Prepared for

San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Hazards and Hazardous Materials

Technical Report

Shipyard Sediment Remediation Site
San Diego Bay, San Diego, CA

Prepared by

Brian Hitchens, P.G., C.Hg.

Howard L Cumberland

Geosyntec consultants

engineers | scientists | innovators

10875 Rancho Bernardo Road, Suite 200
San Diego, California 92127

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1. INTRODUCTION

The proposed project is the dredging of sediment adjacent to shipyards in San Diego Bay, the dewatering and possible solidification of the dredged material on-shore, potential treatment of decanted water, and the transport of the removed material to an appropriate landfill for disposal. The purpose of the project is to implement a Tentative Cleanup and Abatement Order (CAO) issued by the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board). The San Diego Water Board is the Lead Agency under the California Environmental Quality Act (CEQA) for the proposed project. The dredging will occur in an area of the Bay defined in the Tentative CAO. The San Diego Water Board is considering the use of one or more staging sites for the dewatering and treatment (dewatering) of the dredge material, as further described in Section 1.1. The sediment remediation footprint and the optional staging sites comprise the project site for the purpose of this study.

This Technical Report describes the hazards and hazardous materials identified at the site and hazardous conditions or releases that could potentially occur based on the project description. The full project description used as a basis to evaluate this project is attached to this Technical Report as Appendix A. A summary is provided below. Mitigation measures are proposed to reduce impacts associated with the potential release of hazardous materials into the environment to less than significant impacts. The baseline characteristics of the site are based primarily on previous investigations which have been performed in the project area to define the extents of environmental impacts. These investigations are available for review at the San Diego Water Board's office.

1.1 Project Description

The sediment removal site is located along the eastern shore of central San Diego Bay, extending approximately from the Sampson Street Extension on the northwest to Chollas Creek on the southeast, and from the shoreline out to the San Diego Bay main shipping channel to the west (Figure 1). The project consists of marine sediments in the bottom bay waters that contain elevated levels of pollutants above San Diego Bay background conditions. This area is hereinafter collectively referred to as the "Shipyard Sediment Site".

The Shipyard Sediment Site is more specifically bounded by the waters of R.E. Staite facility on the north, the 28th Street Pier on the south, the open waters and shipways of San Diego Bay on the west, and the shoreline of three leaseholds on the east (San Diego

Gas & Electric Co., and two shipyard facilities on the east; the BAE Systems San Diego Ship Repair Facility [BAE Systems] and the National Steel and Shipbuilding Company Shipyard Facility [NASSCO]). The Shipyard Sediment Site (also referred to as the Proposed Remedial Footprint in the Draft Technical Report for Tentative CAO) is comprised of approximately 15.2 acres subject to dredging and 2.3 acres subject to clean sand cover, primarily under piers. The project consists of marine sediments in the bottom bay waters that contain elevated levels of pollutants above San Diego Bay background conditions. The removal of the marine sediments will require upland areas for dewatering, solidification and stockpiling of the materials and potential treatment of decant waters prior to offsite disposal. Therefore, in addition to the open waters of the Shipyard Sediment Site, five upland areas and potentially usable acres at each site have been identified by the San Diego Water Board. Each of the potential staging areas has more defined usable areas, which are illustrated in Figures 2 through 7 and further described below.

- Staging Area 1 – 10th Avenue Marine Terminal and Adjacent Parking (approximately 50 potentially usable acres)
- Staging Area 2 – Commercial Berthing Pier and Parking Lots Adjacent to Coronado Bridge (approximately 12 potentially usable acres)
- Staging Area 3 – SDG&E/BAE Systems/BAE Systems and NASSCO Parking Lot (approximately 7 potentially usable acres)
- Staging Area 4 – NASSCO Parking and Parking Lot North of Harbor Drive (approximately 4 potentially usable acres)
- Staging Area 5 – 24th Street Marine Terminal and Adjacent Parking Lots (approximately 145 potentially usable acres)

1.1.1 Project Setting

The project site is located under the planning jurisdiction of the San Diego Unified Port District (Port District) and is identified as District 4 in the certified Port Master Plan. The Port District is a special government entity created in 1962 by the San Diego Unified Port District Act, California Harbors and Navigation Code, in order to manage San Diego Harbor and administer certain public lands along San Diego Bay. The Port District holds and manages as trust property on behalf of the People of the State of California, including the land occupied by NASSCO and BAE Systems. The Port Master Plan water use designation within the limits of the proposed project is Industrial – Specialized Berthing or Marine –Related Industrial.

San Diego Bay is designated as a State Estuary under section 1, Division 18 (commencing with section 28000) of the Public Resources Code. The San Diego Bay shoreline between Sampson and 28th Streets is listed on the Clean Water Act section 303(d) List of Water Quality Limited Segments for elevated levels of copper, mercury, zinc, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) in the marine sediment. These pollutants are impairing the aquatic life, aquatic-dependent wildlife, and human health beneficial uses designated for San Diego Bay. The northeast boundary of the Shipyard Sediment Site occupies this shoreline.

The principal structural components within the Shipyard Sediment Site include the concrete bulkheads, piers and dry dock facilities associated with the two shipyard facilities. Bathymetry at the Shipyard Sediment Site varies substantially due to the presence of shipways, dry docks, and berths and ranges from -2 feet Mean Lower Low Water (MLLW) along the bulkheads to -70 feet MLLW at the BAE Systems dry dock sump area.

The marine habitat within the Shipyard Sediment Site consists of open water containing both vegetated and unvegetated subtidal soft bottom habitats, pier pilings and bulkhead walls. The vegetated habitat species include sparse beds of eelgrass (*Zostera marina*). The entire extent of the Shipyard Sediment Site shoreline is artificially stabilized, generally consisting of a vertical sheet pile bulkhead and a seawall. The marine habitat types include vertical bulkhead walls and dock structures, vegetated and non-vegetated soft bottom subtidal habitats, and open water. These habitats support marine plants, invertebrates, and fishes.

The five potential staging areas consist primarily of leasehold lands and associated parking areas in the immediate vicinity of the Shipyard Sediment Site. The actual usable areas within each potential staging area are comprised of open, paved portions that could be used for the dewatering, solidifying and drying of the dredged marine sediments. Staging Areas 1 through 4 are located within the City of San Diego and are designated in the City's General Plan as Industrial Employment. Staging Area 5 is located within the City of National City and is under the jurisdiction of the Port District. National City is currently updating their General Plan; the proposed Land Use designation for Staging Area 5 is governed by the San Diego Port Master Plan.

There are two scheduling options for completion of the remedial action. The first scheduling option is expected to take 2 to 2.5 years to complete. Under this option, the dredging operations would occur for 7 months of the year and would cease from April through August during the endangered California least tern breeding season.

The second option is to implement the remedial plan with continuous dredging operations, which would be expected to take approximately 12.5 months to complete. This scenario assumes that the dewatering, solidification and stockpiling of the materials would occur simultaneously and continuously with the dredging. Also assumed under this compressed schedule option is that dredging operations could proceed year-round, including during the breeding season of the endangered California least tern.

Both scheduling options would be followed by a period of post-remedial monitoring. The post-remediation monitoring requirements are part of the proposed project and are not mitigation for the remediation efforts. The preferred schedule will be determined during the final design phase. However, both schedule options are included in the analysis for the technical studies and the Program EIR.

1.2 Report Organization

The remainder of this Technical Report is organized as follows:

- Section 2, “Regulatory Framework and Regional Environmental Setting” presents background information on the current Shipyard Sediment Site conditions and regulatory framework for performing the proposed remedial actions and a summary of environmental conditions in the vicinity of the project site;

- Section 3, “Existing and Proposed Project Site Conditions” Describes the current physical and environmental setting of the project site.

- Section 4, “Project Impacts and Mitigation Measures” presents a summary of potential impacts and potential mitigation measures for each impact;

- Section 5, “Cumulative Impacts” presents an evaluation of potential cumulative impacts related to hazards and hazardous materials that may be anticipated if the proposed project is performed concurrently with other projects at and in the vicinity of the proposed Shipyard Sediment Site; and

- Section 6, “References” presents a list of references cited in this Technical Report.

2. REGULATORY FRAMEWORK AND REGIONAL ENVIRONMENTAL SETTING

The management of hazardous materials, worker safety, and safety of the public are regulated by both state and federal laws and regulations. These regulations are intended to mitigate risk related to handling, transport, and disposal of hazardous materials in addition to providing a framework for the Shipyard Sediment Site remediation process, and will regulate management of potentially hazardous material during the implementation of this project.

An environmental records review was compiled by Environmental Data Resources, Inc. (EDR) to identify locations with environmental impacts within 0.25 mile of the potential staging areas and the project site. Sites with potential hazardous conditions on or adjacent to the project site and the proposed potential dewatering locations were evaluated for compliance with the Cortese List requirements under CEQA as described below.

2.1 Cortese Lists

The "Cortese List" is a planning document used by the state, local agencies, and developers to comply with CEQA requirements to provide information about the location of hazardous materials release sites. The Cortese Lists are compiled annually by the State Water Board, the Department of Resources, Recovery, and Recycling, and the DTSC pursuant to Government Code section 65962.5. These lists are:

- The list of Hazardous Waste and Substances sites from DTSC's Envirostor Database;
- The List of Leaking Underground Storage Tank Sites from the Water Board's Geotracker Database;
- The list of solid waste disposal sites identified by the Department of Resources, Recovery, and Recycling with constituents above hazardous waste levels outside the waste management unit;
- A list of active Cease and Desist Orders and Cleanup and Abatement Orders from the Water Board; and
- A list of hazardous waste facilities subject to corrective action as identified by DTSC.

2.1.1 Review of Adjacent Hazardous Materials Sites

A comprehensive review of available environmental databases was performed by EDR including federal, state, and local hazardous waste records at or adjacent to the project site and the five potential dewatering areas (Appendix B). The Shipyard Sediment Site and potential staging areas are not on or adjacent to a listed site on the active Cortese list, which is compiled annually by the State Water Board, the Integrated Waste Board, and the DTSC pursuant to Government Code section 65962.5. However, there are 13 sites with historical Cortese listings within 0.25 mile of the project site:

- Continental Maritime
- BAE Systems San Diego Ship Repair
- ISP Alginates Inc.
- Silvergate Power Plant
- Chevron Service Station – 2351 Harbor Drive
- Arco San Diego Terminal – 2295 Harbor Drive
- Pro-Line Paints Company
- IMS Recycling Services, Inc.
- Markel Johnson – 2697 Main Street
- Eddie S. Specialists
- Giolzetti and Lulue
- Nex Gas 28th St.
- NASSCO Building 70

These sites are not included on the active Cortese list. This historical list documents sites with historical releases which have been evaluated or remediated such that they are no longer believed to be a source of potential impacts. As such, these sites are not considered to have the potential to impact the proposed sediment dredging project. The Shipyard Sediment Site is not located within an airport land use plan or in the vicinity of a private airstrip. Because the project site is located in an industrial area and is not adjacent to wildland areas, no potentially significant increase in risk due to wildland fires is identified resulting from the implementation of this project.

The combined EDR report was compiled for the project site and potential staging areas 1, 2, and 3, due to the close proximity of these areas (Appendix B). The following listings identified potential groundwater or soil impacts within 0.25 mile of these proposed staging areas:

- No sites on the current Cortese lists;
- 36 Sites on the Historical Cortese lists;
- 1 site on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list;
- 2 sites on the Federal Resource Conservation and Recovery Act Corrective Action Report (RCRA CORRACTS) list;
- 15 sites on the DTSC ENVIROSTOR database;
- 59 cases in the State Water Board leaking underground storage tank (LUST) system;
- 1 Solid Waste Landfill;
- 44 Spills, Leaks, Investigations, and Cleanups (SLIC) program sites;
- 64 sites currently under review by the San Diego County Site Assessment and Mitigation Program (SAM); and
- 68 California Hazardous Material Incident Report System (CHMIRS) Reports.

An EDR report was compiled for Staging Area 4 (Appendix B). The following listings identified potential groundwater and soil impacts within 0.25 mile of the proposed staging areas:

- No sites on the current Cortese list;
- 15 Sites on the Historical Cortese list;
- 2 sites on the DTSC ENVIROSTOR database;
- 20 cases in the State Water Board LUST system;
- 14 SLIC sites; and
- 38 CHMIRS Reports.

The staging, handling, and treatment (dewatering) of sediments in these areas will be in aboveground secondary containment units. These units will be constructed in asphalt paved areas with an underliner, if necessary to prevent infiltration. A savaging layer of sand is placed beneath the sediment to provide a visual indicator to the excavator operator that he/she is getting close to the containment liner, or closely-spaced railroad rails/k-rails are placed to shield the containment liner. It is anticipated that this sediment will be managed so as to not disturb or impact soils or groundwater. Therefore, the implementation of this proposed project is not anticipated to affect or be affected by local soil or groundwater impacts.

Staging Area 5 had an individual EDR report compiled (Appendix B). The following listings identified potential groundwater and soil impacts within 0.25 mile of the proposed staging areas:

- No sites on the current Cortese list;
- 8 sites on the Historical Cortese list;
- 18 cases in the State Water Board LUST system;
- 15 SLIC sites;
- 5 sites on the DTSC ENVIROSTOR database
- 1 Solid Waste Landfill;
- 21 sites currently under review by the SAM Program; and
- 7 CHMIRS sites.

The staging, handling, and treatment of sediments in these areas will be in aboveground secondary containment units and will be managed as to not disturb or impact soils or groundwater. Therefore, these local impacts to soil and groundwater are not anticipated to affect the implementation of the proposed project.

2.2 State and Regional Water Quality Control Boards

The State Water Resources Control Board sets statewide policy for the protection of surface and groundwater quality. The State Water Board oversees and coordinates the efforts of the nine San Diego Water Board agencies which implement and enforce water board policies on a regional level. Each regional board makes critical decisions for its region, including setting standards, issuing waste discharge requirements, determining compliance with those requirements, and taking appropriate enforcement actions.

The Porter-Cologne Act provides the State Water Resources Control Board and Regional Water Quality Control Boards with the authority to develop and enforce water quality standards within the state of California. California Water Code section 13304 authorizes the Regional Water Quality Control Boards to issue “Cleanup and Abatement” orders requiring a discharger to cleanup and abate waste, “Where the discharger has caused or permitted or threatened to cause or permit waste to be discharged or deposited where it is or probably will be discharged into waters of the state and creates or threatens to create a condition of pollution or nuisance.”

2.2.1 Water Quality Control Plan for the San Diego Basin

The water quality control plan for the San Diego Basin (Basin Plan) is designated to preserve and enhance water quality and protect the beneficial uses of all regional waters (San Diego Water Board, 1994). The Basin Plan is the state implementation of the Federal Clean Water Act provisions for water quality planning and management contained in 40 CFR 130 and 40 CFR 131. Division 7 of the California Water Code (the Porter-Cologne Act) establishes a regulatory program to protect water quality and to protect beneficial uses of state waters (San Diego Water Board, 1994). Certain statutory provisions contained in the Health and Safety Code, Fish and Game Code, Harbors and Navigation Code, and the Food and Agriculture Code supplement the water quality provisions of the California Water Code. The California Health and Safety Code (HSC) contains provisions for the regulation of hazardous waste and hazardous materials. The Harbors and Navigation Code has statutory provisions to prevent the unauthorized discharges of waste from vessels to surface waters. The Fish and Game Code has statutory provisions to prevent waste discharges deleterious to fish, plant, animal, or bird life (San Diego Water Board, 1994).

2.2.2 CEQA

The objective of CEQA is to provide full public disclosure of a project and to ensure that environmental factors are considered in the decision-making process. CEQA requires that all projects that may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, to prepare an Environmental Impact Report (EIR). The EIR records the scope of the applicant's proposal and analyzes its known potential environmental effects. The EIR must discuss any significant environmental effects which cannot be avoided if the project is implemented, and propose mitigation measures to minimize the impact of the project and project alternatives (San Diego Water Board, 1994).

2.3 DTSC

The Department of Toxic Substances Control (DTSC) protects California and its residents from exposure to hazardous wastes. DTSC operates programs regulating hazardous material management by: overseeing cleanups; preventing releases of hazardous waste by overseeing those who generate, handle, transport, store, and dispose of waste; taking enforcement actions against those who fail to manage hazardous waste properly; exploring and promoting means of preventing pollution, and encouraging reuse and recycling; evaluating soil, water and air sampling conducted at investigation and cleanup sites and developing new analytical methods; and practicing other environmental sciences, including toxicology, risk assessment, and technology development.

2.4 DEH

The San Diego County Department of Environmental Health (DEH) regulates, among other things, aboveground and underground storage tanks, monitoring wells, and medical and hazardous material and waste. In addition, the DEH also serves as the Solid Waste Local Enforcement Agency (LEA), and is responsible for regulating active and closed solid waste facilities.

2.5 Department of Resources Recycling and Recovery

The Department of Resources Recycling and Recovery (CalRecycle), formerly known as the Integrated Waste Management Board, is responsible for waste reduction and the management of materials to their highest and best use throughout the state. CalRecycle acts as the enforcement agency (EA) for the LEAs and has the authority to write and enforce compliance orders, corrective action orders, and cease and desist orders to ensure compliance at solid waste facilities.

2.6 US DOT

The U.S. Department of Transportation (US DOT) has the regulatory responsibility for the safe transport of hazardous materials by air, rail, highway, and water. The US DOT promulgated a national safety program to minimize the risks to life and property inherent in commercial transportation of hazardous waste. The US DOT also evaluates safety risks, develops and enforces standards for transporting hazardous material, educates shippers and carriers on proper handling and documentation procedures, investigates hazardous materials incidents and failures, and provides assistance to improve emergency response to incidents.

2.7 San Diego Unified Port District

The San Diego Harbor Police have jurisdiction for enforcing statutes within the Harbors and Navigation Code throughout the five member cities of the Port District, including San Diego Bay. These regulations include operation of vessels, boat safety, and navigation rules.

3. EXISTING AND PROPOSED PROJECT SITE CONDITIONS

The shipyard sediment remediation area is located along the eastern shore of central San Diego Bay and encompasses an area extending approximately from the Sampson Street Extension to the northwest and Chollas Creek to the southeast, and from the shoreline out to the San Diego Bay main shipping channel on the southwest (Figure 1). This area is referred to by the term “Shipyard Sediment Site” in this study.

The Shipyard Sediment Site is located on the eastern shore of central San Diego Bay, approximately one-half mile south of the Coronado Bridge and half the total distance into the Bay. The Shipyard Sediment Site encompasses a total combined 56 water acres of the NASCCO and BAE Systems leaseholds. These leaseholds are adjacent to each other, have a similar range of water depths, and lie within the same hydrologic and biogeographic area (Appendix A).

3.1 NASSCO Leasehold

NASSCO, a subsidiary of General Dynamics Company, owns and operates a full-service ship construction, modification, repair, and maintenance facility on 126 acres of tidelands property leased from the Port District on the eastern waterfront of central San Diego Bay, at 2798 Harbor Drive in San Diego, California. Shipyard operations have been conducted at this site over San Diego Bay waters or very close to the waterfront since at least 1960. Shipyard facilities operated over the years at the Shipyard Sediment Site have included concrete platens used for steel fabrication, a graving dock, shipbuilding ways, and berths on piers or land to accommodate the berthing of ships. An assortment of waste is generated at the facility, including spent abrasive, paint, rust, petroleum products, marine growth, sanitary waste, and general refuse.

Current Shipyard Sediment Site improvements include offices, shops, warehouses, concrete platens for steel fabrication, a floating dry dock, a graving dock, two shipbuilding ways, and five piers providing 12 berthing spaces (San Diego Water Board, 2010).

3.2 BAE Systems Leasehold

From 1979 to the present, Southwest Marine, Inc. and its successor BAE Systems have owned and operated a ship repair, alteration, and overhaul facility on approximately 39.6 acres of tidelands property on the eastern waterfront of central San Diego Bay. The facility, currently referred to as BAE Systems San Diego Ship Repair, is located on land leased from the Port District at 2205 East Belt Street, at the foot of Sampson Street in San Diego, California. Shipyard facilities operated over the years have included concrete platens used for steel fabrication, two floating dry docks, five piers, and two marine railways which, together with cranes, enable ships to be launched or repaired. An assortment of waste has been generated at the facility including spent abrasive, paint, rust, petroleum products, marine growth, sanitary waste, and general refuse. The business at the Shipyard Sediment Site has historically been ship repair and maintenance for the U.S. Navy and commercial customers (San Diego Water Board, 2010).

3.3 Sediment Quality in the Remediation Area

The San Diego Water Board compared sediment chemistry levels found at the Shipyard Sediment Site to various sediment quality guidelines (SQGs) as well as background reference sediment chemistry levels found in other parts of present-day San Diego Bay. The purpose of this comparison was to evaluate: 1) if sediment chemistry levels at the Shipyard Sediment Site exceeded background conditions in San Diego Bay; and 2) the potential threat to aquatic life from chemical pollutants detected in the marine sediment (San Diego Water Board, 2011).

In the human health risk assessment presented in the Appendix for Section 28 of the Draft Technical Report for Tentative CAO No. R9-2011-0001 (San Diego Water Board, 2010), the chemicals posing theoretical increased cancer risks include inorganic arsenic and PCBs. The chemicals posing theoretical increased non-cancer risks include cadmium, copper, mercury, and PCBs. Potential risk is also recognized to aquatic dependent wildlife from benzo(a)pyrene (a PAH), PCBs, copper, lead, mercury, and zinc.

3.3.1 Identification of Constituents of Concern

Primary Constituents of Concern (COCs) were defined by the San Diego Water Board in the Draft Technical Report Tentative CAO No. R9-2011-0001 (San Diego Water Board, 2010) as COCs meeting the following criteria:

- Greatest exceedance of background suggesting a strong association with the Shipyard Sediment Site;
- Highest magnitude of potential risk at the Shipyard Sediment Site; and

- Higher potential for exposure reduction via remediation.

Secondary COCs were defined as COCs meeting the following criteria:

- Lower concentrations relative to background suggesting a lower degree of association with the Shipyard Sediment Site; and

- Highly correlated with primary COCs and would be addressed in a common remedial footprint.

The results of the multiple-lines-of-evidence evaluation performed for the Shipyard Sediment Site resulted in the selection of the following primary COCs: copper, mercury, heavy-weight PAHs (HPAHs), PCBs and tributyltin (TBT). Secondary COCs are arsenic, cadmium, lead, and zinc.

3.3.2 Potential Health Effects Related to COCs

The Draft Technical Report for Tentative CAO No. R9-2011-0001 (San Diego Water Board, 2010) identified potential health effects related to the COCs identified in the dredge area as follows:

3.3.2.1 PCBs

The U.S. EPA (2000) has classified PCBs as "probable human carcinogens." Studies have suggested that PCBs may play a role in inducing breast cancer. Studies have also linked PCBs to increased risk for several other cancers including liver, biliary tract, gall bladder, gastrointestinal tract, pancreas, melanoma, and non-Hodgkin's lymphoma. PCBs may also cause non-carcinogenic effects, including reproductive effects and developmental effects (primarily to the nervous system). According to U.S. EPA (2000), "some human studies have also suggested that PCB exposure may cause adverse effects in children and developing fetuses while other studies have not shown effects. Reported effects include lower IQ scores, low birth weight, and lower behavior assessment scores."

3.3.2.2 Inorganic Arsenic

Arsenic is strongly associated with lung and skin cancer in humans, and may cause other internal cancers as well. Skin lesions, peripheral neuropathy, and liver and kidney disorders are commonly associated with chronic arsenic ingestion (U.S. EPA, 2000).

3.3.2.3 Cadmium

Kidney toxicity is the primary concern with cadmium exposure (U.S. EPA, 2000). Chronic exposure to cadmium may also include anemia and bone disorders, including osteomalacia, osteoporosis, and spontaneous bone fractures. Some studies have suggested an association between neurotoxicity and cadmium exposure at levels below those that cause kidney toxicity. According to U.S. EPA (2000b), reproductive and developmental toxicity have been associated with cadmium ingestion.

3.3.2.4 Copper

Although copper is an essential human nutrient, large intakes of copper can cause liver or kidney damage, or even death in cases of extreme exposure. Short periods of exposure to levels above the U.S. EPA's Action Level of 1.3 parts per million can cause gastrointestinal disturbance, including nausea and vomiting (U.S. EPA, 1995).

3.3.2.5 Mercury

Methyl mercury (CH3Hg) is the form of mercury that builds up in the tissues of fish and is the most toxic. It affects the immune system, alters genetic and enzyme systems, and damages the nervous system, including coordination and the senses of touch, taste, and sight (U.S. Geological Survey, 2000). Methyl mercury is particularly damaging to developing embryos, which are five to ten times more sensitive than adults (U.S. Geological Survey, 2000). Studies found that offspring born of women exposed to methyl mercury during pregnancy have exhibited a variety of developmental neurological abnormalities, including the following: delayed onset of walking, delayed onset of talking, cerebral palsy, altered muscle tone and deep tendon reflexes, and reduced neurological test scores (U.S. EPA, 1997).

3.4 Potential Staging Areas

Although no final dewatering site has been selected, 5 options have been proposed by the San Diego Water Board (Figures 2 through 7):

- Area 1 - 10th Avenue Marine Terminal and Parking Areas;
- Area 2 - Commercial Berthing Area and Parking Areas;
- Area 3 - SDG&E and BAE Systems Leaseholds and Parking Areas;
- Area 4 - NASSCO and North Harbor Drive Parking Areas; and
- Area 5 - 24th Street Marine Terminal.

Each site has unique attributes which will affect overall feasibility of use as a dewatering site, including potentially available acreage for dewatering as delineated by the San Diego Water Board, access for dredge barge unloading, proximity to schools or other potentially sensitive receptors, on-site haul and sediment staging logistics, and freeway access. Staging Area 4 is not located adjacent to the waterfront; therefore, sediment transport from the barge to the staging area would be required**.**

Summary of Dewatering Site Characteristics

Potential Dewatering Area	Acres	Number of Areas in Site	Sensitive Receptor Within 0.25 mile?	Proximity to Interstate 5 (miles)
1: 10th Ave. Terminal	36	6	Yes	0.4
2: Com. Berthing Area	11	6	Yes	0.5
3: SDG&E/BAE Systems	6.5	10	Yes	0.5
4: NASSCO/N. Harbor	3.9	4	Yes	0.3
5: 24th Street Terminal	145	6	No	0.5

3.4.1 10th Avenue Marine Terminal and Adjacent Parking

The 10th Avenue Marine Terminal Area is estimated to provide a total of approximately 48 acres of potentially usable area (not covered by structures) for dewatering activities: one 36-acre area directly adjacent to docks where barges could be unloaded, and 5 parking areas approximately 1 mile away from the barge unloading areas ranging in size from roughly 12 acres to 0.2 acres (Figure 3). However, the actual usable space is likely to be reduced to provide access to existing structures, create haul routes, and to optimize the final design of the dewatering containment areas. The dewatering areas are located approximately 0.4 miles from the nearest southbound access to Interstate 5 (I-5). Perkins Elementary School and the Barrio Logan College Institute are located approximately 0.1 and 0.05 miles from the 10th Avenue dewatering site, respectively. The Logan Heights Family Health Center is located approximately 0.2 miles from the dewatering site. Extended haul routes from barge offloading to dewatering areas and handling of potentially hazardous materials within 0.25 miles of a school or other sensitive receptors may increase risk related to hazards and hazardous conditions; mitigation measures for these issues are discussed in Section 4.

3.4.2 Commercial Berthing Area and Adjacent Parking

The Commercial Berthing Pier Areas would provide approximately 11 acres of potentially usable area for dewatering activities. These 11 acres are divided between 6 areas ranging from 0.6 acres to 2.7 acres. Four areas totaling approximately 6.75 acres are located adjacent to the Commercial Berthing Pier Areas, while the remaining 5 acres of potentially usable dewatering area are located adjacent to the Coronado Bridge, located approximately 0.3 to 0.5 miles from the Commercial Berthing Area (Figure 4). The dewatering areas are located approximately 0.5 miles from the nearest southbound access to I-5. Perkins Elementary School and Barrio Logan College Institute are located approximately 0.2 miles and 0.16 miles from the Commercial Berthing Area dewatering site, respectively. Extended haul routes from barge offloading to dewatering areas and handling of potentially hazardous materials within 0.25 miles of a school may increase risk related to hazards and hazardous conditions; mitigation measures for these issues are discussed in Section 4.

3.4.3 SDG&E and BAE Systems Leaseholds and Adjacent Parking

The SDG&E/BAE Systems parking areas would provide approximately 6.5 acres of potentially usable area for dewatering activities. These 6.5 acres are divided between 10 areas ranging from 0.4 acres to 1 acre in size. Five areas totaling approximately 3.5 acres are located adjacent to the BAE Systems Leasehold, while the remaining 3 acres of potentially usable dewatering area are located at five parking areas located along East Belt Street, up to 0.4 miles from the BAE Systems pier (Figure 5). The dewatering areas are located approximately 0.5 miles from the nearest southbound access to I-5. K-12 schools are located within 0.25 miles of the SDG&E and BAE Systems Leaseholds and Adjacent Parking site. However, Mercado Head Start and several family child care businesses are located within 0.25 miles from this potential dewatering site. Extended haul routes from barge offloading to dewatering and handling of potentially hazardous materials within 0.25 miles of sensitive receptors may increase risk related to hazards and hazardous conditions. Mitigation measures for these issues are discussed in Section 4.

3.4.4 NASSCO Parking and Parking Area North of Harbor Drive

The NASSCO Parking and Parking Area North of Harbor Drive would provide approximately 3.9 acres of potentially usable area for dewatering activities. These 3.9 acres are divided between four areas ranging from 0.4 acres to 1.4 acres in size. The areas are not located adjacent to a barge off-loading area and would require trucking to the dewatering sites (Figure 6). The dewatering areas are located approximately 0.3 miles from the nearest southbound access to I-5. No K-12 schools are located within 0.25 miles of the NASSCO Parking or Parking Areas North of Harbor Drive. However, several family child care businesses are located within 0.25 miles from this potential dewatering site. Extended haul routes from barge offloading to dewatering areas may increase risk related to hazards and hazardous conditions; mitigation measures for these issues are discussed in Section 4.

3.4.5 24th Street Marine Terminal

Although the 24th Street Marine Terminal is located approximately 3 miles south of the project site, barges could be offloaded directly at the terminal. The 24th Street terminal would provide approximately 145 acres of potentially usable area for dewatering activities. These 145 acres are divided between 6 areas ranging from 3.7 to 74 acres in size. Approximately 74 acres are located directly adjacent to barge unloading areas; the remaining dewatering areas are within approximately 0.5 miles of the barge unloading zone (Figure 7). The dewatering areas are located approximately 0.4 miles from the nearest southbound access to I-5. No K-12 schools or other sensitive receptors have been identified within 0.25 miles of the 24th Street Marine Terminal site.

3.5 Project Site Constraints

The most significant project constraint will be the coordination of contaminated sediment removal and dewatering activities with the normal ship movement within the project area.

Close coordination between project personnel and contractors with the shipyards, as well as continuance of normal marine traffic, is crucial not only to the overall efficiency of the project, but from a safety standpoint as well. Standard Operating Procedures (SOPs) are presented in Section 4 as mitigation measures which will be required to limit or reduce potential impacts and risks from implementation of the proposed project to less than significant levels. The SOPs are also necessary to conform with federal, state, and Port maritime regulations for safe project execution.

4. PROJECT IMPACTS AND MITIGATION MEASURES

This section outlines potential impacts related to the implementation of this project as understood based on information provided by the San Diego Water Board. Although there is not yet a final project design, the project characteristics as presented in the project description (Appendix A) provide a sufficient basis to evaluate the potential for typical impacts of the proposed dredging and dewatering activities.

There are two scheduling options for completion of the remedial action. The first scheduling option would occur for 7 months of the year and is expected to take 2 to 2.5 years to complete. The second scheduling option is continuous dredging operations expected to take approximately 12.5 months. Regardless of the selected scheduling option, sediment removal efforts will be followed by a period of post-remedial monitoring activities, as required in the Tentative CAO. All environmental dredging operations have the potential to result in impacts related to the handling of potentially hazardous materials. These potential impacts are evaluated in the following sections with associated mitigation measures.

4.1 Dredging Operations

While there is not a final dredging design for the project, the proposed sediment removal operations will most likely involve the use of a barge-mounted crane equipped with an environmental bucket such as the Cable Arm Environmental Clamshell®. Typically, the barge and the tip of the crane boom are equipped with Differential Geo-Positioning equipment that will allow the location and recording of each “clam bite” into the sediment. The actual equipment to be used (i.e., size of the crane and buckets) will depend on the final design.

Dredging operations will be configured to limit the turbidity caused by the actual sediment removal. Several configurations have been utilized throughout the U.S. that allow for the dredge to remove the sediment within a containment cell while the sediment is deposited into the material barge without significant water quality impacts. Double silt curtains will be utilized for containment of the dredge area; configurations and technologies will be finalized during the design phase of the project. Figures 8 and 9 illustrate the two common configurations of dredge operations and silt curtains to minimize turbidity. Configurations shown in the figures are for illustrative purposes only.

Once the clamshell bites into the sediment, it is lifted to the surface and the sediment is deposited into a material barge. This operation continues until the barge is full, and at that time it is transported to an unloading area. Following removal in an unloading area, the barges (dredge and material) are re-positioned via a work tug to the next area to be dredged. This process is repeated until the entire project area is dredged.

A silt curtain containment within a floating "dredge cell" that is lined with a silt curtain on the inside of the cell is shown in Figure 8. A modification of this type of configuration would be to install the silt curtain around the outside of the dredge cell. This type of containment was implemented during the BAE Systems Dry Dock Sump Maintenance Dredging Project executed in late 2010/early 2011 (BAE Systems, 2010). The main advantage of this containment configuration is that the dredge and the material barges are free to move around the project site without the restrictions associated with moving into and out of a total containment system. As dredging progresses, the dredge cell and the barges move about the area, as necessary.

A containment configuration that covers a large area within a double silt curtain is shown in Figure 9. This combination of silt curtain containment systems includes an outer curtain defining the dredging area and an inner curtain around the dredge to be used, to further minimize turbidity. This deployment was also used by BAE Systems during the Dry Dock Sump Maintenance Dredging Project executed in late 2010/early 2011. This configuration requires the material barge to egress and ingress the area via one or more silt curtain gates, if the unloading area is not within the containment area. The configuration also allows for the dredge barge to move throughout the area via tug positioning. The disadvantage to this configuration is that the silt curtain gate must be opened and closed by project personnel, which poses safety concerns, and also increases the potential for suspended contaminant dispersal outside the silt curtain.

The floating silt curtain will be comprised of connected lengths of geotextile fabric. It is intended to supplement the operational controls described above by helping to control and contain migration of (contaminated) suspended sediments at the water surface and at depth. This in turn will help protect surrounding submerged areas from accumulation of resuspended solids originating from the dredging work.

A continuous length of floating silt curtain will be arranged to fully enclose the dredging equipment and the scow barge being loaded with sediment. The silt curtain will be supported by a floating boom in open water areas (such as along the bayward side of the dredging areas). Along pier edges, the contractor will have the option of connecting the silt curtain directly to the structure. In either case, the contractor would be required to continuously monitor the silt curtain for damage, dislocation, or gaps and immediately fix any locations where it is no longer continuous or where it has loosened from its supports.

The bottom of the silt curtain shall be weighted with ballast weights or rods affixed to the base of the fabric. These weights are intended to resist the natural buoyancy of the geotextile fabric and lessen its tendency to move in response to currents. Extending the silt curtain further or all the way to the bay floor would be problematic and potentially counter-productive. This is because at lower tides the geotextile fabric would be in contact with sediments at the mudline, potentially folding up on the seabed; and when subsequently moved by current flow or lifted by rising tide it would cause increased sediment disturbance, generating an additional source of sediment resuspension and turbidity. Therefore, the floating silt curtain around the dredging unit will be deployed in a manner that includes a gap above the seafloor to allow for the tidal ranges and fluctuations, and to sufficiently allow for dredge operation. The outer silt curtain surrounding the remediation site shall be deployed in a manner dependent on site-specific conditions including, but not limited to, depth, current velocities, existing infrastructure for curtain deployment, and proximity of sensitive habitat (i.e., essential fish habitat).[1]

Where feasible and applicable, curtains will be anchored and deployed from the surface of the water to just above the substrate. If necessary, silt curtains with tidal flaps will be installed to facilitate curtain deployment in areas of higher flow. Additional curtains may be required by resource agencies to isolate environmentally sensitive areas like essential fish habitat and eelgrass.

Air curtains may be used in conjunction with silt curtains to contain resuspended sediment, to enhance worker safety, and allow barges to transit into and out of the work area without the need to open and close silt curtain gates. Air curtains are formed by laying a perforated pipe along the mudline and pumping air continuously through the piping. The upwelling of the tiny bubbles to the surface of the water has the effect of preventing fine-grained sediments from passing across the line of the pipe.

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[1] United States Army Corps of Engineers: Engineer Research and Development Center. 2008. Technical Guidelines for Environmental Dredging of Contaminated Sediments. ERDC/EL TR-08-29.

Potential operational impacts that may occur during sediment dredging, barge loading, and transiting to the unloading facility are discussed in the following sections. Common mitigation measures are also suggested.

4.1.1 Accidental Oil or Fuel Spills

Accidental oil or fuel spills that could potentially occur during the proposed dredging operations could impair and/or degrade water quality in the bay, depending on the severity of the spill. The potential for the occurrence of petroleum-product leaks or spills is low, but the potential for, long-term impacts moderate to high if a leak or spill occurs.

Mitigation: As an operational control element, all oil and fuel shall be housed in a secondary containment structure to ensure if spilled or leaked it will be prevented from entering the water column. The inclusion and implementation of a Dredging Management Plan (DMP) containing Standard Operating Procedures (SOPs) for the project will assist the dredge contractor in preventing accidental spills and providing the necessary guidelines to follow in case of an oil or fuel spill. Together, these will reduce the potential for a significant long-term impact to less than significant. The DMP will include the following measures to prevent accidental oil/fuel spills during construction activities:

- Personnel involved with dredging and handling the dredged material will be given training on the potential hazards resulting from accidental oil and/or fuel spills. This operational control will provide the personnel with an awareness of the materials they are handling as well as the potential impact to the environment. This increased awareness will assist in minimizing impacts to the water column as a result of spills.

- All equipment will be inspected by dredge contractor personnel before starting the shift. These inspections are intended to identify typical wear or faulty parts that may contain oil or fuel. This operational control will minimize the potential of impacts during the operations by identifying potential impacts due to wear of important sub-systems.

- Personnel will be required to visually monitor for oil or fuel spills during construction activities. This operational control will minimize impacts associated with leaks or spills and will provide additional mitigation over the automatic systems identified above.

- In the event that a sheen or spill is observed, the equipment will be immediately shut down and the source of the spill identified and contained. Additionally, the spill will be reported to the applicable agencies presented in the DMP. This operational control will minimize impacts to the water quality both in volume and duration as the operations will be immediately shut down and the source of the impact will be identified and remedied.

- The shipyards currently have oil/fuel spill kits located at various locations onsite for routine ship repair operations. All personnel associated with dredging activities will be trained on where these spill kits are located, how to deploy the oil sorbent pads, and proper disposal guidelines. As an additional mitigation step, the dredging barge shall have a full complement of oil/fuel spill kits on board to allow for quick and timely implementation of spill containment.

- The use of oil booms will be deployed surrounding the dredging activities. In the event that a spill occurs, the oil and/or fuel will be contained within the oil boom boundary. This operational control will be the last line of defense against accidental oil/fuel spill occurrences. The oil boom shall be deployed along the entire length of the outer silt curtain.

In addition to providing SOPs to prevent accidental oil/fuel spills during construction activities, the DMP addresses several potential issues related to dredging and presents potential solutions. This includes the identification of dredging needs; a methodology and process for determining dredging priorities and scheduling; the feasibility and requirements for expedited permitting; Quality Assurance Protection Plan (QAPP) to comply with regulatory requirements; alternatives for control and operation of dredging equipment, and BMPs to implement in the event of equipment failure and/or repair.

Typical BMPs for equipment failure or repair include: communication to project personnel, proper signage and/or barriers alerting others of potentially unsafe conditions, all repair work shall be conducted on land and not over water, repair work involving use of liquids shall be performed with proper spill containment equipment (e.g., spill kit), and a contingency plan identifying availability of other equipment or subcontracting options. The use of operational controls will serve to mitigate this potential impact to water quality to less than significant. A regulatory oversight contractor may be used by the San Diego Water Board. The regulatory oversight contractor should be responsible for adherence to this operational control and such adherence should be verified by the San Diego Water Board.

4.1.2 Resuspension due to Operator Over Filling Bucket

Over filling of the dredge bucket during the sediment removal operations is an impact which results in increased turbidity due to resuspension. Increased turbidity (suspended and settleable solids) is deleterious to benthic organisms and may cause the formation of anaerobic conditions, which can clog fish gills and interfere with respiration in aquatic fauna. It also can screen out light, hindering photosynthesis and normal aquatic plant growth and development (San Diego Water Board, 1994). Resuspended sediment from environmental dredging operations can settle onto areas already dredged and reduce the ability of the dredging program to reach target cleanup goals due to increased residual COC concentrations in the dredge area.

Mitigation: Equipment specifications will require that the dredging equipment contain instrumentation that includes bucket transducers, design cut information, and in-cab displays to provide the operator with real time "dredge cut" data. Pre-shift inspection of this instrumentation by the operator to document that it is functioning correctly will also reduce the potential for sediment suspension due to equipment failure. Using this combination of technologies, the operator shall be trained to know how deep the bucket is set in the sediment column prior to initiating its closure.

The development of a detailed sequence of actions that the operator will follow during the dredging cycle will also mitigate potential overfilling of the dredge bucket. The dredging performance will be monitored daily by the oversight team to provide additional control over best dredging practices and techniques. These mitigation measures will significantly reduce the potential for impacts related to bucket overfilling.

4.1.3 Debris Preventing the Dredge Bucket from Fully Closing

If large debris is present in the dredge area, it may lodge in the dredge bucket, preventing full closure and allowing sediment to escape from the bucket, causing resuspension of sediment, with the potential impacts described above.

Mitigation: A debris sweep of the project area prior to dredging can significantly reduce dredge bucket seal problems due to debris obstructions. During dredging, the dredge buckets can be equipped with 4 indicator switches at the four corners (i.e., left, right, top, bottom) of the clamshell seal. The switches are positioned in these locations to inform the operator if and where the bucket is failing to close. The indicator switch data will be relayed to instruments inside the cab to allow the operators to know how to reposition the bucket to avoid the obstruction which is preventing closure. These instrumental additions to dredge buckets and in-cab monitors were first used on the

St. Lawrence River Remediation Project in 2001 and have been subsequently used on several other dredging projects. The use of bucket indicator switches significantly reduces the potential for impacts from bucket non-closure. Pre-shift inspection of this instrumentation by the operator to document that it is functioning correctly will also reduce the potential for sediment suspension due to equipment failure.

4.1.4 Resuspension of Sediment During Barge Positioning due to Vessel Propeller Wash

Resuspension of sediment particles within the water column is due to vessel propeller wash, which is a common issue during operations in shallow waters. Resuspension of sediment particles within the dredge area will lead to increased turbidity and reduced effectiveness of dredging operations due to increased residual COC concentrations in the dredge area as described above. Resuspension of sediment due to propeller wash outside of the dredge area (related to barge traffic to and from the dewatering area) will also potentially result in increased turbidity in the Bay with resulting impacts to aquatic organisms and vegetation.

Mitigation: This potential impact is mitigated through identification of potential problem areas by comparing approximate filled barge draft versus bathymetry along the haul route. These areas will be mapped and provided to the dredge operators and oversight team. Furthermore, mandating load controlled barge movement, line attachment and horsepower requirements of tugs and support boats in the dredge area will reduce resuspension of sediment due to propeller wash.

4.1.5 Resuspension of Sediment During Silt Curtain Placement

Resuspended sediment may be introduced into the water column as a result of either silt curtain placement or re-deployment due to improper design or improper operator care during movement. Extending the silt curtain to the Bay floor can be problematic because at lower tides the geotextile fabric would be in contact with sediments at the mudline, potentially folding up on the seabed. When subsequently moved by current flow or lifted by the rising tide, it would cause increased sediment disturbance, becoming an additional source of sediment resuspension and turbidity. Therefore, the floating silt curtain should be deployed in a manner that includes a gap above the seafloor to allow for the tidal ranges and fluctuations. Resuspension of sediment during silt curtain placement would also result in increased turbidity with the potential effects described above.

Mitigation: Mitigation measures to minimize resuspension during silt curtain placement include using silt curtains designed such that the curtain is reefable and can be extended during high tide and retracted during low tide based on the expected tidal variation during the project implementation. Regular reefing events will be scheduled to ensure that the silt curtain is the appropriate length for the tidal conditions to prevent excess curtain from scouring the bottom due to wind or wave energy.

Personnel responsible for deployment of the silt curtains will be trained in proper deployment techniques. Supervisors will monitor turbidity during silt curtain maintenance operations and adjust best practices as required to reduce the potential for sediment suspension. Through implementation of these design, training, and best practices, sediment resuspension related to silt curtain placement can be significantly mitigated.

4.1.6 Resuspension of Sediment due to Damage of Silt Curtain During Dredging

Damage to the silt curtain during the dredging operations typically occurs when the dredge bucket comes in contact with the curtain, the curtain becomes entangled with the propellers of the tug moving either the dredge or material barges, or passing ships are too close to the operations, drawing the curtain into their propellers. Not only does this cause an instantaneous release of suspended sediments from the dredging containment area, but also causes project delays until the silt curtain can be repaired or replaced. The failure or damage of a silt curtain during dredge operations may lead to impacted sediment settling outside of the treatment area, resulting in a larger area impacted by site-related COCs.

Mitigation: Mitigation of this type of impact requires that the silt curtain be appropriately located during deployment, conforming to the final design locations. Proper lighting will be required in accordance with local, state and federal regulations including a notice to mariners. Daily pre-planning of barge movement and coordination with project, Shipyard Sediment Site and Port District personnel regarding the pre-movement and movement notifications will add an additional layer of impact mitigation.

A contingency plan will be developed prior to project initiation which identifies the notifications and actions to be taken in the event of an accidental breach of containment for immediate turbidity control. At a minimum, this plan will include provisions for emergency silt-curtain deployment, suspension of dredging in the vicinity of the damaged silt curtain until the area can be re-secured, and an incident reporting and review procedure to evaluate the causes of the accidental breach and propose steps to avoid further breaches. These practices will significantly reduce the potential for sediment impacts related to accidental silt-curtain breach.

4.1.7 Spillage of Sediment into the Water Column due to Overloading of the Dredged Material Barge(s)

This type of impact usually occurs when operators attempt to maximize the load within the material barges. Overloaded barges can result in the sloughing of dredged sediment from the barge during transport to the offloading area. Sediment sloughing off a loaded barge may lead to either resuspension of sediment within the treatment area, as described above, or dispersal of contaminated sediment outside the treatment footprint, if the incident occurs outside of the dredge area during transport to the dewatering area.

Mitigation: The impact is mitigated through the development of load limits for each material barge with respect to the bathymetry along the transit route. Additionally, marking the material barges by painting the appropriate draft level helps the operator visualize when the barge is reaching the target load. A contingency plan will also be developed which outlines the actions and notifications necessary if barge overfilling occurs. At a minimum, this plan will include a review of defined load limits and loading procedures and practices to mitigate further overfilling incidents. These practices will significantly reduce the potential for sediment impacts related to barge overfilling.

4.1.8 Contact with Sediment on or Around the Barge During Loading

Contact with sediment by workers during loading will occur regardless of the standard of care taken during the loading process. Contact with impacted sediment by personnel may lead to acute and/or chronic health effects depending on the contaminant type, concentration, and exposure route.

Mitigation: Mitigation of this type of impact is achieved through appropriate operator controls to minimize spillage of dredged material onto the sides, stern or bow of the material barges during the loading operations. Personnel working on or around barges (dredging and material) will be equipped with appropriate Personal Protective Equipment (PPE), will follow standard health and safety plan guidelines as developed for the project site, and will be certified under OSHA 1910.120 and trained in decontamination and waste containment procedures. These measures will significantly reduce potential impacts to barge workers from contact with impacted sediments.

4.1.9 Cable Snap Allowing Loaded Bucket to Enter Water Column

Poor dredging equipment maintenance could potentially lead to a snapped cable on the clamshell bucket, allowing a loaded bucket to enter the water column. This may lead to impacts related to both resuspension of sediment from the loaded bucket, as well as acute physical hazards for workers in the vicinity of the bucket.

Mitigation: Although this type of impact is rare, the crane operator and/or the oiler should check the condition of every aspect of the crane including the integrity of the cable during a “pre-shift” inspection. This inspection should cover the bucket(s) as well as the crane to insure proper operations. Such inspections significantly reduce the potential for unforeseen impacts related to sudden equipment failure.

4.1.10 Shear Pin Breakage Allowing Bucket to Open Prematurely

Poor dredging equipment maintenance could potentially lead to the breakage of a shear pin on the clamshell bucket, allowing a loaded bucket to open before proper positioning over the barge, allowing dredged material to enter the water column. This will lead to both impacts related to resuspension of sediment from the loaded bucket, as well as acute physical hazards for workers in the vicinity of the bucket.

Mitigation: This type of impact is also rare. However, as mentioned above, the “pre-shift” inspection should also include the dredge bucket to ensure proper operations. Such inspections significantly reduce the potential for unforeseen impacts related to sudden equipment failure.

4.1.11 Barge or Tug Collision with Merchant or Military Vessel

The movement of barges and tugs to and from the project site contains inherent risks associated with maritime operations. In addition to the acute physical hazards related to a vessel collision, there is the potential for a release of sediments stored on the barge.

Mitigation: The project will identify and establish lines of communication with the San Diego Port or Harbor Master. Project personnel requiring notification of barge movement will be identified prior to project execution. Most dredging companies operating in this environment are very aware of the lines of communication for barge or vessel movement; however, specific project requirements such as speed, wake/no wake, and notification to project personnel using air horns will be incorporated into the standard procedures for this activity to mitigate the potential for accidental vessel collision.

4.2 Sediment Unloading and Transport Operations

At the sediment unloading area, the material barge is moored and the unloading operations begin. This sediment unloading operation is normally accomplished using one or more track-mounted excavators (track-mounted lattice boom cranes have also been employed). The types of buckets used for the sediment unloading operations range from standard open excavator buckets to hydraulically closed buckets, and in the case of a boom crane, a clamshell bucket.

During unloading operations, the excavator or crane will grab a volume of dredged material and swing from the barge to the trucks. Once the trucks are loaded, they move the dredged material to either a staging area to be stockpiled or a treatment area to be mixed with pozzolonic agents, which facilitate drying.

Depending on Shipyard Sediment Site conditions, off-road or on-road hauling vehicles are used to transport the material from the unloading area to the treatment or stockpile area. The transportation routes, speeds and rights-of-way are developed prior to project implementation to minimize potential safety or hazard impacts.

Potential operational impacts and common mitigation measures which may be employed during sediment unloading and transport operations are discussed in the following sections

4.2.1 Sediment Unloading

Overfilling of the unloading bucket is a common issue during the sediment unloading process, and potential impacts can occur in the water column and on the hardscape adjacent to the barge. It is important to note that the space between the material barge and the dock/unloading surface where the excavator or crane is located can be rather wide, more than 4 feet. There is the potential for sediment to fall into this gap during offloading, re-entering the water column leading to sediment suspension and potential contamination of the Bay floor adjacent to the offloading area. Sediment can also fall onto hardscape of the unloading area or onto the sides of the vehicle being loaded. This material, if not contained, could be a source of landside impacts, or could eventually be washed back into the Bay.

Mitigation: Mitigation of water column impacts can be accomplished by controlling the swing radius of the unloading equipment. A spillage plate can be used to prevent the offloaded sediments from falling into the water beneath the swing radius of the unloading equipment at the offload location, to limit spillage from directly falling into the water (Figure 10).

Mitigation of hardscape spillage will be accomplished by sloping the hardscape near the spill plate into a collection sump to allow water and fluidized mud that may fall to be collected. The sump will require periodic pumping as it is filled during operations (Figure 11). The material removed from the sump will be placed into the dewatering piles and disposed off-site with the dredged sediment.

The addition of a power wash unit is recommended for mitigation of impacts related to spillage from the excavator arm onto transport vehicles. In the event that sediment is splashed onto the transport vehicle, it can be quickly washed into the collection sump. These measures are capable of significantly reducing potential impacts during the sediment unloading process.

4.2.2 Overfilling Transport Vehicle

Overfilling of a transport vehicle can cause sediment to overflow from the vehicle during transport to the sediment staging and dewatering areas. This has the potential to spread sediment related impacts along the designated sediment haul route.

Mitigation: Mitigation of this type of impact is accomplished through restricting the number of buckets allowed to be placed in each vehicle. The amount of material which can safely be placed in each vehicle will be a function of the sediment's physical consistency, as high water content sediments will have more of a tendency to spill during transport, and the transport vehicle's size and dimensions. By placing a set volume of sediment into each vehicle, the potential for accidental spillage of sediment is greatly reduced.

4.2.3 Sediment Spilling out of Transport Vehicle During Transport to the Treatment Area due to Operator Error

Excess vehicle speed, rapid deceleration or acceleration, or tight cornering during transport to the treatment area may result in spillage of sediment during transport, particularly with high water content sediments or with an overfull vehicle as described in Section 4.2.2. This also has the potential to spread impacted sediment along the haul route.

Mitigation: Mitigation of impacts related to sediment spillage from transport vehicles will be managed by restricting speed limits of loaded vehicles to 15 miles per hour (mph) for on-site operations and 25 mph on surface streets. Drivers will be trained to allow for proper stopping distances and cornering speed. These measures will significantly reduce potential impacts related to transportation.

4.3 Sediment Drying/Dewatering Operations

Drying/dewatering of sediments (e.g., with drying agents) may occur to meet transport and disposal requirements. The dewatering areas are typically set up to allow vehicles to enter, drop their load, and exit. The dewatering and sediment mixing areas normally consist of asphalt pads with or without under-liners, which are sloped to a collection area for stormwater and vehicular decant water. Typically, these areas are divided into discrete locations that can accommodate a full day of dredge production.

Given the limited usable areas within the San Diego Bay, selection of the solidification/dewatering area(s) will be a critical project component. As identified in Volume III of the Draft Technical Report for Tentative CAO No. R9-2011-0001 (San Diego Water Board, 2010), "Most uplands landfills require leaching tests for specific chemicals prior to final disposal and these can be performed on the stockpiled sediments after de-watering has occurred." Therefore, the solidified sediment requires time to cure and to be staged pending analytical results in order to make appropriate disposal decisions/certifications. A single day's production may require a 5-day holding time prior to load out, transport and disposal. Table 1 presents this concept over a period of 5 days using a 3-day turn-around for analytical results, after which the cycle begins anew. This example does not consider unanticipated delays related to transport or in landfill operations.

Sediment drying usually involves the introduction of pozzolonic agents such as Portland cement, the amount of which is determined during the final engineering design treatability testing. This approach was used during BAE Systems Dry Dock Sump Maintenance Dredging Project executed in late 2010/early 2011 (BAE Systems, 2010). Regardless of volume required, the pozzolonic agents can be introduced into the sediment stockpile in three general ways:

- Simultaneous addition of sediment and pozzolonics into a pug mill which mixes the two together;

- Surface casting of the pozzolonics onto the sediment stockpile and mixing with a track-mounted excavator; or

- Injection during mixing of the stockpile via a track-mounted excavator.

The stockpile is sampled for landfill profiling, based on the disposal facility's requirements, and usually allowed to cure for several days while daily work on the stockpile continues. Once the stockpile has met the analytical and strength requirements, the material is certified for disposal, manifested, loaded into on-road trucks (typically using a large-wheeled front-end loader), weighed to document compliance with DOT regulations, transported, and deposited at the selected disposal facility.

In San Diego, treatment and discharge of water to the sanitary sewer system is commonly restricted for the 24 hours immediately following a storm event due to sanitary sewer capacity issues. This limits the potential for immediate treatment and discharge of accumulated storm water. A Dredging Management Plan (DMP) will be prepared for the project prior to any dredging operations and will specify that water discharges (decant water from sediment and stormwater) to San Diego Bay are prohibited. Therefore, the containment cell will be designed to meet a performance standard of "no discharge" so that stormwater run off cannot enter the Bay or adjacent areas. The cell will also be designed to ensure that run on from adjacent areas to the cell cannot enter the dewatering area. The water will be tested to evaluate whether it meets discharge criteria for the San Diego Publically Owned Treatment Works (POTW) or if treatment is required. The approach listed above is the method used during BAE

Systems' Dry Dock Sump Maintenance Dredging Project executed in late 2010/early 2011.

Alternatively, where a smaller sump area is required due to specific dewatering area size constraints, additional stormwater containment capacity may be added by capturing stormwater in tanks staged at the dewatering area, filled using automated pumping systems.

Table 1 – Typical Holding Times

Dredge Day	Day Stockpile was Created	Activity on Stockpile
Day 1	1	Dewatering & Sampling
Day 2	1	Curing. Analytical results pending
	2	Dewatering & Sampling
Day 3	1	Curing. Analytical results pending
	2	Curing. Analytical results pending
	3	Dewatering & Sampling
Day 4	1	Sample Results Received & Load Out Scheduled
	2	Curing. Analytical results pending
	3	Curing. Analytical results pending
	4	Dewatering & Sampling
Day 5	1	Loading Out
	2	Sample Results Received & Load Out Scheduled
	3	Curing. Analytical results pending
	4	Curing. Analytical results pending
	5	Dewatering & Sampling

Potential operational impacts and common mitigation measures which may be employed during sediment unloading operations are discussed in the following sections.

4.3.1 Airborne Release of Drying Agent

If pozzolonic agents are used, there is the potential for airborne dispersal of the agent if it is applied as a dry powder. The fine dust can be a respiratory irritant to workers and nearby receptors.

Mitigation: The potential for airborne releases of drying agents will be mitigated through the application of wet pozzolonic agents using a standard track-mounted excavator which will be outfitted with a blending head. A hose from the concrete pump located adjacent to the excavator will be run along the excavator arms and connected to the blending head. Reagent will be delivered to the Shipyard Sediment Site by concrete transport trucks. The trucks will empty the reagent into the concrete pump and the reagent will be pumped to the blending head. The excavator operator will suspend the blending head in the sediment and rotate the blending head blades to mix the reagent into the sediment. This method of blending is similar to that used during BAE Systems' Dry Dock Sump Maintenance Dredging Project executed in late 2010/early 2011 (BAE Systems, 2010). By using a wet slurry, airborne release of pozzolonic agents can be prevented.

4.3.2 Airborne Release of Sediment Contaminants Through Volatilization or Particulate Transport

Sediment-related contaminants could be transported through volatilization to the atmosphere or wind-blown particulate transport of dry sediment. The airborne distribution of sediment-related contaminants could result in COC-related health impacts to receptors in the vicinity of the dewatering areas.

Mitigation: A sediment management plan including dust control as well as fenceline and work-area monitoring will be employed to mitigate potential airborne migration of potentially impacted sediment as particulates. These monitoring stations could be used to evaluate whether mitigation measures are adequately protective of sensitive receptors, such as schools, in the vicinity of several of the proposed dewatering sites. The COCs addressed through this project (metals, heavy-range polynuclear aromatic hydrocarbons (HPAHs), and tributyltin) are not particularly volatile. Consequently, the use of foam is not likely to be necessary to control volatilization.

4.3.3 Breach in Dewatering Pad Containment by Excavator

A breach in the dewatering pad could potentially occur if an excavator penetrates through the bottom of the pad while attempting to load sediment for transport. A breach in the dewatering pad could result in impacts from the impacted sediment to the soil or groundwater in the vicinity of the breach.

Mitigation: Accidental breach of the dewatering pad will be mitigated by either placing a savaging layer of sand beneath the sediment to provide a visual indicator to the excavator operator that he/she is getting close to the containment liner, or the use of closely-spaced railroad rails/k-rails to shield the containment liner. The latter method was implemented during BAE Systems' Dry Dock Sump Maintenance Dredging Project executed in late 2010/early 2011 and successfully prevented accidental breaches of the dewatering pad containment.

4.3.4 Decant and Stormwater Containment Failure

During dewatering operations, the decanted water from the sediment stockpiles will be collected in a containment area. In the event of a storm event, stormwater collected within the drying area will also be contained. There is the potential for the decant/stormwater containment area to fail, resulting in release of untreated water from the treatment area. A release of stormwater or decant water from the containment area could result in impacts to soil or groundwater in the vicinity of the release and potentially flow back into the Bay causing turbid conditions. Additionally, if the decant water flowing back into the water column contains COCs, degradation of water quality can occur and increased toxicity to aquatic organisms is accentuated.

Mitigation: The typical mitigation for this potential impact is to design and construct a decant/stormwater containment area. The containment area typically consists of a small, depressed area within the drying/dewatering area, with containment berms around the area to mitigate potential stormwater runoff/run-on to the project site. A Dredging Management Plan (DMP) will be prepared for the project prior to any dredging operations and will specify that water discharges to San Diego Bay are prohibited. Therefore, the containment cell will be designed to meet a performance standard of "no discharge" so that stormwater run off cannot enter the Bay or adjacent areas. The cell will also be designed to ensure that run on from adjacent areas to the cell cannot enter the dewatering area. The decant and/or stormwater is collected in the sump in the operation area and pumped to the tanks, sampled, and disposed of into the sanitary sewer, following the discharge requirements for the POTW.

An alternative mitigation measure could be the use of aboveground tanks that have sufficient design capacity. The decant and/or stormwater would be collected in a sump in the operation area and pumped to the tanks, sampled, and disposed of either within the sanitary sewer or off site.

4.4 Load out, Transport & Disposal Operations

Prior to load out and transport, other activities that will be performed in the sediment drying/dewatering containment area are sampling and chemical analysis of the dewatered sediment, evaluation of the appropriate disposal options, and weigh-out in accordance with Cal DOT regulations. These activities are not considered to pose an impact to the environment and will not be discussed further in this Technical Report.

Load out operations will take place within the sediment drying/dewatering containment area, which will be contained in a structure to be determined during the final engineering design. Load out operations are typically performed using wheeled front-end loaders which load sediment into trucks located inside of the contained area. Following loading, the trucks are typically power-washed to prevent cross-contamination onto the public roadways.

Potential impacts associated with the sediment unloading operations are discussed in the following sections.

4.4.1 Worker Contact with Treated Sediment

Similar to contact with sediment in and around the barge during loading, worker contact with treated (solidified) sediment is unavoidable. Contact with impacted sediment by personnel may lead to acute and/or chronic health effects depending on the contaminant type, concentration, and exposure route.

Mitigation: Personnel working with the treated sediment will be equipped with appropriate PPE, and will be certified under OSHA 1910.120 and trained in decontamination, use of PPE and respirators, and waste containment procedures. The site-specific health and safety plan will also identify specific task hazard analyses to mitigate potential impacts to workers from contact with impacted sediment.

4.4.2 Overfilling Transport Vehicles, Increasing Potential to Spill onto the Roadway

Although the sediment at load-out will be solidified, overfill of transport vehicles can still lead to potential incidental spills of sediment onto the roadway. This has the potential to spread sediment-related impacts along the transport route.

Mitigation: Truck volumes will be limited to the rated load of the vehicle, and trucks will be covered and secured per Cal-DOT regulations during transport to the disposal facility. These regulations mitigate significant spillage from trucks during transport of sediment.

4.4.3 Operator Error Spilling Sediment During Loading

During loading of vehicles for off-site disposal, some sediment may fall from the loading bucket into the exterior of the vehicle or onto the hardscape of the loading area. This has the potential to impact soil, groundwater, or stormwater in the vicinity of the loading area, if not contained.

Mitigation: Trucks could be loaded within a constructed loading zone to confine sediment spilled during the loading process. In the process of exiting the dewatering/sediment drying area, the vehicles may be power washed to prevent cross-contamination onto the roadways. These processes will mitigate potential sediment migration from the loading area from spillage during loading.

4.4.4 Transport and Disposal of Hazardous Materials

The current project description anticipates that up to 15 percent (21,500 cubic yards) of the excavated sediment may be classified as California hazardous material and would be required to be transported to Kettleman Hills Landfill, located approximately 300 miles north of the site. There is the potential for spills or accident conditions to occur during transportation, resulting in the release of sediment-related impacts to soil or groundwater in the vicinity of the accident. Depending on the concentration of COCs within the sediment, there may also be the potential for health effects to receptors in the vicinity of the accident.

Small quantities of hazardous materials such as fuels and oils will be routinely transported to the Shipyard Sediment Site for ongoing operations and maintenance of equipment for the duration of the project.

Mitigation: The potentially hazardous dewatered dredged soils from San Diego Bay may be transported by truck to approved disposal facilities in California. A Hazardous Material Transportation Plan will be prepared in accordance with local, state, and federal transportation laws, and will include procedures such as hazardous waste profiling, packaging, manifesting, EPA ID numbers (generator, transporter, and disposal facility), and proper placarding and labeling. A Traffic Control Plan will be in effect for the transport and disposal of the dredged sediment. This Plan will provide for emergency vehicle access and right-of-way during project execution and mitigate potential impacts due to accidental spillage or traffic congestion.

4.5 Summary of Impacts

Potential impacts were identified related to the following aspects of the project:

a) Creation of a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

b) Creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

c) Hazardous emissions or the handling of hazardous or acutely hazardous materials, substances, or waste within 0.25 miles of an existing or proposed school.

While the final mitigation measures employed in the execution of the project may be modified based on the final project design details, the potential mitigation measures described in this Technical Report are capable of mitigating these potential impacts to less than significant levels. These measures or modified mitigation measures capable of providing equivalent or greater protection will be in place during implementation of the project.

5. CUMULATIVE IMPACTS

The evaluation of potential cumulative impacts of the implementation of this project with other projects in and around San Diego Bay requires the evaluation of the project with respect to other projects which are anticipated to be implemented simultaneously. Although there are no other contaminated sediment dredging projects currently scheduled for implementation in the Bay, the San Diego Water Board anticipates that regularly scheduled maintenance dredging projects may occur in the Bay over the next several years.

To estimate the likely volume of these potential dredging actions, the San Diego Water Board has provided maintenance and environmental dredging records for the 11-year period from 1994 to 2005. These records show an average of approximately 245,000 cubic yards of material dredged from the Bay each year with yearly totals ranging from zero to 763,000 cubic yards. While the dredge volume proposed for this project (143,000 cubic yards) represents a significant dredge volume, the overall impacts related to dredging projects in San Diego Bay is expected to be within these historical ranges.

Although no specific environmental dredging projects have been identified, the San Diego Water Board expects several dredging projects may be initiated within the next ten years. Based on the conservative assumption that two similar-sized dredging projects occur during the dredging operations at the project site, the potential cumulative impacts related to hazards and hazardous materials may be significant without the implementation of mitigation measures.

Mitigation: If dredging and dewatering areas are located adjacent to each other, the dredge schedule should be staggered to control the amount of material being handled, dewatered, and transported to reduce the potential for accidents or incidents related to high traffic or working in close proximity. If dredging and dewatering activities are ongoing in separate parts of the Bay with distinct haul routes, there is little potential for cumulative adverse impacts related to hazards and hazardous materials.

6. REFERENCES

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FIGURES

APPENDIX A

PROJECT DESCRIPTION

APPENDIX B

EDR REPORTS