ANCHOR QEA

27201 Puerta Real, Suite 350
Mission Viejo, California 92691
Phone 949.347.2780

July 14, 2016

David Barker
San Diego Regional Water Quality Control Board
2375 Northside Drive, Suite 100
San Diego, California 92108

Re: San Diego Shipyard Sediment Site – Final Cleanup and Abatement Completion Report (Place ID 794466; Order No. R9-2013-0093)

Dear Mr. Barker:

On behalf of the San Diego Bay Environmental Restoration Fund (Trust), Anchor QEA, LLC, is pleased to inform the San Diego Regional Water Quality Control Board (Water Board) that we have completed the corrective actions necessary to remediate contaminated marine bay sediments at the San Diego Shipyard Sediment Site, as described in the Remedial Action Plan (RAP), and is providing the enclosed Final Cleanup and Abatement Completion Report. The report provides a demonstration, based on sound technical analysis and field-collected data, that the conditions of Directive A.2 of Cleanup and Abatement Order No. R9-2012-0024 (CAO) have been achieved at the San Diego Shipyard Sediment Site.

Following completion of South Shipyard construction activities, a Cleanup and Abatement Completion Report was prepared specific to remedial action that took place at the South Shipyard. This document was submitted to the Water Board in June 2014 and was made available for public review on Geotracker. After disseminating this South Shipyard report, the project team met with Water Board staff in December 2014 to discuss initial comments on the South Shipyard report in advance of receiving formal comments itemized in a letter dated December 22, 2014. In response to that letter, the Trust provided an amended and final report, entitled the South Shipyard RAP Implementation Report. Included in the report was a statement in the cover letter that a similar report would be provided following

construction activities at the North Shipyard. Accordingly, the North Shipyard RAP Implementation Report has been completed and is enclosed.

In recent email conversation with Charles Cheng (Water Board) on April 25, 2016, further clarification was provided regarding compliance with Directive A.2.c (Post Remedial Surface-area Weighted Average Concentrations) of the CAO. Mr. Cheng provided the following response regarding timing of the Surface-area Weighted Average Concentrations (SWACs) calculations and submittal of the Final Cleanup and Abatement Completion Report.

> *We reviewed CAO No. R9-2012-0024 directives and the approved RAP workplan, and found that the post-remedial evaluation and SWAC calculation will not be performed at this time but in 2 years from the completion of RAPs (Directive D.1.h). CAO Directive C states that the Final Cleanup and Abatement Completion Report be submitted when RAP activities are completed for the entire Shipyard Sediment Site, this was the reason we did not accept NASSCO's work alone as the Final Cleanup and Abatement Completion Report. With the completion of RAP at BAE Systems leasehold, it is pertinent to submit a Final Cleanup and Abatement Completion Report that combines both South and North RAP implementation works. It will be acceptable if the NASSCO's report (as amended) is included as an attached [sic] to the final report.*

To adhere to the directives and approved RAP, the enclosed Final Cleanup and Abatement Completion Report includes both the North and South Shipyard RAP Implementation Reports.

If you have any questions regarding the enclosed documents, please do not hesitate to contact me at (949) 347-2780 or dtempleton@anchorqea.com.

Sincerely,

David Templeton
Project Manager

Enclosures:

Final Cleanup and Abatement Completion Report

South Shipyard RAP Implementation Report

North Shipyard RAP Implementation Report

Cc (without enclosure):

Mike Chee, National Steel and Shipbuilding Company

Kelly Richardson, Latham &Watkins LLP

Shaun Halvax, BAE Systems San Diego Ship Repair

Mike Palmer, San Diego Bay Environmental Restoration Fund

Michael Whelan, P.E. Anchor QEA

FINAL CLEANUP AND ABATEMENT COMPLETION REPORT
SAN DIEGO SHIPYARD SEDIMENT SITE

Cleanup and Abatement Order No. R9-2012-0024

Prepared by

Anchor QEA, LLC

27201 Puerta Real, Suite 350

Mission Viejo, California 92691

July 2016

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CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

R. Thomas Dorsey		7/11/16
San Diego Bay Environmental Restoration Fund – North	Signature - de maximis Inc CFO	Date

DUTY TO USE REGISTERED PROFESSIONAL

This report was prepared under the direction of qualified professionals in accordance with the California Business and Professions Code Sections 6735, 7835, and 7835.1.

Michael Whelan, P.E.		7/11/16
Project Engineer Anchor QEA, LLC	Signature	Date

1 INTRODUCTION

This Final Cleanup and Abatement Completion Report provides a demonstration, based on sound technical analysis and field-collected data, that the conditions of Directive A.2 of Cleanup and Abatement Order No. R9-2012-0024 (CAO; Water Board 2012a) have been achieved at the San Diego Shipyard Sediment Site. Actions required by Directive A.2 are as follows:

- Directive A.2.a: Dredge Remedial Areas
- Directive A.2.b: Under-Pier Remedial Areas
- Directive A.2.c: Post Remedial Surface-area Weighted Average Concentrations

1.1 Site Description and Regulatory Background

Over time, waste discharges to San Diego Bay have resulted in the accumulation of elevated levels of pollutants above background conditions in marine sediments along the eastern shore of central San Diego Bay. This accumulation resulted in conditions identified by the San Diego Regional Water Quality Control Board, (Water Board) as adversely impacting beneficial uses (i.e., aquatic life, aquatic-dependent wildlife, and human health).

The San Diego Shipyard Sediment Site encompasses waters adjacent to two adjoining, active shipyard facilities in San Diego Bay—the South Shipyard (leased by National Steel and Shipbuilding Company Shipyard Facility [NASSCO]) and the North Shipyard (leased by BAE Systems San Diego Ship Repair Facility [BAE Systems]). In March 2012, the Water Board issued a CAO for remediation of marine sediments containing elevated chemical concentrations within the San Diego Shipyard Sediment Site. Figure 1 depicts the location of the site and delineates both the North and South shipyards.

In October 2012, a Remedial Action Plan (RAP; Anchor QEA 2012) was submitted to the Water Board in compliance with Directive B.1 of the CAO (Water Board 2012a). The RAP described the process by which cleanup of the San Diego Shipyard Sediment Site would be managed, designed, planned, implemented, and monitored in accordance with the CAO. The RAP was also the basis of design for detailed engineering of the project and to inform and control the remedial action, which included: 1) obtaining construction bids; and 2) ensuring that that project is implemented in a manner that achieves the directives of the

CAO. Finally, the RAP provided detail on the timing and scoping of subsequent submittals that require approval by the Water Board.

The implementation of the required remedial activities is summarized in Section 2 and is detailed in the attached RAP Implementation Reports, included in Appendices A and B, respectively.

2 RAP IMPLEMENTATION

Remedial activities were initiated in September 2013 with contractor mobilization of the South Shipyard and were concluded in April 2016, with contractor demobilization from the North Shipyard. Though the North and South shipyards are considered a single project under the CAO (Water Board 2012a), the projects were remediated and reported as separate entities. The initiation and completion dates for each shipyard is summarized in Table 1.

Table 1
RAP Activity Milestones

Shipyard Site	Initiation	Completion
South Shipyard	September 2013	March 2014
North Shipyard	September 2014	April 2016

Following the completion of remediation for each shipyard, a standalone RAP Implementation Report was prepared for each shipyard to document and verify compliance with the CAO and the approved RAP (Anchor QEA 2012). In accordance with site permits, each RAP Implementation Report includes the following elements:

- As-built drawings for the remedial action
- Description of the remedial work activities performed
- Summary of the sediment disposal and water discharge
- Documentation that the remediation was performed in accordance with the CAO, the RAP, and the project's Technical Specifications

Both RAP Implementation Reports are attached to this report in the following appendices (provided on the attached CD):

- Appendix A: South Shipyard RAP Implementation Report (amended April 2015)
- Appendix B: North Shipyard RAP Implementation Report (July 2016)

3 DEMONSTRATION THAT SEDIMENT QUALITY CLEANUP LEVELS IN DIRECTIVE A.2 HAVE BEEN ACHIEVED

Directive A.2 of the CAO (Water Board 2012a) states:

> *"The Dischargers shall take all corrective actions necessary to remediate the contaminated marine bay sediment at the Shipyard Sediment Site..."*

To facilitate Directive A.2, several different remedial techniques were considered by the Water Board and the North and South shipyards for their applicability to meeting this goal. Techniques considered included mechanical dredging, hydraulic dredging, subaqueous capping, natural recovery, confined aquatic disposal, and nearshore confined disposal.

After considering each approach in terms of technical and economic feasibility and long-term remediation requirements, mechanical dredging with landfill disposal, with associated placement of clean cover under piers and in other areas as warranted, was selected as the remedial action for cleanup of the remedial footprint.

As a means of facilitating comparative evaluations of feasibility, environmental protectiveness, and cost, the San Diego Shipyard Sediment Site was subdivided into a set of Thiessen polygons. Each Thiessen polygon (for both the North and South shipyards) included at a minimum one post-dredge confirmatory sampling location to confirm that the post-dredge surface met the Post-Remedial Dredge Area Concentrations provided in Directive A.2.a.

3.1 Directive A.2.a: Dredge Remedial Areas

Directive A.2.a of the CAO (Water Board 2012a) states:

> *"The sediments in the dredge remedial areas shown on Attachments 3 and 4 shall be dredged. This dredging shall remediate the sediment in the dredge remedial area to the concentrations in the table below for primary COCs, pursuant to confirmatory testing…"*

Dredging activities were conducted using mechanical dredging methodology supported by various cable-arm dredging platforms provided by the contractor. Dredged material was placed in water-tight scows that were transferred to the shipyard-specific Sediment Management Area (SMA) by tugboats for processing. At the SMA, sediment was stabilized with Portland cement (as necessary to pass the Paint Filter Test), loaded into haul trucks, and transported to an upland disposal location.

The target depth for remediation is the maximum depth of chemical exceedance relative to CAO target cleanup levels. Once the appropriate depth was achieved during dredging, a third-party bathymetric survey was conducted to confirm dredge depths and to determine final dredge volumes. Surveys were followed by post-dredge confirmatory sampling to identify locations where natural variations in the contaminated sediment thickness exceeded selected design depths, which had been developed based on a relatively limited number of site investigations. At the discretion of the engineer, additional dredging passes were required in targeted areas, followed by additional third-party bathymetric surveys and post-dredge confirmatory sampling until the desired level of completion was achieved. The post-dredge bathymetry, post-dredge confirmatory sampling locations, and the locations of the Thiessen polygons for the North and South shipyards are shown in Figures 2a and 2b, respectively.

A total of 142,745 cubic yards of material was dredged from the San Diego Shipyard Sediment Site. Further detail on the dredging, sand cover placement, ancillary activities, and decision-making process during construction are detailed in the RAP Implementation Reports (Appendices A and B).

3.2 Directive A.2.b: Under-pier Remediation

Directive A.2.b of the CAO (Water Board 2012a) states:

> *"The sediments in the under pier areas shown on Attachments 3 and 4 and other locations where significant impacts to infrastructure may occur shall be remediated by dredging, sand covering or other means."*

Two types of cover material were used: sand material and gravelly sand material. Sand cover was placed in relatively flat and under-pier areas, while gravelly sand was placed over sloping areas (due to its higher internal friction angle). Sand cover placement was conducted using three distinct operations: 1) the contractor's dredge barge was equipped with a 10-cubic yard slip box; 2) a telescoping conveyor-belt system mounted to a floating platform; and 3) a pneumatic pumping system mounted on a spudded barge (North Shipyard only).

In general, sand cover was prescribed in the following instances:

- Under pier areas where dredging was not feasible due to existing structures
- In areas in where dredging to the target remedial depth was infeasible, such as in sloping areas required due to structural offsets
- In limited areas where a thin layer of dredging residuals was present above the Post-remedial Dredge Area Concentrations and further dredging was not feasible or practical due to encountering native material or to structural limitations
- In additional areas directed by the engineer as needing supplemental dredging due to visual observations during dredging and post-dredge confirmatory sampling and/or to help promote re-establishment of benthic communities

A total of 42,698 tons of sand was placed at the San Diego Shipyard Sediment Site. Further detail on the sand cover placement, as well as the engineering decision-making processes, are detailed in the RAP Implementation Reports (Appendices A and B).

3.3 Directive A.2.c: Post Remedial Surface-area Weighted Average Concentrations

Directive A.2.c of the CAO (Water Board 2012a) states:

> *"Directive A.2.c states "The Shipyard Sediment Site as shown in Attachment 2 shall be remediated to attain the following post remedial surface-area weighted average concentrations ("SWACs")…"*

Compliance with required post-remedial surface-area weighted average concentrations (SWACs) at the San Diego Shipyard Sediment Site will be measured through post-remedial

monitoring, which will occur in accordance with requirements as outlined in the CAO and as detailed in the Post-Remedial Monitoring Plan (PRMP; Exponent 2012). The objective of post-remedial monitoring is to verify that remediation was effective in reducing and maintaining acceptable SWAC levels. Post-remedial monitoring will commence 2 years (2018) and 5 years (2021) after the completion of remediation to confirm the remedial goals have been met. If the Year 5 remedial goals have not been met, additional testing will be commenced in Year 10 (2026). As such, confirmation that the remedial action objectives were achieved will be provided under a separate cover after completion of post-remedial monitoring.

Post-remedial monitoring will be conducted in accordance with Directive D of the CAO and will include sediment sampling for chemistry analysis, toxicity testing, bioaccumulation testing, and benthic community assessments at specified locations to verify that remedial objectives are met. Specifically:

- Chemistry analysis will verify that the remediation was successful in reducing site-wide SWACs to levels that are determined to be protective of all beneficial uses, including human health and wildlife beneficial uses, under the CAO.
- Sediment toxicity testing will be used to compare the post-remedial sediment toxicity to pre-existing conditions.
- Bioaccumulation testing will be used to compare the average bioaccumulation of nine stations sampled to pre-remedial levels.
- Benthic community assessments will be performed to evaluate post-dredging benthic community development at five stations.

4 SUMMARY AND COMPLETION STATEMENT

As documented in this report and the attached RAP Implementation Reports for the North and South shipyards (Appendices A and B, respectively), the remedial action at the San Diego Shipyard Sediment Site achieved the required CAO remedial goals and was conducted in accordance with all CAO requirements. The remedial action for the project consisted of mechanically removing approximately 142,745 cubic yards of material to remove impacted sediment located at the site. To cover potentially contaminated sediments that were unable to be dredged (in sloping and under-pier areas), 42,698 tons of cover material (including both sand cover and gravelly sand cover) were placed.

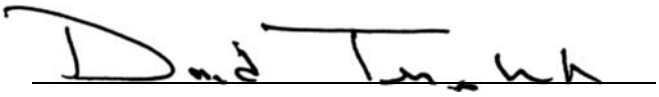
Post-remedial monitoring will be conducted 2 years (2018) and 5 years (2021) after the completion of remediation to confirm remedial goals have been met. If the Year 5 remedial goals have not been met, additional testing will be conducted in Year 10 (2026).

Both the North and South shipyards have since been restored to conditions similar to those existing prior to commencing dredging-related activities.

4.1 Completion Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and believe, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

To the best of my knowledge, information and belief, based on observation of the work during and upon completion of construction by myself or the Resident Engineer under my supervision, the San Diego Shipyard Sediment Site construction was completed in general conformance with the contract and permit documents and the project objectives as described in this Final Cleanup and Abatement Completion Report and the attached North and South shipyards RAP Implementation Reports.

David Templeton		7/11/2016
Project Manager Anchor QEA, LLC	Signature	Date

5 REFERENCES

Anchor QEA, L.P., 2012. *Remedial Action Plan*. San Diego Shipyard Sediment Site. October 2012.

Exponent, 2012. *Work Plan for the San Diego Shipyards Post-Remedial Monitoring*. Cleanup and Abatement Order No. R9-2012-024. September 2012.

Water Board (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. March 14, 2012.

FIGURES

AERIAL SOURCE: ESRI basemaps
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.

LEGEND:

Remediation Boundary

L:\AutoCAD Project Files_Projects\0994-SD Bay Environmental\SD Shipyard\0994-RP-189 VIC SITES.dwg FIG 1

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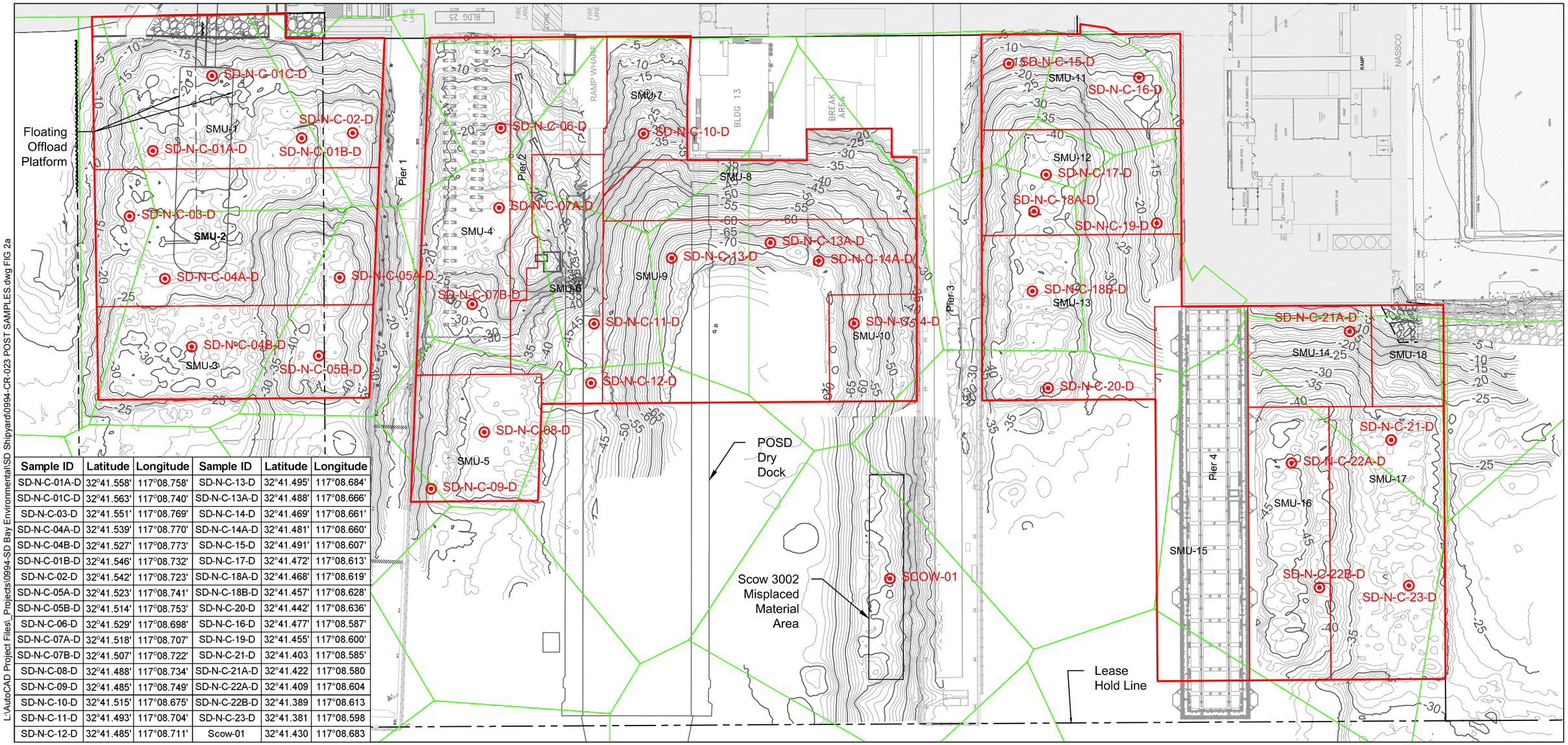
Figure 1
Vicinity Map
Final Cleanup and Abatement Completion Report



Sample ID	Latitude	Longitude	Sample ID	Latitude	Longitude
SD-N-C-01A-D	32°41.558'	117°08.758'	SD-N-C-13-D	32°41.495'	117°08.684'
SD-N-C-01C-D	32°41.563'	117°08.740'	SD-N-C-13A-D	32°41.488'	117°08.666'
SD-N-C-03-D	32°41.551'	117°08.769'	SD-N-C-14-D	32°41.469'	117°08.661'
SD-N-C-04A-D	32°41.539'	117°08.770'	SD-N-C-14A-D	32°41.481'	117°08.660'
SD-N-C-04B-D	32°41.527'	117°08.773'	SD-N-C-15-D	32°41.491'	117°08.607'
SD-N-C-01B-D	32°41.546'	117°08.732'	SD-N-C-17-D	32°41.472'	117°08.613'
SD-N-C-02-D	32°41.542'	117°08.723'	SD-N-C-18A-D	32°41.468'	117°08.619'
SD-N-C-05A-D	32°41.523'	117°08.741'	SD-N-C-18B-D	32°41.457'	117°08.628'
SD-N-C-05B-D	32°41.514'	117°08.753'	SD-N-C-20-D	32°41.442'	117°08.636'
SD-N-C-06-D	32°41.529'	117°08.698'	SD-N-C-16-D	32°41.477'	117°08.587'
SD-N-C-07A-D	32°41.518'	117°08.707'	SD-N-C-19-D	32°41.455'	117°08.600'
SD-N-C-07B-D	32°41.507'	117°08.722'	SD-N-C-21-D	32°41.403	117°08.585'
SD-N-C-08-D	32°41.488'	117°08.734'	SD-N-C-21A-D	32°41.422	117°08.580
SD-N-C-09-D	32°41.485'	117°08.749'	SD-N-C-22A-D	32°41.409	117°08.604
SD-N-C-10-D	32°41.515'	117°08.675'	SD-N-C-22B-D	32°41.389	117°08.613
SD-N-C-11-D	32°41.493'	117°08.704'	SD-N-C-23-D	32°41.381	117°08.598
SD-N-C-12-D	32°41.485'	117°08.711'	Scow-01	32°41.430	117°08.683

SOURCE: Upland topography from Digital Mapping Inc., dated September 2009, and supplemented by Environmental Data Solutions survey dated April 13, 2013.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.

LEGEND:

- Post-dredge Sampling Location
- SMU Boundary
- -20 Major Contour (5' Interval)
- Minor Contour (1' Interval)

0 100
Scale in Feet

L:\AutoCAD Project Files_Projects\0994-SD Bay Environmental\SD Shipyard\0994-CR-023 POST SAMPLES.dwg FIG 2a
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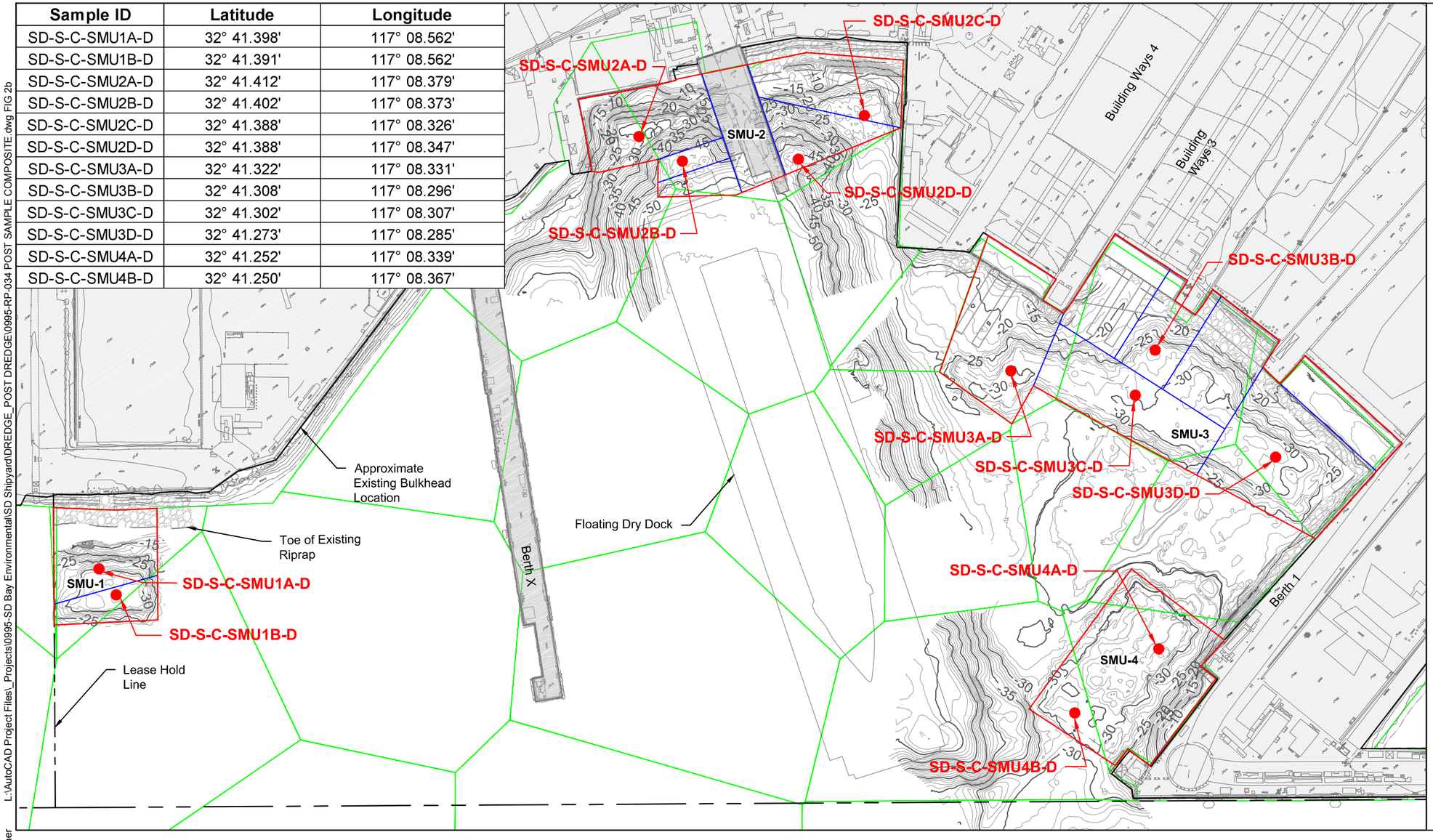
Figure 2a
Post-dredge Bathymetry and Confirmatory Sediment Sampling Locations
Final Cleanup and Abatement Completion Report

Sample ID	Latitude	Longitude
SD-S-C-SMU1A-D	32° 41.398'	117° 08.562'
SD-S-C-SMU1B-D	32° 41.391'	117° 08.562'
SD-S-C-SMU2A-D	32° 41.412'	117° 08.379'
SD-S-C-SMU2B-D	32° 41.402'	117° 08.373'
SD-S-C-SMU2C-D	32° 41.388'	117° 08.326'
SD-S-C-SMU2D-D	32° 41.388'	117° 08.347'
SD-S-C-SMU3A-D	32° 41.322'	117° 08.331'
SD-S-C-SMU3B-D	32° 41.308'	117° 08.296'
SD-S-C-SMU3C-D	32° 41.302'	117° 08.307'
SD-S-C-SMU3D-D	32° 41.273'	117° 08.285'
SD-S-C-SMU4A-D	32° 41.252'	117° 08.339'
SD-S-C-SMU4B-D	32° 41.250'	117° 08.367'



LEGEND:

- Post-dredge Sampling Location
- SMU Boundary
- -20 Major Contour (5' Interval)
- Minor Contour (1' Interval)

SOURCE: Upland topography from Digital Mapping Inc. dated September 2009, and supplemented by Environmental Data Solutions survey dated April 13, 2013. Sample locations provided by AMEC.
HORIZONTAL DATUM: California State Plane, Zone 6, NAD83, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

0 150
Scale in Feet

L:\AutoCAD Project Files_Projects\0995-SD Bay Environmental\SD Shipyard\DREDGE_POST DREDGE\0995-RP-034 POST SAMPLE COMPOSITE.dwg FIG 2b
Jul 05, 2016 11:15am mpratschner

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Figure 2b
Post-dredge Bathymetry and Confirmatory Sediment Sampling Locations
Final Cleanup and Abatement Completion Report

LIST OF APPENDICES

PROVIDED ON CD. HARD COPIES PROVIDED UNDER SEPARATE COVERS.