	0.0824	0.1270	0.1876
4/20/12 7:39	3.83	15.68	0.1884	0.1208	0.0976	0.0806	0.0835	0.1224	0.1683
4/20/12 7:54	3.33	14.40	0.1990	0.1166	0.0891	0.0692	0.0692	0.1043	0.1481
4/20/12 8:09	1.94	11.45	0.1379	0.0748	0.0544	0.0397	0.0384	0.0598	0.0906
4/20/12 8:24	3.13	14.70	0.1328	0.0775	0.0594	0.0465	0.0479	0.0767	0.1185
4/20/12 9:24	524.20	111.00	0.0033	0.0226	0.1002	0.7471	4.4366	8.6551	6.4435
4/20/12 9:39	35.49	140.85	0.6035	0.1763	0.0884	0.0424	0.0338	0.0681	0.1381
4/20/12 9:54	3.58	16.18	0.3316	0.1393	0.0854	0.0505	0.0423	0.0671	0.1109
4/20/12 10:09	2.54	11.24	0.3179	0.1282	0.0762	0.0432	0.0348	0.0546	0.0907
4/20/12 10:24	2.44	13.68	0.2859	0.1101	0.0633	0.0344	0.0268	0.0419	0.0713
4/20/12 10:39	1.59	10.71	0.2412	0.0859	0.0467	0.0236	0.0174	0.0274	0.0484
4/20/12 10:54	1.26	9.37	0.2121	0.0715	0.0374	0.0180	0.0129	0.0203	0.0364
4/20/12 11:09	1.11	8.60	0.1906	0.0649	0.0341	0.0164	0.0115	0.0178	0.0315
4/20/12 11:24	1.05	9.27	0.1736	0.0584	0.0303	0.0143	0.0099	0.0151	0.0269
4/20/12 11:39	0.85	8.40	0.1401	0.0485	0.0256	0.0124	0.0087	0.0133	0.0234
4/20/12 11:54	0.78	9.20	0.1228	0.0402	0.0204	0.0094	0.0064	0.0098	0.0179

Appendix D: LISST-StreamSide Data File

Fraction:			8	9	10	11	12	13	14
	Total Conc.	Mean Size	6.6	7.79	9.2	10.86	12.83	15.15	17.89
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/18/12 13:54	9.67	57.39	0.2149	0.2196	0.2270	0.2349	0.2477	0.2637	0.2546
4/18/12 14:09	13.94	53.22	0.2773	0.2808	0.2955	0.3279	0.3822	0.4465	0.4781
4/18/12 14:24	8.81	103.83	0.0933	0.0862	0.0855	0.0972	0.1235	0.1577	0.1793
4/18/12 14:39	8.82	112.84	0.0887	0.0750	0.0695	0.0787	0.1052	0.1424	0.1594
4/18/12 14:54	8.97	116.65	0.0852	0.0714	0.0656	0.0734	0.0970	0.1315	0.1551
4/18/12 15:09	9.42	128.14	0.0798	0.0647	0.0580	0.0646	0.0860	0.1167	0.1308
4/18/12 15:24	8.99	137.06	0.0664	0.0522	0.0460	0.0521	0.0715	0.1002	0.1107
4/18/12 15:39	8.85	134.03	0.0684	0.0536	0.0468	0.0524	0.0719	0.1010	0.1149
4/18/12 15:54	8.37	135.70	0.0661	0.0498	0.0419	0.0459	0.0622	0.0872	0.0999
4/18/12 16:09	8.54	138.49	0.0601	0.0447	0.0377	0.0423	0.0598	0.0869	0.0998
4/18/12 16:24	8.91	142.42	0.0586	0.0428	0.0358	0.0406	0.0582	0.0850	0.0975
4/18/12 16:39	9.15	142.04	0.0607	0.0445	0.0371	0.0414	0.0585	0.0865	0.1008
4/18/12 16:54	9.76	145.94	0.0578	0.0424	0.0356	0.0403	0.0575	0.0852	0.0987
4/18/12 17:09	10.53	146.82	0.0603	0.0451	0.0382	0.0430	0.0604	0.0875	0.1028
4/18/12 17:24	10.81	143.11	0.0650	0.0504	0.0441	0.0503	0.0699	0.0985	0.1122
4/18/12 17:39	10.70	144.33	0.0608	0.0477	0.0421	0.0481	0.0672	0.0963	0.1118
4/18/12 17:54	10.11	138.85	0.0651	0.0523	0.0468	0.0528	0.0712	0.0987	0.1157
4/18/12 18:09	9.16	135.41	0.0641	0.0510	0.0454	0.0511	0.0690	0.0948	0.1112
4/18/12 18:24	9.36	134.36	0.0642	0.0527	0.0480	0.0546	0.0741	0.1019	0.1220
4/18/12 18:39	8.78	129.19	0.0654	0.0545	0.0502	0.0573	0.0762	0.1024	0.1222
4/18/12 18:54	8.02	125.15	0.0660	0.0550	0.0502	0.0560	0.0733	0.0980	0.1199
4/18/12 19:09	7.45	118.17	0.0676	0.0570	0.0526	0.0586	0.0759	0.1004	0.1209
4/18/12 19:24	7.50	104.08	0.0828	0.0734	0.0699	0.0772	0.0967	0.1228	0.1489
4/18/12 19:39	5.15	67.91	0.1029	0.0969	0.0950	0.1010	0.1149	0.1309	0.1418
4/18/12 19:54	3.94	36.99	0.1431	0.1398	0.1359	0.1300	0.1251	0.1217	0.1075
4/18/12 20:09	4.02	32.45	0.1551	0.1495	0.1421	0.1317	0.1223	0.1154	0.1016
4/19/12 1:39	1.40	7.53	0.0862	0.0888	0.0903	0.0880	0.0844	0.0812	0.0684
4/19/12 1:54	1.45	15.61	0.0711	0.0678	0.0679	0.0742	0.0870	0.1017	0.1057
4/19/12 2:54	4.35	38.92	0.1255	0.1163	0.1102	0.1111	0.1205	0.1326	0.1344
4/19/12 7:24	2.79	31.24	0.0964	0.0951	0.0963	0.1028	0.1167	0.1322	0.1264
4/19/12 9:09	6.89	22.77	0.2114	0.2138	0.2331	0.2832	0.3604	0.4396	0.4502
4/19/12 9:24	7.55	39.19	0.1095	0.1093	0.1194	0.1478	0.1908	0.2342	0.2421
4/19/12 10:09	10.55	56.99	0.0386	0.0429	0.0548	0.0807	0.1173	0.1544	0.1567
4/19/12 10:24	1.24	14.24	0.0519	0.0518	0.0579	0.0751	0.1009	0.1306	0.1547
4/19/12 10:39	1.13	14.35	0.0436	0.0436	0.0494	0.0665	0.0918	0.1189	0.1423
4/19/12 10:54	4.37	37.72	0.0411	0.0424	0.0493	0.0659	0.0866	0.1045	0.1152
4/19/12 11:09	0.87	13.56	0.0331	0.0344	0.0411	0.0580	0.0816	0.1075	0.1272
4/19/12 11:24	0.95	14.11	0.0333	0.0343	0.0410	0.0585	0.0832	0.1103	0.1383
4/19/12 11:39	0.83	13.97	0.0276	0.0282	0.0342	0.0513	0.0758	0.1019	0.1282
4/19/12 11:54	0.85	14.35	0.0295	0.0300	0.0356	0.0512	0.0726	0.0949	0.1212
4/19/12 12:09	1.69	20.52	0.0430	0.0446	0.0516	0.0672	0.0842	0.0977	0.1217
4/19/12 12:24	2.71	30.85	0.0360	0.0379	0.0459	0.0642	0.0835	0.0970	0.1145
4/19/12 12:39	0.86	15.50	0.0249	0.0259	0.0320	0.0480	0.0672	0.0842	0.1153
4/19/12 12:54	0.94	17.29	0.0250	0.0258	0.0321	0.0491	0.0685	0.0823	0.1026

Appendix D: LISST-StreamSide Data File

Fraction:			8	9	10	11	12	13	14
	Total Conc.	Mean Size	6.6	7.79	9.2	10.86	12.83	15.15	17.89
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/19/12 13:09	3.03	36.95	0.0251	0.0270	0.0347	0.0533	0.0737	0.0882	0.1038
4/19/12 13:24	0.89	17.07	0.0229	0.0238	0.0301	0.0469	0.0662	0.0802	0.1010
4/19/12 13:39	9.56	38.13	0.1987	0.2004	0.2185	0.2680	0.3521	0.4511	0.4761
4/19/12 13:54	4.43	46.42	0.0976	0.0988	0.1054	0.1213	0.1469	0.1765	0.1896
4/19/12 14:09	3.09	26.80	0.0925	0.0942	0.1018	0.1191	0.1467	0.1783	0.1907
4/19/12 16:39	21.05	36.79	0.4572	0.4715	0.5128	0.5992	0.7359	0.8899	0.9475
4/19/12 16:54	38.26	31.40	1.0057	1.0435	1.1296	1.2862	1.5198	1.7727	1.7912
4/19/12 17:09	55.51	30.66	1.5379	1.5720	1.6753	1.8899	2.2425	2.6510	2.7158
4/19/12 17:24	49.25	25.08	1.7386	1.7574	1.8297	1.9772	2.2180	2.4864	2.4161
4/19/12 17:39	38.46	16.81	1.8531	1.8419	1.8599	1.8990	1.9590	2.0154	1.8373
4/19/12 17:54	28.83	15.48	1.4483	1.4373	1.4344	1.4319	1.4518	1.4811	1.3348
4/19/12 18:09	31.53	22.24	1.2256	1.2311	1.2514	1.2822	1.3418	1.4142	1.3419
4/19/12 18:24	18.04	16.56	0.8331	0.8348	0.8395	0.8388	0.8481	0.8639	0.7842
4/19/12 18:39	16.07	18.91	0.6892	0.6978	0.7106	0.7197	0.7367	0.7583	0.6915
4/19/12 18:54	22.52	25.56	0.8350	0.8396	0.8553	0.8700	0.8817	0.8883	0.8040
4/19/12 19:09	15.66	18.98	0.6947	0.6980	0.7040	0.7047	0.7127	0.7250	0.6496
4/19/12 19:24	17.38	24.17	0.6958	0.6989	0.7027	0.6978	0.6981	0.7037	0.6268
4/19/12 19:39	10.03	13.76	0.4980	0.5092	0.5249	0.5371	0.5513	0.5649	0.5063
4/19/12 19:54	11.47	18.11	0.4919	0.5024	0.5174	0.5301	0.5470	0.5662	0.5228
4/19/12 20:09	21.49	30.07	0.6606	0.6814	0.7172	0.7651	0.8322	0.9070	0.8783
4/19/12 20:24	8.52	14.36	0.4102	0.4224	0.4378	0.4483	0.4588	0.4695	0.4257
4/19/12 20:39	6.52	13.39	0.3189	0.3320	0.3489	0.3624	0.3755	0.3882	0.3556
4/19/12 20:54	17.53	34.72	0.4947	0.5021	0.5187	0.5445	0.5912	0.6504	0.6427
4/19/12 21:09	17.87	28.03	0.4573	0.4896	0.5462	0.6327	0.7526	0.8858	0.9284
4/19/12 21:24	9.23	18.64	0.3640	0.3813	0.4073	0.4374	0.4746	0.5133	0.4889
4/19/12 21:39	15.87	27.49	0.4377	0.4659	0.5130	0.5795	0.6673	0.7608	0.7633
4/19/12 21:54	24.29	32.98	0.5350	0.5760	0.6471	0.7547	0.9025	1.0651	1.1102
4/19/12 22:54	451.50	120.73	0.5228	0.5267	0.6519	1.1141	2.4572	5.4549	6.4435
4/19/12 23:09	105.60	57.72	1.0924	1.1339	1.2484	1.4833	1.8463	2.2950	2.9202
4/19/12 23:24	141.55	128.47	0.4584	0.4688	0.5063	0.5829	0.6893	0.8109	0.9901
4/20/12 0:24	283.35	297.28	0.0941	0.0327	0.0055	0.0003	0.0000	0.0000	0.0000
4/20/12 1:09	6.43	33.77	0.1551	0.1692	0.1902	0.2159	0.2470	0.2817	0.2933
4/20/12 1:24	7.95	36.57	0.2056	0.2243	0.2470	0.2638	0.2760	0.2874	0.2669
4/20/12 1:39	4.04	12.70	0.1949	0.2087	0.2235	0.2304	0.2314	0.2300	0.1888
4/20/12 1:54	10.15	47.39	0.2946	0.3056	0.3144	0.3093	0.2978	0.2873	0.2407
4/20/12 2:24	3.39	12.76	0.1607	0.1723	0.1841	0.1878	0.1854	0.1809	0.1468
4/20/12 2:39	3.38	11.38	0.1734	0.1851	0.1974	0.2023	0.2018	0.1990	0.1620
4/20/12 2:54	4.40	15.06	0.1932	0.2064	0.2216	0.2305	0.2350	0.2367	0.1981
4/20/12 3:09	39.20	64.76	0.6786	0.7060	0.7621	0.8567	0.9980	1.1581	1.1707
4/20/12 3:24	77.75	146.19	0.2202	0.2602	0.3118	0.3392	0.3284	0.2977	0.1820
4/20/12 3:39	8.83	44.92	0.1923	0.1963	0.2090	0.2346	0.2741	0.3177	0.3212
4/20/12 3:54	17.88	48.20	0.4176	0.4175	0.4279	0.4527	0.4976	0.5531	0.5692
4/20/12 4:09	6.13	29.55	0.1814	0.1786	0.1850	0.2079	0.2490	0.2971	0.3126
4/20/12 4:24	6.10	29.40	0.1824	0.1770	0.1818	0.2055	0.2503	0.3036	0.3160

Appendix D: LISST-StreamSide Data File

Fraction:			8	9	10	11	12	13	14
	Total Conc.	Mean Size	6.6	7.79	9.2	10.86	12.83	15.15	17.89
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/20/12 4:39	10.29	41.77	0.2566	0.2537	0.2592	0.2796	0.3206	0.3727	0.3896
4/20/12 4:54	11.71	46.12	0.3018	0.2935	0.2909	0.2973	0.3176	0.3452	0.3572
4/20/12 5:39	24.82	44.00	0.4909	0.4777	0.4857	0.5363	0.6461	0.7902	0.8821
4/20/12 5:54	14.93	41.94	0.4104	0.4153	0.4281	0.4480	0.4775	0.5073	0.4673
4/20/12 6:09	7.95	32.43	0.2885	0.2921	0.2995	0.3077	0.3178	0.3241	0.2716
4/20/12 6:24	5.26	19.58	0.2647	0.2656	0.2664	0.2624	0.2575	0.2503	0.1967
4/20/12 6:39	11.34	41.19	0.3584	0.3547	0.3512	0.3447	0.3422	0.3417	0.3001
4/20/12 6:54	11.92	42.88	0.3587	0.3602	0.3613	0.3563	0.3526	0.3501	0.2988
4/20/12 7:09	4.64	23.65	0.2067	0.2097	0.2101	0.2019	0.1900	0.1770	0.1303
4/20/12 7:24	4.84	24.76	0.2032	0.2093	0.2138	0.2096	0.2010	0.1909	0.1459
4/20/12 7:39	3.83	15.68	0.1831	0.1909	0.2022	0.2138	0.2264	0.2381	0.2102
4/20/12 7:54	3.33	14.40	0.1612	0.1682	0.1777	0.1864	0.1961	0.2059	0.1832
4/20/12 8:09	1.94	11.45	0.1046	0.1121	0.1217	0.1299	0.1369	0.1430	0.1225
4/20/12 8:24	3.13	14.70	0.1418	0.1543	0.1722	0.1926	0.2154	0.2381	0.2189
4/20/12 9:24	524.20	111.00	4.0707	3.1081	2.6506	2.9572	4.2793	6.5837	7.7851
4/20/12 9:39	35.49	140.85	0.1747	0.2002	0.2288	0.2337	0.2070	0.1744	0.1145
4/20/12 9:54	3.58	16.18	0.1362	0.1519	0.1719	0.1894	0.2041	0.2165	0.1870
4/20/12 10:09	2.54	11.24	0.1123	0.1258	0.1422	0.1547	0.1630	0.1692	0.1425
4/20/12 10:24	2.44	13.68	0.0914	0.1047	0.1218	0.1370	0.1492	0.1589	0.1348
4/20/12 10:39	1.59	10.71	0.0639	0.0744	0.0881	0.1003	0.1096	0.1176	0.1025
4/20/12 10:54	1.26	9.37	0.0496	0.0589	0.0715	0.0833	0.0924	0.0998	0.0860
4/20/12 11:09	1.11	8.60	0.0426	0.0506	0.0617	0.0731	0.0835	0.0934	0.0860
4/20/12 11:24	1.05	9.27	0.0371	0.0447	0.0554	0.0663	0.0758	0.0845	0.0789
4/20/12 11:39	0.85	8.40	0.0325	0.0394	0.0495	0.0611	0.0734	0.0870	0.0822
4/20/12 11:54	0.78	9.20	0.0260	0.0322	0.0416	0.0527	0.0641	0.0765	0.0775

Appendix D: LISST-StreamSide Data File

Fraction:			15	16	17	18	19	20	21
	Total Conc.	Mean Size	21.12	24.95	29.46	34.79	41.08	48.51	57.29
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/18/12 13:54	9.67	57.39	0.2467	0.2307	0.2145	0.1898	0.1637	0.1274	0.1131
4/18/12 14:09	13.94	53.22	0.4835	0.4702	0.4330	0.4098	0.3774	0.3495	0.3822
4/18/12 14:24	8.81	103.83	0.1945	0.1984	0.1697	0.1631	0.1409	0.1071	0.1068
4/18/12 14:39	8.82	112.84	0.1779	0.1873	0.1474	0.1456	0.1241	0.0916	0.0928
4/18/12 14:54	8.97	116.65	0.1766	0.1876	0.1471	0.1442	0.1226	0.0886	0.0867
4/18/12 15:09	9.42	128.14	0.1502	0.1614	0.1236	0.1237	0.1048	0.0731	0.0701
4/18/12 15:24	8.99	137.06	0.1280	0.1373	0.0976	0.0959	0.0798	0.0526	0.0517
4/18/12 15:39	8.85	134.03	0.1343	0.1449	0.1059	0.1036	0.0830	0.0537	0.0502
4/18/12 15:54	8.37	135.70	0.1219	0.1403	0.1022	0.1083	0.0871	0.0537	0.0473
4/18/12 16:09	8.54	138.49	0.1225	0.1400	0.1007	0.1058	0.0857	0.0528	0.0475
4/18/12 16:24	8.91	142.42	0.1191	0.1362	0.0964	0.0996	0.0777	0.0475	0.0434
4/18/12 16:39	9.15	142.04	0.1239	0.1408	0.0970	0.1004	0.0819	0.0508	0.0469
4/18/12 16:54	9.76	145.94	0.1224	0.1399	0.0966	0.1000	0.0795	0.0486	0.0450
4/18/12 17:09	10.53	146.82	0.1271	0.1433	0.1006	0.1027	0.0834	0.0532	0.0505
4/18/12 17:24	10.81	143.11	0.1348	0.1499	0.1093	0.1123	0.0953	0.0629	0.0612
4/18/12 17:39	10.70	144.33	0.1320	0.1446	0.1054	0.1065	0.0901	0.0594	0.0575
4/18/12 17:54	10.11	138.85	0.1354	0.1468	0.1098	0.1094	0.0924	0.0628	0.0616
4/18/12 18:09	9.16	135.41	0.1332	0.1470	0.1118	0.1128	0.0937	0.0607	0.0570
4/18/12 18:24	9.36	134.36	0.1430	0.1541	0.1179	0.1146	0.0946	0.0629	0.0600
4/18/12 18:39	8.78	129.19	0.1445	0.1581	0.1238	0.1237	0.1028	0.0688	0.0649
4/18/12 18:54	8.02	125.15	0.1446	0.1585	0.1258	0.1232	0.0996	0.0649	0.0599
4/18/12 19:09	7.45	118.17	0.1446	0.1615	0.1365	0.1411	0.1169	0.0758	0.0675
4/18/12 19:24	7.50	104.08	0.1727	0.1903	0.1721	0.1780	0.1495	0.1010	0.0864
4/18/12 19:39	5.15	67.91	0.1519	0.1599	0.1468	0.1379	0.1156	0.0727	0.0552
4/18/12 19:54	3.94	36.99	0.1042	0.1016	0.0964	0.0838	0.0723	0.0433	0.0305
4/18/12 20:09	4.02	32.45	0.1013	0.1046	0.1086	0.1086	0.1031	0.0729	0.0567
4/19/12 1:39	1.40	7.53	0.0671	0.0661	0.0581	0.0374	0.0149	0.0035	0.0001
4/19/12 1:54	1.45	15.61	0.1153	0.1318	0.1302	0.1375	0.0969	0.0425	0.0057
4/19/12 2:54	4.35	38.92	0.1421	0.1578	0.1603	0.1879	0.1938	0.2033	0.1858
4/19/12 7:24	2.79	31.24	0.1232	0.1301	0.1229	0.1251	0.1081	0.1284	0.0861
4/19/12 9:09	6.89	22.77	0.4733	0.4957	0.4666	0.5186	0.5639	0.5706	0.5742
4/19/12 9:24	7.55	39.19	0.2728	0.3149	0.3177	0.4327	0.5529	0.7207	1.0236
4/19/12 10:09	10.55	56.99	0.2033	0.2720	0.2852	0.4823	0.6247	0.8269	1.2847
4/19/12 10:24	1.24	14.24	0.1810	0.1677	0.0893	0.0239	0.0024	0.0000	0.0000
4/19/12 10:39	1.13	14.35	0.1688	0.1558	0.0829	0.0218	0.0022	0.0000	0.0000
4/19/12 10:54	4.37	37.72	0.1466	0.1934	0.2189	0.3817	0.6054	0.8001	0.9478
4/19/12 11:09	0.87	13.56	0.1372	0.1013	0.0348	0.0042	0.0002	0.0000	0.0000
4/19/12 11:24	0.95	14.11	0.1548	0.1245	0.0487	0.0081	0.0006	0.0000	0.0000
4/19/12 11:39	0.83	13.97	0.1419	0.1019	0.0310	0.0034	0.0001	0.0000	0.0000
4/19/12 11:54	0.85	14.35	0.1409	0.1155	0.0464	0.0084	0.0007	0.0000	0.0000
4/19/12 12:09	1.69	20.52	0.1497	0.1712	0.1668	0.1875	0.2146	0.0990	0.0420
4/19/12 12:24	2.71	30.85	0.1429	0.1749	0.1797	0.2695	0.4335	0.4314	0.4092
4/19/12 12:39	0.86	15.50	0.1407	0.1344	0.0702	0.0247	0.0055	0.0002	0.0000
4/19/12 12:54	0.94	17.29	0.1237	0.1300	0.0917	0.0666	0.0508	0.0095	0.0011

Appendix D: LISST-StreamSide Data File

Fraction:			15	16	17	18	19	20	21
	Total Conc.	Mean Size	21.12	24.95	29.46	34.79	41.08	48.51	57.29
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/19/12 13:09	3.03	36.95	0.1311	0.1614	0.1505	0.2285	0.3922	0.4744	0.6678
4/19/12 13:24	0.89	17.07	0.1208	0.1251	0.0866	0.0587	0.0418	0.0070	0.0008
4/19/12 13:39	9.56	38.13	0.4902	0.4912	0.4166	0.4135	0.3900	0.3856	0.4682
4/19/12 13:54	4.43	46.42	0.1962	0.1958	0.1740	0.1636	0.1392	0.1061	0.0932
4/19/12 14:09	3.09	26.80	0.1979	0.1994	0.1821	0.1760	0.1567	0.1189	0.1154
4/19/12 16:39	21.05	36.79	0.9652	0.9595	0.8799	0.8698	0.8279	0.8535	1.0403
4/19/12 16:54	38.26	31.40	1.7454	1.6595	1.4926	1.4120	1.3718	1.4886	1.9094
4/19/12 17:09	55.51	30.66	2.5984	2.4185	2.1105	1.9314	1.8607	1.9901	2.4986
4/19/12 17:24	49.25	25.08	2.2907	2.1391	1.9051	1.7585	1.6961	1.7810	2.1322
4/19/12 17:39	38.46	16.81	1.7489	1.5963	1.4338	1.2875	1.2349	1.2981	1.4463
4/19/12 17:54	28.83	15.48	1.2486	1.1641	1.0713	0.9809	0.9548	0.9757	1.0805
4/19/12 18:09	31.53	22.24	1.2956	1.2364	1.1650	1.0961	1.0468	1.0395	1.1354
4/19/12 18:24	18.04	16.56	0.7454	0.7033	0.6666	0.6241	0.6136	0.6272	0.7172
4/19/12 18:39	16.07	18.91	0.6604	0.6227	0.5857	0.5383	0.5082	0.4891	0.5318
4/19/12 18:54	22.52	25.56	0.7961	0.7366	0.6971	0.6511	0.6199	0.6427	0.6946
4/19/12 19:09	15.66	18.98	0.6173	0.5829	0.5499	0.5099	0.4890	0.4755	0.5179
4/19/12 19:24	17.38	24.17	0.6024	0.5788	0.5620	0.5392	0.5217	0.4976	0.5203
4/19/12 19:39	10.03	13.76	0.4766	0.4536	0.4240	0.4104	0.4060	0.4371	0.4413
4/19/12 19:54	11.47	18.11	0.4986	0.4727	0.4373	0.4087	0.3819	0.3957	0.4113
4/19/12 20:09	21.49	30.07	0.8508	0.8121	0.7546	0.7139	0.6723	0.6758	0.7255
4/19/12 20:24	8.52	14.36	0.4054	0.3901	0.3659	0.3527	0.3347	0.3443	0.3329
4/19/12 20:39	6.52	13.39	0.3434	0.3388	0.3282	0.3318	0.3128	0.3149	0.2579
4/19/12 20:54	17.53	34.72	0.6270	0.6139	0.5841	0.5825	0.5475	0.5510	0.5584
4/19/12 21:09	17.87	28.03	0.9257	0.8998	0.8274	0.8062	0.7667	0.8535	1.0723
4/19/12 21:24	9.23	18.64	0.4714	0.4548	0.4220	0.4143	0.4034	0.4558	0.5160
4/19/12 21:39	15.87	27.49	0.7452	0.7136	0.6488	0.6288	0.6075	0.7106	0.9391
4/19/12 21:54	24.29	32.98	1.1011	1.0589	0.9651	0.9307	0.8869	1.0104	1.3539
4/19/12 22:54	451.50	120.73	8.3345	9.5638	5.1702	5.9647	5.2323	5.6558	9.4029
4/19/12 23:09	105.60	57.72	3.5517	3.6838	4.0347	4.2048	4.5970	4.3985	5.7317
4/19/12 23:24	141.55	128.47	1.3709	1.3166	1.6963	1.4224	1.6365	1.0141	1.6772
4/20/12 0:24	283.35	297.28	0.0000	0.0000	0.0000	0.0000	0.0002	0.0013	0.0057
4/20/12 1:09	6.43	33.77	0.2929	0.2864	0.2580	0.2437	0.2092	0.2116	0.2169
4/20/12 1:24	7.95	36.57	0.2591	0.2504	0.2334	0.2246	0.1906	0.1928	0.1706
4/20/12 1:39	4.04	12.70	0.1703	0.1553	0.1436	0.1272	0.1167	0.1166	0.1106
4/20/12 1:54	10.15	47.39	0.2292	0.2209	0.2217	0.2183	0.2102	0.2136	0.2101
4/20/12 2:24	3.39	12.76	0.1346	0.1268	0.1244	0.1186	0.1162	0.1202	0.1119
4/20/12 2:39	3.38	11.38	0.1483	0.1395	0.1359	0.1281	0.1265	0.1278	0.1088
4/20/12 2:54	4.40	15.06	0.1838	0.1752	0.1725	0.1673	0.1637	0.1665	0.1575
4/20/12 3:09	39.20	64.76	1.1522	1.1151	1.0438	1.0317	1.0163	1.1091	1.3509
4/20/12 3:24	77.75	146.19	0.2360	0.1926	0.3053	0.2704	0.4168	0.2996	0.6285
4/20/12 3:39	8.83	44.92	0.3257	0.3272	0.3112	0.3183	0.3100	0.3291	0.3966
4/20/12 3:54	17.88	48.20	0.5913	0.6036	0.5977	0.6167	0.5972	0.5932	0.6375
4/20/12 4:09	6.13	29.55	0.3323	0.3495	0.3341	0.3533	0.3403	0.3413	0.3834
4/20/12 4:24	6.10	29.40	0.3328	0.3507	0.3268	0.3502	0.3456	0.3571	0.4078

Appendix D: LISST-StreamSide Data File

Fraction:			15	16	17	18	19	20	21
	Total Conc.	Mean Size	21.12	24.95	29.46	34.79	41.08	48.51	57.29
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/20/12 4:39	10.29	41.77	0.3990	0.4088	0.3973	0.4180	0.4084	0.4124	0.4448
4/20/12 4:54	11.71	46.12	0.3823	0.4077	0.4206	0.4586	0.4518	0.4511	0.4694
4/20/12 5:39	24.82	44.00	0.8849	0.8851	0.8428	0.8847	0.9401	1.0524	1.2539
4/20/12 5:54	14.93	41.94	0.4523	0.4421	0.4246	0.4254	0.4211	0.4542	0.5108
4/20/12 6:09	7.95	32.43	0.2500	0.2359	0.2239	0.2148	0.2142	0.2274	0.2367
4/20/12 6:24	5.26	19.58	0.1742	0.1618	0.1526	0.1420	0.1422	0.1528	0.1459
4/20/12 6:39	11.34	41.19	0.2868	0.2790	0.2750	0.2709	0.2650	0.2729	0.2737
4/20/12 6:54	11.92	42.88	0.2811	0.2704	0.2662	0.2646	0.2680	0.2892	0.3066
4/20/12 7:09	4.64	23.65	0.1136	0.1059	0.1046	0.1023	0.1071	0.1189	0.1079
4/20/12 7:24	4.84	24.76	0.1296	0.1217	0.1200	0.1152	0.1134	0.1187	0.0991
4/20/12 7:39	3.83	15.68	0.1884	0.1702	0.1455	0.1186	0.1067	0.0994	0.0809
4/20/12 7:54	3.33	14.40	0.1656	0.1508	0.1314	0.1077	0.0970	0.0927	0.0760
4/20/12 8:09	1.94	11.45	0.1075	0.0976	0.0841	0.0650	0.0562	0.0494	0.0307
4/20/12 8:24	3.13	14.70	0.2028	0.1876	0.1655	0.1390	0.1253	0.1146	0.0927
4/20/12 9:24	524.20	111.00	9.1698	7.2203	5.9826	3.3131	3.9712	1.8208	2.7276
4/20/12 9:39	35.49	140.85	0.1448	0.1082	0.1386	0.1129	0.1580	0.1403	0.2140
4/20/12 9:54	3.58	16.18	0.1694	0.1546	0.1396	0.1186	0.1053	0.0995	0.0822
4/20/12 10:09	2.54	11.24	0.1273	0.1145	0.1012	0.0801	0.0675	0.0595	0.0421
4/20/12 10:24	2.44	13.68	0.1194	0.1079	0.0946	0.0766	0.0667	0.0629	0.0504
4/20/12 10:39	1.59	10.71	0.0898	0.0808	0.0652	0.0444	0.0284	0.0173	0.0061
4/20/12 10:54	1.26	9.37	0.0743	0.0663	0.0528	0.0354	0.0239	0.0158	0.0064
4/20/12 11:09	1.11	8.60	0.0767	0.0689	0.0530	0.0309	0.0149	0.0055	0.0009
4/20/12 11:24	1.05	9.27	0.0714	0.0656	0.0538	0.0365	0.0236	0.0144	0.0051
4/20/12 11:39	0.85	8.40	0.0682	0.0509	0.0265	0.0078	0.0015	0.0002	0.0000
4/20/12 11:54	0.78	9.20	0.0688	0.0580	0.0369	0.0149	0.0043	0.0008	0.0000

Appendix D: LISST-StreamSide Data File

Fraction:			22	23	24	25	26	27	28
	Total Conc.	Mean Size	67.65	79.89	94.34	111.41	131.56	155.36	183.47
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/18/12 13:54	9.67	57.39	0.0920	0.0898	0.1010	0.1616	0.3156	1.0888	1.5563
4/18/12 14:09	13.94	53.22	0.4065	0.4796	0.5278	0.6650	0.8936	1.6668	1.4825
4/18/12 14:24	8.81	103.83	0.0886	0.0995	0.1043	0.1704	0.3314	1.2494	1.9530
4/18/12 14:39	8.82	112.84	0.0751	0.0873	0.0885	0.1488	0.3015	1.2271	2.0696
4/18/12 14:54	8.97	116.65	0.0673	0.0767	0.0791	0.1365	0.2801	1.1679	2.0853
4/18/12 15:09	9.42	128.14	0.0528	0.0616	0.0656	0.1202	0.2679	1.2329	2.3569
4/18/12 15:24	8.99	137.06	0.0389	0.0491	0.0511	0.0979	0.2268	1.1629	2.4364
4/18/12 15:39	8.85	134.03	0.0369	0.0444	0.0478	0.0949	0.2273	1.1741	2.3721
4/18/12 15:54	8.37	135.70	0.0315	0.0367	0.0382	0.0785	0.1958	1.0875	2.3175
4/18/12 16:09	8.54	138.49	0.0323	0.0393	0.0419	0.0853	0.2074	1.0931	2.3485
4/18/12 16:24	8.91	142.42	0.0309	0.0395	0.0418	0.0853	0.2095	1.1354	2.4757
4/18/12 16:39	9.15	142.04	0.0324	0.0416	0.0445	0.0925	0.2281	1.2061	2.6164
4/18/12 16:54	9.76	145.94	0.0317	0.0423	0.0471	0.0995	0.2471	1.2949	2.8213
4/18/12 17:09	10.53	146.82	0.0369	0.0492	0.0541	0.1106	0.2746	1.4178	3.0526
4/18/12 17:24	10.81	143.11	0.0456	0.0598	0.0656	0.1291	0.3035	1.4804	3.0506
4/18/12 17:39	10.70	144.33	0.0432	0.0562	0.0618	0.1227	0.2933	1.4570	3.0227
4/18/12 17:54	10.11	138.85	0.0465	0.0587	0.0636	0.1244	0.2925	1.4242	2.8086
4/18/12 18:09	9.16	135.41	0.0408	0.0494	0.0528	0.1044	0.2477	1.2617	2.5411
4/18/12 18:24	9.36	134.36	0.0444	0.0530	0.0564	0.1062	0.2461	1.2299	2.5284
4/18/12 18:39	8.78	129.19	0.0470	0.0547	0.0569	0.1065	0.2411	1.1679	2.3331
4/18/12 18:54	8.02	125.15	0.0414	0.0457	0.0460	0.0885	0.2046	1.0596	2.1028
4/18/12 19:09	7.45	118.17	0.0434	0.0436	0.0409	0.0750	0.1702	0.9233	1.9084
4/18/12 19:24	7.50	104.08	0.0559	0.0525	0.0492	0.0848	0.1789	0.8715	1.6563
4/18/12 19:39	5.15	67.91	0.0360	0.0325	0.0435	0.0866	0.2406	0.8783	1.2635
4/18/12 19:54	3.94	36.99	0.0187	0.0160	0.0238	0.0532	0.1640	0.6392	0.7194
4/18/12 20:09	4.02	32.45	0.0384	0.0329	0.0454	0.0804	0.2061	0.5917	0.5575
4/19/12 1:39	1.40	7.53	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 1:54	1.45	15.61	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 2:54	4.35	38.92	0.2086	0.2412	0.3655	0.2696	0.3115	0.2235	0.1392
4/19/12 7:24	2.79	31.24	0.0961	0.0772	0.1203	0.0388	0.0205	0.0104	0.0194
4/19/12 9:09	6.89	22.77	0.3558	0.1432	0.0181	0.0006	0.0000	0.0000	0.0000
4/19/12 9:24	7.55	39.19	1.1094	1.0133	0.3709	0.0463	0.0014	0.0000	0.0000
4/19/12 10:09	10.55	56.99	1.5857	2.1035	1.4816	0.6210	0.0971	0.0025	0.0000
4/19/12 10:24	1.24	14.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 10:39	1.13	14.35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 10:54	4.37	37.72	0.4197	0.0820	0.0022	0.0000	0.0000	0.0000	0.0000
4/19/12 11:09	0.87	13.56	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 11:24	0.95	14.11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 11:39	0.83	13.97	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 11:54	0.85	14.35	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 12:09	1.69	20.52	0.0029	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 12:24	2.71	30.85	0.0936	0.0097	0.0002	0.0000	0.0000	0.0000	0.0000
4/19/12 12:39	0.86	15.50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 12:54	0.94	17.29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Appendix D: LISST-StreamSide Data File

Fraction:			22	23	24	25	26	27	28
	Total Conc.	Mean Size	67.65	79.89	94.34	111.41	131.56	155.36	183.47
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/19/12 13:09	3.03	36.95	0.2953	0.0750	0.0030	0.0000	0.0000	0.0000	0.0000
4/19/12 13:24	0.89	17.07	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/19/12 13:39	9.56	38.13	0.6097	0.8677	0.9500	0.8351	0.5153	0.1513	0.0167
4/19/12 13:54	4.43	46.42	0.0889	0.1078	0.1558	0.2492	0.4630	0.6255	0.3862
4/19/12 14:09	3.09	26.80	0.1136	0.1455	0.1695	0.1866	0.1247	0.0243	0.0012
4/19/12 16:39	21.05	36.79	1.3810	1.8912	2.0633	1.7025	1.1331	0.4755	0.0823
4/19/12 16:54	38.26	31.40	2.6895	3.6742	3.6940	2.5606	1.2654	0.3603	0.0412
4/19/12 17:09	55.51	30.66	3.4349	4.6294	4.8985	3.8524	2.4234	1.0080	0.1802
4/19/12 17:24	49.25	25.08	2.7771	3.5277	3.5682	2.6427	1.5206	0.5636	0.0867
4/19/12 17:39	38.46	16.81	1.6376	1.7712	1.5854	1.1510	0.5437	0.1386	0.0125
4/19/12 17:54	28.83	15.48	1.2586	1.3491	1.1206	0.5818	0.1949	0.0328	0.0019
4/19/12 18:09	31.53	22.24	1.3506	1.6312	1.8345	1.6557	1.3506	0.7810	0.1870
4/19/12 18:24	18.04	16.56	0.8849	1.0142	0.8813	0.4430	0.1359	0.0180	0.0008
4/19/12 18:39	16.07	18.91	0.6460	0.8004	0.9011	0.7232	0.4931	0.2057	0.0335
4/19/12 18:54	22.52	25.56	0.7845	0.9212	1.1355	1.3967	1.5913	1.2864	0.4526
4/19/12 19:09	15.66	18.98	0.6250	0.7812	0.8952	0.7407	0.4990	0.1983	0.0293
4/19/12 19:24	17.38	24.17	0.5912	0.7223	0.9133	0.9750	1.0667	0.9086	0.3455
4/19/12 19:39	10.03	13.76	0.4358	0.2867	0.1234	0.0132	0.0007	0.0000	0.0000
4/19/12 19:54	11.47	18.11	0.4962	0.5500	0.6178	0.3630	0.2479	0.0860	0.0323
4/19/12 20:09	21.49	30.07	0.8765	1.0838	1.4091	1.3893	1.5302	1.2004	0.4744
4/19/12 20:24	8.52	14.36	0.3569	0.2929	0.2150	0.0476	0.0084	0.0003	0.0000
4/19/12 20:39	6.52	13.39	0.2007	0.0805	0.0201	0.0008	0.0000	0.0000	0.0000
4/19/12 20:54	17.53	34.72	0.6549	0.7627	1.0161	1.0122	1.3382	1.3868	0.8283
4/19/12 21:09	17.87	28.03	1.4943	1.7974	1.4584	0.5445	0.1238	0.0103	0.0003
4/19/12 21:24	9.23	18.64	0.6277	0.5313	0.2954	0.0408	0.0031	0.0000	0.0000
4/19/12 21:39	15.87	27.49	1.4165	1.7371	1.3763	0.4505	0.0932	0.0068	0.0002
4/19/12 21:54	24.29	32.98	2.0819	2.8433	2.6928	1.3603	0.4835	0.0800	0.0058
4/19/12 22:54	451.50	120.73	12.1931	20.8420	21.0224	29.1974	41.6143	74.2653	81.9875
4/19/12 23:09	105.60	57.72	5.9336	7.1329	7.9177	9.2108	10.5124	10.9272	5.6854
4/19/12 23:24	141.55	128.47	1.2035	1.6892	2.6494	6.0081	12.8792	35.4240	49.9432
4/20/12 0:24	283.35	297.28	0.0315	0.1069	0.5043	1.0389	4.7801	9.3290	13.9439
4/20/12 1:09	6.43	33.77	0.2646	0.2796	0.4025	0.2784	0.4198	0.4178	0.3319
4/20/12 1:24	7.95	36.57	0.1915	0.1680	0.2261	0.1639	0.3174	0.5094	0.7979
4/20/12 1:39	4.04	12.70	0.1157	0.1096	0.1161	0.0729	0.0446	0.0156	0.0025
4/20/12 1:54	10.15	47.39	0.2196	0.2253	0.2693	0.2818	0.3766	0.4846	0.7004
4/20/12 2:24	3.39	12.76	0.1076	0.0919	0.0925	0.0517	0.0282	0.0076	0.0009
4/20/12 2:39	3.38	11.38	0.0869	0.0515	0.0306	0.0080	0.0015	0.0001	0.0000
4/20/12 2:54	4.40	15.06	0.1519	0.1386	0.1407	0.1007	0.0719	0.0331	0.0072
4/20/12 3:09	39.20	64.76	1.7134	2.1371	2.2755	2.0440	1.8823	1.6345	1.6810
4/20/12 3:24	77.75	146.19	0.5432	0.7646	1.2372	2.6845	5.9572	16.2904	24.9679
4/20/12 3:39	8.83	44.92	0.4904	0.6155	0.6520	0.5963	0.5991	0.5748	0.4068
4/20/12 3:54	17.88	48.20	0.6845	0.7671	0.8800	0.9686	1.3128	1.8250	1.4382
4/20/12 4:09	6.13	29.55	0.4166	0.4510	0.3890	0.2451	0.1255	0.0387	0.0053
4/20/12 4:24	6.10	29.40	0.4444	0.4694	0.3748	0.2113	0.0942	0.0258	0.0033

Appendix D: LISST-StreamSide Data File

Fraction:			22	23	24	25	26	27	28
	Total Conc.	Mean Size	67.65	79.89	94.34	111.41	131.56	155.36	183.47
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L	µL/L
4/20/12 4:39	10.29	41.77	0.4870	0.5419	0.5969	0.5832	0.6980	0.8008	0.5242
4/20/12 4:54	11.71	46.12	0.4769	0.4990	0.5485	0.5729	0.7551	1.0535	0.8569
4/20/12 5:39	24.82	44.00	1.4496	1.6499	1.7867	1.7126	1.8445	1.8758	1.0460
4/20/12 5:54	14.93	41.94	0.6188	0.7310	0.8828	0.8951	1.1249	1.3363	0.9334
4/20/12 6:09	7.95	32.43	0.2504	0.2508	0.2982	0.2914	0.4021	0.5697	0.5292
4/20/12 6:24	5.26	19.58	0.1421	0.1244	0.1500	0.1282	0.1647	0.2064	0.1788
4/20/12 6:39	11.34	41.19	0.2866	0.2903	0.3569	0.3891	0.6168	1.0207	1.0847
4/20/12 6:54	11.92	42.88	0.3413	0.3608	0.4466	0.4740	0.7098	1.1083	1.1004
4/20/12 7:09	4.64	23.65	0.0954	0.0701	0.0808	0.0650	0.1036	0.1971	0.2970
4/20/12 7:24	4.84	24.76	0.0835	0.0585	0.0653	0.0516	0.0836	0.1690	0.2904
4/20/12 7:39	3.83	15.68	0.0761	0.0610	0.0921	0.0635	0.0900	0.0929	0.0736
4/20/12 7:54	3.33	14.40	0.0773	0.0628	0.0969	0.0600	0.0673	0.0470	0.0215
4/20/12 8:09	1.94	11.45	0.0252	0.0126	0.0213	0.0090	0.0095	0.0040	0.0016
4/20/12 8:24	3.13	14.70	0.0807	0.0516	0.0514	0.0168	0.0071	0.0013	0.0001
4/20/12 9:24	524.20	111.00	1.5605	1.9585	3.6297	11.9448	36.7489	137.8825	210.2216
4/20/12 9:39	35.49	140.85	0.1816	0.1731	0.3172	0.6477	1.9946	5.0497	7.8146
4/20/12 9:54	3.58	16.18	0.0802	0.0624	0.0849	0.0526	0.0679	0.0901	0.0886
4/20/12 10:09	2.54	11.24	0.0363	0.0216	0.0312	0.0168	0.0198	0.0252	0.0227
4/20/12 10:24	2.44	13.68	0.0481	0.0343	0.0554	0.0367	0.0469	0.0541	0.0366
4/20/12 10:39	1.59	10.71	0.0027	0.0007	0.0008	0.0004	0.0008	0.0032	0.0214
4/20/12 10:54	1.26	9.37	0.0038	0.0013	0.0029	0.0019	0.0059	0.0086	0.0130
4/20/12 11:09	1.11	8.60	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/20/12 11:24	1.05	9.27	0.0024	0.0006	0.0011	0.0004	0.0006	0.0001	0.0000
4/20/12 11:39	0.85	8.40	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4/20/12 11:54	0.78	9.20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Appendix D: LISST-StreamSide Data File

Fraction:			29	30	31	32
	Total Conc.	Mean Size	216.66	255.85	302.13	356.79
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L
4/18/12 13:54	9.67	57.39	1.7548	0.4587	0.0549	0.0014
4/18/12 14:09	13.94	53.22	1.2023	0.2379	0.0242	0.0008
4/18/12 14:24	8.81	103.83	2.0968	0.5399	0.0564	0.0012
4/18/12 14:39	8.82	112.84	2.2907	0.6028	0.0618	0.0013
4/18/12 14:54	8.97	116.65	2.4865	0.6978	0.0744	0.0016
4/18/12 15:09	9.42	128.14	2.7995	0.8026	0.0850	0.0017
4/18/12 15:24	8.99	137.06	2.7973	0.7805	0.0796	0.0015
4/18/12 15:39	8.85	134.03	2.6898	0.7583	0.0806	0.0016
4/18/12 15:54	8.37	135.70	2.5613	0.7140	0.0742	0.0014
4/18/12 16:09	8.54	138.49	2.6517	0.7613	0.0779	0.0014
4/18/12 16:24	8.91	142.42	2.8340	0.8183	0.0847	0.0015
4/18/12 16:39	9.15	142.04	2.8523	0.7791	0.0750	0.0013
4/18/12 16:54	9.76	145.94	3.0882	0.8596	0.0795	0.0013
4/18/12 17:09	10.53	146.82	3.3388	0.9049	0.0815	0.0013
4/18/12 17:24	10.81	143.11	3.3527	0.9094	0.0821	0.0013
4/18/12 17:39	10.70	144.33	3.3541	0.9161	0.0836	0.0013
4/18/12 17:54	10.11	138.85	3.0374	0.8258	0.0792	0.0014
4/18/12 18:09	9.16	135.41	2.7214	0.7352	0.0714	0.0012
4/18/12 18:24	9.36	134.36	2.8578	0.7677	0.0710	0.0012
4/18/12 18:39	8.78	129.19	2.5667	0.6857	0.0654	0.0011
4/18/12 18:54	8.02	125.15	2.3074	0.6205	0.0641	0.0012
4/18/12 19:09	7.45	118.17	2.1062	0.5516	0.0554	0.0010
4/18/12 19:24	7.50	104.08	2.0045	0.5538	0.0640	0.0014
4/18/12 19:39	5.15	67.91	0.5571	0.0630	0.0022	0.0001
4/18/12 19:54	3.94	36.99	0.1935	0.0172	0.0008	0.0000
4/18/12 20:09	4.02	32.45	0.1410	0.0116	0.0005	0.0000
4/19/12 1:39	1.40	7.53	0.0000	0.0000	0.0000	0.0000
4/19/12 1:54	1.45	15.61	0.0000	0.0000	0.0000	0.0000
4/19/12 2:54	4.35	38.92	0.0871	0.0237	0.0062	0.0044
4/19/12 7:24	2.79	31.24	0.2415	0.1852	0.0417	0.0173
4/19/12 9:09	6.89	22.77	0.0000	0.0000	0.0000	0.0000
4/19/12 9:24	7.55	39.19	0.0000	0.0000	0.0000	0.0000
4/19/12 10:09	10.55	56.99	0.0000	0.0000	0.0000	0.0000
4/19/12 10:24	1.24	14.24	0.0000	0.0000	0.0000	0.0000
4/19/12 10:39	1.13	14.35	0.0000	0.0000	0.0000	0.0000
4/19/12 10:54	4.37	37.72	0.0000	0.0000	0.0000	0.0000
4/19/12 11:09	0.87	13.56	0.0000	0.0000	0.0000	0.0000
4/19/12 11:24	0.95	14.11	0.0000	0.0000	0.0000	0.0000
4/19/12 11:39	0.83	13.97	0.0000	0.0000	0.0000	0.0000
4/19/12 11:54	0.85	14.35	0.0000	0.0000	0.0000	0.0000
4/19/12 12:09	1.69	20.52	0.0000	0.0000	0.0000	0.0000
4/19/12 12:24	2.71	30.85	0.0000	0.0000	0.0000	0.0000
4/19/12 12:39	0.86	15.50	0.0000	0.0000	0.0000	0.0000
4/19/12 12:54	0.94	17.29	0.0000	0.0000	0.0000	0.0000

Appendix D: LISST-StreamSide Data File

Fraction:			29	30	31	32
	Total Conc.	Mean Size	216.66	255.85	302.13	356.79
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L
4/19/12 13:09	3.03	36.95	0.0000	0.0000	0.0000	0.0000
4/19/12 13:24	0.89	17.07	0.0000	0.0000	0.0000	0.0000
4/19/12 13:39	9.56	38.13	0.0007	0.0000	0.0000	0.0000
4/19/12 13:54	4.43	46.42	0.0767	0.0064	0.0003	0.0000
4/19/12 14:09	3.09	26.80	0.0000	0.0000	0.0000	0.0000
4/19/12 16:39	21.05	36.79	0.0088	0.0004	0.0000	0.0000
4/19/12 16:54	38.26	31.40	0.0032	0.0001	0.0000	0.0000
4/19/12 17:09	55.51	30.66	0.0239	0.0012	0.0001	0.0000
4/19/12 17:24	49.25	25.08	0.0098	0.0004	0.0000	0.0000
4/19/12 17:39	38.46	16.81	0.0009	0.0000	0.0000	0.0000
4/19/12 17:54	28.83	15.48	0.0001	0.0000	0.0000	0.0000
4/19/12 18:09	31.53	22.24	0.0302	0.0017	0.0001	0.0000
4/19/12 18:24	18.04	16.56	0.0000	0.0000	0.0000	0.0000
4/19/12 18:39	16.07	18.91	0.0032	0.0001	0.0000	0.0000
4/19/12 18:54	22.52	25.56	0.1701	0.0217	0.0021	0.0001
4/19/12 19:09	15.66	18.98	0.0025	0.0001	0.0000	0.0000
4/19/12 19:24	17.38	24.17	0.0870	0.0076	0.0005	0.0000
4/19/12 19:39	10.03	13.76	0.0000	0.0000	0.0000	0.0000
4/19/12 19:54	11.47	18.11	0.0066	0.0022	0.0011	0.0070
4/19/12 20:09	21.49	30.07	0.1268	0.0112	0.0007	0.0001
4/19/12 20:24	8.52	14.36	0.0000	0.0000	0.0000	0.0000
4/19/12 20:39	6.52	13.39	0.0000	0.0000	0.0000	0.0000
4/19/12 20:54	17.53	34.72	0.3678	0.0545	0.0055	0.0006
4/19/12 21:09	17.87	28.03	0.0000	0.0000	0.0000	0.0000
4/19/12 21:24	9.23	18.64	0.0000	0.0000	0.0000	0.0000
4/19/12 21:39	15.87	27.49	0.0000	0.0000	0.0000	0.0000
4/19/12 21:54	24.29	32.98	0.0003	0.0000	0.0000	0.0000
4/19/12 22:54	451.50	120.73	77.3581	22.3256	3.8522	0.1650
4/19/12 23:09	105.60	57.72	2.1639	0.1956	0.0073	0.0002
4/19/12 23:24	141.55	128.47	15.2321	0.2184	0.0001	0.0000
4/20/12 0:24	283.35	297.28	15.7171	14.8017	37.4559	183.6673
4/20/12 1:09	6.43	33.77	0.1082	0.0108	0.0005	0.0001
4/20/12 1:24	7.95	36.57	0.7820	0.2704	0.0551	0.0186
4/20/12 1:39	4.04	12.70	0.0002	0.0000	0.0000	0.0000
4/20/12 1:54	10.15	47.39	0.8402	0.7175	0.5205	0.5900
4/20/12 2:24	3.39	12.76	0.0000	0.0000	0.0000	0.0000
4/20/12 2:39	3.38	11.38	0.0000	0.0000	0.0000	0.0000
4/20/12 2:54	4.40	15.06	0.0009	0.0000	0.0000	0.0000
4/20/12 3:09	39.20	64.76	1.6343	1.7387	2.0841	4.1055
4/20/12 3:24	77.75	146.19	18.9511	1.1089	0.0041	0.0000
4/20/12 3:39	8.83	44.92	0.2573	0.0688	0.0127	0.0022
4/20/12 3:54	17.88	48.20	0.9925	0.1843	0.0188	0.0011
4/20/12 4:09	6.13	29.55	0.0004	0.0000	0.0000	0.0000
4/20/12 4:24	6.10	29.40	0.0003	0.0000	0.0000	0.0000

Appendix D: LISST-StreamSide Data File

Fraction:			29	30	31	32
	Total Conc.	Mean Size	216.66	255.85	302.13	356.79
date/time	µL/L	microns	µL/L	µL/L	µL/L	µL/L
4/20/12 4:39	10.29	41.77	0.2910	0.0452	0.0042	0.0003
4/20/12 4:54	11.71	46.12	0.6842	0.1475	0.0177	0.0012
4/20/12 5:39	24.82	44.00	0.5070	0.0671	0.0053	0.0003
4/20/12 5:54	14.93	41.94	0.6210	0.1147	0.0122	0.0009
4/20/12 6:09	7.95	32.43	0.4696	0.0869	0.0070	0.0005
4/20/12 6:24	5.26	19.58	0.1659	0.0289	0.0023	0.0002
4/20/12 6:39	11.34	41.19	1.1537	0.2863	0.0341	0.0024
4/20/12 6:54	11.92	42.88	1.1530	0.3048	0.0423	0.0033
4/20/12 7:09	4.64	23.65	0.4692	0.1092	0.0097	0.0010
4/20/12 7:24	4.84	24.76	0.5823	0.1774	0.0221	0.0027
4/20/12 7:39	3.83	15.68	0.0357	0.0046	0.0003	0.0002
4/20/12 7:54	3.33	14.40	0.0051	0.0003	0.0000	0.0000
4/20/12 8:09	1.94	11.45	0.0001	0.0000	0.0000	0.0000
4/20/12 8:24	3.13	14.70	0.0000	0.0000	0.0000	0.0000
4/20/12 9:24	524.20	111.00	34.0515	0.1528	0.0000	0.0000
4/20/12 9:39	35.49	140.85	11.9842	3.6152	0.2121	0.0026
4/20/12 9:54	3.58	16.18	0.0776	0.0154	0.0026	0.0018
4/20/12 10:09	2.54	11.24	0.0137	0.0012	0.0001	0.0000
4/20/12 10:24	2.44	13.68	0.0143	0.0009	0.0000	0.0000
4/20/12 10:39	1.59	10.71	0.0717	0.0063	0.0001	0.0000
4/20/12 10:54	1.26	9.37	0.0010	0.0000	0.0000	0.0000
4/20/12 11:09	1.11	8.60	0.0000	0.0000	0.0000	0.0000
4/20/12 11:24	1.05	9.27	0.0000	0.0000	0.0000	0.0000
4/20/12 11:39	0.85	8.40	0.0000	0.0000	0.0000	0.0000
4/20/12 11:54	0.78	9.20	0.0000	0.0000	0.0000	0.0000