Oak Harbor Sanitation Treatment Plant
Release 59177
VCP NW1823

DRAFT SEDIMENT SAMPLING AND ANALYSES PLAN
CITY OF OAK HARBOR
OUTFALL 001
OAK HARBOR, WASHINGTON

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Prepared for
City of Oak Harbor

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June 16, 2006

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ABBREVIATIONS AND ACRONYMS

cm	centimeters
COC	chain-of-custody
COH	City of Oak Harbor
DGPS	differentially corrected global positioning system
DQOs	data quality objectives
LAETs	lowest apparent effects thresholds
MDLs	method detection limits
MLLW	mean lower low water
MS/MSD	matrix spike/matrix spike duplicate
NPDES	National Pollutant Discharge Elimination System
QA	quality assurance
QC	quality control
RBC	rotating biological contactor
RLs	reporting limits
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SMS	sediment management standards
SOW	Scope of Work
SWP	Safe Work Plan
TOC	total organic carbon
WAAS	wide area augmentation system
WAC	Washington Administrative Code
WDOE	Washington Department of Ecology (Ecology)
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

1.1 BACKGROUND

The City of Oak Harbor is conducting baseline sediment sampling in the vicinity of Outfall 001. This outfall receives treated wastewater from the City of Oak Harbor (COH) Rotating Biological Contactor (RBC) Wastewater Treatment Plant (WWTP) located at 1501 SE City Beach Drive in Oak Harbor, Washington. The 18-inch outfall was constructed in the mid-1950s and currently discharges a maximum of 0.7 million gallons per day of treated domestic sewage under National Pollutant Discharge Elimination System (NPDES) Permit WA-002056-7. This NPDES permit also allows discharge for the COH Outfall 002. Outfall 002 discharges wastewater from a separate WWTP (Seaplane Base Lagoons) into Crescent Harbor and is not addressed in this Sampling and Analysis Plan (SAP).

1.2 OBJECTIVE

The objective of this sampling plan is to document the procedures to be used for field sampling and analytical testing to characterize baseline sediment quality in the vicinity of Outfall 001. To meet this objective, all sediment samples shall be analyzed for the full suite of 47 Washington Sediment Management Standards (SMS) chemicals and conventional sediment variables. In addition, sediment bioassays will be performed on samples where SMS criteria are exceeded. Sampling is proposed for late winter/spring 2007, dependant upon approval of this SAP. Results of the sediment analysis will be used to evaluate baseline sediment quality data for subsequent NPDES permit cycles.

1.3 SITE DESCRIPTION

The project site is located in the City of Oak Harbor, Island County, Washington (Figure 1-1). The outfall extends approximately 1,160 feet offshore to a depth of approximately -15 feet mean lower low water (MLLW) in a constricted portion of Oak Harbor. The outfall is constructed of 18-inch corrugated steel outfall pipe and terminates in a 6-inch port that discharges vertically and an 8-inch port that discharges horizontally. The outfall location and proposed sediment sampling stations are presented in Figure 1-2. Sampling station details are presented in Section 3.

The COH has not previously collected sediment samples in the vicinity of Outfall 001. There are no known sites with impacted marine sediments listed in the WDOE *Toxic Cleanup Program Integrated Site Information System of Confirmed or Suspected Contaminated Sites List* (WDOE 2006) within one half mile of COH wastewater Outfall 001.

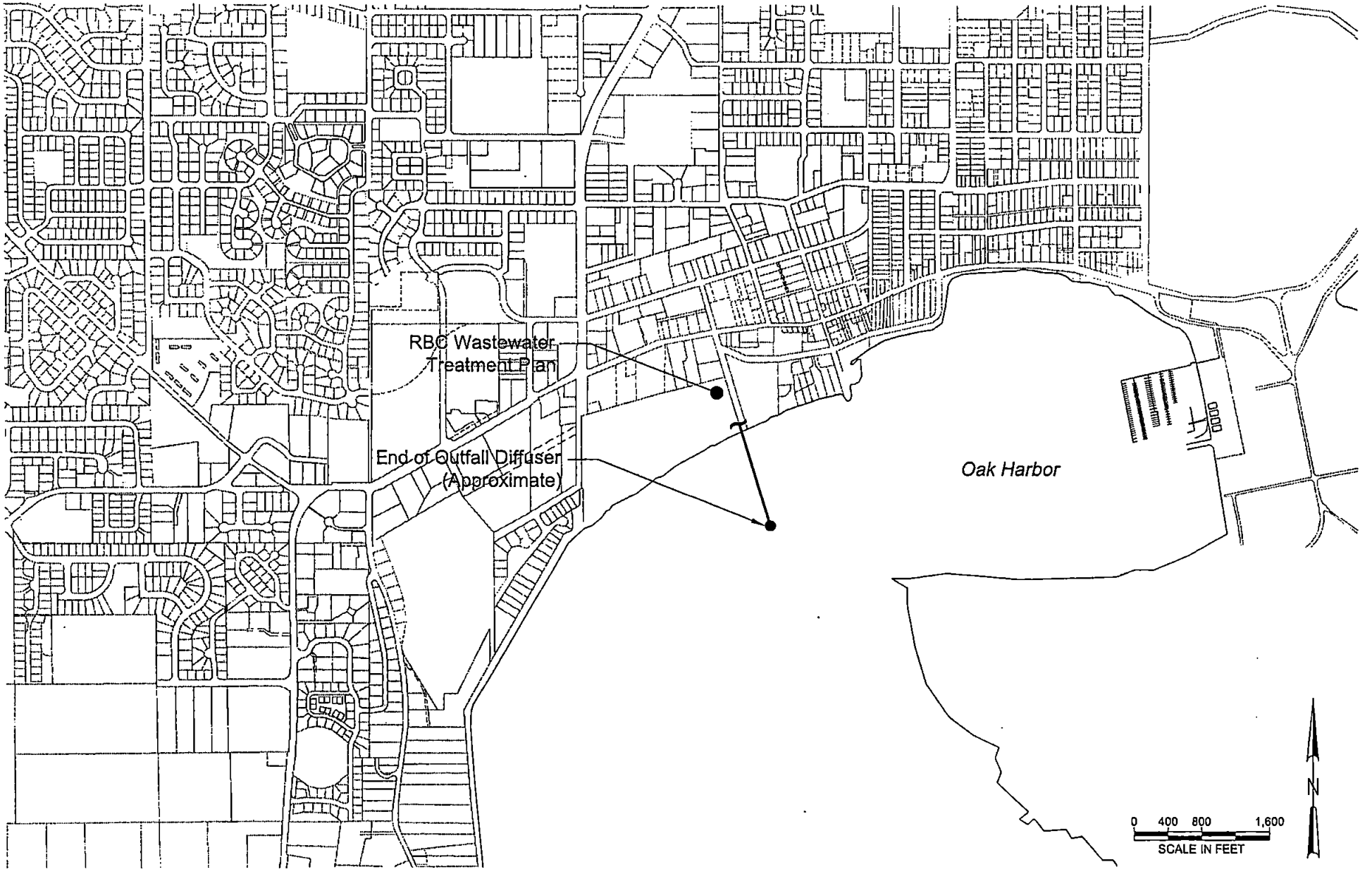

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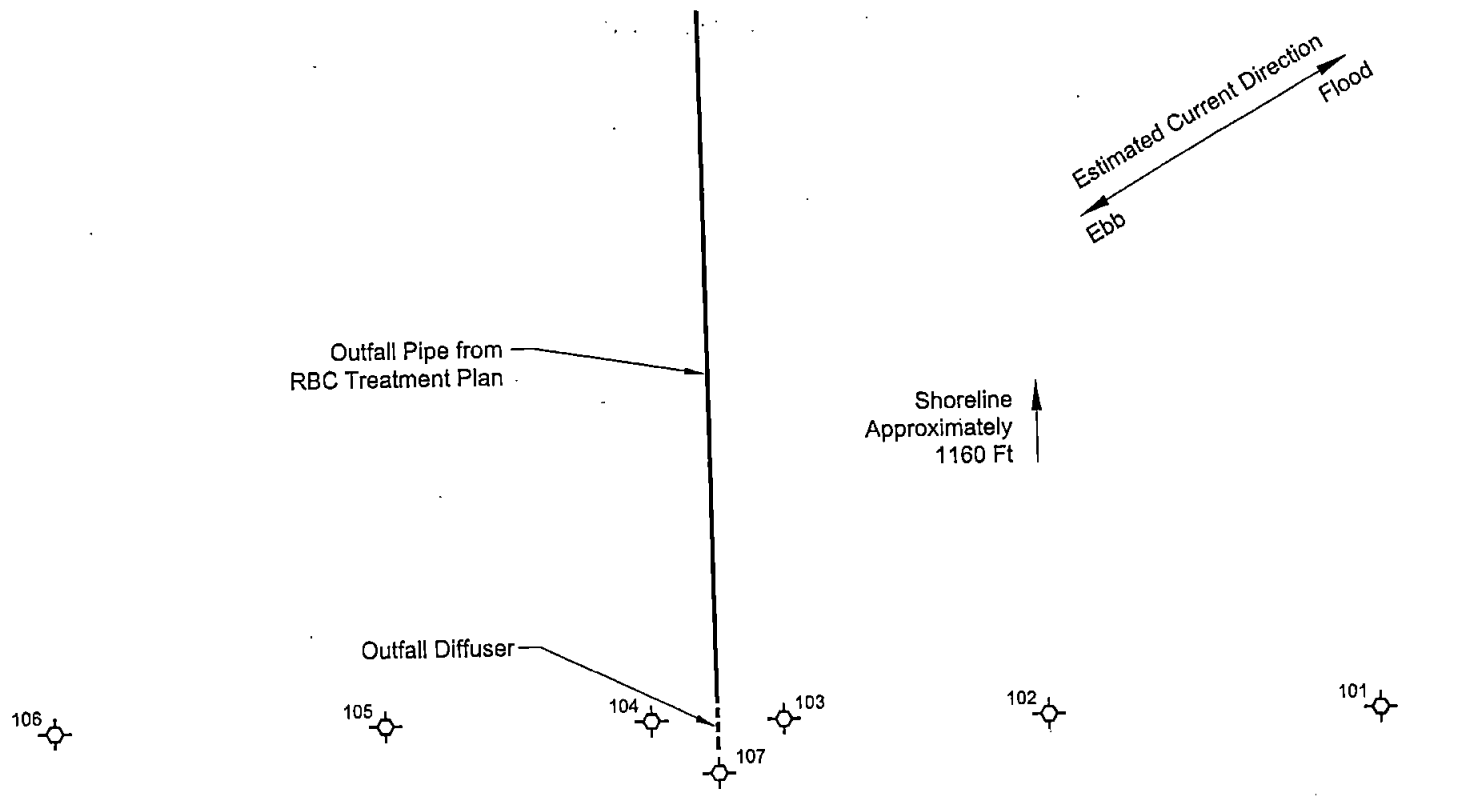
Figure 1-1
Location Map
City of Oak Harbor
Oak Harbor, WA
Outfall 001
SAMPLING AND ANALYSIS PLAN



Legend

Proposed Sediment Sample Location

Notes:

1. The coordinate system relative to this figure (See Table 3-1) is in NAD 83, Latitude/Longitude, Decimal Degrees.
2. The selected reference station is in Holmes Harbor. (URS Station ID 100)

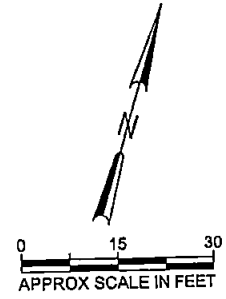


Figure 1-2

Sediment Sampling Locations

City of Oak Harbor
Oak Harbor, WA
Outfall 001
SAMPLING AND ANALYSIS PLAN

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2.0 PROJECT ORGANIZATION AND SCHEDULE

2.1 ORGANIZATION AND RESPONSIBILITIES

The project-specific organization, shown in Figure 2-1, indicates key positions together with lines of authority and lines of communication and coordination. The names of individuals filling key roles on the project, including planning and implementation, are provided in Table 2-1 together with their telephone numbers. It is essential that all individuals have defined responsibilities for their functional areas and that they are clearly aware of the entire project organization and the interrelationships of various roles.

Project responsibilities are briefly summarized here.

- The COH is responsible for ensuring that the work is performed in accordance with the Scope of Work (SOW) in order to achieve project objectives. They will monitor progress through communications with the URS Project Manager. They have the authority to modify the delivery order to address changing project requirements or unforeseen circumstances, if such modifications are deemed necessary to achieve the project objectives.

- The URS Client Manager is responsible for URS' total project performance. While the URS Client Manager will not direct the daily activities of the project, he will coordinate closely with the URS Project Manager to ensure that the project is completed successfully.

- The URS Project Manager has overall responsibility for project activities and progress. The URS Project Manager is responsible for planning, scheduling, cost control, and completion of project tasks. He also has overall responsibility for overseeing the development and implementation of all parts of the SAP, monitoring the quality of the technical and managerial aspects of the project, interfacing with the COH, and ensuring the timeliness of all project deliverables.

- The URS QA/QC Officers will provide senior review to ensure the SAP meets the project QA objectives. They will work directly with project personnel, be immediately notified if problems occur, and approve changes to the SAP if such changes are warranted. In the event that changes are needed, the appropriate URS QA/QC Officer will immediately notify the URS Project Manager, who will discuss the proposed changes with the COH Project Manager prior to implementing those changes. Changes in the SAP will not be made without prior approval from the COH Project Manager unless conditions require immediate response in the field or laboratory.

- The URS Project Chemist will be the daily manager for analytical chemistry. She will provide oversight of field analysis and the analytical laboratory and will direct the desk-top review and validation of chemical data. She will work closely with the

URS Project Manager, the URS Field Investigation Manager, and the analytical laboratory.

- The URS Project Health and Safety Manager will work directly with the URS Project Manager and field staff. He has the responsibility for monitoring and verifying that the work is performed in accordance with the Safe Work Plan (SWP). The URS Project Health and Safety Manager will advise the URS Project Manager regarding health and safety issues, but will function independently.

- The URS Field Manager is responsible for the overall performance of the field operations, including adherence to the SAP and SWP, scheduling, sample logging and custody. The Field Manager will also be the Site Safety Officer for this project. He has the responsibility to monitor and verify that field operations are conducted in accordance with the SWP.

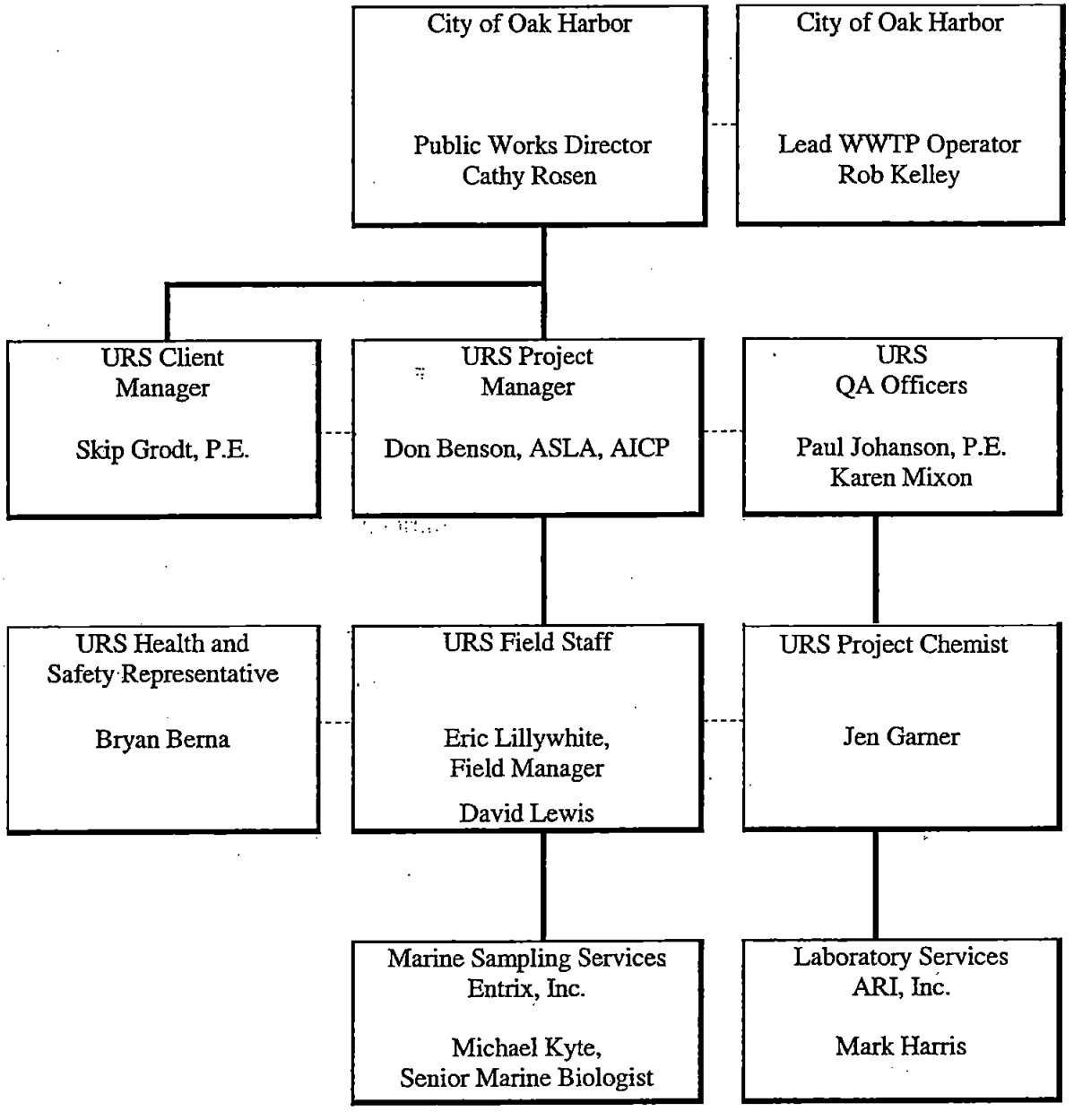
- The marine sampling services subcontractor (Entrix Inc.) is responsible for providing equipment and personnel appropriately trained and skilled to perform the sediment sampling activities according to the SAP. The marine sampling subcontractor will operate under the immediate direction of the URS Field Manager.

- The analytical laboratory (Analytical Resources, Inc. [ARI], Tukwila, Washington) is responsible for performing all chemical analyses for the project according to the specifications established in the SAP. The laboratory will coordinate closely with the URS Project Manager, URS QA/QC Officer, URS Project Chemist, and the URS Field Manager. The analytical laboratory will be subcontracted to and under the direction of URS.

2.2 PROJECT SCHEDULE

The project schedule is dependent upon several factors including the review of the SAP, construction activities, and subcontractor availability. Table 2-2 presents an approximate schedule for the completion of the project.

Figure 2-1
Organization Chart



- - - - - Lines of Communication

——— Lines of Authority

Table 2-1
Project Contacts

Key Role	Name	Telephone
City of Oak Harbor		
Public Works Director	Cathy Rosen	(360) 279-4500
Lead Wastewater Treatment Plant Operator	Rob Kelley	(360) 279-4770
URS Corporation		
URS Client Manager	Skip Grodt P.E.	(206) 438-2135
URS Project Manager	Don Benson ASLA., AICP	(206) 438-2027
URS Quality Assurance Officer (Project)	Paul Johanson P.E.	(206) 438-2164
URS Quality Assurance Officer (Chemistry)	Karen Mixon	(206) 438-2234
Project Chemist	Jen Garner	(206) 438-2063
URS Health and Safety Representative	Bryan Berna	(206) 438-2274
URS Field Manager	Eric Lillywhite	(206) 438-2196
Marine Sampling Services-Entrix Inc.		
Senior Marine Biologist and Operator	Michael Kyte	(206) 239-0272
Laboratory Services-Analytical Resources Inc.		
Contract Administrator and Quality Assurance	Mark Harris	(206) 695-6210

Table 2-2
Project Schedule

Activity	Start Date[a]	End Date[a]
Ecology review of plans	6/30/06	1/5/07
Finalization of plans	1/8/07	1/22/07
Mobilization/Procurement	1/23/07	2/5/07
Field work	2/6/07	2/7/07
Demobilization	2/8/07	2/8/07
Lab Analysis	2/8/07	3/12/07
Data Quality Review	3/13/07	3/19//07
Draft Report	3/13/07	4/12/07
Ecology Review	4/13/07	5/14/07
Final Report	5/15/07	5/25/07

[a] Schedule dates subject to revision and dependent on agency review times.

3.0 SAMPLING AND RATIONALE

3.1 SAMPLING STANDARDS

Current Ecology guidance *Sediment Sampling and Analysis Plan Appendix* (SAPA) (WDOE 2003) for developing SAPs was used to ensure that analytical requirements in the SMS are met. Sampling procedures and collection will follow current Puget Sound Estuary Program (PSEP [U.S. EPA 1997]) protocols. Sediment samples will be collected in accordance with standard environmental sample handling and custody procedures.

All sediment samples collected will be analyzed for the full suite of 47 SMS chemicals and conventional sediment variables presented in Washington Administrative Code (WAC) 173-204-400 (WDOE, 1995). In addition, sediment bioassays will be performed on properly archived samples from locations where these SMS criteria are exceeded.

3.2 SAMPLE STATIONS AND RATIONALE

In accordance with current WDOE guidance, transect sampling will be utilized to characterize the sediments in the vicinity of Outfall 001. Since the quantity of daily discharge is low (0.7 mgd) and the WWTP does not receive significant waste from industrial sources, the likelihood of contamination is low. Therefore, seven sample stations are an appropriate number of stations to characterize the area.

Table 3-1 shows the locations of the stations. Table 3-2 summarizes the rationale for selecting the stations.

Sample stations 101 and 106 are located 100 feet from the outfall diffuser. These stations are located outside the area where sediments are expected to be impacted by Outfall 001.

Sample stations 102 and 105 are located 50 feet from the outfall diffuser. These stations are located halfway between the diffuser and Stations 101 and 106.

Sample stations 103, 104, and 107 are located between 5 and 15 feet from the outfall diffuser. These stations are intended to characterize the sediment most likely to be impacted from the Outfall 001 wastewater discharge.

PSEP reference station HM06 (URS Station ID 100) at Holmes Harbor will also be sampled. Analytical data from this reference station will be used as a basis of comparison with sediment collected in the study area.

WDOE guidance recommends sample stations be occupied in order from least impacted to the most likely impacted. Since no sediment quality data has been collected in the vicinity of Outfall 001, sample stations will be occupied based upon the distance from Outfall 001 in the following order:

- PSEP reference station HM06 at Holmes Harbor.

- Stations 101 and 106 located 100 feet from the Outfall 001 diffusers.
- Stations 102 and 105 located 50 feet from the Outfall 001 diffusers.
- Station 107 located 5 feet from the end of the Outfall 001 diffusers
- Stations 103 and 104 located 10 feet from the Outfall 001 diffusers.

3.3 SAMPLE COLLECTION

Each sample station will be located using a differentially corrected global positioning system (DGPS). To ensure accuracy, the DGPS antenna will be positioned above the winch cable. The depth to bottom will be determined by a fathometer. A 0.1 square meter stainless steel van Veen sampler will be lowered to within a couple of meters of bottom. Once it has been verified the sampling vessel is on station, the van Veen sampler will be lowered at a rate of one foot per second until impact with the bottom. The van Veen sampler will be retrieved from the bottom at the same rate.

The grab sampler will be placed on a processing stand and overlying water removed using a siphon tube or suction bulb. The contents of the sampler will then be inspected to ensure that the following acceptability criteria are satisfied:

- The sampler is not over-filled with sample, resulting in the loss of the finer grained surface material. A corrective measure would involve the removal of weights from the grab sampler.
- The overlying water is not excessively turbid (indicating sample disturbance).
- The sediment surface is relatively flat and not eroded due to an incomplete closure of the grab sampler caused from obstructions in the jaws.
- The desired penetration depth is achieved (i.e., several centimeters more than the targeted sample depth of 10 centimeters (cm)). Coarse sands and gravel may limit the penetration depth of the van Veen grab, in which case weights may be required to obtain a desired penetration. If successive attempts to achieve a desired penetration depth fail, a comment will be placed in the field log, and the recovered sediments will be processed.

Any samples that do not meet these criteria will be discarded.

The collected sediment sample will be carefully inspected and characterized in the field notebook (see Section 4.1). At each station, the upper 10 cm of the sediment are desired for chemical analysis. Unrepresentative material such as woody debris, shells, large biota, fragments or rocks will be removed from the grab and documented in the field notes. Sediments representing the upper 10 cm will be transferred to a stainless steel bowl and homogenized. The sample crew will ensure that any sediment that comes in contact with the van Veen sampler will be excluded from that portion submitted for chemical analysis. Portions of the homogenized sediments will be placed into clean laboratory supplied sample containers using a stainless steel spoon. Additional homogenized sediment will be placed into clean laboratory-supplied sample

containers for archive for possible bioassays. Sample containers will be placed into a laboratory supplied cooler containing ice. All unused sediments will be discarded in the water at a location downcurrent of the unsampled stations prior to equipment decontamination.

3.4 DECONTAMINATION

Prior to collection of sediments at each sampling station, the van Veen grab sampler and other sampling equipment will be decontaminated. The grab sampler will be washed with ambient seawater to remove attached sediments. At each sample station the grab sampler will be washed with laboratory grade detergent (Alconox) and rinsed with distilled water prior to sampling. If repeated grabs are required to obtain sufficient sample volume, the sampling vessel will relocate downcurrent of the station so attached sediments can be removed from the sampler by repeated dips in ambient seawater. The grab sampler will be rinsed with ambient seawater only when repeated grabs occur at the same station.

All sample utensils (stainless steel bowls, spoons, stainless steel rulers) will be cleaned prior to collecting sediments. Utensils will be rinsed in potable water to remove attached sediments, washed in laboratory grade detergent, and rinsed in distilled water. In addition, a 10 percent nitric acid rinse will be performed since sediments are to be analyzed for metals. A final acetone rinse will follow the nitric acid rinse if contamination (petroleum sheen or odor) is observed. The utensils will be allowed to air dry. After air drying, the decontaminated utensil will be placed inside an aluminum foil wrap (dull side of foil facing in) for storage before use. A minimal volume of investigation derived waste totaling approximately 5 gallons of washwater will be generated. Decontamination fluid will be placed into a sealable container and properly disposed of.

Table 3-1
Sediment Stations and Outfall Coordinates

Station Number	Latitude	Longitude	Depth (ft MLLW)
101	48.28250	122.64980	TBD
102	48.28260	122.65000	TBD
103	48.28250	122.65010	TBD
104	48.28250	122.65020	TBD
105	48.28240	122.65040	TBD
106	48.28230	122.65050	TBD
107	48.28250	122.65020	TBD
Holmes Harbor (Station 100)[a]	48.03140	122.52030	TBD
End of Diffuser	48.28250	122.65020	-15 (to be verified)

Notes:
Coordinates are in NAD 83, Latitude and Longitude in Decimal Degrees (coordinates to be field verified).
[a] PSEP reference station HM06 at Holmes Harbor
TBD – to be determined

Table 3-2
Rationale

Station Number	Station Type	Sampling Rationale
101	Baseline	New sampling station to evaluate baseline sediment quality approximately 100 feet from the outfall diffusers.
102	Baseline	New sampling station to evaluate baseline sediment quality approximately 50 feet from the outfall diffusers.
103	Baseline	New sampling station to evaluate baseline sediment quality approximately 10 feet from the outfall diffusers.
104	Baseline	New sampling station to evaluate baseline sediment quality approximately 10 feet from the outfall diffusers.
105	Baseline	New sampling station to evaluate baseline sediment quality approximately 50 feet from the outfall diffusers.
106	Baseline	New sampling station to evaluate baseline sediment quality approximately 100 feet from the outfall diffusers.
107	Baseline	New sampling station to evaluate baseline sediment quality approximately 5 feet from the end outfall diffusers.
Holmes Harbor (Station 100)[a]	Reference	Authorized PSEP reference station for comparison to study area data.

[a]PSEP reference station HM06 at Holmes Harbor

4.0 SAMPLE DOCUMENTATION, HANDLING, AND CUSTODY

4.1 DOCUMENTATION AND LABELING

All field activities will be documented in a project-dedicated bound field logbook and on field forms. General information typically recorded in the field log book will include:

- Sampling personnel.
- Initial and changing weather information.
- Sampling vessel and crew names.
- Times of events such as leaving and returning to the dock, arrival at stations, sample collection times, phone conversations related to the project, problems encountered.
- Sample identification numbers.
- A listing of sample analyses and container types.
- List of project contacts, shipping address and phone numbers.
- Station name, DGPS coordinates, and water depth
- Date and time
- Gear type and grab number
- Penetration depth (cm) of the grab sampler into the sediment.
- Degree of leakage or sediment surface disturbance
- A description of the sediment texture using the Unified Soil Classification System.
- Sediment color using a Munsell color chart.
- Sediment texture (i.e. very soft, soft, firm, very firm).
- Biological organisms visually present.
- Wood, shell, rock, and anthropogenic material observed.
- Sediment stratifications, redox layers
- Presences and types of odors or sheens.

If repeated grabs are required at a station in order to obtain sufficient sample volume, additional physical sediment descriptions will not be required after the first grab, provided similar sediment characteristics are encountered. If different characteristics are noted in multiple grabs from the same station, they will be documented in the field log. Labels will be attached to the outside of all sample containers prior to collection of the samples. The following information will be included on each sample label: a sample identification number, project name, laboratory name, the station number or sampling location, date and time, initials of sampler, analysis to be performed and preservatives used (if any). Clear tape will be placed around the jar and label to ensure secure label attachment.

4.2 CUSTODY AND STORAGE

After placement of the sample in the associated sample container, a signed and dated custody seal will be placed across the lid. Each sample container will be placed in a bubble wrap pouch and then in a cooler containing bagged ice and a temperature blank. The samples will be maintained at a temperature of 4 degrees +/- 2 degrees Celsius. A Chain of Custody (COC) form will be completed for samples in each cooler before being sent to the laboratory. The COC form will list the project name, the sample numbers, individual collection dates and times, sample matrix type, requested analysis, the name of the relinquishing sampler, the laboratory name, laboratory contract number and the URS point of contact. Prior to delivery of the samples to the laboratory, the COC will be signed and dated with the appropriate carbon copies placed in the cooler and the remaining carbon copy retained by the field sampling personnel. Copies of the COC will be placed in a Ziploc bag and taped to the inside of each cooler cover. Signed and dated custody seals will be placed on all four sides of each sample cooler lid. The samples will either be hand delivered to the laboratory by sampling personnel or shipped by Federal Express.

Upon receipt at the laboratory, the custody seals will be broken by laboratory personnel, the condition of the samples noted and recorded, and the COC signed by laboratory personnel. Storage temperature and maximum holding time will be determined based on the analyses to be performed. Sample containers designated as archive for possible bioassays will be maintained by the laboratory in accordance with PSEP protocols. The holding time and conditions of the samples must be reported along with the test results. Section 5 presents the sample holding times for the chemical analysis to be performed. Appendix A lists the storage temperatures and maximum holding times for the physical/chemical analyses.

5.0 SAMPLE ANALYSIS

5.1 ANALYTICAL TESTING AND METHODS

A summary of the chemical parameters to be tested, analytical methods, container sizes and types, and sample holding times is presented in Table 5-1 (see Appendices A and B for additional information). Pre-cleaned sample containers with preservative as required, will be obtained from the laboratory performing the chemical analysis. Table 5-2 lists the total number of environmental samples and quality control samples that will be collected during the field-sampling program.

The chemical parameters to be investigated include those that have been assigned numerical criteria in the SMS (see Appendix C). WDOE-recommended sample preparation methods, cleanup methods, analytical methods, and practical quantitation limits for chemical testing of sediments are summarized in Appendix D.

Chemical parameters will be analyzed using methods from U.S. EPA's *Test Methods for Evaluating Solid Waste (SW-846)*, Update IIIB (EPA 2005), the State's PSEP Methods, or EPA protocols as identified in the SAPA. Grain size will follow PSEP methods.

Samples submitted to the laboratory will have an estimated 30-day turn around time for reporting the analytical results. ARI Inc., a WDOE-accredited laboratory, has been selected to perform the chemical analyses for this project. The laboratory provided method detection limits (MDLs), reporting limits (RLs), and control limits for organic, metals, and conventional analyses for the compounds of concern are presented on Table E-1 in Appendix E. The analytical methods shown in Tables 5-1 and E-1 were selected to achieve as much as practicable the SQS criteria even when compounds are reported as not detected.

Reasonable adjustments to sample volume used for analysis will be made to account for total solids content and total organic carbon (TOC) in an effort to achieve the SQS criteria. However, low TOC levels (0.1% to 0.3%) have been observed in Puget Sound sediments such that an increase in sample volume used for analysis may not achieve the criteria due to other factors such as matrix interferences that can't be overcome through cleanups due to the sample volume used. The TOC-normalized laboratory reporting limits for 1,2,4-trichlorobenzene, dimethyl phthalate, diethyl phthalate, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, butylbenzylphthalate, and hexachlorobutadiene may exceed SQS criteria if TOC content in sediments is very low (0.1% to 0.3%). It has been documented that meeting the SQS criteria for these compounds has been problematic in samples collected from Puget Sound. If SQS criteria are exceeded, comparison to other criteria such as lowest apparent effects thresholds (LAETs, Barrick et al, 1998) may be considered.

In the event that the laboratory reporting limits exceed SQS criteria, every effort will be made by the laboratory to resolve the cause of the exceedance and achieve the requested criteria. These efforts may include extracting additional sample volume and performing additional cleanup procedures. The laboratory method detection limits (MDLs) will meet the SQS criteria even with correction for the anticipated low TOC. The problematic compounds identified previously are analyzed by GC-MS technique with the exception of hexachlorobutadiene. If low TOC

results impact the ability to clearly assess if chemical concentrations are above or below SQS or LAET criteria for 1,2,4-trichlorobenzene, dimethyl phthalate, diethyl phthalate, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, butylbenzylphthalate, and hexachlorobutadiene, the data for these compounds will be reviewed based on the MDL and a determination will be made as to whether it is appropriate to report an estimated value between the MDL and the RL if it appears the compound is present or to report as not detected at the MDL if it is not present.

5.2 DATA REVIEW

The quality control procedures for organic analyses are presented in Appendix E. The laboratory will provide a complete data package including summarized sample results and quality assurance/quality control results as well as raw data. The analytical data will be reviewed by a URS chemist for correctness and compliance with analytical methods and project requirements. Data found to be unreliable or incomplete will be returned to the laboratory for correction of the errors. In the event that laboratory control limits are not met, data qualifiers will be assigned as needed using guidance from EPA National Functional Guidelines (US EPA 1999 and 2004). Data qualifiers will be shown on the data tables and documented in a data review report. Qualifiers that may be assigned to sample results include:

- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- DNR – Do Not Report. Another result is available that is more appropriate or reliable.

5.3 ADDITIONAL SAMPLING

Should any samples exceed SQS or LAETs, an area of exceedance will be estimated and mapped. As noted previously, sufficient sample volume will collected during the initial sampling event to accommodate reanalyses or additional testing requirements, including bioassays, in accordance with WAC 173-204-300 through 173-204-315. Additional testing may be conducted (if required) after concurrence between COH and WDOE.

5.4 REPORTING

A data summary report will be prepared for WDOE. The sample, field duplicate, and rinsate blank results will be summarized in data tables. For comparison purposes, the numerical chemical criteria will be presented alongside the data results. Data will be presented in both dry-weight and TOC-normalized units, where applicable. Chemicals that are not detected in the lab analysis will be reported as "undetected". Undetected results will be presented as the numeric detection limit for the sample, followed by a "U" qualifier. In the event that results are reported between the MDL and the RL, the result will be considered an estimate and the result will be flagged with a "J" qualifier.

Any data that exceed the chemical criteria will be highlighted in the data tables using bold text. In addition to the written data summary report and data tables, all data will be submitted to Ecology in electronic Excel format (.xls) and in electronic SEDQUAL format (comma separated file, .csv).

Table 5-1
Chemical Parameters and Methods

Chemical Parameter	Analytical Method	Number of Samples or Containers*	Container Type/ Size of Sample	Holding times
Total Metals	EPA SW846 6010B/7471A	1	8-oz Wide-Mouth Glass Jar	6 Months (28 Days for mercury)
VOCs[1]	EPA SW846 8260B	3	2-oz Wide-Mouth Glass Jar	14 Days
SVOCs[2]	EPA SW846 8270D/8270-SIM	1	32-oz Wide-Mouth Glass Jar	14 Days (preparation), 40 Days (analysis)
Pesticides	EPA SW846 8081A	1	32-oz Wide-Mouth Glass Jar	14 Days (preparation), 40 Days (analysis)
PCBs	EPA SW846 8082	1	32-oz Wide-Mouth Glass Jar	14 Days (preparation), 40 Days (analysis)
Grain Size	PSEP Method (1986a)	1	32-oz Wide-Mouth Glass or Plastic Jar	6 Months
TOC	Plumb, 1981	1	8-oz Wide-Mouth Glass Jar	28 Days
Ammonia	Plumb, 1981-modified	1	8-oz Wide-Mouth Glass Jar	7 Days
Total sulfides	EPA SW846 9030B	1	2-oz Wide-Mouth Glass Jar	7 Days
Acid Volatile Sulfides (AVS)	EPA Method (1991)	1	2-oz Wide-Mouth Glass Jar (No Headspace)	14 Days
Total Solids	PSEP Method (1986a)	1	8-oz Wide-Mouth Glass Jar	7 Days
Total Volatile Solids (TVS)	PSEP Method (1986a)	1	8-oz Wide-Mouth Glass Jar	7 Days

Reference: (WDOE 2003).

*The number of sample containers is per sample. Additional sample containers are required for MS/MSD analyses (i.e., 1 container for primary sample, 1 container for MS, and 1 container for MSD). One additional 16-oz. wide-mouth glass jar will be collected for potential bioassay analysis during the initial sampling event and archived by the laboratory.

[1] volatile organic compounds

[2] semivolatile organic compounds

Table 5-2
Environmental and Quality Control Sample Quantities for Marine Sediment Analyses

Analyses	Analytical Method	Environmental Samples	Field Duplicates	Matrix QC*	Field Blanks**	Total Samples
Total Metals	EPA SW846 6010B/7471A	8	1	1/1	1	12
VOCs	EPA SW846 8260B	8	1	1/1	2	13
SVOCs	EPA SW846 8270D/8270-SIM	8	1	1/1	1	12
Pesticides	EPA SW846 8081A	8	1	1/1	1	12
PCBs	EPA SW846 8082	8	1	1/1	1	12
Grain Size	PSEP Method (1986a)	8	1	0	0	9
TOC	Plumb, 1981	8	1	0	0	9
Ammonia	Plumb, 1981-modified	8	1	0	0	9
Total sulfides	EPA SW846 9030B	8	1	0	0	9
Acid Volatile Sulfides (AVS)	EPA Method (1991)	8	1	0	0	9
Total Solids	PSEP Method (1986a)	8	1	0	0	9
Total Volatile Solids (TVS)	PSEP Method (1986a)	8	1	0	0	9

* Matrix QC – MS/MSD and/or laboratory duplicate analyses.
** Field blanks include equipment rinsates and trip blanks (VOC analysis only)

6.0 QUALITY ASSURANCE

Quality assurance (QA) personnel have sufficient authority, access to work areas, and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions to problems through established channels; and to verify solution implementation. They ensure that all work, including processing of information, delivery of products, and installation or use of equipment is reviewed in accordance with the quality control (QC) objectives and that all deficiencies and non-conformances are corrected. QA personnel have direct access to senior management, so that the required authority is available when needed to carry out QA duties.

6.1 SAMPLE COLLECTION AND HANDLING

Sampling procedures are described in Section 4. If a permanent modification of an approved sampling protocol is necessary, the modification will be included in this document. Temporary modifications in response to non-typical field conditions or equipment malfunction shall be recorded in the field log and field forms. The URS Project Manager will be notified of the modification by telephone. The URS Project Manager will notify the COH Project Manager of the modification. Depending on the nature of the modification, a decision will be made whether to resample at the location where the modification occurred.

Sample containers, preservatives, and holding times will be appropriate for the type of sample collected and the analytical method to be used as outlined in Section 5. Maximum sample holding times will be strictly adhered to. Each sample will be documented, labeled, and identified as noted in Section 4.

Complete documentation of sample collection and handling will be maintained by URS in the master job file. Specific records to be kept include sample collection forms, chain-of-custody (COC) forms, sediment logs, and analysis request forms.

6.2 SAMPLE CUSTODY

A sample is under an individual's custody if one or more of the following criteria are met:

- it is in the sampler's possession
- it is in the sampler's view after being in possession
- it is in the sampler's possession and secured to prevent tampering
- it is in a secure location (e.g., locked room, locked vehicle, etc.)

Strict COC procedures will be adhered to in order to maximize sample integrity and accountability. These procedures are detailed in Section 4.

6.2.1 Field Custody Procedures

A limited number of people will handle the samples. The sampler will be personally responsible for completion of the COC Form and the care and custody of collected samples until they are transferred to another person.

6.2.2 Transfer of Custody

When samples transfer possession, the individuals relinquishing and receiving the samples will sign the COC Form and document the date and time of transfer. The sample collector will sign the form in the first signature space. The sample receiver will then sign the form in the second signature space.

6.2.3 Laboratory Custody Procedures

A designated sample custodian in the laboratory will accept custody of the samples. The custodian will verify that the sample identification numbers match those on the chain-of-custody record. The laboratory will maintain sample security and custody as appropriate.

6.3 INTERNAL QUALITY CONTROL

Quality Control (QC) checks will consist of measurements performed in the field and laboratory. QC checks include analysis of a number of field and laboratory QC samples. These samples will be evaluated to verify accuracy, comparability, completeness, and precision of analytical results for this sampling program.

6.3.1 Trip Blanks

Trip blanks are used to assess potential contamination in the field. Trip blanks, which are provided by the laboratory, accompany all volatile sample containers as they are transported to and from the sampling site and then to the laboratory. They consist of 40-mL glass vials filled with distilled/carbon-free water provided by the laboratory. One trip blank per cooler submitted with volatile samples will be analyzed for this sampling program.

6.3.2 Equipment Rinsate Blanks

Equipment rinsate blanks are used to evaluate the effectiveness of decontamination procedures. The equipment rinsate blank consists of carbon-free/deionized water that is poured through or over sample collection devices (following decontamination procedures) and collected in an appropriate sample container. One equipment rinsate blank is planned for this sampling program.

6.3.3 Duplicate Samples

Laboratory and field duplicate samples will be utilized for this project. One field duplicate is planned for this sampling program. A laboratory duplicate shall be reported for every twenty

environmental samples submitted if a matrix spike/matrix spike duplicate (MS/MSD) is not collected.

6.3.4 Field Instruments

Differential correction from the on-vessel GPS will be obtained from the Coast Guard. In the event the GPS is unable to obtain differential correction, a hand-held GPS utilizing the wide area augmentation system (WAAS) for position correction shall be utilized. WAAS correction factors have similar accuracy to differential correction.

6.4 REPORTING LIMITS

Selection of the appropriate analytical method is critical to provide usable data to properly assess site conditions. The analytical methods for this program have been selected to achieve reporting limits that meet the Sediment Quality Standards and LAETs. The reporting limits are presented in Appendix E.

6.5 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative or quantitative statements of the precision (a measure of the random error), bias (a measure of systematic error), representativeness, completeness, and comparability necessary for the data to serve the project objectives. During plan implementation, field data as well as laboratory data will be generated. These data will be evaluated to determine that DQOs have been met and that the data are usable for the project objectives.

6.6 QUALITY ASSURANCE MEASUREMENTS

The quality of the field data will be evaluated based on successful calibration and the manufacturer's stated accuracy and precision of the instrument. The quality of laboratory data will be evaluated based on the precision, bias, representativeness, completeness, and comparability of the data generated by each type of analysis. These data assessment parameters are described in the following subsections. Project DQOs, MDLs, RLs, and control limits for precision and bias are summarized in Appendix E.

6.6.1 Precision

Precision is a measure of the scatter in the data due to random error. For most environmental measurements, the major sources of random error are sampling and analytical procedures and natural variability. Sampling and analytical precision is expressed as the relative percent difference (RPD) between the field and/or laboratory duplicates.

6.6.2 Bias

Bias is a measure of the difference between the analytical results for a parameter and the true value due to systematic errors. Potential sources of systematic errors include sample collection, physical/chemical instability of samples, interference effects, calibration of the measurement system, and artificial contamination. Bias is expressed as the percent recovery of the surrogate or spike analyte from a sample or standard.

6.6.3 Representativeness

Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness of the environmental conditions at the time of sampling is achieved by selecting sampling stations, methods, and times so that the data describe the site conditions that the project seeks to evaluate. Representative samples will also be ensured through following proper protocols for sample handling (storage, preservation, packaging, custody, and transportation), sample documentation, and laboratory sample handling and documentation procedures.

6.6.4 Completeness

Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. The closer the numbers are, the more complete the measurement process. In general, completeness greater than 95 percent will fulfill the DQOs.

6.6.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. The comparability goal is achieved by maintaining consistency in sampling conditions, selection of sampling procedures, sample preservation methods, and analytical methods.

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APPENDIX A

Storage Temperatures and Maximum Holding Times for Physical/Chemical Analysis and Sediment Toxicity Tests

TABLE 10. STORAGE TEMPERATURES AND MAXIMUM HOLDING TIMES FOR PHYSICAL/CHEMICAL ANALYSES AND SEDIMENT TOXICITY TESTS

Sample Type	Sample Preservation Technique	Maximum Holding Time
Grain Size	Cool, 4°C	6 months
Total solids	Cool, 4°C Freeze, -18°C	14 days 6 months
Total volatile solids	Cool, 4°C Freeze, -18°C	14 days 6 months
Total organic carbon	Cool, 4°C Freeze, -18°C	14 days 6 months
Ammonia	Cool, 4°C	7 days
Total sulfides	Cool, 4°C, zero headspace required (a 250 ml sample for 5 ml of 2 N zinc acetate)	7 days
Acid Volatile Sulfides	Cool, 4°C, zero headspace required	14 days
Oil and grease	Cool, 4°C (HCl) Freeze, -18°C (HCl)	28 days 6 months
Metals (except mercury)	Cool, 4°C Freeze, -18°C	6 months 2 years
Mercury	Freeze, -18°C	28 days
Methyl Mercury	Freeze, -18°C	28 days
Organotins	Cool, 4°C Freeze, -18°C (for interstitial water analysis, extract water prior to freezing)	14 days 1 year
after extraction	Cool, 4°C	40 days
Semivolatile organic compounds; pesticides and PCBs; PCDDs/PCDFs	Cool, 4°C Freeze, -18°C	14 days 1 year
after extraction	Cool, 4°C	40 days
Volatile organic compounds	Cool, 4°C, zero headspace required	14 days
Sediment toxicity tests	Cool, 4°C Cool, 4°C, nitrogen atmosphere	2 weeks[a] 8 weeks[a]

Note: HCl - hydrochloric acid
PCB - polychlorinated biphenyl
PCDD - polychlorinated dibenzo-p-dioxin
PCDF - polychlorinated dibenzofuran

[a] The PSEP (1995) protocols recommend a maximum holding time of 2 weeks, but recognize that it may be necessary under certain circumstances to extend the holding time to accommodate a tiered testing strategy in which chemical analyses are conducted prior to toxicity testing. The DMMP, for example, allows sediments to be stored in the dark in a nitrogen atmosphere at 4°C for up to 8 weeks.

APPENDIX B

Minimum Sediment Sample Size and Acceptable Containers for Physical/Chemical Analyses and Sediment Toxicity Tests

TABLE 9. MINIMUM SEDIMENT SAMPLE SIZES AND ACCEPTABLE CONTAINERS FOR PHYSICAL/CHEMICAL ANALYSES AND SEDIMENT TOXICITY TESTS

Sample Type	Minimum Sample Size[a]	Container Type[b]
Physical/Chemical Analyses		
Grain size	100–150 g	P,G
Total solids	50 g	P,G
Total volatile solids	50 g	P,G[c]
Total organic carbon	25 g	P,G
Ammonia	25 g	P,G
Total sulfides	50 g	P,G[c]
Acid volatile sulfides	50 g	G[c]
Oil and grease	100 g	G
Metals (except mercury)	50 g	P,G
Mercury	1 g	P,G
Methyl Mercury	100 g	G, T[c]
Organotins	100 g	G (for bulk sediment) Pc, T (for interstitial
Volatile organic compounds	50 g	G,T[c]
Semivolatile organic compounds	50–100 g	G
Pesticides and PCBs	50–100 g	G,T
Toxicity Tests		
Marine		
Amphipod (*Rhepoxynius abronius, Ampelisca abdita*, or *Eohaustorius estuarius*)	0.25 L per replicate (1.25 L per station)	G
Bivalve larvae (*Crassostrea gigas, Mytilus* sp.)	200 g (wet weight) per station	G
Echinoderm larvae (*Strongylocentrotus purpuratus, Strongylocentrotus droebachiensis,* or *Dendraster excentricus*)	200 g (wet weight) per station	G
Juvenile polychaete (*Neanthes* sp.)	0.25 L per replicate (1.25 L per station)	G
Microtox® 100% porewater	0.5 L per station	G
Freshwater		
Amphipod (*Hyalella azteca*)	0.1 L per replicate (0.8 L per station)	G
Midge (*Chironomus tentans*)	0.1 L per replicate (0.8 L per station)	G
Frog embryo *(Xenopus laevis)*	45 g (dry weight) per station	G
Microtox® 100% porewater	0.5 L per station	G

[a] Recommended minimum field sample sizes (wet weight basis) for one laboratory analysis. If additional laboratory analyses are required (e.g., laboratory replicates, allowance for having to repeat an analysis), the field sample size should be increased accordingly. For some chemical analyses, smaller sample sizes may be used if comparable sensitivity can be obtained by adjusting instrumentation, extract volume, or other factors of the analysis.

[b] P - linear polyethylene; G - borosilicate glass; Pc – Polycarbonate; T - polytetrafluorethylene (PTFE, Teflon®)-lined cap.

[c] No headspace or air pockets should remain. If such samples are frozen in glass containers, breakage of the container is likely to occur.

Table B-1
Minimum Sample Sizes and Acceptable Containers for Physical/Chemical Analyses and Sediment Toxicity Tests
City of Oak Harbor - Outfall 001
2006 Sampling

Analysis	Analytical Method	Matrix	Container Type	Number Required*	Preservation Requirements	Holding Time
VOCs	EPA SW846 8260B	Sediment	2-oz Wide-Mouth Glass (No Headspace)	1	4°C	14 Days
		Water	40mL vials	3	4°C HCl to pH<2	14 Days
SVOCs	EPA SW846 8270D/8270-SIM	Sediment	32-oz Wide-Mouth Glass	1	4°C	14 Days (preparation) 40 Days (analysis)
		Water	500-mL Amber Glass	2	4°C	7 Days (preparation) 40 Days (analysis)
PCBs	EPA SW846 8082	Sediment	32-oz Wide-Mouth Glass	1	4°C	14 Days (preparation) 40 Days (analysis)
		Water	500-mL Amber Glass	2	4°C	7 Days (preparation) 40 Days (analysis)
Pesticides	EPA SW846 8081A	Sediment	32-oz Wide-Mouth Glass	1	4°C	14 Days (preparation) 40 Days (analysis)
		Water	500-mL Amber Glass	2	4°C	7 Days (preparation) 40 Days (analysis)
Total Metals**	EPA SW846 6010B/7471A	Sediment	8-oz Wide-Mouth Glass	1	4°C	6 Months (28 days for Mercury)
		Water	500-mL HDPE	1	4°C HNO_3 to pH<2	
Nitrogen as Ammonia	Plumb, 1981-modified	Sediment	8-oz Wide-Mouth Glass	1	4°C	7 Days
Total Organic Carbon (TOC)	Plumb, 1981	Sediment	8-oz Wide-Mouth Glass	1	4°C	28 Days
Total Solids	PSEP Method (1986a)	Sediment	8-oz Wide-Mouth Glass	1	4°C	7 Days
Total Volatile Solids	PSEP Method (1986a)	Sediment	8-oz Wide-Mouth Glass	1	4°C	7 Days
Total Sulfides	EPA 9030B	Sediment	2-oz Wide-Mouth Glass	1	4°C Zinc Acetate	7 Days
Acid Volatile Sulfide (AVS)	EPA Method (1991)	Sediment	2-oz Wide-Mouth Glass (No Headspace)	1	4°C Zinc Acetate	14 Days
Grain Size	PSEP Method (1986a)	Sediment	32-oz Wide-Mouth Plastic or Glass	1	4°C	6 Months

* Number of sample containers required is per sample. For QC such as MS/MSD, include 2 more containers per sample (i.e. 1 sample jar +1 MS jar + 1 MSD jar).
** Total metals include arsenic, cadmium, chromium, copper, lead, silver and zinc by EPA Method 6010B and mercury by EPA Method 7471A.

APPENDIX C

Chemical Criteria for Puget Sound Marine Sediments

TABLE 1. CHEMICAL CRITERIA FOR PUGET SOUND MARINE SEDIMENTS

Chemical Parameter	Sediment Management Standards		Dredged Material Management Program		
	SQS	SIZ_{max}, CSL, MCUL	1998 SL	1998 BT	1998 ML
Metals	(mg/kg dry weight, ppm)		(mg/kg dry weight, ppm)		
Antimony	--	--	150	150	200
Arsenic	57	93	57	507	700
Cadmium	5.1	6.7	5.1		14
Chromium	260	270	--		--
Copper	390	390	390		1300
Lead	450	530	450		1200
Mercury	0.41	0.59	0.41	1.5	2.3
Nickel	--	--	140	370	370
Silver	6.1	6.1	6.1	6.1	8.4
Zinc	410	960	410		3800
Tributyl tin (ug TBT/liter -- interstitial water)	--	--	0.15	0.15	
Nonionizable Organic Compounds	(mg/kg organic carbon[a], ppm OC)		(µg/kg dry weight, ppb)		
Aromatic Hydrocarbons					
Total LPAH[b]	370	780	5,200		29,000
Naphthalene	99	170	2,100		2,400
Acenaphthylene	66	66	560		1,300
Acenaphthene	16	57	500		2,000
Fluorene	23	79	540		3600
Phenanthrene	100	480	1,500		21,000
Anthracene	220	1,200	960		13,000
2-Methylnaphthalene	38	64	670		1900
Total HPAH[c]	960	5,300	12,000		69,000
Fluoranthene	160	1,200	1,700	4,600	30,000
Pyrene	1,000	1,400	2,600		16,000
Benz[a]anthracene	110	270	1,300		5,100
Chrysene	110	460	1,400		21,000
Total benzofluoranthenes[d]	230	450	3,200		9,900
Benzo[a]pyrene	99	210	1600	3,600	3,600
Indeno[1,2,3-c,d]pyrene	34	88	600		4,400
Dibenzo[a,h]anthracene	12	33	230		1,900
Benzo[g,h,i]perylene	31	78	670		3,200
Chlorinated Benzenes					
1,2-Dichlorobenzene	2.3	2.3	35	37	110
1,3-Dichlorbenzene	--	--	170		--
1,4-Dichlorobenzene	3.1	9	110	120	120
1,2,4-Trichlorobenzene	0.81	1.8	31		64
Hexachlorobenzene	0.38	2.3	22	168	230

Table 1. (continued)

Chemical Parameter	Sediment Management Standards		Dredged Material Management Program		
	SQS	SIZ_{max}, CSL, MCUL	1998 SL	1998 BT	1998 ML
Nonionizable Organics (cont.)	(mg/kg organic carbon[a], ppm OC)		(µg/kg dry weight, ppb)		
Phthalate Esters					
Dimethyl phthalate	53	53	1,400	1,400	–
Diethyl phthalate	61	110	1,200		–
Di-n-butyl phthalate	220	1,700	5,100	10,220	–
Butyl benzyl phthalate	4.9	64	970		–
Bis[2-ethylhexyl]phthalate	47	78	8,300	13,870	–
Di-n-octyl phthalate	58	4,500	6,200		–
Miscellaneous					
Dibenzofuran	15	58	540		1,700
Hexachlorobutadiene	3.9	6.2	29	212	270
Hexachloroethane	–	–	1,400*	10,220	14,000*
N-nitrosodiphenylamine	11	11	28	130	130
Total PCBs	12	65	130	38**	3,100
Chlorinated Pesticides					
Total DDT	–	–	6.9	50	69
Aldrin	–	–	10	37	–
Chlordane	–	–	10	37	–
Dieldrin	–	–	10	37	–
Heptachlor	–	–	10	37	–
Lindane	–	–	10		–
Volatile Organic Compounds					
Ethylbenzene	–	–	10	27	50
Tetrachloroethene	–	–	57	102	210
Total xylene	–	–	40		160
Trichloroethene	–	–	160*	1,168*	1,600*
Ionizable Organic Compounds	(µg/kg dry weight, ppb)		(µg/kg dry weight, ppb)		
Phenol	420	1,200	420	876	1,200
2-Methylphenol	63	63	63		77
4-Methylphenol	670	670	670		3,600
2,4-Dimethylphenol	29	29	29		210
Pentachlorophenol	360	690	400	504	690
Benzyl alcohol	57	73	57		870
Benzoic acid	650	650	650		760

Notes on next page.

Table 1. (continued)

Note:
- – - no numerical criterion of this type for this chemical
- AET - apparent effects threshold
- BT - bioaccumulation trigger
- CSL - cleanup screening level
- DMMP - Dredged Material Management Program
- HPAH - high molecular weight polycyclic aromatic hydrocarbon
- LPAH - low molecular weight polycyclic aromatic hydrocarbon
- MCUL - minimum cleanup level
- ML - maximum level
- PCB - polychlorinated biphenyl
- SIZ_{max} - Sediment Impact Zone maximum allowable contamination level (WAC 173-204-420)
- SL - screening level
- SMS - Sediment Management Standards (WAC 173-204)
- SQS - Sediment Quality Standards (WAC 173-204-320)

Where laboratory analysis indicates a chemical is not detected in a sediment sample, the detection limit shall be reported with U (Undetected) qualifier code and shall be at or below the Marine Sediment Quality Standards (SQS) chemical criteria (Table 1) . Where chemical criteria in Table 1 represent the sums of individual compounds (e.g., total LPAHs and total HPAHs), isomers (e.g., total benzofluoranthenes), or groups of congeners (e.g., total PCBs), the following methods shall be applied: (i) Where chemical analyses identify an undetected value for every individual compound/isomer/congener, then the single highest detection limit shall represent the sum of the respective compounds/isomers/congeners; and (ii) Where chemical analyses detect one or more individual compound/isomers/ congeners, only the detected concentrations will be added to represent the group sum.
Both the SMS and DMMP numerical criteria are based on Puget Sound apparent effects threshold (AET) values (Barrick et al. 1988). Conceptually, the SMS and DMMP numerical criteria provide two regulatory levels for the evaluation of sediment contaminant concentrations. The SQS under the SMS and the SL under the DMMP represent concentrations below which adverse biological effects are considered to be unlikely. The SIZ_{max}, CSL, and MCUL under the SMS and the ML under the DMMP represent concentrations above which adverse biological effects are considered to be significant. The derivation of these numerical criteria from the AET values is somewhat different because of the different regulatory uses of these criteria in the two applications. In addition, the fact that the concentrations of nonionizable organic compounds are expressed on a TOC-normalized basis under the SMS but on a dry-weight basis under the DMMP means that direct comparison of these two sets of numerical criteria is not possible.

[a] The listed values represent concentrations in parts per million "normalized" on a total organic carbon basis. To normalize to total organic carbon, the dry-weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content of the sediment.

[b] The total LPAH criterion under the SMS represents the sum of the concentrations of the following LPAH compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. 2-Methylnaphthalene is not included in the LPAH definition under the SMS, but is included in the LPAH definition under the DMMP. The total LPAH criterion is not the sum of the corresponding criteria listed for the individual LPAH compounds.

[c] The total HPAH criterion under the SMS represents the sum of the concentrations of the following HPAH compounds: fluoranthene, pyrene, benz[a]anthracene, chrysene, total benzofluoranthenes, benzo[a]pyrene, indeno[1,2,3-c,d]pyrene, dibenzo[a,h]anthracene, and benzo[g,h,i]perylene. The total HPAH criterion is not the sum of the corresponding criteria listed for the individual HPAH compounds.

[d] The total benzofluoranthenes criterion represents the sum of the concentrations of the b, j, and k isomers of benzofluoranthene.

*Values derived through equilibrium portioning.

** Value normalized to total organic carbon, mg/kg (TOC normalized).

APPENDIX D

Recommended Sample Preparation Methods, Cleanup Methods, Analytical Methods, and Practical Quantitation Limits for Sediments

TABLE 5. RECOMMENDED SAMPLE PREPARATION METHODS, CLEANUP METHODS, ANALYTICAL METHODS, AND PRACTICAL QUANTITATION LIMITS FOR SEDIMENTS

Chemical	Recommended Sample Preparation Methods[a]	Recommended Sample Cleanup Methods[b]	Recommended Analytical Methods[c]	Recommended Practical Quantitation Limits[d,e]
Metals				**(mg/kg dry weight)**
Antimony	PSEP/3050B	–	6010B/6020/B7041	50
Arsenic	PSEP/3050B	–	6010B/6020/7061A	19
Cadmium	PSEP/3050B	–	6010B/6020/7131A	1.7
Chromium	PSEP/3050B	–	6010B/6020/7191	87
Copper	PSEP/3050B	–	6010B/6020	130
Lead	PSEP/3050B	–	6010B/6020	150
Mercury	–[f]	–	7471A/245.5	0.14
Nickel	PSEP/3050B		6010B/6020	47
Silver	PSEP/3050B	–	6010B/6020	2
Zinc	PSEP/3050B	–	6010B/6020	137
Nonionizable Organic Compounds				**(µg/kg dry weight or as listed)**
LPAH Compounds				
Naphthalene	3540C/3550B/3545	3640A/3660B	8270C/1625C	700
Acenaphthylene	3540C/3550B/3545	3640A/3660B	8270C/1625C	433
Acenaphthene	3540C/3550B/3545	3640A/3660B	8270C/1625C	167
Fluorene	3540C/3550B/3545	3640A/3660B	8270C/1625C	180
Phenanthrene	3540C/3550B/3545	3640A/3660B	8270/1625C	500
Anthracene	3540C/3550B/3545	3640A/3660B	8270C/1625C	320
2-Methylnaphthalene	3540C/3550B/3545	3640A/3660B	8270C/1625C	223
HPAH Compounds				
Fluoranthene	3540C/3550B/3545	3640A/3660B	8270C/1625C	567
Pyrene	3540C/3550B/3545	3640A/3660B	8270C/1625C	867
Benz[a]anthracene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	433
Chrysene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	467
Total benzofluoranthenes[g]	3540C/3550B/3545	3640A/3660B	8270[h]/1625C	1067
Benzo[a]pyrene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	533
Indeno[1,2,3-cd]pyrene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	200
Dibenz[a,h]anthracene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	77
Benzo[ghi]perylene	3540C/3550B/3545	3640A/3660B	8270C/1625C	223
Chlorinated Benzenes				
1,2-Dichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	35
1,3-Dichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	57
1,4-Dichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	37
1,2,4-Trichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	31
Hexachlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	22
Phthalate Esters				
Dimethyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	24
Diethyl phthalate	3540C/3550B/3545	3640/A3660B	8270C/1625C	67
Di-n-butyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	467
Butyl benzyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	21
Bis[2-ethylhexyl]phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	433
Di-n-octyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	2067

TABLE 5. (continued)

Chemical	Recommended Sample Preparation Methods[a]	Recommended Sample Cleanup Methods[b]	Recommended Analytical Methods[c]	Recommended Practical Quantitation Limits[d,e]
Miscellaneous Extractable Compounds				(µg/kg dry weight or as listed)
Dibenzofuran	3540C/3550B/3545	3640A/3660B	8270C/1625C	180
Hexachlorobutadiene	3540C/3550B/3545	3640A/3660B	8270C/1625C	11
Hexachloroethane	3540C/3550B/3545	3640A/3660B	8270C/1625C	47
N-nitrosodiphenylamine	3540C/3550B/3545	3640A/3660B	8270C/1625C	28
PCBs				
PCB Aroclors®	3540/3550	3620B/3640A/3660B	8082	6
Chlorinated Pesticides				
DDD	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	3.3
DDE	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	2.3
Total DDT	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	6.7
Aldrin	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	1.7
Chlordane	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	1.7
Dieldrin	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	2.3
Heptachlor	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	1.7
Lindane	3540C/3550B/3545	3620B/3640A/3660B	8081A/8085	1.7
Volatile Organic Compounds				
Ethylbenzene	-/	–	8260B/1624C	3.2
Tetrachloroethene	-/	–	8260B/1624C	3.2
Total xylene	-/	–	8260B/1624C	3.2
Trichloroethene	-/	–	8260B/1624C	3.2
Ionizable Organic Compounds				
Phenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	140
2-Methylphenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	63
4-Methylphenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	223
2,4-Dimethylphenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	29
Pentachlorophenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	120
Benzyl alcohol	3540C/3550B/3545	3640A/3660B	8270C/1625C	57
Benzoic acid	3540C/3550B/3545	3640A/3660B	8270C/1625C	217
Conventional Sediment Variables				
Ammonia	-/	–	Plumb (1981)	100 mg/L
Grain size	-/	–	Plumb (1981)	1%
Total solids	-/	–	PSEP	0.1% (wet wt)
Total organic carbon (TOC)	-/	–	9060	0.1%
Total sulfides	-/	–	Plumb (1981)/ 9030B	10 (mg/kg)
Acid Volatile Sulfides			AVS (U.S. EPA 1991)	10 (mg/kg)
Site Specific Compounds				(µg/kg dry weight or as listed)
Ammonia	-/	–	See above	100
Other potentially toxic metals (e.g., antimony, beryllium, nickel)	PSEP	–	See above	Sb 50, Ni 47
Organotin complexes			Bulk sediment: Krone (1989);	1 - 5
			Interstitial water: Krone (1989) extraction, performance based analysis	3 - 5 ug/L
Pesticides, herbicides	3540C/3550B	3620B/3640A/3660B	8081A/8085/8151A	1.7-6.7
Petroleum compounds (e.g., benzene, toluene, ethylbenzene, xylene)	–	–	8021B/8260B/1624C	50
Total petroleum hydrocarbons	–	–	8440	20 mg/kg (gasoline), 50 mg/kg (#2 diesel),

Chemical	Recommended Sample Preparation Methods[a]	Recommended Sample Cleanup Methods[b]	Recommended Analytical Methods[c]	Recommended Practical Quantitation Limits[d,e]
			Ecology method - pub. 97-602 (1997)	100 mg/kg (motor oil) based on 100% solids
Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs)	–	–	1613	1 - 10 ng/kg
Guaiacols	3540C	–	NCASI Method CP – 86.02 Chlorinated Phenols	50-100
Resin acids	3540C (using acetone)	–	NCASI Method RA/FA 85.02	50-100
Radioactive substances, Explosive compounds	8330	–	8095/8330	250-2200 (method 8330)

Note: AVS - acid volatile sulfide
EPA - U.S. Environmental Protection Agency
GPC - gel permeation chromatography
HPAH - high molecular weight polycyclic aromatic hydrocarbon
LPAH - low molecular weight polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PSEP - Puget Sound Estuary Program
TOC - total organic carbon

[a] Recommended sample preparation methods are:
PSEP (1997a)
Method 3050B and 3500 series - sample preparation methods from SW-846 (U.S. EPA 1996) and subjected to changes by EPA updates.

[b] Recommended sample cleanup methods are:
Sample extracts subjected to GPC cleanup follow the procedures specified by EPA SW-846 Method 3640A. Special care should be used during GPC to minimize loss of analytes.
If sulfur is present in the samples (as is common in most marine sediments), cleanup procedures specified by EPA SW-846 Method 3660B should be used.
All PCB extracts should be subjected to sulfuric acid/permanganate cleanup as specified by EPA SW-846 Method 3665A.
Additional cleanup procedures may be necessary on a sample-by-sample basis. Alternative cleanup procedures are described in PSEP (1997b) and U.S. EPA (1986).

[c] Recommended analytical methods are:
Method 6000, 7000, 8000, and 9000 series - analytical methods from SW-846 (U.S. EPA 1986) and updates
The SW-846 and updates are available from the web site at:

http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm

Method 1613 - analytical method from U.S. EPA-821/B-94-005 (1994)
Method 1624C/1625C - isotope dilution method (U.S. EPA 1989)
NCASI – analytical methods from the National Council for Air and Stream Improvement, Inc.
Plumb (1981) - U.S. EPA/U.S. Army Corps of Engineers Technical Report EPA/CE-81-1
PSEP (1986a)
Acid volatile sulfide method for sediment (U.S. EPA 1991).
Krone (1989) – Krone, C. A., D. W. Brown, D. G. Burrows, R. G. Bogar, S. L. Chan and U. Varanasi, 1989. A Method for the Analysis of Butyltin Species and the Measurement of Butyltins in Sediment and English Sole Livers from Puget Sound. Marine Environmental Research 27:1-18.

To achieve the recommended practical quantitation limits for organic compounds, it may be necessary to use a larger sample size approximately 100 g), a smaller final extract volume for gas chromatography/mass spectrometry analyses (0.5 mL), and one of the recommended sample cleanup methods as necessary to reduce interference, using different analytical methods with better sensitivity. Detection limits are on a dry-weight basis unless otherwise indicated. For sediment samples with low TOC, it may be necessary to achieve even lower detection limits for certain analytes in order to compare the TOC-normalized concentrations with applicable numerical criteria (see Table 1).

(Footnotes continued on next page)

[e] The recommended practical quantitation limits are based on a value equal to one third of the 1988 dry weight lowest apparent effects threshold value (LAET, Barrick et al 1988) except for the following chemicals: 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, hexachlorobenzene, hexachlorobutadiene, n-nitrosodiphenylamine, 2-methylphenol, 2,4-dimethylphenol, and benzyl alcohol, for which the recommended maximum detection limit is equal to the full value of the 1988 dry weight LAET.

[f] The sample digestion method for mercury is described in the analytical method (Method 7471A, September 1994).

[g] Total benzofluoranthenes represent the sum of the b, j, and k isomers.

[h] Selected ion monitoring may improve the sensitivity of method 8270C and is recommended in cases when detection limits must be lowered to human health criteria levels or when TOC levels elevate detection limits above ecological criteria levels. See PSEP organics chapter, appendix B—Guidance for Selected Ion Monitoring (1997b).

[i] Sample preparation methods for volatile organic compound analyses are described in the analytical methods.

[j] Sample preparation methods for sediment conventional analyses are described in the analytical methods.

APPENDIX E

Quality Control Procedures for Organic, Metal, and Conventional Analysis

TABLE 11. QUALITY CONTROL PROCEDURES FOR ORGANIC ANALYSES

Quality Control Procedure	Frequency	Control Limit	Corrective Action
Instrument Quality Assurance/Quality Control			
Initial Calibration[a]	See reference method(s) in Table 5	See reference method(s) in Table 5	Laboratory to recalibrate and reanalyze affected samples
Continuing Calibration[a]	See reference method(s) in Table 5	See reference method(s) in Table 5	Laboratory to recalibrate if correlation coefficient or response factor does not meet method requirements
Method Quality Assurance/Quality Control			
Holding Times[ab]	Not applicable	See Table 10	Qualify data or collect fresh samples in cases of extreme holding time or temperature exceedance
Detection Limits[ab]	Annually	See Table 5	Laboratory must initiate corrective actions (which may include additional cleanup steps as well as other measures, see Table 5) and contact the QA/QC coordinator and/or project manager immediately.
Method Blanks[ab]	One per sample batch or every 20 samples, whichever is more frequent, or when there is a change in reagents	Analyte concentration < PQL	Laboratory to eliminate or greatly reduce laboratory contamination due to glassware or reagents or analytical system; reanalyze affected samples
Analytical (Laboratory) Replicates[ab] **and Matrix Spike Duplicates**[ab]	1 duplicate analysis with every sample batch or every 20 samples, whichever is more frequent; Use analytical replicates when samples are expected to contain target analytes. Use matrix spike duplicates when samples are not expected to contain target analytes	Compound and matrix specific RPD ≤ 35 % applied when the analyte concentration is > PQL	Laboratory to redigest and reanalyze samples if analytical problems suspected, or to qualify the data if sample homogeneity problems suspected and the project manager consulted
Matrix Spikes[ab]	One per sample batch or every 20 samples, whichever is more frequent; spiked with the same analytes at the same concentration as the LCS	Compound and matrix specific	Matrix interferences should be assessed and explained in case narrative accompanying the data package.
Surrogate Spikes[ab]	Added to every organics sample as specified in analytical protocol	Compound specific	Follow corrective actions specified in SW-846.
Laboratory Control Samples (LCS), Certified or Standard Reference Material[ab]	One per analytical batch or every 20 samples, whichever is more frequent	Compound specific, recovery and relative standard deviation for repeated analyses should not exceed the control limits specified in the method of Table 5 or performance based intralaboratory control limits, whichever is lower	Laboratory to correct problem to verify the analysis can be performed in a clean matrix with acceptable precision and recovery; then reanalyze affected samples

TABLE 11. (continued)

Quality Control Procedure	Frequency	Control Limit	Corrective Action
Field Quality Assurance/Quality Control			
Field Replicates	**At project manager's discretion**	**Not applicable**	**Not applicable**
Field Blanks	**At project manager's discretion**	**Analyte concentration ≤ PQL**	**Compare to method blank results to rule out laboratory contamination; modify sample collection and equipment decontamination procedures**

Notes:
- CLP - Contract Laboratory Program (EPA)
- COV - coefficient of variation
- EPA - U.S. Environmental Protection Agency
- PCB - polychlorinated biphenyl
- PQL - practical quantitation limit
- RPD - relative percent difference
- RSD - relative standard deviation
- SVOC - semivolatile organic compound
- VOC - volatile organic compound

[a] Subject to QA2 review
[b] Subject to QA1 review

TABLE 12. QUALITY CONTROL PROCEDURES FOR METAL ANALYSES

Quality Control Procedure	Frequency	Control Limit	Corrective Action
Instrument Quality Assurance/Quality Control			
Initial Calibration[a]	Daily	Correlation coefficient ≥0.995	Laboratory to optimize and recalibrate the instrument and reanalyze any affected samples
Initial Calibration Verification[a]	Immediately after initial calibration	90–110 % recovery for ICP-AES, ICP-MS and GFAA (80–120 % for mercury), or performance based intralaboratory control limits, whichever is lower	Laboratory to resolve discrepancy prior to sample analysis
Continuing Calibration Verification [a]	After every 10 samples or every 2 hours, whichever is more frequent, and after the last sample	90–110 % recovery for ICP-AES and GFAA, 85-115 % for ICP-MS (80–120 % for mercury)	Laboratory to recalibrate and reanalyze affected samples
Initial and Continuing Calibration Blanks [a]	Immediately after initial calibration, then 10 percent of samples or every 2 hours, whichever is more frequent, and after the last sample	Analyte concentration < PQL	Laboratory to recalibrate and reanalyze affected samples
ICP Interelement Interference Check Samples [a]	At the beginning and end of each analytical sequence or twice per 8 hour shift, whichever is more frequent	80–120 percent of the true value	Laboratory to correct problem, recalibrate, and reanalyze affected samples
Method Quality Assurance/Quality Control			
Holding Times [ab]	Not applicable	See Table 10	Qualify data or collect fresh samples
Detection Limits [ab]	Not applicable	See Table 5	Laboratory must initiate corrective actions and contact the QA/QC coordinator and/or the project manager immediately
Method Blanks [ab]	With every sample batch or every 20 samples, whichever is more frequent	Analyte concentration ≤ PQL	Laboratory to redigest and reanalyze samples with analyte concentrations < 10 times the highest method blank
Analytical (Laboratory) Replicates[ab] and Matrix Spike Duplicates [ab]	1 duplicate analysis with every sample batch or every 20 samples, whichever is more frequent; Use analytical replicates when samples are expected to contain target analytes. Use matrix spike replicates when samples are not expected to contain target	RPD ≤ 20 % applied when the analyte concentration is > PQL	Laboratory to redigest and reanalyze samples if analytical problems suspected, or to qualify the data if sample homogeneity problems suspected and the project manager consulted

TABLE 12. (continued)

Quality Control Procedure	Frequency	Control Limit	Corrective Action
	analytes		
Matrix Spikes [ab]	With every sample batch or every 20 samples, whichever is more frequent	75–125 % recovery applied when the sample concentration is < 4 times the spiked concentration for a particular analyte	Laboratory may be able to correct or minimize problem; or qualify and accept data
Laboratory Control Samples, Certified or Standard Reference Material [ab]	Overall frequency of 5 percent of field samples	80– 20 % recovery, or performance based intralaboratory control limits, whichever is lower	Laboratory to correct problem to verify the analysis can be performed in a clean matrix with acceptable precision and recovery; then reanalyze affected samples
Field Quality Assurance/Quality Control			
Field Replicates	At project manager's discretion	Not applicable	Not applicable
Field Blanks	At project manager's discretion	Analyte concentration ≤ PQL	Compare to method blank results to rule out laboratory contamination; modify sample collection and equipment decontamination procedures

Notes:

CLP - Contract Laboratory Program (EPA)
EPA - U.S. Environmental Protection Agency
GFAA - graphite furnace atomic absorption
ICP-MS - inductively coupled plasma/mass spectrometry
ICP-AES - inductively coupled plasma/atomic emission spectrometry
PQL - practical quantitation limit
RPD - relative percent difference

Instrument and method QA/QC monitor the performance of the instrument and sample preparation procedures, and are the responsibility of the analytical laboratory. When an instrument or method control limit is exceeded, the laboratory is responsible for correcting the problem and reanalyzing the samples. Instrument and method QA/QC results reported in the final data package should always meet control limits (with a very small number of exceptions that apply to difficult analytes as specified by EPA for the CLP). If instrument and method QA/QC procedures meet control limits, laboratory procedures are deemed to be adequate. Matrix and field QA/QC procedures monitor matrix effects and field procedures and variability. Although poor analytical procedures may also result in poor spike recovery or duplicate results, the laboratory is not held responsible for meeting control limits for these QA/QC samples. Except in the possible case of unreasonably large exceedances, any reanalyses will be performed at the request and expense of the project manager.

[a] Subject to QA2 review
[b] Subject to QA1 review

TABLE 13. QUALITY CONTROL PROCEDURES FOR CONVENTIONAL ANALYSES

Analyte	Suggested Control Limit						
	Initial Calibration[a]	Continuing Calibration[a]	Calibration Blanks[a]	Laboratory Control Samples	Matrix Spikes[ab]	Laboratory Triplicates [ab]	Method Blank[ab]
Ammonia	Correlation coefficient ≥0.995	90–110 percent recovery	Analyte concentration ≤ PQL	80–120 percent recovery	75–125 percent recovery	20 % RSD	Analyte concentration ≤ PQL
Grain size	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	20 % RSD	Not applicable
Total organic carbon	Correlation coefficient ≥0.995	90–110 percent recovery	Analyte concentration ≤ PQL	80–120 percent recovery	75–125 percent recovery	20 % RSD	Analyte concentration ≤ PQL
Total sulfides	Correlation coefficient ≥0.990	85–115 percent recovery	Not applicable	65–135 percent recovery	65–135 percent recovery	20 % RSD	Analyte concentration ≤ PQL
Total solids	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	20 % RSD	Analyte concentration ≤ PQL

Notes:

EPA - U.S. Environmental Protection Agency
PSEP - Puget Sound Estuary Program
PQL - practical quantitation limit
QA/QC - quality assurance and quality control
RSD - relative standard deviation

[a] Subject to QA2 review
[b] Subject to QA1 review

EPA and PSEP control limits are not available for conventional analytes. The control limits provided above are suggested limits only. They are based on EPA control limits for metals analyses (see Table 12), and an attempt has been made to take into consideration the expected analytical accuracy using PSEP methodology. Corrective action to be taken when control limits are exceeded is left to the Project Manager's discretion. The corrective action indicated for metals in Table 12 may be applied to conventional analytes.

When applicable, the QA/QC procedures indicated in this table should be completed at the same frequency as for metals analyses (see Table 12).

Table E-1
Data Quality Objectives and Laboratory Control Limits
City of Oak Harbor - Outfall 001
2006 Sampling

Analytical Test	Laboratory Method Detection Limit (MDL)	Laboratory Reporting Limit (RL)	Sediment Quality Standard (SQS)[1]	Sample Surrogate Recovery[2] (%)	MS/MSD Recovery (%)[4]	MS/MSD RPD (%)[4]	LCS/SRM Recovery (%)[4]	Laboratory Duplicate RPD (%)
VOCs by EPA SW846 8260B (ug/kg)								
1,4-Dichlorobenzene*	0.094	1.0	3,100	--	50-150%	40%	84-123%	40%
1,2-Dichlorobenzene*	0.051	1.0	2,300	--	50-150%	40%	85-120%	40%
1,2,4-Trichlorobenzene*	0.208	5.0	810	--	50-150%	40%	83-132%	40%
d4-1,2-Dichloroethane	--	--	--	71-143%	--	--	--	--
d8-Toluene	--	--	--	79-118%	--	--	--	--
4-Bromofluorobenzene	--	--	--	69-126%	--	--	--	--
d4-1,2-Dichlorobenzene	--	--	--	79-119%	--	--	--	--
SVOCs by EPA SW846 8270D (ug/kg)								
Phenol	38.1	63	420	--	30-160%	40%	30-160%	40%
4-Methylphenol	22.8	63	670	--	--	--	30-160%	40%
Benzoic Acid	148	625	650	--	--	--	30-160%	40%
Napthalene*	36.6	63	99,000	--	--	--	30-160%	40%
Dimethyl Phthalate*	29.3	63	53,000	--	--	--	30-160%	40%
Acenaphthylene*	29.3	63	66,000	--	--	--	30-160%	40%
Diethyl Phthalate*	33.1	63	61,000	--	--	--	30-160%	40%
Phenanthrene*	32.2	63	100,000	--	--	--	30-160%	40%
Anthracene*	24.8	63	220,000	--	--	--	30-160%	40%
Di-n-butyl Phthalate*	20.8	63	220,000	--	--	--	30-160%	40%
Fluoranthene*	26.8	63	160,000	--	--	--	30-160%	40%
Pyrene*	29.3	63	1,000,000	--	30-160%	40%	30-160%	40%
Benz[a]anthracene*	27.1	63	110,000	--	--	--	30-160%	40%
Chryaene*	30.2	63	110,000	--	--	--	30-160%	40%
Benzo(b)fluoranthene*	27	63	230**	--	--	--	30-160%	40%
Benzo(k)fluoranthene*	24.9	63	230**	--	--	--	30-160%	40%
Bis[2-ethylhexyl]phthalate*	34.4	63	47,000	--	--	--	30-160%	40%
Di-n-octyl Phthalate*	31.9	63	58,000	--	--	--	30-160%	40%
Benzo(a)pyrene*	25.20	63	99,000	--	--	--	30-160%	40%
2-Chlorophenol-d4 (Surrogate)	--	--	--	30-160%	--	--	--	--
1,2-Dichlorobenzene-d4 (Surrogate)	--	--	--	30-160%	--	--	--	--
2,4,6-Tribromophenol (Surrogate)	--	--	--	30-160%	--	--	--	--
2-Fluorophenol (Surrogate)	--	--	--	30-160%	--	--	--	--
Phenol-d5 (Surrogate)	--	--	--	30-160%	--	--	--	--
Nitrobenzene-d5 (Surrogate)	--	--	--	30-160%	--	--	--	--
2-Fluorobiphenyl (Surrogate)	--	--	--	30-160%	--	--	--	--
p-Terphenyl-d14 (Surrogate)	--	--	--	30-160%	--	--	--	--
SIM-SVOCs by EPA SW846 8270-SIM (ug/kg)								
Benzyl Alcohol	15,547	31	57	--	--	--	30-160%	40%
2-Methylphenol	3.379	6.3	63	--	--	--	30-160%	40%
2,4-Dimethylphenol	3.858	6.3	29	--	--	--	30-160%	40%
2-Methylnapthalene*	1.277	6.3	38,000	--	--	--	30-160%	40%
Acenaphthene*	1.233	6.7	16,000	--	30-160%	40%	30-160%	40%
Dibenzofuran*	0.9845	6.7	15,000	--	--	--	30-160%	40%
Fluorene*	0.848	6.7	23,000	--	--	--	30-160%	40%
N-nitrosodiphenylamine*	3.054	6.3	11,000	--	--	--	30-160%	40%
Pentachlorophenol	13.126	31	360	--	30-160%	40%	30-160%	40%
Butyl Benzyl Phthalate*	3.76	6.3	4,900	--	--	--	30-160%	40%
Indeno[1,2,3-cd]pyrene*	1.01	6.3	34,000	--	--	--	30-160%	40%
Dibenz[a,h]anthracene*	0.501	6.3	12,000	--	--	--	30-160%	40%
Benzo[ghi]perylene*	0.83	6.3	31,000	--	--	--	30-160%	40%
2-Chlorophenol-d4 (Surrogate)	--	--	--	30-160%	--	--	--	--
1,2-Dichlorobenzene-d4 (Surrogate)	--	--	--	30-160%	--	--	--	--
2,4,6-Tribromophenol (Surrogate)	--	--	--	30-160%	--	--	--	--
2-Fluorophenol (Surrogate)	--	--	--	30-160%	--	--	--	--
Phenol-d5 (Surrogate)	--	--	--	30-160%	--	--	--	--
Nitrobenzene-d5 (Surrogate)	--	--	--	30-160%	--	--	--	--
2-Fluorobiphenyl (Surrogate)	--	--	--	30-160%	--	--	--	--
p-Terphenyl-d14 (Surrogate)	--	--	--	30-160%	--	--	--	--

Table E-1
Data Quality Objectives and Laboratory Control Limits
City of Oak Harbor - Outfall 001
2006 Sampling

Analytical Test	Laboratory Method Detection Limit (MDL)	Laboratory Reporting Limit (RL)	Sediment Quality Standard (SQS)[1]	Sample Surrogate Recovery[2] (%)	MS/MSD Recovery (%)[4]	MS/MSD RPD (%)[4]	LCS/SRM Recovery (%)[4]	Laboratory Duplicate RPD (%)
Pesticides by EPA SW846 8081A (ug/kg)								
Hexachlorobenzene*	0.066	1.0	3,900	--	50-150%	40%	50-150%	40%
Hexachlorobutadiene*	0.132	1.0	380	--	50-150%	40%	50-150%	40%
Tetrachlorometaxylene (Surrogate)	--	--	--	40-112%	--	--	--	--
Decachlorobiphenyl (Surrogate)	--	--	--	44-133%	--	--	--	--
Low-Level PCBs by EPA SW846 8082 (ug/kg)								
Aroclor 1016	--	4.0	--	--	37-129%	40%	37-145%	40%
Aroclor 1242	--	4.0	--	--	--	--	--	40%
Aroclor 1248	--	4.0	--	--	--	--	--	40%
Aroclor 1254	--	4.0	--	--	--	--	--	40%
Aroclor 1260	--	4.0	--	--	13-177%	40%	45-148%	40%
Aroclor 1221	--	4.0	--	--	--	--	--	40%
Aroclor 1232	--	4.0	--	--	--	--	--	40%
Aroclor 1660[3]	0.397	4.0	--	--	--	--	--	40%
Total PCBs*	--	4.0	12,000	--	--	--	--	40%
Tetrachlorometaxylene (Surrogate)	--	--	--	36-133%	--	--	--	--
Decachlorobiphenyl (Surrogate)	--	--	--	37-175%	--	--	--	--
Metals by EPA SW846 6010B/7471A (mg/kg)								
Arsenic	0.78	5.0	57	--	75-125%	20%	80-120%	20%
Cadmium	0.04	0.2	5.1	--	75-125%	20%	80-120%	20%
Chromium	0.09	0.5	260	--	75-125%	20%	80-120%	20%
Copper	0.06	0.2	390	--	75-125%	20%	80-120%	20%
Lead	0.11	2.0	450	--	75-125%	20%	80-120%	20%
Mercury	0.003	0.05	0.41	--	75-125%	20%	80-120%	20%
Silver	0.04	0.3	6.1	--	75-125%	20%	80-120%	20%
Zinc	0.34	0.6	410	--	75-125%	20%	80-120%	20%
Ammonia by Plumb 1981-modified (mg-N/kg)								
Ammonia	--	0.1	--	--	75-125%	20%	80-120%	20%
Total Sulfides by EPA SW846 9030B and EPA Method (1991) (mg/kg)								
Total Sulfides	--	1.0	--		65-135%	20%	65-135%	20%
Acid Volatile Sulfides	--	1.0	--	--	75-125%	20%	75-125%	20%
Total Solids by PSEP Method (%)								
Total Solids	--	0.01	--	--	--	--	--	20%
Total Volatile Solids	--	5.0	--	--	--	--	--	20%
TOC by Plumb 1981 (%)								
TOC	--	0.0200	--	--	75-125%	20%	80-120%	20%

Notes:
PCBs - Polychlorinated Biphenyls
SIM - Select Ion Monitoring
SVOCs - Semivolatile Organic Compounds
TOC - Total Organic Carbon
VOC - Volatile Organic Compound
Laboratory MDLs, RLs, and control limits provided by Analytical Resources, Inc.
* The listed SQS value represents a concentration in parts per million (ppm) 'normalized' on a TOC basis.
** The listed SQS value represents the sum of the concentrations of the b, j, and k isomers of benzofluoranthene.
[1] Sediment Sampling and Analysis Plan Appendix; Washington State Department of Ecology, Publication 03-09-043, Revised April 2003 (WAC 173-204).
[2] Surrogate recovery control limits for QC samples (method blank and LCS) are as follows:
VOCs: d4-1,2-dichloroethane 74-128%, d8-toluene 76-119%, 4-bromofluorobenzene 78-116%, d4-1,2-dichlorobenzene 78-122%
SVOCs: 2-Chlorophenol-d4 = 30-160%, 1,2-Dichlorobenzene-d4 = 30-160%, 2,4,6-Tribromophenol = 30-160%, 2-Fluorophenol = 30-160%, Phenol-d5 = 30-160%, Nitrobenzene-d5 = 30-160%, 2-Fluorobiphenyl = 30-160%, and p-Terphenyl-d14 = 30-160%
SIM-SVOCs: d14-Dibenzo(a,h)anthracene = 30-160%, d10-2-Methylnaphthalene = 30-160%
Pesticides: Tetrachlorometaxylene = 51-107%, Decachlorobiphenyl = 64-121%
PCB: Tetrachlorometaxylene = 43-145%, Decachlorobiphenyl = 43-164%
[3] For Aroclor analysis, the laboratory uses a combination of Aroclor 1016 and Aroclor 1260 (Aroclor 1660). Control limits for LCS and MS/MSD analyses are for Aroclor 1016 and Aroclor 1260 reported as Aroclor 1660.
[4] Control limits are periodically recalculated per EPA guidance. The control limits shown may be revised prior to the sample analysis. If so, the laboratory's updated limits will be used for data assessment.

APPENDIX F

Health and Safety Plan

CITY OF OAK HARBOR

SEDIMENT SAMPLING
HEALTH AND SAFETY PLAN

F.1 INTRODUCTION

This Health and Safety Plan (HSP), and each of its provisions, is applicable only to, and for use only by, URS Corporation, its affiliates, and its subcontractors. Any use of this Plan by other parties, including, without limitation, third party contractors on projects where URS is providing engineering, construction management, or similar services, without the express written permission of URS, will be at that party's sole risk, and URS Corporation shall have no responsibility therefore. The existence and use of this Plan by URS shall not be deemed an admission or evidence of any acceptance of any safety responsibility by URS for other parties unless such responsibility is expressly assumed in writing by URS in a specific project contract. Prior to implementation of this HSP, the Project Manager, Project Health and Safety Officer and each field team member shall sign the Project Team Compliance Agreement presented as Attachment A

This HSP complies with, but does not replace applicable state and Federal Health and Safety Regulations, as set forth in 29 CFR 1910 and 1926. This HSP is to be used by URS Corporation (URS) personnel as a supplement to these rules, regulations, and guidance. This HSP is to be augmented by the URS Health and Safety Program and Management System and applicable portions of the client's Health and Safety Program.

Changing and/or unanticipated site conditions may require modification of this HSP to maintain a safe and healthful work environment. Under no circumstances will modifications to this plan conflict with federal, state, or other governmental health and safety regulations.

The URS vessel subcontractor shall develop their own HSP particular to their project work. URS shall review and concur with this plan prior to field operations.

F.2 PROJECT DESCRIPTION

F.2.1 SITE DESCRIPTION

The project site is located in the city of Oak Harbor (COH), Island County, Washington (Figure 1-1). The outfall is approximately 1,160 feet offshore at a depth of approximately -15 feet Mean Lower Low Water (MLLW) in a constricted portion of Oak Harbor. The outfall is constructed of 18-inch corrugated steel outfall pipe and terminates in a 6-inch port that discharges vertically and an 8-inch port that discharges horizontally.

F.2.2 SITE HISTORY

COH is conducting baseline sediment sampling in the vicinity of Outfall 001. This outfall receives treated wastewater from the City of Oak Harbor (COH) Rotating Biological Contactor (RBC) Wastewater Treatment Plant (WWTP) located at 1501 SE City Beach Drive in Oak Harbor, Washington. The outfall was constructed in the 1940s and currently discharges a maximum of 0.7 million gallons per day of treated domestic sewage under the National Pollutant Discharge Elimination System (NPDES) Permit WA-002056-7. No sediment sampling has previously been conducted by the COH have occurred in the vicinity of Outfall 001.

F.2.3 PROJECT OBJECTIVE

The objective of this project is to characterize baseline sediment quality in the vicinity of Outfall 001. To meet this objective all sediment samples shall be analyzed for the full suite of 47 Washington Sediment Management Standards (SMS) chemicals and conventional sediment variables. Results of the sediment analysis will be used to evaluate baseline sediment quality data for subsequent NPDES permit cycles.

F.2.4 SUBCONTRACTOR SCOPES OF WORK

Entrix Incorporated has been contracted to URS to provide marine sampling services. These services include providing a Coast Guard approved skippered vessel with differential global positioning satellite (DGPS) capability, stainless steel van Veen grab sampler, and other vessel-related equipment required to complete the sediment sampling tasks. Entrix shall develop its own HSP with an emphasis on vessel safety. URS shall approve this plan prior to field operations.

Analytical Resources Incorporated (ARI) has been contracted to provide laboratory analytical services. Bioassay analyses, if required, will be subcontracted by ARI to an Ecology approved laboratory.

F.3 PROJECT ORGANIZATION

URS will have site safety and health oversight and coordination responsibilities for URS personnel; each subcontractor will be held accountable for the safe and healthful performance of work by each of its employees, subcontractors, or support personnel who may enter the site.

Project Contacts

Key Role	Name	Telephone
City of Oak Harbor		
Public Works Director	Cathy Rosen	(360) 279-4500
Lead Wastewater Treatment Plant Operator	Rob Kelley	(360) 279-4770
URS Corporation		
URS Client Manager	Skip Grodt P.E.	(206) 438-2135
URS Project Manager	Don Benson A.S.L.A., A.I.C.P.	(206) 438-2027
URS Regional Health and Safety Manager	Shawn Williams.	(503) 222-7200
URS Health and Safety Representative	Bryan Berna	(206) 438-2274
URS Site Safety Officer	Eric Lillywhite	(206) 438-2196
Marine Sampling Services-Entrix Inc.		
Subcontractor Safety Representative	Michael Kyte	(206) 239-0272

F.3.1 DAILY FIELD NOTIFICATIONS

The field manager will notify the URS Project Manager prior to the beginning of daily vessel operations. The scheduled sampling stations, personnel on-board and the estimated time of arrival will be communicated. Following daily field activities, the URS Project manager will be notified that the vessel has returned safely to shore.

F.4 HAZARD ANALYSES

The following hazards have been identified as potentially occurring during the course of the project. URS Safety Management Standards (SMSs) will be followed and enforced to ensure a safe work environment and to respond to unsafe conditions if they are encountered.

Project Hazard Analysis

Hazard	Mitigation	SMS Reference
Back Injuries	Proper lifting techniques and procedures	45
Cold Stress	Safe procedures, clothing	59
Hand Injuries	Safe procedures	64
Slip/Trip/Fall	Housekeeping	21
Vessel Operations	Safe practices	53
Weather	Safe practices	

Task Hazard Analysis

Task	Hazards	Mitigation	SMS References
Work over Water (Sediment Sampling)	Drowning	PPE-USCG approved Type III or Type V flotation device	027
Work over Water (Sediment Sampling)	Drowning	Buddy System	027
Work over Water (Sediment Sampling)	Chemical Exposures	Hazard Communications, PPE	002, 009, 029

F.4.1 PROJECT HAZARDS AND CONTROLS

Back Injury Prevention

The following guidelines will be followed whenever lifting equipment such as portable generators, coolers filled with samples, and any other objects that are of odd size or shape or that weigh over 50 pounds. The procedures include the following.

1. Get help when lifting heavy loads. Lift portable generators using a two-person lift.

2. When moving heavy objects, such as the sediment grab, use a winch or other means of assistance.

3. Plan the lift. If lifting a heavy object, plan the route and where to place the object. In addition, plan communication signals to be used (i.e., "1,2,3, lift," etc.)

4. Wear sturdy shoes that are in good condition and supply traction when performing lifts.

5. Keep your back straight and head aligned during the lift, and use your legs to lift the load – do not twist or bend from the waist. Keep the load in front of you – do not lift or carry objects from the side.

6. Keep the heavy part of the load close to your body to help maintain your balance.

Cold Stress

Protection against cold stress should be initiated when working outdoors in damp and cool conditions (below 50°F or 10° Celsius [C]) conditions or anytime temperatures are equal to or below 32°F or 0°C. Exposure to cold working conditions can result in cold stress (hypothermia) and/or injury (frostbite) to hands, feet, and head. Hypothermia results when the body looses heat faster than it can be produced 36°C (96.8°F). Lower body temperature will likely result in dizziness, drowsiness, disorientation, slurred speech, or loss of consciousness, with possible fatal consequences. Pain in the extremities may be the first warning of danger to cold stress. Shivering can develop when the body temperature has fallen to below 36°C (or 98°F).

Hypothermia can be brought on by exposure to cold air, immersion in cold water, or a combination of both. Wind chill factor, the cooling power of moving air, is a critical factor in cold stress.

Workers must wear adequate insulating clothing (three layers) if work is performed in temperatures below 4°C (40°F). At temperatures of 2°C (35.6°F), workers whose clothing becomes wet should be immediately provided with a change of clothing, and if necessary, treated for hypothermia. Treatment includes warming the victim with skin-to-skin contact, or by providing warm blankets or other coverings, and drinking warm liquids. Skin exposure should not be permitted at temperatures of -32°C (-25°F) or below.

If fieldwork is to be performed with bare hands for more than 10-20 minutes at temperatures below 16°C (60°F), provisions should be made for keeping the workers' hands warm. If equivalent chill temperatures fall below 40°F and fine manual dexterity is not required, then gloves should be worn. Metal handles of tools should be covered with insulating material at air temperatures below -1°C (30°F).

If work is to be performed continuously in the cold when the wind chill factor is at or below -7°C (19°F), heated warming shelters (tents, trailers, vehicle cabs) should be made available nearby.

Hand Injuries

Hand tools will be used for their intended purpose. The following are a few specific and general suggestions that apply to the safe use of several commonly used hand tools:

1. When a tool becomes damaged, either repair or discard the tool.

2. When using a hammer, for any purpose, wear safety glasses and require all others in the vicinity to do the same.

3. Keep all tools cleaned and stored in an orderly manner when not in use.

4. Replace hook and heel jaws when they become visibly worn.

5. When breaking tool joints on the ground or on a drilling platform, position hands so that fingers will not be caught between the wrench handle and the ground or the platform should the wrench slip or the joint suddenly release.

Slip/Trip/Falls

Workers should exercise caution when walking on the boat or while on the dock preparing for the day's activities. If conditions become slippery, workers should take small steps with their feet pointed slightly outward to decrease the probability of slipping. Good housekeeping practices such as keeping work areas free of equipment not being used and securing extension cords should also be implemented to avoid slips, trips, and falls.

Weather

In the event of adverse weather conditions, subcontractor's safety representative (SSR) (vessel operator) shall determine whether work can continue without compromising the health and safety of site personnel. The SSO and SSR will direct the implementation of precautions necessary to protect the health and safety of site personnel. Adverse weather may include the following:

1. High winds;
2. Limited visibility;
3. Snow and ice;
4. Heavy rainfall or hail;
5. Tornadoes;
6. Potential for heat stress;
7. Electrical storms; and
8. Potential for cold stress.

Outdoor work will also cease if electrical storms occur or when small craft warnings are issued.

F.4.2 TASK HAZARDS AND CONTROLS

Sediment Sampling

Drowning following a slip/trip/fall incident is the greatest concern while working on water. Such work will always be performed by a minimum of two personnel. Coast Guard-approved Type III (life vest) or Type V (mustang suit) personal flotation device (PFD) shall be worn at all times while the vessel is away from the dock. Good housekeeping should be implemented and proper boots should be worn to reduce tripping and slips.

Additional PPE to be worn on an as needed basis are a hard hat when overhead hazards exist, safety glasses during sampling activities, and nitrile or latex gloves while handling retrieved sediment. Safety goggles and nitrile gloves shall be worn while handling decontamination chemicals.

F.4.3 CHEMICAL HAZARDS AND CONTROLS

Chemicals such as limited quantities of Alconox detergent, acetone, and nitric acid will be used during the decontamination process or used as chemical preservatives for samples. Nitrile gloves and safety glasses shall be worn while handling these chemicals. Quantities of acetone and nitric acid will be limited to less than 500 ml each. Material Safety Data Sheets are provided in Attachment B.

Trace quantities of chemical pollutants may be found in the sampled sediment. Nitrile gloves and safety glasses shall be worn while handling sediment. Proper hygiene including frequent hand washing and showering following the work shift will further limit any potential chemical exposure. Material Safety Data Sheets are provided in Attachment B.

F.4.4 EQUIPMENT

Field team members shall be prepared to prevent and mitigate project, task and chemical hazards with equipment listed in Attachment C. This list represents the minimum health and safety equipment required to complete the sediment sampling task.

F.5 EMERGENCY PLANNING AND PROCEDURES

In the event of an emergency, notify site personnel of the situation, survey the scene to determine whether the situation is safe, to determine what happened, and to search for victims. All emergencies will be reported to the Project Manager, Site Supervisor, Site Safety Officer, and the COH. All incidents will be documented using the URS Incident Report form and following the procedures outlined in URS SMS 049-Incident Reporting.

In certain extremely hazardous situations, the SSO or Site Supervisor may request that site operations be temporarily suspended while the underlying hazard is corrected or controlled.

It is URS policy to evacuate personnel from areas of hazardous material emergencies and to summon outside assistance from agencies with personnel trained to respond to the specific emergency. This section outlines the procedures to be followed by URS personnel in the event of a site emergency. These procedures are to be reviewed during the onsite safety briefings conducted by the SSO. In the event of a fire or medical emergency, the emergency numbers identified in the included Emergency Contact List should be called for assistance.

The emergency response will consist of employees who assume the following roles:

1. Emergency care provider(s)

2. Provide first aid/CPR as needed

3. Communicator - The role of the communicator is to maintain contact with appropriate emergency services and to provide as much information as possible, such as the number injured, the type and extent of injuries, and the exact location of the accident scene. The communicator will be located as close to the scene as possible to transmit to the emergency care providers any additional instructions that may be given by emergency services personnel in route.

4. Site Supervisor - The Site Supervisor will survey and assess existing and potential hazards, evacuate personnel as needed, and contain the hazard. Follow up responsibilities include replacing or repairing damaged equipment, documenting the incident, and notifying appropriate personnel/agencies described under Incident Reporting. Responsibilities also include reviewing and revising site safety and contingency plans as necessary.

F.5.1 MEDICAL EMERGENCIES

Medical emergencies are a primary concern for the project since emergency services may not be readily available until the vessel can reach shore. In the event of a serious injury, emergency services will be summoned by **dialing 911** from a cellular telephone or by contacting the Coast Guard by VHF radio (Channel 16). Emergency services will be directed to meet the vessel at the Oak Harbor Marina to treat the injury and transport the injured personnel to the Whidbey General Hospital. A map to the hospital is provided as Attachment D. A minimum of two

persons on-board shall have current CPR and First Aid training. These persons will be responsible for treating minor injuries or stabilizing victims of major injuries. A well stocked occupational first aid kit will be available to treat injuries that may be reasonably expected to occur.

F.5.2 VESSEL EMERGENCIES

Vessel emergencies may include an on-board fire or taking on water (sinking). In the event of a fire, emergency services shall be contacted by dialing 911 from a cellular telephone or by contacting the Coast Guard by VHF radio (Channel 16). Emergency services shall be directed to meet the vessel at or near the Oak Harbor Marina. The boat will have a fire extinguisher capable of extinguishing flammable liquids (fuel). An extinguisher rating of 10B is recommended for 5 gallons or more of flammable or combustible liquid.

Emergency Contact List

Role	Name	Telephone Number
URS Regional Health and Safety Manager	Shawn Williams.	(503) 222-7200
Project H&S Officer	Bryan Berna	(206) 438-2274
Injury Reporting	Jeanette Scrimsher	(866) 326-7321
Rescue Coordination	U.S. Coast Guard	(206) 220-7001
Emergency Response	Ambulance	911
Emergency Response	Fire	911
Emergency Response	Police	911
Hospital	Whidbey General Hospital	(360) 678-5151

F.6 SAFETY MANAGEMENT STANDARDS

The following SMSs apply to the field project and are presented as Attachment E. The SSO shall review the requirements of each SMS and determine appropriate steps to ensure project compliance with the requirements. In addition to the attached standards, the SSO shall be familiar with all URS SMSs in the event unforeseen safety issues are encountered so that they can be addressed.

SMS	
002	Worker Right to Know (HazCom)
009	Corrosive and Reactive Materials
014	Fire Prevention
021	Housekeeping
027	Work over Water
029	Personal Protective Equipment
049	Injury/Illness/ Incident Reporting and Notifications
053	Marine Safety and Boat Operations
059	Cold Stress
064	Hand Safety
069	Manual Material Handling

ATTACHMENT A

Project Team Compliance

Agreement Form

APPROVAL

Project Manager:

Approval Signature:______________________________ Date:____________________

Project H&S:

Approval Signature:______________________________ Date:____________________

****

PROJECT TEAM COMPLIANCE AGREEMENT

I, ______________________________, have received a copy of the Health and Safety Plan for this Project. I have reviewed the plan, understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the plan.

SIGNED:______________________________ ______________________________
Signature Date

I, ______________________________, have received a copy of the Health and Safety Plan for this Project. I have reviewed the plan, understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the plan.

SIGNED:______________________________ ______________________________
Signature Date

I, ______________________________, have received a copy of the Health and Safety Plan for this Project. I have reviewed the plan, understand it, and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the health and safety requirements specified in the plan.

SIGNED:______________________________ ______________________________
Signature Date

ATTACHMENT B

MSDSs

CORNELL

Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

ACETONE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification
ACETONE

Product Identification: ACETONE
Date of MSDS: 01/01/1985 **Technical Review Date:** 07/03/1999
FSC: 6810 **NIIN:** 01-015-8437
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ALLIED CHEMICAL CORP
Post Office Box: 1087R
Manufacturer's Address1: COLUMBIA RD & PARK AVE
Manufacturer's Address2: MORRISTOWN, NJ 07960
Manufacturer's Country: US
General Information Telephone:
Emergency Telephone: NONE
Emergency Telephone: NONE
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 1L168
Special Project Code: N

Item Description

Item Name: ACETONE,ACS
Item Manager: S9G
Specification Number: O-C-265
Type/Grade/Class: NONE
Unit of Issue: CN **Quantitative Expression:** 00000000005GL
Unit of Issue Quantity: 0
Type of Container: 1A1 METAL

Contractor Information

Contractor's Name: ALLIED CHEMICAL COMPANY
Post Office Box: 1087R
Contractor's Address1: UNKNOWN
Contractor's Address2: UNKNOWN, NK 00000

Contractor's Telephone: UNKNOWN
Contractor's CAGE: 1L168

Contractor Information

Contractor's Name: ALLIED-SIGNAL INC
Post Office Box: 2332R
Contractor's Address1:
Contractor's Address2: MORRISTOWN, NJ 07962-2332
Contractor's Telephone: 201-455-4414
Contractor's CAGE: 1L164

Section 2 - Compositon/Information on Ingredients
ACETONE

Ingredient Name: ACETONE (SARA III)
Ingredient CAS Number: 67-64-1 **Ingredient CAS Code:** M
RTECS Number: AL3150000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 100
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: 1000PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 750PPM/1000STEL;9293 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
ACETONE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
IRRTNT TO EYES,SKIN,MUCOUSA.INGEST:GI IRRTNT,NARCOSIS,KID/LIV DAMAGE.INHAL:
HEADACH,NAUS,DROWSNS,COMA

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:

Inhalation: N/P
Skin: N/P
Ingestion: N/P

Carcenogenicity Indicators

NTP: N/P
IARC: N/P
OSHA: N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
ACETONE

First Aid:
EYES:FLUSH COPIOUSLY W H*2O.SKIN:WASH W SOAP & WATER.REMOVE
CONTAMINATED CLOTHES,INHALED:REMOVE TO FRESH AIR.GIV CPR/O*2 IF NEED.
INGEST:GIV 2 TBLSPNS SYRUP IPECAC FOLLOWED BY 3/4 GLASS H*2O.REPEAT IF NO
VOMIT IN 20 MIN.CALL DR. AT ONCE.

Section 5 - Fire Fighting Measures
ACETONE

Fire Fighting Procedures:
USE H*2O SPRAY TO COOL EXPOSED CONT.WEAR SELF-CNTND BRTHG AP
Unusual Fire or Explosion Hazard:
EXTREMELY FLAMMABLE.VAPORS FORM EXPLOSV MIX IN AIR.DANGER WHEN EXPOSD
TO HEAT,SPARKS,FLAME,OXIDANTS.
Extinguishing Media:
SM FIRE:CO*2,DRY CHEM;LG FIRE:ALC FOAM,H*2O SPRAY REDUC FLAM
Flash Point: Flash Point Text: 1.4F/-17C CC

Autoignition Temperature:

Autoignition Temperature Text: 869F
Lower Limit(s): 2.15
Upper Limit(s): 13

Section 6 - Accidental Release Measures
ACETONE

Spill Release Procedures:
STOP LEAK IF POSSIBLE.ELIMINATE IGNIT.SOURCES.ISOLATE SPILL AREA.COLLECT IN WASTE CONT.FLUSH AREA W H*2O.WASH CONTAMINATED EQUIP W H*2O.DIKE LG SPILL TO PREVENT ENTRY TO WATER WAY.REPORT SPILLS TO LOC AL,STATE,FED AUTHORITIES.ADEQUATELY VENTILATE AREA

Section 7 - Handling and Storage
ACETONE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ACETONE

Repiratory Protection:
<5000 PPM:GAS MSK W ORG.CONSTR;<10,000 PPM-ESCAP:SELF-CNTND BTHG APP
Ventilation:
LOCAL/MECHAN TO MAINTN EXPOS **Protective Gloves:**
RUBBER/NEOPRENE
Eye Protection: SAFETY GLASSES/GOGGLES
Other Protective Equipment: SAFETY SHOES,HARD HAT,FACE SHIELD,SPECIAL PROTECTVE CLOTHES.
Work Hygenic Practices: N/P
Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties
ACETONE

HCC: F2
NRC/State License Number:
Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 133F/56.2C
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: 181 **Vapor Density:** 2.0
Percent Volatile Organic Content:
Specific Gravity: 0.79
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: >7.0(BU ACETONE)
Solubility in Water: COMPLETE
Appearance and Odor: COLORLESS LIQUID;SWEET PUNGENT ODOR.
Percent Volatiles by Volume: 100
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
ACETONE

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS
Stability Condition to Avoid:
HEAT,SPARKS AND OPEN FLAME.
Hazardous Decomposition Products:
COMPLETE BURN:CO*2,H*2O;INCOMPLETE BURN:CAN PRODUCE CO.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NONE

Section 11 - Toxicological Information
ACETONE

Toxicological Information:
N/P

Section 12 - Ecological Information
ACETONE

Ecological Information:
N/P

Section 13 - Disposal Considerations

ACETONE

Waste Disposal Methods:
WASTE MATERIAL SHOULD BE TREATED/DISPOSED AT AUTHORIZED WASTE SITE.
CONTACT APPROP LOCAL,STATE,FED REGS BEFORE DISPOSAL.

Section 14 - MSDS Transport Information
ACETONE

Transport Information:
N/P

Section 15 - Regulatory Information
ACETONE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
ACETONE

Other Information:
N/P

HMIS Transportation Information

Product Identification: ACETONE
Transporation ID Number: 98735
Responsible Party CAGE: 1L168
Date MSDS Prepared: 01/01/1985
Date MSDS Reviewed: 09/02/1982
MFN: 09/02/1982
Submitter: D DG
Status Code: C

Container Information
Unit of Issue: CN
Container Quantity: 0
Type of Container: 1A1 METAL
Net Unit Weight:

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
MFGR STATES(1 SEPT 82) IATA/IMCO PROPER SHIPPING NAME:ACETONE;CLASS-FLAMMABLE LIQUID.FLASHPOINT FROM MFGR: -17C CC.

Department of Transportation Information

DOT Proper Shipping Name: ACETONE
DOT PSN Code: ABF
Symbols:
DOT PSN Modifier:
Hazard Class: 3
UN ID Number: UN1090
DOT Packaging Group: II
Label: FLAMMABLE LIQUID
Special Provision(s): T8
Packaging Exception: 150
Non Bulk Packaging: 202
Bulk Packaging: 242
Maximimum Quanity in Passenger Area: 5 L
Maximimum Quanity in Cargo Area: 60 L
Stow in Vessel Requirements: B
Requirements Water/Sp/Other:

IMO Detail Information

IMO Proper Shipping Name: ACETONE
IMO PSN Code: ADF
IMO PSN Modifier:
IMDG Page Number: 3102
UN Number: 1090
UN Hazard Class: 3.1
IMO Packaging Group: II

Subsidiary Risk Label: -
EMS Number: 3-06
Medical First Aid Guide Number: 300

IATA Detail Information

IATA Proper Shipping Name: ACETONE
IATA PSN Code: ACM
IATA PSN Modifier:
IATA UN Id Number: 1090
IATA UN Class: 3
Subsidiary Risk Class:
UN Packaging Group: II
IATA Label: FLAMMABLE LIQUID
Packaging Note for Passengers: 305
Maximum Quantity for Passengers: 5L
Packaging Note for Cargo: 307
Maximum Quantity for Cargo: 60L
Exceptions:

AFI Detail Information

AFI Proper Shipping Name: ACETONE
AFI Symbols:
AFI PSN Code: ACM
AFI PSN Modifier:
AFI UN Id Number: UN1090
AFI Hazard Class: 3
AFI Packing Group: II
AFI Label: FLAMMABLE LIQUID
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: ACETONE
CAGE: 1L168
Assigned Individual: N
Company Name: ALLIED CHEMICAL COMPANY
Company PO Box: 1087R
Company Street Address1: UNKNOWN
Company Street Address2: UNKNOWN, NK 00000 NK
Health Emergency Telephone:
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K

Organization Code: F
hronic Hazard Indicator: N/P
ye Protection Indicator: N/P
kin Protection Indicator: N/P
espiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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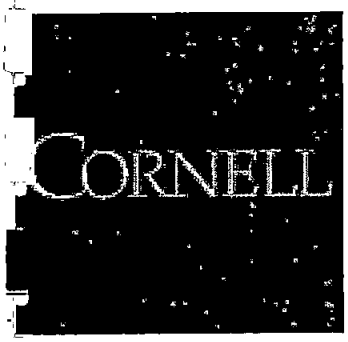

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

ALCONOX, ANIONIC POWDERED DETERGENT

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
Section 4 - First Aid Measures	Section 12 - Ecological Information
Section 5 - Fire Fighting Measures	Section 13 - Disposal Considerations
Section 6 - Accidental Release Measures	Section 14 - MSDS Transport Information
Section 7 - Handling and Storage	Section 15 - Regulatory Information
Section 8 - Exposure Controls & Personal Protection	Section 16 - Other Information

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Section 1 - Product and Company Identification
ALCONOX, ANIONIC POWDERED DETERGENT

Product Identification: ALCONOX, ANIONIC POWDERED DETERGENT
Date of MSDS: 03/01/1995 **Technical Review Date:** 09/23/1996
FSC: 7930 **NIIN:** 01-341-6365
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ALCONOX INC
Manufacturer's Address1: 215 PARK AVE SOUTH
Manufacturer's Address2: NEW YORK, NY 10003
Manufacturer's Country: US
General Information Telephone: 212-473-1300 FAX 212-353-1342
Emergency Telephone: 212-473-1300 FAX 212-353-1342
Emergency Telephone: 212-473-1300 FAX 212-353-1342
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 17534
Special Project Code: N

Item Description

Item Name: DETERGENT,HOSPITAL GLASSWARE AND INSTRUMENT
Item Manager:
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue:
Unit of Issue Quantity:
Type of Container: UNKNOWN

Contractor Information

Contractor's Name: ALCONOX INC
Contractor's Address1: 9 EAST 40TH STREET, SUITE 200
Contractor's Address2: NEW YORK, NY 10016
Contractor's Telephone: 212-532-4040
Contractor's CAGE: 17534

Section 2 - Compositon/Information on Ingredients
ALCONOX, ANIONIC POWDERED DETERGENT

ngredient Name: THE MANUFACTURER STATES THAT NO HAZARDOUS INGREDIENTS ARE PRESENT IN THIS PRODUCT.
ngredient CAS Number: Ingredient CAS Code: X
RTECS Number: 9999999ZZ **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: UNKNOWN
% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: NOT ESTABLISHED **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT ESTABLISHED **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
ALCONOX, ANIONIC POWDERED DETERGENT

Health Hazards Acute & Chronic: INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA. EYE CONTACT MAY PROVE IRRITATING.

Signs & Symptoms of Overexposure:
SNEEZING, NOSE/THROAT IRRITATION, GI TRACT IRRITATION, DIARRHEA, EYE IRRITATION.

Medical Conditions Aggravated by Exposure:
RESPIRATORY CONDITIONS MAY BE AGGRAVATED BY POWDER.

LD50 LC50 Mixture: NOT GIVEN FOR PRODUCT AS A WHOLE

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: YES

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: THIS COMPOUND CONTAINS NO INGREDIENTS AT CONCENTRATIONS OF 0.1% OR GREATER THAT ARE CARCINOGENS OR SUSPECT CARCINOGENS.

Section 4 - First Aid Measures
ALCONOX, ANIONIC POWDERED DETERGENT

First Aid:
EYES: FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. SKIN: REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IF IRRITATION PERSIST, GET MEDICAL ATTENTION. INH ALATION: REMOVE TO FRESH AIR. RESTORE BREATHING. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. DRINK WATER OR MILK. GET MEDICAL ATTENTION.

Section 5 - Fire Fighting Measures
ALCONOX, ANIONIC POWDERED DETERGENT

Fire Fighting Procedures:
FIRE FIGHTERS SHOULD WEAR SELF CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR.
Unusual Fire or Explosion Hazard:
NONE SPECIFIED BY MANUFACTURER.
Extinguishing Media:
NONFLAMMABLE. USE EXTINGUISHING MEDIA SUITABLE FOR SURROUNDING FIRE.
Flash Point: Flash Point Text: NONFLAMMABLE

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): NOT GIVEN
Upper Limit(s): NOT GIVEN

Section 6 - Accidental Release Measures
ALCONOX, ANIONIC POWDERED DETERGENT

Spill Release Procedures:
MATERIAL FOAMS PROFUSELY. RECOVER AS MUCH AS POSSIBLE AND FLUSH REMAINDER TO SEWER. MATERIAL IS BIODEGRADEABLE.

Section 7 - Handling and Storage
ALCONOX, ANIONIC POWDERED DETERGENT

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
ALCONOX, ANIONIC POWDERED DETERGENT

Repiratory Protection:
DUST MASK RECOMMENDED.
Ventilation:
LOCAL EXHAUST AND MECHANICAL (GENERAL) VENTILATION AS REQUIRED TO MAINTAIN EXPOSURE LEVELS.
Protective Gloves:
IMPERVIOUS GLOVES RECOMMENDED
Eye Protection: GOGGLES WHEN HANDLING SOLUTIONS.
Other Protective Equipment: CHEMICAL RESISTANT CLOTHING AS NECESSARY TO PREVENT SKIN CONTACT. AN EMERGENCY EYEWASH AND SHOWER SHOULD BE AVAILABLE.
Work Hygenic Practices: WASH HANDS THOROUGHLY WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES.
Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
ALCONOX, ANIONIC POWDERED DETERGENT

HCC: N1
NRC/State License Number: N/R
Net Property Weight for Ammo: N/R
Boiling Point: Boiling Point Text: NOT GIVEN
Melting/Freezing Point: Melting/Freezing Text: NOT GIVEN
Decomposition Point: Decomposition Text: UNKNOWN
Vapor Pressure: NOT GIVEN **Vapor Density:** NOT GIVEN

Percent Volatile Organic Content:
Specific Gravity: NOT GIVEN
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: NOT GIVEN
Solubility in Water: APPRECIABLE
Appearance and Odor: WHITE POWDER INTERSPERSED WITH CREAM COLORED FLAKES
Percent Volatiles by Volume: NIL
Corrosion Rate: UNKNOWN

Section 10 - Stability & Reactivity Data
ALCONOX, ANIONIC POWDERED DETERGENT

Stability Indicator: YES
Materials to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Stability Condition to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:
CARBON DIOXIDE
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NONE. WILL NOT OCCUR.

Section 11 - Toxicological Information
ALCONOX, ANIONIC POWDERED DETERGENT

Toxicological Information:
N/P

Section 12 - Ecological Information
ALCONOX, ANIONIC POWDERED DETERGENT

Ecological Information:
N/P

Section 13 - Disposal Considerations
ALCONOX, ANIONIC POWDERED DETERGENT

Waste Disposal Methods:
MATERIAL IS BIODEGRADEABLE. SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF IN ACCORDANCE WITH LOCAL

ORDINANCES FOR DETERGENT PRODUCTS.

Section 14 - MSDS Transport Information
ALCONOX, ANIONIC POWDERED DETERGENT

Transport Information:
N/P

Section 15 - Regulatory Information
ALCONOX, ANIONIC POWDERED DETERGENT

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
ALCONOX, ANIONIC POWDERED DETERGENT

Other Information:
N/P

HMIS Transportation Information

Product Identification: ALCONOX, ANIONIC POWDERED DETERGENT
Transporation ID Number: 127309
Responsible Party CAGE: 17534
Date MSDS Prepared: 03/01/1995
Date MSDS Reviewed: 09/02/1992
MFN: 09/02/1992
Submitter: D DG
Status Code: C

Container Information
Unit of Issue:
Container Quantity:
Type of Container: UNKNOWN
Net Unit Weight: 4.00 LBS

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:

Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R
Non Bulk Packaging: N/R
Bulk Packaging: N/R
Maximimum Quanity in Passenger Area: N/R
Maximimum Quanity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION

IATA PSN Code: ZZZ
ATA PSN Modifier:
ATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: ALCONOX, ANIONIC POWDERED DETERGENT
CAGE: 17534
Assigned Individual: N
Company Name: ALCONOX INC
Company PO Box:
Company Street Address1: 9 EAST 40TH STREET, SUITE 200
Company Street Address2: NEW YORK, NY 10016 US
Health Emergency Telephone: 212-473-1300
Label Required Indicator: Y
Date Label Reviewed: 09/02/1992
Status Code: C
Manufacturer's Label Number: N/R
Date of Label: 09/02/1992
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: N/P
Respiratory Protection Indicator: YES

Signal Word: CAUTION
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None

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PURITAN PRODUCTS INC -- NITRIC ACID, 50-70%

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ISDS Safety Information

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FSC: 6810
NIIN: 00-237-2954
MSDS Date: 01/04/1999
MSDS Num: CKRHS
Product ID: NITRIC ACID, 50-70%
MFN: 02
Responsible Party
Cage: 0TG10
Name: PURITAN PRODUCTS INC
Address: 2290 AVENUE A
City: BETHLEHEM PA 18017
Info Phone Number: 610-866-4225
Emergency Phone Number: 610-866-4225
Chemtrec IND/Phone: (800)424-9300
Review Ind: Y
Published: Y

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Contractor Summary

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Cage: 0TG10
Name: PURITAN PRODUCTS INC
Address: 2290 AVENUE A
City: BETHLEHEM PA 18017
Phone: 610-866-4225
Cage: 1KH20
Name: TELECHEM INTERNATIONAL, INC
Address: 524 E WEDDELL DRIVE SUITE 3
City: SUNNYVALE CA 94089-2115
Phone: 916-941-3688
Contract Number: SP0450-00-M-SF60

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Item Description Information

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Item Manager: S9G
Item Name: NITRIC ACID,ACS
Specification Number: O-C-265C
Type/Grade/Class: NONE

Unit of Issue: BT
uantitative Expression: 00000000005PT
I Container Qty: 4
ype of Container: BOTTLE
==========
Ingredients
==========
as: 7697-37-2
TECS #: QU5775000
ame: NITRIC ACID
low Wt: 65.
high Wt: 70.
SHA PEL: 5 MG/M3;2 PPM
CGIH TLV: 5.2 MG/M3;2 PPM
CGIH STEL: 10 MG/M3;4 PPM
EPA Rpt Qty: 1000 LBS
OT Rpt Qty: 1000 LBS
---
as: 7732-18-5
TECS #: ZC0110000
Name: WATER
low Wt: 30.
high Wt: 35.
==========
ealth Hazards Data
==========
oute Of Entry Inds - Inhalation: YES
kin: YES
ngestion: YES
ffects of Exposure: INHALATION:CORROSIVE! INHALATION OF VAPORS CAN
AUSE
BREATHING DIFFICULTIES & LEAD TO PNEUMONIA & PULMONARY EDEMA, WHICH
MAY BE FATAL. INGESTION: CORROSIVE! SWALLOWING NITRIC ACID CAN CAUSE
IMMEDIATE PAIN & BURNS OF THE MOUTH, THROAT, ESOPHAGUS &
GASTROINTESTINAL TRACT. SKIN:CORROSIVE! CAN CAUSE REDNESS, PAIN &
EVERE
SKIN BURNS. CONCENTRATED SOLUTIONS CAUSE DEEP ULCERS & STAIN SKIN A
YELLOW OR Y ELLOW-BROWN COLOR. EYE: CORROSIVE! VAPORS ARE
RRITATING &
MAY CAUSE DAMAGE TO THE EYES. CONTACT MAY CAUSE SEVERE BURNS &
PERMANANENTDAMAGE. CHRONIC:EROSION OF TEETH & LUNG DAMAGE.
igns And Symptions Of Overexposure: INHALATION: INHALATION OF VAPORS
AN CAUSE

BREATHING DIFFICULTIES & LEAD TO PNEUMONIA & PULMONARY EDEMA, WHICH MAY BE FATAL. OTHER SYMPTOMS MAY INCLUDE COUGHING, CHOKING & IRRITATION OF THE NOSE, THRO AT,& RESPIRATORY TRACT. INGESTION: SWALLOWING CAN CAUSE IMMEDIATE PAIN & BURNS OF THE MOUTH, THROAT, ESOPHAGUS & GASTROINTESTINAL TRACT. SKIN CAN CAUSE REDNESS, PAIN & SEVERE SKIN BURNS. CONCENTRATED SOLUTIONS CAUSE DEEP ULCERS & STAIN SKIN A YELLOW OR YELLOW-BROWN COLOR. EYE: VAPORS ARE IRRITATING & MAY CAUSE DAMAGE TO THE EYES. CONTACT MAY CAUSE SEVERE BURNS & PERMANANENT EYE DAMAGE. Medical Cond Aggravated By Exposure: PERSONS WITH PRE-EXISTING SKIN DISORDERS, EYE DISEASE, OR CARDIOPULMONARY DISEASE MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS SUBSTANCE. First Aid: IMMEDIATE FIRST AID TREATMENT REDUCES THE HEALTH EFFECTS OF THIS SUBSTANCE. INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN. INGESTION: DO NOT INDUCE VOMITING! GIVE LARGE QUANTITIES OF WATER OR MILK IF AVAILABLE. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY. SKIN: MM EDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING & SHOES. WASH CLOTHING & THOROUGHLY CLEAN SHOES BEFORE REUSE. GET MEDICAL ATTENTION IMMEDIATELY.

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Handling and Disposal

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Spill Release Procedures: VENTILATE AREA OF LEAK OR SPILL. WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT. ISOLATE HAZARD AREA. KEEP UNNECESSARY & UNPROTECTED PERSONNEL FROM ENTERING. CONTAIN & RECOVER LIQUID WHEN POSSIBLE. NE UTRALIZE WITH ALKALINE MATERIAL (SODA ASH, LIME). THEN

ABSORB
WITH AN INERT MATERIAL (E.G., VERMICULITE, DRY SAND, EARTH), & PLACE IN A
CHEMICAL WASTE CONTAINER. DO NOT USE COMBUSTIBLE MATERIALS.
Neutralizing Agent: NEUTRALIZE WITH ALKALINE MATERIAL (SODA ASH, LIME).
Waste Disposal Methods: WHATEVER CANNOT BE SAVED FOR RECOVERY OR RECYCLING
SHOULD BE MANAGED IN AN APPROPRIATE & APPROVED WASTE FACILITY. ALTHOUGH
NOT A LISTED RCRA HAZARDOUS WASTE, THIS MATERIAL MAY EXHIBIT ONE OR MORE CHAR
ACTERISTICS OF A HAZARDOUS WASTE & REQUIRE APPROPRIATE ANALYSIS TO
DETERMINE SPECIFIC DISPOSAL REQUI REMENTS. DISPOSE IAW LOCAL, STATE & FED
REGS.
Handling And Storage Precautions: STORE IN A COOL, DRY, VENTILATED STORAGE AREA
WITH ACID RESISTANT FLOORS & GOOD DRAINAGE. PROTECT FROM PHYSICAL DAMAGE.
KEEP OUT OF DIRECT SUNLIGHT & AWAY FROM HEAT, WATER, & INCOMPATIBLE
MATERIALS. D O NOT WASH OUT CONTAINER & USE IT FOR OTHER PURPOSES.
Other Precautions: WHEN DILUTING, THE ACID SHOULD ALWAYS BE ADDED SLOWLY TO
WATER & IN SMALL AMOUNTS. NEVER USE HOT WATER & NEVER ADD WATER TO
THE ACID. WATER ADDED TO ACID CAN CAUSE UNCONTROLLED BOILNG & SPLASHING.
CON TAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTY SINCE THEY RETAIN
PRODUCT RESIDUES(VAPORS, LIQU ID).

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Fire and Explosion Hazard Information

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Extinguishing Media: WATER SPRAY MAY BE USED TO KEEP FIRE EXPOSED CONTAINERS
COOL. DO NOT GET WATER INSIDE CONTAINER.
Fire Fighting Procedures: INCREASES THE FLAMMABILITY OF COMBUSTIBLE, ORGANIC
& READILY OXIDIZABLE MATERIALS. IN THE EVENT OF FIRE, WEAR FULL
PROTECTIVE CLOTHING & NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS
WITH FULL FAC EPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE

PRESSURE MODE. FIRE: NOT COMBUSTIBLE, BUT IS A STRONG OXIDIZER.
Unusual Fire/Explosion Hazard: REACTS EXPLOSIVELY WITH COMBUSTIBLE ORGANIC OR
READILY OXIDIZABLE MATERIALS SUCH AS: ALCOHOLS, TURPENTINE, CHARCOAL, ORGANIC
REFUSE, METAL POWDER, HYDROGEN SULFIDE, ETC. REACTS WITH MOST METALS TO REL
EASE HYDROGEN GAS WHICH CAN FORM EXPLOSIVE MIXTURES WITH AIR.

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Control Measures

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Respiratory Protection: PERSONAL RESPIRATORS (NIOSH APPROVED): IF THE EXPOSURE
LIMIT IS EXCEEDED, WEAR A SUPPLIED AIR, FULL-FACEPIECE RESPIRATOR, AIRLINED
HOOD, OR FULL-FACEPIECE SELF-CONTAINED BREATHING APPARATUS. NITRIC AC ID IS
AN OXIDIZER & SHOULD NOT COME IN CONTACT WITH CARTRIDGES & CANISTERS
THAT CONTAIN OXIDIZABLE MATERIALS, SUCH AS ACTIVATED CHARCOAL. CANISTER-TYPE
RESPIRAT
Ventilation: A SYSTEM OF LOCAL &/OR GENERAL EXHAUST IS RECOMMENDED TO KEEP
EMPLOYEE EXPOSURES BELOW THE AIRBORNE EXPOSURE LIMITS. LOCAL EXHAUST
VENTILATION PREFERRED.
Protective Gloves: WEAR IMPERVIOUS GLOVES.
Eye Protection: USE CHEMICAL SAFETY GOGGLES &/OR FACE SHIELD WHERE SPLASHING IS
POSSIBLE.
Other Protective Equipment: WEAR IMPERVIOUS PROTECTIVE CLOTHING, INCLUDING
BOOTS, LAB COAT, APRON OR COVERALLS AS APPROPRIATE, TO PREVENT SKIN CONTACT.
MAINTAIN EYE WASH FOUNTAIN & QUICK-DRENCH FACILITIES IN WORK AREA.
Work Hygienic Practices: USE IN A WELL VENTILATED AREA. AVOID CONTACT.

==========

Physical/Chemical Properties

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HCC: C1
Boiling Point: =122.C, 251.6F
Melt/Freeze Pt: =-42.C, -43.6F
Vapor Pres: 48@20C(68F)
Vapor Density: 2-3(AIR=1)

Spec Gravity: 1.41
PH: 1.0
Evaporation Rate & Reference: NO DATA FOUND.
Solubility in Water: INFINITELY SOLUBLE
Appearance and Odor: COLORLESS TO YELLOWISH LIQUID. SUFFOCATING, ACRID ODOR.
Percent Volatiles by Volume: 100

==========

Reactivity Data

==========

Stability Condition To Avoid: LIGHT AND HEAT. STABLE UNDER ORDINARY CONDITIONS
OF USE AND STORAGE. CONTAINERS MAY BURST WHEN HEATED.
Materials To Avoid: A DANGEROUSLY POWERFUL OXIDIZING AGENT, CONCENTRATED NITRIC
ACID IS INCOMPATIBLE WITH MOST SUBSTANCES, ESPECIALLY STRONG BASES, METALLIC
POWDERS, CARBIDES, HYDROGEN SULFIDE, TURPENTINE, AND COMBUSTIBLE ORGANICS.
Hazardous Decomposition Products: WHEN HEATED TO DECOMPOSITION, EMITS TOXIC
NITROGEN OXIDES FUMES AND HYDROGEN NITRATE. WILL REACT WITH WATER OR STEAM TO
PRODUCE HEAT AND TOXIC AND CORROSIVE FUMES.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: WILL NOT OCCUR

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Toxicological Information

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Toxicological Information: INHALATION: RAT LC50 = 244 PPM(NO2/30M); INVESTIGATED AS A MUTAGEN, REPRODUCTIVE EFFECTOR. ORAL HUMAN LDL0 = 430
MG/KG.

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Ecological Information

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MSDS Transport Information

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Transport Information: PSN: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID),
8, UN2031, II.

==========

Regulatory Information
==========
Sara Title III Information: SEC 302: RQ= 1,000 LBS; TPQ = 1,000 LBS;
SARA
311/312 HAZ CATEGORIES: ACUTE, CHRONIC, FIRE = YES;
Federal Regulatory Information: NITRIC ACID IS LISTED ON THE TSCA
INVENTORY
State Regulatory Information: LISTED ON EC, JAPAN, AUSTRALIA, CANADA
AN
PHILADELPHIA.
==========
Other Information
==========
==========
Transportation Information
==========
Responsible Party Cage: 0TG10
Trans ID NO: 154165
Product ID: NITRIC ACID, 50-70%
MSDS Prepared Date: 01/04/1999
Review Date: 07/22/2000
MFN: 2
Net Unit Weight: 7.34LB/5 PT
Multiple KIT Number: 0
Unit Of Issue: BT
Container QTY: 4
Type Of Container: BOTTLE
==========
Detail DOT Information
==========
DOT PSN Code: KFD
DOT Proper Shipping Name: NITRIC ACID
DOT PSN Modifier: OTHER THAN RED FUMING, WITH NOT MORE THAN 70
PERCENT NITRIC
ACID
Hazard Class: 8
UN ID Num: UN2031
DOT Packaging Group: II
Label: CORROSIVE
Special Provision: B2,B47,B53,T9,T27
Non Bulk Pack: 158
Bulk Pack: 242
Max Qty Pass: FORBIDDEN

Max Qty Cargo: 30 L
essel Stow Req: D
ater/Ship/Other Req: 44,66,89,90,110,111
==========
etail IMO Information
==========
MO PSN Code: KPF
MO Proper Shipping Name: NITRIC ACID
IMO PSN Modifier: ,OTHER THAN RED FUMING,ALL CONCENTRATIONS
MDG Page Number: 8195
UN Number: 2031
N Hazard Class: 8
MO Packaging Group: I/II
Subsidiary Risk Label: -
MS Number: 8-03
MED First Aid Guide NUM: 610
==========
etail IATA Information
==========
ATA PSN Code: RWF
IATA UN ID Num: 2031
ATA Proper Shipping Name: NITRIC ACID
ATA PSN Modifier: ,OTHER THAN RED FUMING, WITH 70% OR LESS BUT MORE
THAN 20%
NITRIC ACID
ATA UN Class: 8
ATA Label: CORROSIVE
N Packing Group: II
Packing Note Passenger: FORB
lax Quant Pass: FORB
lax Quant Cargo: 30L
ackaging Note Cargo: 813
xceptions: A1
==========
etail AFI Information
==========
FI PSN Code: RWF
FI Proper Shipping Name: NITRIC ACID,
AFI PSN Modifier: OTHER THAN RED FUMING, WITH NOT MORE THAN 70%
ITRIC ACID
FI Hazard Class: 8
FI UN ID NUM: UN2031
FI Packing Group: II

Special Provisions: P4
Pack Pack Reference: A12.11
==========
HAZCOM Label
==========
Product ID: NITRIC ACID, 50-70%
Cage: 0TG10
Company Name: PURITAN PRODUCTS INC
Street: 2290 AVENUE A
City: BETHLEHEM PA
Zipcode: 18017
Health Emergency Phone: 610-866-4225
Label Required IND: Y
Date Of Label Review: 07/22/2000
Status Code: A
Year Procured: 2000
Origination Code: F
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Severe
Contact Hazard: Severe
Fire Hazard: None
Reactivity Hazard: None
Hazard And Precautions: DANGER! POISON! STRONG OXIDIZER! CONTACT WITH OTHER
MATERIALS MAY CAUSE FIRE. CORROSIVE LIQUID & MIST CAUSE SEVERE BURNS TO
ALL BODY TISSUES. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE
LUNG AND TOOTH DAMAGE. FIRST AID:IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES
OR SKIN WITH WATER FOR 15 MINUTES WHILE REMOVING CONTAMICATED CLOTHING &
SHOES. WASH CLOTHING BEFORE REUSE. INHALATION: R EMOVE TO FRESH AIR. IF NOT
BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHINGIS DIFFICULT, GIVE
OXYGEN. CALL A PHYSICIAN. INGESTION: DO NOT INDUCE VOMITING. IF CONSCIOUS,
GIVE LARGE QUANTITIES OF WA TER OR MILK. GET MEDICAL ATTENTION IN

ALL CASES.

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Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense.

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ATTACHMENT C

Equipment List

HEALTH AND SAFETY EQUIPMENT LIST

Required	Not Required	
X		URS SMSs (relevant to project)
X		Type III or Type V personal flotation device
X		Hardhats
X		Safety glasses
	X	Ear plugs or muffs
	X	Cotton coveralls
	X	Traffic safety vest
	X	Tyvek® coveralls
	X	Polycoated Tyvek® Q-23 coveralls
X		Steel-toed boots
X		Chemical-resistant steel-toed boots or chemical-resistant boot covers
	X	Work gloves
X		Nitrile outer gloves
X		Surgical nitrile inner gloves
X		Plastic sheeting (visqueen)
	X	55-gallon 17-H drums (for contaminated solids)
X		55-gallon (or appropriate DOT approved) 17-E drums (for liquids)
	X	Drum liners
	X	Barricade tape and barricades
X		Wash tubs and scrub brushes
X		Decontamination solution (i.e., TSP)
	X	Folding chairs
X		Portable eyewash
	X	Respirator sanitizing equipment
X		First aid kit
X		Infection control kit
X		Drinking water
	X	Gatorade or similar drink
X		Type ABC fire extinguishers
	X	Half-face respirators approved by National Institute for Occupational Safety and Health (NIOSH)
	X	Full-face respirators (NIOSH-approved)
	X	Respirator cartridges
	X	PID w/[ ] lamp and calibration kit
	X	Combustible gas indicator (CGI) and calibration kit
X		Garden sprayer
	X	Compressed gas horn
	X	Duct tape
X		Paper towels and hand soap
	X	Spill sorbent
X		Plastic garbage bags
	X	Broom and/or shovel

ATTACHMENT D

Hospital Map

Yahoo! Driving Directions

Starting from: A 1401 Se Catalina Dr, Oak Harbor, WA 98277-4706

Arriving at: B 101 N Main St, Coupeville, WA 98239-3413

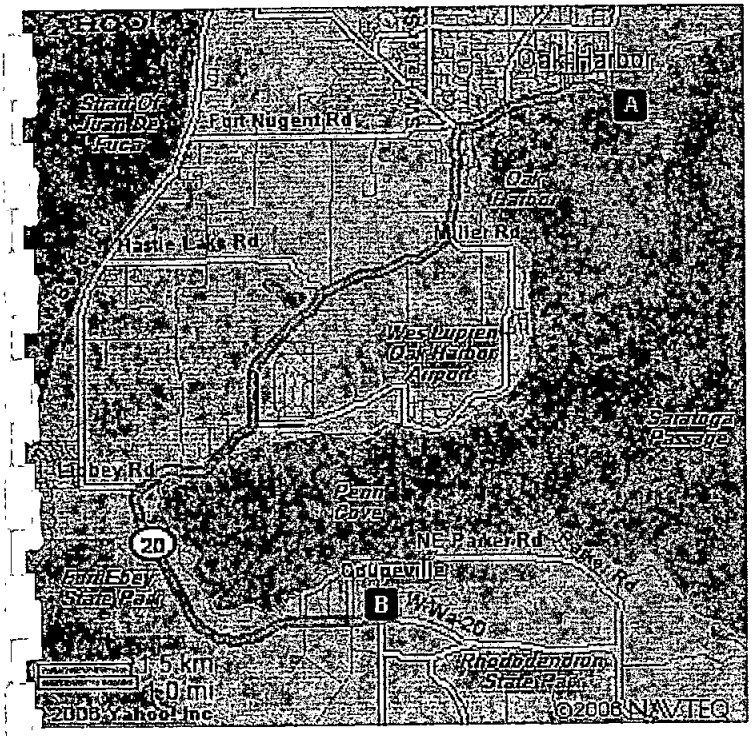
Distance: 11.0 miles **Approximate Travel Time:** 19 mins

Your Directions

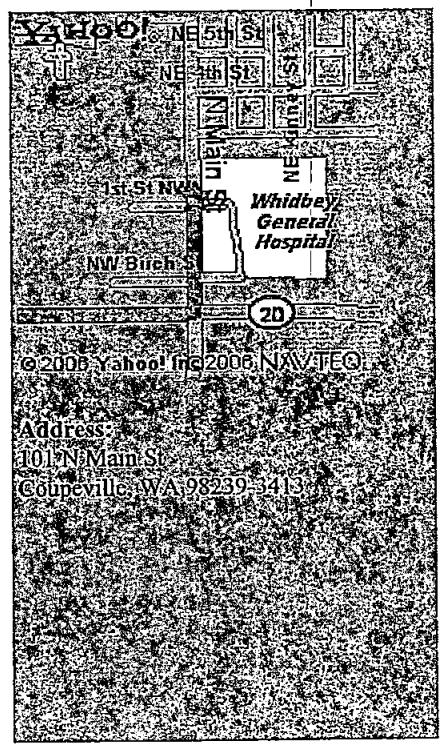
1.	Start at **1401 SE CATALINA DR, OAK HARBOR** - go **0.1** mi
2.	Turn L on **SE PIONEER WAY** - go **1.2** mi
3.	Continue on **WA-20** - go **9.5** mi
4.	Turn L on **N MAIN ST** - go **0.2** mi
5.	Arrive at **101 N MAIN ST, COUPEVILLE**, on the R

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Your Full Route



Your Destination



Address:
101 N Main St
Coupeville, WA 98239-3413

ATTACHMENT E

Safety Management Standards

URS SAFETY MANAGEMENT STANDARD
Worker Right-to-Know (Hazard Communication)

1. Applicability

This procedure applies to URS office and field operations.

2. Purpose and Scope

The worker right-to-know program provides URS personnel with information and training about safety and health hazards associated with the chemicals they might encounter in the workplace. This procedure describes how chemical safety hazards are communicated to URS personnel working in offices and at field site locations, and how information is to be provided to employees of other employers working at the location. The requirements include steps to acquire this information, maintain it, and train everyone to use it.

3. Implementation

Office Locations: Implementation of this program is the responsibility of the Office Manager.

Field Activities: Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Hazardous Material Inventory

1. Maintain a hazardous material inventory that lists all of the hazardous materials used at each workplace (i.e., office/field location). Use chemical names consistent with the applicable material safety data sheet (MSDS).

2. File a copy of the chemical inventory with the Project Safety Plan or with the local URS Health, Safety, and Environment (HSE) Representative.

B. Material Safety Data Sheets (MSDS)

1. Obtain a MSDS for each chemical before it is used.

2. Review each MSDS when it is received to evaluate whether the information is complete and to determine if existing protective measures are adequate.

3. Maintain a collection of all applicable and relevant MSDS where they are accessible by all employees at all times.

4. Replace MSDS when updated sheets are received. Communicate any significant changes to those who work with the chemical.

5. MSDS are required for all hazardous materials used on site by project personnel.

C. Labels

Unless each container has appropriate labeling, label all chemical containers with:

1. Identity of the hazardous chemical(s),

2. Appropriate hazard warnings, and

3. Name and address of the chemical manufacturer, importer, or other responsible party.

D. Hazardous Nonroutine Tasks

Periodically, employees are required to perform hazardous non-routine tasks. Prior to starting work on such projects, provide each employee with information about hazards to which they may be exposed during such an activity.

This information will include:

1. Specific chemical hazards.

2. Protective/safety measures which must be utilized; and

3. Measures that have been taken to lessen the hazards including ventilation, respirators, presence of another employee and emergency procedures.

E. Informing Contractors/Subcontractors

Provide contractors/subcontractors the following information on chemicals used by or provided to URS personnel:

1. Names of hazardous chemicals to which they may be exposed while on the jobsite.

2. Precautions the employees may take to lessen the possibility of exposure by usage of appropriate protective measures.

3. Location of URS MSDS and written chemical inventory.

F. Training

1. Conduct training of all employees potentially exposed to hazardous materials on the following schedule:

   a. Before new employees begin their jobs.

   b. Whenever new chemicals are introduced into the workplace, or

   c. Annually thereafter.

2. This training will include:

   a. Applicable regulatory requirements.

   b. Names of those responsible for implementing this program.

   c. Location of the program, inventory and MSDS.

   d. Chemicals used and their hazards (chemical, physical and health).

   e. How to detect the presence or release of chemicals.

   f. Safe work practices.

   g. How to read an MSDS.

3. Document the training.

5. Documentation Summary

A. File these records with the local URS HSE Representative:

1. Chemical Inventory.

2. Location of the MSDS inventory.

3. Training records.

4. Contractor/Subcontractor notifications.

B. File these records in the Project Safety File.

1. Chemical Inventory.
2. Location of the MSDS inventory.
3. Training records.
4. Contractor/Subcontractor notifications.

6. Resources

A. U.S. OSHA Technical Links - Hazard Communication

B. U.K. - Control of Substance Hazardous to Health - Regulations

References to the UK legislation listed above can be found at the link provided:

www.tionestop.com
username: Thorburn
password: Dames
enter search criteria – (see underlined text)
select the checkbox for Construction Information Service (CIS)

C. National Paint and Coatings Association (NPCA) Hazardous Materials Identification System (HMIS) Version III

D. National Fire Protection Association (NFPA) Standard 704 (Standard System for the Identification of Hazardous Materials for Emergency Response)

URS SAFETY MANAGEMENT STANDARD
CORROSIVE AND REACTIVE MATERIALS

1. Applicability

This program applies to URS office and field operations where corrosive or reactive materials are stored or used.

2. Purpose and Scope

This program provides information regarding the proper methods to store, handle and work with corrosive and reactive materials. This procedure considers a corrosive material as one that has a pH less than 2.0 (acid), or greater than 12.5 (base). A reactive material is a chemical that may be sensitive to shock, or may react with air or water depending upon its makeup.

3. Implementation

Office Locations -Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Appoint a responsible person who will:

1. Inspect storage areas periodically.
2. Monitor the quantity of corrosive and reactive materials on site as well as those incoming materials.
3. Review work practices utilizing corrosive and reactive materials.

B. Require that all employees working with corrosive or reactive materials, or who are working in close proximity to where such materials are being used or handled, are trained in accordance with SMS 002, "Worker Right to Know".

C. Control the use of corrosive and reactive materials by URS personnel.

1. Order only those materials and quantities that are needed to complete a job.
2. Check incoming corrosive and reactive materials for proper labeling.

a. Label materials if needed upon arrival on site.

b. Mark reactive materials containers with the date of receipt of the chemical.

3. Check incoming corrosive and reactive materials for material safety data sheets (MSDS). If MSDS are not already on file, order them from the manufacturer, distributor or vendor.

4. Add incoming corrosive and reactive chemicals to the hazardous materials inventory, if not already on the inventory, following procedures set forth in SMS 002, "Worker Right to Know".

5. Do not store any quantity of corrosive or reactive materials except consumer products in an office. These materials are to be stored off-site or at an on-site laboratory or storage area.

D. Store corrosive and reactive materials appropriately.

1. Store corrosives and reactive materials as indicated on the MSDS. In general, store these materials:

a. In a cool, dry environment, free from extremes of temperature and humidity.

b. In a manner that separates them from other materials (including flammables and oxidizers) and from each other.

1. Separate acids and bases.

2. Separate reactive materials from acids and bases, and protect from contact with water.

c. On materials that are acid resistant (Teflon-coated, plastic, etc.) for small containers.

d. Covered, not stacked on one another on acid resistant material for carboys (approximately 5 gallons/22 liters).

e. On individual racks or securely blocked on skids with closure (plug) facing upward to prevent leakage for drums.

E. Require that labeling and signage are in place.

Label containers with the appropriate warning word to indicate the hazard: DANGER; WARNING; CAUTION; CORROSIVE; OXIDIZER.

F. Use corrosive and reactive materials appropriately.

1. Safe-handling procedures will vary with each operation and type and concentration of the chemical, in all cases review the MSDS and product information before use.

2. Use SMS 029, "Personal Protective Equipment," when working with or around corrosive and reactive materials.

    a. Review the MSDS for the chemical used to determine the type of PPE needed.

    b. Wear the following PPE as a minimum when working with corrosives and reactive materials:

        1. Chemical splash goggles.

        2. Chemical resistant gloves.

        3. Chemical resistant apron.

3. Obtain medical care immediately in the event of:

    a. Skin or eye exposure (e.g., splash) to corrosive liquids.

    b. Inhalation of vapors of corrosive liquids that cause respiratory discomfort.

4. Require an eyewash to be located in all areas where acids or bases are used. Safety showers should be nearby if significant acid or base quantities are involved.

    a. Place emergency eyewashes and showers in accessible locations that require no more than 10 seconds to reach and are in a travel distance no greater than 25 feet (7.5 meters) from the hazard.

    b. Mark emergency eyewashes and showers with a highly visible sign.

    c. Require the area around emergency eyewashes and showers to be well lighted and visible.

d. Require emergency showers to deliver a minimum 20 gallons (85 liters) per minute for 15 minutes.

e. Require emergency eyewashes to be capable of delivering to the eyes not less than 1.5 liters per minute for 15 minutes.

G. Be prepared to clean up spills of corrosive and reactive materials.

1. Have a written spill response plan in place before materials are stored on site.

2. Have commercial spill kits available for clean up of small quantities of materials.

3. Clean up or respond to spills promptly.

4. Do not use combustible organic materials (sawdust, excelsior, wood chips and shavings, paper, rags or burlap bags) to absorb or clean up spills.

H. Dispose of corrosive and reactive materials appropriately.

1. Segregate organic acids, inorganic acids, and basic wastes.

2. Contract hazardous waste disposal services should be obtained to dispose of waste materials. All waste must be appropriately packaged for off-site transportation.

I. Inspect corrosive and reactive storage and use areas periodically.

1. Inspect office settings quarterly.

2. Inspect field related project sites monthly.

3. Use the inspection sheet provided as Attachment 9-1 to inspect sites.

5. Documentation Summary

A. File these records in the Office Safety Filing System:

1. Completed Corrosive and Reactive Material Inspection Sheets.

2. Worker Right to Know training documentation.

3. Written Spill Response Plan.

B. For field operations, file these records in the Project Safety File.

1. Completed Corrosive and Reactive Material Inspection Sheets.
2. Worker Right to Know training documentation.
3. Written Spill Response Plan.

6. Resources

A. ANSI Z358.1-1990 American National Standard for Emergency Eyewash and Shower Equipment

B. U.S. OSHA Technical Links - Personal Protective Equipment

C. U.S. OSHA Technical Links - Hazard Communication

D. Australian Standards AS 3780 - 1994. The Storage and Handling of Corrosive Substances

E. Attachment 9-1 - Inspection Sheet

URS SAFETY MANAGEMENT STANDARD
Fire Prevention

1. Applicability

This procedure applies to URS office and project locations.

2. Purpose and Scope

The purpose of this procedure is to reduce/eliminate potential fire hazards in the workplace and to provide for a rapid, effective response should a fire occur.

3. Implementation

Office Locations – Implementation of this procedure is the responsibility of the Office Manager.

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

General

A. Develop an Emergency Action Plan as outlined in SMS 3, "Emergency Action Plans."

B. Maintain good housekeeping to reduce fire hazards and to provide safe routes of egress should a fire occur.

C. Provide the appropriate number and types of fire extinguishers for the operations being performed. Refer to Attachment 14-1 for guidance.

D. Inspect fire extinguishers monthly and maintain an inspection log.

E. Conduct frequent periodic inspections to identify fire hazards such as:

1. Unnecessary accumulation of combustibles.
2. Unnecessary storage of flammables.
3. Sources of ignition (e.g., faulty wiring, sparks, open flame, etc.).

F. Remove all fire hazards promptly.

G. Prohibit smoking and other ignition sources in flammable storage and other fire hazard areas.

H. Post emergency numbers near telephones and evacuation maps in appropriate locations.

I. Conduct evacuation drills.

J. Train employees in:

1. Fire hazard recognition.
2. Fire hazard prevention.
3. Fire extinguisher use.
4. Emergency and evacuation procedures.

6. Documentation Summary

File the following in the Office/Project Health and Safety File:

A. Emergency Action Plans.

B. Fire extinguisher inspection logs.

C. Employee training documentation.

D. Site audits.

E. Evacuation drills.

7. Resources

A. U.S. OSHA Standard - Means of Egress - 29 CFR 1910, Subpart E

B. U.S. OSHA Standard – Exit Routes, Emergency Action Plans, and Fire Prevention Plans - 29 CFR 1910.38

C. U.S. OSHA Standard - Fire Protection - 29 CFR 1910, Subpart L

D. U.S. OSHA Technical Links - Fire Safety

E. U.S. OSHA Construction Standard - Fire Protection and Prevention 29 CFR 1926, Subpart F

F. U.K. Statutory Instrument 1997 No. 1840 - Fire Precautions (Workplace) Regulations

G. Australian Standards AS 1851.1-1995 - Maintenance of Fire Protection Equipment - Portable Fire Extinguishers and Fire Blankets

H. USACE EM 385-1-1 Section 9 - Fire Prevention and Protection

I. Attachment 14-1 - Fire Extinguisher Placement Guidelines

URS SAFETY MANAGEMENT STANDARD
Housekeeping

1. Applicability

This procedure applies to URS facilities and field operations.

2. Purpose and Scope

Proper housekeeping in office locations, on construction sites, and fixed work facilities is essential to prevent fires as well as injuries resulting from slips, trips and falls.

3. Implementation

Office Locations - Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Maintain the cleanliness of the site.

1. Require tools and equipment to be stowed at the end of the day.
2. Store supplies in locations away from walkways and in a manner that will not trip workers.
3. Keep weeds and vegetation away from stockpiled materials and walkways.
4. Maintain flooring and walkways in a clean, dry, smooth condition.
5. Dispose of construction debris in a timely manner.

B. Regularly inspect the work area for slip and trip hazards.

1. Office locations - Inspect work areas at least quarterly. Utilize the check-sheet provided as Attachment 21-1.
2. Field sites - Inspect sites at least monthly. Utilize the check- sheet provided as Attachment 21-1.

C. Thoroughly investigate all injuries resulting from slips, trips and falls on site. Correct those housekeeping conditions contributing to injuries.

URS SAFETY MANAGEMENT STANDARD
Housekeeping

5. Documentation Summary

A. Office/Laboratory

File completed Housekeeping Inspection Sheets (Attachment 21-1) in the Office Safety Filing System.

B. Field

File completed Housekeeping Inspection Sheets (Attachment 21-1) in the Project Safety File.

6. Resources

A. U.S. OSHA Standard - Sanitation - 29 CFR 1910.141

B. U.S. OSHA Standard - Walking and Working Surfaces - 29 CFR 1910.22.

C. U.K. - The Workplace (Health, Safety and Welfare) Regulations

D. U.K. - The Construction (Health, Safety and Welfare) Regulations

E. Attachment 21-1 - Housekeeping Inspection Sheet

URS SAFETY MANAGEMENT STANDARD
Work Over Water

1. Applicability

This procedure applies to URS projects where personnel will work above or immediately adjacent to water where a drowning hazard exists. Refer to SMS 053, "Marine Safety and Boat Operations."

2. Purpose and Scope

This procedure is intended to protect employees from drowning while working above or adjacent to water.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. Review the project in the planning phase to determine if any work will occur above or immediately adjacent to water where a drowning hazard exists. In general, a risk of drowning is present when:

1. Employees perform work on or under bridges without constant protection from falling into the water, or

2. Employees work on the banks of rivers, lakes, canals, or other waterways which slope so steeply that an employee could slip or fall into the water when no portable protection (like roping off) is used.

NOTE: Employees working on or under bridges who are constantly protected by guardrail systems, nets, or body harness systems are deemed to be adequately protected from the danger of drowning and are not required to wear life jackets or buoyant work vests.

B. If site activities pose a risk of drowning:

1. Provide employees with a US Coast Guard (USCG) approved (for U.S. operations) personal floatation device (PFD). This should include either a Type II buoyant vest or a Type III flotation aid. Employees should inspect PFDs daily before use for defects. Do not use defective PFDs.

2. Post USCG-approved Type IV throwable devices (e.g., ring buoys) with at least 90 feet (27 meters) of line next to the work area. If the work area is large, post extra buoys 200 feet (60 meters) or less from each other.

3. Provide at least one life saving skiff immediately available at locations where employees are working over or adjacent to water. Require that the skiff is in the water, is capable of being launched by one person, and is equipped with both motor and oars.

4. Designate at least one employee on site to respond to water emergencies and operate the skiff at times when there are employees above water.

    a. If the designated skiff operator is not within visual range of the water, provide him or her with a radio or provide some form of communication to inform them of an emergency.

    b. Designated employee should be able to reach a victim in the water within three to four minutes.

5. Require that at least one employee trained in CPR and first aid is on site during work activities.

5. Documentation Summary

Records required in the Project Safety File:

Copy of the fall protection plan designed for work activities (as necessary; refer to SMS 040)

6. Resources

A. U.S. OSHA Standard - Working Over or Near Water - 29 CFR 1926.106

B. U.K. Health and Safety Executive (HSE) Informational Sheets – Agricultural Sheet No. 1 (Personal Buoyancy Equipment on Inland and Inshore Waters)

URS Safety Management Standard
Personal Protective Equipment

1. Applicability

This program applies to URS Corporation office, shop, laboratory and field operations where the use of personal protective equipment (PPE) is warranted. Refer to SMS 42, "Respiratory Protection", for respiratory hazards. Hearing protection issues are addressed in SMS 26, "Noise and Hearing Conservation."

2. Purpose and Scope

This procedure provides information on recognizing those conditions that require PPE as well as selecting PPE for hazardous activities.

3. Implementation

Office/Shop/Lab Locations - Implementation of this program is the responsibility of the Office Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Perform hazard assessments for those work activities that are likely to require the use of PPE.

   1. Use Attachment 29-1 to perform the assessment.

   2. Reevaluate completed hazard assessments when the job changes.

B. Eliminate the hazards identified in Attachment 29-1, if possible, through engineering or administrative controls.

C. Select PPE that will protect employees if hazards cannot be eliminated.

   1. See Attachment 29-1 for recommended PPE.

   2. Review Material Safety Data Sheets for chemicals used for PPE recommendations.

   3. If needed, consult with the URS Health, Safety, and Environment (HSE) Representative for assistance in selecting PPE.

D. Provide required PPE to employees free of charge (excluding in some instances components of standard work attire such as steel-toed boots),

assuring that it fits properly and giving them a choice if more than one type is available.

E. Whenever a hazard is recognized and PPE is required, the employees will be provided with the appropriate PPE. However, when PPE is not required and the employee elects to wear his or her own PPE, the project or office manager shall ensure that the employee is properly trained in the fitting, donning, doffing, cleaning, and maintenance of his or her employee owned equipment.

F. Conduct and document employee training.

1. Train all employees who are required to wear PPE.
2. Require that training includes:
   a. When PPE is to be worn.
   b. That PPE necessary for the task to be completed.
   c. How to properly don, doff, adjust and wear PPE.
   d. Limitations of PPE.
   e. Proper care, maintenance, useful life and disposal of PPE.
3. Training must be conducted before PPE is assigned.
4. Refresher training is needed when:
   a. New types of PPE are assigned to the worker.
   b. Worker cannot demonstrate competency in PPE use.
5. Keep written records of the employees trained and type of training provided, including the date of training.

G. Maintain Protective Equipment

1. Check PPE for damage, cracks, and wear prior to each use. Replace or repair equipment not found in good condition.
2. Wash off contaminated PPE with water and mild soap, as necessary, to prevent degradation of the equipment.

H. Periodically inspect worksites where employees are using PPE using Attachment 29-2.

1. Field activities – inspect work sites at least monthly.
2. Office/laboratory/shop locations – inspect work sites semi-annually.

5.0 Documentation Summary

A. Records required in the Project Safety File:

1. Completed Hazard Assessment Certification Forms (Attachment 29-1)
2. Completed Personal Protective Equipment Inspection Sheet (Attachment 29-2)
3. Documentation of employee training.

B. Records required in the Office/Laboratory Safety Filing System:

1. Completed Hazard Assessment Certification Forms (Attachment 29-1)
2. Completed Personal Protective Equipment Inspection Sheet (Attachment 29-2)
3. Documentation of employee training.

6.0 Resources

A. U.S. OSHA Standards - Personal Protective Equipment -29 CFR 1910, Subpart I

B. U.S. OSHA Construction Standard - Personal Protective Equipment –29 CFR 1926 Subpart E

C. U.S. OSHA Technical Links - Personal Protective Equipment

D. Australian Standards SAA HB9-1994 - Occupational Personal Protection

E. American National Standards Institute, ANSI Z89.1-2003, Protective Headwear

F. American National Standards Institute, ANSI Z87.1 - 1989, Eye and Face Protection

G. American Society for Testing and Materials, ASTM F13-WK4519, Specification for Personal Protective Footwear

H. SMS 40 - Fall Protection

I. Queensland Workplace Health and Safety - Personal Protective Equipment

J. Attachment 29-1 Hazard Assessment Form

K. Attachment 29-2 PPE Inspection Form

L. Attachment 29-3 – Eye and Face Protector Selection Guide

URS SAFETY MANAGEMENT STANDARD
Injury / Illness / Incident Reporting & Notifications

1. Applicability

This procedure applies to URS Corporation offices and field operations.

2. Purpose and Scope

The purpose of this procedure is to provide guidance for the timely reporting of work related injuries, illness, and incidents. This procedure also defines incident notification procedures for URS employees. Note – For incidents involving motor vehicles, the reporting and notification requirements of URS SMS 057 – Vehicle Safety Program may also apply.

For significant incidents (e.g., fatality, serious injury, injury to members of the public), SMS 066 – Incident Investigation is also required.

3. Implementation

Office Locations -	Implementation of this program is the responsibility of the employee's Supervisor.
Field Activities -	Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Reporting: All employees shall immediately notify their appropriate level of management (line, project, and/or office) of a reportable incident. A reportable incident includes the following:

1. An injury or illness to any URS employee or subcontractor, even if the injury does not require medical attention;
2. An injury to a member of the public, including clients, occurring on a URS controlled work site;
3. Illness resulting from suspected chemical exposure;
4. Chronic or re-occurring conditions such as back pain or cumulative trauma disorders (example: carpal tunnel syndrome);
5. Fire, explosion, or flash;
6. Any vehicle accidents occurring on site, while traveling to or from client locations, or with any company-owned, rented, or leased vehicle (including personal vehicles used for company business);

7. Property damage resulting from any URS or subcontractor activity;
8. Structural collapse or potential structural hazards;
9. Unexpected release or imminent release of a hazardous material;
10. Unexpected chemical exposures to workers or the public;
11. A safety related complaint from the public regarding URS activities.
12. Incidents that could result in adverse public media interest concerning URS or a URS project.
13. Any incident that could result in, or any actual investigation by, OSHA, DOT, EPA, or State, Federal, or local law enforcement agency.
14. Any other significant occurrence that could impact safety – including a near-miss.

Note: A near-miss is defined as an incident having the potential to cause significant injury or property damage as listed above – but did not. Examples of a near-miss include:

A worker steps off a ledge and falls three feet (1 meter) to the floor – and is uninjured.

A crane drops a 1,000-pound (454 kg) beam during a lift – and nobody is hurt, no equipment is damaged.

A work crew is conducting a survey along the highway. A vehicle leaves the roadway (driver asleep) and the vehicle enters the survey area at 50 mph (80 kph). The vehicle misses an employee by 3-feet (1 meter), the driver recovers control of the vehicle and leaves the area.

B. Actions: The following actions will be taken following a reportable incident:

1. Employees:

   a. If necessary, suspend operations and secure and/or evacuate the area;

   b. Immediately notify your supervisor and/or project manager

   c. Record information pertaining to the incident (e.g., time, date, location, name and company of person(s) involved witnesses,

description of event, and actions taken) and initiate either an Incident Report (49-1) or Near-Miss Report (49-2);

d. Assist with incident investigation as directed by management;

e. Implement corrective actions as directed by management;

f. *Do not* discuss the incident with members of the news media or legal representatives (except URS legal counsel or your personal legal advisor) unless directed to do so by URS management;

g. *Do not* make statements pertaining to guilt, fault, or liability.

2. Line/Project Management:

a. For instances involving serious accidents, injuries, or other significant consequences, verbally notify the URS H&S Management Team as soon as possible at the following numbers:

In the U.S., Canada, and Mexico: (866) 326-7321
Fax +1 (512) 419 6413

In Europe: +44-1291-621768
Fax +44 1291 621768

In Asia/Pacific: +61 (3) 8699 7500
Fax +61 (3) 8699 7550

Notification should in no case occur later than the end of the work shift. Follow-up notification by faxing an SMS 49-1 Incident Report Form within 24 hours to the URS Occupational Health Manager (OHM) at +1-512.419.6413. Also, assure copies of the report are distributed as outlined on the form.

URS Corporate H&S Management will make notification to Federal and State authorities as appropriate.

b. For minor incidents involving only first aid treatment, minor damage to vehicle of equipment, etc., make notifications to the above number as soon as reasonable during normal business hours and fax the SMS 49-1 Incident Report Form to the URS

OHM within 24 hours at +1-512.419.6413. Also, assure copies of the report are distributed as outlined on the form.

c. For a near-miss incident, complete the Near-Miss Report Form (49-2) and give it to the Office or Project Health and Safety Representative. Also, assure copies of the report are distributed as outlined on the form.

d. Review circumstances (i.e., who, what, when, where, and how) of the incident with applicable employee(s) to determine apparent causes and to develop recommended corrective actions;

e. Discuss with department or project staff the circumstances surrounding the incident and corrective actions taken.

3. Local Office or Project Health And Safety Representative

   a. Assist with incident evaluation;

   b. With management, identify cause(s) of incident and identify corrective actions needed to avoid recurrence;

   c. Review injury/incident report or the near-miss report for completeness and accuracy. Assure the reports are distributed properly.

   d. Assure notifications are made in a timely manner.

   e. Assure that the injured employee is properly counseled/advised as directed by SMS 65 - Injury Management. Communicate with the OHM at (866) 326-7321.

4. Occupational Health Manager

   a. Report work-related injuries and illness to workers' compensation carrier.

   b. Assure that the employee's injury is managed in accordance with SMS 065. Provide guidance for the affected Office or Project Health and Safety Representative.

   c. Periodically disseminate near-miss reporting summary information to the Regional and Corporate H&S Managers.

5. Corporate Health and Safety Management

   a. Notify URS management of any significant occurrence including lost-time injuries, deaths, or other serious result or circumstance.

   b. The Occupational Health Manager (OHM) will review all reported incidents to determine OSHA reporting and recording requirements with input from the appropriate Corporate Health and Safety Manager. For a determination of recordability in those infrequent instances where there is not a clear answer, the Vice President, Health, Safety, and Environment shall make the final determination. All decisions will be based strictly on current Federal OSHA guidelines.

   c. Official records (including required reports and logs for all reported incidents) will be maintained at one central location by the OHM.

   d. Each January the OHM will prepare and distribute, to each URS establishment, the appropriate government injury/illness reports. These reports will summarize all required government information for incidents that occurred during the preceding calendar year.

5. Documentation Summary

A. File these records in the Office Safety File:

   1. Attachment 49-1 - Incident Report Form

   2. Attachment 49-2 – Near-Miss report

B. File these records in the Project Health and Safety File

   1. Attachment 49-1 - Incident Report Form

   2. Attachment 49-2 – Near-Miss report

URS SAFETY MANAGEMENT STANDARD
Marine Safety and Boat Operations

1. Applicability

This program establishes guidelines for the safe conduct of personnel working in the marine environment and personnel operating watercraft during URS field activities such as biological sampling, sediment sampling, and bathymetry.

2. Purpose and Scope

Maritime work has the same risks associated with land-side activities with the additional risks of drowning, hypothermia, and the energy of wave action. It is an inherently dangerous environment that must be treated with respect. This SMS delineates personal protective equipment requirements to address these hazards. In addition, this specifies watercraft operating restrictions for URS activities.

The operation of watercraft by company employees will be an infrequent event, but may be a necessary part of a project due to the remote location of the job site. Where possible, subcontractors who specialize in the operation if watercraft will be contracted to provide work platforms. In most countries, a contractor hired to carry passengers aboard a small craft is required to be licensed by the national maritime authority or coast guard. Similarly, any vessel carrying more than 12 passengers (6 passengers in the US) must carry a certificate certifying safe carriage of passengers.

When it is not possible to hire an appropriate contractor to provide a safe work platform or vessel, then URS personnel may operate work boats in accordance with the guidance of this standard.

3. Implementation

Field Locations - Implementation of this program is the responsibility of the employee and the Project Manager.

4. Definitions

There are five types of Personal Flotation Device (PFD):

A. Type I is an offshore lifejacket

Type I PFD will right an unconscious wearer and will usually keep the wearer's face out of the water.

Type I PFD's are bulky and uncomfortable to wear for long periods of time.

B. Type II is a near shore buoyancy vest

Type II PFD will right an unconscious wearer and will usually keep the wearer's face out of the water.

Type II PFD's are bulky and uncomfortable to wear for long periods of time.

C. Type III is a floatation aid

Generally the most comfortable PFD is the Type III which has at least 15.5 pounds of buoyancy in the adult size.

The Type III PFD provides adequate buoyancy, but will not turn the wearer face-up in the water.

The Type III device is more comfortable to wear, and is designed to be worn as work attire.

Common Type III devices are work vests and harnesses with built in pneumatic floatation.

D. Type IV is a throwable device

Type IV PFDs include the horseshoe collar, ring buoy, and seat cushion.

They have at least 16.5 pounds of buoyancy and must offer immediate access.

E. Type V is a hybrid inflatable or special use device

A Type V PFD is special purpose floatation.

The full body insulating floatation suits that are suitable for work in cold weather are Type V devices.

PFDs designed to survive high-speed impacts (like water skiing vests and jet-ski vests) are Type V devices.

Some Type V PFDs are CO2 activated, and are very low profile until inflated.

5. General Marine Safety

In general, the two additional hazards that maritime work involves are drowning and hypothermia. All other hazards are generally similar to our landside activities, and the personal protective equipment requirements are identical (hardhat, safety glasses, hearing protection, steel-toe shoes, etc).

Wearing a personal floatation device mitigates the risk of drowning. Company employees are required to wear a type III PFD anytime they are aboard a small craft and are outside of an enclosed cabin. The PFD must be readily accessible for each person inside a cabin. If employees are working aboard a larger vessel (>26 feet in length), a PFD must be readily accessible, but need not be worn unless engaged in activities on an open deck or at the rail.

The risk of hypothermia is mitigated by wearing appropriate insulated floating outerwear when cold weather or cold water is a threat. A Type V PFD, usually referred to as a "mustang suit', is a full body PFD that has excellent insulation qualities and will extend the wearer's survivability in the event of immersion or dowsing with spray when in cold weather. The wearing of these PFDs is required when the air temperature and the water temperature combined are less than 100 degrees F (38 degrees C), and when the small craft is less than 26 feet in length. When the working platform is larger than 26 feet, the wearing of a mustang suit is at the discretion of the boat Captain, the site supervisor, or the URS employee.

6. Operation Of Boats

A. Limitations

1. URS personnel may perform work from a small boat under following conditions:

   a. The boat used for the work must be appropriate to the type of work and suitable for safe carriage of the workers necessary for the task.

   b. The work site must be located in a protected area like a bay, sound, lake, or body of water that is protected from open-sea weather conditions.

   c. The work site must be within sight of land, and in no case more than 5-miles from shore.

   d. All operations will be completed in daylight hours under

reasonable weather conditions with good visibility.

e. The operator of the boat must have sufficient experience and knowledge to be competent in the operation of the boat at the work site location.

f. There must be at least two people in the boat anytime the boat is underway.

g. The boat and personnel must be properly equipped as specified below.

h. The boat operator must be intimately familiar with all aspects of the boat, its intended use, the local area, and expected weather conditions.

i. The boat must be monitored from the shore, either directly with a supervisor, or by filing a "float plan" with the project manager or other responsible person before getting underway.

2. Prior to departing the dock, the boat should be checked for:

   a. Watertight integrity

   b. Operation of machinery (ahead and astern, throttle, ignition cut-off)

   c. Appropriate safety gear (see section 6.B below)

   d. Proper loading of the boat (personnel and equipment) such that vessel stability is not jeopardized.

   e. Sufficient fuel for the duration of the trip and site work.

   f. All electrical and electronic equipment in good working order (lights, radios, horns, etc)

3. While operating, the boat operator shall:

   a. Maintain a communication schedule with shore support as specified in the float plan.

   b. Periodically monitor the weather on the VHF radio.

4. When moored, the boat operator shall close-out the float plan (if one was required).

B. Boat Safety Equipment (for URS Operated Small Boats)

1. All persons on the boat will wear an U. S. Coast Guard approved Type III PFD device.
2. In addition, at least one throwable Type IV devices will be readily available for use.
3. At least one B-II U. S. Coast Guard approved hand-held portable fire extinguisher will be on the boat, readily available for use.
4. Visual Distress Signal Flares (check expiration date) and a battery operated light will be in good working order and readily available on the boat.
5. A sound-producing distress signal, either bell, whistle, or horn, will be in good working order and readily available on the boat.
6. A first aid kit will be available on the boat.
7. All boat fuel (gasoline or diesel) will be contained in fuel tanks or approved containers that supply fuel to the engine via approved fuel lines. No fuel transfers between containers are to be conducted aboard the boat.
8. A secondary means of propulsion will be available on the boat (multiple engines, oars or paddles for smaller vessels).
9. A boat hook, anchors, and proper mooring lines will be available on the boat.
10. A VHF radio is required for any boat working more than one mile offshore, or at any site where there is no shore-side support for the boat crew. (The radio may have to be licensed by the FCC depending upon transmission strength and installation.) When operating less than one mile from shore, a citizens band radio, cellular telephone, or a UHF radio may be used to provide positive communication with shoreside support.

C. Safe Boating Operations

1. All boats will be properly registered for use in waterways of local, state, and federal jurisdictions.

2. All boat trailers and towing vehicles will be properly licensed and in good working order.

3. The boat must be operated by experienced personnel. The U. S. Coast Guard Auxiliary and other volunteer organizations regularly sponsor boating safety courses. In addition to basic boating safety, the courses cover navigation regulations and emergency procedures. The training is recommended, even for experienced boat operators.

4. The boat will be operated in a safe manner and all waterway regulations will be obeyed.

5. No alcoholic beverages are permitted on the boat.

6. No recreational equipment for fishing, hunting, water skiing, or SCUBA diving will be allowed on the boat unless specifically authorized as part of the work-related equipment.

D. Boating Accidents

Coast Guard and State regulations require accident reports if significant injuries or property damage occurs. The definition of a reportable accident varies between State and National authorities. The boat operator must be familiar with accident reporting requirements, usually available through the State's Department of Motor Vehicles. Any incident or accident should also be reported in accordance with SMS 49.

E. Float Plan

A float plan is required to be completed anytime the watercraft will be operating beyond the confines of a shore supported work site. The float plan (Attachment 53-1) should be completed and given to a shore supervisor who will know what actions to take in the event the boat is overdue.

URS SAFETY MANAGEMENT STANDARD
Cold Stress

1. Applicability

This procedure applies to URS projects where field crews are working outdoors in damp and cool (below 50° F or 10°C) conditions or anytime temperatures are below 32°F or 0°C.

2. Purpose and Scope

The purpose of this procedure is to protect project personnel from the following conditions:

Hypothermia: Hypothermia results when the body loses heat faster than it can be produced. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are first affected. If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia. Further heat loss produces speech difficulty, confusion, loss of manual dexterity, collapse, and finally death. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia may be seen in Attachment 59-1.

Frostbite: Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite can be categorized into:

Frost Nip or Initial Frostbite: (1st degree frostbite) Characterized by blanching or whitening of skin.

Superficial Frostbite: (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.

Deep Frostbite: (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.

Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. The toes, fingers, cheeks, and ears are the most commonly affected. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues. The first symptom of frostbite is an uncomfortable sensation of coldness, followed by numbness. There may be tingling, stinging, or cramping. Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.

3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager and the field supervisor.

4. Requirements

A. Carefully plan work anticipated to be performed in cool or cold conditions. Include costs in project budgets for specialized equipment and supplies needed to complete the field activities.

B. Monitor weather forecasts immediately prior to entering the field.

C. Observe and monitor weather conditions such as ambient temperature, wind speed, and precipitation while in the field. Use Attachment 59-2 to determine wind chill.

D. Wear at least 3 layers of clothing.

An outer layer to break the wind and allow some ventilation (e.g., Gortex® or nylon)

A middle layer of down, wool, or similar materials to provide insulation

An inner layer of cotton or synthetic weave to allow ventilation

In addition:

Wear a hat. Up to 40% of body heat can be lost when the head is left exposed.

Wear insulated boots or other insulated footwear.

Keep a change of dry clothing available in case work clothes become wet.

Do not wear tight clothing. Loose clothing allows better ventilation.

E. Use the following work practices:

Use Attachment 59-3 to establish work/rest cycles in cold weather.

Drink plenty of warm liquids. It is easy to become dehydrated in cold

weather.

Avoiding caffeine and alcohol. Alcohol will accelerate loss of body heat.

Eat high calorie snacks to help maintain body metabolism.

If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold.

Work in pairs to keep an eye on each other and watch for signs of cold stress.

NEVER IGNORE SHIVERING. Persistent or violent shivering is a clear warning that you are on the verge of hypothermia.

Avoid exhaustion.

F. When possible, use the following engineering controls:

Provide shelter to escape cold, wind and precipitation

Provide a source of heat (such as warm packs or portable heaters)

Use insulating materials on equipment handles when temperatures drop below 30°F or -1°C.

G. Watch for symptoms and signs of hypothermia (see Attachment 59-1).

H. Treat cold stress illness as follows:

Hypothermia: Prompt treatment of hypothermia is essential. Once the body temperature drops below 95°F or 35°C, the loss of temperature control occurs, and the body can no longer rewarm itself. Initial treatment includes reducing heat loss by moving the individual out of the wind and cold, removal of wet clothing, applying external heat (such as a pre-warmed sleeping bag, electric blanket, or body-heat from other workers) and follow-up medical attention.

Frost Bite: The initial treatment for frostbite includes bringing the individual to a warm location, removal of clothing in the affected area, and, **if help is delayed**, placing the affected parts in warm (100° to104° F or 38° to 40°C) water. Do not massage or rub the frostbite area. After

the initial treatment, wrap the affected area loosely in sterile gauze and seek medical attention.

For further discussion on Cold Stress treatment, please refer to Attachment 59-1

I. Hypothermia in Water:

Loss of body heat to the water is a major cause of deaths in boating accidents. Often the cause of death is listed as drowning; however the primary cause is often hypothermia. It should also be noted that alcohol lowers the body temperature around two to three degrees by dilating the blood vessels. Do not drink alcohol around cold water. The following table shows the effects of hypothermia in water:

WATER TEMPERATURE	EXHAUSTION	SURVIVAL TIME
32.5° F (0°C)	Under 15 min.	Under 15 to 45 min.
32.5 to 40°F (0 – 4°C)	15 to 30 min.	30 to 90 min.
40 to 50°F (4 – 10°C)	30 to 60 min.	1 to 3 hrs.
50 to 60°F (10 – 16°C)	1 to 2 hrs.	1 to 6 hrs.
60 to 70°F (16 – 21°C)	2 to 7 hrs.	2 to 40 hrs.
60 to 70°F (16 – 21°C)	3 to 12 hrs.	3 hrs. to indefinite
Over 80°F (27°C)	Indefinite	Indefinite

SOME POINTS TO REMEMBER:

Wear your PFD. Review SMS 053 - Marine Safety and Boat Operations.

If water is less than 50°F (10°C), wear a wet suit or dry suit for work in water (e.g., wading) or if significant potential to fall in water.

While in the water, do not attempt to swim unless to reach nearby safety. Unnecessary swimming increases the rate of body heat loss. Keep your head out of the water. This will increase your survival time.

Keep a positive attitude about your rescue. This will increase your chances of survival.

If there is more than one person in the water, huddling is recommended.

J. Training

Workers at risk of developing hypothermia or cold-related injury will be trained in:

recognition of the signs and symptoms of cold injury or impending hypothermia,

proper re-warming procedures and appropriate first aid treatment,

proper use of clothing,

proper eating and drinking practices

safe work practices appropriate to the work that is to be performed.

5. Documentation Summary

File these records in the Project Safety File.

A. Completed Project Hazard Analysis form (see Health and Safety Website – "Hazard Analysis")

B. Cold stress training records

6. Resources

A. OSHA Fact Sheets – "Protecting Workers in Cold Environments" http://www.osha-slc.gov/OshDoc/Fact_data/FSNO98-55.html

B. Attachment 59-1 "Signs of, and Treatment for, Cold Stress related Illnesses"

C. Attachment 59-2(a) "Wind Chill Index" (units in °F and miles/hour)

D. Attachment 59-2(b) "Wind Chill Index" (units in °C and Kilometers/hour)

E. Attachment 59-3 "TLVs Work/Warm-up Schedule for Outside Workers based on a Four-hour Shift"

F. OSHA Publication 3156 – Quick Reference Card http://www.osha.gov/Publications/osha3156.pdf

Attachment 59-1
Signs of and Treatment for Cold Stress Related Illnesses

Condition	Signs/Symptoms	Treatment
Hypothermia **Mild** (98° - 90° F) (36° - 32°C)	shivering lack of coordination stumbling, fumbling hands slurred speech memory loss pale, cold skin	move to warm area stay active remove wet clothes and replace with dry clothes or blankets cover the head drink warm (not hot) sugary drink
Hypothermia **Moderate** (90° - 86° F) (32° - 30°C)	shivering stops unable to walk or stand confused and irrational	All of the above, plus Call for an ambulance Cover all extremities completely Place very warm objects, such as hot packs or water bottles on the victim's head, neck, chest and groin
Hypothermia **Severe** (86° - 78° F) (30° - 26°C)	severe muscle stiffness very sleepy or unconscious ice cold skin death	Call for an ambulance Treat the victim very gently Do not attempt to re-warm -- the victim should receive treatment in a hospital
Frostbite	Cold, tingling, stinging or aching feeling in frostbitten area; numbness Skin color turns red, then purple, then white or very pale skin, cold to the touch Blisters in severe cases	Seek medical attention Do not rub the area Wrap in soft cloth If help is delayed, immerse in warm, not hot, water
Trench Foot	Tingling, itching or burning sensation Blisters	Soak feet in warm water, then wrap with dry cloth bandages Drink a warm, sugary drink

Source: Princeton University, Department of Environmental Health and Safety, posted 2/2/99.

URS SAFETY MANAGEMENT STANDARD
Cold Stress

Attachment 59-2(a)
Wind-Chill Index[1]
(miles per hour and °F.)

	ACTUAL THERMOMETER READING (F)									
	50	40	30	20	10	0	-10	-20	-30	-40
Wind speed in mph	EQUIVALENT TEMPERATURE (F)									
calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Over 40 mph (little added effect)	Little Danger (for properly clothed person)				Increasing Danger (Danger from freezing of exposed flesh)				Great Danger	

[1] Source: Fundamentals of Industrial Hygiene, Third Edition. Plog, B.A., Benjamin, G.S., Kerwin, M.A., National Safety Council, 1988

URS SAFETY MANAGEMENT STANDARD
Cold Stress

Attachment 59-2(b)
Wind-chill Index[1]
(Kilometers per hour and °C.)

Estimated wind speed	Actual temperature reading (°C)												
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
(in km/h)	Equivalent chill temperature (°C)												
0 (Calm)	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
8	9	3	-2	-7	-12	-18	-23	-28	-33	-38	-44	-49	-54
16	4	-2	-7	-14	-20	-27	-33	-38	-45	-50	-57	-63	-69
24	2	-5	-11	-18	-25	-32	-38	-45	-52	-58	-65	-72	-78
32	0	-7	-14	-21	-28	-35	-42	-50	-56	-64	-71	-78	-84
40	-1	-8	-16	-24	-31	-38	-46	-53	-60	-67	-76	-82	-90
48	-2	-10	-17	-25	-33	-40	-48	-55	-63	-70	-78	-86	-94
56	-3	-11	-18	-26	-34	-42	-50	-58	-65	-73	-81	-89	-96
64	-3	-11	-19	-27	-35	-43	-51	-59	-66	-74	-82	-90	-98
(Wind speeds greater than 64 km/h have little additional effect.)	LOW HAZARD: Risk of exposed dry skin being affected in less than one hour. Awareness of hazard low.				INCREASING HAZARD Danger from freezing of exposed flesh within one minute.			HIGH HAZARD: Flesh may freeze within 30 seconds.					

The table was originally developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA, and is adapted from the 1995-1996 *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices,* published by the ACGIH. The ACGIH publication provides the equivalent table with temperature in degrees Fahrenheit and wind speed in mph.

Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F).

URS SAFETY MANAGEMENT STANDARD
Cold Stress

Attachment-59-3

TLVs Work/Warm-up Schedule for Outside Workers based on a Four-hour Shift*

The ACGIH has adopted the guidelines developed by the Saskatchewan Labour for working outdoors in cold weather conditions. These guidelines recommend protective clothing and limits on exposure time. The recommended exposure times are based on the wind chill factor, a scale based on air temperature and wind speed. The work-break schedule applies to any four-hour period with moderate or heavy activity. The warm-up break periods are of 10-minute duration in a warm location. The schedule assumes that "normal breaks" are taken once every two hours. At the end of a 4-hour period, an extended break (e.g. lunch break) in a warm location is recommended. More information is available in the ACGIH publications "2000 TLVs and BEIs" and "Documentation of TLVs and BEIs" and on the Saskatchewan Labour web page "Cold Conditions Guidelines for Outside Workers".

Air Temperature - Sunny Sky		**No Noticeable Wind**		**5 mph Wind**		**10 mph Wind**		**15 mph Wind**		**20 mph Wind**	
°C (approx.)	°F (approx.)	Max. work Period	No. of Breaks**	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm breaks) 1		(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4
-29°to -31°	-20°to -24°	(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to -34°	-25°to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease					
-40° to -42°	-40°to -44°	30 min.	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

*2000 TLVs and BEIs - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati : American Conference of Governmental Industrial Hygienists (ACGIH), 2000 - page 176. Adopted from Saskatchewan Labour "Cold Conditions Guidelines for Outside Workers"

URS SAFETY MANAGEMENT STANDARD
HAND SAFETY

1. Applicability

This program applies to URS Corporation office and field operations where hand safety is a concern.

2. Purpose and Scope

This procedure is intended to protect employees from activities that might or could expose them to injury. This procedure provides information on recognizing those conditions that require personal protective equipment or specific work practices to reduce hand injury risk.

3. Implementation

Office locations: The implementation of this program is the Office Manager's responsibility, with support from the URS Local Health and Safety Representative.

Field Activities: Implementation of this program is the Project Manager(s)' responsibility.

4. Requirements

A. Personal Protective Equipment

1. Perform hazard assessments for those work activities likely to require PPE.

   a. Use SMS 29-1 (PPE Hazard Assessment Certification Form) to perform the assessment. The Hazard Assessment Certification Form shall accompany URS personnel at job sites for use in the event of a job or task change.

   b. Reevaluate completed hazard assessments when the job or task changes.

2. If possible, eliminate the hazards identified through engineering or administrative controls. Examples of controls are: chemical substitution, machine guarding, and use of different tools.

3. Select PPE that will protect employees if hazards cannot be eliminated.

   a. Review Material Safety Data Sheets for project or task-specific chemicals to determine appropriate PPE. If needed, consult with the URS Health and Safety Representative for assistance.

b. Review glove manufacturer recommendations for both physical and chemical protection.

c. Obtain gloves of the correct size for project field staff.

d. When both chemical and physical protection are of concern, the chemical protection gloves (e.g. nitrile) shall be worn inside the physical protection gloves (e.g. leather, Kevlar®).

e. Latex gloves are not recommended for chemical protection.

B. Guidelines for Working With and Around Equipment (Hand Tools, Portable Equipment)

1. General

a. Keep hand and power tools in good repair and used only for the task for which they were designed.

b. Remove damaged or defective tools from service.

c. Do not remove or bypass a guarding device for any reason.

d. Keep surfaces and handles clean and free of excess oil to prevent slipping.

e. Wear proper PPE, including gloves, as necessary.

f. Do not carry sharp tools in pockets.

g. Clean tools and return to the toolbox or storage area upon completion of a job.

h. Wrenches must have a good bite before pressure is applied.

i. Brace yourself by placing your body in the proper position so that in case the tool slips you will not fall.

ii. Make sure hands and fingers have sufficient clearance in the event the tool slips.

iii. Always pull on a wrench, never push.

i. When working with tools overhead, place tools in a holding receptacle when not in use.

j. Do not throw tools from place to place, from person to person, or drop from heights.

k. Inspect all tools prior to start-up or use to identify any defects.

l. Powered hand tools should not be capable of being locked in the on position.

m. Require that all power-fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.

n. Do not allow loose clothing, long hair, loose jewelry, rings and chains to be worn while working with power tools.

o. Do not use cheater pipes.

p. Make provisions to prevent machines from restarting through proper lockout/tagout (refer to SMS 023 – Lockout and Tagout Safety).

2. Cutting Tools

a. Hand cutting tools such as knives, scissors, paper cutters, etc. should be used with care and in the manner intended by the manufacturer.

b. Personnel when utilizing cutting tools should observe the following precautions to the fullest extent possible:

i. Use the correct tool and correct size tool for the job,

ii. Cut in a direction away from yourself and not towards other workers in the area,

iii. Maintain the non-cutting hand and arm towards the body and out of the direction of cutting tool if it were to slip out of the material being cut.

iv. Ensure that the tool is sharp and clean; dirty and dull tools typically cause poor cuts and more hazard than a sharp clean cutting tool

v. Store these tools correctly with covers in-place or blades retracted as provided by the manufacturer.

vi. On tasks where cutting may be very frequent or an all day task (e.g., liner samples), Kevlar® gloves should be considered in the PPE evaluation for the project.

vii. Do not remove guards on paper cutters.

3. Moving/Rotating Equipment

a. General Requirements for Drilling

i. Require a meeting at project start-up regarding the drill rig operator responsibility for rig safety and any site and equipment specific safety requirements. The significant potential for hand injuries (including finger amputation) in drilling operations requires proper work practices and well-maintained equipment.

ii. Set up any sample tables and general work areas for the URS field staff to the side of the drill rig (preferably 10 meters away) and not directly behind the rig.

iii. URS engineers, technician, and geologists shall not assist drillers with the drilling equipment or supplies and shall not at any time operate the drill rig controls.

iv. Do not wear loose clothing or jewelry while working near rotating equipment.

b. Safe Use of Augers (Drilling work)

i. When the drill is rotating, stay clear of the drill string and other rotating components of the drill rig. Never reach behind or around a rotating auger for any reason.

ii. Move auger cuttings away from the auger with a long-handled shovel or spade; never use hands.

iii. Never clean an auger attached to the drill rig unless the transmission is in neutral or the engine is off, and the auger has stopped rotating.

c. Other Rotating Equipment (feed augers, chippers, conveyors, etc.)

i. Never place hands, fingers, extremities near hoppers and operational areas of machinery.

ii. When the equipment is rotating, stay clear of the rotating components and only operate equipment with proper machine guarding in place.

iii. Never clean a jammed piece of equipment unless the transmission is in neutral and the power source or the engine is off, and the moving parts of the equipment have stopped rotating. Refer to SMS 23, Lockout and Tagout Safety.

4. Power Saws

   a. Require that circular saws are fitted with blade guards.

   b. Remove damaged, bent or cracked saw blades from service immediately.

   c. Require that table saws be fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.

   d. Require guards that cover the blade to the depth of the teeth on hand held circular saws. The guard should freely return to the fully closed position when withdrawn from the work surface.

5. Pneumatic Tools and Equipment

   a. Require that pneumatic tools have:

      i. Tool retainers to prevent the tool from being ejected from the barrel during use.

      ii. Safety clip or tie wire to secure connections between tool/hose/compressor if they are of the quick connection (Chicago fittings) type.

   b. Never use compressed air to blow dirt from hands, face or clothing.

   c. Compressed air exhausted through a chip-guarded nozzle shall be reduced to less than 30 psi. Proper respiratory, hand, eye and ear protection must be worn.

   d. Never raise or lower a tool by the air hose.

6. Chain Saws

   a. Inspect the saw prior to each use and periodically during daily use. Refer to the manufacturer's manual for an inspection checklist.

   b. Operate the chain saw with both hands at all times.

c. Never cut above chest height.

d. Require that the idle is correctly adjusted on the chain saw. The chain should not move when the saw is in the idle mode.

e. Start cutting only after a clear escape path has been made.

f. Shut the saw off when carrying through brush or on slippery surfaces. The saw may be carried no more than 50 feet (15 meters) while idling.

g. Require applicable protective gear.

   i. Loggers safety hat.
   ii. Safety glasses.
   iii. Steel-toed boots.
   iv. Protective leggings.
   v. Hearing protection.

h. Inspect saws to ensure that they are fitted with an inertia break and hand guard.

i. Never operate a chain saw when fatigued.

j. Do not allow others in the area when chain saws are operated.

k. Make sure there are no nails, wire or other imbedded material that can cause flying particles.

l. Do not operate a chain saw that is damaged, improperly adjusted, or is not completely and securely assembled. Always keep the teeth sharp and the chain tight. Worn chains should immediately be replaced.

m. Keep all parts of your body away from the saw chain when engine is running.

7. Hand Operated Pressure Equipment

   a. High-pressure water/steam sprayers or cleaners should be used and handled as directed by the manufacturer. Hands should not be cleaned utilizing this equipment.

D. Biological Impacts

1. Poisonous Plants

a. Personnel in regions where potential contact with poisonous plants should be aware of the hazard.

i. Avoid contact

ii. Wear appropriate PPE

iii. Thorough hand cleaning after impact prior to further work tasks

2. Further information can be obtained from the SMS 47 - Biological Hazards

E. Cleaning Hands

1. Avoid contamination of hands by proper use of gloves when contact with physical, chemical, or biological hazards is possible.

2. Use soap and water for normal hand cleaning. Do not use solvents for cleaning as they remove essential oils in the skin and may cause dermatitis. Do not use pressure washers for hand cleaning.

3. If the hands contact a corrosive (e.g. nitric acid), wash the area with water for fifteen minutes and then seek medical attention.

4. Use antibiotic ointment and skin protection on minor breaks/scratches of the skin.

5. Resources

A. SMS 16 - Hand Tools and Portable Equipment

B. SMS 29 - Personal Protective Equipment

C. SMS 54 - Office Ergonomics

D. SMS 56 - Drilling Safety Guidelines

URS SAFETY MANAGEMENT STANDARD
Manual Material Handling

1. Applicability

This procedure applies to URS operations where personnel perform manual handling of materials. For this procedure, manual material handling (MMH) is defined as the movement of items by lifting, lowering, pushing, pulling, carrying, holding, or restraining.

2. Purpose and Scope

The purpose of this procedure is to prevent common injuries caused by the practice of MMH. Immediate or short-term effects include lacerations, bruises, and muscle fatigue. Long-term effects include chronic pain, typically in the lower back.

3. Implementation

Office/Warehouse Locations– Implementation of this procedure is the responsibility of the Office/Warehouse Manager.

Field Activities– Implementation of this procedure is the responsibility of the Project Manager.

4. Requirements

A. General

1. Prior to lifting, lowering, pushing, pulling, carrying, holding, or restraining an object of any significant size or weight, employees must evaluate the object and the required task to determine if they can handle the object safely.
2. If the employee has any doubt about whether than can safely move the object by themselves, additional manual or mechanical help should be obtained.
3. Healthy employees with no physician imposed restrictions should lift and carry a maximum of 50 pounds (23 kilograms) using proper lifting and carrying techniques. Physical and workplace factors may reduce this recommended weight limit (RWL) significantly and should be considered prior to attempting lifts of this magnitude.
4. An employee's personal "safe" MMH capability is defined as the employee's personal capability to manually lift, carry, push, or pull an object alone. This "safe" limit must consider the employee's past experience and training with MMH, health status, and any other personal or environmental characteristics affecting the employee's ability to perform these tasks. An employee's "safe" MMH capability is typically at or below the calculated RWL.
5. An MMH task that exceeds an employee's personal "safe" MMH capability or RWL should be brought to the attention of the Project Manager.
6. If, due to a medical or health condition, the employee's physician or the employee has set a personal "safe" MMH capability, then appropriate medical documentation must be provided to the Project Manager to define these limits.
7. A recommended RWL can be calculated using the factors described in Attachment 69-1. The weight limit derived from these calculations is considered to be a load that over 99% of men and over 75% of women can safely handle without application of engineering or administrative controls. **Implementation of the calculations in Attachment 69-1 should only be attempted with the assistance of a safety professional knowledgeable in the application of**

these factors. The calculations are intended to determine RWLs for repetitive lifting scenarios rather than occasional lifts.

B. Pre-Planning

1. If a heavy object is to be moved to another location, the safest transport route should be determined prior to the activity.
2. The area around the object and the route over which it will be transported should be checked for slip, trip, and fall hazards. Hazards should be removed prior to initiation of the task.
3. The object to be moved should be inspected for grasping or handling hazards, including slivers, sharp edges, grease, water, etc. Eliminate or abate any identified hazards where possible. Safe grasping or handling points on the object should be determined.
4. The distance to be traveled and the length of time which a grip on the object must be maintained should be considered before moving objects.

C. Lifting/Lowering Guidelines

1. Reduce or eliminate manual lifting and lowering tasks where possible. Determine if there are ways to abate the safety and ergonomic hazards associated with manual lifting.
2. The recommended technique for manual lifting/lowering involves five maneuvers:
   a. Get a firm footing. Keep your feet apart for a stable base. Put one foot slightly in front of the other.
   b. Bend your knees. Do not bend at the waist. When grasping the object, a firm grip should be obtained before lifting/lowering.
   c. Lift/lower with your legs. Lift/lower the load slowly and in a straight line, avoiding sudden movements.
   d. Keep the load close to the body. Generally, the closer the load is to the body, the less force it exerts on your back.
   e. Keep your back straight. Do not add the weight of your body to the load. Avoid twisting.
3. When a turn or change of direction is necessary, the object should be lifted or lowered into a carrying position, then the whole body should be turned with the feet, avoiding any trunk twisting motion.
4. Objects to be lifted to shoulder height should first be lifted to waist height, then rested on a level surface so the grasping position can be changed prior to lifting to a higher level.
5. Employees should never lift a load above their head.

D. Carrying/Holding Guidelines

1. Manual carrying is an inefficient way of transporting materials in the work place. Where possible, reduce or eliminate manual carrying tasks.
2. Employees should never carry a load above their head.

3. Carry an object close to the body using both hands. One-handed carries are awkward and tend to unbalance the employee.
4. Do not carry objects that are so large they will obstruct visibility.
5. Grips on an object should not be changed while carrying or holding an object. Rest the object on a secure surface prior to changing grip.
6. Avoid two person carries where possible. If an object is of a size, shape, or mass that it requires two people to carry, use two people of similar size and physique. Perform lifting of the item in unison.
7. Avoid carrying objects on stairs, particularly where the line of sight may be obstructed or the object can interfere with leg movement.

E. Pushing/Pulling Guidelines

1. Check the condition of the floor, ground, or other surface prior to pushing or pulling an object across it.
2. Be aware of the "break out" force of the object - the force at which a push or pull overcomes the frictional force between the surface and object. Adjust posture to avoid losing balance when this point is reached.
3. Get assistance when moving or guiding a large load.
4. Where possible, always push rather than pull a load.

F. Workplace Design

1. Store heavy or bulky materials at heights between the knee and shoulder to avoid the need to stretch or bend.
2. Pack or arrange items to be lifted to avoid shifting of weight in the package.
3. Design work areas to avoid the need to lift, carry, push, or pull heavy or bulky materials for extended distances.
4. Design workplaces with the following in mind.
   a. Lifts from the floor should be avoided.
   b. The torso should never twist while handling loads.
   c. Asymmetrical or unbalanced one-handed lifts should be avoided.
   d. Loads should not be lifted with sudden movements.
   e. Loads should not be lifted over obstacles.
   f. Loads should not be lifted at extended reaches.
   g. Uncomfortable postures should not be necessary throughout the work cycle.
   h. Environmental factors (e.g., task lighting, dry work surfaces, heat stress) should be considered.

G. Training

1. Require that personnel who may have MMH as part of their duties receive training that includes the following topics:

a. Showing personnel how to avoid unnecessary physical stress and strain during MMH operations.

b. Teaching personnel to become aware of what they can comfortably handle without undue strain.

c. Instructing personnel on the proper use of equipment.

d. Teaching personnel to recognize potential hazards and how to prevent or correct them.

2. This training must be completed prior to an employee being assigned to a task that involves MMH activities.

5. Documentation Summary

Training rosters or other proof of completion of MMH training will be filed in the Project or Office Health and Safety File.

6. Resources

A. Recommended Weight Limit Calculations (RWL) – Attachment 69-1

B. Work Practices Guide for Manual Lifting, NIOSH
http://www.cdc.gov/niosh

C. Canadian Centre for Occupational Health and Safety
http://www.ccosha.ca/oshaanswers/ergonomics/mmh/

D. Oregon OSHA "Ergonomics of Manual Materials Handling"
http://www.cbs.state.or.us/external/osha/pdf/workshops/206w.pdf

E. North Carolina Department of Labor "A Guide to Manual Materials Handling and Back Safety http://www.nclabor.com/osha/etta/indguide/ig26.pdf

F. European Agency for Safety and Health at Work
http://uk.osha.eu.int/good_practice/msd.stm