EPA Region 10 Dive Team

Rhone Poulenc Groundwater Investigation, Duwamish River,

Seattle, WA

What: The EPA Region 10 Dive Team assisted the Superfund program in participating in a groundwater investigation at the Rhone Poulenc site in the Duwamish Waterway.

Why: Diver survey objectives were to install piezometers and provide core samples to assist in a groundwater/surface water interface study to determine the fate of organic and metals contamination known to be in groundwater.

When: Dive sampling was conducted in August, 2004.

How: Diver investigations included installation of piezometers and collection of core samples. Due to contaminants in sediments and the water column, diver decon was necessary to accomplish the scientific diving mission. See the safety / SOP page for more details on diver decon used by Region 10 and polluted water scientific diving in general.

Duncan P.B., R. Henry, E.R. Pedersen, S. Sheldrake, D. Thompson, 2007. Adaptation of Groundwater Evaluation and Sampling Tools for Underwater Deployment. Proceeding of the American Academy of Underwater Sciences 25th Symposiumpp. 55-83. (PDF) (29 pp. 4.0MB)

Results: Diver assisted sampling helped to better understand the diffusion of chemicals into the river environment, and what threat these chemicals pose to aquatic receptors. See the attached report below for more information.

Where: Duwamish River, approximately N47 31.127 W122 18.309

More Details: See attached QASP.

http://yosemite.epa.gov/R10/CLEANUP.NSF/LDW/Rhone-Poulenc+Incorporated

Contact: Bruce Duncan, Duncan.Bruce@epa.gov

Photos:

Upland sampling occurring of seepage areas

Divers Rob Pedersen and Lisa Macchio discuss sediment core collection aboard the vessel Monitor

Diver on tether brings piezometer tubing to surface for sample collection

Final adjustments for diver Rob Pedersen before descending.

Return to EPA Region 10 Dive Team homepage.

QUALITY ASSURANCE AND SAMPLING PLAN

FOR

Rhone- Poulenc Facility
Tukwila, WA

Prepared By: Quality Assurance Staff
Risk Evaluation Unit Staff
US EPA Region 10
1200 Sixth Ave.
Seattle, WA 98101

Date: 08/05/04

APPROVAL:

Project Manager: ________________________________ Date:________________
Christy Brown, USEPA, RCRA

Quality Assurance Manager: ______________________ Date:
Roy Araki, USEPA, OEA

PROJECT MANAGEMENT

Technical Support and Distribution List

Christy Brown	RCRA Project Manager		
René Fuentes	Hydrogeologist		
Bruce Duncan	Ecologist/Dive Team Coordinator		
Rob Pedersen	Alternate Dive Team Coordinator		
Ginna Grepo-Grove	QA Chemist		
Brandon Perkins	QA Chemist	Christopher Pace	ESAT Project Manager
Laura Castrilli	RSCC		

Problem Definition/Background

Introduction

The former Rhone-Poulenc facility is located on the Lower Duwamish Waterway (LDW) in Seattle, Washington. The facility is under a RCRA 3008(h) Order for cleanup of releases to the soil, ground water, and sediments. Sediments offshore of the facility are also part of the LDW Superfund site. Ground water monitoring conducted at the facility confirms that a number of organic and metals contaminants have discharged from the ground water to the Waterway. Metals migrating from the facility, for example copper and mercury, are present in some locations in the ground water immediately adjacent to the Waterway at levels three to five orders of magnitude in excess of the screening criteria. The RFI Report also documents metals in a bank seep at levels two to three orders of magnitude above the screening criteria. In addition, a removal action was conducted in 1995 due to PCBs in soils, process drains, and storm sewers at the facility. The PCB Remediation and Sewer Cleaning Report (April 1, 1998) confirms that PCB-contaminated sediments were present in sewers which discharge to the Waterway.

A barrier wall was constructed in 2003 in an attempt to control contaminant migration to the Waterway, and work continues on the accompanying pump-and-treat system in order to provide hydraulic control of the contaminated ground water. A monitoring program is in place to determine the impacts of construction on the contaminants remaining in the riverbank outside of the barrier wall. The results of this monitoring indicate that copper contamination is increasing in concentration in some locations since construction of the barrier wall.

The contaminants of interest for this sampling event are metals (i.e., including copper, lead, vanadium), total mercury, PCBs as total Aroclors, Semi-volatile Organic Compounds (SVOCs), and Volatile Organic Compounds (VOCs) (VOC analysis from water samples only).

The purpose of this sampling event is to determine whether there are contaminants of concern outside the barrier wall in either the transition zone ground water or the inter- or sub-tidal sediments adjacent to the facility. Sampling will be done to obtain water samples for chemical analysis and for field parameters which can be measured at the time of sampling. The sampling will be conducted with manual field equipment on the shoreline (mudflats during low tides), and with field kits. Sediments and transition zone sampling in the river and Slip 6 (along the south side of facility) will be done with the EPA Region 10 dive team support. A dive plan is available from the dive team coordinator. All the sediment sampling stations will overlap to a great extent with the transition zone ground water sampling stations. The samples collected will be analyzed at the EPA Region 10 Manchester Environmental Laboratory. The sampling is scheduled to occur Aug 24-26, 2004. A container inventory is available from any support team member.

Purpose and Objectives

Purpose: The purpose of this investigation is to obtain representative ground water / surface water transition zone water samples and sediment samples, from locations that have the highest likelihood of containing the contaminants of interest to determine whether 1) human exposures are controlled, 2) unacceptable exposures to ecological receptors such as juvenile salmonids are occurring, and 3) whether a more detailed investigation to determine the full nature and extent of contaminants remaining outside the barrier wall, in the wedge between the wall and the river, is warranted.

Objectives: The primary objectives of this field investigation are to collect transition zone ground water and sediment data to:

- Assess the potential for water quality and sediment quality impacts to the Duwamish River, including Slip 6;
- Determine whether migration of contaminated ground water from the site has been controlled;
- Understand the nature of contamination outside the barrier wall on the shoreline mud flats along the Duwamish River and in the shallow sub-tidal zone of Slip 6;
- Provide data to develop a conceptual model of the contamination distribution; and,
- Determine whether further investigation of the ground water and sediments outside the barrier wall is warranted.

Project/Task Description

The following samples will be collected by the EPA as part of this investigation:

Sediment

Samples from up to 22 stations – samples collected in plastic cores (for metals) or metal cores (for organics) of about 1 foot length by 2 inches diameter. Sediment core samples will be divided in half, into surface and subsurface components. Both portions will be analyzed for metals and mercury, only the lower will be analyzed for organics. Most sediment stations will be co-located with transition zone ground water sample stations. Along the Duwamish River about 9 shoreline stations and 3 sub-tidal stations will be sampled. In Slip 6, 10 subsurface stations will be sampled. The sampling locations are shown (approximately) in Figure 1, subject to field adjustments to allow for obstructions and field decisions. When the actual samples are taken in the field the locations will be documented in a field notebook and also located using field GPS (Global Positioning System) units which will be further refined after the field work using differential corrections in the office.

Transition Zone Ground Water

Shoreline samples (about 9) will be collected using MHE mini-piezometers, and subsurface samples (about 13) in Slip 6 (10) and along the Duwamish (3) will be taken using larger diameter mini-piezometers installed by divers and sampled from the EPA boat. One subtidal station may be located at the edge of the channel.

Sampling of the shoreline will occur mainly in two clusters – one at the North end where soil copper concentrations were high during previous site sampling and one at the South end where well samples have been high in copper, mercury, vanadium. There will also be samples near historic outfall locations and near the suspected previous discharge area near monitoring well DM-8. In addition to the contaminants previously listed there is a high pH (up to 12.5) ground water plume in the south west corner of the facility, also in combination with copper and mercury. There will be samples taken as close as possible to this area in both the Duwamish and Slip 6, as allowed by accessibility to the sediments away from the rip-rap.

The general location of the proposed samples are shown on the attached map of the site (Fig 1)

Table 1 - Sample Station Collection Description

Sediments

Subtidal. 13 stations. Samples from maximum of 10 subtidal sediment stations in Slip 6 plus 3 stations along the Duwamish. All parameters analyzed for sediments below 10cm except: Metals - two samples per station; first sample from upper 10cm and second from lower section (below 10 cm). SVOCs, PCBs and TOC - from upper 10cm at 5 stations.
Shoreline. 9 stations. Samples from up to 9 intertidal sediment stations along the Duwamish. All parameters analyzed for sediments below 10cm except: Metals - two samples per station; first sample from upper 10cm and second from lower section (below 10cm). Pesticides from upper 10cm at 2 stations. SVOCs and PCBs and TOC - from upper 10cm at 3 stations.

Transition Zone Ground Water

Subtidal. 13 stations. Up to 10 from Slip 6 and 3 from along the Duwamish.
Shoreline. 9 stations. Up to 9 samples from intertidal stations along the Duwamish.

Table 2. Project Activity Schedule

Activity	Estimated Date
Mobilization To Site	Aug 24-26, 2004
Sample Collection	Aug 24-26, 2004 (Aug 31-Sep 2 - backup)
Sample Receipt At MEL	Aug 24 - Sep 3, 2004
Sample Analysis	9 weeks from the receipt of last sample shipped
Data Validation	3 weeks after data submission from ESAT
Project Report Preparation	Draft - Jan 1, 2005
Project Completion	Final Report Mar 1, 2005

Data Quality Objectives (DQOs) and Criteria for Measurement Data

Data Quality Objectives (DQOs) are the quantitative and qualitative terms used by EPA to describe how good the data needs to be in order to meet the objectives of the project. DQOs for measurement data (referred to here as data quality indicators) are precision, accuracy, representativeness, completeness, comparability, and measurement range. The overall QA objective for analytical data is to ensure that data of known, acceptable and legally defensible quality are generated. To achieve this goal, data must be reviewed for 1) precision, 2) accuracy or bias, 3) representativeness, 4) comparability, and 5) completeness. The DQO requirements for this project are listed in Attachment 1 at the end of this QASP (Quality Assurance and Sampling Plan).

Field and analytical Precision will be evaluated by the relative percent difference (RPD) between field duplicate samples and laboratory duplicate samples; laboratory accuracy and precision will be determined by the spike recoveries and the RPDs of the MS/MSD samples, respectively.

$$\text{RPD} = \frac{(R1 - R2)}{((R1 + R2)/2)} \times 100$$

R1 = Recovery for MS or initial analyte concentration
R2 = Recovery for MSD or duplicate sample concentration

The precision goals for this study are 35% for sediment and 25% for water (Attachment 1).

Accuracy will be evaluated by the use of percent recovery (%R) of the target analyte in spiked samples and surrogates in all samples and QC samples. The accuracy goals for this study are specified in Attachment 1.

$$\%\ \text{Recovery} = \frac{SQ - NQ}{S} \times 100$$

SQ = quantity of spike or surrogate found in sample
NQ = quantity found in native (unspiked) sample
S = quantity of spike or surrogate added to native sample

Representativeness is the degree to which data from the project accurately represent a particular characteristic of the environmental matrix, which is being tested. Representativeness of samples is ensured by adherence to standard field sampling protocols and standard laboratory protocols. The design of the sampling scheme and number of samples should provide a representativeness of each matrix or product of the chemical processes being sampled.

Comparability is the measurement of the confidence in comparing the results of this study/project with the results of a different study/project using the same matrix, sample location, sampling techniques and analytical methodologies.

Completeness is the percentage of valid results obtained compared to the total number of samples taken for a parameter. Since sampling is by grabs and limited in number of samples, the number of valid results obtained from the analyses are expected to be equal or better than 90%. Percent completeness may be calculated using the following formula:

$$\text{\% Completeness} = \frac{\text{\# of valid results}}{\text{\# of samples taken}} \times 100$$

The QA objectives outlined, above, will be evaluated in conjunction with the data validation process.

Special Training Requirements/Certification

Divers are trained under the EPA Diver training certification. Shoreline personnel have 40 hour hazardous waste training and yearly 8 hour refresher. Boat operators have boat safety training updated quarterly through boat operation and safety proficiency tests/training.

Documentation and Records

The EPA sample collection team will maintain field notes in a bound waterproof notebook, photographs of the area and sampling points, and chain-of-custody documents. The locations of the sampling points will be documented using GPS technology. All sample collection related documents, records, and summaries of data generated will be kept by the PM in a project file.

The following documents will be archived at the Manchester Environmental: (1) signed hard copies of sampling and chain-of-custody records; and (2) electronic and hard copies of analytical data including extraction and sample preparation bench sheets, raw data and reduced analytical data.

The laboratory will also store all sample receipt, sample login, extraction documentation, and laboratory instrument documentation per the lab's SOP.

MEASUREMENT/DATA ACQUISITION

Sampling Process Design

Transition Zone Ground Water Samples. Near-shore samples will be taken using the "MHE Push-Point Sampling Tool" (see attached description and Figure 2). Sampling tool is stainless steel with a small screened area near the tip, which is pushed into the subsurface to attempt to access the ground water within the ground water/surface water transition zone. The sample will be obtained using a peristaltic pump to get a sample up to the surface, where the samples will go directly into sampling jars. In addition, additional sample volume will be collected to do field analysis for selected parameters (as possible) which may indicate other different water characteristics along the transect (potentially these will be pH, electrical conductivity, Dissolved Oxygen, Eh, and temperature). Sub-tidal samples will be collected using a similar push probe tool of larger diameter (which include a small screened length of a few inches length attached to a sampling tube, a larger version of mini-piezometer described above and made of flexible tubing), and analyzed for the same parameters as the shoreline water samples. The sampling process involves inserting the tool two or three feet (as practical based on the individual location) into the sediment and tamping to prevent surface water leakeage along tubing, then purging the water inside the tubing until clear water (if possible) with stable field parameters is obtained, and at that point filling the sampling bottles for the laboratory and field parameter analyses.

Sediment Samples

Samples will be taken with small cores (about 1 foot long and 2 inches diameter) which will be pushed into the sediment and then pulled out with the sediment inside. The samples for SVOCs, PCBs, and mercury will be obtained from the lower portion of the cores to minimize recent deposited surface material. Separate cores will be pulled for metals and for organics to allow the analysis to be depth comparable between the two sub-samples. The samples for metals will be obtained from two depths by splitting the volume inside the cores into an upper surface sample and a deeper sample. Both subsamples will be analysed to determine whether any concentration differences are present between the deeper zone and the zone near oxygenated surface water.

Sampling Methods Requirements

Transition zone water sampling will be adapted as necessary in the field to obtain water for analysis, but the basic method is as documented in the MHE Push-Point Sampling Device Operators Manual Ver. 1.02 dated 5/13/00 (see general description attached in appendix). The MHE sampler is basically a mini-well point, made of stainless steel, with machined cut small screened end. This tool is connected to sampling hose which goes into the peristaltic pump and empties into the sampling containers. This method is basically not much different than the method which has been used in the larger, permanently installed monitoring wells, but the equipment is portable, and very short (27 inches), designed to be used at the edge of surface water bodies. The other slightly larger mini-piezometer works under the same principle, but is made with a longer screen (a few inches long and about half inch in diameter), connected to flexible tubing which is pumped with a peristaltic pump from land or from the boat.

Cores are plastic or metal tubes about one foot long and about two inches diameter. The samples are obtained by pushing the core into the sediment and capping the bottom to retain the sediment in place. Plugs may be used temporarily prior to placing the sediment into the laboratory sampling jars.

Sampling method limitations
The sampling methods have some inherent limitations due to the materials used in their construction and to the method of acquiring the samples.

The use of peristaltic pumps has limitations in that it will probably degas some of the sample, and potentially provide samples which are biased low (some laboratory comparisons indicate maybe a 10% lower value for volatiles). This will lead to a low bias for results.

The water samples are in contact with the stainless steel of the MHE samplers, and with the tubing used for the mini-piezometer well screens and discharge tube. This is not expected to alter the concentrations significantly due to the very short contact time the water is inside of the tubing, and also due to the water constantly flowing. However, to assure that there are no cross-contamination impacts from the sampling equipment, several blank samples (10 to 20 % of total samples) will be taken with the same equipment used to obtain laboratory analysis samples.

Another limitation is the potential cross-contamination caused by the sampling tools materials themselves. The core samplers are either metal or plastic, which is not expected to alter sample concentrations due to the large volume of sediment in comparison to the core itself, and also due to the short time the sediments are inside of the cores. Similarly, the tubing used from the mini-piezometers to the sampling bottles are potentially a source of contaminants or may absorb the contaminants. Again blanks will be taken to assure that if any equipment contaminants are introduced these will be quantified from the blanks. It will not be possible to quantify whether any of the environmental contaminants are absorbed by the sampling equipment in this field effort. However, due to the short contact time with the sampling equipment, and the consistent method of purging the water any such cross-contamination should be minimal and able to be quantified.

Sample Requirements

The samples which will be collected include water and sediments. Only certified clean sample containers provided by the laboratory will be used in the field. Container type, number, volume, preservatives, and maximum sample holding times to extraction and/or analysis will be completed as specified by the respective analytical methods. Table 3 includes a summary of the sample container sizes, preservatives, and holding times for the project.

Equipment Decontamination

If possible dedicated sampling tools and equipment will be used in the field. For non-dedicated sampling equipment and tools, the following decontamination procedure will be followed: (1) the tools will be brushed cleaned prior to use with laboratory grade soap (Alconox) and rinsed with water, (2) methanol or acetone will be used to clean the equipment of any oily residue and (3) equipment will be rinsed with deionized water as a final rinse. Any equipment which can be used only once will not be reused for field sampling.

Sample Handling and Custody Requirements

Samples will be stored in coolers and kept under custody at all times An EPA Region 10 chain-of-custody (COC) form will be completed in indelible ink for each shipping container (e.g., ice chest) used. Each sample will be included in the field data sheets and given individual numbers to match the bottles and the field data sheets. Prior to sealing the ice chest, one copy of the COC form and a copy of the field record sheet will be sealed in a re-sealable waterproof plastic bag. This plastic bag will be taped to the inside cover of the ice chest so that it is maintained with the samples being tracked. Ice chests will be sealed with reinforced tape for shipment.

Until the field samples are relinquished to ESAT, the samples will be kept in coolers with ice and cooled to approximately 4 C. Each cooler will have an accompanying temperature blank.

Analytical Method Requirements

Field tests for geochemistry indicator parameters like pH, electrical conductivity, dissolved Oxygen, Eh, and temperature will be obtained by the EPA field crew based on the availability of the field equipment.

Field samples collected will be analyzed for metals, i.e., metals including copper, lead, vanadium, total mercury, PCBs as total Aroclors, Semi-volatile Organic Compounds (SVOCs), and Volatile Organic Compounds (VOCs) (VOCs in water samples only). The approximate number of samples, analytical methods, reporting limits, and DQO goals for the project are listed in Table 3 of this QASP.

Quality Control Requirements

All of the field instruments will be calibrated and used in accordance with the specified EPA methods and the manufacturer’s instruction manual. The following QC samples will be collected for this project: one field duplicate, one matrix spike and one rinsate blank (homogenization equipment blank, if available) per species for mercury and metal analyses; one field duplicate, one set of matrix spike, matrix spike duplicate, one rinsate blank (homogenization equipment blank, if available) per species per suite of parameters for organic analyses performed by MEL. The results obtained from the analysis of QC samples will be used in data validation to determine the quality, bias and usability of the data generated.

Instrument/Equipment Testing, Inspection, and Maintenance Requirements

The EPA Field Coordinator is responsible for testing, inspection and maintenance of the field instruments used for sample collection.

The laboratories will follow their standard operating procedures for any preventive maintenance required on laboratory instruments or systems used for this project.

Calibration Procedures and Frequency

Field maintenance and calibration will be performed prior to use of the instruments according to manufacturer's specifications when appropriate.

The laboratory will follow the calibration procedures found in the specified EPA method or in the laboratory's SOPs.

Inspection/Acceptance Requirements for Supplies and Consumables

All sample containers used for this project will be new and certified clean by MEL. Sample collection team will make note of the information on the certificate of analysis that accompanies sample containers to ensure that they meet the specifications and guidance for contaminant free sample containers.

Data Acquisition Requirements (non-Direct Measurements)

Historical data will not be used for this project.

Data Management

A field sampler's notebook, photos, GPS location data and the MEL Field Sample Data/Chain of Custody Data Sheet (FSDS/COC) will be used to document the sampling and inspection activities. The FSDS/COC will have the following information: site name, sample number, date, time of each sample collection, sampler's name or initials and sampling location. If applicable, a suffix l-FD will be appended to the sample identified as the field duplicate. For fixed laboratory analyses, field duplicates will be assigned a unique sample identifier and will be submitted 'blind' to the analytical laboratory. Analytical duplicate results will be reported with a trailing -AD (analytical duplicate) or D.

Validated laboratory results and necessary interpretation will be appended to the reports. All data generated during this project will be processed, stored, and distributed according to the QASP's specifications and laboratory's SOPs.

Reports to Management

A draft report will be prepared to document the results of this investigation. A final report containing the sampling locations, data, calculations, and conclusions will be prepared, including a map documenting the sampling locations.

ASSESSMENT/OVERSIGHT

Assessments and Response Actions

An internal assessment of the data and results may be conducted by the appropriate supervisors and the Laboratory QA Coordinator. MEL routinely participates in EPA's WP Studies. No USEPA system audit is planned for this project.

Corrective action procedures that might be implemented from QA results or detection of unacceptable data will be developed if required (See Attachment 2- Corrective Action Form).

Deviations from the specifications of this QASP shall be documented in a Sample Alteration Form (See Attachment 2).

DATA VALIDATION AND USABILITY

Data Review, Validation, and Verification Requirements

The summary of all analytical results will be reported to the project managers. The raw data for this project shall be maintained by the laboratory. Data verification will be performed by MEL or the CLP designated laboratory for all the analyses prior to the release of data. The laboratory will archive the analytical data into their laboratory data management system.

Validation and Verification Methods

All data generated shall be validated in accordance with the methods specified in the QASP and the Functional Guidelines for Organic and Inorganic Data Review. All data generated by the laboratory will be reported to the project managers.

Table 3. Summary of Project's Data Quality Objectives

Analytical Group	# Samples[1]	# Field Samples	# QA Samples: Dup/MS/MSD/ tripblank/ core rinsate/ tubing rinsate	Matrix	EPA Method	Detection Limits	Accuracy	Precision (RPD)	Completeness	Preservation	Volume, Container	Holding Time
LABORATORY MEASUREMENT												
Water – 9 Shoreline Stations - MHE Samplers; 13 Subtidal Stations - Minipiezometers and tubing. 4 sampling days = 4 VOC trip blanks + 4 core rinsates + 4 tubing rinsates												
metals	32	22	2/2/2/0/4/0	Water	6020/200.8	per MEL RL	per MEL	per MEL	100%	Cool 4°C HNO_3	500 mL, P	6 months
Mercury	32	22	2/2/2/0/4/0	Water	1631E	per MEL RL	per MEL	per MEL	100%	Cool 4°C HCL; BrCL	500 mL, P	90 days
SVOCs	33	22	2/2/2/0/4/1	Water	8270	per MEL RL	per MEL	per MEL	100%	Cool 4°C	1 L, AG	7 d extract 40 d analysis
VOCs	32	22	2/2/2/4/0/0	Water	8260	per MEL RL	per MEL	per MEL	100%	Cool 4°C pH ≤ 2	3 - 40 mL, w/septa	14 days
Sediment - 9 Shoreline Stations + 13 Subtidal Stations - all collected with cores (plastic for metals, metal for organics) - cores split into upper (0-10cm) and lower (below 10 cm) sections. Metals & Hg analyzed in both sections. SVOCs and PCBs - lower core sections all stations, upper section at 8 stations; Pesticides - upper section at 2 stations												
metals	53	44	3/3/3/-/-	Sediment	6010/200.7	per MEL RL	per MEL	per MEL	100%	Freeze -18°C	4 oz, WM	1 year
Mercury	53	44	3/3/3/-/-	Sediment	245.5	per MEL RL	per MEL	per MEL	100%	Freeze -18°C	2 oz, WM	28 days
SVOCs	36	30	2/2/2/-/-	Sediment	8270	per MEL RL	per MEL	per MEL	100%	Freeze -18°C	4 oz, WM, G, TL	1 year
PCBs	36	30	2/2/2/-/-	Sediment	8082	per MEL RL	per MEL	per MEL	100%	Freeze -18°C	4 oz, WM, G, TL	1 year
Pesticides	4	2	-/1/1/-/-	Sediment	8081	per MEL RL	per MEL	per MEL	100%	Freeze -18°C	4 oz, WM, G, TL	1 year
TOC	32	30	2/-/-/-/-	Sediment	PSEP/9060	per MEL RL	per MEL	per MEL	100%	Freeze -18°C	4 oz, WM, G, TL	1 year
Grain Size	24	22	2/-/-/-/-	Sediment	per MEL	per MEL RL	per MEL	per MEL	100%	Freeze -18°C	8 oz, WM, G, TL	1 year

1 - Maximum samples including field QA samples such as field duplicates and blanks. 1 core rinsate per day, 1 tubing rinsate for phthalates for project, 1 VOC trip blank per day, 1 field duplicate per matrix per 20 samples, 1 MS/D per matrix per 20 samples.

2 - P=plastic, AG=amber glass, WM=wide mouth, TL=teflon lined cap

Table 4. Metals Reporting Limits for Water Samples

Instrument	ICP-AES	GFAAS	ICP-MS	ICP-MS
Method	200.7	200.9	200.8	200.8 Mod
	6010			(no HCL)
Elements				
Aluminum	20		6.3	5
Antimony	45		1	0.5
Arsenic	45	1.5	0.63	0.1
Barium	0.5		2.5	2
Beryllium	1		0.05	0.04
Boron	5			
Cadmium	2		0.13	0.1
Calcium	10			
Cerium	20			
Chromium	5		1.3	1
Cobalt	5		0.013	0.01
Copper	4		1.3	1
Iron	10			
Lead	25	1	0.13	0.1
Lithium	3			
Magnesium	20			
Manganese	1		0.13	0.1
Molybdenum	6		0.063	0.05
Nickel	10		0.38	0.3
Phosphorus	75			
Potassium	700			
Selenium	100	1.5	1.3	1
Silicon	15			
Silver	4		0.63	0.1
Sodium	20			
Strontium	0.6			
Tin	25			
Thallium	150	2	0.63	0.5
Titanium	2			
Vanadium	3		1	0.1
Zinc	4		2.5	2
Zirconium	2			

Reporting limits might be adjusted due to matrix effects, sample size, etc.

Attachment 1. Sample Alteration Form

Project Name and Number: ____

Material to be Sampled: ____

Measurement Parameter:

Standard Procedure for Field Collection & Laboratory Analysis (cite reference):

____

Reason for Change in Field Procedure or Analysis Variation:

____

Variation from Field or Analytical Procedure:

____

Special Equipment, Materials or Personnel Required:

____

Initiators Name:____ Date:

Project Officer:____ Date:

QA Officer:____ Date:

Attachment 2. Corrective Action Form

Project Name and Number:
Sample Dates Involved:
Measurement Parameter:

Acceptable Data Range:
Problem Areas Requiring Corrective Action:

Measures Required to Correct Problem:
Means of Detecting Problems and Verifying Correction:

Initiators Name:____ Date:

Project Officer:____ Date:

QA Officer:____ Date:

APPENDIX - MHE Push-Point sampling tools by Mark A.Henry May 13, 2000

MHE PP27" Push-Point Sampling device (Patent Pending)
Operators Manual Ver. 1.02 5/13/00

Directions
Look at Figure 1.

As you can see, the PP27 device is a very simple, precisely machined tool consisting of a tubular body fashioned with a screened zone at one end and a sampling port at the other. The bore of the PP27 body is fitted with a guard-rod that gives structural support to the PP27 and prevents plugging and deformation of the screened zone during insertion into sediments. The PP27 is made of 316 stainless steel assuring compatibility with most sampling environments. The screened-zone consists of a series of interlaced machined slots which form a short screened-zone with approximately 20% open area.

Operation of the device is not difficult. One simply holds the device in a manner that squeezes the two handles towards each other to maintain the guard-rod fully inserted in the PP27 body during the insertion process (as shown in Figure 2). Holding the device in this manner, push the PP27 into the sediments or beach to the desired depth using a gentle twisting motion. When the desired depth is reached (or you hit refusal, usually at an aquitard) remove the guard-rod from the PP27 body without disturbing the position of the deployed sampler. Once the guard-rod has been removed from the PP27, it SHOULD NOT be reinserted into the device until the bore of the PP27 has been thoroughly cleansed of all sand, silt, etc.

Attach a syringe or (peristaltic) pump to the PP27 sample-port (see Figure 3) and withdraw water at a low-flow sampling rate (50-200 ml/min.). Once non-turbid aliquots have been withdrawn, representative samples can be collected for on-site and off-site analysis.

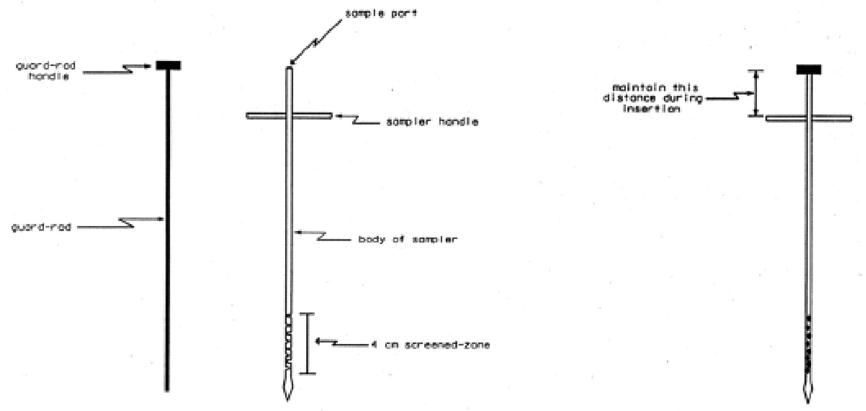
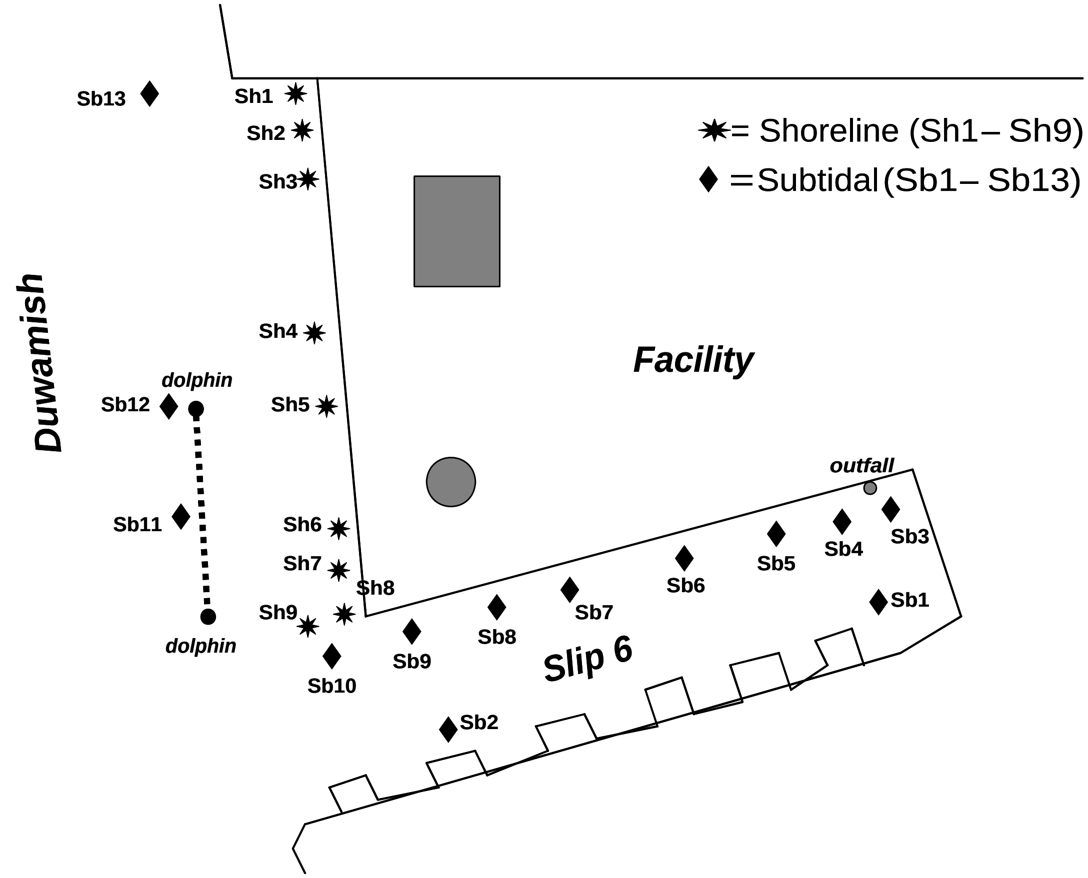


Figure 1

Fig. 1a
disassembled sampler

Fig. 1b
assembled sampler

Figure 1. Sample locations map - Approximate locations. Final locations to be decided in the field. Potentially one subtidal station will be moved to the edge of the river channel. For rough idea of scale, Slip 6 is about 750ft long. Sediment samples from below the surface 10cm except:



Pesticides to be collected in surface sediment from Stations Sh3 & Sh6. SVOCs & PCBs to be collected in surface sediment from Sh3, Sh6, Sh9, Sb1, Sb3, Sb4, Sb8, & Sb12.