APPENDIX D
SAMPLING AND ANALYSIS PLAN
SAN DIEGO SHIPYARD SEDIMENT SITE

Cleanup and Abatement Order No. R9-2012-0024

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
µg	microgram
CAO	Cleanup and Abatement Order
COC	chain-of-custody
COPC	chemical of potential concern
CVAA	cold vapor atomic absorption
CVAFS	cold vapor atomic fluorescence spectrometry
DGPS	digital global position system
ICP-MS	inductively coupled plasma-mass spectrometry
GC/FPD	chromatography/flame photometric detector
GS/MS	gas chromatography/mass spectrometry
kg	kilogram
NAD83	North American Datum 1983
MLLW	mean lower low water
PPE	personal protection equipment
PSEP	Puget Sound Estuary Program
SIM	selected ion monitoring
PRMP	Post-Remedial Monitoring Plan
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RAP	Remedial Action Plan
RMP	Remediation Monitoring Plan
SAP	Sampling and Analysis Plan
Shipyard Sediment Site	San Diego Shipyard Sediment Site
USEPA	U.S. Environmental Protection Agency

1 INTRODUCTION

This Sampling and Analysis Plan (SAP) is one component of the Remedial Action Plan (RAP) for the Shipyards Sediment Site. This document describes detailed methodologies for sediment sampling as required for pre-design field investigations and confirmation of dredging completion. Consistent with Directive B.1.l of the Cleanup and Abatement Order No. R9-2012-0024 (CAO; Water Board 2012a) and Section 34.1 of the Technical Report (Water Board 2012b), this SAP includes discussion of the following key elements:

- Sample and data collection methods to be used for the project
- Description of the media and parameters to be monitored or sampled during the remedial action
- Description of the analytical methods to be used

Table 1 notes all CAO requirements that this document fulfills.

Table 1
Elements Required by the CAO

Required Element	Completed	Location within SAP
Sampling and Analysis Plan (B.1.f)		
I. Sample and data collection methods to be used for the project	✓	Sections 2 and 3 *Further detail provided in Sections 2.2.5.1 and 3.3.1 of the RMP (Appendix C)*
II. Description of the media and parameters to be monitored or sampled during the remedial action	✓	Section 4 *Further detail provided in Sections 2.2.1 and 3.3.3 of the RMP (Appendix C)*
III. Description of the analytical methods to be utilized and an appropriate reference for each	✓	Section 5 *Further detail provided in Post-Remedial Monitoring Plan (Exponent 2012)*

Furthermore, the SAP includes details on the following additional topics:

- Decontamination procedures
- Sample identification procedures
- Sample collection schedule
- Sampling documentation, sample handling, and chain-of-custody procedures

- Quality assurance and quality control (QA/QC) requirements
- Waste management

2 GENERAL FIELD OPERATIONS

This section describes the sediment sample collection activities as they pertain to the Remediation Monitoring Plan (RMP; Appendix C). Methods for water quality monitoring are described in detail in the RMP and are not included in this SAP. As indicated in the Quality Assurance Project Plan (QAPP; Appendix B), import material testing and disposal monitoring will be performed by the contractor and are also not included in this SAP.

Required Element	Completed
Sampling and Analysis Plan (B.1.f)	
I. Sample and data collection methods to be used for the project	✓
II. Description of the media and parameters to be monitored or sampled during the remedial action	
III. Description of the analytical methods to be utilized and an appropriate reference for each	

Subsurface sediment sampling will be conducted to: 1) inform design activities; 2) to confirm remedial actions have achieved the remediation goals outlined in the RAP; and 3) to inform additional removal action if necessary. The remainder of this section provides information that is consistent for all sediment sampling methods, including station positioning, equipment, and laboratory analytical parameters. The following sections provide method-specific collection and processing procedures.

2.1 Station Positioning

The objective of location control is to accurately determine horizontal and vertical positioning of sampling locations. To achieve this objective, each sample location will be referenced to known survey control points using the methods described below.

The following parameters will be documented at each sampling location, if applicable:

- Location coordinates (California state plane, north zone, North American Datum 1983 [NAD83], international survey feet)
- Vertical elevation in feet National Geodetic Vertical Datum (mean lower low water [MLLW], including mudline and tidal elevation above mudline)
- Actual water depth
- Time and date
- Tidal elevation referenced to MLLW

These parameters will be measured using a differential global positioning system (DGPS), pre-surveyed, visual horizontal triangulation to known control points and/or landmarks on shore if necessary, and vertical control using weighted tape measures.

2.1.1 Differential Global Positioning System

Location control will be performed with a DGPS unit onboard the sampling vessel. DGPS coordinates for each sampling location will be recorded at the time of sampling.

2.1.2 Visual Horizontal Triangulation Methods

Visual horizontal triangulation methods will be used as a backup method to the DGPS. This system will use pre-surveyed markers and/or established landmarks on shore. This method determines sampling locations based on horizontal distances to survey control points and/or landmarks identifiable on base maps. Locations will be identified by measuring the horizontal distance from the actual sampling location to the known control point or landmark to the nearest foot using a tape measure. Horizontal measurements can be calculated from registered base maps so field measurements can be translated to state plane coordinates. Buoy markers may be used to mark the sampling location.

2.1.3 Vertical Control

The vertical control parameters measured will be depth to sediment (mudline) and tidal elevation. The depth to sediment will be measured during each sampling event using a hand-held weighted tape (lead line). The tape will be dropped from the work platform to the bottom, pulled taut, and read to the nearest 0.1 foot. This observation will be cross-checked against the onboard depth sounder.

Tidal readings will be taken periodically from a tide board installed on site and checked against daily tide charts for San Diego Bay. Tidal elevations and time will be monitored and recorded before each sample is collected to the nearest 0.1 foot. Sample elevations will then be corrected to MLLW.

2.2 Equipment List

The following general equipment will be required during sample collection procedures:

- Personal protective equipment (PPE), as required by the Health and Safety Plan (Appendix F)
- Navigation and site maps
- Camera
- Field notebook
- Aluminum decked boat equipped with outboard motor
- Calibrated rod or ruler for sediment depth measurement
- Sampling device (vibracore sampler or similar device)
- Weighted tape measure calibrated in 0.1-foot increments
- Decontamination supplies

2.3 Decontamination Procedures

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with collected samples must meet high standards of cleanliness. All equipment that comes into contact with sampling media will be decontaminated prior to each day's use and between sampling locations. The decontamination procedure is as follows:

- Pre-wash rinse with site water
- Wash with solution of laboratory grade non-phosphate-based soap
- Rinse with site water
- Rinse three times with laboratory-grade distilled water
- Store in clean, closed container or wrap in aluminum foil for next use

Additionally, the laboratory will provide pre-cleaned and labeled sample containers.

2.5 Sample Identification

All sediment samples will be properly identified on their attached labels as well as in any forms or other documentation. All sample identifications will be consistent with the following identification scheme:

- The first two characters will be "SD" to identify the samples as Shipyard Sediment Site samples.
- The next character will be used to designate North Shipyard ("N") or South Shipyard ("S") area samples.
- The next character will identify whether the sample has been obtained for pre-design purposes ("P") or for post-dredge confirmatory purposes ("C").
- The next characters will identify the station location. Station location names will be determined during final design.
- The next character will indicate the whether the sediment sample is discrete ("D") or composite ("C")
- The next four characters will indicate the depth interval (in centimeters) of the sample:
  - 0005 (0 to 5 cm)
  - 0560 (5 to 60 cm)
  - Or otherwise, per this numbering protocol
- The last six characters will indicate the sample date by YYMMDD.

For example, following this identification scheme, SD-N-C-[Station ID]-D-0560-120607 indicates a discrete confirmatory sediment sample of the 5 to 60 cm interval collected at the North Shipyard Area on June 7, 2012.

3 SAMPLE AND DATA COLLECTION METHODS

This section describes the sampling methods and procedures specific for collecting and processing subsurface sediment samples and submitting samples for analytical chemistry.

Required Element	Completed
Sampling and Analysis Plan (B.1.f)	
I. Sample and data collection methods to be used for the project	✓
II. Description of the media and parameters to be monitored or sampled during the remedial action	
III. Description of the analytical methods to be utilized and an appropriate reference for each	

Collection of sediment cores will be conducted using an experienced vibracore contractor.

3.1 Sampling Methods

Sediment cores will be collected using vibracoring methods. The Project Team will coordinate vibracore sample collection, sediment compositing (if necessary), and sample transport to the analytical laboratory. Cores will be collected at the locations to be determined as part of the final remedial design. Sediment core locations may be adjusted in the field as necessary if difficult conditions are encountered such as refusal, poor recovery, underwater obstructions, or vessel obstructions.

3.1.1 Sediment Coring Procedures

Sediment cores will be collected using a 3-inch or 4-inch vibracorer, or equivalent sampling technology. The vibracorer is typically deployed using an A-frame and winch assembly. The vibracorer will be lowered to the bottom, where the unit will be energized and advanced to the appropriate depth. As described in the Remediation Monitoring Plan (Appendix C), the target core length will be based on the accuracy to which the dredge operator can guarantee the dredge depth, as specified in the Technical Report (Water Board 2012b). Therefore, the final target core length will be determined after the dredge contractor, and its dredging accuracy, has been determined.

Cores will be driven to this target depth or to refusal. If refusal is encountered at any core location, the core sample will be offset from 10 to 100 feet, and the station will be re-attempted at a comparable water depth. After three rejections or refusals at a given station, the core will be processed using the available recovered intervals. If field evidence suggests refusal is caused by dense or gravelly native alluvium, it may be assumed that this material is

below screening levels. If refusal at multiple locations results in significant changes to the SAP, these changes will be discussed with the project manager.

Recovered core tubes will be cut into sections, capped, stored upright (vertical) onboard the vessel, and sent to the logging and processing site at the end of the day or periodically throughout the day. The core tubes will be individually labeled with core orientation clearly marked. Labels identifying the core section will be etched into the tube or securely attached to the outside of the casing and wrapped with transparent tape to prevent loss or damage of the label.

3.1.2 Sample Acceptance Criteria

Sample acceptance criteria are listed below. If acceptance criteria are not achieved, the core will be rejected and another collection attempt will be made.

Following are the sediment core acceptance criteria:

- The core penetrated to (and retained material to) the project depth or refusal.
- Recovery was at least 75 percent of the length of core penetration.
- Sediment does not extend out of the top of the core tube or contact any part of the sampling apparatus at the top of the core tube.
- There are no obstructions in the cored material that might have blocked the subsequent entry of sediment into the core tube and resulted in incomplete core collection.
- There are no significant air gaps in the core tube or evidence of significant loss of material out of the cutter head during retrieval.

3.2 Sample Processing

This section describes core processing procedures, including sample compositing procedures, equipment decontamination, sample storage, and preservation requirements. Sediment processing will likely be conducted at an onshore processing area at the San Diego Shipyard. Core sections will be offloaded from the sampling vessel and transferred to the crew at the onshore processing area. At the processing facility, cores will be opened, described, and subsampled. Sediment samples will be homogenized, labeled, and dispatched under chain-of-custody procedures (described in Section 4) to the analytical laboratory.

3.2.1 Core Logging

Core tubes will be cut longitudinally using a clean carpet knife, reciprocating saw, or similar device, taking care not to penetrate the sediment too deeply while cutting. Each core will be described and documented on standardized core log forms. The core logs will include the following observations, as relevant:

- Sample recovery (recovered sediment depth relative to penetration depth) and calculated percent compaction
- Physical soil description in accordance with the Unified Soil Classification System (includes soil type, density, color, etc.)
- Odor (including hydrogen sulfide, petroleum, etc.)
- Presence of vegetation
- Presence of man-made debris (e.g., trash)
- Biological activity (including shells, tubes, burrows, organisms, etc.)
- Presence and depth of the redox layer, if observed
- Depth and distinctness of geologic contacts
- Any other distinguishing characteristics or features

3.2.2 Subsampling and Compositing

A final subsurface sediment subsampling and compositing scheme (if necessary) will be developed during after the final dredge design is complete and approved.

Each container will be clearly labeled with the following information:

- Project name
- Sample identification number
- Type of analysis
- Date and time
- Initials of the person preparing the sample

This information will be recorded in the log book and on the chain-of-custody forms. Field quality control samples will also be documented and identified in the field logs. Following proper sealing and labeling, all sample containers will be placed on ice in a cooler and maintained at 4 degrees plus or minus 2 degrees Celsius (°C) during storage and transport to the analytical laboratory.

3.3 Sample Collection Schedule

The schedule of sample collection events is identified in the RMP (Appendix C).

4 MEDIA AND PARAMETERS TO BE MONITORED AND SAMPLED

Subsurface sediment samples will be analyzed for copper, mercury, nickel, silver, zinc, tributyltin, polychlorinated biphenyl (PCBs), and polycyclic aromatic hydrocarbons (PAHs). The specific list of individual PCBs and PAHs to be analyzed will be consistent with those described in the Post-Remedial Work Plan (PRWP; Exponent 2012) and Table 2 of the RMP (Appendix C). Conventional analytes such as grain size, total organic carbon, and ammonia will also be analyzed. Approximately 500 mL will be collected for these analyses.

Required Element	Completed
Sampling and Analysis Plan (B.1.f)	
I. Sample and data collection methods to be used for the project	
II. Description of the media and parameters to be monitored or sampled during the remedial action	✓
III. Description of the analytical methods to be utilized and an appropriate reference for each	

Subsurface sediment samples will also be used to perform waste characterization during the design phase to identify a suitable disposal location as discussed in Section 2 of the Design Criteria Report (Appendix A). Landfill representatives will be consulted to determine what analyses are required to determine if material properties (chemical and physical) meet their requirements for disposal as either daily cover material, as solid waste at a local landfill (such as the Otay Landfill in San Diego County), or if any of the sediment qualifies as California hazardous waste and requires disposal at a more remote regional landfill. Required testing to determine disposal suitability of dredged sediments for the Otay Landfill includes paint filter, percent moisture, Title 22 metals, volatiles, semi-volatiles, pesticides/herbicides, PCBs and TPH extended range (C_4 – C_{40}).

Collection of water quality field parameters are described in detail in the RMP (Appendix C) and are not included in this SAP. As indicated in the QAPP (Appendix B), import material testing and disposal monitoring will be performed by the contractor and are also not included in this SAP.

5 ANALYTICAL METHODS

All laboratories for this study will have established protocols and QA procedures that meet or exceed any applicable U.S. Environmental Protection Agency (USEPA) or ASTM guidelines. A description of analytical methods to be used and an appropriate reference for each is provided in the subsequent subsections. Laboratory procedures and chemical analyses of sediment monitoring samples are consistent with the Post-Remedial Monitoring Plan (PRMP; Exponent 2012).

Required Element	Completed
Sampling and Analysis Plan (B.1.f)	
I. Sample and data collection methods to be used for the project	
II. Description of the media and parameters to be monitored or sampled during the remedial action	
III. Description of the analytical methods to be utilized and an appropriate reference for each	✓

5.1 Sediment Monitoring

5.1.1 Polycyclic Aromatic Hydrocarbons

Analyses for PAHs will be completed using gas chromatography/mass spectrometry (GC/MS) with selected ion monitoring (SIM). The SIM method is more sensitive than the commonly used USEPA Method 8270C, typically yielding reporting limits of 5 micrograms per kilogram (µg/kg) in sediment. Samples will be subjected to gel permeation chromatography (USEPA Method 3640) to remove interferents. QA/QC procedures will be completed as described in USEPA Method 8270C, whenever applicable, with modifications made as necessary to accommodate the greater sensitivity of the SIM method (e.g., lower spiking levels for surrogate compounds, matrix spikes, and internal standards).

5.1.2 Polychlorinated Biphenyl Congeners

PCB congeners will be analyzed by USEPA Method 8082. Samples will be extracted using sonication (USEPA Method 3550C). Sample extracts will be cleaned using sulfuric acid and, if necessary, potassium permanganate (USEPA Method 3665A). Additional cleanup procedures (e.g., gel permeation chromatography or Florisil column chromatography) will be used if necessary to remove interferences from the sample extracts. The surrogate hexabromobiphenyl will be used rather than decachlorobiphenyl to avoid potential coelution of PCB Congeners with the surrogate. 2,4-Dibromobiphenyl will be used for the internal standard. Analyses for PCB congeners will be completed by simultaneous dual-column gas chromatography with electron capture detection. The temperature program will be modified

and the run time extended to allow better separation of individual congeners. Calibration standards, laboratory control sample, and matrix spike/matrix spike duplicate spiking solutions will include all congeners of interest. A five-point initial calibration will be completed for each congener.

5.1.3 Organometallic Compounds

Analyses for tributyltin will be completed using Stallard et al. (1989). For this method, samples are extracted with methylene chloride and/or n-hexane (containing up to 0.2 percent tropolone). After extraction and concentration, tributyltin is derivatized with hexylmagnesium bromide and analyzed by gas chromatography/flame photometric detector (GC/FPD).

5.1.4 Metals

Metals analyses will be completed by inductively coupled plasma-mass spectrometry (ICP-MS) according to USEPA Method 6020. Analyses for mercury in sediments will be completed by cold vapor atomic absorption (CVAA) spectrometry using USEPA Method 7471A will be completed by cold vapor atomic fluorescence spectrometry (CVAFS) using USEPA Method 1631, Revision E (USEPA 2002).

5.1.5 Conventional Analytes

Ammonia will be analyzed according to USEPA Method 350.1. Total organic carbon and grain size will be completed according the 1986 Puget Sound Estuary Program (PSEP; PSEP 1986) guidelines.

5.2 Waste Characterization

As discussed in Section 4, landfill representatives will be consulted to determine what analyses are required to determine if material properties (chemical and physical) meet their requirements for disposal at a local landfill (such as the Otay Landfill in San Diego County), or if any of the sediment qualifies as California hazardous waste and requires disposal at a more remote regional landfill. Required testing to determine disposal suitability of dredged sediments for the Otay Landfill includes paint filter, percent moisture, Title 22 metals, volatiles, semi-volatiles, pesticides/herbicides, PCBs and total petroleum hydrogen extended

range (C_4 – C_{40}). Chemical analytical methods for these analytes are subsequently listed in Table 2.

Table 2
Analytical Methods

Analytes	Method
Title 22 metals	USEPA Method 6010B/7471A
Volatile organics	USEPA Method8260B
Semi-volatile organics	USEPA Method 8270C
Pesticides	USEPA Method 8081A
Herbicides	USEPA Method 8150
PCBs	USEPA Method 8082
Total petroleum hydrocarbon (C_4-C_{40})	USEPA Method 8015B

6 DOCUMENTATION, SAMPLE HANDLING, AND CHAIN-OF-CUSTODY

The following sections outline the requirements for documentation, sample handling, and chain-of-custody procedures related to the sample collection events.

6.1 Documentation

Field activities and samples must be properly documented during the sample collection process. Documentation of field activities provides an accurate and comprehensive record of the work performed sufficient for a technical peer to reconstruct the day's activities and provide certification that all necessary requirements were met. General requirements include:

- Use of a field activity log to formally document activities and events. The field activity log can be a standard or project-specific form or a bound field book. Preprinted standard forms are available for many activities and should be used whenever possible. These forms will provide prompts and request additional information that may be useful and/or needed, and that the author is not aware of at the time. Project-specific field forms may be generated or existing forms may be modified to meet specific project needs. As required, client-supplied forms may be substituted.
- Appropriate header information documented on each page, including project title, project number, date, weather conditions, changes in weather conditions, other persons (if any) in the field party, and author. The specific information requested depends on the nature of the work being performed and on the form being used. Information fields that are not applicable should be noted "N/A" or with other appropriate notations.
- Field documentation entries using indelible ink.
- Legible data entries. A single line should be drawn through incorrect entries and the corrected entry should be written next to the original strikeout. Strikeouts are to be initialed and dated by the originator.
- Applicable units of measurement with entry values.
- Field records maintained in project files unless otherwise specified by a client or stipulated by a contract.

6.1.1 Documentation Entries

A chronology of field events will be recorded. General entry requirements include:

- Visitors to the removal action area, including owner and regulatory representatives
- Summary of pertinent project communications with the client, regulators, or other removal action area visitors
- Other contractors working at the removal action area
- A description of the day's field activities, in chronological sequence using military time notation (e.g., 9:00 am: 0900, and 5:00 pm: 1700)
- If applicable, calibration of measuring and test equipment and identification of the calibration standard(s) and use of a calibration log, if available, with cross-reference entered into the field book
- Field equipment identification, including type, manufacturer, model number, or other specific information
- General weather conditions, including temperature, wind speed, and direction readings, including time of measurement and units
- Safety and/or monitoring equipment readings, including time of measurements and units
- If applicable, reference in the field notebook to specific forms used for collection of data
- Subcontractor progress and/or problems encountered
- Changes in the scope of work
- Other unusual events

6.1.2 Specific Requirements

6.1.2.1 Sample Collection

Sample collection data will be documented in a bound field book and/or on a sample collection form. Where both are being used, information contained in one is cross-referenced to the other. Entries include:

- Sample identification number, location taken, depth interval, sample media, sample preservative, collection time, and date
- Sample collection method and protocol
- Physical description of the sample (standard classification system for soil)

- If a composite sample, the sample's make up, including number and location of samples incorporated
- Quality control-related samples collected (e.g., duplicates, blinds, trip blanks, field blanks)
- Container description and sample volume
- Length and depth intervals of each core section and estimated recovery for each sediment sample, as measured in MLLW
- Pertinent technical comments
- Location of each station, as determined by DGPS
- Elevation of each station sampled, as measured in MLLW
- Names of field supervisor and person(s) collecting and handling the sample
- Observations made during sample collection, including weather conditions, currents (if any), ship traffic, and other relevant field conditions
- Descriptions of apparent resistance of sediment column to sampling (i.e., sediment density and coring conditions)
- Any deviation from the approved SAP

6.1.2.2 Sample Labeling

Sample labels must be prepared and attached to sample containers. Labels will either be provided by the laboratory performing the analyses or will be generated internally. The information to be provided includes:

- Sample identification number
- Sample date and collection time
- Physical description of the sample (e.g., water, solid, gas)
- Analytical parameters
- Preservatives, if present
- Sample location
- Client

6.2 Sample Handling

Sample handling procedures include correctly labeling and packing all sample containers prior to transport for laboratory testing. Sample containers will be obtained from the

analytical laboratory. Each container will be labeled appropriately with all relevant information, including at a minimum:

- Sample type
- Project number and site name
- Sample identification
- Date
- Time
- Sampler's initials

Samples will be stored and shipped in a properly packed container at 4°C. All samples will be delivered to the laboratory as soon as possible after the time of collection to facilitate a fast turnaround time.

6.3 Chain-of-Custody

An important component of data collection is the ability to demonstrate that the samples were obtained from the stated locations and that they reached the laboratory or archive without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal or archive must be properly documented. Documentation will be accomplished through the use of a COC form that documents each sample and identifies the individuals responsible for sample collection, shipment, and receipt. A sample is considered in custody if at least one of the following criteria is met:

- The sample is in a person's actual possession
- The sample is in unobstructed view, after being in the person's actual possession
- The sample is locked and only accessible by the custodian after having been in the person's actual possession
- The sample is in a secured area, restricted to authorized personnel (e.g., laboratory)

A laboratory typically will not accept samples for analysis without a correctly prepared COC form. The COC form must be signed by each individual who has the sample in his or her custody. A COC form is to be prepared for each sample shipped to a laboratory for analysis. Information on this form correlates with other supporting documentation, including sample labels and sample collection logs.

The COC form accounts for the elapsed time and custodians of the sample from the time of its collection. The individuals who have physically handled the sample or witnessed initial sample collection and packaging (e.g., a sample team member) must be identified on the form. A sample team member relinquishes the sample by signing the COC form. Individuals who either relinquish or receive samples must include their complete names, company affiliation, and the date and time the samples were relinquished and received. The times that the samples are relinquished and received by the next custodian should coincide, with the exception of transfer by commercial carriers. Commercial carriers will not be required to sign the COC form.

If a sample is to be stored for a period of time (e.g., overnight), measures are to be taken to secure the sample container in a manner that provides only the custodian of record with access. If samples are relinquished to a commercial carrier (e.g., UPS or Federal Express), the carrier waybill number will be recorded and a copy of the waybill will be attached to the COC form. The original COC form is sealed inside the shipping container with the samples. Extra copies of all documents will be maintained with other field documentation.

If a correction is made to the COC form, the correction should be made by the originator of the change, who will draw a single line through the error, initial and date the correction and, if necessary, provide an explanation of the change. The documentation should have sufficient detail to clearly document the change to a third-party reviewer.

7 QUALITY ASSURANCE AND QUALITY CONTROL REQUIREMENTS

All analyses described in this SAP will be conducted in accordance with the standard QA/QC procedures described in the PRMP (Exponent 2012). Analytical instruments will be maintained and calibrated regularly. Log books will be maintained for major field and laboratory instrumentation to document servicing, maintenance, and instrument modification.

7.1 Analytical Chemistry

Quality procedures are described for each analytical method in the PRMP. The type and frequency of QA/QC samples analyzed by the laboratory will be according to the specified analytical method. Necessary corrective actions will be taken to address problems, according to the guidelines for a particular method. All corrective actions will be reported, along with any deviations from the standard protocols.

Results of all laboratory QA/QC analyses and anything that might affect the integrity of the results will be reported. Any deviations from the standard testing guidelines, QA/QC limits, and acceptability criteria will be reported, including a discussion of their effect on data validity. All data sheets will be checked to ensure that test conditions are within the protocol specifications, and project data will be reviewed to determine their usability for making suitability determinations.

8 WASTE MANAGEMENT PLAN

This waste management plan presents the procedures that will be used to properly dispose of field-generated waste from the field work associated with sediment grab samples. Waste in the category of disposable sampling materials and PPE will be placed in heavy-weight garbage bags or other appropriate containers.

All disposable sampling materials and PPE used in sample processing (e.g., disposable coveralls, gloves, and tubing) will be placed in heavyweight garbage bags or other appropriate containers. Disposable materials will be placed in an on-site refuse container for disposal at a solid waste landfill.

9 REFERENCES

Exponent, 2012. *Post-Remedial Monitoring Plan, San Diego Shipyard Sediment Site*. Prepared for the Regional Water Quality Control Board. June 2012. PSEP (Puget Sound Estuary Program), 1986. *Recommended protocols for measuring conventional sediment variables in Puget Sound*. Prepared for U.S. Environmental Protection Agency Region 10, Office of Puget Sound, Seattle, WA. Puget Sound Estuary Program.

Stallard et al. (Stallard, M.O., S.Y. Cola, and C.A. Dooley), 1989. *Optimization of butyltin* measurements *for seawater, tissue, and marine sediment samples*. Appl. Organomet. Chem. 3:105 114.

USEPA (U.S. Environmental Protection Agency), 2002. Method 1631, Revision E: *Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry*. USEPA/821/R-02-012. USEPA, Office of Water.

Water Board (San Diego Regional Water Quality Control Board), 2012a. Cleanup and Abatement Order R9-2012-0024 for the Shipyard Sediment Site. March 14, 2012.

Water Board, 2012b. *Technical Report for Cleanup and Abatement Order No. R9-2012-0024 for the Shipyard Sediment Site, San Diego Bay, San Diego, CA.* March 14, 2012.